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MEMORANDUM FOR: Jesse L. Funches, Director  
 Program Management, Policy Development and  
 Analysis Staff, NMSS

FROM: Robert E. Browning, Director  
 Division of High-Level Waste Management, NMSS

SUBJECT: REQUEST APPROVAL OF PAPER BY DIRECTOR, NMSS AS PER  
 NMSS POLICY AND PROCEDURES LETTER 1-39 - REVIEW OF  
 SPEECHES, PAPERS AND JOURNAL ARTICLES

Approval of the Director, Office of NMSS is requested for the following paper proposed to be presented at the FOCUS'89 meeting in September 1989:

"U.S. Nuclear Regulatory Commission's <sup>Proposed</sup> Clarification of 10 CFR 60:  
 Definition and Use of the Terms 'Anticipated Processes and Events' and  
 'Unanticipated Processes and Events'"

A summary of the paper is enclosed.

The following procedures in NMSS Policy and Procedures Letter 1-39 are being followed:

Procedure #2. Paper involves policy issues on which there is a published NRC policy; such papers must be approved and transmitted by Division Director for Office Director/Deputy Director review and approval.

Procedure #5. Such papers that fall under procedure 2 must be transmitted by memorandum from Division Director to Director, PMDA.

The authors are aware that approval for presentation does not guarantee that travel funds and permission to travel will be authorized.

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Robert E. Browning, Director  
 Division of High-Level Waste Management, NMSS

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U.S. NUCLEAR REGULATORY COMMISSION'S PROPOSED CLARIFICATION OF 10 CFR 60:  
DEFINITION AND USE OF THE TERMS "ANTICIPATED PROCESSES AND EVENTS" AND  
"UNANTICIPATED PROCESSES AND EVENTS"

BY JOHN S. TRAPP AND PHILIP S. JUSTUS

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MAILSTOP 4H3, WASHINGTON, DC 20555

The performance objectives of 10 CFR Part 60, the controlling regulation for disposal of High-Level Waste in a geologic repository, require that the engineered barrier system and waste package be designed assuming anticipated processes and events. In addition, these same objectives require that the overall waste disposal system be able to comply with the Environmental Protection Agency standards with respect to both anticipated processes and events and unanticipated processes and events. Therefore, unless it has been determined what constitutes anticipated processes and events and unanticipated processes and events, the NRC cannot totally evaluate the suitability of the proposed site. In addition, unless there are clear, agreed upon guidelines as to what constitutes such processes and events, the DOE can not be sure that their site characterization program is adequate, or that the testing and design of the engineered barrier system and waste package has been focused upon the correct set of design parameters.

During a meeting between the NRC and the DOE in December of 1985, the DOE presented preliminary thoughts on how it was interpreting the definitions of anticipated processes and events and unanticipated processes and events contained within 10 CFR Part 60. The NRC stated at that time that it did not consider the DOE interpretations to be consistent with the intent of 10 CFR Part 60. During subsequent interactions between the NRC and DOE, such as review of the draft and final environmental assessments, it became apparent that differences in interpretations remained between the two agencies, and in February 1988, the NRC published a draft technical position on this subject for public comment. The draft position was primarily intended to provide guidance on the methodologies and rationale that NRC would use for categorizing naturally initiated processes and events which could occur in the post-closure, to discuss how human-induced processes and events should be evaluated, and to provide guidance on those processes and events which the staff considered not sufficiently credible to warrant consideration.

While the draft position provided guidance on the above subjects, the public comments received indicated that the ambiguities present within 10 CFR 60 concerning APE/UPE had not been removed. Because the NRC was concerned with potential detrimental effects on the waste disposal program if this area of regulatory uncertainty was unresolved, it was determined that rulemaking on this subject should be initiated.

The primary technical areas which the draft technical position intended to clarify and which the rule modification will focus upon are the use of deterministic rather than probabilistic criteria for selection of anticipated processes and events and unanticipated processes and events, the geologic time frame which must be considered, the area or geologic setting which must be considered, how direct and indirect human initiated processes and events should be considered, and the relationship of these terms to terms utilized by the EPA

within 40 CFR part 191. The rulemaking is not intended to prescribe how the analysis to determine compliance with the various performance objectives will be performed, but rather to clarify which external processes and events must be considered in the design and analysis.

The following provides a summary of the areas which would be clarified or modified during the proposed rulemaking:

#### Guidance on Deterministic Methods

The proposed rulemaking would modify the definitions for anticipated processes and events and unanticipated processes and events to clarify the primarily "deterministic" methodology required to identify such processes and events. Included in this modification would be further specification on the use the geologic record, in particular the Quaternary and Holocene record for selection of APE/UPE.

#### Guidance on 'Geologic Setting'

The present wording of 10 CFR 60.102 can be construed to mean that the area of the geologic setting is the summation of all of the various components of the geologic, hydrologic and geochemical systems. The NRC considers this illogical and the proposed rulemaking would clarify that the area intended for each subsystem of the geologic setting should be based on technically sound consideration for that subsystem. For example, climatological considerations may require global modeling, while the geochemical subsystem may be largely confined within the site area.

#### Guidance on How Anticipated Processes and Events and Unanticipated Processes and Events Will Be Used in Evaluating Compliance With the Performance Objectives

Within 60.113, the anticipated processes and events used in the design and analysis of the waste package and the engineered barrier system(s) may be supplemented by additional processes and events if the Commission determines them necessary to provide reasonable assurance that the overall system performance objectives presented in 60.112 will be met. In the specific case of the site at Yucca Mountain, the staff considers that the additional processes should include, at a minimum, such things as the effects of nuclear weapons testing, the effects of groundwater pumpage, and changes to the climate caused by human-induced modifications to the atmosphere.

Within 60.112, the DOE is to evaluate the overall system performance with respect to both anticipated processes and events and unanticipated processes and events. Together, these processes and events are considered to represent a broad category of processes and events which must be studied and evaluated utilizing the criteria presented in 60.122(a) to determine which processes and events are considered "significant processes and events" for determining compliance with the EPA standard. Following selection of APE/UPE, using deterministic criteria, and evaluation and investigation in accordance with 60.122(a), probabilities and consequences can be evaluated to determine which APE/UPE must be utilized to determine compliance with the EPA standard.

#### REFERENCES

1. U.S. Nuclear Regulatory Commission, "Disposal of High-Level Radioactive Waste in Geologic Repositories, Technical Criteria," Federal Register, vol.48, no.120, June 21, 1983, 28194-28229.
2. Nuclear Waste Policy Act of 1982, Public Law 97-425, 96 Stat. 2201, 42 U.S.C. 10101, January 7, 1983.
3. Nuclear Waste Policy Amendments Act of 1987, Public Law 100-203, December 22, 1987.
4. U.S. Nuclear Regulatory Commission, "Draft Generic Technical Position: Guidance for Determination of Anticipated Processes and Events and Unanticipated Processes and Events," Notice of Availability, Federal Register, vol.53, no.39, February 29, 1988, 6040.
5. U.S. Environmental Protection Agency, "Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," Federal Register, vol.50, no.182, September 19, 1985, 38066-38089.