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REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 5.57

SHIPPING AND RECEIVING CONTROL OF SPECIAL NUCLEAR MATERIAL

A. INTRODUCTION

Section 70.58 of 10 CFR Part 70, "Special Nuclear Material," requires certain licensees authorized to possess at any one time and location special nuclear material (SNM) in quantities exceeding one effective kilogram to establish, maintain, and follow detailed fundamental material control and accounting procedures for shipping and receiving SNM.

The requirements for packaging and transporting SNM are specified in 10 CFR Part 71, "Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions," and in the applicable portions of the regulations appropriate to the mode of transportation in 49 CFR Parts 170-189, 14 CFR Part 103, and 46 CFR Part 146. These requirements are not included in the scope of this guide.

Requirements for the physical protection of SNM at licensee facilities and of material in transit are specified in 10 CFR Part 73, "Physical Protection of Plants and Materials," and are the subject of various regulatory guides issued or under development. Section 73.30 of Part 73 requires that uranium-235 (contained in uranium enriched to 20 percent or more in the U-235 isotope), uranium-233, plutonium, or any combination of these materials which is 5,000 grams or more computed by the formula, grams = (grams contained U-235) + 2.5 (grams U-233 + grams plutonium), shall be shipped in containers that are sealed by tamper-indicating seals.[1]

Licensees who transfer and receive SNM are required under § 70.54 to complete Form NRC/ERDA-741, "Nuclear Material Transaction Report," and submit a copy to NRC. In addition, paragraph (c) of § 70.42 requires that,

[1] Regulatory Guide 5.15, "Security Seals for the Protection and Control of Special Nuclear Material," identifies features of security seal systems and describes the types of tamper-indicating seals that are acceptable to the NRC staff for tamper-safing SNM.

before transferring SNM, the person making the shipment verify that the recipient is authorized to receive the type, form, and quantity of SNM to be transferred. Paragraph (d) of § 70.42 outlines the methods to be used to make this verification. Further, by mutual arrangement with the carrier and the receiver, the shipper is required by paragraph (b) of § 73.30 to arrange for the delivery of the SNM to the receiver's facility at a time when trained personnel are available to properly handle the material received, and under § 73.36 the shipper and receiver are required to follow certain notification procedures.

Section 70.57 and paragraph (f) of § 70.58 require that the licensee's measurement and control program for SNM must include a means for the control and evaluation of measurement bias and systematic and random errors for all parts of the measurement process, including scales, balances, volume measurements, analytical quality control, and sampling.

Paragraph (g)(2) of § 70.58 requires that procedures be established to review and evaluate shipper-receiver differences on an individual container or lot basis, a shipment basis, and a cumulative basis for shipments of like material. Guidelines for performing the evaluation and resolution of shipper-receiver differences are contained in various other regulatory guides that have been issued or are under development;[2] these guidelines are not included in the scope of this guide. Any loss of SNM (other than normal operating loss) must, under § 70.52, be reported to the Director of the appropriate NRC Inspection and Enforcement Regional Office (listed in Appendix A of Part 73) by telephone, telegram, or teletype.

This guide describes procedures acceptable to the NRC staff for complying with the Commission's regulations regarding the control of SNM during shipment and receipt by a licensee.

B. DISCUSSION

Adequate control of SNM during transfer between licensees includes (1) physical protection of the material at the licensees' facilities and while in transit and (2) the timely, accurate, and independent identification and measurement of the SNM by both shipper and receiver to determine and evaluate any shipper-receiver differences. These measurements are necessary to (1) detect the loss or theft of SNM being transferred between licensees, (2) detect and permit correction of clerical or handling errors, (3) detect falsification or errors in the shipment source data, (4) provide assurance that measurement bias is detected and corrected, and (5) detect and prevent the transfer of "material unaccounted for" (MUF) from one licensee to another.

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[2] Regulatory Guide 5.28, "Evaluation of Shipper-Receiver Differences in the Transfer of Special Nuclear Materials," is currently available. A regulatory guide on the reconciliation of statistically significant shipper-receiver differences is under development.

Where tamper-indicating seals are used, their application to each item or container by the shipper immediately after sampling or assay and the prompt verification of these seals by the receiver can help ensure the integrity of the material measured.

Initial receiving checks, made immediately after receipt, can determine if loss, theft, or substitution of SNM may have occurred during transfer and can detect packaging and clerical errors. The checks can include counting the pieces; identifying and weighing the containers or items received; comparing the results with the same information on a bill of lading, Form NRC/ERDA-741 (Nuclear Material Transaction Report), or other appropriate document supplied by the shipper; and, to the extent possible, performing an overcheck of each container by nondestructive analysis or equivalent means to provide a gross verification of the SNM content.

After these initial checks have been made, prompt quantitative verification of the contents of each container will provide early assurance that the contents of the packages received are identical to those shipped. Written procedures that call for performing these verifications within specific time limits after shipment can help ensure that Form NRC/ERDA-741 is filed in a timely fashion. In addition, the validity of both the shipper and receiver measurements is dependent on the existence of a program of standardization and calibration of measurement equipment and procedures.

Prior coordination between the carrier and receiver can ensure that SNM will be delivered to the receiver's facility at a time when trained personnel are available to properly handle the material received. This procedure will eliminate the possibility of material arriving during off hours when proper receiving checks or adequate physical security for the material cannot be ensured.

Appropriate procedures that identify employees who are authorized to ship SNM and the responsibilities of the various organizational components that have cognizance of the shipment will ensure that all aspects of the shipment are adequately coordinated. The following organizational components are listed with typical responsibilities as related to the shipment:

1. Organizational component that fabricates or assembles material:

    a. Determine the correct weights of the SNM,

    b. Obtain appropriate analysis of the SNM,

    c. Ensure product specifications,

    d. Provide guidance as to packaging or package material properly as required.

2. Shipping control:

   a. Prepare shipping forms,

   b. Arrange transfer of material to shipping area,

   c. Ensure proper packaging.

3. Security:

   a. Accompany package to shipping area when appropriate,

   b. Be cognizant of the storage areas while shipment is in them,

   c. Guard shipment while it is being loaded,

   d. Plan and arrange with the dispatcher of the material,

   e. Obtain signed receipts and pass them on to the appropriate departments.

4. Traffic (dispatcher):

   a. Make carrier arrangements,

   b. Coordinate shipments,

   c. Prepare bill of lading and other formal shipping papers,

   d. Notify receivers as to when shipments will be made and approximate time of scheduled arrival.

5. Nuclear materials control:

   a. Approve all SNM shipping memos,

   b. Prepare and transmit NRC/ERDA-741 forms,

   c. Transmit information for computer records, if used,

   d. Post shipping transactions to control records,

   e. Investigate and correct shipper-receiver differences.

To document the transfer of SNM containing 1 gram or more of contained uranium-235, uranium-233, or plutonium, Form NRC/ERDA-741 is initiated and distributed by the shipper promptly after the material is shipped. Normally, the licensee receiving SNM is required to measure independently its element

and isotopic content and complete and distribute Form NRC/ERDA-741 within 10 days of receipt of the material. However, if receipt measurements cannot be completed within 10 days, a licensee may, when authorized by his license, prepare and distribute Form NRC/ERDA-284, "Nuclear Material Transfer Report," or use Form NRC/ERDA-741 as a temporary receipt record after performing an initial receiving check to verify that the items, containers, and gross quantities shipped have been received. In such cases, the receiver is then required to complete his measurements and report them on Form NRC/ERDA-741 within 30 days of receipt of the shipment. If the material received is scrap or irradiated material that may take longer than 30 days to measure, Form NRC/ERDA-741 is completed and distributed to indicate temporary acceptance of the shipper's values; at a later date, the receiver prepares and distributes a "corrected copy" of Form NRC/ERDA-741 that reports the receiver's own measurements.[3]

C. REGULATORY POSITION

The following methods are acceptable to the NRC staff for the control of shipments and receipts of special nuclear material:

1. Shipping

a. Before shipping SNM, a licensee should ensure that the intended receiver is authorized to receive the type, form, and quantity of SNM to be transferred.

b. The element and isotopic content of the material to be shipped should be measured and associated limits of error determined by a method whose validity is ensured by an ongoing quality control program.

c. The shipper should establish and maintain written procedures that identify employees who are authorized to initiate shipment of SNM and identify the responsibilities of the various departments that should have cognizance of the shipment.

d. When shipments are required to be transported in containers that are sealed by tamper-indicating seals, the shipper should seal all containers or items with the tamper-indicating device immediately after sampling or assaying to ensure the integrity of the material measure.

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[3] See § 70.54 of 10 CFR Part 70 and the written instructions entitled "Instructions to NRC and Agreement State Licensees for Reporting Nuclear Material Transfers on Form NRC/ERDA-741 - Nuclear Material Transaction Report," U.S. Nuclear Regulatory Commission, July 1976. Copies of the letter may be obtained from the Division of Safeguards, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

e. Written procedures should be established and maintained to assign specific organizational components responsibility for packaging the shipment and ensuring that it is packaged and transported in accordance with the provisions of 10 CFR Part 71 and other applicable regulations.

f. Organizational components responsible for the shipment within the plant and in transit should have a set of written procedures that cover both normal and emergency conditions.

g. Under § 73.36(c)(1) the shipper is required to notify the consignee of the pertinent details of the shipment. The notification should include the time and method of shipping, the name of the carrier, and the estimated time of arrival at the receiver's facility. In addition, the shipper should notify the receiver of the bill of lading number, the seal numbers, the gross and net weights, and the element and isotopic content of each item or container.

h. The shipper should initiate and distribute a Nuclear Material Transaction Report (Form NRC/ERDA-741) in accordance with the printed instructions on the form.

2. Receipts

a. A licensee should accept receipt of only those types and quantities of SNM authorized by his license. If other material is delivered to his facility, the licensee should notify the shipper immediately so that appropriate arrangements can be made for the disposition of the material and the continuous maintenance of adequate physical protection.

b. Arrangements should be made to deliver the material to the receiver at a time when he has personnel available to properly handle the material. If the shipment fails to arrive at the scheduled time, the receiving licensee is required under § 73.36(e) to notify the shipper so that a prompt investigation can be initiated.

c. As soon as possible, but in no case more than 24 hours after receipt, the identification and integrity of the shipper's tamper-safing devices on each item or container should be verified. The piece count and identification and gross weight of the items or containers received should be checked against the bill of lading, Form NRC/ERDA-741, or other appropriate shipping document to provide assurance that the shipment was received intact. To the extent possible, an overcheck determination by nondestructive analysis (NDA) or other appropriate means should be made to provide a prompt estimate of the SNM content of each item or container. After the initial receiving checks have been performed, the material should be sent

to an area where the contents of the containers or items can be verified quantitatively. Written procedures should be established and maintained for verifying the receipts within specific time limits so that Form NRC/ERDA-741 can be filed within the required time.

d. If any of the tamper-safing devices have been disturbed in a way that may indicate an attempt to render the device inoperable or if the device has been accidentally damaged, the following actions should be taken:

(1) The affected containers should immediately be resealed with another tamper-safing device, and the resealing should be witnessed and attested to by the personnel delivering the containers.

(2) The containers should be weighed and a determination made as to whether any of the contents have been removed.

(3) If the contents of the containers appear to be in order, the shipper should be notified and given the option of witnessing a quantitative assessment of the containers' contents within 48 hours following receipt of the shipment. If the shipper does not respond to this offer, the contents of the container should be assessed as soon as possible but in no case later than 48 hours after receipt.

(4) If the contents of the containers appear to have been removed, the shipper and the Director of the appropriate NRC Inspection and Enforcement Regional Office listed in Appendix A of 10 CFR Part 73 should be notified and given the option of witnessing a quantitative assessment of the containers' contents within 24 hours following receipt. If neither responds to this offer, the contents of the container should be quantitatively assessed immediately and witnessed and attested to by personnel from at least two different groups within the receiver's organization.

e. Within the time specified in the instructions for the preparation of Form NRC/ERDA-741, the receiver should make an accurate, precise, and independent measurement of the SNM content of the material received. This measurement should be in accordance with a program for acceptable measurement quality as required by paragraph (e) of § 70.58.

f. The difference between the amount of SNM stated by the shipper as having been shipped and the amount received as measured by the receiver should be reviewed and evaluated.

All measurement discrepancies should be reported to the nuclear material control managers or their alternates, who should personally verify the discrepancy in the presence of the employee who discovered them. Written procedures should quantitatively define what constitutes a discrepancy for each type of SNM received. Appropriate action should

be taken to reconcile those shipper-receiver differences that are statistically significant at the 95% confidence level, except for shipments that involve differences of 50 grams or less of U-235 or plutonium. When a discrepancy is identified, the nuclear material manager should resolve the discrepancy with the shipper. If the discrepancy cannot be resolved, the appropriate NRC Inspection and Enforcement Regional Office should be notified by telephone, telegram, or teletype.

g. Within 10 days of receipt of material, the receiver should complete and distribute the Form NRC/ERDA-741 prepared by the shipper. When receipt measurements cannot be completed within this 10-day period, the receiver should complete a temporary receipt in one of the following two ways: (1) as indicated in the instructions[3] for reporting nuclear material transfers on Form NRC/ERDA-741, complete blocks 17A and 17B of the form, note on the form whether the containers, boxes, cases, etc., reported as shipped were received, and mark on the form: "Nuclear Material Transfer Receipt" or (2) if authorized in the license, prepare Form NRC/ERDA-284, "Nuclear Material Transfer Report," as a temporary receipt. In either case, a copy of the original Form NRC/ERDA-741 issued by the shipper should then be completed and distributed within 30 days of receipt to show the receiver's measurements. However, if measurements of scrap and irradiated material cannot be completed and reported within 30 days of receipt of material and if a temporary receipt has been filed on a Form NRC/ERDA-284 or Form NRC/ERDA-741, the licensee should complete Form NRC/ERDA-741 accepting the shipper's weights and file a corrected copy to report his own measurements at a later date.

D. IMPLEMENTATION

This section provides information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

This guide consists of a compilation of practices that are currently in use and are acceptable to the NRC staff. Therefore, except in those cases in which the applicant or licensee proposes an acceptable alternative method, the staff will use the method described herein in evaluating an individual's capability for and performance in complying with specified portions of the Commission's regulations until this guide is revised as a result of suggestions from the public or additional staff review.