Department of Energy
Washington, DC 20585

January 26, 1994

Mr. B. J. Youngblood, Director
Division of High-Level
Waste Management
Office of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Reference 1: Ltr. Youngblood to Shelor, dtd., 12/30/93
Reference 2: Ltr. Holonich to Shelor, dtd., 4/7/93
Reference 3: Ltr. Shelor to Holonich, dtd., 11/30/93

Dear Mr. Youngblood:

The U.S. Department of Energy (DOE) has received the U.S. Nuclear Regulatory Commission's (NRC) December 30, 1993 letter (Reference 1) reporting the status of NRC's review on the Topical Report (TR), "Evaluation of the Potentially Adverse Condition 'Evidence for Extreme Erosion During the Quaternary Period' at Yucca Mountain, Nevada." The NRC letter expressed four concerns, which appear to be indirect questions. This letter addresses some concerns. Actions to be taken to fulfill specific NRC requests are also identified. We anticipate that discussions at the site visit on February 1-2, 1994, should serve to help resolve NRC's questions.

DOE interprets these concerns as a request for additional information. DOE could respond more precisely if questions were expressed in a direct manner. Also, the status and conduct of the NRC TR review process is unclear to DOE, given that the Topical Report Review Position Paper (Reference 2) has not yet been approved. It appears that the NRC TR review process may be premature, absent such a plan. DOE urges NRC to finalize its Position Paper without further delay.

1. Scope of the Topical Report

The TR was prepared by DOE to address the specific regulatory concern of whether the potentially adverse condition (PAC) found in 10 CFR Part 60.122(c)(16), "Evidence of Extreme Erosion During the Quaternary Period" exists. DOE presented the results of studies that conclude that there is no evidence the PAC is present at Yucca Mountain. The NRC staff has addressed this PAC in NUREG-0804, in which it defines "extreme erosion" to be "substantial changes in land forms (as a result of erosion) over relatively short intervals of time". In reference 1, DOE now finds that NRC has offered further interpretation of the PAC, namely that the time intervals to be considered are in the range of 10,000 to 100,000 years. DOE believes that this is beyond

1/0

102.7
WM-11
NH03

the requirements of 10 CFR 60.122(c)(16) and the qualitative guidance of NUREG-0804.

DOE articulated an approach to defining "extreme erosion" that is appropriate within the existing and inherently qualitative guidance. The approach was to compare slope degradation and hillslope channel incision rates at the site with erosion rates determined for other parts of the world, in 1) rocks that were both similar and dissimilar with the volcanic tuffs of Yucca Mountain, and 2) climatic regimes that were both similar and dissimilar to that at Yucca Mountain. The regulatory time frame is the Quaternary Period, and a time-averaged approach over its duration is appropriate, and necessary. To retrospectively recognize short-term erosion or hillslope degradation events as "extreme" when the cumulative erosion over the Quaternary is not "extreme", and to geochronologically resolve short-term events to a few tens of thousands of years appears inconsistent with the narrow regulatory question posed by 10 CFR 60.122(c)(16). Evidence of extreme erosion must be determined within the precision of analytical techniques geologists can access.

DOE understands that the NRC may have additional concerns about erosion beyond that which is addressed in the question posed by 10 CFR 60.122(c)(16). However, DOE does not intend to expand this TR to address issues beyond the PAC.

2. Reliance Upon a Single Controversial Dating Method

The label of "controversial" for varnish cation ratio (VCR) dating is confusing and somewhat prejudicial, particularly when the NRC recognized in developing 10 CFR Part 60 that innovative scientific techniques will be applied in this program. It is a technique suited to the geology of the site in light of the question to be resolved. Section 3.3.2.1.1 of the TR states clearly the rationale for why VCR was an appropriate technique to apply.

All Quaternary dating techniques are developmental and evolve through specific applications. They also have their unique limitations and inherent analytical or calculational uncertainties. As these pertain to the VCR technique, they are explained in Section 3.3.2 of the TR.

DOE wishes to provide the items requested in Reference 1 as soon as they can be gathered. A telecon with the NRC staff and other affected parties on January 5, 1994 helped DOE to better understand NRC's additional data requests. For point 1, DOE will undertake a review of the data packages provided in our November 30, 1993, submission to NRC (Reference 3) to see if there is some ambiguity or missing information for identifying the data points that were used in the calculation of mean VCR cation ratios. DOE will inform the NRC about the results of this recheck.

For point 2, DOE believes that time spent with the PI during the DOE/NRC site visit on February 1-2, 1994, will allow further clarification to resolve this point. Following the site visit, the NRC should inform DOE whether or not this has occurred.

For point 3, the telecon identified an inconsistency in the level-of-detail in our data package submittal for the Red Cone and Black Cone VCR calibration sites. DOE will retrieve the data from the Los Alamos Participant Data Archive, submit it to the Yucca Mountain Site Characterization Project Office Technical Data Base, and send it the NRC as soon as possible.

During the January 5, 1994 telecon, DOE indicated that an additional action being undertaken was to digitize the locations of the colluvial boulder fields into YMPO's Geographic Information System (GIS). This request was made by NRC staff in a telephone call to DOE in late November 1993. A tape containing this data subsequently will be provided to the NRC On-Site Representative for entry into NRC's GIS system.

3. Qualification of Existing Data on Erosion

Because the process of data qualification has broad implications for other aspects of the site characterization program, DOE will address the points raised in Reference 1 in a separate letter that will post-date this one. There are NRC staff insights in these comments from which we will benefit in future data qualification applications. We do note that the NRC agrees with DOE's conclusions from Appendix A of the TR, and that DOE has successfully qualified a specific data set.

4. Comprehensiveness of the Data Submitted

It is very important to understand that in this TR, DOE gathered the data, performed the analyses, and reported the conclusions that bear directly upon our conclusion that extreme erosion during the Quaternary Period is not present at Yucca Mountain. The TR is a report that addresses a specific regulatory question by providing information and conclusions to address the regulatory issue in 10 CFR 60.122(c)(16). It is not considered to be a document containing all of the data and interpretations that DOE has collected on the topic of erosion at Yucca Mountain. The technical information in the TR is the data needed to support the validity of the conclusions presented. Given the ability to acquire direct, calibrated age dates of ancient colluvial boulder fields, DOE does not believe a detailed geomorphic map is needed for this application.

The Forty Mile Wash stream incision scenarios in TR section 3.3.3.4 (Figure 13) are interpretations permissible from geologic field relations and dated terrace surfaces. If there are specific data sets that NRC believes are needed to assess these scenarios, then DOE will provide the desired information upon request.

Technical Data Availability/Format

Finally, NRC states that the, "key data that are used in support of conclusions made in a report... should be provided in tabular form either in the Topical Report itself or as an appendix." DOE is left with the impression that the data packages from YMPO's Technical Data Base (Reference 3) are not formatted in a manner conducive to NRC review of the document. DOE is uncertain, however, about what changes NRC is advocating.

The DOE also notes that TRs submitted for nuclear power plant licensing do not typically include all information that might be required in the course of a review. Beyond DOE's furnishing a TR, cited references, and the technical data packages from YMPO's Technical Data Base, DOE will consider any suggestions on how it can ameliorate the task of conducting "extensive literature surveys to confirm the results of analyses presented in TRs".

As noted by the NRC staff (Linehan) during the May 3, 1993, Management Meeting on Topical Review Plan held in Las Vegas, NV, the NRC generally intends to follow its historic application of TRs and corresponding Safety Evaluation Reports (SER) as found in nuclear facility licensing, and as is contemplated in 10 CFR 60.16 (i.e., timely resolution of licensing issues).

DOE recognizes that the development and regulatory review of the first program TR, and subsequent issuance of an SER, would involve unanticipated administrative and technical difficulties, regardless of the issue involved. DOE is on a learning curve with respect to making the data in our TRs easily tracked to its application within the document. From lessons learned, DOE hopes that future TRs developed to resolve issues will proceed more smoothly.

DOE looks forward to the upcoming site visit in the hope that we can clarify and resolve NRC questions. DOE requests that any questions that remain after the February 1-2, 1994, site visit be forwarded. This would include any clarifications on what additional information is needed to complete the TR review beyond what which has been noted herein as in preparation for submittal to the NRC.

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

Sincerely,

Lake H. Barrett, Deputy Director
Office of Civilian Radioactive
Waste Management

cc w/o enclosure:

R. Nelson, YMPO
R. Loux, State of Nevada
W. Offutt, Nye County, NV
T. J. Hickey, Nevada Legislative Committee
D. Bechtel, Las Vegas, NV
Eureka County, NV
Lander County, Battle Mountain, NV
P. Niedzielski-Eichner, Nye County, NV
L. Bradshaw, Nye County, NV
C. Schank, Churchill County, NV
F. Mariani, White Pine County, NV
V. Poe, Mineral County, NV
J. Pitts, Lincoln County, NV
J. Hayes, Esmeralda County, NV
B. Mettam, Inyo County, CA