SECY-99-059

February 24, 1999

FOR: The Commissioners

FROM: William D. Travers /s/
Executive Director for Operations

SUBJECT: AGREEMENT STATE COMPATIBILITY FOR CRITICALITY REQUIREMENTS APPLICABLE TO LOW-LEVEL WASTE DISPOSAL FACILITIES

PURPOSE:

To inform the Commission of the staff's assessment that criticality requirements should be an item of compatibility for Agreement State programs that regulate low-level waste (LLW) disposal facilities, and to request that the Commission approve staff's approach to consult with Agreement States.

BACKGROUND:

This paper responds to the April 29, 1998, Staff Requirements Memorandum (SRM) concerning SECY-98-010, "Petition for Envirocare of Utah, Inc., to Possess SNM in Excess of Current Regulatory Limits" (Enclosed). This SRM directed the staff, in part, to investigate whether emplacement criticality requirements should be an item of Agreement State compatibility, in accordance with the Commission's policy on adequacy and compatibility and based on realistic scenarios, and to inform the Commission of its findings. SECY-98-010 stated that staff would consult with the Commission before initiating discussion with affected Agreement States on this topic. In addition, the Commission approved staff's plan to develop guidance on emplacement criticality that could be used by Agreement States for existing and proposed LLW disposal facilities.

The Commission's authority to regulate special nuclear material (SNM) is contained in Chapter 6 (51 - 58) of the Atomic Energy Act (AEA) of 1954, as amended. Section 57 of the AEA prohibits persons from transferring, delivering, acquiring, owning, or possessing SNM without a general or specific license issued by the Commission. Section 274(b) of the AEA authorizes the Commission to enter into agreements with States to regulate SNM in quantities not sufficient to form a critical mass. This is codified in 10 CFR Part 150. Specifically, 10 CFR 150.10 exempts persons in Agreement States from Nuclear Regulatory Commission (NRC) licensing for SNM in quantities not sufficient to form a critical mass. Quantities not sufficient to form a critical mass are defined in 10 CFR 150.11 as enriched uranium not exceeding 350 grams, uranium-233 not exceeding 200 grams, plutonium not exceeding 200 grams, or mixtures where the sum of the fractions is less than unity. In both Agreement States and non-Agreement States, an NRC license is required, pursuant to 10 CFR Part 70, for persons who possess quantities of SNM in excess of the Section 150.11 limits. As it pertains to disposal facilities, the staff has applied the possession limits to material above ground. Once the SNM is disposed of (i.e., placed in the disposal trench), the staff has not considered the SNM to be restricted by the Section 150.11 limits.

LLW containing SNM is currently disposed of at three facilities: Barnwell, South Carolina; Hanford, Washington; and Clive, Utah. All of these facilities are licensed by Agreement States. The NRC licensed the Barnwell and Hanford facilities under 10 CFR Part 70, to receive, possess, store, and dispose of kilogram quantities of SNM. In 1997, these facilities requested that the SNM possession limits be reduced to the Section 150.11 limits, and that NRC licenses be transferred to the respective Agreement States. These actions have been taken for both licensees. The State of Washington incorporated NRC criticality controls for emplaced waste in license conditions in its Hanford license. Although not in the license, the State of South Carolina has required the licensee to retain the SNM emplacement procedures that address criticality safety. These procedures cannot be changed by the operator without State approval. The State of Utah license does not address criticality safety beyond the Section 150.11 mass limits.

Emplacement criticality safety is addressed in 10 CFR 61.16(b)(2), which states applicants shall describe proposed procedures, for avoiding accidental criticality, that address both storage of SNM before disposal, and waste emplacement for disposal. Because 10 CFR 61.16 is not a matter of Agreement State compatibility, there is no equivalent Agreement State regulatory requirement for Agreement State licensees of existing or future LLW facilities to evaluate emplacement criticality safety. Although the SNM mass limits in Part 150 limit above ground possession and ensure criticality safety above ground (during receipt and storage), they do not apply to waste emplacement and thereby the question of criticality safety below ground is left open (after disposal). There is no equivalent mass restriction or other controls which limit the amount of SNM that can be placed in a disposal trench. Therefore, greater than critical masses of SNM could be emplaced into disposal trenches in subcritical increments. Without control of placement, concentration, enrichment, and mass, etc., it is conceivable that SNM waste could be emplaced in such a manner that an inadvertent criticality could occur. Although such a criticality is theoretically possible, as noted above, license conditions and procedures at existing LLW disposal facilities practically limit the likelihood of a below-ground inadvertent criticality.

DISCUSSION:

To address the regulatory gap between NRC and Agreement States associated with the current compatibility designation for 10 CFR 61.16(b)(2), staff used the procedures outlined in Management Directive 5.9 and concluded that the compatibility designation for Section 61.16(b)(2) should be revised from category *NRC*, requirements reserved to NRC, to category *Health and Safety*, required due to its health and safety significance. *Health and Safety* applies to activities that could result directly in an exposure to an individual in excess of basic radiation protection standards, if the essential objectives of the provision were not adopted by an Agreement State. If procedures which ensured emplacement criticality safety were not followed or if the licensee's radiation protection program did not address emplacement criticality safety, an inadvertent criticality could occur, even though LLW disposal facility operational history indicates it is unlikely. If an inadvertent criticality were to occur at a LLW disposal facility, it is likely that workers could receive doses in excess of the 10 CFR Part 20 limits. Under the *Health and Safety* category, States would need to adopt program elements that embody the essential objectives of the NRC program elements within three years of the change in compatibility.

Prior to transferring the SNM licenses for the Barnwell and Hanford facilities to Agreement States, criticality safety of greater than critical mass quantities of SNM was ensured through NRC license conditions. Moreover, the low license concentration limits for the Clive facility ensure criticality safety, although they were not developed for that purpose. Although the SNM emplacement requirements have been maintained by South Carolina and Washington, there is no regulatory requirement for existing or future licensees in Agreement States to demonstrate criticality safety at emplacement. If the compatibility is changed to *Health and Safety*, Agreement States would need to revise their regulations to require licensees to demonstrate criticality safety at emplacement.

To assist Agreement State personnel that typically do not have experience in criticality safety, NRC staff is developing guidance that could be used by LLW facility licensees and Agreement State staff to prevent accumulations and configurations of SNM in a disposal unit from causing an inadvertent criticality. Staff has contracted with Oak Ridge National Laboratory to prepare this guidance, which is expected to be completed by July 1999.

Given the Commission's direction in the SRM responding to SECY-98-010, staff has not requested Agreement State input on revising the compatibility of Section 61.16. After receiving Commission consent, staff plans to solicit State comment by issuing an All-Agreement States letter transmitting a Federal Register notice (FRN). This FRN would identify NRC's proposed change to the compatibility and NRC's plan to issue guidance on emplacement criticality safety.

RESOURCES:

Resources to revise the compatibility and to develop the emplacement criticality guidance are included in the current fiscal year 1999 budget.

RECOMMENDATION:

Staff recommends that the Commission approve the staff's recommendation to request Agreement State review and comment on the proposal to revise the compatibility of 10 CFR 61.16(b)(2) from category *NRC* to category *Health and Safety*. Staff intends to obtain input from the public and Agreement States on the emplacement criticality guidance prior to publishing the final guidance. It is envisioned that publication of the guidance would coincide with revision to the compatibility category designation of Section 61.16(b)(2). After review and evaluation of State comments on the compatibility of Section 61.16(b)(2) and on the emplacement criticality guidance, staff will inform the Commission before publishing the final guidance and potentially changing the compatibility category for 10 CFR Part 61.16(b)(2).

COORDINATION:

The Office of the General Counsel has reviewed this Commission Paper and has no legal objections. The Office of the Chief Financial Officer has reviewed this paper for resource implications and also has no objections.

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Enclosure: As stated