



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

November 30, 1999

Ms. Lynnette Hendricks, Director
Plant Support
Nuclear Generation Division
Nuclear Energy Institute
1776 I Street, NW, Suite 400
Washington, DC 20006-3708

SUBJECT: INTERIM STAFF GUIDANCE - 5, "CONFINEMENT EVALUATION"

Dear Ms. Hendricks:

In response to your letter dated October 25, 1999, the U.S. Nuclear Regulatory Commission's Spent Fuel Project Office staff has completed a preliminary review of the Nuclear Energy Institute's (NEI) comments regarding Interim Staff Guidance (ISG) -5, Revision 1, "Confinement Evaluation" (ISG-5). The purpose of ISG-5, and all ISGs issued by the staff, is to provide for consistent staff reviews in conducting safety determinations such as those affecting the storage of spent fuel. ISG-5 provides a method for the staff to perform the following: (1) estimate a bounding dose for normal, off-normal, and accident conditions to verify that the requirements of 10 CFR 72.104 and 10 CFR 72.106 can be met, and (2) assess the storage cask performance relative to the control of effluents that could be released from an independent spent fuel storage installation (ISFSI). We appreciate NEI's role in providing industry comments on staff positions.

Enclosed is the staff's response to your comments with regard to ISG-5. The guidance contained in ISG-5 is based on the best available information currently accepted by the staff, such as NUREG/CR-6487, "Containment Analysis for Type B Packages Used to Transport Various Contents." Because your comments address fundamental inputs used by the staff to perform confinement evaluations and reference new, unreviewed information, detailed staff review has not been completed for Notes 1, 2, 3, and 5.

Currently, the staff is very confident that the guidance provided in ISG-5 provides reasonable assurance of public safety with regard to the confinement analyses of spent fuel storage casks. The staff needs to carefully consider your suggestions to modify the inputs and assumptions in the confinement analysis for the potential impact on public health and safety. Further review of these comments and evaluation of the new information require significant staff resources at a time of very high workload due to the current review of ISFSI and spent fuel storage and transportation package applications. In light of staff resource limitations, we would like to discuss NEI's desired goals and priorities so that we can better prioritize and schedule detailed staff investigation of your comments.

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Thank you for the opportunity to review your comments on ISG-5. We would be pleased to meet with you and industry representatives in a public meeting to discuss your comments. Please contact Chet Poslusny (301-415-1341) to arrange a meeting at your convenience. If you have any questions or comments regarding this letter, please contact M. Wayne Hodges (301-415-2398) or Eric J. Leeds (301-415-8540).

Sincerely,

ORIGINAL SIGNED BY /s/

E. William Brach, Director
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Enclosure: Staff Comments

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SFPO Staff Comments on NEI's Individual Notes

Note (1) Rod Breakage Fractions

The rod breakage fractions presented in ISG-5 were based on those already contained in NUREG-1536, "Standard Review Plan for Dry Cask Storage Systems," as discussed on page 2-7. This NUREG was previously subject to public comment.

There are several uncertainties regarding the long-term performance of the fuel cladding in a storage environment. The discussion in NUREG/CR-6487 Section 6.1.2 and Table 6-1 suggests a 3% breach level for transport as a reasonable bounding value to account for uncertainties and variations in fuel performance. To account for the variety of fuels that may be loaded in storage casks, a 1% fuel rod breakage fraction was considered to be reasonable for storage conditions at the time NUREG-1536 was developed.

Before changes in staff guidance of rod breakage fractions can be made, substantial staff investigation of this issue would be necessary to better understand the fuel performance data, long-term performance of cladding in the storage environment, and the anticipated performance of high burnup fuel. Not related to this ISG, NRC investigation of fuel and cladding performance in dry storage systems is ongoing and may be of use in the future to further develop this staff position.

Note (2) Table 7.1

The release fractions presented in Table 7.1 are based on NUREG/CR-6487. This document referenced SAND90-2406 but did not approach the level of detail included in SAND90-2406, with respect to temperature effects on volatile release fractions. As stated in ISG-5, other release fractions may be used in the confinement analysis provided the applicant properly justifies the basis for their usage. The staff is open to reviewing these bases using a lead plant concept or on a case-by-case basis if necessary.

Note (3) Guidance for Calculating Leakage Rates

The staff agrees with this comment. In ISG-5, Section V.3, at the end of the first paragraph, it is recognized that all fuel fines released from a fuel rod may not remain suspended in the cask volume and be available for release. Beyond the information discussed in NUREG/CR-6487, SFPO has not directed resources to conduct detailed reviews of the historical and emerging fuel data especially with respect to high burnup fuels. However, an applicant may request consideration of a reduction in the fraction along with justification for the request. The staff will review these requests on a case-by-case basis or using a lead plant concept so that the conclusions may be developed generically.

Note (4) Confinement Analyses Normal Conditions

The comment is correct in that general licensees must calculate dose equivalents for their ISFSIs, considering site-specific meteorology and distances to the site boundary. In addition,

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other exposure pathways such as ingestion and ground deposition need to be considered. However, 10 CFR Part 72, Subpart L, which is applicable to cask approvals, has the following two requirements that apply to confinement analysis for cask approval:

Section 72.236 (d) states that confinement features must be provided to meet the requirements of Sections 72.104 and 72.106.

Section 72.236 (l) states that the applicant must demonstrate that the cask and its systems important to safety must be evaluated, by appropriate tests or other means acceptable to the Commission, to demonstrate that they will reasonably maintain confinement of radioactive material under normal, off-normal, and accident conditions.

Based on these requirements, staff guidance for review of analysis of normal and anticipated occurrences will remain in ISG-5.

Note (5) Accident Conditions

The staff recognizes that bounding assumptions were made regarding meteorological conditions and the duration of the hypothetical receptor at the site boundary. Currently, the staff method only considers the inhalation and immersion pathways in its dose equivalent estimates. The staff believes that this assumption bounds the contribution from other potential pathways. However, the staff would welcome further dialogue with NEI regarding (1) its priorities for further review in this area, (2) the applicability of NUREG-1512, (3) the possible development of generic guidance for dose estimates that include all relevant pathways, and (4) the assumptions for the presence of a receptor at the site boundary.

Note (6) General Comments on Section V

- 1) The staff considers that the requirements in 10 CFR 72.104 and 10 CFR 72.106 are bounding for normal, anticipated occurrences, and design basis accident conditions which are reflected in the approaches taken in ISG-5 guidance. The terminology used in ISG-5 Section II is not a change from that used in Section 7 of NUREG-1536. However, the staff agrees that reference to a hypothetical individual is not consistent with that used in 10 CFR Part 72. The hypothetical individual concept was adopted because applications for cask approval are not based on conditions at a specific site. Associated with the absence of site-specific conditions, ISG-5 provides guidance for bounding assumptions regarding the duration of the receptor at the site boundary. The ISG recognizes that the staff will consider other assumptions with justification.

The staff will consider specific recommendations from NEI regarding new terminology instead of the term hypothetical individual. Along with the areas discussed in the staff response to Note (5) for the accident case, the staff invites further discussion regarding specifics on developing reasonable bounding assumptions for the duration of the receptor at the site boundary for normal conditions and anticipated occurrences.

- 2) Three conditions, i.e., normal, off-normal, and accident, are discussed in ISG-5. The staff will revise the guidance, as appropriate, to ensure consistency with the terminology used in 10 CFR Part 72, i.e., normal, anticipated occurrences, and design basis accident conditions.
- 3) Section V.4: Confinement Analyses
 - A. The staff will revise the guidance, as appropriate, to state that Ci/cm³ is the activity concentration.
 - B. Examples of conditions using tested leak rates and conditions during testing as input parameters, calculation of adjusted maximum seal leakage rates (Cm³/sec) under normal, off-normal [sic], and hypothetical [sic] accident conditions acceptable to the staff are delineated in recent applications for which the staff has prepared preliminary safety evaluation reports (SERs), such as the TN-32, TN-68, and Holtec HI-STORM applications.
 - C. The staff requires clarification on where NEI believes the method (equations in Section V.4) to evaluate committed effective dose equivalent, committed dose equivalent, deep dose equivalent, or shallow dose equivalent is overly conservative.