

MAY 08 1990

NOTE FOR: Ronald L. Ballard, Chief
Geosciences and Systems Performance Branch
Division of High-Level Waste Management

FROM: John J. Linehan, Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

SUBJECT: COMMENTS ON PROPOSED GUIDANCE FOR PERFORMING PROBABILISTIC
SEISMIC HAZARD ANALYSIS (PSHA) FOR A GEOLOGIC REPOSITORY

The staff of the Repository Licensing and Quality Assurance Project Directorate (HLPD) has reviewed the internal draft of the proposed guidance on PSHA, transmitted by your memorandum of March 30, 1990, and has the following comments and recommendations. Several of these comments and recommendations were identified earlier, during informal reviews of the proposed guidance requested by your staff. Overall, the HLPD staff has concerns about the proposed guidance because of the degree to which the information it contains has been developed, because of the adequacy of the regulatory basis on which the guidance is premised, and because of how the information it contains has been organized.

Additional, but lesser comments are also provided for your consideration and these are included in Attachment 1; Attachment 2 is a mark-up of the internal draft itself.

Major Comment No. 1

It is not clear if the document achieves its intended goal of providing the U.S. Department of Energy (DOE) with guidance on the attributes of an acceptable PSHA (e.g., acceptance criteria) because of its' "text book-like format." In section 3.0 entitled "Technical Guidance and Discussion," for example, the text skips between the rationale behind the staffs' position on PSHA and the description of what the staffs' position on PSHA is, thus making it difficult to distinguish between the two. Although Waste Policy Management Memorandum No. 46 permits a format in which both the staffs' position and the rationale behind that position can be combined, it does so with the condition that the staffs' position be clearly identified as such. In a number of instances throughout the text, it is not clear what the staffs' position relative to PSHA is or, if a position is stated, the position may not be fully developed.

To further illustrate this point, in section 3.3.3 describing ground motion attenuation, there is no apparent staff position. Moreover, in this particular section, as well as in other portions of the text, frequent reference is made to journal articles; however, it is rarely evident what the significance of these articles is, especially in the context of this guidance. Do these journal articles embody the attributes of an acceptable PSHA? If they do, then it should be made clear to the reader.

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If the HLGP staff strongly believes that the PSHA topic does not warrant development as a TP, then the information contained in it should be transmitted to DOE in some other format. However, if this is the case, then there is no need to publish a public comment draft or undertake any of the other administrative steps identified in Waste Policy Management Memorandum No. 46. The decision on what type of guidance document to issue is the responsibility of HLGP. At present, the HLGP staff are following these steps; therefore, the document should be issued as a TP.

If you have any questions or desire additional information concerning these comments, please contact the PSHA Project Manager Michael P. Lee.

ORIGINAL SIGNED BY

John J. Linehan, Director
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 Project Directorate
 Division of High-Level Waste Management

Enclosures (2): As stated

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GENERAL COMMENTS

Abstract, page iii.

- (1) The abstract needs to be amended to indicate that consideration of differential fault displacement will be included in the probabilistic seismic hazard analysis (PSHA).

1.0 Introduction, page 2.

- (1) Paragraph 1: It is not clear from the discussion how and in what ways the methodologies for conducting a probabilistic risk assessment (PRA) have advanced during the last decade.
- (2) Paragraph 1: Does the reference to "subjective judgement" refer to "modeling assumptions?" The "subjective judgement" concept needs to be clarified.
- (3) Paragraph 2: How are "PRA methods" different from "PRA procedures?"
- (4) Paragraph 2: In noting that this guidance document comment will address seismic hazards, it should be pointed out that both faulting and earthquakes constitute this hazard.
- (5) Paragraph 2: The logic is missing on how one goes from a PRA to a PSHA.
- (6) As a Technical Position, Appendix C of Waste Policy Management Memorandum No. 46 requires the following statement regarding alternatives be added to the introduction:

"Technical Positions are issued to describe and to make available to the public criteria for methods acceptable to the NRC staff [for] implementing specific parts of the Commission's regulations, or to provide guidance to the [U.S.] Department of Energy. Technical Positions are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the position will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission."

2.0 Regulatory Framework

2.1 Background, page 3.

- (1) There is no explicit requirement in 10 CFR Part 60 for the need to conduct a PSHA. The basis for the acceptability to the staff of conducting a PSHA to assess the seismic hazard at the site appears to be missing from this section of the discussion and should be established.

- (2) The connection between the need to conduct a PSHA and its relationship, if any, to the complementary commutative distribution function (CCDF) is not clear. Furthermore, where, and at what point, will the design requirement for estimating vibratory ground motion and fault displacement be satisfied?
- (3) Much of the discussion on 40 CFR Part 191 and the CCDF appears to be superfluous to the PSHA. Unless the relationship between the CCDF and the PSHA can be clarified, we suggest deleting this discussion from the guidance.
- (4) On page 4, the discussion needs to be reworked to establish the relationship between "investigations" and "assess[ments]." The connection, as proposed in the text, is not clear.

2.2. Discussion

- (1) It is not clear how paragraph 2 (page 4) and paragraph 3 (page 5) are different. It sounds like paragraph 3 is a more generic description of paragraph 2.

3.0 Technical Guidance and Discussion

- (1) It isn't clear what items a-d on page 6 add to the technical discussion. It might be more appropriate to address the concepts they embody in section 1.0 entitled "Introduction."
- (2) Is paragraph 1 on page 7 a staff position?

3.1 Summary of Guidance, page 8.

- (1) Rather than summarizing what the staff position is, it might be more effective to just clearly identify it in the text under a separate section.

3.2 Probabilistic Seismic Hazard Analysis [Considerations]

No Comment

3.3 Seismic Hazard Model [Considerations]

3.3.1 Seismic Source Zones

No Comment

3.3.2 Earthquake Activities

- (1) Reference in the first paragraph (page 14) is made to the "corrected for completeness" concept. What does this concept mean and is DOE to do so in the manner described by the cited references? If so, the position should be stated as such and the concept briefly described.

- (2) On page 15, it is proposed that DOE consider a number of items when analyzing earthquake occurrences. How many staff positions are being stated under this subsection?

3.3.3 Ground Motion Attenuation (pages 15-16).

- (1) It is not clear what the staffs' position is relative to this concept.

3.4 Seismic Hazard Model [Considerations]

- (1) On page 16, it is not clear if the reference to the National Research Council's use of logic trees is intended to be a staff position. If it is, then there is a need to designate it as such and briefly describe the concept.

3.4.1 Seismic Source Uncertainty (page 17).

- (1) The text talks about the need to consider alternatives whereas the title makes no reference to alternatives. Is "uncertainty" the same as "alternatives" in this context? If so, then this point needs to be clarified.
- (2) What is the staff's position on seismic source uncertainty? It is not clear from the text.

3.4.2 Maximum Earthquake Magnitude Uncertainty

No Comment

3.4.3 Ground Motion Attenuation Uncertainty

- (1) Again, are we saying that DOE should consider ground motion attenuation uncertainty in the manner described by the references cited in this subsection? If so, we should make that clear in our guidance.

3.5 Sensitivity Analysis [Considerations]

No Comment

3.6 Fault Displacement [Considerations]

- (1) Do the references to Der Kiureghian and Ang (1977) and Kiremidjian (1984) on page 19 represent the staff's position on attributes of an acceptable analysis for differential fault displacement? If so, then this point should be made in the text. If not, then the significance of the references should be explained.
- (2) What characteristics or features should the "iterative procedure" described by Wang (1985) on page 20 have?

ENCLOSURE 2