

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

**SUBJECT: STATUS OF SURFACE BASED
TESTING**

PRESENTERS: SUSAN B. JONES

**PRESENTER'S TITLE
AND ORGANIZATION: ASSISTANT MANAGER, SCIENTIFIC PROGRAMS
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
LAS VEGAS, NEVADA**

**PRESENTER'S
TELEPHONE NUMBER: (702) 794-7613**

**BEATTY, NEVADA
JANUARY 11, 1995**

NWTRB Concern:

Sharply Reduced Scope of Surface- Based Drilling

| <u>Key Deep Borehole Type</u> (primary purpose) | | <u>Number of Deep Boreholes Drilled</u> | | |
|--|--|--|-------------------|------------------|
| | | 1/95 | TSS (9/96) | LA (9/99) |
| WT Water Table (hydrochemistry / aquifer tests) | | 16 | 17 | 20 |
| UZ Unsaturated Zone | | 10 | 12 | 17 |
| SD Systematic Drilling | | 3 | 4 | 11 |
| G Geologic (3D Geologic Framework) | | 4 | 5 | 6 |
| Totals | | 33 | 38 | 54 |

NWTRB Concern:

Sharply Reduced Scope of Surface- Based Drilling

| <u>Program</u> | <u>Number of Holes Tested/Sampled</u> | | |
|---------------------------------------|--|-------------------|------------------|
| | <u>Jan. '95</u> | <u>TSS</u> | <u>LA</u> |
| Geophysical logs-all boreholes | 14 | 30 | 65 |
| Thermal - mechanical tests | 11 | 15 | 26 |
| Rock Properties | 26 | 29 | 37 |
| Saturated Zone Testing | 0 | 7 | 17 |
| Unsaturated Zone Testing | 10 | 12 | 17 |

PRELIMINARY PLAN FIELD WORK FOR FY95 - FY99
AS OF JANUARY 10, 1995

| | Boreholes | Stemming | Pumping/Cleaning | Geophys. Logging | Soil & Rock |
|-------------|---|--|---|--|---|
| FY95 TSS | WT-24 SD-7 SD-12 (finish) UZ-7a | NRG-7a NRG-6 UZ-7a UZ-16 UZ-4 UZ-5 | NRG-4 C-Well phases 1,2 and 3 UZ-7 UZ-4 UZ-5 WT-10 G-2 WT-12 WT-11 | LBL geophysics ONC #1 UZ-4 G-2 SD-7 SD-9 SD-12 UZ-7a WT-24 UZ-7 WT-10 WT-11 WT-12 | Trenches: Rock Valley Crater Flat Amargosa Valley Bare Mtn. Sleeping Buttes ESF Leach field |
| FY96 TSS | G-6 SD-3 V-1 V-3 V-4 SRG-3 SRG-3 SRG-3 SRG-3 UZ-12 | SD-12 UZ-6 UZ-6s UZ-14 SRG-3 | WT-6 WT-10 WT-14 | G-6 UZ-13 UZ-6s SD-3 SRG-3 V-1 V-3 V-4 UZ-6 UZ-14 SRG-3a SRG-2 SRG-1 UZ-12 WT-6 WT-14 | South Portal Pad and Access Water Tank Trenches |
| FY97 LA | SD-11 UZ-11 SD-6/H-7 STC-3 WT-23 | UZ-7a UZ-11 UZ-6 SD-3 SD-11 2 - SRG holes | WT-2 WT-17 WT-1 6 additional | H-4 G-4 VH-1 WT-13 WT-17 WT-2 UZ-B1H A-6 WT-23 STC-3 SD-6/H-7 UZ-11 SD-11 | Repository surface facilities test pits and boreholes Trenches |
| FY98 LA | UZ-9 SD-4 UZ-9a SD-8 UZ-9b STC-1 STC-2 WT-9 | UZ-9 UZ-9a SD-4 SD-8 | WT-4 WT-18 WT-3 WT-7 | H-1 UZ-9 UZ-9a UZ-9b SD-4 SD-8 STC-1 STC-2 WT-9 WT-4 WT-18 WT-3 V-7-7 | Repository surface facilities test pits and boreholes Trenches |
| FY99 LA | SD-2 SD-10 UZ-2 SD-1 WT-21 G-5 WT-9a UZ-8a | UZ-8a UZ-9b SD-10 SD-1 SD-2 | WT-15 | SD-1 SD-2 SD-10 G-5 UZ-2 UZ-8a WT-9a WT-21 WT-15 | |

Key Deliverables FY 1995

- **Preliminary framework geologic model (1/95)**
- **Preliminary tectonics models (5/95)**
- **Results of geophysics at Yucca Mountain (9/95)**
- **Letter report: preliminary saturated zone model (6/95)**
- **Intermediate unsaturated zone hydrologic framework model (9/95)**
- **Letter report: preliminary fracture flow model of Tiva Canyon, Yucca Mountain, NV (9/95)**

Key Deliverables FY 1995 (contd)

- **Preliminary report on unsaturated zone hydrochemistry (9/95)**
- **Summary report on site-scale integrated transport**

BACK UP MATERIAL

GEOLOGY PROGRAM
Field Summary

| PRESENT (JAN 95) | PLANNED FOR TSS (End FY96) | PLANNED FOR LA (End of 1999) |
|---|--|---|
| Preliminary 3-d site geologic framework model | Intermediate geologic framework and integrated site area 3-d models. | Final Integrated site area 3-d models. |
| 4 G-holes completed | 5 G-holes completed | 6 G-holes completed |
| 3 SD boreholes available | 4 SD boreholes completed | 11 SD holes available |
| 9 NRG holes completed | 4 or 5 SRG and 9 NRG holes completed | All NRG and SRG boreholes |
| 40 existing (pre '92) holes; non-Q: geophysical logs | 40 existing (pre '92) holes; non-Q: geophysical logs | 40 existing (pre '92) holes; non-Q: geophysical logs |
| 14 Boreholes: post '92 geophysical logs (Q) | 30 boreholes: post '92 geophysical logs (Q) | 65 boreholes: post '92 geophysical logs (Q) |
| Thermal/Mechanical Tests: core from 11 wells | Thermal/Mechanical Tests: core from 15 boreholes and ESF | Thermal/Mechanical testing: core from 26 boreholes and ESF |
| Acquired 30 KM Geophysical data; regional, and repository areas underway | 50 KM plus interpreted seismic, gravity and magnetic profiles, regional and 2d local | |
| 26 boreholes: Rock properties information (porosity, permeability, density, etc.) | 29 boreholes: Rock properties information (porosity, permeability, density, etc.) | 37 boreholes: Rock properties information (porosity, permeability, density, etc.) |
| Construction monitoring: design verification and rock mass properties investigations underway | Construction monitoring at repository level | Complete ESF tests for rock mass properties |

HYDROLOGY PROGRAM
Field Summary

| PRESENT (January 1995) | PLANNED FOR TSS (End of 1996) | PLANNED FOR LA (End of 1999) |
|---|--|---|
| 16 WT Boreholes Drilled | 17 Boreholes Drilled | 20 Boreholes Drilled |
| No Hydrochemistry/Aquifer Tests (WT Boreholes) | Preliminary Hydrochemistry/Aquifer Tests From 7 Boreholes | In Situ Hydrochemistry/Aquifer Tests From 17 Boreholes |
| Phase I Testing (Initial Barometric Response) at C-Wells | Preliminary Cross-Hole Aquifer and Tracer Testing at C-Wells | Completed Cross-Hole and Aquifer Testing at C-Wells and Possible Initial Testing at Second Location |
| Radial Borehole Testing in 1 Alcove | Radial Borehole Testing in 3 Alcoves | Radial Borehole Testing in 4 Alcoves |
| No Intact Fracture Tests in ESF | 1 Intact Fracture Test in ESF | 2 Intact Fracture Tests in ESF |
| Laboratory-Scale Diffusion Tests | 1 Field-Scale Diffusion Test in ESF (12-Month Duration) | 2 Field-Scale Diffusion Tests in ESF (1 of Possible Long-Term Duration) |
| 10 Unsaturated Zone Boreholes Drilled (Testing in Progress) | 12 Unsaturated Zone Boreholes (Testing to Continue Beyond TSS) | 17 Unsaturated Zone Borehole Drilled (Testing to Continue Beyond LA) |

Field Activities 10/93 - 1/95

Drilling, Coring, Testing, and Instrumentation

- **Completed drilling of UZ-16 (3/93) and air-K and hydrochemistry testing to investigate hydrologic and transport parameters in the unsaturated zone**
- **Completed drilling and coring of UZ-14 to 1442 ft (12/93). Investigated perched water conditions**
- **Completed drilling of neutron boreholes (8/93) to investigate infiltration processes and soil moisture conditions**
- **Completed drilling and coring of SD-9 to 2223 ft.**
- **Drilling of SD-12 completed to 1413 ft.**
- **Completed instrumentation of NRG-6 and NRG-7a.**
- **Completed drilling of radial boreholes in alcove #1 to support air-K, hydrochemistry testing to determine hydrologic and geochemical parameters**

Mapping

- Detailed geologic maps of Ghost Dance fault underway
- Structural maps of Ghost Dance fault pavement completed
- Quaternary mapping completed of 2/3 of YM site
- Full periphery map of starter tunnel completed
- Initial 3-D geologic model (LYNX) of YM developed

Geophysics

- Regional geophysics line (22 miles) data acquisition completed
- Initial results received for shallow seismic reflection ground gravity and magnetic profiles at YM

Tectonics Program, Seismic Hazards

- Excavated trenches on Ghost Dance fault, Rock Valley faults, Solitario Canyon fault splays
- Completed 2 shallow boreholes on Stage Coach Road fault to evaluate early Quaternary displacement history - age dating in progress
- Upgraded the Southern Great Basin Seismic Network

Tectonics Program, Volcanic Hazards

- Volcanism status report
- Geochronology studies completed at Lathrop Wells

Hydrologic testing at C-Well complex

- Packer strings installed and tested.
- Phase I open hole barometric testing completed - to investigate ground water travel time and transport under saturated fractured conditions.
- C-well discharge pipeline completed and discharge basin constructed.

ESF Design/Repository Support

- Drilled 9 boreholes in support of engineering design of North Ramp
- North Ramp geologic cross section completed
- Geoengineering reports completed for North Ramp
- Excavated trench above North Ramp alignment to test engineering properties of non-welded air-fall tuff to be encountered in North Ramp.

Other

- **Initiated thermal studies on qualified specimens from the repository block**
- **Cut block to be used in Large Block thermal/mechanical tests**
- **Sampling and reconnaissance for P-Tunnel test**