



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

OCT 30 1992

MEMORANDUM FOR: Ronald L. Ballard, Chief  
Geology and Engineering Branch

THRU: Keith McConnell, Section Leader  
Geology/Geophysics Section  
Geology and Engineering Branch

FROM: John S. Trapp  
Geology/Geophysics Section  
Geology and Engineering Branch

SUBJECT: TRIP REPORT ON TRB MEETING ON VOLCANISM

On September 14-16, 1992, Keith McConnell, M. Rose Byrne, Harold LeFevre, and John Trapp of the Division of High-Level Waste Management attended a meeting of the United States Nuclear Waste Technical Review Board, Panel on Structural Geology and Geoengineering (TRB), on the subject of volcanism. The first two days of the meeting consisted of talks by various participants and interested parties on work being undertaken in the area, while the third day consisted of a field trip to the Lathrop Wells-Crater Flat area. A copy of the agenda for this meeting and field trip is attached to this memorandum. The various meeting handouts are quite voluminous and have not been attached. However, they are present in the office of John Trapp for those who would wish to review them.

The majority of the presentations during the first day, while updating the work of the various participants, presented no information beyond what had been presented at the last TRB meeting in Tucson. The one exception was a paper by Frank Perry in which he presented additional results from geochemical analysis of samples from Lathrop Wells cone. These data appear to provide strong evidence that the material comprising Lathrop Wells cone could not have come from a single magma batch, but had to come from multiple batches. This would tend to argue for a polycyclic origin for Lathrop Wells cone as well as suggest a relatively long time period for development of this cone.

The session on the second day began with a presentation by Greg Valentine that was primarily aimed at addressing volcanic effects. His talk presented some preliminary results and described proposed activities that will be covered in a study plan on volcanic effects on repository performance, presently in review at Los Alamos National Laboratories. This presentation is considered significant as it represents the first clear indication that DOE participants are beginning to address processes, secondary effects, intrusive and subsurface characteristics, as well as provide a better understanding of the possible effects of extrusive volcanic events. When this study plan becomes available it should help resolve many outstanding staff concerns about the DOE volcanic characterization program.

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The talks by Turin and Champion of the United States Geologic Survey are of interest as their interpretation of the history of the volcanic centers in the area of Yucca Mountain is in direct contrast to the interpretations presented by the DOE participants and State of Nevada participants. Turin and Champion have interpreted their paleomagnetic, potassium-argon, and granulometric analyses to support a monogenetic history for the Lathrop Wells cone. They suggest that the entire eruptive history of Lathrop Wells could have spanned no more than 100 years.

Aside from the technical implications of the work of Turin and Champion, there is a Quality Assurance consideration which could become quite important. All other presenters (with the obvious exception of the NRC) at this meeting were project participants funded by either the State of Nevada or by DOE, and their work is being conducted under an approved Quality Assurance program. Turin and Champion are not project participants, but rather are performing their work under other USGS funding, and their work is not being conducted under a Quality Assurance Program that would meet NRC requirements. While it is recognized that the project is not yet in a licensing mode, the difference between the two existing technical interpretations and the differences in forensic documentation supporting each interpretation might lead to some difficult problems during development of the Safety Evaluation Report and any subsequent licensing hearings.

Clarence Allen, of the TRB, moderated a round table discussion at the end of the presentations in which he attempted to determine areas where consensus was being approached. In general, it would appear that it is premature to consider that consensus is or has developed on any issue discussed during the meeting.

On September 16 the first field trip stop was at the Lathrop Wells cone where several areas of past and ongoing field investigations were visited. The speed at which commercial quarrying operations are being conducted means that new exposures are constantly being opened up, however, old exposures are also being destroyed. At several of the stops the difference in opinion and interpretation between the DOE geologists and the USGS geologists were emphasized, and it does not appear that the differences will be resolved soon.

In a side discussion, the new water supply well for the quarrying operations was discussed. This well was reported to have encountered the groundwater table at about 300 feet. Water in the well had a temperature of approximately 95 degrees Fahrenheit. The source of the high temperature water, and the heating mechanism, is unknown.

At Steve's Pass the preliminary results of the ongoing DOE mapping of Crater Flat was discussed. Of interest is that the results of the mapping are being preliminarily interpreted as suggesting a rhomb pull-apart basin for Crater Flat. Such an interpretation would probably result in entirely different probability calculations for volcanic activity than the models currently being used to evaluate the likelihood of volcanic activity. It is premature to speculate on the validity of this model or the magnitude of the effect that such a model could have on probability calculations.

The final field trip stop was to view the Red Cone area where the State of Nevada investigators are working. The purpose of the stop was to review field

evidence that has been used to support their interpretations. Of interest is that the field evidence of multiple flows and erosion surfaces between features would appear to support multiple episodes of volcanic activity separated by relatively long periods of geologic time. In other words, the State of Nevada evidence would appear to support the DOE's interpretation of polycyclic volcanism, not the USGS interpretation. Such an interpretation of the data at Red Cone was contested, however, by Turrin and Champion of the USGS.

If there are any questions regarding this trip report, please contact either John Trapp at 504-2509, Harold Lefevre at 504-3464, M. Rose Byrne at 504-4668, or Keith McConnell at 504-3532.

John S. Trapp  
 Geology/Geophysics Section  
 Geology and Engineering Branch

cc: K. Hooks

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DATE	10/29/92	10/29/92			

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UNITED STATES  
NUCLEAR WASTE TECHNICAL REVIEW BOARD  
1100 Wilson Boulevard, Suite 910  
Arlington, VA 22209

**Tentative Agenda**

**Panel on Structural Geology & Geoengineering  
Meeting on Volcanism**

Alexis Park Hotel  
375 East Harmon  
Las Vegas, NV 89109  
(702) 796-3300

September 14-16, 1992

**Monday, September 14, 1992**

**1:00 P.M.**

**Welcome**  
Clarence R. Allen, Nuclear Waste Technical  
Review Board (NWTRB)

**1:10 P.M.**

**Introductions**  
Department of Energy (DOE), state of Nevada,  
Nuclear Regulatory Commission (NRC)

**UPDATE ON GEOLOGIC AND GEOPHYSICAL STUDIES**

**1:30 P.M.**

**Overview of Task Status**  
Bruce Crowe, Los Alamos National Laboratory  
(LANL)

**2:00 P.M.**

**Status of Lathrop Wells Studies**  
Bruce Crowe, LANL

**2:45 P.M.**

**Review of Age-Dating Activity**  
Don DePaolo, University of California at Berkeley

**3:30 P.M.**

**BREAK**

**3:45 P.M.**

**Paleomagnetism Studies**  
John Geissman, University of New Mexico (UNM)

-over-

**4:30 P.M.**

**Soils and Geomorphic Studies**  
Leslie McFadden, UNM  
or Steve Wells, University of California at Riverside

**5:15 P.M.**

**ADJOURN**

**Tuesday, September 15, 1992**

**8:30 A.M.**

**Opening Remarks**  
Clarence R. Allen, NWTRB

**UPDATE ON GEOLOGIC AND GEOPHYSICAL STUDIES (cont.)**

**8:40 A.M.**

**Petrology Studies -- Basal Cycles**  
Frank Perry, UNM

**9:30 A.M.**

**Progress in Field Studies of Recent Volcanism**  
Eugene Smith, University of Nevada-Las Vegas  
(UNLV)

**10:15 A.M.**

**BREAK**

**10:30 A.M.**

**New High-Precision  $^{40}\text{Ar}/^{39}\text{Ar}$  Step-Heating Results  
from Basalts near Yucca Mountain**  
Brent Turrin, U.S. Geological Survey (USGS)

**11:00 A.M.**

**New Paleomagnetic and Geologic Constraints:  
Evaluation of Polycyclic Volcanism in Basalts  
near Yucca Mountain**  
Duane Champion, USGS

**UPDATE ON PROBABILISTIC HAZARD STUDIES**

**11:30 A.M.**

**Status of Probability Studies**  
Bruce Crowe, LANL

**12:15 NOON**

**LUNCH**

**1:30 P.M.**

**Progress in Probabilistic Studies**  
Chih-Hsiang Ho, UNLV

**UPDATE ON VOLCANIC EFFECTS STUDIES**

**2:00 P.M.**

**Volcanic Effects/Magma Studies**  
Greg Valentine, LANL

**2:45 P.M.**

**NRC Perspective on Issue of Volcanism  
John Trapp, NRC**

**3:30 P.M.**

**BREAK**

**3:45 P.M.**

**Closing Remarks  
DOE, state of Nevada, NRC**

**4:15 P.M.**

**Round-Table Discussion**

- 1. On which issues is a consensus developing?**
- 2. On which issues are there serious differences?**
- 3. Are these issues important with respect to site suitability and public health and safety?**
- 4. How can these issues be resolved?**

**5:15 P.M.**

**Closing Remarks  
Clarence R. Allen, NWTRB**

**5:30 P.M.**

**ADJOURN**



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NUCLEAR WASTE TECHNICAL REVIEW BOARD  
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**Tentative Agenda**

**Panel on Structural Geology & Geoengineering**

**Field Trip**

**Las Vegas, Nevada**

**September 16, 1992**

**Wednesday, September 16, 1992**

- 7:00 A.M.** Depart Valley Bank Center  
101 Convention Center Drive  
Las Vegas, Nevada
- 9:00 A.M.** Arrive at Lathrop Wells Cone  
Several stops around the cone to understand geologic relationships of units, and to view evidence in trenches of buried lava and polycyclic volcanism
- 11:45 A.M.** Depart Lathrop Wells for Steve's Pass
- 12:05 P.M.** **LUNCH AT STEVE'S PASS**  
Discussion of tectonic framework for volcanic events in Crater Flat
- 1:00 P.M.** Depart Steve's Pass for Northern Crater Flat
- 1:20 P.M.** Arrive at Black Cone  
Discuss 1.2 million-year-old basalts - state of Nevada  
May also stop at Red Cone
- 3:15 P.M.** Depart Black or Red Cone for View of Northern Yucca Mountain and Discussion of 3.7 Million-Year-Old Basalts
- 4:45 P.M.** Depart Crater Flat for Las Vegas
- 7:00 P.M.** Arrive at Valley Bank Center