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Linehan Stablein (Return to WM, 623-SS)

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P. T. Prestholt NRC Site Representative 1050 East Flamingo Road Suite 319 Las Vegas, NV 89119

NUCLEAR REGULATORY COMMISSION (NRC) COMMENTS ON NEVADA NUCLEAR WASTE STORAGE INVESTIGATION PROJECT GEOLOGY DATA REVIEW

Enclosed, for your information, is a copy of a letter, dated June 25, 1985, to me from the United States Geological Survey (USGS). The letter addresses comments made by the NRC staff as a result of the September 17-21, 1984 Geology Data Review.

Please call J. S. Szymanski if you have any questions regarding this matter.

Donald L. Vieth, Director Waste Management Project Office

WMPO:JSS-1249

Enclosure: As stated

- cc w/encl: N. K. Stablein, NRC, Washington, DC M. A. Glora, SAIC, Las Vegas, NV R. B. Raup, Jr., USGS, Denver, CO T. O. Hunter, SNL, 6310, Albuquerque, NM L. D. Ramspott, LLNL, Livermore, CA W. W. Dudley, Jr., USGS, Denver, CO D. T. Oakley, LANL, Los Alamos, NM J. B. Wright, W, Mercury, NV M. E. Spaeth, SAIC, Las Vegas, NV

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United States Department of the Interior

GEOLOGICAL SURVEY
BOX 25046 M.S. 913
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

IN REPLY
REFER TO

June 25, 1985

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

ACTION HAMPO
INFO
R.F.
AMA
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AMO

RE: NRC COMMENTS ON NNWSI GEOLOGY DATA REVIEW

We appreciate the Nuclear Regulatory Commission's staff comments on the NNWSI review of geologic data. Some modifications of procedures have grown out of their comments--to the betterment, we think, of the program.

All comments in the covering letter and comment summary are discussed below in relation to specific comments except concerns expressed about Quality Assurance. Since the NRC data review, the Geologic Division of the USGS has added to the program a staff member whose principal duties are to 1) expedite preparation of QA procedures, 2) assure that all necessary procedures are in place, and 3) work closely with principal investigators and their staffs to ensure that they fully understand the rationale, objectives, and importance of the QA program. Some individual scientists originally were wary of the QA process, mainly because of misunderstandings and uncertainties about how QA is applied to scientific investigations. Significant progress has been made by relating QA to "good (and defensible) professional scientific practice," a concept widely understood. Many QA requirements are covered by documenting such "good practices"; the remainder still require education and effort--but the scope of the problem is much smaller.

Specific Comments

Core Library

Core logging practices.--A number of changes in practices at the Core Library have been made by DOE in conjunction with the USGS staff at the Library. Most changes relate to the use of existing materials, but consideration also has been given to the handling of core between the drill site and the Core Library. In lieu of detailed logging at the drill site, a major logistics problem, the plan is to systematically photograph the core at the drill site. Comparison of photographs with final boxed core at the Library would ensure that if errors occur during handling they would be identified and corrected. Other drilling-related data recommended by the NRC staff have been gathered regularly as part of the drilling record in the form of paper strips from continuous records on the rig. The records are kept by DOE as part of their drilling contract reporting but are available for consultation.

ACTION

CC: VIETH

CC: Blankenship

CC: Seymanski

Boreholes in Paleozoic rocks.--Another drill hole that would intersect Paleozoic rocks is among the holes proposed for FY 1987. Data from this hole certainly would be valuable, but experience at the Nevada Test Site suggests that hope for unequivocal structural data must be tempered with realism. Problems include uncertain core recovery, particularly at structurally complex intervals, and the difficulty of distinguishing between evidence of structural processes and the effects of other geologic processes on the basis of the small sample available from core.

#### G-Tunnel

Further studies of fractures in G-tunnel.--Studies in G-tunnel and at other analogous locations will continue as appropriate. Our main focus, however, is on the fractures of the repository block where observations are most directly applicable to characterization for hydrologic modeling, proposed tests in the exploratory shaft, and mining plans. Using "pavements," drill core, prototype pits, and eventually the underground workings, we believe we have the best chance to draw convincing and defensible conclusions about fracture origins, distribution, and effects on the repository.

#### Yucca Mountain

Fault investigations.--Study is continuing on the detailed structural framework of the repository block but with the clear recognition that the block is an integral part of a larger framework. Therefore both site specific and regional investigations are moving forward in concert. Additional discussion of northwest-trending faults at Yucca Mountain is in USGS Open-file report 84-567.

Stronger communication among USGS projects.--This observation is well taken and we are stressing better integration of various studies, including those not directly in the NNWSI program. Steps include more overview of planning details, better documentation of interactions (more were happening than could be demonstrated), and systematic group reviews of program elements.

Crater Flat studies.--Additional work is planned in FY 1986 and beyond for Crater Flat and for the more general question of regional volcanism as it relates to Yucca Mountain. Specific elements include additional drilling, application of higher-resolution dating techniques, and close integration with evolving concepts of regional tectonics.

More attention to surface study of joints and fractures.--A close and effective working relation exists between Scott and Barton and also between the geologists and hydrologists. We are confident that fracture mapping, "pavement" studies, core hole fracture studies, and hydrologic modeling are well integrated--but much is yet to be done. We appreciate the NRC staff's observations about the significance of these studies and agree completely.

### Trenches

**Fracture/fault fillings.--**A focused study of this matter is underway.

**Evidence of Quaternary offsets.--**Continuing detailed study not only of trenches but also of surface exposures along observed lineaments at and near Yucca Mountain is providing much additional information of fault ages, motion, and recurrence. Refinement of these data is underway even as new observations are being made. The relation between new neotectonics data and regional tectonics concepts is the subject of an in-house program review this fall. Implications for the proposed repository are among the items to be discussed with DOE at a meetings in late June and July 1985.

### Menlo Park

**Regional studies.--**In a terrane as geologically complex as southern Nevada, a site-scale study is too specific to provide answers or even defensible guidance for predictions of the tectonic behavior of the site during repository lifetime. Generalizations about the whole candidate area, on the other hand, are too broad to give a thoughtful and fair appraisal of the site. Therefore, a careful blending of the two will be most effective. We believe that the 1:100,000 scale is ideal for portraying the regional tectonic framework of the site and for demonstrating the basis for conclusions about future tectonic behavior. Also, additional geologic mapping and compilation in the region are underway as part of projects funded by direct appropriation to the USGS. This work is at a scale of 1:100,000. The common scale helps with integration of results, thereby enhancing the NRC-sponsored effect. Upcoming workshops, interagency discussions, and the Site Characterization Plan will further document the evolving direction of regional studies and their role in the selection and licensing process.

**Petrographic studies.--**Studies of thin sections from P-1 drill core will be reported systematically in the final report. The NRC staff's observation about more systematic annotation at the time of study is well taken. Additional petrographic studies of Paleozoic rocks, if pursued, will follow the lead of similar studies of Tertiary volcanic rocks, which have adhered to a stringent system of annotation for some time under the direction of Rick Spengler in Denver.

### Denver

**Uranium-trend dating technique.--**We are well aware that the uranium-trend dating technique is theoretically sound but still is very experimental in application. Interpretations involving uranium-trend dates must be carefully presented so that the levels of uncertainty are unequivocally clear. We are instituting a modified review procedure for reports to ensure that technical uncertainties, for example, are expressed clearly enough for a more general audience than the usual readership of technical products. Properly used and reported, the uranium-trend dating technique is an important tool added to the other techniques available to Quaternary geologists.

Lineament analysis.--We are sorry that the NRC team was unable to fully review the lineament studies at Yucca Mountain. Thorough analysis of these lineaments has been more effective than we had hoped. Although some linears are subtle vegetation lines with no clear geologic cause on the ground, others have guided field studies that have been remarkably informative about neotectonics.

Tectonic studies.--Added staff is building on the experience Will Carr has brought to tectonic studies of the Yucca Mountain area. The effect, we believe, will be an even better evaluation of the tectonic framework of the site.

Sincerely,



Robert B. Raup, Jr.  
USGS, Geologic Division Coordinator,  
NWSI

Copy to: J. F. Devine  
W. W. Dudley, Jr.  
E. H. Roseboom, Jr.