

7/31/95

NOTE TO: Susan Fridley, DCS

FROM: Mark Delligatti, DMM *MD*

SUBJECT: DOCUMENTATION AND PHOTOGRAPHS OF YUCCA MOUNTAIN  
ALTERED ZONE

Attached are two documents dealing with an altered zone found during the excavation of the Exploratory Studies Facility (ESF) at Yucca Mountain. The referenced photographs are being maintained in the Division of Waste Management and are available there for review.

010100

*NHOB 102-8  
WM-11*

**Response to NRC Questions at the ESF Technical Meeting on 7/19/95: Prepared 7/27/95**

- 1) Provide an official copy of YAP 30.27, "Reportable Geologic Condition", Rev. 0, ICN 0, with an effective date 7/24/95.

SEE ATTACHED YAP 30.27

- 2) a) Will the DOE prepare a report that deals specifically with the "fumarole" encountered in the ESF in the pre-Pah Canyon Bedded Unit?

Dennis Williams has informed Chad Glenn that this issue will be discussed in the tunnel geology report as will other parts of the stratigraphy. It is part of the normal geology and will not be treated otherwise.

- b) What samples were collected for the fumarole?

There were 57 samples taken.

- c) What study plan were the specimens collected for?

The samples collected were for the following PI's and study plans.

| <b><u>Investigator</u></b> | <b><u>Study Plan</u></b> | <b><u>Title</u></b>  |
|----------------------------|--------------------------|--|
| B. Carlos/D. Vaniman       | 8.3.1.3.2.1              | "Mineralogy , Petrology, and Chemistry of Transport Pathways"            |
| J. Whelan                  | 8.3.1.5.2.1              | "Characterization of the Quaternary Regional Hydrology"                  |
| J. Fabryka-Martin          | 8.3.1.2.2.2              | "Water Movement Test"  |
| S. Levy                    | 8.3.1.3.2.2              | "History of Mineralogical and Geochemical Alterations of Yucca Mountain" |

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|-------------|-------------|--|
| S. Beason   | 8.3.1.4.2.2 | "Characterization of Structural Features in the Site Area"   |
| Z. Peterman | 8.3.1.9.2.1 | "Mineral Resources Assessment of Yucca Mountain, Nye County" |

3) In the ESF, at the top of the PIN at 7+50 a noticeably wetter zone was encountered.

a) What samples were collected there, and what tests are being done to measure saturation?

At the top of the PIN at about 7+50, there were samples taken. Currently, there have been 12 samples taken between CS 7+40 and CS 7+65. G. Patterson is sample criteria is specifically for to moist rock. Saturation measurements will be made but no data are available at this time.

| Investigator               | Study Plan  | CS      | Title  |
|----------------------------|-------------|---------|--|
| G. Patterson(1)            | 8.3.1.2.2.4 | 7+58.63 | "Characterization of Yucca Mountain Percolation in the Unsaturated Zone" |
| B.Carlos(1)/D. Vaniman (1) | 8.3.1.3.2.1 | 7+59.17 | "Mineralogy, Petrology, and Chemistry of Transport Pathways"             |
| Z. Peterman(1)             | 8.3.1.9.2.1 | 7+59.17 | "Mineral Resources Assessment of Yucca Mountain, Nye County"             |
| J. Fabryka-Martini(1)      | 8.3.1.2.2.2 | 7+59.17 | "Water Movement Test"  |
| S. Levy(1)                 | 8.3.1.3.2.2 | 7+59.17 | "History of Mineralogical and Geochemical Alterations of Yucca Mountain" |
| B. Carlos(1)               | 8.3.1.3.2.1 | 7+61.15 | "Mineralogy, Petrology, and Chemistry of Transport Pathways"             |

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| Z. Peterman(1)   | 8.3.1.9 2.1 | 7+61.15 | "Mineral Resources Assessment of Yucca Mountain, Nye County"             |
| S. Levy(1)       | 8.3.1.3.2.2 | 7+61.15 | "History of Mineralogical and Geochemical Alterations of Yucca Mountain" |
| G. Patterson (3) | 8.3.1.2.2.4 | 7+57.53 | "Characterization of Yucca Mountain Percolation in the Unsaturated Zone" |

4) In the isometric view of the proposed thermal tests, the second to the last slide shown by William Boyle, the drifts are shown with a rectangular cross-section.

a) Why was that shape chosen?

The cross-section for the thermal test area is illustrative and drawn as a rectangular because it was easier to draw 3-D than the horseshoe shape. The actual shape of the heated drift region will be similar to current emplacement drift designs (i.e., circular, elliptical, or horseshoe) and there is no constraint on the shape of the access drifts. The access drift will probably have a shape similar to other ESF alcove breakout cross-sections.

5) Request for color photos shown in William Boyle's presentation. Also, include panoramic pictures of the right rib and left rib in ESF (location noted on photographs).

SEE ATTACHED COLOR PHOTOS AND PANORAMIC PICTURES

6) a) What is the plan for SD-12 should perched water be encountered?

Once it has been established that perched water has been encountered, DOE will stop drilling. The borehole will then be turned over to USGS for testing. Once USGS is through with their testing, the borehole will be instrumented for pneumatic monitoring.

b) Will DOE grout and keep drilling?

No, DOE will not grout and we will stop drilling.

- c) Will DOE stop and test?

Yes, once it is established that perched water has been encountered then drilling will be stopped and the borehole will be turned over to USGS for testing.

- 7) For the work scheduled, from July 1, 1995 to September 30, 1995, for the Ghost Dance Fault,

- a) Will brand new trenches be constructed?  
b) Will additions be made to existing trenches ?

Three trenches are to be complete within this time frame. One trench will be newly constructed (T5), the other two trenches are additions/modifications of existing trenches (T3 and T4).

- 8) Provide a description of the age dating of the perched water from SD-7.

Perched-water samples collected during the pumping test yielded consistent results of 28.5 percent modern carbon (PMC), carbon-13 of -9.5 per mil (0/00), del-D of -99.6 0/00, and del 18O of -13.4 0/00. The apparent radiocarbon age of about 10,800 years should therefore be corrected to account for the effects of caliche dissolution, which could result in corrected ages on the order of 7,000 years. These waters appear to be generally younger than waters in the saturated zone beneath the site, and because they are also isotopically heavier a post-Wisconsinan age is indicated. The consistency of isotopic and chemical compositions of the water pumped from SD-7 further suggest a post-Wisconsinan recharge event.