



Department of Energy

Washington, DC 20585

NOV 23 1993

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:

This letter is in response to the U.S. Nuclear Regulatory Commission (NRC) letter to the U.S. Department of Energy (DOE), dated August 18, 1993. In this letter, the NRC conveyed six NRC staff concerns regarding technical issues on data-gathering, and the methodology and approach presented in the preliminary draft Los Alamos volcanism status report and related study plans. The letter also transmitted the Center for Nuclear Waste Regulatory Analysis' (CNWRA) comments on the draft Los Alamos report.

We wish to thank the NRC for providing their concerns and the CNWRA's comments to DOE. Since this was a draft contractor document, DOE will not provide NRC with formal responses to CNWRA comments nor track the comments as open items. However, we have transmitted the CNWRA comments to the Los Alamos authors who are in the process of finalizing their draft manuscript. Several of the comments provided useful technical information and are being incorporated in the final status report. The remainder of the comments will be considered in making final revisions to the Los Alamos document.

The transmittal of the draft Los Alamos report to the NRC provided the basis for discussion at the June, 1993 "Volcanism" technical exchange, and as such, focused on the current status of volcanism studies. The report was not, and is not, intended to be a DOE topical report or DOE licensing document. If DOE decides to produce a topical report, the NRC will be notified in accordance with the requirements of NRC's Topical Report Position Paper.

DOE appreciates the opportunity to interact with the NRC staff through their review of the draft Los Alamos volcanism status report. We feel that many of the NRC concerns were covered in the draft volcanism status report, however, to facilitate understanding of the volcanism studies, DOE has prepared a point-by-point discussion of the six NRC concerns (enclosure). We believe this will facilitate consideration of the new information presented in the draft report. We encourage the

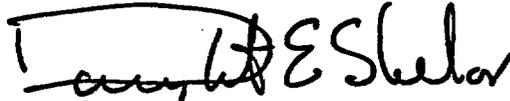
9312230010 931123
PDR WASTE PDR
WM-11

102.2 /
WM-11
NH03

NRC to continue to monitor volcanism studies through evaluation of the final volcanism status report and the YMP Site Characterization Progress Reports.

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

Sincerely,



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

Enclosure:
Discussion of the Six NRC
Concerns on Volcanism

cc:

R. Nelson, YMPO
T. J. Hickey, Nevada Legislative Committee
R. Loux, State of Nevada
D. Bechtel, Las Vegas, NV
Eureka County, NV
Lander County, Battle Mountain, NV
P. Niedzielski-Eichner, Nye County, NV
L. Bradshaw, Nye County, NV
W. Offutt, 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

Discussion of the Six NRC Concerns on Volcanism

NRC Concern 1

The adequacy of existing and planned characterization activities principally geophysical testing, to address key technical factors related to igneous activity cannot be determined. Based on information provided by DOE in study plans and other reports and at recent technical exchanges, the staff has no clear understanding of when or where additional geophysical testing will be used in the investigation of key technical factors related to igneous activity. As a result, the staff is unable to judge the sufficiency of planned testing.

DOE Discussion of Concern 1

The Los Alamos report presents the current status of ongoing studies. DOE has previously explained in the two issued volcanism study plans, and in several technical exchanges, that new geophysical testing will provide input to the volcanism program through the following studies:

- 8.3.1.4.2.1 - integrated seismic reflection/refraction profiles, ground-based electrical surveys, and ground-based magnetics, to characterize Paleozoic/Tertiary boundary beneath Crater Flat and characterize volcanic units.
- 8.3.1.8.5.2 - temperature logs of wells to characterize regional heat-flow and identify anomalies.
- 8.3.1.17.4.1 - passive seismic monitoring to identify structural discontinuities/magma bodies.
- 8.3.1.17.4.3 - integrated shallow-to-deep seismic reflection/refraction profiles, ground-based magnetics, regional magnetotelluric survey, and spectral analysis of Thematic Mapper Satellite Imagery, to characterize shallow and deep structures and/or volcanic features including potential magma bodies (if feasible), and identify structural domains.
- 8.3.1.17.4.4 - shallow seismic refraction profiles to evaluate NE-trending fault zones near Yucca Mountain.
- 8.3.1.17.4.6 - shallow seismic refraction profiles to image basalt flows and structures associated with Windy Wash Fault in Crater Flat.
- 8.3.1.17.4.7 - ground-based gravity survey of site area and ground-based magnetic survey of selected aeromagnetic anomalies to evaluate the subsurface extent and character of structural and volcanic features.

The results of planned geophysical testing feed into the volcanology program directly or through technical reports. In addition to supporting the development of integrated volcano-tectonic models, the geophysical studies support identification of potential Quaternary intrusive or extrusive basaltic events or existing magma bodies in the vicinity of the Yucca Mountain site required for volcanism Study Plan 8.3.1.8.1.1. Near-surface aeromagnetic anomalies have been and will be drilled and dated through volcanism Study Plan 8.3.1.8.5.1, and considered in calculations of event probabilities provided by Study Plan 8.3.1.8.1.1. Unfortunately, it is premature for the DOE to provide the technical details and schedule of planned geophysical testing to the NRC since those details have not yet been completed by the geophysical integration working group.

ENCLOSURE

NRC Concern 2

The "tripartite" probability as used in the draft Los Alamos report, although perhaps suitable for demonstrating compliance with the disqualifying conditions of 10 CFR Part 960, is insufficient for assessing compliance with 10 CFR Part 60 performance objectives, because not all the effects of volcanism (i.e., indirect) are considered in determining the relevant probability.

DOE Discussion of Concern 2

The "tripartite probability" is used to describe the contribution of the effects of basaltic igneous activity to the total repository system performance over the 10,000 year performance period. At the time of any license application, the risk evaluation approach for igneous activity will be integrated with that of other disruptive scenarios to estimate all releases from the repository system. However, the tripartite probability also permits preliminary estimates to be made of the potential for all or part of the basaltic volcanism disruptive scenario to result in releases which exceed regulatory limits for all scenarios. DOE has used this approach to assess whether currently available site data indicate that system or technical guidelines of 10 CFR Part 960 cannot be met and thus that the site should be found to be unsuitable and withdrawn from consideration for repository development.

NRC Concern 3

Conclusions made in the Los Alamos report, such as references to waning volcanism, are unsupported or poorly supported by data presented in the report. Although those conclusions may not directly affect the probability of disruption, they apparently are used to determine the "most likely" values. This lack of support casts doubt on the approach used, particularly the consideration of viable alternatives, and the conservatism of the analysis.

DOE Discussion of Concern 3

The conclusions regarding waning volcanism contained in the Los Alamos status report are preliminary. The limited evidence available points to volcanism being a waning process. Further site data will be presented and evaluated before such an assertion is included in a licensing document. In any case, the waning volcanism hypothesis is not critical to the evaluation of the probability of a basaltic event occurring in the vicinity of Yucca Mountain--the evidence is offered only to support the conservatism of assuming a steady-state process.

NRC Concern 4

The probabilistic analysis in the draft report does not incorporate models other than the homogenous poissonian model and, therefore, unwarranted a priori conclusions eliminating other probability models from consideration have been made.

DOE Discussion of Concern 4

DOE has not eliminated any probability models from the analyses. Many models are considered. In finalizing the Los Alamos status report, the authors are attempting to provide more explicit traceability between the conceptual models considered in Section III of their draft report, and the event probabilities presented in Section VII.

NRC Concern 5

The approach to addressing uncertainty in the analysis, including the treatment of alternative tectonic models, is not fully transparent. The staff considers that the analysis of volcanic hazard should explicitly treat the degree of data uncertainty and clearly present the potential for disruption of the site by all viable models. Failure to test and evaluate viable models because they may appear overly conservative is unwarranted prior to the completion of site characterization [this does not preclude the eventual selection of a most likely tectonic model].

DOE Discussion of Concern 5

We accept NRC's comment that the staff was unable to understand some of the probability calculations. As stated above, revisions of the Los Alamos document have been undertaken to attempt to be more explicit regarding uncertainty of the data and to make the calculations more readily traceable from section to section. However, DOE believes NRC's inference that Los Alamos failed to use all viable models is inaccurate. Table 7.7 of the Volcanism Status Report lists 13 structural models used in calculating E2. Table 7.6 lists 20 subsets of these models used in the probability calculations.

NRC Concern 6

There appears to be a lack of significant progress towards resolution of open items derived from previous study plan reviews, including some of the concerns noted above, in the Los Alamos draft report.

DOE Discussion of Concern 6

DOE has responded to a number of NRC's major concerns in revising two volcanism study plans (8.3.1.8.1.1 and 8.3.1.8.5.1) and in the preparation of the draft Los Alamos status report. On August 25, 1992, a videoconference technical exchange included considerable discussion of the importance of assessing the contribution of subsurface effects of volcanism. The DOE concurred with the NRC review comments that this issue needed to be covered more completely in the Volcanism Status Report and in the Probability Study Plan (8.3.1.8.1.1). DOE informed the NRC that much of the information requested concerning subsurface effects of volcanism would be covered in Study Plan 8.3.1.8.1.2. Additionally, the draft version of the Volcanism Status Report (particularly Section 7) and Study Plan 8.3.1.8.1.1 was modified extensively to respond directly to this NRC concern. Comment two of the August 18, 1993 letter indicates no apparent awareness of the effort on the part of DOE and their contractors to address this concern. DOE has also revised the study plans to state more clearly that alternative conceptual models and alternative interpretations of available data will be fully considered in evaluating the potentially adverse condition of igneous activity. The finalization of Study Plan 8.3.1.8.1.2, Physical Processes of Magmatism and Effects, has been expedited and will be available for transmittal to the NRC in September, 1993. DOE is currently awaiting formal NRC response to the revisions made to Study Plan 8.3.1.8.1.1, Probability of Magmatic Disruption of the Repository, and Study Plan 8.3.1.8.5.1, Characterization of Volcanic Features.