

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS  
WASHINGTON, DC 20555

December 5, 1996

NRC INFORMATION NOTICE 96-63: POTENTIAL SAFETY ISSUE REGARDING THE SHIPMENT OF  
FISSILE MATERIAL

Addressees

All U.S. Nuclear Regulatory Commission licensees authorized to possess special nuclear material in unsealed quantities greater than a critical mass.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to an issue with potential safety significance regarding shipments using the fissile material exemption provisions and general licenses. It is expected that recipients will review this information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action nor written response is required.

Description of Circumstances

An NRC licensee recently informed NRC of a potential situation where one of the fissile material exemptions in 10 CFR 71.53 would not have provided adequate criticality safety if large amounts of an exempt concentration of fissile material were to be transported in the presence of a special moderating material (i.e., beryllium). A recent contract was awarded to the licensee to process weapons-usable enriched uranium materials. The waste product, a uranium-beryllium filtercake, met the fissile exemption provisions in 10 CFR 71.53 and 49 CFR 173.453. The presence of beryllium in significant quantities in NRC-regulated fissile exempt shipments is extraordinary, and was not considered in the development of the fissile exemptions in the regulations. NRC has reviewed and verified the licensee's calculations, and has concluded that the current regulations need to be revised to preclude criticality in fissile exempt shipments made under 10 CFR 71.53, and fissile shipments made under the general licenses in 10 CFR 71.18 and 10 CFR 71.22. This information notice is being issued to provide additional, timely notice, to licensees, of this potential safety issue, while the regulatory revisions are made.

Discussion

The licensee proposed to employ the provision in 10 CFR 71.53(d), or the parallel provision in the U.S. Department of Transportation (DOT) regulations, 49 CFR 173.453(d).

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Section 71.53(d) exempts fissile material from the requirements in 10 CFR 71.55 and 71.59 (i.e., the additional requirements placed on fissile packages and shipments to preclude criticality), provided the package does not contain more than 5 grams (0.18 ounces) of fissile material in any 10-liter (610-cubic-inch) volume. The

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fissile exemptions appearing in 10 CFR 71.53 are assumed to provide inherent criticality control for all practical cases in which fissile materials exist at or below the applicable regulatory limits (i.e., independent calculations would generally not be expected nor required). Consequently, the fissile exemptions generally do not place limits on the types of moderating or reflecting material present in fissile exempt packages, nor the number of fissile exempt packages that can be shipped in a single consignment, and do not require that a transport index (see 10 CFR 71.4) be assigned to packages for criticality control. Further, the fissile material exemptions and general license provisions allow any licensee to make shipments without first seeking NRC approval.

A fairly realistic computer model of the enriched uranium-beryllium oxide waste packages, as loaded for shipment into a sea-land container, and at 0.5 grams per liter, could not be demonstrated to provide adequate nuclear criticality safety. Because the current regulations would allow the possibility of criticality in fissile exempt shipments, and since there is no assurance that such shipments will not occur, NRC intends to revise 10 CFR Part 71 to address exclusion of beryllium and other special moderating material (e.g., deuterium and graphite) in the shipment of fissile materials, and to limit the amount of fissile exempt material that can be transported in a single consignment.

NRC has contacted the U.S. Department of Energy (DOE) and the DOT on this issue. DOE is a shipper of fissile material, which could include the special moderating materials in question. NRC and DOT are coordinating the revisions to their respective regulations.

NRC notes that very few licensees are involved in the shipment of fissile materials with beryllium, graphite, or deuterium. However, for those licensees that are involved in such shipments, it is important that programs be assessed to ensure that adequate criticality safety is provided where fissile materials are transported with materials known or expected to have moderating properties greater than water. As demonstrated by the licensee in this case, the existing fissile material exemptions cannot be presumed, without independent analysis, to preclude nuclear criticality in all cases.

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This information notice requires no specific action nor written response. If you have any questions about the information in this notice, please contact the individual listed below, or the appropriate NRC regional office.

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