

**U. S. Department of Energy
Office of Civilian Radioactive Waste Management**

Update on Major New Work

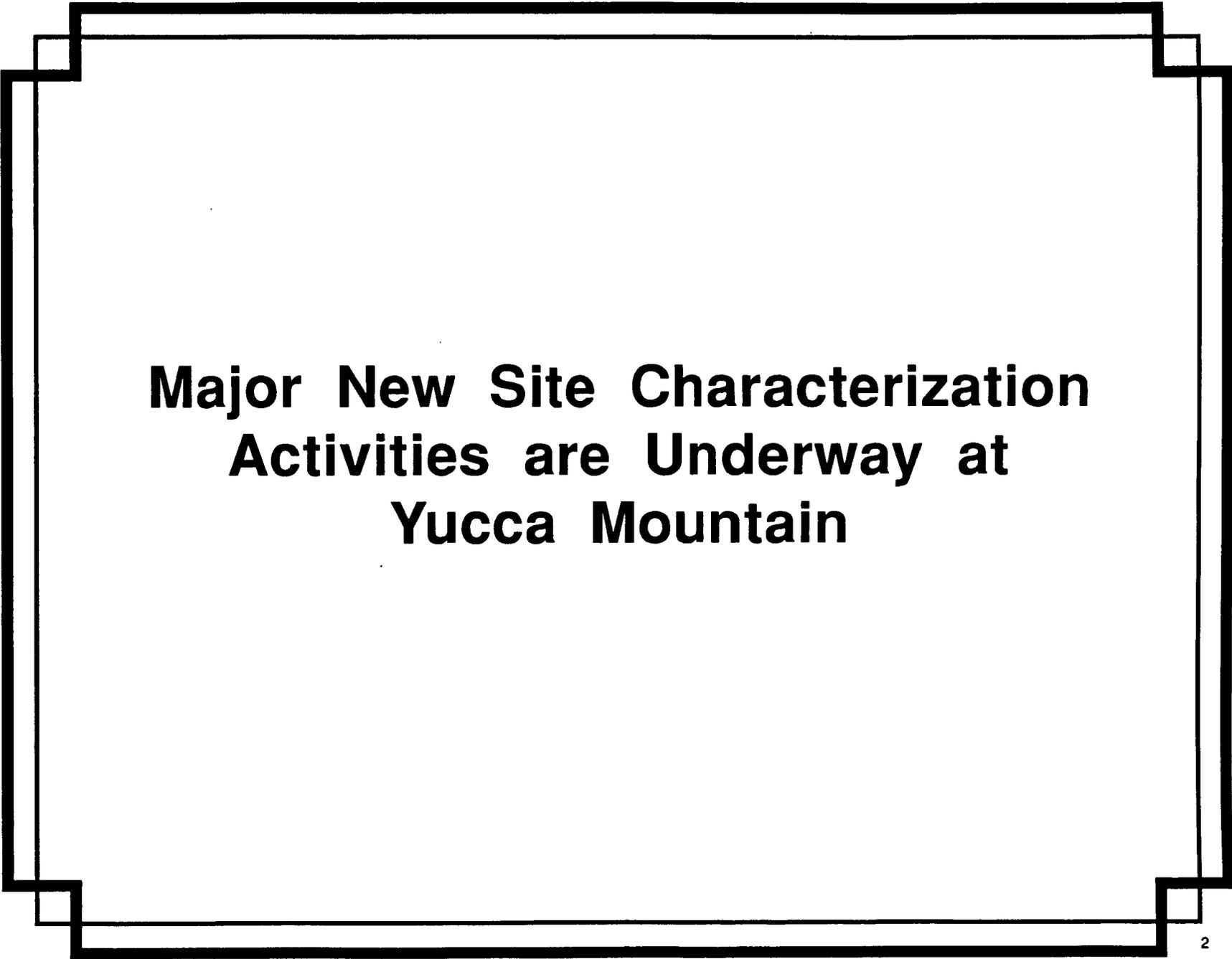


**Carl Gertz
Project Manager**

July 7, 1992

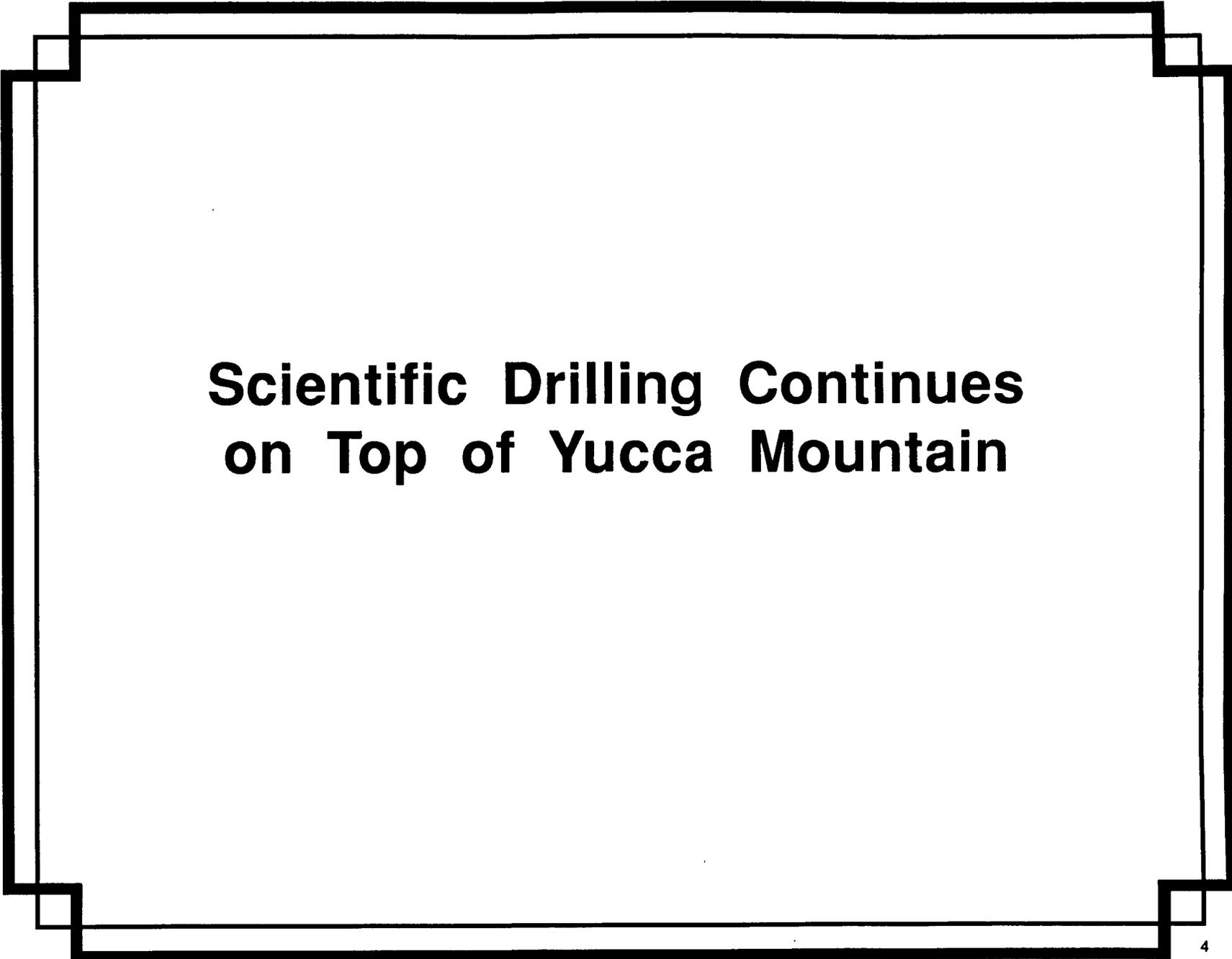
Agenda

- **Overview of New Work**
- **Borehole UZ-16**
- **Neutron Access Boreholes**
- **Midway Valley Investigations**
- **Soil & Rock Properties Investigations**
- **Borehole NRG-1**
- **Monitoring Well JF-3**
- **Volcanism Investigations**

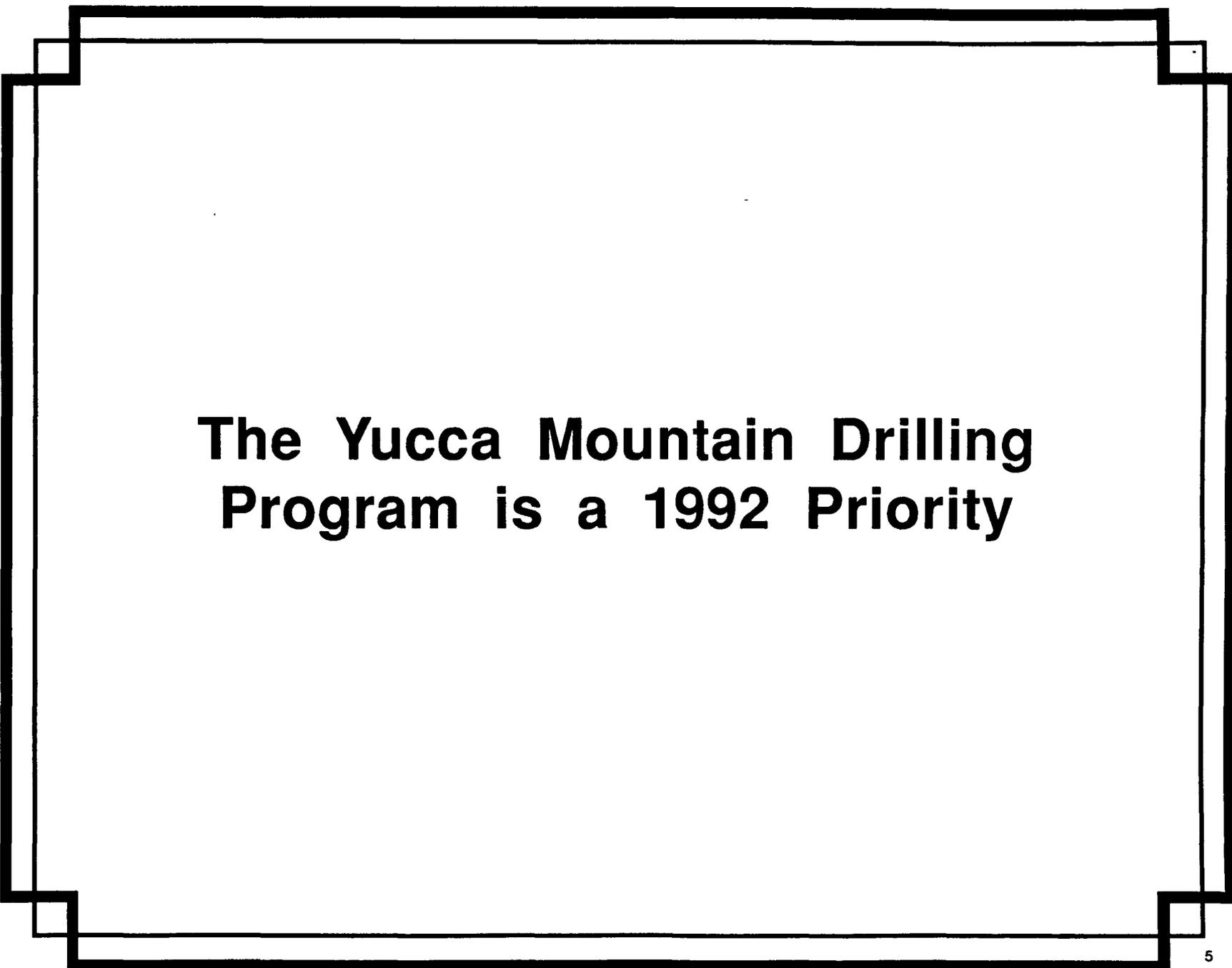


**Major New Site Characterization
Activities are Underway at
Yucca Mountain**

**Limited New Work Started
July 1991**



**Scientific Drilling Continues
on Top of Yucca Mountain**



**The Yucca Mountain Drilling
Program is a 1992 Priority**

Surface-Based Testing Summary Status

	Total	Completed	Planned
Shallow Drillholes (<1,000 ft)	431	164	267
Deep Drillholes (>1,000 ft)	118[*]	44	64[*]
Trenches/Test Pits/ Pavements	102	70	32
Geophysical Surveys	65	41	24

- Includes 19 possible additional deep drillholes

Major New Work is Underway At Yucca Mountain at Several Locations

SUMMARY

- **Drill pad construction completed and drilling started at borehole UZ-16**
- **Twelve neutron access boreholes have been drilled for natural infiltration studies. An additional twelve boreholes are planned to begin this year**
- **Total of 18 soil test pits and 2 trenches were excavated in Midway Valley study area; 2 other trenches being excavated**
- **Total of 33 test pits excavated as part of Soil and Rock Properties investigations related to potential locations of north area surface and subsurface access facilities**

Major New Work is Underway At Yucca Mountain at Several Locations

SUMMARY (Continued)

- **NRG-1 (north ramp geologic hole) access road and pad completed; drilling underway**
- **Drilling of JF-3 environmental monitoring well completed and monitoring equipment installed; fulfills commitment to National Park Service**
- **Volcanism studies - 37 excavations completed**

Major New Work at Yucca Mountain

Borehole UZ-16

- **Planned Depth - 1663 feet or approximately 40 feet below the water table**
- **Planned diameter**
 - **16-inch surface casing presently set at 52 feet**
 - **12-3/8" borehole will be drilled to Total Depth (TD)**
- **Start date - drilling/coring initiated May 27th**
- **Estimated completion date**
 - **Drilling/coring: 11/15/92**
 - **Borehole testing: 4/15/93**
- **Drill Rig LM-300**

Major New Work at Yucca Mountain

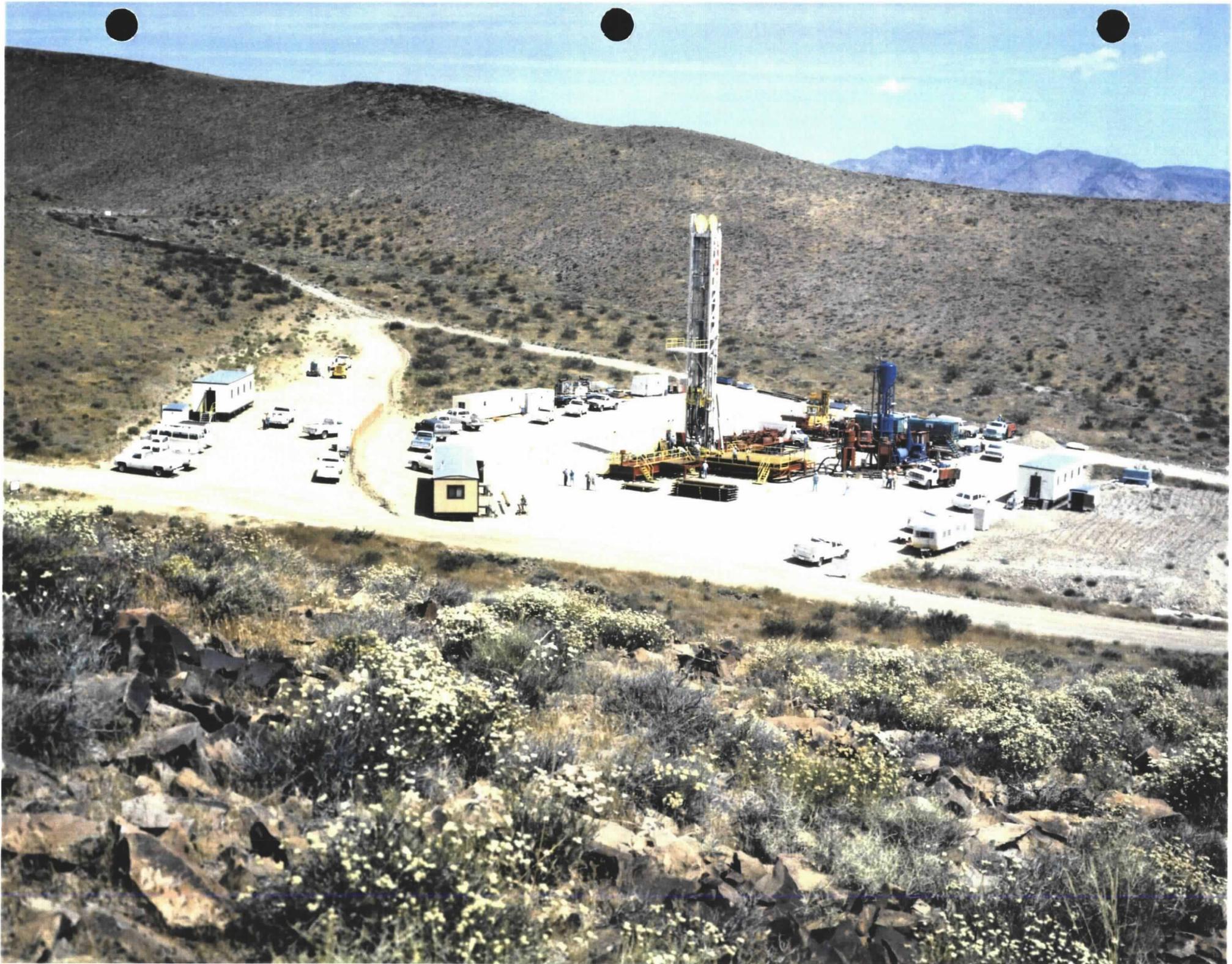
Borehole UZ-16 (Continued)

Use of data:

- **The structural, stratigraphic, hydrologic, mechanical and geochemical information obtained from the cores will benefit many studies to help understand if the natural barriers at Yucca Mountain can isolate nuclear waste**
 - **Information on rate of infiltration of surface waters at depth**
 - **In-situ tests of the bulk rock mass**
 - **Borehole-to-borehole correlation data**
 - **Provides a means for improved understanding of subsurface structural features and stratigraphic correlation**

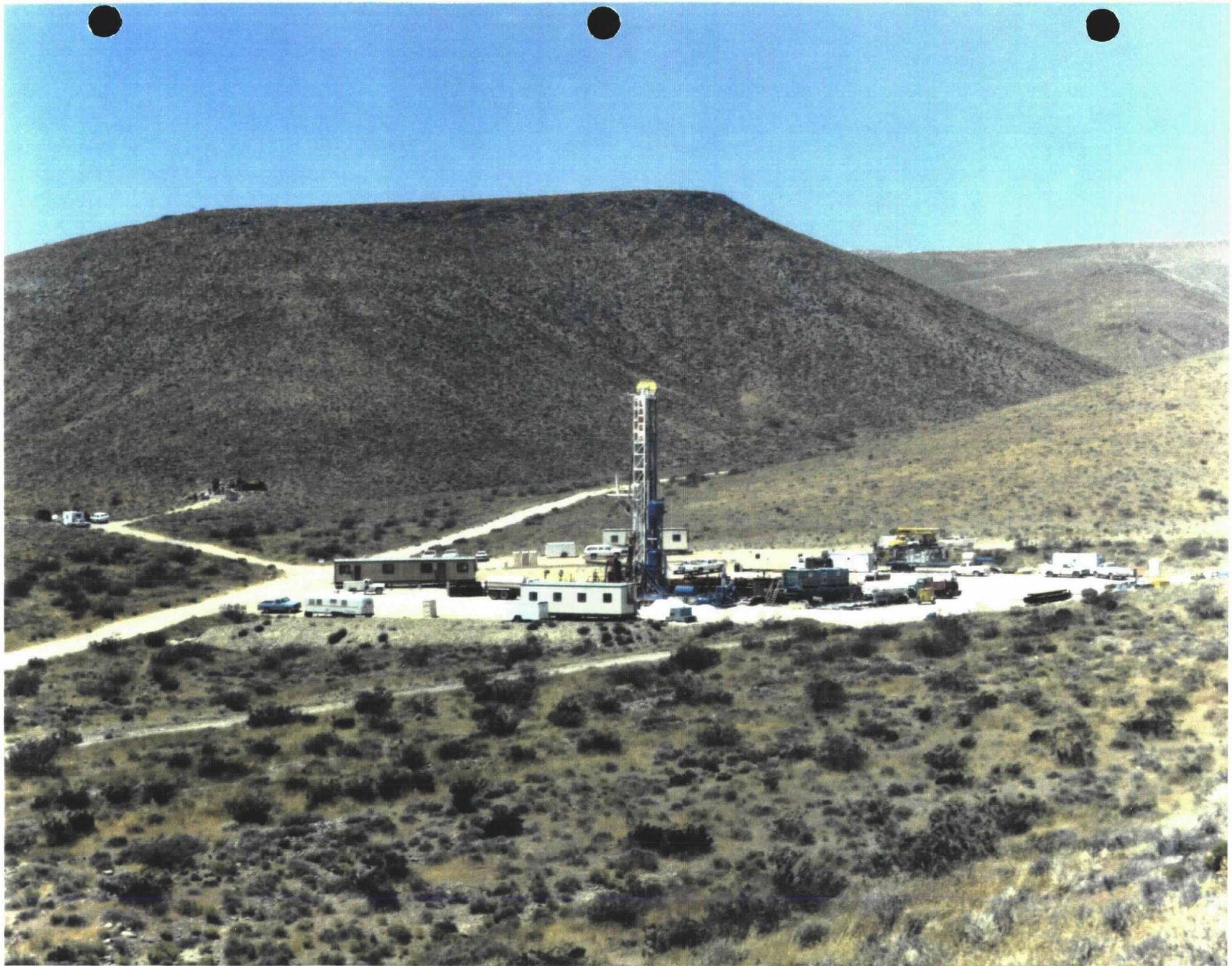
LM-300 ENROUTE TO DRILL SITE



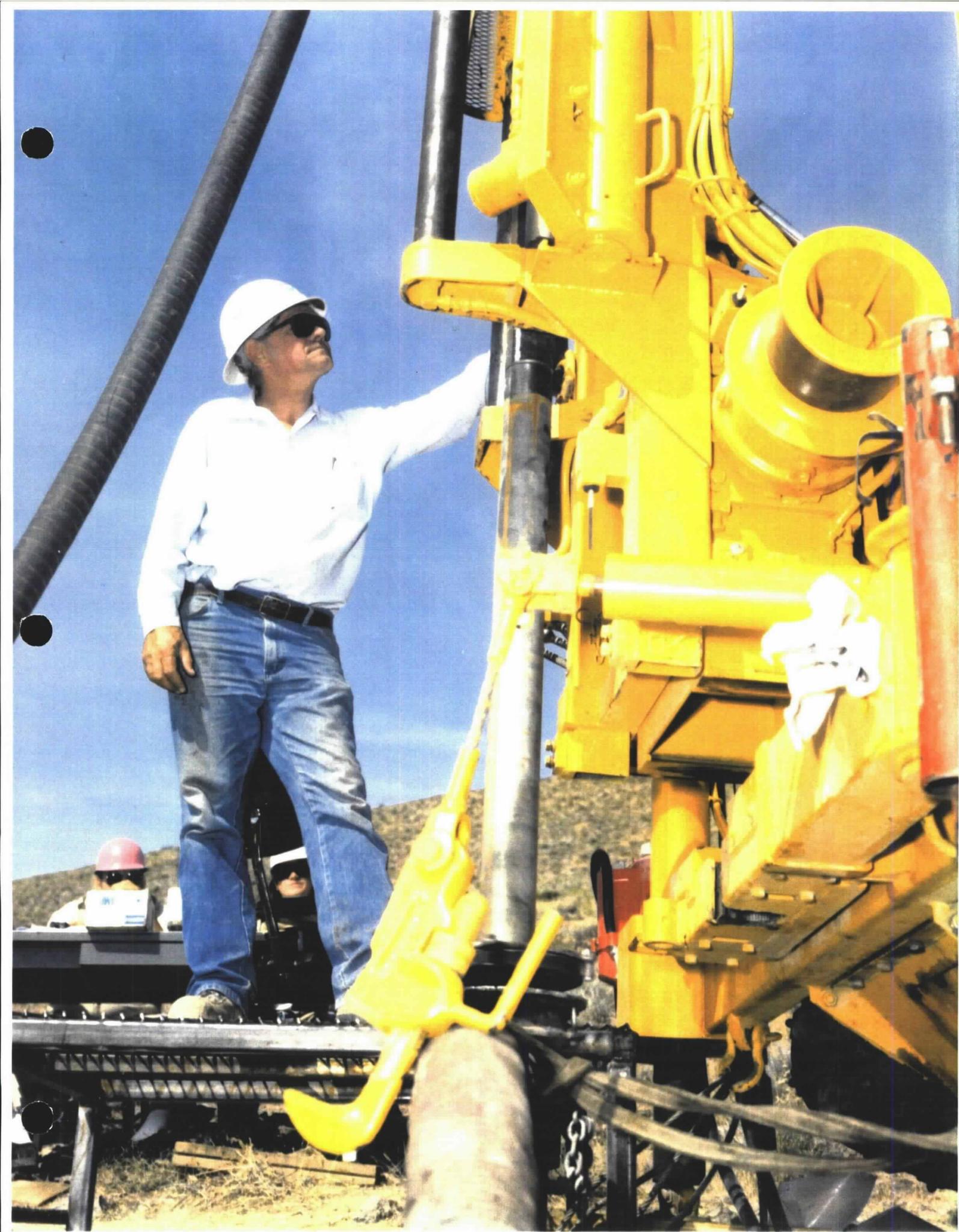


LM-300 ON UZ-16 PAD











Major New Work at Yucca Mountain

Neutron Access Boreholes

Purpose:

- Investigate the present-day precipitation infiltration processes
- Measure precipitation infiltration rates within site surficial materials at the site

Major New Work at Yucca Mountain

Neutron Access Boreholes - Phase I

	Borehole Identified	Depth, Feet	Diameter, Inches	Percent Core Recovered	Date Completed
1.	USW UZ N-55	255.3	6	96.1	13 NOV 91
2.	USW UZ N-54	244.7	6	89.3	11 DEC 91
3.	USW UZ N-37	270.4	6	74.6	31 JAN 92
4.	USW UZ N-11	84.4	6	98.5	25 FEB 92
5.	USW UZ N-36	59.8	6	98.2	4 MAR 92
6.	USW UZ N-17	59.8	6	97.5	19 MAR 92
7.	USW UZ N-15	59.8	6	92.1	25 MAR 92
8.	USW UZ N-16	60.0	6	78.5	30 MAR 92
9.	USW UZ N-38	89.6	6	99.2	13 APR 92
10.	USW UZ N-64	60.0	6	84.7	17 APR 92
11.	USW UZ N-27	202.4	6	83.7	29 APR 92
12.	USW UZ N-53	234.5	6	TBD	12 JUN 92

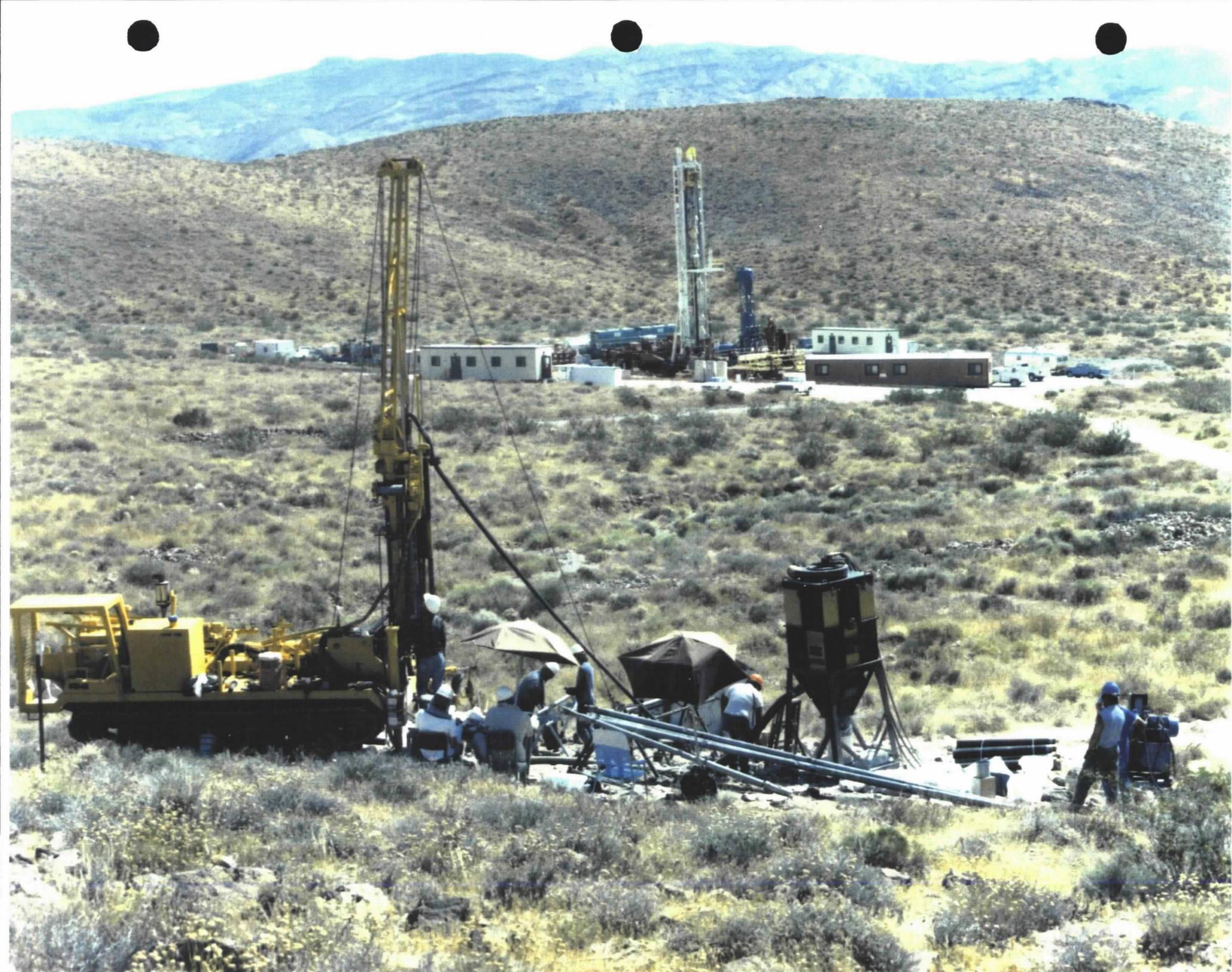
Weighted average percent recovery all completed holes: 88.3

Major New Work at Yucca Mountain

Neutron Access Boreholes (Continued)

Future Drilling Activities

- Phase I drilling completed
- 12 additional neutron-access boreholes to be drilled during Phase II
- Phase II drilling footage expected to total about 1200 feet
- Phase II beginning in mid- to late July



FY92 SHALLOW NEUTRON HOLE DRILLING PROGRAM

- **The purpose of the shallow neutron hole drilling program is to provide access to a variety of hydrologically active topographic settings (i.e., washes, hill slopes, ridgetops) to evaluate the most dynamic part of Yucca Mountain, the near surface**
- **Profiles of saturations and physical properties measured on core samples have provided understanding about shallow infiltration processes:**
 - **The top of the nonwelded base of the Tiva Canyon flow unit is nearly saturated, which supports the expectation, from the conceptual model, of capillary barriers**
 - **This nearly saturated zone is likely a zone where fracture flow terminates, below which matrix flow dominates. (This zone is also a likely barrier to gas flow between the Tiva Canyon and Topopah Spring units)**

FY92 SHALLOW NEUTRON HOLE DRILLING PROGRAM

(CONTINUED)

- **The new boreholes have provided a dataset for INTRAVAL (an international model validation program) which will be used to develop flow transport models**
 - **Preliminary modeling by the USGS indicates that the system has been in a long term drying trend (>1000 years). In order to produce current saturation profiles seen in the deeper neutron holes there is a net water loss from Yucca Mountain under the current arid conditions. The system is not steady state**
- **Future information will help in many ways to characterize Yucca Mountain:**
 - **Data from geochemical analysis will help to identify fast pathways which may be critical in determining the suitability of Yucca Mountain**
 - **Continued neutron moisture meter logging will help characterize changes in water content over the variety of topographic settings thought to be hydrologically active**

Major New Work at Yucca Mountain

Borehole - North Ramp Geologic (NRG-1)

Purpose: To collect data for Exploratory Studies Facility design

Description:

- Geotechnical borehole to be cored to total depth
- Depth - 150 feet (targeted below tunnel invert)
- Hole diameter 5.5" - core 2.5" nominal
- Drilling method - dry air circulation w/tracer
- Drill Rig - CME 850

Use of Data

- Design of portal high wall excavation and support
- Design of tunnel launch chamber for Tunnel Boring Machine

CONSTRUCTION OF PADS AND ROADS IN MIDWAY VALLEY





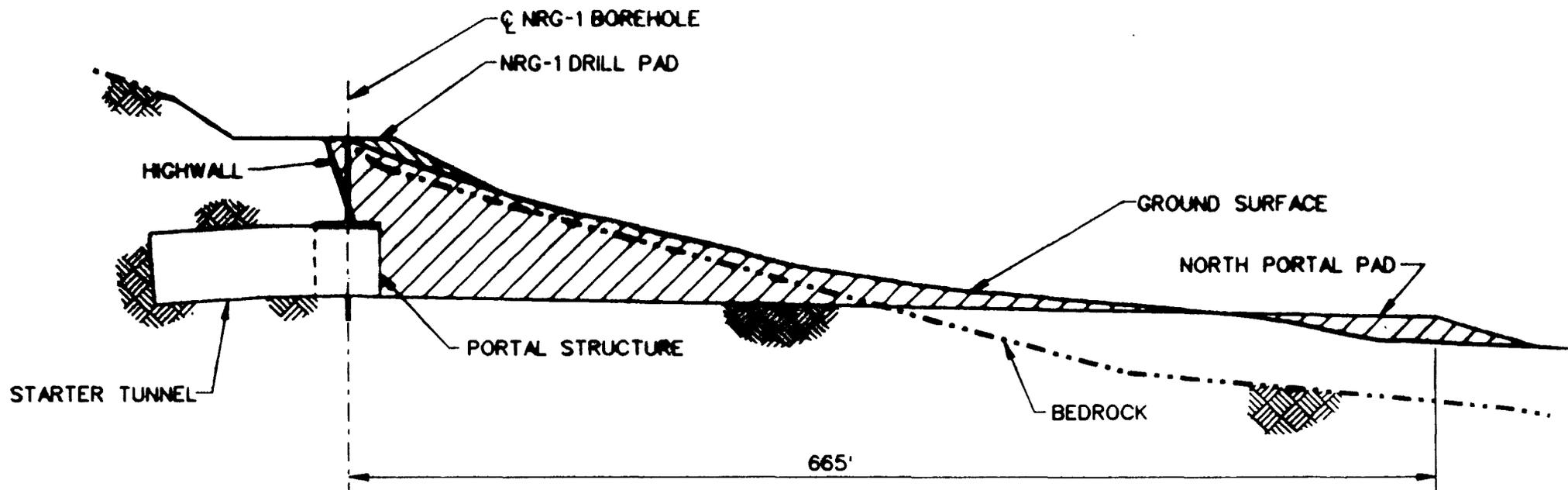




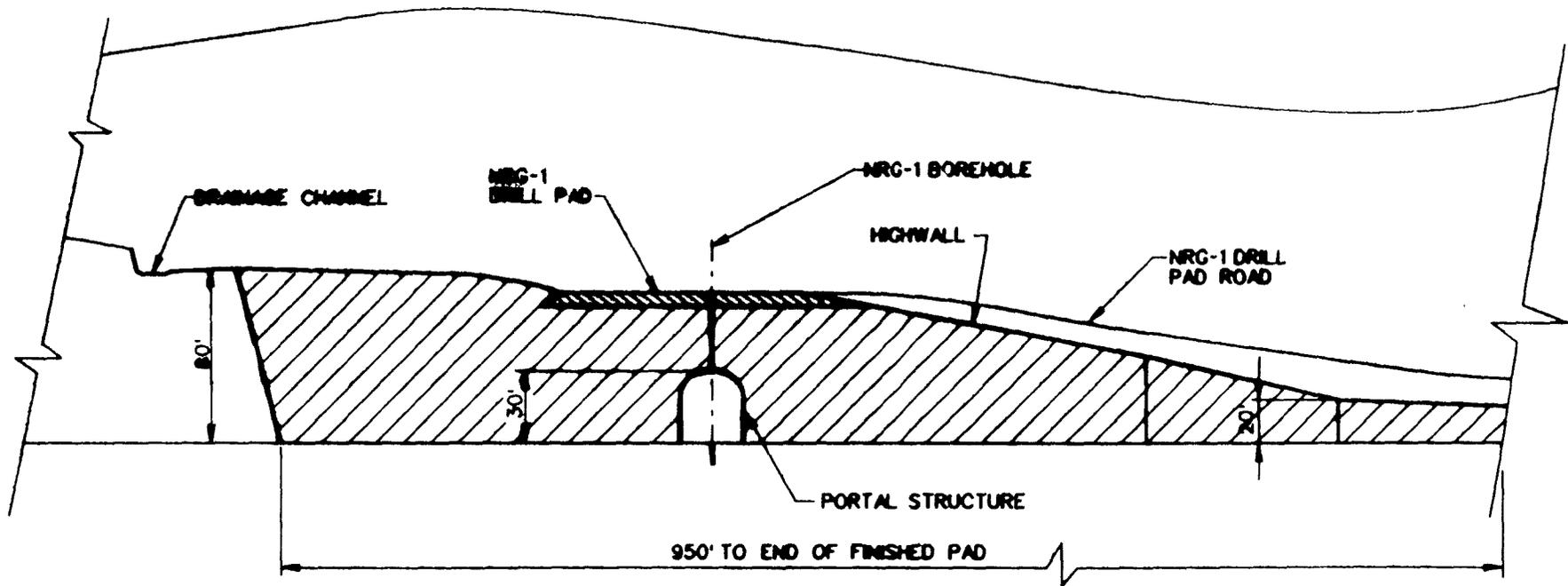


59957

2101630

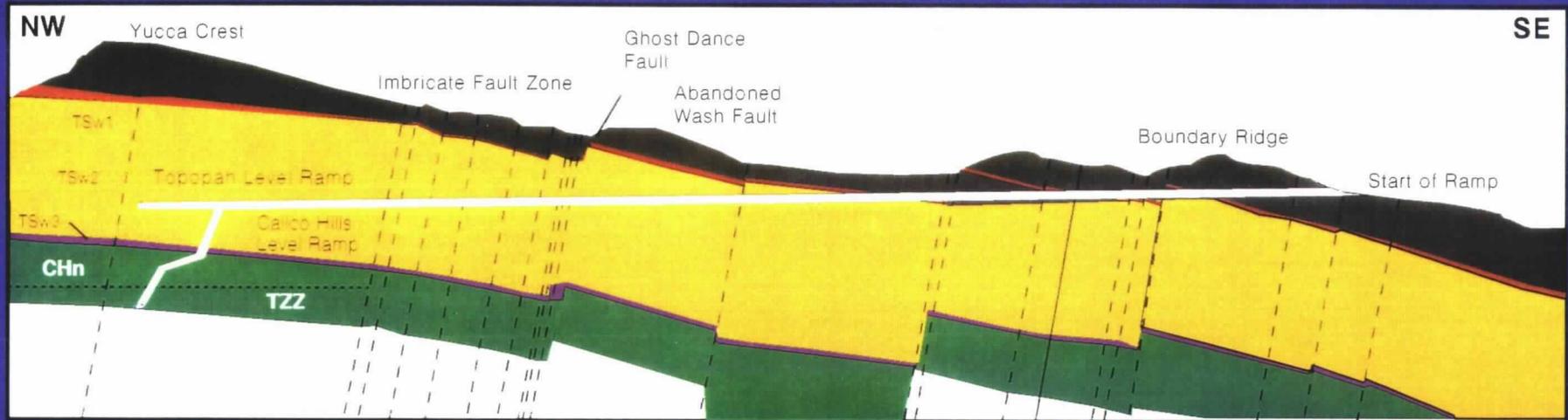


SIDE ELEVATION
 EXISTING NRG-1 DRILL PAD
 AND FUTURE ESF PORTAL PAD



FRONT ELEVATION
EXISTING NRG-1 DRILL PAD
AND FUTURE ESF PORTAL PAD

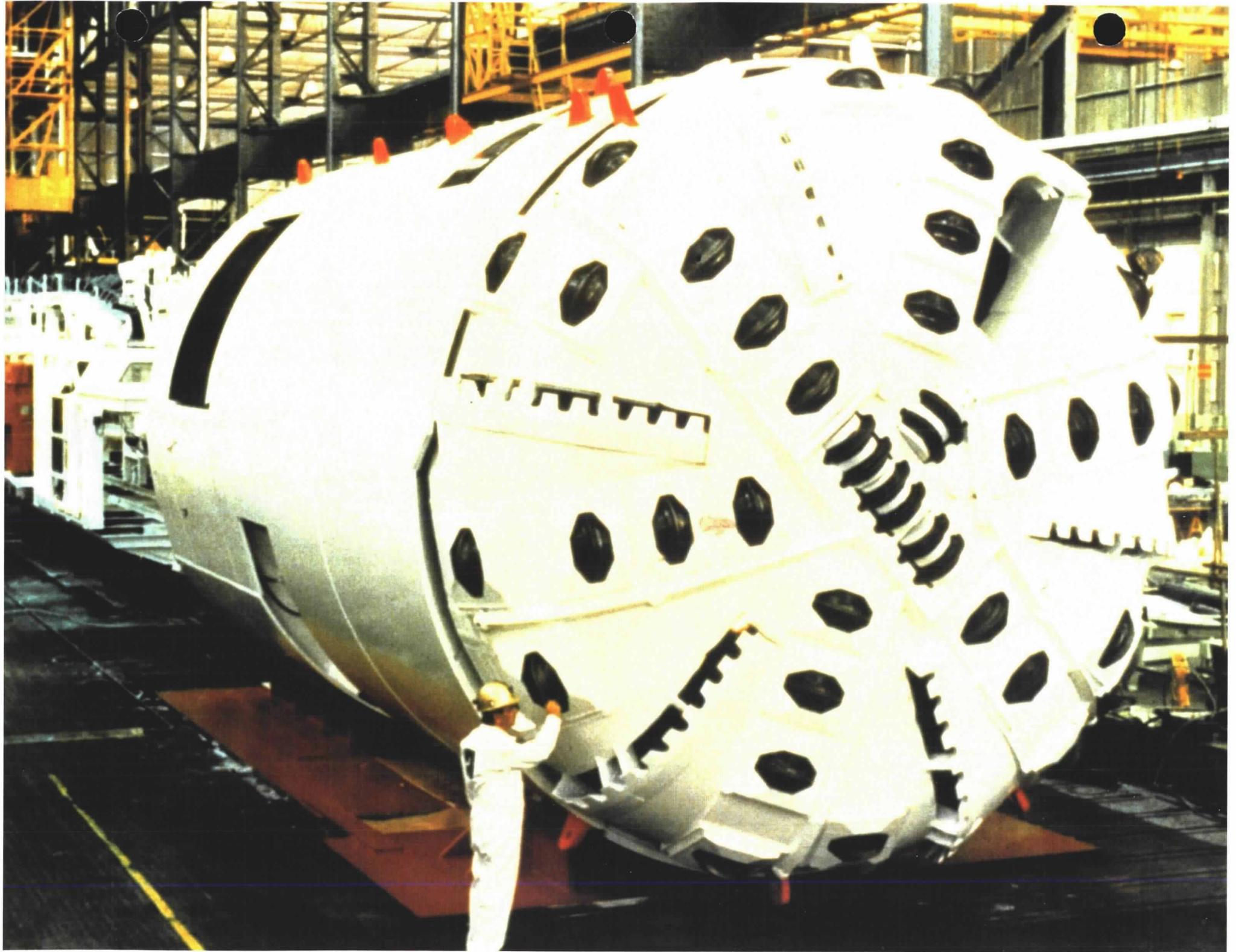
SOUTH RAMP DESIGN WILL EXPAND AREAS OF GEOLOGIC INTEREST TO BE STUDIED



Thermal/Mechanical Units

Tcw		Tiva Canyon Member
PTn		Yucca Mountain Member Pah Canyon Member
TSw1 TSw2		Topopah Spring Member
TSw3		Topopah Spring Member
CHn		Tuffaceous Beds of Calico Hills
TZZ		Zeolite-Vitric Contact in Calico Hills (TZZ)
Ppw CFUn BFw		Prow Pass Member and Bullfrog Member

Conceptual Illustration
Not To Scale



Major New Work at Yucca Mountain

Soil and Rock Property Investigations at Exile Hill

Phase I test pits consists of 33 excavations

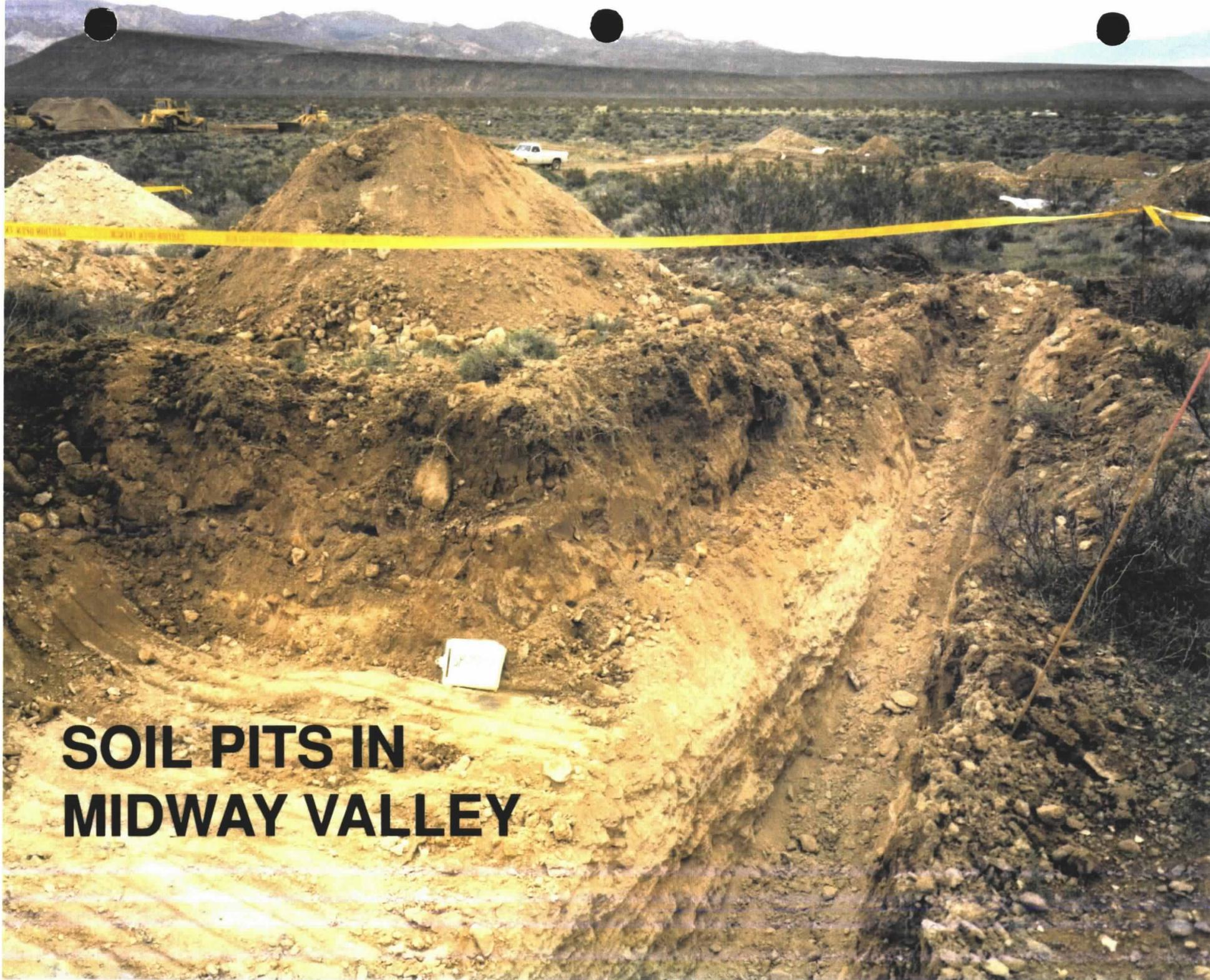
Size: 3 ft. wide by 20 ft. long by 15 ft. deep with 10 x 10 enlargements for testing.

Purpose:

- **Examine bedrock and in-situ soil conditions**
- **Determine soil gradation characteristics**
- **Test in-place soil density**

Use of Data:

- **Design of ESF Surface Facility pad excavation, engineered fill requirements, and building foundations**
- **Design of portal high wall excavation and support requirements**



**SOIL PITS IN
MIDWAY VALLEY**



Major New Work at Yucca Mountain

Midway Valley Investigations

Purpose: To prepare a detailed geologic map of Midway Valley and to evaluate the potential for faulting (earthquake activity) at the prospective surface facilities

Progress to Date

April 1991

- Preliminary geologic map completed

July 1991

- 350-ft.-long, 8-ft.-deep trench was excavated and mapped
- No evidence of faulting was found in the trench

March 1992

- 18 soil test pits were excavated in Midway Valley
- Descriptions of the soils will provide information on the ages of the geologic deposits in the mapped area

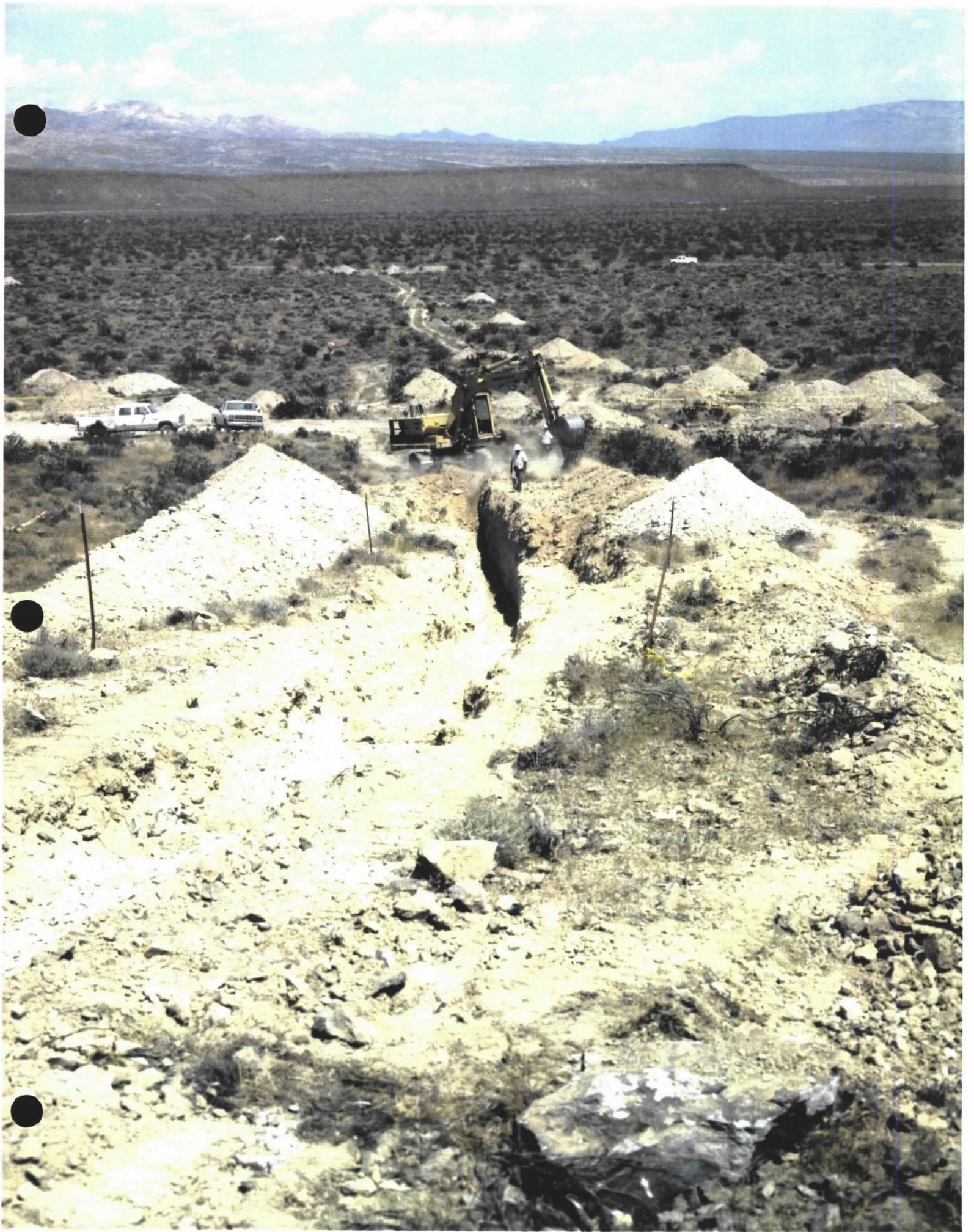


Major New Work at Yucca Mountain

Midway Valley Investigations (Continued)

June 1992

- **1100-ft.-long, 10-ft.-deep trench was excavated in the area of the prospective surface facilities to determine if faults are present**
- **Mapping of trench is in progress**
- **Other trenches on the Bow Ridge fault and the Paintbrush Canyon fault are currently being excavated**





Major New Work at Yucca Mountain

Groundwater Monitoring Well JF-3

Purpose:

- Well JF-3 has been developed by DOE as an early warning monitoring well to protect against potential impacts of water withdrawals from wells J-12 and J-13 on water rights, sensitive wildlife habitats and other beneficial uses of groundwater in Amargosa Valley, Ash Meadows and Death Valley
- Well JF-3, is part of the well and spring groundwater monitoring program accepted by the National Park Service and the Nevada State Engineer

Well data

- | | |
|----------------------------|-------------------|
| - Depth of hole | 1298 feet |
| - Date started | November 26, 1991 |
| - Date completed | April 20, 1992 |
| - Diameter of hole (cased) | 8-5/8 inches |

**THE YUCCA MOUNTAIN DRILLING
PROGRAM IS A 1992 PRIORITY**



Major New Work at Yucca Mountain

Volcanism Investigations

Purpose

- Test alternative models of the eruptive history of the volcano
- Examine soil development to test chronology results
- Collect samples for petrology

Progress to Date:

- Since July 1991, 32 trenches completed at the Lathrop Wells Volcanic Center. 5 trenches completed in the Cima Volcanic Field

Conclusions to Date

- Lathrop Wells is a polycyclic volcanic center
 - important input to Performance Assessment
- Petrology studies indicate that volcanism is waning in the Yucca Mountain area

Major New Work at Yucca Mountain

Volcanism Investigations (Continued)

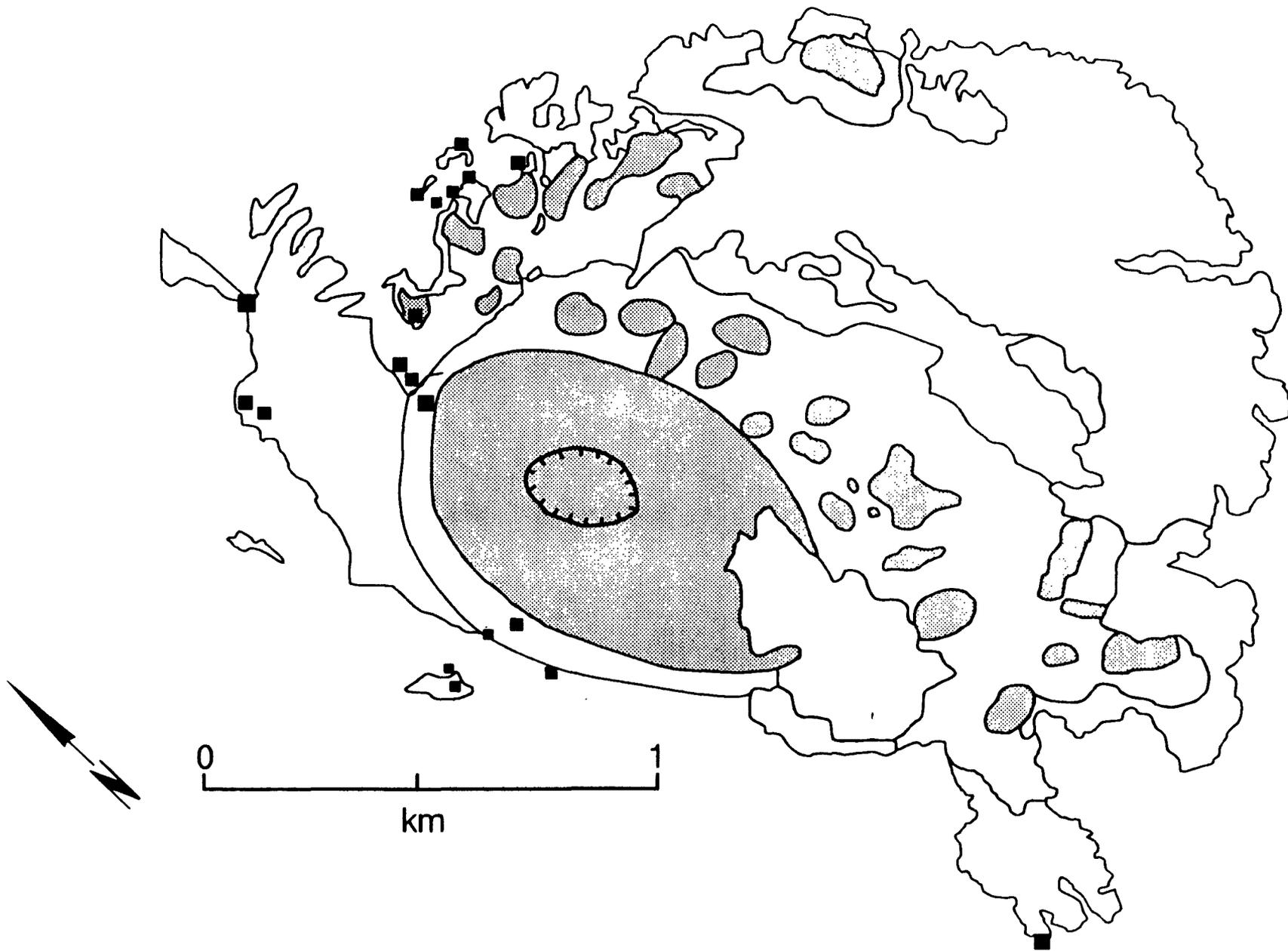
Planned Trenching - FY93

- **Finish at Lathrop Wells**
- **Continue in the Cima Field**
- **Begin at the Sleeping Butte centers and the 1Ma centers in Crater Flat**



Volcanism Studies Geochronology Investigators

U-Th Disequilibrium:	Dr. Mike Murrell, Los Alamos National Laboratory
Cosmogenic ^3He:	Dr. Jane Poths, Los Alamos National Laboratory
Thermoluminescence:	Dr. Steve Forman, Ohio State University
K-Ar and $^{40}\text{Ar}/^{39}\text{Ar}$:	Dr. Peter Zeitler, Lehigh University
Geomorphic Studies:	Dr. Stephen Wells, U. C. Riverside
Soils Studies:	Dr. Leslie McFadden, University of New Mexico
Paleomagnetism:	Dr. John Geissman, University of New Mexico
Field Studies:	Dr. Bruce Crowe, Los Alamos National Laboratory
Geochronology Advisor:	Dr. Donald DePaolo, U.C. Berkeley



Lathrop Wells Volcanic Center: Trench Sites