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'85 MAY -6 ⁸³¹² NUCLEAR WASTE PROJECT OFFICE

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May 1, 1985

Dr. Donald L. Vieth, Director
Waste Management Project Office
Department of Energy
Post Office Box 14100
Las Vegas, Nevada 89114-4100

Dear Dr. Vieth:

I am in receipt of your April 3, 1985 letter transmitting the "Annotated Outline for Site Characterization Plans," dated February 1985. This office has conducted a detailed review of the document. We have concern with both the process for scoping the Site Characterization Plans (SCPs) conducted by DOE to date, and with the content of the Annotated Outline (AO).

We were rightfully disturbed to read in the April 3 letter that your office met on February 13 with representatives of the NRC to discuss the Annotated Outline for SCPs. According to the minutes of that meeting, the NRC representatives concurred on the AO as an acceptable implementation and interpretation of NRC Regulatory Guide 4.17 and that preparation of SCPs could proceed. It is apparent to us that: (1) NRC received and reviewed the AO prior to the February meeting; (2) this office did not receive a copy of the AO prior to the meeting; (3) a meeting announcement was not sent to this office; and (4) comments from the State of Nevada were not solicited until April 3, 1985. As a result, the NRC has had no benefit of reviewing and considering the comments of this office prior to their meeting with you and, therefore, the comments we are providing on the AO are of questionable value. We hope this SCP/AO process is not a preview of State/DOE interactions on site characterization activities.

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Even though our concerns, at this late date, are of questionable value as the SCP/AO process is well advanced, our office has prepared specific comments on the AO, which are enclosed. One overall comment from our review is that the AO is generic in its content, not site-specific. The AO should be focused specifically on the Yucca Mountain site, because of the many unique characteristics of the site, which separate it from the Washington or Texas sites. Due to the generic nature of the AO, some important topics are either poorly developed or not addressed at all. This problem may also be the result of an over-emphasis on meeting the letter of Regulatory Guide 4.17, which is also generic. Specifically, the unsaturated zone is addressed in only one section, consideration of defense waste is absent, description of the existing seismic monitoring network is absent, vertical vs. horizontal waste emplacement is not mentioned, and the effect of certain conditions on repository performance is only superficially noted. We would hope DOE gives full consideration to revising the AO to apply to Yucca Mountain conditions and lend additional confidence that the SCP will be complete and appropriate.

If there are any questions or clarifications on our comments, do not hesitate to contact us.

Sincerely,

Robert R. Loux
Director

gjb

Enclosure

cc: Mr. Robert Browning, Nuclear Regulatory Commission ✓

May 1, 1985

SPECIFIC COMMENTS ON
ANNOTATED OUTLINE FOR
SITE CHARACTERIZATION PLANS

- 1.3.2.1. Volcanic History
p. 8 Volcanic hazard is a critical issue at the Yucca Mountain site. It does not appear to be a major concern at the other two sites. Given the importance of volcanism as a potential repository hazard, the Site Characterization Plan (SCP) should discuss the implications that renewed volcanism may have on repository integrity.
- 1.3.2.2. Structural History
p. 9 The Annotated Outline (AO) indicates the SCP will consider that joints may form pathways from the repository to the accessible environment. There is a possibility that if the joints do provide potential pathways, fluid movement could be increased to the point that ground water travel time standards cannot be met. Since this point is important to the overall suitability of the site as a repository, the implication of these pathways on repository performance should be described.
- 1.4.1.1. Seismicity of Candidate Area
p. 10 Two comments are appropriate to this section:
1. The text indicates the SCP will identify the techniques used to locate all epicenters or hypocenters and to determine magnitudes. The error of location of all epicenters and hypocenters should also be discussed. Establishment of a location error for each epicenter, especially moderate to large events, will help promote confidence in seismic record and the relation of seismicity to tectonic structures. The error of location is also important in correlating earthquakes to geologic structures.
 2. This section should describe the existing seismic network in the candidate area as background for a discussion in Chapter 8 of possible changes to the seismic net to better characterize seismic conditions. A similar description of the existing seismic network should be included in Section 1.4.2., Seismology of Site, again as background for a Chapter 8 discussion of site characterization activities. We note that in Chapter 3, on

p. 24, there is a section which will describe the site hydrogeologic monitoring network; there should be a similar section for seismology.

- 1.4.2.3. **Potential for Induced Seismicity Affecting Site**
From the text discussion in this section, it appears the discussion will center on the possibility of induced seismicity and its effect on the site. Given that Yucca Mountain is in close proximity to present and future nuclear weapons testing, the potential is thus a reality. Therefore, the section should also describe the vibratory ground motion and the characteristics of seismic wave transmission of induced seismicity, similar to Sections 1.4.2.1. and 1.4.2.2. for natural seismicity.

It is also important that Section 1.4.2., Seismology of Site, consider induced seismicity in its analysis of maximum probable or credible events which could affect the site and the accompanying maximum horizontal and vertical vibratory ground motion.

- 1.7.1.
p. 13 **Mineral Resources**
The first sentence, "To the extent that information on the mineral resources is available prior to site characterization, the following information will be provided.", is a statement which can (and maybe should) be made in all technical areas. Information deficiencies are not unique to mineral resources, but are common to all technical areas in Part A. We recommend that either the first sentence be added to all technical areas in Part A, or the sentence be deleted from Section 1.7.1.
- 3.6.4.
p. 23 **Hydraulic Characteristics of Principal Hydrogeologic Units**
The AO indicates that this section will include a discussion of the appropriateness of assuming Darcian flow conditions in the various hydrogeologic units. We understand this inclusion comes straight from NRC Regulatory Guide 4.17. It appears that this discussion would be appropriate for Yucca Mountain, if the proposed repository were in the saturated zone, however, since the repository is proposed for the unsaturated zone, a discussion of non-Darcian flow conditions may be more appropriate. NRC Regulatory Guides are just guidelines, and are not required to be adhered to verbatim; therefore, DOE should modify this section (and any other section necessary in Chapter 3) to reflect the appropriate conditions of unsaturated zone hydrogeology.
- 3.9.3.4.
p. 26 **Unsaturated Zone Relationships**
Given the critical importance of unsaturated zone

hydrology in the ultimate viability of Yucca Mountain as a repository site, this section may be quite large and, thus, could benefit from subheadings. Possible subheadings might be:

- Characteristics of the Unsaturated Zone
- Principal Modes of Recharge
- Perched Water Zones
- Unsaturated Zone Flux Rates
- Flow Pathways
- Vapor Transport

3.9.7.
p. 27

Local Ground-Water Users

Is this section going to consider DOE-use during site characterization, and its affect on the ground-water system and other ground-water users?

4.1.2.
p. 30

Ground-Water Geochemistry

This section should include a discussion of the hydrochemistry of recharge water infiltrating the Yucca Mountain system. Hydrochemistry of the recharge water provides a base upon which discussions of unsaturated zone hydrochemistry, host rock geochemistry, and hydrogeochemistry along potential pathways evolve.

5.2.1.
p. 36

Paleoclimatology

The AO indicates that, "Potential changes in precipitation regimes and their influence on aquifer recharge...will be identified." We would recommend that identification include the effect of climate change on flow mechanisms in the unsaturated zone. As precipitation increases during a cooler climate, infiltration may increase, which could alter currently perceived flow conditions through the unsaturated zone.

5.2.2.
p. 36

Future Climatic Variation

This section will discuss how paleoclimate information is used to define future climatic variations. There is no mention of future ground water levels at the site, as might be influenced by climatic variation. Separately, there is no discussion of the possible impacts of climate change on repository performance.

6.2.
p. 40

Current Repository Design Description

The AO indicates the description of design concepts will focus on design features that are influenced by site characteristics. The AO should consider the alternative of vertical emplacement vs. horizontal emplacement as part of this discussion. Site charac-

teristics may greatly influence the selection of one emplacement mode over another.

The AO also indicates that major alternative design concepts will be described as part of design process. This description should include the alternative design concepts of a two-phased repository, first presented in the draft Mission Plan and then briefly mentioned in the draft Environmental Assessment.

6.3.2.
p. 43

Design of Underground Openings

This section should consider the alternatives of vertical vs. horizontal emplacement when discussing space requirements for emplacement, layout for separation and control and waste emplacement operations.

7.3.
p. 47

Design Descriptions

The section appears not to consider defense waste in either the reference design or alternative designs. At this point, it is almost a foregone conclusion that defense waste will comeingle with commercial waste, since comingling is described in both the draft Mission Plan and the draft Environmental Assessment. At a minimum, the waste package requirements of defense waste must be described along with any different package designs.

8.3.1.2.
p. 58

Geology

This section should also present studies necessary to character volcanic conditions.

8.3.1.3.
p. 58

Hydrology

This section should present the studies necessary to characterize past hydrologic systems at Yucca Mountain.

8.3.1.6.
p. 58

Resource Potential

Two comments:

1. This section should describe the studies necessary to assess the economic mineral and fossil fuel potential and the ground-water resources.
2. Geothermal resource potential should be considered in this section.

8.3.2.3.
p. 59

Coupled Interaction Tests

Direct Testing Guidance Number 2 states: "In evaluating overall repository performance, no credit is taken for the near-field host rock that cannot be characterized adequately." This statement engenders a concern from our perspective. If there is a situation where the near-field host rock cannot be adequately characterized, what might be the impact of that situation on the ultimate licensability of the site? A site which

cannot be adequately and completely characterized may not be licensable (or licensable with extreme difficulty) by the NRC, and thus the overall suitability of such a site for a repository is questionable.

8.5. Milestones, Decision Points, and Schedule
p. 69 The AO indicates that this section will identify the milestones and decision points established for the site characterization program up to submittal of the license application. According to Section 113 of the Nuclear Waste Policy Act, site characterization is complete with issuance of a final EIS. The presidential recommendation of a single repository site for development and submittal of a license application for construction to the NRC are not part of site characterization. Any milestones, decision points, or schedules presented in this section should be restricted to site characterization activities only.

8.5.6. Schedules
p. 70 Two comments:

1. The beginning of repository construction is not part of site characterization. The SCP should restrict milestone schedules to the completion of the final EIS. See previous comment on p. 69.
2. NRC Regulatory Guide 4.17 requests that all schedules identify submittals for NRC, State, Indian Tribe, and public review. The AO and SCP should reflect this guidance.

Appendix A, Table 2

p. A-5 Under the section heading on Stress Field, the AO explains that, "Regime is a more general term that does not imply that the complete three-dimensional stress field will be presented in this section." If the complete three-dimensional stress field will not be presented in this section, which section will it be presented in? This is an important topic for a complete understanding of the stress environment of the site.

Appendix A, Table 4

p. A-13 Under Section 3.9.5., we assume that, "evolution of ground water at the site," equates with, "age of ground water at the site."

Appendix A, Table 9

p. A-27 Under Section 8.3., the explanation and rationale does not address NRC Regulatory Guide 4.17, subsections 8.3.1. (Planned Tests with Radioactive Materials), and 8.3.2. (Planned Tests That May Affect Capability of Site to Isolate High Level Radioactive Wastes). We

have concern with these two issues and how they will be considered during site characterization. Either the AO should be revised to address these topics, or the explanation should be expanded to address how DOE will consider these topics within the existing AO.

gjb