



Department of Energy
Office of Civilian Radioactive Waste Management
Yucca Mountain Site Characterization Office
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MAY 23 1997

QA: N/A

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FIELD TEST COORDINATION REPORT FOR THE WEEK ENDING MAY 16, 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. A new lab technique is being tried which slowed reporting of the concentrations, but concentrations are thought to be continuing at about the same levels as those reported two weeks ago. 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.

Instrument installation and 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	Depth (meters)	Purpose
ESF-HD-TEMP-7	5/12/97	5/12/97	20.0 m	Temperature
ESF-HD-TEMP-11	5/12/97	5/13/97	20.0 m	Temperature
ESF-HD-WH-25	5/13/97	5/14/97	11.6 m	Wing Heater
ESF-HD-TEMP-12	5/13/97	5/14/97	19.8 m	Temperature
ESF-HD-TEMP-15	5/14/97	5/15/97	20.1 m	Temperature
ESF-HD-WH-26	5/14/97	5/14/97	11.6 m	Wing Heater
ESF-HD-WH-27	5/14/97	5/15/97	11.6 m	Wing Heater
ESF-HD-TEMP-8	5/14/97	ABANDONED	(10.2 m)	Temperature
ESF-HD-TEMP-14	5/15/97	5/15/97	19.9 m	Temperature
ESF-HD-WH-24	5/15/97	5/15/97	11.6 m	Wing Heater
ESF-HD-WH-22	5/15/97	5/16/97	11.6 m	Wing Heater
ESF-HD-TEMP-10	5/15/97	5/15/97	20.4 m	Temperature
ESF-HD-TEMP-6	5/15/97	5/16/97	19.8 m	Temperature
ESF-HD-WH-23	5/16/97	IN PROGRESS	1.52 m	Wing Heater
ESF-HD-TEMP-16	5/16/97	5/16/97	20.0 m	Temperature
ESF-HD-TEMP-20	5/16/97	IN PROGRESS	(8.1 m)	Temperature
ESF-HD-TEMP-8A	5/16/97	5/16/97	11.5 m	Temperature
ESF-HD-CHE-8	5/16/97	IN PROGRESS	1.5 m	Chemistry

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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.

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.

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 15, 1997, and continue to generally show an increase in temperature:

Radial Distance from Heater Centerpoint (m)	Temperature in Degrees Celsius
0.33 m	159.2°C
0.67 m	124.1°C
1.48 m	78.2°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 borehole across the Ghost Dance Fault was completed this week. Temperature monitoring was conducted on May 15, 1997, in the completed borehole which satisfies project milestone "Start of Testing in Alcove 6."

Hole number	Start	Finish	Depth (meters)	Purpose
ESF-NDR-MF #1	5/12/97	5/14/97	30.5m	Hydrochemistry

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ESF Alcove 7 (Southern Ghost Dance Fault Alcove):

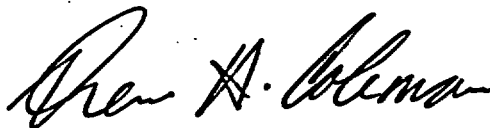
The excavation of the Southern Ghost Dance Fault Alcove is continuing using an Alpine Miner AM-75 and progressed to station 1+51.6 meters this week. This completes the excavation far enough to allow the USGS to begin planned pneumatic and hydrochemistry testing across the Ghost Dance Fault and splays from the fault. The Seamist system for pneumatic testing and sampling could not be installed in the borehole, so efforts continued to clean the borehole and prepare it for testing.

Niche Drift Study:

Pneumatic and air injection tracer testing continued in the three niche holes this week for Niche#1. When the niche area is excavated, at a later date, dye may be injected to help trace the fracturing. The Drift Niche Studies are part of the Risk Reduction Strategy for VA and focus on unsaturated zone hydrochemistry testing.

Area	Hole number	Start	Finish	Depth (meters)	Purpose
Niche	ESF-MD-NICHE#3a	5/2/97	5/3/97	10.0 m	Hydrology
Niche	ESF-MD-NICHE#2	5/5/97	5/6/97	10.0 m	Hydrology
Niche	ESF-MD-NICHE#1	5/7/97	5/7/97	10.0 m	Hydrology

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



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AML:DHC-1615

Enclosures:

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

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cc w/encls:

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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 ³⁶ measurements (SBT drillholes, ESF)

Site Characterization Field Activities in Progress Continued

<u>SCP ACTIVITY</u>	<u>TITLE</u>	<u>ACTIVITY</u>
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.

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+33 to 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+53 to 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 35+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

ESF 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.