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DRAFT REGULATORY GUIDE

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(Proposed New Regulatory Guide)

SHIPPING, RECEIVING, AND INTERNAL TRANSFER OF SPECIAL NUCLEAR MATERIAL AT FUEL CYCLE FACILITIES

A. INTRODUCTION

Purpose

This regulatory guide (RG) describes approaches and methods that the U.S. Nuclear Regulatory Commission (NRC) staff considers acceptable when developing material control and accounting (MC&A) system capabilities required by Title 10 of the *Code of Federal Regulations* (10 CFR), Part 74, "Material Control and Accounting of Special Nuclear Material" (Ref. 1), for monitoring facility shipments and receipts, as well as internal transfers of licensed materials, at fuel cycle facilities.

Applicability

This RG applies to fuel cycle facilities licensed under 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," and subject to 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material," Subparts C, D, or E. This RG does not apply to power reactors, research and test reactors, or independent spent fuel storage installations.

Applicable Regulations

- 10 CFR 74 Subpart C, "Special Nuclear Material of Low Strategic Significance" (Ref. 2), requires licensees of fuel fabrication facilities and uranium enrichment facilities to implement and maintain an NRC-approved MC&A program that achieves specific performance objectives delineated in subparagraphs 74.31(a) (applicable to fuel fabrication facilities) and 74.33(a) (applicable to uranium enrichment facilities). Subparagraphs 74.31(c) and 74.33(c), specifically, require that these licensees' MC&A systems provide system capabilities related to shipping, receiving, and internal transfers of special nuclear material (SNM) of low strategic significance,

to achieve the performance objectives. Note that the 74.33 requirements applicable to uranium enrichment facilities also cover source material (SM) and depleted uranium (DU).

- 10 CFR 74 Subpart D, "Special Nuclear Material of Moderate Strategic Significance" (Ref. 3), requires licensees authorized to hold this type of SNM to implement and maintain an NRC-approved MC&A program that achieves specific performance objectives delineated in subparagraph 74.41(a). Subparagraph 74.41(c), specifically, requires that a licensee's MC&A systems provide system capabilities related to shipping, receiving, and internal transfers of SNM of moderate strategic significance, to achieve the performance objectives.

- 10 CFR 74 Subpart E, "Formula Quantities of Strategic Special Nuclear Material" (Ref. 4), requires licensees authorized to hold this type of SNM to implement and maintain an NRC-approved MC&A program that achieves specific performance objectives delineated in subparagraph 74.51(a). Subparagraph 74.51(b), specifically, requires that a licensee's MC&A systems to provide system capabilities related to shipping, receiving, and internal transfers of formula quantities of strategic SNM to achieve the performance objectives.

- 10 CFR 73, "Physical Protection of Plants and Materials," (Ref. 5), Subsection 73.67, "Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance" requires the control of, and accounting for, SNM at fixed sites and for documenting the transfer of SNM.

- 10 CFR 74 Subpart B, "General Reporting and Recordkeeping Requirements" (Ref. 6), includes requirements for the fuel cycle facilities authorized to hold the above types of SNM, on (1) notifying the NRC of any SNM thefts or attempted thefts, or other instances in which SNM is lost, pursuant to 10 CFR 74.11; (2) the periodic transmittal of material balance reports to the Nuclear Materials Management and Safeguards System (NMMSS) data base, pursuant to 10 CFR 74.13; (3) the periodic transmittal of material transaction reports to NMMSS, pursuant to 10 CFR 74.15; and (4) submitting periodic physical inventory summary reports to the NRC pursuant to 10 CFR 74.17. These and related reporting topics are discussed in Section C below under "Reports."

Related Guidance

- NUREG-1280, "Standard Format and Content Acceptance Criteria for the Material Control and Accounting (MC&A) Reform Amendment" (Ref. 7), provides additional guidance for facilities with formula quantities of strategic special nuclear material (SSNM), including a section on shipments and receipts.

- NUREG-1065, "Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Facilities" (Ref. 8), provides additional guidance on shipments, receipts, and internal transfers for fuel fabrication facilities with SNM of low strategic significance.

- NUREG/CR-5734, "Recommendations to the NRC on Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Enrichment Facilities" (Ref. 9), provides additional guidance on shipments, receipts, and internal transfers for enrichment facilities with SNM of low strategic significance.

- NUREG/CR-4604, "Statistical Methods for Nuclear Material Management" 1988 (Ref. 10), provides additional information on shipping, receiving, and internal transfer of nuclear material.

Purpose of Regulatory Guides

The NRC issues RGs to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated events, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions that differ from those set forth in RGs will be deemed acceptable if they provide a basis for the findings required for the issuance or continuance of a permit or license by the Commission.

Paperwork Reduction Act

This RG contains and references information collections covered by 10 CFR Part 74 that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et. seq.). These information collections were approved by the Office of Management and Budget (OMB), control number 3150-0123.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

B. DISCUSSION

Reason for Issuance

This new RG was issued to provide implementing guidance for the requirements in NRC regulations in 10 CFR Part 74 related to the shipment, receipt, and transfer of SNM. These requirements were previously provided in RGs 5.28, 5.49, and 5.57, but these RGs were outdated by an amendment to 10 CFR part 74, and are being withdrawn. In addition, this new guide provides updated guidance for source material (SM) and depleted uranium (DU) at uranium enrichment facilities by incorporating relevant guidance from three NUREGs without making substantive changes to that guidance.

Background

This RG updates guidance provided by the U.S. Atomic Energy Commission (AEC) and the NRC for satisfying the MC&A regulations issued in 1973-1975 under 10 CFR 70.51-70.58. As discussed below, these regulations were later revised or deleted in consolidating MC&A requirements in 10 CFR Part 74. The associated RG 5.28, "Evaluation of Shipper–Receiver Differences in the Transfer of Special Nuclear Materials" (Ref. 11), RG 5.49, "Internal Transfers of Special Nuclear Material" (Ref. 12), and RG 5.57, "Shipping and Receiving Control of Strategic Special Nuclear Material" (Ref. 13), RG 5.49, and RG 5.57, thus became outdated. For example, RG 5.49 (1975) became overly prescriptive for the current performance-based MC&A regulations in 10 CFR Part 74. The current MC&A regulations reflect significant advances that have been made in using modern computer systems for controlling, tracking, and documenting the internal movements and locations of nuclear material. As a result, manually recorded documentation system capabilities (e.g., paper material transfer tickets or MTs) are typically augmented with secured mainframes and terminals for electronic transfer entries and digital signatures, including that for external transfers entering or shipped out of the shipping-receiving area.

Although the NRC until now had not updated RGs 5.28, 5.49, and 5.57, it had developed key implementing acceptance criteria as part of the rulemaking process from 1985 to 2002. Such guidelines instead were provided in NUREG-1280 for facilities with formula quantities of strategic special nuclear material, NUREG-1065 for low enriched fuel fabrication facilities, and in NUREG/CR-5734 for uranium enrichment plants. As a result, those NUREGs are typically referenced by NRC licensing standard review plans, including criteria closely applied by the NRC staff for reviewing the adequacy of implementing licensee Fundamental Nuclear Material Control (FNMC) plans. This, among other things, pertains to each plan's coverage of shipments and receipts, including NRC acceptance criteria (where license applications meeting these criteria should be acceptable to the NRC staff) and basic facility commitments on how they are to be achieved. Such NUREGs also include guidance on various MC&A aspects relevant to the monitoring of shipments and receipts and internal transfers, namely, management organization, measurements, measurement control, statistics, recordkeeping, and resolving indications of missing SNM. This new RG updates and consolidates guidance from RGs 5.28, 5.49, and 5.57, and incorporates relevant guidance from the three NUREGs mentioned above.

1. Current Risk-Informed and Performance-Based Regulations

From 1985 to 2002, the NRC conducted four major rulemakings revising the MC&A regulations and consolidating them in 10 CFR Part 74. These risk-informed and performance-based regulations are applicable to major fuel cycle facilities authorized to possess more than 1 effective kilogram of SNM in unsealed form. These rulemakings revised the requirements for taking physical inventories and evaluating inventory results. Required time intervals between facility physical inventories were lengthened. This change increased material flow and active inventory amounts, making external and internal transfers

larger factors (e.g., both in resolving inventory differences (IDs) and in reconciling book inventories to the results of physical inventories). The revised MC&A requirements were also graded and made commensurate with the strategic significance of the SNM being held. This graded nature of the MC&A requirements is shown in the following discussion regarding the MC&A regulations in 10 CFR Part 74 subparts C, D, and E, and the different categories of SNM that each of these subparts cover.

"*Strategic special nuclear material*" (SSNM) is a defined term in 10 CFR 74.4 meaning "uranium-235 (contained in uranium enriched to 20 percent or more in the U-235 isotope), uranium-233, or plutonium." Linked to this definition is the 10 CFR 74.4 term *Formula quantity*, meaning SSNM "in a quantity of 5,000 grams or more" that is often referred to as a "Category I quantity of material." Similarly, fuel cycle facilities authorized to hold a formula quantity of SSNM are often referred to as Category I facilities. Commensurate with the high strategic significance of SSNM in quantities of 5,000 grams or more, Category I facilities are subject to the rigorous set of MC&A regulations in Part 74 subpart E.

The Part 74 subpart D regulations are applicable to SNM of "moderate strategic significance." The 10 CFR 74.4 definition of this term refers to both quantity and the uranium's enrichment level, and covers the following two sets of NRC-licensed material: (1) 10,000 grams or more of any uranium enriched in the U-235 isotope in levels ranging from 10% to 20%; and (2) 1,000 to 5,000 grams of any uranium enriched in the U-235 isotope in levels above 20%. These two sets of enriched uranium are often referred to as Category II quantities of material, and fuel cycle facilities authorized to hold such SNM are referred to as Category II facilities.

The Part 74 subpart C regulations are applicable to SNM of "low strategic significance." Similar to the above, such SNM is defined with respect to quantity and the uranium's enrichment level, and its 10 CFR 74.4 definition covers the following three sets of NRC-licensed material: (1) 10,000 grams or more of any uranium enriched in the U-235 isotope in levels ranging from "above natural" up to 10%; (2) 1,000 to 10,000 grams of any uranium enriched in the U-235 isotope in levels ranging from 10% to 20%; and (3) 15 to 1000 grams of any uranium enriched in the U-235 isotope in levels above 20%. These three sets of enriched uranium are often referred to as Category III quantities of material, and fuel cycle facilities that are authorized to hold any of these defined categories of SNM are accordingly referred to as Category III facilities.

As indicated above, the subpart C, D and E regulations in Part 74 move from a less to a more rigorous set of MC&A requirements, and each contains graded general performance objectives that the MC&A system must be capable of achieving. Each licensee, certificate holder, or applicant subject to the subpart C, D or E regulations must submit to the NRC a Fundamental Nuclear Material Control (FNMC) plan showing that its MC&A system meets the general performance objectives. An FNMC plan describes the licensee's MC&A system capabilities, including those capabilities related to shipping, receiving, and making internal transfers of SNM (or of SSNM in the case of Category I facilities). An FNMC plan also includes procedures for investigating and resolving significant indicators of SNM (or SSNM) theft, diversion, or other unidentified loss mechanisms.

For threat considerations, the subpart D MC&A regulations under 10 CFR 74.41 contain system capability requirements applicable to Category II facilities. Such facilities must incorporate checks and balances sufficient to detect the falsification of data and reports that could conceal the diversion of SNM by an individual, including an employee in any position, or involving collusion between two individuals, one or both of whom have authorized access to SNM. The subpart E MC&A regulations under 10 CFR 74.51 contain similar system capability requirements applicable to Category I facilities to prevent the diversion of SSNM. These requirements generally underscore the importance of tamper-safing and cross-

checking controls to ensure the integrity of transfers and the continued validity of their assigned SNM (or SSNM) contents.

2. Receipts, Shipments, and Their Impact on Physical Inventory Evaluations

It is important for licensees to ensure that nuclear materials (SNM, SSNM, SM, or DU, depending on the type of facility) moving between facilities are properly tracked. Tracking inputs to a facility (receipts) and outputs from it (shipments) are one element of a licensee's MC&A system. These movements of material have an impact on another element of the licensee's MC&A system: the conduct of physical inventories. Even though the conduct of physical inventories, and the resulting material balances, focus on IDs within a single facility (and thus seem to be a separate activity from tracking movements of material between facilities), the two MC&A activities are linked. Any significant discrepancy (e.g., from measurement or recording errors, as well as in-transit theft) in determining receipts and shipments directly affect the magnitude and direction of an ID. Generally, the longer the time interval between a given facility's physical inventories, the greater the amount of nuclear material received and shipped, and the greater the potential impact of the receipts and shipments on the ID.

Each facility's inputs and outputs should be based on measurements from two parties, the shipper and the receiver. For a given shipment not in an encapsulated form, the observed nuclear material content of the shipper and receiver tend to differ, largely because of measurement errors. The receiver's measurements are made to verify the shipper's values. The observed discrepancies from comparing such independent determinations are commonly called shipper–receiver differences (SRDs), and affected facilities are required to statistically test the SRDs for significance and to investigate and resolve significant discrepancies. Uranium enrichment facilities require the monitoring of SRDs for both SNM and SM.

In making inventory changes, some fuel cycle facility licensees typically accept all of a shipper's values when the SRD (1) is not statistically significant and (2) does not exceed the minimum quantity of nuclear material specified in the requirements. Other licensees choose to record all receipts at their own receivers' values.

But if an SRD is statistically significant, it should be investigated and resolved (e.g., by applying a procedure mutually acceptable to the shipper and receiver). The shipper or receiver values are then adjusted to the resulting accepted value. If the adjustment is made after the close of the material balance period, the transaction is posted to the SRD account and to an account for prior period adjustments. Instead of using a prior period adjustment account, some licensees make corrections to the ID account at the end of the accounting period when the book inventory records are reconciled to the results of the ending physical inventory.

Harmonization with International Standards

The International Atomic Energy Agency (IAEA) has established a nuclear services series of guides and standards that constitute nuclear materials controls and accounting. IAEA services series guides present the international expectation to assist member States when striving to achieve the appropriate levels of safeguards. Pertinent to this regulatory guide, chapters 2, 4 & 5 of IAEA Nuclear Services Series No. 15, "Nuclear Material Accounting Handbook" (Ref. 14), issued May 2008, provides recommendations for best practices and methods used to account for nuclear material. While 10 CFR Part 74 pertains to material control and accounting of special nuclear material, this regulatory guide incorporates guidelines similar to those provided in the IAEA Nuclear Services Series No. 15, and is consistent with the principles stated therein.

C. STAFF REGULATORY GUIDANCE

This section provides detailed descriptions of the methods and approaches that the staff considers acceptable for meeting the requirements in 10 CFR 74 Subparts B, C, D, and E, for receiving and shipping operations, evaluating SRDs, conducting internal and external transfers of nuclear material, and for sending reports to either the NRC or the NMMSS.

1. Receiving Operations

a. MC&A operating procedures should cover steps to be taken both before shipment and after the receipt of nuclear material. Coverage should include SM receipts at uranium enrichment plants. All receipts and shipments should be controlled in a designated shipping and receiving area.

b. The first action to be taken upon the receipt of nuclear material should be the verification of the number of items, the item identities, and the integrity of individual items and of tamper indicating devices (TIDs). Specific receipt controls should include:

(1) Checks immediately after receipt to determine if loss, theft, or substitution may have occurred during transportation and to detect packaging or clerical mistakes. This should include identifying and counting the containers; verifying TID seal integrity; weighing the items and containers received; and comparing the results with corresponding information on the bill of lading, nuclear material transaction report, or other documentation provided by the shipper.

(2) Subsequent nondestructive assay (NDA) or other confirmatory measurement of nuclear material receipts.

(3) Assignment of organizational responsibility for the nuclear material while it is in the shipping and receiving area.

(4) Arrangement of the internal transfer of the material to the next area along the facility's process or interim storage flow line.

(5) Completion of the receiver's data on the nuclear material transaction report concurrently with recording the transaction in the facility's accounting system.

(6) Collection of receipt transaction data to be posted to control records.

c. All SNM and SM shipments received from an external supplier are subject to shipper-receiver comparisons. Such comparisons involve measuring received material by the receiver, or by the receiver's contractor (who is independent of the shipper), and comparing the receiver's total receipt measurement for element and isotope to that of the shipper's.

d. For any nuclear material received, the licensee should provide all appropriate information on the nuclear material transaction report that accompanies the shipment. This also applies to any source material of foreign origin received by uranium enrichment plants.

2. Receiver's Values

a. The shipper's data should be substantiated with timely checks and nuclear material measurements for mass, element concentration (e.g., plutonium or uranium), and fissile isotope abundance (U-235 or U-233). If NDA measurements are not feasible or practicable, shipper's values may be accepted for transfers in encapsulated form.

b. For UF_6, the licensee may establish receiver's values by measuring the U-235 isotopic concentration by NDA, weighing each cylinder to determine net weight UF_6 (gross weight minus certified cylinder tare weight), and applying a historical established percent uranium factor that is periodically confirmed or updated by measurement. Such a practice avoids the need to sample UF_6 cylinders and analyze the samples (except when obtaining data to establish or update the historical percent uranium factor). However, it is more desirable and common practice to derive UF_6 receipt values based on the measurement of UF_6 samples. Arrangements can usually be made with the UF_6 supplier to provide samples of the shipped UF_6. The receiving facility should have an agent, who is independent of the shipper, witness the sampling that represents the UF_6 contained in the cylinder(s) to be shipped, apply a TID to the sample, and verify the unique identity of the filled cylinder.

c. Nuclear material receipts not in the form of UF_6 should be measured for total quantity (mass), element concentration, and isotope abundance, as opposed to using a historical factor for deriving element content.

3. Evaluation of Shipper–Receiver Differences (SRDs)

a. Licensee's and certificate holder's procedures should describe how SRDs are determined and how their significance is evaluated. When shipper's measurement uncertainty (or standard error) information is available, the following should define the estimated standard deviation of the difference estimator or combined standard error:

$$\text{combined standard error} = [(\sigma_S)^2 + (\sigma_R)^2]^{1/2}$$

where -

σ_S = shipper's measurement standard error

σ_R = receiver's measurement standard error

b. If the shipper's measurement uncertainty values are not available, the receiver can assume that the shipper's measurement uncertainty is equal to (but no greater than) its own uncertainty. In this situation (i.e., both shipper and receiver have the same measurement uncertainty), the following becomes the combined measurement standard error:

$$\text{combined standard error} = [2(\sigma_R)^2]^{1/2} = 1.414\sigma_R$$

c. The SRD for a total shipment should be considered significant if it exceeds both a minimum quantity and twice the combined standard error.

d. In addition to evaluating SRDs on an individual external transfer basis, facilities with a formula quantity of SSNM should investigate and take corrective action if the net cumulative differences accumulated over a 6-month period exceed the larger of 1 formula kilogram or 0.1 percent of the total amount received. Regardless of whether any single SRD is statistically significant, such

excessive cumulative differences may be attributable to out-of-control measurement biases or possible protracted theft or diversion. NUREG-1280 provides information on cumulative SRDs (CUMSRDs) where facilities consider:

(1) the means of determining the uncertainty against which the significance of the difference should be assessed; and

(2) the course of action with respect to review and measurement systems, shipper notification, and treatment regarding the impact on ID (i.e., how the impact of the CUMSRD should be accounted for in the evaluation of ID significance).

e. The element and isotopic content of nuclear material received or shipped by a licensee or certificate holder should be based on measurements obtained from measurement systems subject to the measurement control program. Accordingly, a variety of measurement methods and techniques are applied to a wide range of materials and generally fall into four categories: bulk measurements, NDA, chemical analyses, and isotopic analysis. Even though it is not a measurement method itself, material sampling should also be factored in because it affects the errors in chemical and isotopic analyses.

4. Resolution of Significant Shipper-Receiver Differences

a. The facility's procedures should state, for each material type, the maximum elapsed time (following actual receipt) for determining if a significant SRD exists. The procedures should describe the steps involved with the investigation of a significant SRD and discuss how such difference is resolved. The criteria for defining a resolved SRD also should be presented. Accordingly, the facility should describe the:

(1) method of establishing the standard deviation of the SRD estimator under conditions when the shipper's uncertainty estimate is available and also when it is unavailable,

(2) conditions under which a referee laboratory is involved and the criteria for selecting a referee laboratory,

(3) bases established for concluding that a significant SRD is resolved,

(4) method for adjusting book records to accommodate resolution of the difference, and

(5) method for establishing and resolving differences involving scrap.

b. Generally, resolution of a significant SRD involves an analytical measurement of a retainer sample(s) by an independent (referee) laboratory. The resolution process should specify whose weight value is used in the resolution process if shipper's and receiver's weights differ by more than one-half of the total combined standard error.

c. If the two parties fail to resolve the difference, a referee laboratory should be involved, during which the shipper and receiver should mutually agree on the sampling procedure. Unless contractual requirements dictate otherwise, the value closest to the referee's value should be accepted and booked by both parties. If the referee's value is not within the statistical uncertainty limits of either the shipper's or receiver's value, but lies between the two, the referee's value should be used. For additional information, NUREG/CR-4604, Section 15.2.2.1, provides pertinent guidance on the use of inter-laboratory exchanges (or "round robins") involving the

analytical laboratories of a shipper, a receiver, and a referee to examine the possibility of a shipper-receiver measurement bias between facilities.

d. To summarize, the following types of responding investigation and resolution actions should be described and taken stepwise:

(1) The receiver reviews its data to check for possible entry errors, e.g., an incorrect number or the transposition of numbers.

(2) The receiver then reviews source data, including basic calculations and measurement control data.

(3) If the SRD remains unresolved, the receiver re-measures the nuclear material content of the receipt.

(4) If re-measurement fails to resolve the difference, the shipper is notified and requested to conduct a similar investigation.

(5) If the two parties fail to resolve the significant SRD, a referee laboratory should be involved. The shipper and receiver should mutually agree on a sampling procedure to be used.

(6) Unless contractual requirements dictate otherwise, the value closest to the referee's value should be accepted and booked by both parties. If the referee's value is not within statistical limits of either the shipper's or receiver's, but lies between the two, the referee's value should be used.

5. Pre-Shipment Operations

Facility shipment procedures should describe the steps taken before external shipments. This should include a description of preparation and certification procedures for shipping nuclear material. Descriptions of such pre-shipment controls should address, at a minimum:

(1) measurement and other assigned nuclear material content data;

(2) tamper-safing information;

(3) cross-checks;

(4) types of records maintained, including the posting of shipping transactions to control records;

(5) packaging;

(6) assurance that the intended receiver is authorized to receive the shipment;

(7) reporting, (e.g., preparation and transmittal of the nuclear material transaction report);

(8) investigation and reconciliation of SRDs with the receiver;

(9) physical protection arrangements, as required by the NRC; and

(10) measurement (e.g., NDA or other means for assigning nuclear material content based on measurement), packaging, and tamper-safing of waste being shipped off site.

6. In-Transit Physical Protection

As referenced under 10 CFR 70.22(g), licensees of Category I, II, and III facilities must ensure that their physical protection plans provide security over SNM (or SSNM) in transit (e.g., the use of tamper-safing, locks, escorts, or other means to ensure that shipments and receipts are properly protected from loss or theft).

7. Reports

a. The periodic transmittal of material balance reports and material transaction reports to the NMMSS data base are subject to the 10 CFR 74.13 and 10 CFR 74.15 requirements, respectively.

b. As reported additions to inventories, receipts should represent all nuclear material received during the material balance period. For uranium enrichment plants, this includes all SM and DU fed into the enrichment system (except that which has been recycled) plus the low-enriched uranium withdrawn from the process. The reporting of shipment totals under 10 CFR 74.15 should reflect all SNM, SM, and DU shipped off site or to other on-site plants, except for prior period waste shipped from a waste holding account and any current period waste that was shipped.

c. Prior period adjustments (i.e., corrections to ID) reported on NRC Form 327 in accordance with 10 CFR 74.17, should reflect the resolution within the current material balance period of statistically significant SRDs involving material that was on the beginning inventory, and adjustments to initial receipt values related to scrap received in a prior period because of better measurement following dissolution of such scrap in the current period. Moreover, the investigation and resolution of significant SRDs may uncover measurement biases from measurement control program data that had not been applied to various receipts and shipments. The net algebraic sum of such biases, expressed as grams element or grams isotope as appropriate, should be applied as a correction to the initially applied ID.

d. For Category I and II quantities of SNM (i.e, the types of SNM that are subject to the 10 CFR Part 74, subpart D or E requirements), the preparation of reports should include checks and balances sufficient to detect falsification to conceal theft or diversion of SNM by a single individual, including an employee at any position, and collusion between two individuals, one or both of whom have authorized access to SNM.

8. Internal Transfers

a. The licensee's facility should be divided into areas in a way that facilitates the monitoring of nuclear material movements and locations, and localizes losses that might be the result of theft, diversion, hidden inventory (e.g., material holdup in hoods or pipes), unmeasured discards, recording error, or some other unidentified loss mechanism. All such areas should be administratively controlled by a designated individual responsible for the nuclear material.

b. Physical boundaries of these areas should be established to control the nuclear material moving into, out of, and within the area. For uranium enrichment plants, this should include SM and DU, in addition to the internal transfer of SNM.

c. Areas receiving nuclear material should ensure that such transfers are not accepted without adequate transfer documentation containing sufficient measurement information. If applicable, areas should also not accept transfers without sufficient tamper-safing information.

d. At a minimum, the transferring area should provide the receiving area with gross and tare weights of each transferred container. The receiving area should subsequently confirm at least the gross weights. Any significant difference should be resolved before the contents of the container are removed. As another example, when nuclear material is transferred by pipeline from one area to another, the material should be measured in the receiving area before any chemical or physical change in the material occurs.

e. In accordance with the 10 CFR 74.41 performance objectives, data entry and access controls for Category II facilities should include checks and balances sufficient to detect falsification of data that could conceal theft or diversion by a single individual, including an employee at any position, or collusion between two individuals, one or both of whom have authorized access to SNM of moderate strategic significance.

f. In accordance with the 10 CFR 74.51 performance objectives, data entry and access controls for Category I facilities should include checks and balances sufficient to detect falsification of data that could conceal theft or diversion by a single individual, including an employee at any position, or collusion between two individuals, one or both of whom have authorized access to strategic SNM (SSNM). The checks and balances should include at a minimum countersigning by one other person of any SSNM transfer within a material access area (MAA), and countersigning by two individuals for SSNM transfers out of an MAA.

g. Any internal transfers of SSNM within a Category I facility's protected area, vital area, or MAA are subject to the access, surveillance, and escort requirements of 10 CFR 73.45.

D. IMPLEMENTATION

The purpose of this section is to provide information on how applicants and licensees[1] may use this guide and information regarding the NRC's plans for using this regulatory guide. In addition, it describes how the NRC staff complies with the backfit rules in 10 CFR 70.76.

Use by Applicants and Licensees

Applicants and licensees may voluntarily[2] use the guidance in this document to demonstrate compliance with the underlying NRC regulations. Methods or solutions that differ from those described in this regulatory guide may be deemed acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative demonstrates compliance with the appropriate NRC regulations. Current licensees may continue to use guidance the NRC found acceptable for complying with the identified regulations as long as their current licensing basis remains unchanged. The acceptable guidance may be a previous version of this regulatory guide.

Licensees may use the information in this regulatory guide for actions that do not require NRC review and approval, such as changes to a facility design under 10 CFR 70.72, "Facility Changes and Change Processes." Licensees may use the information in this regulatory guide or applicable parts to resolve regulatory or inspection issues.

Use by NRC Staff

The NRC staff does not intend or approve any imposition or backfitting of the guidance in this regulatory guide. The NRC staff does not expect any existing licensee to use or commit to using the guidance in this regulatory guide, unless the licensee makes a change to its licensing basis. The NRC staff does not expect or plan to request licensees to voluntarily adopt this regulatory guide to resolve a generic regulatory issue. The NRC staff does not expect or plan to initiate NRC regulatory action that would require the use of this regulatory guide. Examples of such unplanned NRC regulatory actions include issuance of an order requiring the use of the regulatory guide, generic communication, or promulgation of a rule requiring the use of this regulatory guide without further backfit consideration.

During regulatory discussions on plant-specific operational issues, the staff may discuss with licensees various actions consistent with staff positions in this regulatory guide as one acceptable means of meeting the underlying NRC regulatory requirement. Such discussions would not ordinarily be considered backfitting, even if prior versions of this regulatory guide are part of the licensing basis of the facility. However, unless this regulatory guide is part of the licensing basis for a facility, the staff may not represent to the licensee that the licensee's failure to comply with the positions in this regulatory guide constitutes a violation.

If an existing licensee voluntarily seeks a license amendment or change and (1) the NRC staff's consideration of the request involves a regulatory issue directly relevant to this new or revised regulatory guide, and (2) the specific subject matter of this regulatory guide is an essential consideration in the staff's determination of the acceptability of the licensee's request, then the staff may request that the licensee either follow the guidance in this regulatory guide or provide an equivalent alternative process

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1 In this section, "licensees" refers to holders of, and the term "applicants" refers to applicants for, special nuclear material licenses under 10 CFR Part 70.

2 In this section, "voluntary" and "voluntarily" mean that the licensee is seeking the action of its own accord, without the force of a legally binding requirement or an NRC representation of further licensing or enforcement action.

that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered backfitting as defined in 10 CFR 70.76(a)(1).

Additionally, an existing applicant may be required to comply with new rules, orders, or guidance if 10 CFR 70.76(a)(3) applies.

If a licensee believes that the NRC is either using this regulatory guide or requesting or requiring the licensee to implement the methods or processes in this regulatory guide in a manner inconsistent with the discussion in this Implementation section, then the licensee may file a backfit appeal with the NRC in accordance with the guidance in NRC Management Directive 8.4, "Management of Facility-Specific Backfitting and Information Collection" (Ref 15) and NUREG-1409, "Backfitting Guidelines," (Ref. 16) .

REFERENCES[3]

1. *U.S. Code of Federal Regulations* (CFR), "Material Control and Accounting of Special Nuclear Material," Part 74, Chapter I, Title 10, "Energy."

2. CFR, "Special Nuclear Material of Low Strategic Significance," Part 74, Subpart C, Chapter 1, Title 10, "Energy."

3. CFR, "Special Nuclear Material of Moderate Strategic Significance," Part 74, Subpart D, Chapter 1, Title 10, "Energy."

4. CFR, "Formula Quantities of Strategic Special Nuclear Material," Part 74, Subpart E, Chapter 1, Title 10, "Energy."

5. CFR, "Physical Protection of Plants and Materials," Part 73, Chapter I, Title 10, "Energy."

6. CFR, "General Reporting and Recordkeeping Requirements," Part 74, Subpart B, Chapter I, Title 10, "Energy."

7. NRC, NUREG-1280, "Standard Format and Content Acceptance Criteria for Material Control and Accounting (MC&A) Reform Amendment: 10 CFR Part 74, Subpart E," Washington, DC.

8. NRC, NUREG-1065, "Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Facilities," Washington, DC.

9. NRC, NUREG/CR-5734, "Recommendations to the NRC on Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Enrichment Facilities," Washington, DC.

10. NRC, NUREG/CR-4604, "Statistical Methods for Nuclear Material Management," Washington, DC.

11. NRC, Regulatory Guide (RG) 5.28, "Evaluation of Shipper–Receiver Differences in the Transfer of Special Nuclear Materials," Washington, DC.

12. NRC, RG 5.49, "Internal Transfers of Special Nuclear Material," Washington, DC.

13. NRC, RG 5.57, "Shipping and Receiving Control of Strategic Special Nuclear Material," Washington, DC.

14. IAEA Nuclear Services Series No. 15, "Nuclear Material Accounting Handbook," Vienna, Austria, May 2008.

[3] Publicly available NRC published documents are available electronically through the NRC Library on the NRC's public Web site at: http://www.nrc.gov/reading-rm/doc-collections/. The documents can also be viewed online or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone 301-415-4737 or 800-397-4209; fax 301-415-3548; and e-mail pdr.resource@nrc.gov.

15. NRC, Management Directive 8.4, "Management of Facility-Specific Backfitting and Information Collection," October 2013. (ADAMS Accession No. ML12059A460)

16. NRC, NUREG-1409, "Backfitting Guidelines," Washington, DC.