



## Department of Energy

Washington, DC 20585

JUN 30 1994

Mr. Joseph J. Holonich, Chief  
High-Level Waste and Uranium  
Recovery Project Branch  
Division of Waste Management  
Office of Nuclear Material  
Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

References: (1) Ltr, Shelor to Holonich, dtd 6/17/93  
(2) Ltr, Holonich to Shelor, dtd 7/14/93  
(3) Ltr, Shelor to Holonich, dtd 8/18/93  
(4) Ltr, Holonich to Shelor, dtd 2/28/94  
(5) Ltr, Shelor to Holonich, dtd 11/23/93  
(6) Ltr, Reamer to Shelor, dtd 12/9/93

Dear Mr. Holonich:

Enclosed for review by the U.S. Nuclear Regulatory Commission (NRC) is the U.S. Department of Energy (DOE) approved topical report entitled, "Methodology to Assess Fault Displacement and Vibratory Ground Motion Hazards at Yucca Mountain." This topical report documents the methodology that will be used to assess preclosure and postclosure fault displacement and vibratory ground motion hazards at Yucca Mountain, Nevada. Two subsequent topical reports will describe how the hazard assessment will be used in the preclosure seismic design of the Geologic Repository Operations Area at the potential repository site. In addition, results from the application of the methodology of this report will be used in the postclosure total system performance assessment of long-term waste isolation at the site.

In the Site Characterization Plan, a deterministic approach to seismic hazard evaluation was described for the development of the preclosure seismic design basis using the concept of the 10,000-year cumulative slip earthquake. The DOE no longer intends to use this approach. Instead, DOE will use a probabilistic approach to seismic hazard assessment, as described in this topical report. The probabilistic approach allows the frequency of earthquake recurrence to be incorporated in the analysis. It also allows variabilities in input to be explicitly included in the hazard assessment and displayed as uncertainties in the final hazard results. The probabilistic methodology is consistent with the requirements of total system performance assessment and the performance goal-based design process. For these reasons, it is apparent that the state-of-the-practice probabilistic approach is well suited to the design and performance assessment of the potential repository at Yucca Mountain. The DOE recognizes that there are ongoing discussions about the proper role of the traditional deterministic approach within the overall regulatory framework of seismic hazard assessment. It is not clear to DOE how a combined probabilistic and deterministic approach would be implemented, or

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that there is substantial benefit to doing so. Therefore, the DOE methodology as described in this topical report does not include a deterministic hazard assessment component.

An outline for this topical report was submitted to the NRC by a letter dated June 17, 1993, (Reference 1). On July 14, 1993, the NRC responded with a request that the DOE provide additional information in the outline (Reference 2). The DOE provided an expanded annotated outline on August 18, 1993 (Reference 3). Subsequent to that submittal, the topical report was modified as discussed with the NRC at the November 17, 1993, Technical Exchange on Seismic Hazards Assessment. Discussions on the modified scope of the topical report were also held at the Nuclear Waste Technical Review Board Structural Geology and Geoen지니어ing Panel Meeting in San Francisco, California, on March 8-9, 1994.

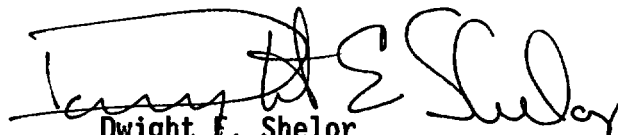
The DOE requests that NRC review this methodology for acceptability for referencing in a license application for the potential geologic repository at Yucca Mountain. It is anticipated that this review will be conducted in accordance with the NRC's Division of High-Level Waste Management Topical Report Review Plan, as provided to the DOE by letter dated February 28, 1994 (Reference 4). Approval of this methodology is needed in order to proceed, without undue regulatory risk, with the seismic hazard assessment and seismic design for the potential repository at Yucca Mountain.

Additional information is provided in enclosures to this letter that should assist the NRC with the review of the topical report. Enclosure 2 is a list of open items from the NRC Site Characterization Analysis that are addressed, in whole or in part, by the report. NRC concurrence on closure of open items related to this topical report will be requested in subsequent letters to the NRC. Enclosure 3 is a list of study plans that are related to the topical report. These study plans are being written or revised to be consistent with the probabilistic seismic hazard assessment approach of this topical report. Enclosure 4 addresses how the topical report relates to the License Application Annotated Outline (Reference 5). Enclosure 5 provides specific responses to comments made by the NRC and the State of Nevada at the November 17, 1993, Technical Exchange on Seismic Hazard Assessment (Reference 6).

As noted above, this topical report is the first in a series of three planned reports addressing seismic hazard assessment and seismic design. The second report will address the determination of appropriate seismic hazard levels for design. In accomplishing this objective, that report will establish seismic safety categories for Geologic Repository Operations Area systems, structures, and components; associated seismic safety performance goals and risk reduction factors; and seismic design criteria to achieve the performance goals and risk reduction. The current schedule calls for the annotated outline for the second report to be provided to the NRC in July 1994, with the report submitted for review in February 1995. The third topical report will describe the development of seismic design input (e.g., seismic response spectra, time histories, and fault displacement levels) for the appropriate seismic hazard levels. It is currently anticipated that this report will be provided to the NRC around the end of fiscal year 1995. Additional copies of the topical report are available through the contact named below.

If you have any questions, please contact Chris Einberg of my staff at (202) 586-8869.

Sincerely,



Dwight E. Shelor  
Associate Director for  
Systems and Compliance  
Office of Civilian Radioactive  
Waste Management

Enclosures:

1. Topical Report YMP/TR-002-NP
2. Site Characterization Analysis  
Open Items Addressed by  
YMP/TR-002-NP
3. Study Plans Related to  
YMP/TR-002-NP
4. Relationship Between YMP/TR-002-NP  
and License Application Annotated  
Outline
5. Responses to NRC and State of  
Nevada Comments from 11/17/93  
Technical Exchange

cc: w/enclosures:

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