Department of Energy
Washington, DC 20585

OCT 14 1992

Mr. Joseph J. Holonich, Director
Repository Licensing & Quality Assurance
Project Directorate
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Holonich:

Enclosed is the U.S. Department of Energy's response to a U.S. Nuclear Regulatory Commission's (NRC) comment made in its Phase I review of Site Characterization Study Plan 8.3.1.17.3.1, "Relevant Earthquake Sources." Enclosure 1 is the NRC Phase I letter, and Enclosure 2 is DOE's response to the comment. The DOE forwarded the comment to the U.S. Geological Survey's technical project officer and principal investigator for an assessment of potential impact on the planned study.

The NRC comment noted that two Site Characterization Analysis comments (Comments 48 and 66) are related to this study plan and remain open items. The NRC is concerned with the application of fault slip-rates to determine the level of hazard to a repository and the use of the 10,000 year cumulative slip earthquake (CSE) concept in general. These concerns have been the focus of technical exchanges between the DOE and the NRC in the past. The DOE intends to provide the best available estimate of the net slip component for faults active during the Quaternary Period to furnish a conservative estimate of ground motion that has a one-in-ten chance of occurring during the facility's lifetime. The DOE intends to reevaluate the Site Characterization Plan's CSE methodology in light of forthcoming new American Society of Civil Engineers seismic hazard guidelines and to consider present DOE policy for non-reactor facilities.

If you have any questions, please contact Mr. Chris Einberg of my office at 202-586-8869.

Sincerely,

John P. Roberts
Acting Associate Director for
Systems and Compliance
Office of Civilian Radioactive
Waste Management

Enclosures:
1. Ltr, 5/12/92, Holonich to Roberts,
   w/o encl
2. DOE Response to NRC Comments

cc: w\enclosures
Alice Cortinas, CNWRA, San Antonio, TX

cc: w\enclosures
C. Gertz, YMPO
R. Loux, State of Nevada
T. Hickey, Nevada Legislative Commission
M. Baughman, Lincoln County, NV
J. Bingham, Clark County, NV
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P. Goicoechea, Eureka, NV
C. Schank, Churchill County, NV
F. Mariani, White Pine County, NV
V. Poe, Mineral County, NV
E. Wright, Lincoln County, NV
J. Pitts, Lincoln County, NV
R. Williams, Lander County, NV
J. Hayes, Esmeralda County, NV
M. Hayes, Esmeralda County, NV
B. Mettam, Inyo County, CA
C. Abrams, NRC

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

MAY 12 1992

Mr. John P. Roberts, Acting Associate Director
for Systems and Compliance
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Mr. Roberts:

SUBJECT: PHASE I REVIEW OF U.S. DEPARTMENT OF ENERGY (DOE) STUDY PLAN, RELEVANT EARTHQUAKE SOURCES

On January 16, 1992, DOE transmitted the study plan, "Relevant Earthquake Sources" (Study Plan 8.3.1.17.3.1), to the U.S. Nuclear Regulatory Commission. for review and comment. NRC has completed its Phase I Review of this document using the Review Plan for NRC Staff Review of DOE Study Plans, Revision 1 (December 6, 1990).

The material submitted in the study plan was considered to be consistent, to the extent possible at this time, with the NRC-DOE agreement on content of study plans made at the May 7-8, 1986, meeting on Level of Detail for Site Characterization Plans and Study Plans.

A major purpose of the Phase I Review is to identify concerns with studies, tests, or analyses that, if started, could cause significant and irreparable adverse effects on the site, the site characterization program, or the eventual usability of the data for licensing. Such concerns would constitute objections, as that term has been used in earlier NRC staff reviews of DOE's documents related to site characterization (Consultation Draft Site Characterization Plan and the Site Characterization Plan for the Yucca Mountain Site). It does not appear that the conduct of the activities described in this study plan will have adverse impacts on repository performance and the Phase I Review of this study plan identified no objections with any of the activities proposed.

After completion of the Phase I Review, selected study plans are to receive a second level of review, called a Detailed Technical Review, based on the relationship of a given study plan to key site-specific issues or NRC open items, or its reliance on unique, state-of-the-art test or analysis methods. During the Phase I Review, the NRC staff observed that SCA open items (Comments 48 and 66) are related to this study plan. In Comment 48 the staff expressed a concern with the use of fault slip rates to determine the level of hazard to repository facilities; in Comment 66 the staff noted a concern with the use of the 10,000 year cumulative slip earthquake (CSE) concept. The aspects of the SCP that motivated the staff to generate those comments are reiterated in this study plan. The NRC staff wishes to call DOE's attention to these open items which have not been addressed in this study plan. Although we have decided

ENCLOSURE 1

not to proceed with a Detailed Technical Review because the NRC staff considers that such a review would only serve to restate the concerns already expressed in the SCA, we believe that the relationship between the CSE and the maximum-magnitude earthquake needs clarification, specifically, whether or not the design of facilities important to safety will be based on the maximum-magnitude earthquake or the CSE.

If you have any questions concerning this letter, please contact Charlotte Abrams, of my staff, on (301) 504-3403.

Sincerely,

Joseph J. Holonich

Joseph J. Holonich, Director
Repository Licensing and Quality
Assurance Project Directorate
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

cc: C. Gertz, DOE/NV
R. Loux, State of Nevada
S. Bradhurst, Nye County, NV
P. Niedzielski-Eichner, Nye County, NV
C. Thistlethwaite, Inyo County, CA
M. Baughman, Lincoln County, NV
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L. Vaughan II, Esmeralda County, NV
C. Schank, Churchill County, NV
T. J. Hickey, Nevada Legislative Committee

U.S. Department of Energy (DOE) Response to U.S. Nuclear Regulatory Commission (NRC) Letter on Study Plan 8.3.1.17.3.1
(Relevant Earthquake Sources)

NRC Comment

"During the Phase I review, the NRC staff observed that Site Characterization Analysis (SCA) open items (Comments 48 and 66) are related to this study plan. In Comment 48, the staff expressed a concern with the use of fault slip-rates to determine the level of hazard to repository facilities. In Comment 66, the staff noted a concern with the use of the 10,000-year cumulative slip earthquake (CSE) concept. The aspects of the Site Characterization Plan (SCP) that motivated the staff to generate those comments are reiterated in this study plan. The NRC staff wishes to call DOE's attention to these open items which have not been addressed in this study plan. Although we have decided not to proceed with a Detailed Technical Review because the NRC staff considers that such a review would only serve to restate the concerns already expressed in the SCA, we believe that the relationship between the CSE and the maximum-magnitude earthquake needs clarification, specifically, whether or not the design of facilities important to safety will be based on the maximum-magnitude earthquake or the CSE."

DOE Response

In SCA comments 48 and 66, the NRC's concern revolves around using geologically recent slip-rates and 10,000-year CSEs to determine the level of seismic hazard at Yucca Mountain. The NRC staff believes it is possible that such a methodology may not be conservative. In particular, they are not convinced that 10,000-year CSEs, calculated using the geologically recent slip-rate, will control assessments of repository performance when compared to maximum-magnitude earthquakes that have return periods greater than 10,000 years.

The DOE and NRC have conducted a technical exchange over these concerns (seismic hazards, June 12-13, 1990), and have a significant comment and response dialog. NRC's comment 52 on the Site Characterization Plan/Consultation Draft and response is a good example. The DOE, therefore, wishes to reemphasize two points with respect to these concerns. First, DOE intends to characterize Quaternary faults not only by their slip-rate, but also by the amount of displacement in individual events. Data on event-displacement is being actively sought in site characterization where faults are trenched and mapped. The DOE is also investigating the relative amount of strike- and dip-slip movement evidenced by faults. The NRC staff received a good explanation for how data was being collected to characterize faults in recently opened trenches on the September 17-18, 1992, Yucca Mountain site visit. Explanations provided by principal investigators about these trenches indicated to NRC staff that strike- and dip-slip components are both receiving careful attention. The goal is to provide the best available estimate of net slip for each fault, not just the dip-slip component.

Second, as stated in Study Plan 8.3.1.17.3.1, the 10,000-year CSE "is intended to define that earthquake for which the seismic design ensures minimal disruption to operation of facilities that are important to safety; the methodology is intended to provide a conservative estimate of ground motion that has a one-in-ten chance of occurring during the facility lifetime. Greater-than-CSE (emphasis added) events during the preclosure period are unlikely but possible, and the design of facilities important to safety must therefore also ensure safe performance for such events, including maximum-magnitude earthquakes. Engineering analyses to demonstrate safe performance for earthquake loads which exceed the nominal CSE design basis are an inherent part of the CSE approach to develop a sufficient seismic design." Thus, the current plan is to design facilities important to safety using the 10,000-year CSE, but also to ensure their safe performance under loads from maximum-magnitude events.

Finally, DOE is currently reevaluating the SCP methodology (including the 10,000-year CSE) to assess seismic hazards at Yucca Mountain. Guidelines being developed by the American Society of Civil Engineers and present DOE policy for non-reactor facilities are the impetus for this reevaluation. An issue resolution working group on DOE site characterization seismic hazard assessment methodology has identified the need to produce a position paper on this topic, once the new ASCE guidelines are completed in 1993.