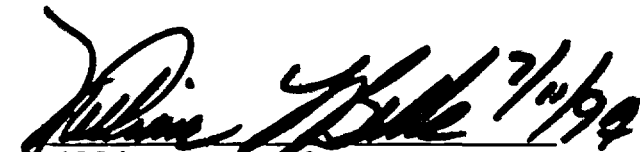


U.S. NUCLEAR REGULATORY COMMISSION
ON-SITE LICENSING REPRESENTATIVE REPORT

NUMBER OR-97-06

FOR THE REPORTING PERIOD OF JUNE 1-30, 1997

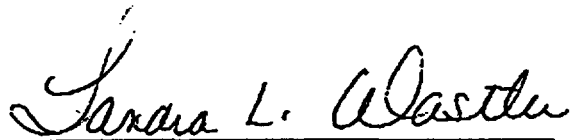

William L. Belke

Sr. On-Site Licensing
Representative
Performance Assessment &
High-Level Waste Integration
Section
Division of Waste Management


Chad J. Glenn

Sr. On-Site Licensing
Representative
Performance Assessment &
High-Level Waste Integration
Section
Division of Waste Management

Reviewed and approved by:


Sandra L. Wastler

Acting Section Leader
Performance Assessment &
High-Level Waste Integration
Section
Division of Waste Management

TABLE OF CONTENTS

U.S. NUCLEAR REGULATORY COMMISSION
ON-SITE LICENSING REPRESENTATIVE REPORT
NUMBER OR-97-06

	PAGE
1. APPROVAL SHEET.....	i
2. TABLE OF CONTENTS.....	ii
REPORT DETAILS	
1.0 INTRODUCTION.....	1
2.0 OBJECTIVES.....	1
3.0 SUMMARY AND CONCLUSIONS.....	1
4.0 QUALITY ASSURANCE, ENGINEERING, AND NRC KEY TECHNICAL ISSUES.....	2
5.0 EXPLORATORY STUDIES FACILITY AND KEY NRC TECHNICAL ISSUES.....	3
6.0 GENERAL	6
7.0 REPORTS.....	7

REPORT DETAILS

1.0 INTRODUCTION

The principal purpose of the On-Site Licensing Representative (OR) reports is to alert NRC staff, managers and contractors to information on the U.S. Department of Energy (DOE) programs for site characterization, repository design, performance assessment, and environmental studies that may be of use in fulfilling NRC's role during pre-licensing consultation. The principal focus of this and future OR reports will be on DOE's programs for the Exploratory Studies Facility (ESF), surface-based testing, performance assessment, data management systems and environmental studies. Relevant information includes new technical data, DOE's plans and schedules, and the status of activities to pursue site suitability and ESF development. The ORs also participate in activities associated with resolving NRC Key Technical Issues (KTI). In addition to communication of this information, any potential licensing concerns, or opinions raised in this report represent the views of the ORs and not that of NRC headquarters' staff. The reporting period for this report covers June 1-30, 1997.

2.0 OBJECTIVES

The function of the OR mission is to principally serve as a point of prompt informational exchange and consultation and to preliminarily identify concerns about site investigations relating to potential licensing issues. The ORs accomplish this function by communicating, consulting and identifying concerns. Communication is accomplished by exchanging information on data, plans, schedules, documents, activities and pending actions, and resolution of issues. The ORs consult with the DOE scientists, engineers, or managers with input from NRC Headquarters management on NRC policy, philosophy, and regulations. The ORs focus on such issues as QA, design controls, data management systems, performance assessment, and KTI resolution. A principle OR role is to identify areas in site characterization and related studies, activities, or procedures that may be of interest or concern to the NRC staff.

3.0 SUMMARY AND CONCLUSIONS

This report highlights a number of Yucca Mountain Project activities of potential interest to NRC staff. The OR's participated in the June 11, 1997, NRC/DOE quarterly technical meeting (video conference) held in Washington, D.C., and Las Vegas, NV. Also, an Appendix 7 meeting was held June 11-12, 1997, in Las Vegas, NV, to obtain information and clarification of the open issues related to the October 13, 1994, letter, R. Bernero, NRC, to

D. Dreyfus, DOE, expressing concerns with the quality assurance program. The ORs made arrangements and participated in several Yucca Mountain site visits by NRC technical staff and Center for Nuclear Waste Regulatory Analyses personnel.

4.0 QUALITY ASSURANCE, ENGINEERING, AND NRC KEY TECHNICAL ISSUES

- Following the June 11, 1997, quarterly technical meeting, an Appendix 7 meeting was scheduled for the remainder of this day and all day June 12, 1997. The purpose of this meeting was for NRC to obtain information and clarification of open issues related to the NRC October 13, 1994, letter to DOE (R. Bernero to D. Dreyfus) expressing concerns with the QA Program; the NRC April 3-6, 1995, In-Field Verification and selected NRC Site Characterization Analysis (SCA) Comments and Questions. The purpose of this Appendix 7 meeting was to obtain sufficient information and confidence that the corrective actions initiated for the DOE design control process and associated QA issues as related to NRC's KTI efforts, were being effectively implemented. This KTI related effort is expressed in Section 7.3.2 of the NRC High-Level Radioactive Waste Program Annual Progress Report for FY 1996. NRC emphasized that no policy or other decisions will be made at this Appendix 7 meeting and that its main purpose was to obtain information contributing towards closure of the NRC open items.

The meeting was attended by the NRC OR, NRC Technical Lead, DOE representatives, and representatives from the Civilian Radioactive Waste Management System Management and Operating Contractor (M&O). The State of Nevada also provided two representatives to observe this Appendix 7 meeting. Nye and Clark County representatives were invited but were unable to attend because of prior commitments.

Pertinent subject matter discussed at this meeting included: 1) numerical modeling of rockbolts; 2) design process improvements; 3) North Ramp ESF design; 4) seismic design parameters; 5) document hierarchy; 6) concrete invert classification; 7) pneumatic pathways; 8) ESF/GROA interface; 9) requirements flowdown; 10) procedure for reportable geologic conditions; 11) Regulatory Compliance Review Report; 12) selected SCA open items; and 13) the KTI item pertaining to the DOE design control process.

From the NRC perspective, this was a very useful and productive meeting in obtaining review information leading towards closure of the above mentioned open

issues. Preliminary feedback from the DOE and M&O participants appeared to agree with the NRC impression of the meeting being a worthwhile and productive with open dialogue.

Enclosure 1 reflects the current status of all the QA Open Items.

5.0 EXPLORATORY STUDIES FACILITY AND KEY TECHNICAL ISSUES

Exploratory Studies Facility (ESF) Testing:

The Tunnel Boring Machine (TBM) is being dismantled at the South Portal of the ESF. Geologic mapping and ESF construction and testing activities continue in Alcoves 5, 6, 7 and for the niche studies. Temperature, pressure, relative humidity, and air velocity measurements are being collected at several locations in the ESF main drift. Investigators continue to collect barometric pressure, temperature, and relative humidity data in Alcove 4 and monitor an evaporation test outside Alcove 3. Tensiometers and heat dissipation probes installed in the South Ramp and in Alcove 3 continue to measure the dry-out of tunnel wall rock. In the North Ramp, investigators are also dry coring approximately 20 shallow boreholes at various locations in the Paintbrush nonwelded unit for moisture studies. Seismographs in Alcoves 1 and 5 continue to monitor seismicity. There was no new testing activity conducted in Alcoves 1 and 2 over this reporting period. The location of alcoves and preliminary tunnel stratigraphy is summarized in Enclosure 2.

Alcove 5 (Thermal Testing Facility Access/Observation Drift, Connecting Drift, and Heated Drift)

Constructors completed drilling the heater and instrument boreholes for the Heated Drift Test over this reporting period. The installation and hook-up of heaters and monitoring equipment for this test continues. This test is designed to heat approximately 15,000 cubic meters of rock in the repository horizon to 100 degrees centigrade or greater to investigate coupled thermal-hydrologic-mechanical-chemical processes. This test is scheduled to begin in December 1997.

Alcove 5 (Thermomechanical Alcove)

The Single Element Heater Test started on August 26, 1996. This test is designed to heat approximately 25 cubic meters of rock to 100 degrees centigrade or greater to investigate thermomechanical properties of rock in the potential repository horizon. All instrumentation, with the exception of some chemistry probes, are reported to be working properly and the collection of test data continues. On May

28, 1997, DOE turned off the heater to initiate the cool-down phase of this test. Rock mass temperatures, closest to the heater, dropped 100 degrees centigrade one month into this phase of the test. On June 26, 1997, preliminary instrumentation measurements indicated rock mass temperatures of approximately 56.5 and 54.0 degrees centigrade at distances of 0.33 and 1.5 meters, respectively, from the midpoint of the heater element.

Alcove 6 (Northern Ghost Dance Fault Alcove)

Testing in Alcove 6 is designed to investigate the hydrochemical and pneumatic properties of the Ghost Dance Fault. The excavation of this alcove was completed over this reporting period. This alcove intersects the fault at station 1+54. At this location, the fault is approximately 1 meter wide with vertical offset of less than 10 meters. Investigators continue to test hydrologic properties of the Ghost Dance Fault from two radial boreholes in this alcove.

Alcove 7 (Southern Ghost Dance Fault Alcove)

Constructors previously excavated this alcove to station 1+34 meters and then drilled a horizontal radial borehole from the end of this alcove to locate the Ghost Dance Fault. This borehole cut a splay and the main trace of the Ghost Dance Fault at depths of approximately 30 and 63 meters, respectively. The alcove was then excavated an additional 16 meters to prepare for the first phase testing across the splay of this fault. Over this reporting period, the Seamist system was installed in the radial borehole to initiate gas sampling across the splay of the Ghost Dance Fault.

Niche Study

DOE has initiated work to reduce the uncertainty in amount of percolation flux through the potential repository horizon at Yucca Mountain. Two niches will be excavated in the right rib of the ESF Main Drift between Alcoves 5 and 6. Niche #1 (station 35+66) represents an area of potential fast percolation flux and Niche #2 (station 36+50) represents an area of potential slow percolation flux, based on the results of Chlorine 36 studies. Investigators hope to characterize these two areas to identify any difference in ambient conditions in potential fast and slow percolation flux areas. Niche testing activities include borehole logging, pneumatic testing, tracer injection, and seepage testing.

Over this reporting period, investigators drilled a number of boreholes at each niche location. Boreholes were logged and air injection testing completed. A dye was injected through a borehole at Niche #1.

Investigators excavated Niche #1 to a depth of 5 meters noting the presence of dye on fracture surfaces and installed gauges in the niche to monitor temperature and humidity. A curtain was placed over the entrance of this niche to prevent rock dry out. Additional radial boreholes will be drilled and instrumented inside each niche. Niche entrances will eventually be sealed with a steel bulkhead and allowed to equilibrate. Borehole instrumentation inside each niche will monitor ambient conditions. After ambient conditions are established, an aqueous tracer will be injected via boreholes above these niches and seepage monitored by this instrumentation. Niche #2 is expected to be excavated in July 1997.

Surface-Based Testing:

Fran Ridge Large Block Heater Test

The Fran Ridge Large Block Test (LBT) started on February 28, 1997, and continues its heat-up phase. The heat-up phase of this test is expected to continue through the August-September 1997 time frame. Rock mass temperatures are projected to reach approximately 140 degrees centigrade (near heaters) and 60 degrees centigrade (away from heaters). On June 12, 1997, two preliminary temperatures measurements of 116 and 98 degrees centigrade were obtained near the plane of the heaters. The purpose of this test is to gather data to evaluate thermal-hydrologic-mechanical-chemical processes in rock similar to potential repository horizon. This test will investigate: the development of a dry-out region around the heaters and a rewetting front after cessation of boiling; the development of heat pipes and the role of fractures in the reflux of condensed water; and the effects of changes in chemistry and mineralogy and their effect on hydrology. This test will also yield information on biological organism activity, and help to discriminate among alternate conceptual models.

Borehole Testing:

The location of boreholes referenced in this section is provided in Enclosure 3.

C-Hole Complex

Tracer testing at the C-Hole Complex is currently being conducted in the Bullfrog-Upper Tram interval of the Crater Flat Group for the purpose of determining hydrologic properties in the saturated zone. Conservative (non-sorbing) tracer testing continues at the C-Hole Complex. On January 9, 1997, investigators injected up to 4 kilograms of the tracer Prydone into borehole C#1 and up to 15 kilograms of the tracer 2,6 difluorobenzoic acid (DFBA) into borehole C#2. Breakthrough of DFBA occurred on January 16, 1997.

Peak concentration values of DFBA were measured on January 21, 1997. In April 1997, Pyridone tracer was detected in low concentrations (0.116 parts per billion) in water samples collected from borehole C#3. Initial breakthrough of Pyridone may have occurred in March 1997. Pyridone concentrations values are believed to have peaked over this period, however sampling and analyses of water pumped at C#3 will continue to be monitored through July 1997. Testing of the overlying Prow Pass interval of the Crater Flat Group is planned to begin by December, 1997.

New Boreholes Planned

DOE is proceeding with plans to drill two new boreholes in the Yucca Mountain area in FY97. One borehole (SD-6) will be located on the crest of Yucca Mountain and will penetrate the potential repository block. A second borehole (WT-24) will investigate the large hydraulic gradient north of the potential repository block. Based on current planning, these boreholes will be dry-drilled to depths ranging from 2500 to 3000 feet, and selected stratigraphic intervals will be cored in these boreholes. A standard suite of geophysical logs will also be run in each of these boreholes. Drilling of WT-24 is planned to start in late July 1997 followed by the drilling of SD-6.

Pneumatic Testing

Pneumatic data recording continues at boreholes UZ-4, UZ-5, UZ-7a, SD-12, NRG-7a, and SD-7. Gas sampling and pneumatic monitoring is being conducted in UZ-14. Nye County continues to record pneumatic data in boreholes NRG-4 and ONC-1.

OTHER ACTIVITIES

6.0 GENERAL

1. Meetings/Interactions

- The ORs attended the June 11, 1997, NRC/DOE quarterly technical meeting (videoconference) held between the DOE Office in Las Vegas, NV, NRC Headquarters in Washington, D.C, and the Center for Nuclear Waste Regulatory Analyses in San Antonio, TX. Enclosure 4 provides a list of the technical items related to the site characterization program discussed at this conference.

2. Appendix 7 Site Interactions

- On June 4, 1997, the ORs, two members from the NRC Division of Waste Management (DWM) technical staff, and a representative from the Center for Nuclear Waste Regulatory Analyses (CNWRA) visited the Yucca Mountain

- Site and Armagosa Valley area. There were no outstanding issues raised during this visit.
- On June 7-9, 1997, a DWM technical staff member and six CNWRA personnel conducted field work on infiltration and identification of plant communities in the Yucca Mountain and Shoshone Mountain areas. There were no outstanding issues raised during this visit.
 - A DWM technical staff member and four CNWRA personnel conducted ground magnetic geophysical surveys during the week of June 9, 1997. The purpose of these surveys are to investigate aeromagnetic anomalies that may represent buried igneous features and tectonic structures. Data analyses is presently underway.
 - On June 10, 1997, the ORs and two members from the NRC DWM technical staff visited the Yucca Mountain Site. There were no outstanding issues raised during this visit.
 - On June 27, 1997, the ORs and three members from the NRC DWM technical staff visited the Yucca Mountain Site, Ash Meadows, and Armagosa Valley area. There were no outstanding issues raised during this visit.

3. Other

- The ORs attended June 25-26, 1997, Nuclear Waste Technical Review Board meeting held in Las Vegas, NV. The agenda and subjects discussed at this meeting are provided in Enclosure 5.

7.0 REPORTS

Over this reporting period the following reports were received in the NRC Las Vegas office:

DOE

DOE/EIS-0200-F FINAL WASTE MANAGEMENT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT - For Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste - SUMMARY, May 1997

DOE/RW-0498 SITE CHARACTERIZATION PROGRESS REPORT: YUCCA MOUNTAIN, NEVADA, (4/1/96-9/30/96), April 1997

STATE OF NEVADA

NWPO-TR-025-97 FAULT-CONTROLLED VERTICAL LEAKAGE INFERRED FROM
WATER-TABLE TEMPERATURE VARIATIONS AT YUCCA MOUNTAIN, NV, 5/97,
T. Brikowski

NUREG

NUREG/CR-6372 RECOMMENDATIONS FOR PROBABILISTIC SEISMIC HAZARD
ANALYSIS: GUIDANCE ON UNCERTAINTY AND USE OF EXPERTS (Vol 1,
Main Report; Vol 2, Appendices), Senior Seismic Hazard Analysis
Committee, 4/97

NUREG/CR-6515 BLT-EC (Breach, Leach and Transport-Equilibrium
Chemistry) Data Input Guide, A Computer Model for Simulating
Release and Coupled Geochemical Transport of Contaminants from a
Subsurface Disposal Facility, R. MacKinnon, T. Sullivan, R.
Kinsey, 5/97

N= WAITING NRC ACTION O= NO FURTHER ACTION NEEDED
 D= WAITING DOE ACTION

	ISSUE	REFERENCE	STATUS
1	M&O DESIGN CONTROL PROGRAM	BERNERO TO DREYFUS LTR. 10/13/94	OPEN (N)
2	POTENTIAL OF CONSTRUCTION WORK TO IMPACT SITE CHARACTERIZATION OR THE WASTE CAPABILITY OF THE SITE	BERNERO TO DREYFUS LTR. 10/13/94	OPEN (N)
3	REQUEST FOR MORE DETAILS REGARDING QA CONCERNS AS WELL AS THE DESIGN OF THE ESF	BERNERO TO DREYFUS LTR. 10/13/94	OPEN (N)
4	LICENSE APPLICATION ANNOTATED OUTLINE (LAAO) INCOMPLETE AND EDITORIALY POOR	HOLONICH TO MILNER LTR. 8/15/95	OPEN (N)
5	LAAO CHAPTER 10 HEADINGS DO NOT REFLECT NRC GUIDANCE	HOLONICH TO MILNER LTR. 8/15/95	OPEN (N)
6	QUALITY CONTROLS APPLIED TO THE LAAO	HOLONICH TO MILNER LTR. 8/15/95	OPEN (N)
7	USGS TECHNICAL PROGRAM EFFECTIVENESS	HOLONICH TO MILNER LTR. 11/2/95	OPEN (D)
8	DATA QUALIFICATION	AUSTIN TO MILNER LTR. 3/18/96	OPEN (N)
9	LEVEL OF QUALITY OF WORK PRODUCTS	AUSTIN TO MILNER LTR. 10/24/96	OPEN (D)
10	EXEMPTION OS STATISTICAL ANALYSIS PROGRAMS FROM QA REQUIREMENTS	OBSERVER INQUIRY OF 11/12/96	CLOSED SEE #11 BELOW
11	DOE QARD SUPPLEMENT I GUIDANCE/REQUIREMENTS UNCLEAR FOR STATISTICAL ANALYSIS PROGRAM	SECTION 4.0 OF NRC ON-SITE FEB. 1997 REPORT	OPEN (D)

NRC QA ISSUES 1-10 WERE PRESENTED/DISCUSSED AT THE 12/5/96 QA MEETING.

ISSUE 11 HAS BEEN ADDED SINCE THAT MEETING, THEREBY CLOSING ISSUE 10 SINCE THIS PROBLEM INVOLVES A LARGER PROBLEM THAN THE ORIGINAL OBSERVER INQUIRY

NOTE: ALL THE ABOVE QA COMMENTS ARE DIRECTLY RELATED TOWARD IMPROVING INPUT AND ACQUISITION OF DATA FOR THE NRC KTI EFFORTS

RESOLUTION STATUS OF THE NRC OPEN QA ISSUES

ISSUE STATUS

- 1,2,3 DOE responded to NRC in its September 25, 1996, letter (Brocoum to Bell). In general, the QA portion is considered acceptable based on: 1) the NRC November 14, 1994, verification exercise; 2) revisions improvements to the overall design process; 3) the recent DOE QA Transition Plan, NRC observations of DOE audits/surveillances of the design process and; 4) meeting and observations of the design process by the ORs. The technical portion for this open item is presently being reviewed. An Appendix 7 meeting was held on June 12, 1997, in order for the NRC Technical Lead to obtain additional review information which may assist in the closure of the open items (W. Belke QA Lead, M. Nataraja NRC Technical Lead).
- 4,5,6 DOE responded to NRC in its March 21, 1997, letter (Brocoum to Thoma). In this letter, DOE indicates that the LAAO development will be terminated. It is also indicated that, should a repository licensing application be recommended in the future, information from the LAAO may be used in addition to other current NRC guidance. Should DOE submit such documentation in the future, the NRC comments that surfaced during its review of the DOE LAAO submittal will be considered. NRC will document its rationale for closure of these items in a formal letter to DOE.
- 7 DOE has initiated a comprehensive technical review of three key USGS technical documents. Should this review yield no major technical deficiencies, NRC will close this item at a subsequent QA meeting or in the monthly OR Report.
- 8 In late 1996, in response to the NRC August 19, 1996, letter (Austin to Brocoum), DOE organized a working group for improving the requirements and process for qualification of existing data. This was tracked by the ORs and was presented at the 5/12/97 QA meeting, and discussed at an Appendix 7 type meeting if necessary. From the OR perspective, this revised methodology appears to be responsive to the NRC position expressed in the above August 19, 1996 letter. This methodology will be documented in a forthcoming revision to the DOE Quality Assurance and Requirements Document. Should the review by the NRC HQ staff of this revised methodology be acceptable, this open item will be closed in a subsequent QA meeting and in the monthly OR Report.
- 9 As a result of the LANL audit, DOE wrote 4 Deficiency Reports. Corrective action to close these Deficiency Reports is scheduled for completion in July 1997. If this corrective action satisfactorily addresses the NRC Open

Item, it can be closed.

10 Closed

11 DOE has discussed the content of a future proposed clarification to the QARD for this open item with the ORs. This may be discussed at the 5/12/97, QA meeting. From the OR perspective, this proposed QARD clarification should close this open item.1

ESE TUNNEL STRATIGRAPHY*

STATION

0+00 to 0+99.5m

Tiva Canyon crystal poor upper lithophysal zone.

Alcove #1 (centerline station intersection):0+42.5

0+99.5 to 1+90m

Tiva Canyon crystal poor middle nonlithophysal zone

Alcove #2 (centerline station intersection):1+68.2

1+90 to 1+99.5m

Tiva Canyon crystal poor lower lithophysal zone.

1+99.5 to 2+02m

Bow Ridge Fault Zone (placing Pre-Ranier Mesa Tuff against Tiva Canyon Tuff)

2+02 to 2+63.5m

Pre-Ranier Mesa bedded tuffs

2+20

Fault (4.3m offset)***

2+63.5 to 3+33m

Tuff "X"

3+33to 3+49.5m

Pre-Tuff "X"

3+49.5 to 3+59.5m

Tiva Canyon crystal rich vitric zone

3+59.5 to 4+34m

Tiva Canyon crystal rich nonlithophysal zone

4+30m

Fault (~10m offset)***

4+34 to 4+39m

Tiva Canyon crystal rich lithophysal zone

4+39 to 5+53m

Tiva Canyon crystal poor upper lithophysal zone

5+50m

Fault (~5m offset)***

5+53to 5+87m

Tiva Canyon crystal poor middle nonlithophysal zone

5+87 to 6+17m

Tiva Canyon crystal poor lower lithophysal zone

ESE TUNNEL STRATIGRAPHY CONTINUED*

STATION

6+17 to 7+77m Tiva Canyon crystal poor lower nonlithophysal zone

7+00m Fault (~20m? offset)***

Alcove #3 (centerline station intersection):7+54.

7+77 to 8+69m Tiva Canyon crystal poor vitric zone

8+69 to 8+72.5m Pre-Tiva Canyon bedded tuffs

8+72.5 to 8+73.5m Yucca Mountain Tuff

8+73.5 to 9+12m Pre-Yucca Mountain bedded tuffs

9+12 to 10+20m Pah Canyon Tuff

10+20 to 10+51.5m Pre-Pah Canyon bedded tuffs

Alcove #4 (centerline station intersection):10+27.8

10+51.5 to 12+00m Topopah Spring crystal rich vitric zone

12+00 to 17+17m Topopah Spring crystal rich nonlithophysal zone

17+17 to 17+97m Topopah Spring crystal rich lithophysal zone

17+97 to 27+20m Topopah Spring crystal poor upper lithophysal zone

27+20 to 63+08m Topopah Spring crystal poor middle nonlithophysal zone

Alcove #5 (centerline station intersection):28+27

35+93m Sundance fault (most prominent fault plane, minor fracturing reported between Stations 35+85 and 36+40)

Alcove #6 (centerline intersection): 37+37

Alcove #7 (centerline intersection): 50+64

ESE TUNNEL STRATIGRAPHY CONTINUED*

STATION

57+30	Splay of the Ghost Dance Fault - Offset is approximately 2 meters
63+08 to 64+55	Topopah Spring crystal poor upper lithophysal zone
63+25	Fault with the offset estimated as 3.8 meters
64+55 to 65+07	Topopah Spring crystal rich lithophysal zone
65+07 to 65+25	Topopah Spring crystal rich nonlithophysal zone
65+23	Fault
65+25 to 65+27	Topopah Spring crystal rich lithophysal zone
65+27 to 66+33	Topopah crystal rich nonlithophysal zone
66+33 to 66+49	Topopah Spring vitric zone
66+49 to 66+80.5	Bedded tuffs
66+80.5 to 67+26	Tiva Canyon crystal poor vitric zone
67+26 to 67+62	Tiva Canyon crystal poor lower nonlithophysal zone
67+62 to 67+70	Tiva Canyon crystal poor vitric zone
67+70 to 67+88	Tiva Canyon crystal poor lower nonlithophysal zone
67+88 to 67+91	Dune Wash fault (offset is greater than 10m)
67+91 to 68+47	Topopah Spring crystal poor upper lithophysal zone
68+47 to 68+85	Topopah Spring crystal rich lithophysal zone
68+85 to 69+90.5	Topopah Spring crystal rich nonlithophysal zone
69+90.5 to 69+96	Topopah Spring crystal rich vitric zone
69+96 to 70+58	Bedded tuffs

ESE TUNNEL STRATOGRAPHY CONTINUED*

STATION

70+58	Fault (Offset greater than 10 meters)
70+58 to 71+68?	Topopah Spring crystal poor middle nonlithophysal zone
71+31?	Fault
71+68 to 73+02	Topopah Spring crystal poor upper lithophysal zone
73+02 to 73+41	Topopah Spring crystal rich lithophysal zone
73+41? to 74+40	Topopah spring crystal rich nonlithophysal zone
74+40 to 74+50.5	Topopah Spring vitric zone
74+50.5 to 74+96	Bedded tuffs
74+96 to 75+15	Tiva Canyon crystal poor vitric zone
75+15 to 76+03	Tiva Canyon crystal poor lower nonlithophysal zone
76+03 to 78+40	Tiva Canyon crystal poor middle nonlithophysal zone
76+32	Fault - offset estimated to be 0.2 meters
78+40 to 78+77	Tiva Canyon crystal poor upper lithophysal zone

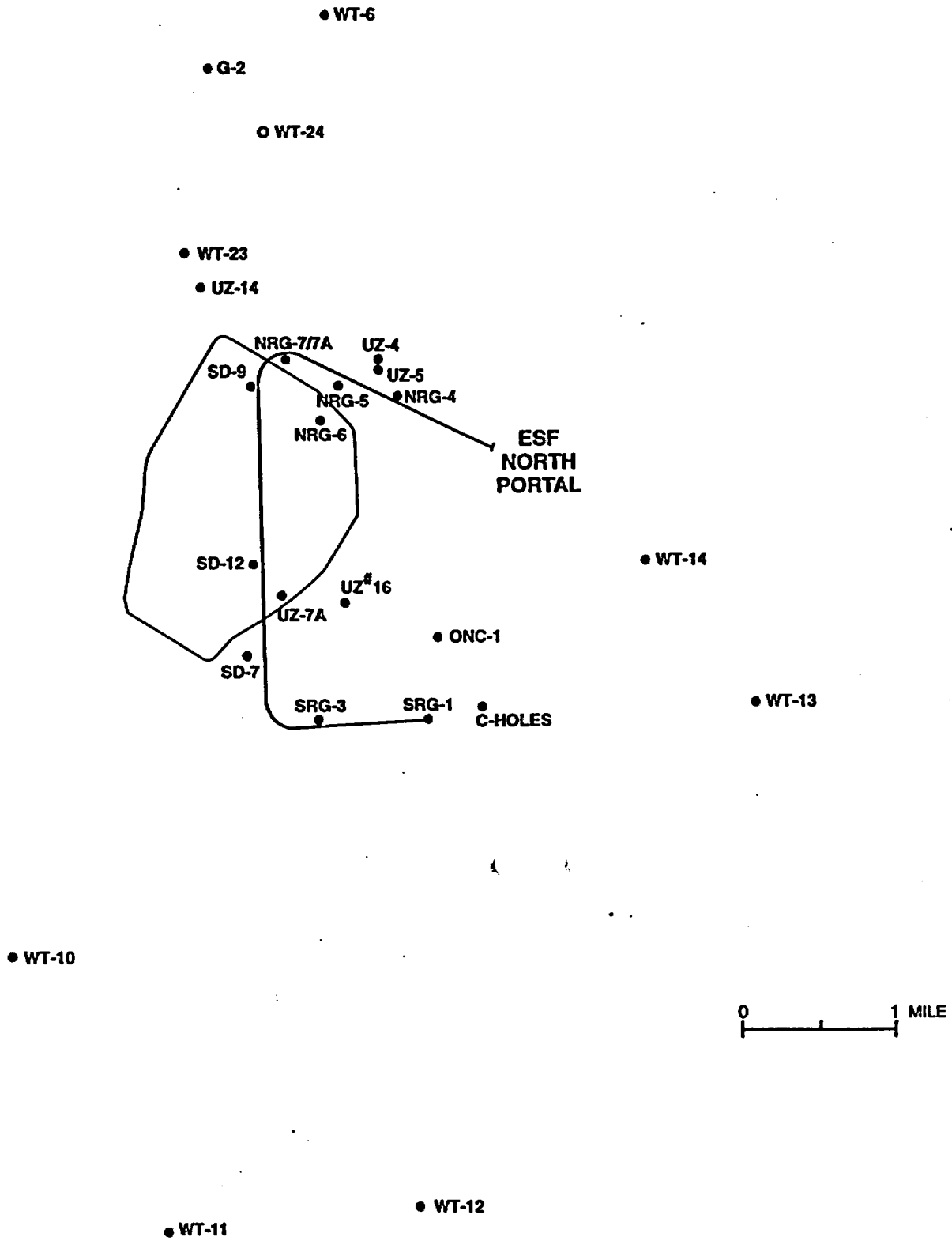
Note: Starting at station 57+02 and ending at 59+80, the crystal poor lower lithophysal zone is exposed in the lower portion of the tunnel (below springline).

* All stations given are referenced to the right springline unless otherwise noted. Station 0+00 is located at coordinates N765352.7, E569814.4.

? Indicates that contact is preliminary and has not been verified by USGS geologists.

*** Only significant faults are noted on the table.

Selected Borehole Locations



SELHOLES.CDR.123/9-7-95

**PROPOSED AGENDA
DOE-NRC VIDEO CONFERENCE
EXPLORATORY STUDIES FACILITY
[Page change. Re: Las Vegas Location]**

**June 11, 1997
9:00 — 2:00 p.m. (PST)**

**DOE Locations:
Summerlin Building 8
1180 Town Center Drive, Room 817, Las Vegas, Nevada**

**Forrestal Building
1000 Independence Avenue, SW (Room 7F088), Washington, D.C. 20585**

<i>Time</i>	<i>Subject</i>	<i>Lead(s)</i>
9:00 a.m. PST (12:00 EST)	Opening Remarks	DOE, NRC, State, AUG
9:10	ESF Construction Update - Status of Alcove Construction	DOE
9:30	Engineering Design Program - Status - Repository Description Document (RDD) - Design binning update	DOE, NRC
10:30	Scientific Studies Update - Thermal testing update - Additional work in existing tunnel	DOE
12:15 — 12:15	BREAK	
12:15	Other Topics - Mid-Year course correction - East/West drift	DOE, NRC State, AUG
1:45	Closing Remarks and Additional Discussion	DOE, NRC
2:00	Adjourn	



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
2300 Clarendon Boulevard, Suite 1300
Arlington, VA 22201-3367

Agenda

Summer Board Meeting

Crowne Plaza
4255 S. Paradise Road
Las Vegas, NV 89109
Tel: 702-369-4400
Fax: 702-369-3770

June 25-26, 1997

Ballroom A & B

Wednesday, June 25

- 8:00 a.m.** **Welcome and introductory remarks**
Jared Cohon, chair
Nuclear Waste Technical Review Board (NWTRB)
- 8:10 a.m.** **Status of the program and the viability assessment (VA)**
Lake Barrett, acting director
Office of Civilian Radioactive Waste Management (OCRWM)
- 8:25 a.m.** *Questions/discussion*
- 8:40 a.m.** **VA - description of the products and schedule for completion**
Steve Brocoum, OCRWM
- 8:55 a.m.** *Questions/discussion*
- 9:10 a.m.** **Comments on VA from the state of Nevada**
Bob Loux, state of Nevada
- 9:25 a.m.** *Questions/discussion*
- 9:40 a.m.** **Break (15 min)**

PERFORMANCE AND UNCERTAINTIES OF THE REPOSITORY DESIGN AND THE ENGINEERED BARRIER SYSTEM:

- 9:55 a.m.** **Session introduction**
Dan Bullen, NWTRB

June 25 - continued

- 10:00 a.m.** **The OCRWM waste containment and isolation strategy**
 Jean Younker, M&O (TRW Environmental Safety Systems, Inc.)
- Review of the OCRWM/management and operating contractor (M&O) waste containment and isolation strategy.
 - How does it take into account the large uncertainty in the percolation flux?
- 10:20 a.m.* *Questions/discussion*
- 10:30 a.m.** **Performance assessment viewpoint on the waste package performance**
 Bob Andrews, M&O (INTERA)
- Major issues and uncertainties in predicting the in-drift environment and waste package performance
- 10:45 a.m.* *Questions/discussion*
- 10:55 a.m.** **Repository design and operations**
 Richard Snell, M&O (TRW Environmental Safety Systems, Inc.)
- Review of the present design and operations of the proposed repository.
 - How will the large uncertainty in the percolation flux impact this design?
 - What are the alternative design concepts?
- 11:15 a.m.* *Questions/discussion*
- 11:30 a.m.** **Waste package design and materials**
 Dave Stahl, M&O (B&W Fuel Company)
- Major issues and uncertainties with the waste package design
- 11:45 a.m.* *Questions/discussion*
- 11:55 a.m.** **Behavior of cementitious materials**
 Della Roy, Penn State University
- Major issues and uncertainties on the near field environment due to use of cementitious materials
- 12:20 p.m.* *Questions/discussion*
- 12:30 p.m.** **LUNCH (1 hour)**

REPOSITORY PERFORMANCE AND UNCERTAINTIES IN THE NATURAL SYSTEM

- 1:30 p.m.** **Session introduction**
 Debra Knopman, NWTRB

June 25 - continued

- 1:35 p.m.** **Performance assessment viewpoint on the natural barriers**
 Abe Van Luik, DOE
- Key technical issues and remaining problem areas for total system performance assessment–viability assessment (TSPA-VA).
 - Significant enhancements/changes for TSPA-VA.
- 1:50 p.m.* *Questions/discussion*
- 2:05 p.m.** **The process and objectives of the unsaturated zone expert elicitation project**
 Kevin Coppersmith, Geomatrix
- 2:15 p.m.* *Questions/discussion*
- 2:25 p.m.** **Infiltration, the unsaturated zone model, and expert elicitation results**
 Bo Bodvarsson, M&O (Lawrence Berkeley National Laboratory)
- 2:45 p.m.* *Questions/discussion*
- 2:55 p.m.** **Break (15 min)**
- 3:10 p.m.** **Expert viewpoint on the process and results**
 Shlomo Neuman, University of Arizona
- 3:35 p.m.* *Questions/discussion*
- 3:50 p.m.** **Expert viewpoint on the process and results**
 Gaylon Campbell, Washington State University
- 4:15 p.m.* *Questions/discussion*
- 4:30 p.m.** **Lessons learned from the expert elicitation**
 Bob Andrews (M&O) and Bo Bodvarsson (M&O)
- Who are the intended customers of this information?
 - How will this elicited information be used in TSPA-VA?
- 4:40 p.m.* *Questions/discussion*
- 5:00 p.m.** **Questions/comments from the public**
- 5:30 p.m.** **Adjourn until Thursday 8:00 a.m.**

Thursday, June 26

- 8:00 a.m.** **Session introduction**
Priscilla Nelson, NWTRB
- 8:05 a.m.** **Saturated zone flow and transport**
Dwight Hoxie, USGS
• How YMP is addressing remaining uncertainties of the saturated zone that are important for TSPA
- 8:30** *Questions/discussion*
- 8:50 a.m.** **Projected plans and costs of additional work through license application (post-VA)**
Jean Younker, M&O
- 9:05** *Questions/discussion*
- 9:15 a.m.** **Performance confirmation after licensing**
Richard Wagner, M&O
- 9:30** *Questions/discussion*
- 9:45 a.m.** **Plan for developing projected costs of repository construction and operation**
Mitch Brodsky, DOE
- 10:00** *Questions/discussion*
- 10:15 a.m.** **Break (15 min)**
- 10:30 a.m.** **East-west tunnel crossing the repository block, planned studies and their objectives**
Mike Voegele, M&O (Science Applications International Corporation)
- 10:45** *Questions/discussion*
- 11:00 a.m.** **Update on scientific activities at Yucca Mountain**
Larry Hayes, M&O (TRW Environmental Safety Systems, Inc.)
- 11:30** *Questions/discussion*
- 12:00** **Comments from the public**
- 12:45 p.m.** **Closing comments**
Jared Cohon, NWTRB
- 1:00 p.m.** **Adjourn**