



**Department of Energy**  
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P.O. Box 30307  
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MAY 29 1997

QA: N/A

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**FIELD TEST COORDINATION REPORT FOR THE WEEK ENDING MAY 23, 1997**

Enclosure 1 lists site characterization field activities that are currently active. Many of these are ongoing monitoring and mapping activities; therefore, only those activities having significant status change are addressed below.

**C-HOLE COMPLEX HYDRAULIC INTERFERENCE TESTING**

The U.S. Geological Survey (USGS) received permission from the State of Nevada to inject up to 4 kilograms of the tracer pyridone into borehole C#1. The tracer was injected on January 9, 1997. Sampling and analysis of the water pumped from C#3 continues. No updated results have been received as of the date of this report. The C-holes testing is expected to continue through June of 1997. Tracer testing helps to understand flow in the saturated zone and yields data to help model the travel of radionuclides in the saturated zone.

**ENGINEERED BARRIER - LARGE BLOCK TEST**

Lawrence Livermore National Laboratory continues the thermal testing at the Large Block. The temperature at the top of the block is nominally at the steady-state boundary condition of 60°C. No new temperature readings were reported this week. The Large Block Test will yield information on movement of water under thermal load, geochemistry of refluxing water, and biological organism (microbe) activity.

**EXPLORATORY STUDIES FACILITY (ESF) TESTING**

The Tunnel Boring Machine (TBM) is being dismantled at the South Portal.

Data collection in support of construction monitoring continues. Geologic mapping continues intermittently as the TBM is moved out of the ESF. Preliminary tunnel stratigraphy identified to date is summarized in Enclosure 2.

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Multiple Addressees

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ESF Alcove 5 (Thermal Testing Facility Access/Observation Drift [AOD], Connecting Drift, and Heated Drift):

Drilling of instrumentation holes for the Heated Drift Test resumed on April 9, 1997, and has continued around-the-clock, five or six days per week, in order to meet upcoming testing objectives and milestones. The drilling program for the Heated Drift Test is currently ahead of schedule. The following holes were completed or are in progress this week:

Hole Name	Start	Finish	Total Depth (m)	Purpose
ESF-HD-TEMP-19	5/19/97	5/19/97	20.1 m	Temperature
ESF-HD-TEMP-18	5/19/97	5/20/97	20.3 m	Temperature
ESF-HD-WH-28	5/19/97	5/19/97	11.6 m	Wing Heater
ESF-HD-MPBX-4	5/19/97	5/20/97	14.8 m	Extensometer
ESF-HD-ERT-10	5/20/97	5/21/97	16.0 m	Tomography
ESF-HD-WH-29	5/20/97	5/20/97	11.6 m	Wing Heater
ESF-HD-WH-31	5/20/97	IN PROGRESS	(7.1 m)	Wing Heater
ESF-HD-MPBX-3	5/21/97	5/21/97	15.1 m	Extensometer
ESF-HD-ERT-10	5/21/97	5/21/97	15.9 m	Tomography
ESF-HD-CHEM-9	5/21/97	5/22/97	40.1 m	Chemistry
ESF-HD-ERT-9	5/22/97	5/23/97	19.8 m	Tomography
ESF-HD-MPBX-5	5/22/97	5/22/97	15.1 m	Extensometer
ESF-HD-TEMP-13	5/23/97	IN PROGRESS	(7.4 m)	Temperature
ESF-HD-MPBX-6	5/23/97	IN PROGRESS	(4.7 m)	Extensometer

The Heated Drift Test will heat approximately 15,000 cubic meters of the rock of the repository horizon to a temperature of 100°C or greater in order to investigate the coupled processes under thermal loading.

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**ESF Alcove 5 (Thermomechanical Alcove):**

The Single Heater Test (SHT) started on schedule on August 26, 1996. The instruments, except the water chemistry probes, are reported to be working properly and data are being collected. The SHT will heat approximately 25 cubic meters of rock to 100°C or greater. Plans are to turn the heater off on Thursday, May 29, 1997, and monitor the instruments during a six-to-nine month cool down period.

The following temperature readings have been reported from three thermocouple holes parallel to the heater. The holes are at radial distances from the heater of 0.33, 0.67, and 1.48 meters. Each measurement is made at an axial distance along the thermocouple hole that puts the measurements at the mid-length of the heater. These measurements were made on May 27, 1997, and continue to generally show an increase in temperature:

Radial Distance from Heater Center Point (m)	Temperature in Degrees Celsius
0.33 m	159.0°C
0.67 m	124.2°C
1.48 m	78.4°C

The purpose of this test is to understand heat related processes and measure physical parameters. Some of these processes include heat transfer (conduction and convection), moisture movement, and geochemical changes (water chemistry changes due to heating of the rock). In addition, the results from the SHT will provide guidance for instrumentation and conducting the Drift Scale Test in Alcove 5. The results will be available for the Viability Assessment (VA) design; specifically, thermal properties, deformation of the rock at elevated temperatures, and performance of rock bolts at elevated temperatures.

**ESF Alcove 6 (Northern Ghost Dance Fault Alcove):**

Drilling of a second borehole across the Ghost Dance Fault was completed this week. The USGS is preparing to perform Hydrologic Properties of Faults testing in the boreholes for approximately the next four months.

Hole Number	Start	Finish	Depth (Meters)	Purpose
ESF-NDR-MF #2	5/16/97	5/21/97	30.6 m	Hydrochemistry

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**ESF Alcove 7 (Southern Ghost Dance Fault Alcove):**

The USGS has experienced difficulties installing the Seamist system in the borehole due to fractured rock in the area of testing interest (the splay of the Ghost Dance Fault). Efforts to clean the borehole out enough to allow testing to proceed are continuing. Currently, the borehole is being cleaned using a vacuum dust collection system alternating with a borehole video.

**Niche Drift Study (Niche #1):**

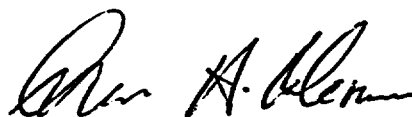
Pneumatic and air injection tracer testing continued this week in the three niche boreholes. Current plans are to inject dye in the holes next week and begin excavation of the niche using an Alpine Miner on or about June 9, 1997.

**Niche #2**

Preparations are underway for drilling of seven boreholes in the silhouette of the niche. Drilling may start next week.

Niche Studies are part of the Risk Reduction Strategy for VA and focus on unsaturated zone hydrochemistry testing.

If you have any questions, please contact Drew H. Coleman at 295-7825.



Drew H. Coleman  
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AML:DHC- 1638

**Enclosures:**

1. Site Characterization Field  
Activities in Progress
2. Tunnel Stratigraphy

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**Multiple Addressees**

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# Site Characterization Field Activities in Progress

<u>SCP ACTIVITY</u>	<u>TITLE</u>	<u>ACTIVITY</u>
8.3.1.3.2.1	Mineralogy, Petrology, and Rock Chemistry of Transport Pathways	ESF Sampling, Borehole Sampling
8.3.1.3.2.2	Mineralogic and Geochemical Alteration	ESF Sampling, Borehole Sampling
8.3.1.4.2.2	Structural Features Within Site Area	Surface & ESF Mapping
8.3.1.17.4.3	Quaternary Faulting Within 100 km of Yucca Mtn.	Surface Mapping
8.3.1.17.4.4	Quaternary Faulting in NE-Trending Fault Zones	Surface Mapping
8.3.1.17.4.6	Quaternary Faulting Within Site Area	Trench Logging
8.3.1.2.1.1	Precipitation and Meteorological Monitoring for Regional Hydrology	Ongoing Measurements
8.3.1.2.1.2	Runoff and Streamflow	Ongoing Measurements
8.3.1.4.2.1	Characterization of Vertical/Lateral Distribution Stratigraphic Units in Site Area	Core Logging (all boreholes), surface of geophysical surveys
8.3.1.2.1.3	Regional Groundwater Flow System	Ongoing monitoring
8.3.1.2.2.1	Unsaturated Zone Infiltration	Shallow borehole neutron logging
8.3.1.2.2.2	Water Movement Tracer Tests	Cl <sup>36</sup> measurements (SBT drillholes, ESF)

## **Site Characterization Field Activities in Progress Continued**

<b><u>SCP ACTIVITY</u></b>	<b><u>TITLE</u></b>	<b><u>ACTIVITY</u></b>
8.3.1.2.2.4	Characterization of Unsaturated Zone (ESF)	Hydrochemistry/Radial Boreholes testing
8.3.1.2.2.6	Gaseous Phase Movement in the Unsaturated Zone	Pneumatic pathways monitoring
8.3.1.2.3.1	Site Saturated Zone Groundwater Flow System	Ongoing monitoring, C-well testing
8.3.1.2.3.2	Saturated Zone Hydrochemistry	Ongoing monitoring
8.3.1.4.3.1	Systematic Acquisition of Site Specific Subsurface Information	Core logging
8.3.1.15.1.8	In Situ Design verification	Construction monitoring/testing
8.3.1.9.2.1	Natural Resource Assessment of Yucca Mountain	Rock sampling
8.3.1.3.4.2	Biological Sorption and Transport	Sampling in ESF
8.3.1.19.5.1	Engineered Barrier System Field Tests	Sampling in ESF

## ESF TUNNEL STRATIGRAPHY\*

### STATION

0+00 to 0+99.5m	Tiva Canyon crystal poor upper lithophysal zone.
<u>Alcove #1</u> (centerline station intersection):0+42.5	
0+99.5 to 1+90m	Tiva Canyon crystal poor middle nonlithophysal zone
<u>Alcove #2</u> (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

## ESF 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.