We'd such letter dtd.
8/18/95

MINUTES OF THE JULY 19, 1995
U.S. NUCLEAR REGULATORY COMMISSION/U.S. DEPARTMENT OF ENERGY
TECHNICAL MEETING ON THE EXPLORATORY STUDIES FACILITY

On July 19, 1995, staff from the U.S. Nuclear Regulatory Commission met with representatives of the U.S. Department of Energy (DOE) to discuss items of mutual concern regarding progress in DOE's Exploratory Studies Facility (ESF) at Yucca Mountain: tunnel boring, the drilling, testing and sampling program, the status of ESF and seismic design and the results of NRC's in-field verification. The meeting, held by videoconference between DOE facilities in Washington, D.C. and Las Vegas, Nevada, was convened at 1:00 PM EDT. Other attendees represented the State of Nevada Nuclear Waste Project Office, the Environmental Protection Agency, the United States Geological Survey, the National Congress of American Indians, DOE's Civilian Radioactive Waste Management System Management and Operating Contractor (M&O), Weston, and NRC's Center for Nuclear Waste Regulatory Analysis. Attachment 1 provides the attendance lists at the two videoconference locations. Attachment 2 is the meeting agenda.

DOE's representatives provided an update on construction of the ESF north ramp. Attachment 3 provides details on progress of the tunnel boring machine (TBM). The head of the TBM had entered the Topopah Springs welded tuff and was still going through blocky ground requiring the use of steel sets. Progress was slightly ahead of schedule. To facilitate smoother operation of the TBM several modifications have been adopted, including the use of a turbo boost to increase oil flow, which has halved the time required for the grippers to act. The blasting for Test Alcove 2 has gone well. Controlled blasting techniques are being used throughout as required. It was noted that the blasting plan becomes part of the excavation records. At the surface, the water tanks on Exile Hill have been completed and work on the booster pump station and the change house is under way.

In its next presentation, DOE updated the ESF drilling, sampling and testing program. Attachment 4 provides an overview of work in boreholes and trenches that has been completed and is planned, the status of installing and monitoring pneumatic instrumentation, and a summary of ESF test activities. In September, testing of hydrologic properties of the Bow Ridge fault in Alcove 2 and excavation of Alcove 3 are scheduled to begin; testing in Alcove 1 continues. Photographs were shown that reveal some geologic features for which the identification is not yet fully agreed upon. They have been determined to be non-reportable geologic features. In response to a question from NRC staff, it was noted that a copy of the procedure for determining whether a geologic feature is reportable, which has been modified to address comments (effective date, July 24, 1995), will be made available to NRC's on-site representatives.

A discussion of the status of ESF design followed. Progress on ESF design packages and the design of the integrated data and control system, the North Portal standby power generators, Alcoves #3 and #4, and the ESF main drift was discussed. The determination of importance evaluation for the ESF main drift, considered the most important step prior to approving specifications and drawings, was approved July 14. A number of questions about design and construction were discussed. Invert segments are being redesigned for cost effectiveness. DOE noted that it is dividing design packages into smaller

102.8

Enclosure

units and will be distributed for "external review." NRC noted that its role is that of observer, rather than reviewer, and NRC should receive only information or courtesy copies. NRC desires a good flow of information, but should not be part of the approval process. The schedule for design of the ESF main drift and planning the GROA/ESF interface was presented. In answer to a question about progress on a response to the corrective action request (CAR) on requirements flowdown (YMQAD-94-C-100), DOE stated that flowdown has been addressed within the M&O and will be in the July 31 response to the CAR. Changes and considered changes to streamline the M&O review and approval process were discussed. Typically there will be no design review meeting, for example, and each review is shorter due to the reduced scope of each review. An update on improvements in the design control process was discussed in response to a prior request because design documentation was not in compliance with QA procedure requirements. An independent checking group has been established to check all design products. Several problems in process design control, their impacts and lessons applied were discussed. Finally the formation and the role of the Office of Product Integrity was discussed. In answer to a question regarding the differences in the roles of the checking group and the Office of Product Integrity (OPI), it was explained that the OPI provides assurance to management through an independent check which is simultaneous with external review. More detail is given in Attachment 5.

The last presentation addressed the revisions to the design requirements documents. The status of revisions in site design and test requirements, engineered barrier design requirements, exploratory facility design requirements, surface-based test requirements and repository design requirements are shown in Attachment 6.

In closing remarks it was agreed to set up a phone call to clarify the nature of NRC's role in receiving courtesy copies of ESF design documents.

Pauline P. Brooks 8/17/95

Pauline P. Brooks
High-Level Waste & Uranium Recovery
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
U.S. Nuclear Regulatory Commission

Christian E. Einberg 8/17/95

Christian E. Einberg
Regulatory Integration Branch
Office of Civilian Radioactive
Waste Management
U.S. Department of Energy

DOE/NRC
Exploratory Studies Facility Technical Meeting
July 19, 1995
Videoconference: DC\Las Vegas
Washington, DC Attendees

NAME	ORGANIZATION	PHONE
Chris Einberg	DOE/HQ	202-586-8869
Mark Delligatti	NRC	301-415-6620
Bret Leslie	EPA	202-233-9201
Pauline Brooks	NRC	301-415-6604
Mysore Nataraja	NRC	301-415-6695
John L. Russell	CNWRA	301-881-0289
Banad Jagannath	NRC	301-415-6653
Tom Rogers	M&O/NCFS	202-488-2320
Ray Wallace	USGS	202-586-1244
Jim York	Weston	202-646-6650
Ram Murthy	DOE/RW3.1	202-586-1239
L. J. Hopkins	NCAI	202-466-7767
Keith McConnell	NRC	301-415-7289

Attachment 1

DOE/NRC ESF TECHNICAL MEETING

July 19, 1995

Videoconference: DC\Las Vegas

Las Vegas Attendees

NAME	ORGANIZATION	TITLE
Steve Frishman	NV/NMPO	
V. Lewis Killpack	TRW	Consultant
Phil Hammond	M&O	Sr. Engineer
William Boyle	DOE	Team Lead, Geoengineer
Nick Stellavato	Nye C.	OSR
Alden Sigrest	M&O	Mgr. MGDS Mgr.
Dana Rogers	M&O	MGDS-ESF-Subsurface
Tim Hawe	DOE	Physical Scientist
Dick Snell	M&O	Mgr.-Eng. & Integ.
Tom Fortner	DOE	Const. Mgr. DOE
Dick McDonald	M&O	Const. Mgr.
Richard Crann	DOE AMAFO	AMEFO
M. Sam Rindskoff	M&O	MGDS Requirements Mgr.
Carol Hanlon	DOE\AMSL	Physical Scientist
William Belke	NRC	OSR

DOE-NRC TECHNICAL MEETING AGENDA
EXPLORATORY STUDIES FACILITY DESIGN AND CONSTRUCTION
VIDEOCONFERENCE
Bank of America Center, Blue Room, Las Vegas, Nevada
Forrestal Building, Room DC1 (1E267), Washington, DC
July 19, 1995

10:00 PDT (1:00 EDT)	**Opening Remarks**	**DOE, NRC, NV, AUG**
10:15 PDT (1:15 EDT)	**ESF Construction Update** **- Alcove #2** **- Blasting Process** **- Feedback of Monitored Data**	**DOE**
10:45 PDT (1:45 EDT)	**Drilling, Testing, and Sampling Program Update**	**DOE**
11:15 PDT (2:15 EDT)	**ESF Design Status** **- Design Progress Update** **- External Review Process** **- Design Control Process**	**DOE**
11:45 PDT (2:45 EDT)	**Requirements Traceability Update** **- Automated Requirements Monitoring System** **- Requirements Traceability Network System** **- Requirement Document Revisions**	**DOE**
12:15 PDT (3:15 EDT)	**Closing Remarks and Discussion**	**DOE, NRC, NV, AUG**
12:45 PDT (3:45 EDT)	**Adjourn**	

Attachment 2

YUCCA MOUNTAIN PROJECT

Studies

DOE-NRC Technical Exchange Meeting on The Exploratory Studies Facility

ESF Construction Update

Presented by:

Dick McDonald
Construction Manager
Management and Operations Contractor/M-K

July 19, 1995

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

Attachment 3

Construction Update

Tunnel work status

- The head of the TBM is at 11 + 54.94 on 7/19/95 at 8 AM. Average advance per operated day since 5/16/95 is 13.3 M/day
- Now into Topopah Springs welded tuff
- Completed 500 hr TBM maintenance inspection*
- TBM modifications
- Underground conveyor

* Except for hardfacing on cutterhead

Construction Update

(Continued)

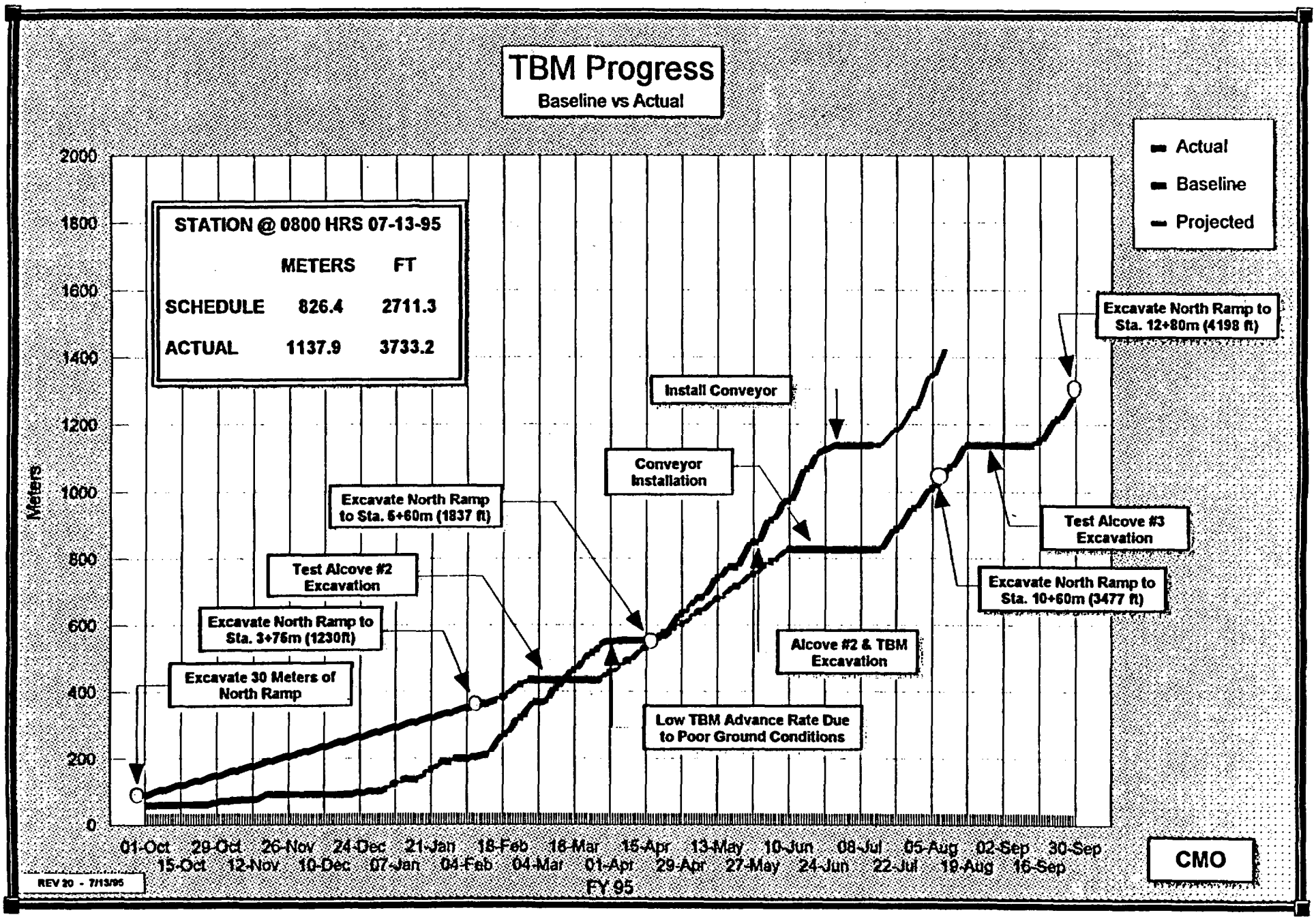
Alcove #2 status

- Excavated to 0+48m
- Blasting plan designed by Contractor to meet A/E specifications
- Submittal from contractor approved by A/E after minor adjustments
- Excavation monitored for peak particle velocity (max 700 mm/sec @ one meter dist.)
- PPV stayed within planned parameters

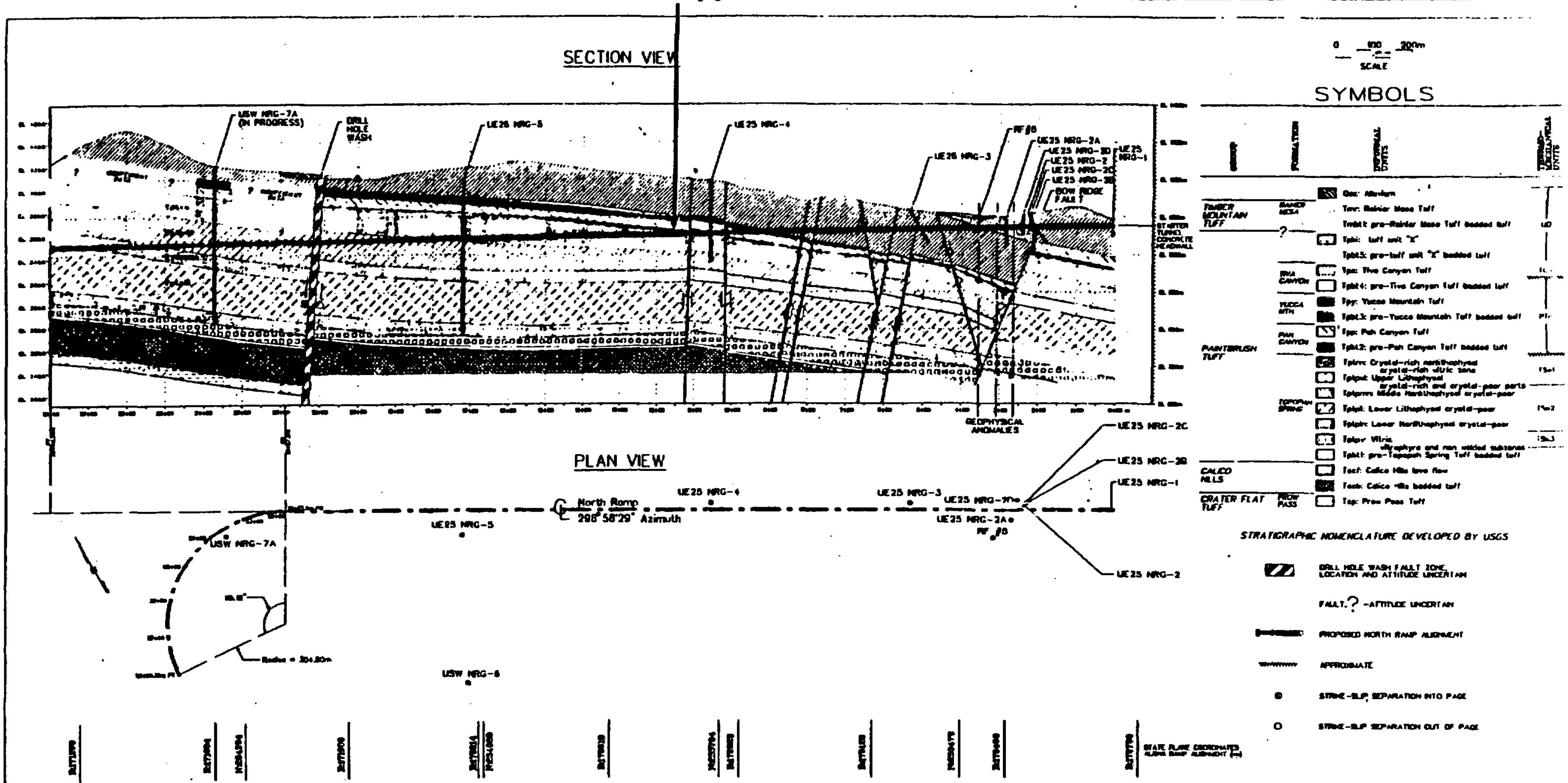
Construction Update
(Continued)

Surface work status

- Surface portion of underground conveyor complete
- Earth works for surface conveyor and muck storage area completed
- Change House structural steel erection under way
- Booster pump station under construction
- Water tanks on Exile Hill complete


TBM Progress
Baseline vs Actual
Actual
Baseline
Projected
STATION @ 0800 HRS 07-13-95
METERS FT
SCHEDULE 826.4 2711.3
ACTUAL 1137.9 3733.2
Meters
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Excavate 30 Meters of North Ramp
Excavate North Ramp to Sta. 3+76m (1230ft)
Test Alcove #2 Excavation
Excavate North Ramp to Sta. 5+60m (1837 ft)
Conveyor Installation
Install Conveyor
Low TBM Advance Rate Due to Poor Ground Conditions
Alcove #2 & TBM Excavation
Excavate North Ramp to Sta. 10+60m (3477 ft)
Test Alcove #3 Excavation
Excavate North Ramp to Sta. 12+80m (4198 ft)
01-Oct 29-Oct 26-Nov 24-Dec 21-Jan 18-Feb 18-Mar 15-Apr 13-May 10-Jun 08-Jul 05-Aug 02-Sep 30-Sep
15-Oct 12-Nov 10-Dec 07-Jan 04-Feb 04-Mar 01-Apr 29-Apr 27-May 24-Jun 22-Jul 19-Aug 16-Sep
FY 95
CMO
REV 20 - 7/13/95

Approximate Location of TBM on ___/___/___ at _________.



PRELIMINARY RAMP DATA
QA:NO

Station (m)	Grade	State Plane Coord. (m) Northing	State Plane Coord. (m) Easting	Elevation (m)
0+00 (Portal)	-2.000°	[illegible]	[illegible]	[illegible]
[illegible] (PC)		[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]
28+00.38 (PT)		[illegible]	[illegible]	[illegible]

* [illegible]

BOREHOLE PROJECTIONS
QA:QA

Borehole	Projection to Section along Azimuth	Ground Elevation (m)	Distance to Section (m)
UE25 NRG-1	[illegible]	[illegible]	[illegible]
UE25 NRG-2	[illegible]	[illegible]	[illegible]
UE25 NRG-2A	[illegible]	[illegible]	[illegible]
UE25 NRG-2B	[illegible]	[illegible]	[illegible]
UE25 NRG-2C	[illegible]	[illegible]	[illegible]
UE25 NRG-2D	[illegible]	[illegible]	[illegible]
UE25 NRG-3	[illegible]	[illegible]	[illegible]
UE25 NRG-4	[illegible]	[illegible]	[illegible]
UE25 NRG-5	[illegible]	[illegible]	[illegible]
USW NRG-7A	[illegible]	[illegible]	[illegible]
RF#8	[illegible]	[illegible]	[illegible]

Note: Boreholes projected into cross section along strike of rock units

REV. NO.	DATE	BY	VERSION	SUPERCEDES
5	[illegible]	[illegible]	QA:[illegible]	QA:[illegible]
4	[illegible]	[illegible]	QA:[illegible]	QA:[illegible]
3	[illegible]	[illegible]	QA:[illegible]	QA:[illegible]
2	[illegible]	[illegible]	QA:[illegible]	[illegible]
1	[illegible]	[illegible]	QA:[illegible]	[illegible]

REVISIONS

QA:QA

ESF NORTH RAMP
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
CROSS SECTION ALONG RAMP FROM 0+00 to 28+00.38m (PT)

Sandia National Laboratories

Preliminary Predecisional Draft

Construction Progress Pictures

YUCCA MOUNTAIN PROJECT

Studies

DOE-NRC Technical Exchange Meeting on The Exploratory Studies Facility

Drilling, Sampling, and Testing Program Update

Presented by:

William J. Boyle
Geoengineering, Team Leader
U.S. Department of Energy

July 19, 1995

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

Attachment 4

Drilling/Sampling/Testing Completed May 1, 1995 - July 1, 1995

SD-7	Initially monitored perched water level and subsequently enlarged borehole to a depth of 1575 ft to allow for casing and further deepening of the hole
C-Hole Work Period-1	Ran three pump tests; one to check integrity of pumping system for 400 gpm and two drawdown tests of 380 gpm and 350 gpm
UZ#4	Enlarged and deepened borehole to 419 ft and completed pneumatic instrumentation
UZ#5	Completed pneumatic instrumentation
UZ-7a	Completed coring and reaming to 770 ft

Drilling/Sampling/Testing Completed May 1, 1995 - July 1, 1995

(Continued)

SD-12	Completed air permeability testing and gas phase sampling. Future plans include deepening of the borehole and installation of pneumatic instruments
Solitario Canyon Fault Trench	Completed excavation and began mapping
Bare Mountain Fault Trench	Completed excavations and began mapping
Rock Valley Fault Trench	Completed excavations and began mapping

Drilling/Sampling/Testing Completed May 1, 1995 - July 1, 1995

(Continued)

- Monitoring of Pneumatic Instrumentation
  - NRG-4 (Nye County)
  - NRG-6
  - NRG-7a
  - ONC#1 (Nye County)

Borehole Geophysical Logging Completed May 1, 1995 - July 1, 1995

• C#3	Water Flow Log/Spinner
• UZ#4	Logs & Video
• UZ#5	Logs & Video
• UZ-7a	Logs & Video
• USW G2	Video only

Drilling/Sampling/Testing Planned July 1, 1995 - September 30, 1995

SD-7	Complete drilling to total depth of 2675 ft
SD-12	Reinitiate drilling and proceed to total depth of 2300 ft or to perched water level if encountered
WT-24	Begin drilling and progress to 1000 ft
WT-10	Workover existing borehole and run pump test
WT-11	Workover existing borehole and run pump test
WT-12	Workover existing borehole and run pump test
UZ-16 VSP	Upgrade roads and acquire Vertical Seismic Profile data

Drilling/Sampling/Testing Planned July 1, 1995 - September 30, 1995

(Continued)

Ghost Dance Fault Trenches	Construct trenches for geologic mapping
Sleeping Butte Trenches	Construct trenches for geologic mapping
Amargosa Valley Trench	Construct trenches for geologic mapping
Rock Valley Surface Geophysics	Conduct seismic reflection survey
Repository Area Surface Geophysics Phase II	Conduct a suite of surface geophysical surveys

Drilling/Sampling/Testing Planned July 1, 1995 - September 30, 1995

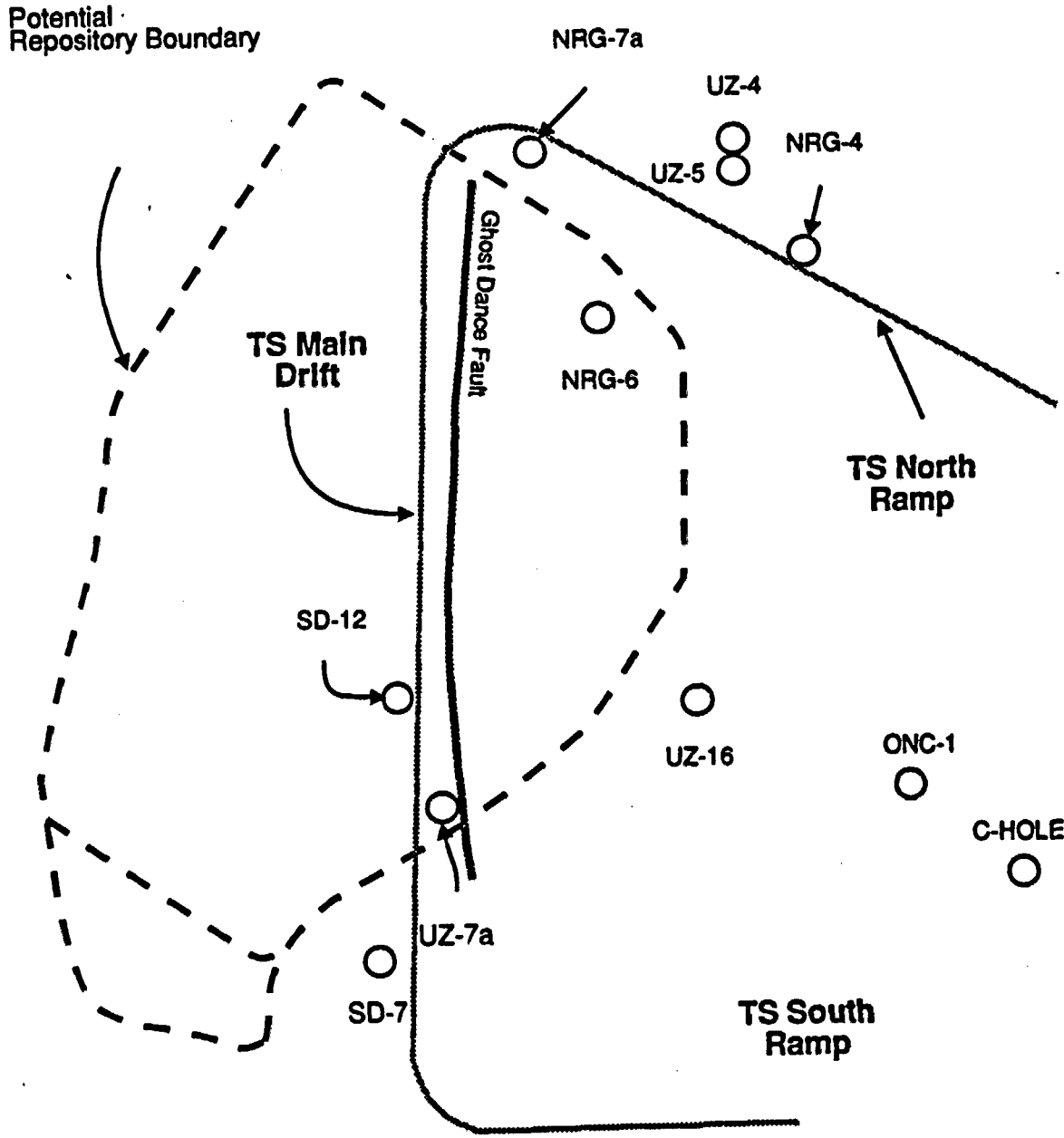
(Continued)

- Monitoring of Pneumatic Instrumentation
  - NRG-4 (Nye County)
  - NRG-6
  - NRG-7a
  - ONC#1 (Nye County)
  - UZ-4
  - UZ-5

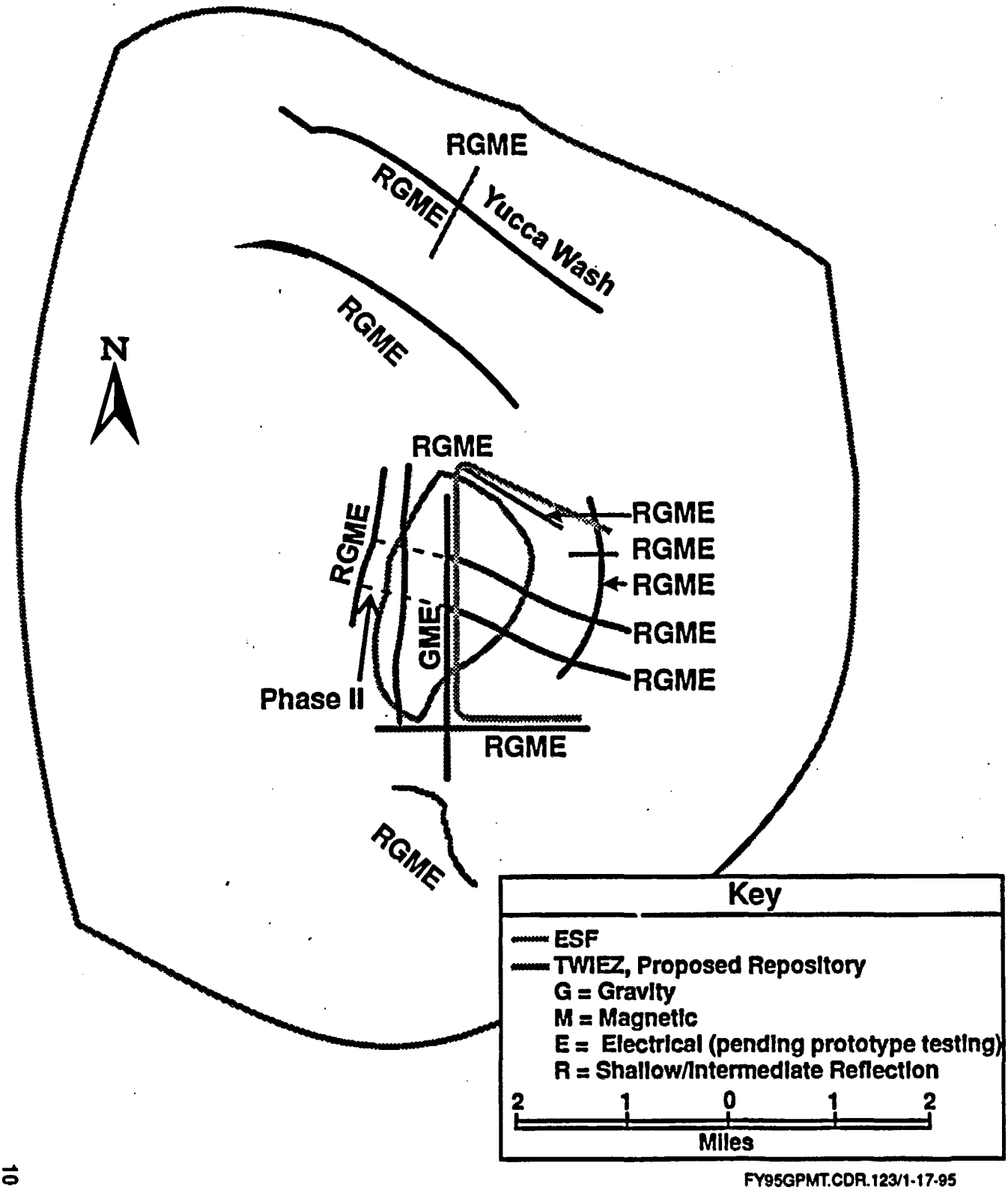
Borehole Geophysical Logging Planned
July 1, 1995 - September 30, 1995

• SD-7	Run #1, Log & Video
• SD-12	Logs & Video
• WT-10	Logs & Video
• WT-11	Logs & Video
• WT-12	Logs & Video
• C#3	Caliper only

SBT Borehole Activities in the Vicinity of the Repository



SCHEMATIC MAP
1995 GEOPHYSICS PROGRAM



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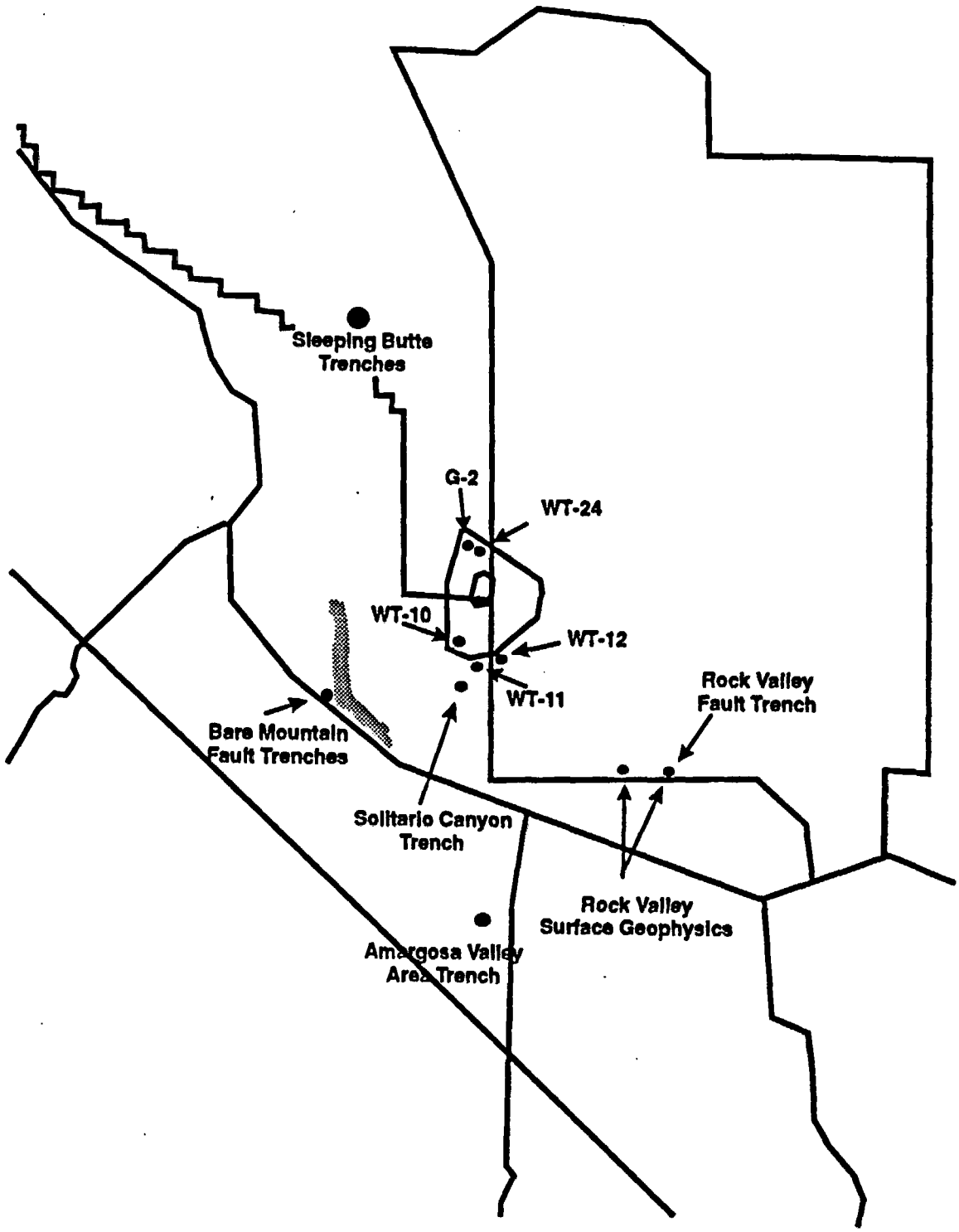


SBT Activities in the YM Region

BOYLE.125.NRC.CDR/7-19-95

ESF TEST ACTIVITIES SUMMARY

ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES

I. GEOHYDROLOGY (PERMEABILITY) TESTS

RECENT ACCOMPLISHMENTS:

- **CROSS-HOLE PRESSURE TESTING WAS INITIATED IN ALCOVE #1 IN LATE APRIL, 1995**
- **PRIMARY TESTING (CROSS-HOLE) IS ONGOING (ANISOTROPIC RADIAL BOREHOLES) THROUGH JULY**
- **EXCAVATION OF ALCOVE #2 (BOW RIDGE FAULT HYDROLOGIC PROPERTIES) BEGAN IN MID-MAY; ALCOVE REACHED FINAL (DESIGN) DEPTH OF 43 METERS ON JULY 11**
- **FINAL LOCATION (CS 7+60) FOR ALCOVE #3 (CONTACT RBT) WAS SELECTED BY TEST ORGANIZATION AND A/E REPRESENTATIVES DURING JUNE - JULY**

NEAR-TERM OBJECTIVES:

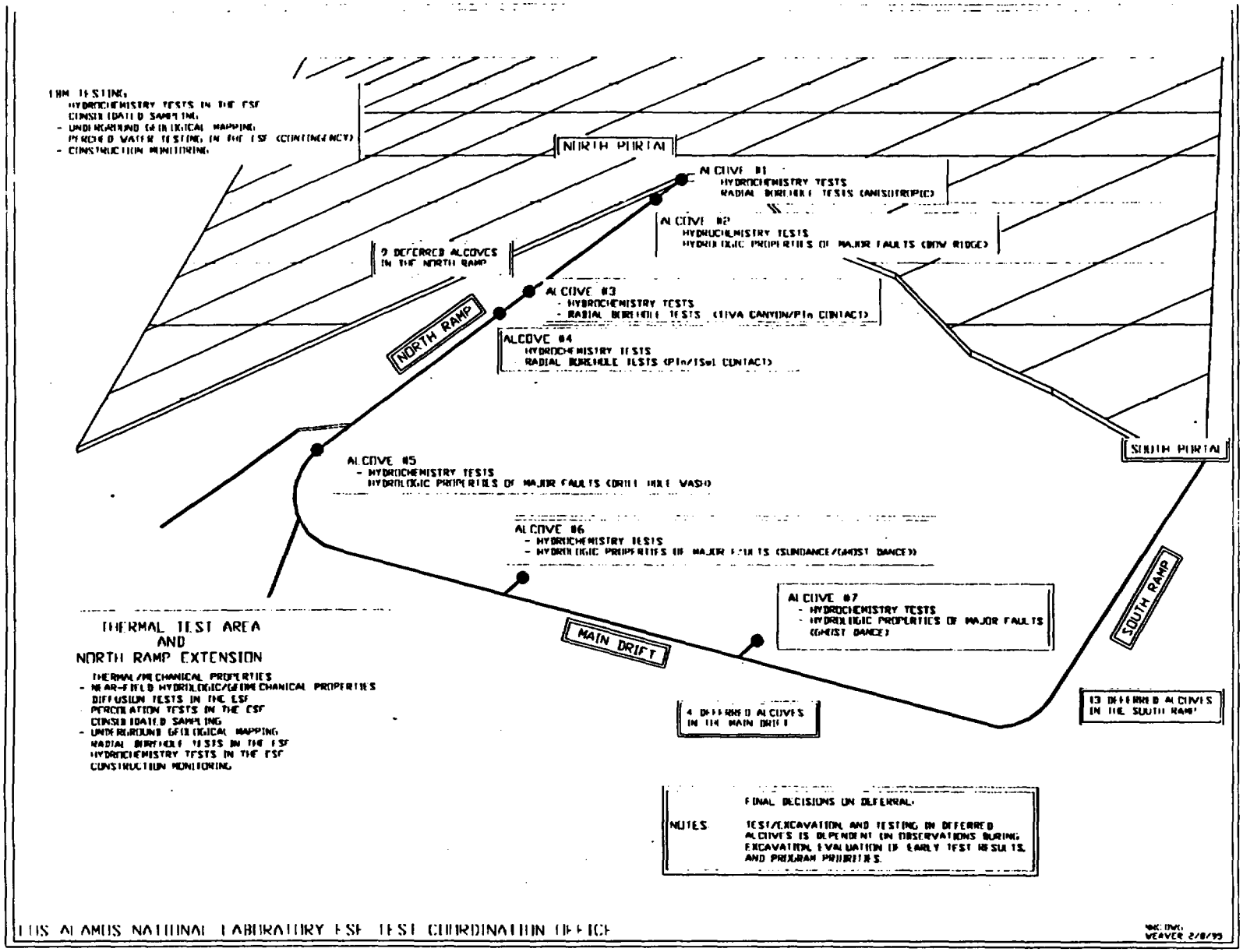
- **PRIMARY TESTING PHASE (CROSS-HOLE) FOR ANISOTROPIC RBT IN ALCOVE #1 WILL BE COMPLETED IN AUGUST**

- **CORE DRILLING FOR BOW RIDGE FAULT TESTING (ALCOVE #2) IS SCHEDULED TO BEGIN IN AUGUST; TESTING (SINGLE-HOLE /HYDROCHEMISTRY) WILL BEGIN IN SEPTEMBER**

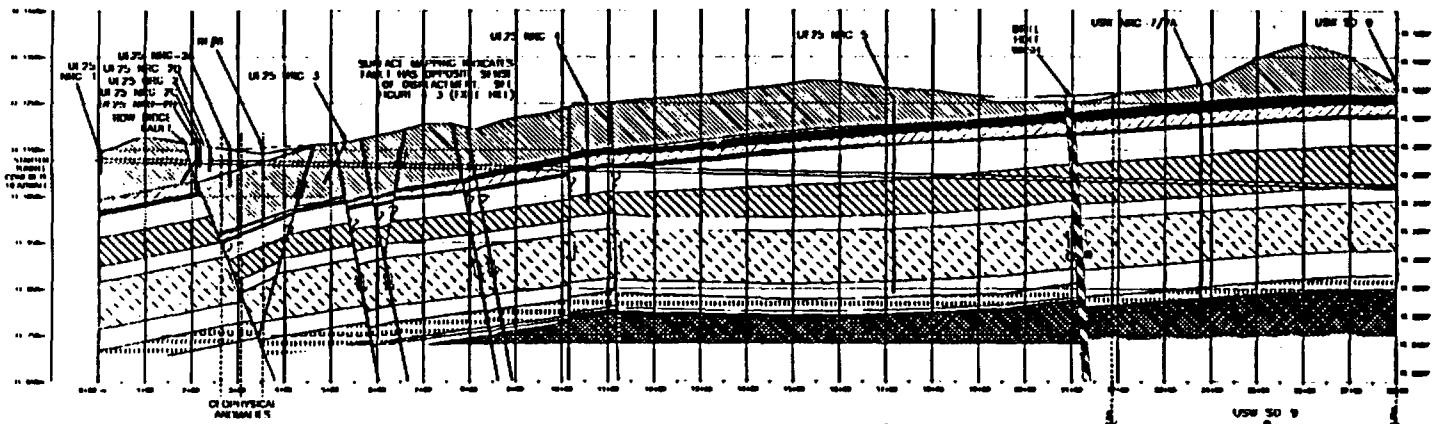
- **EXCAVATION OF ALCOVE #3 (POSSIBLY USING ROADHEADER) IS SCHEDULED TO BEGIN BY EARLY SEPTEMBER**

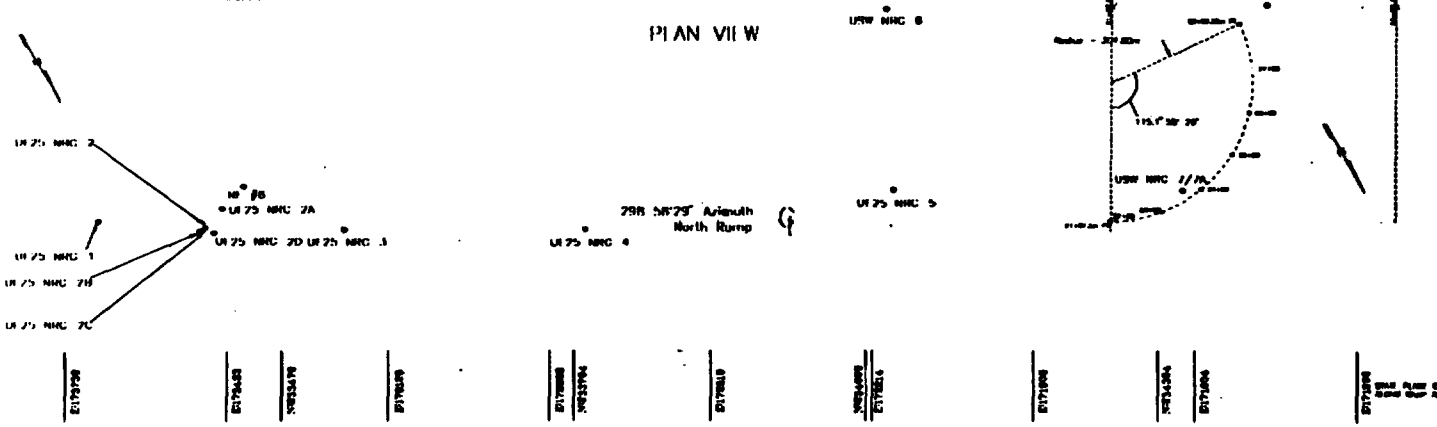
- **LOCATION AND DESIGN MODIFICATION CRITERIA FOR ALCOVE #4 (BEDDED TUFF/TOPOPAH CONTACT RBT) WILL BE FINALIZED BY INVESTIGATORS AND ESF TEST COORDINATION OFFICE IN LATE JULY-EARLY AUGUST (APPROX. LOCATION AT CS 10+50 - 10+75)**

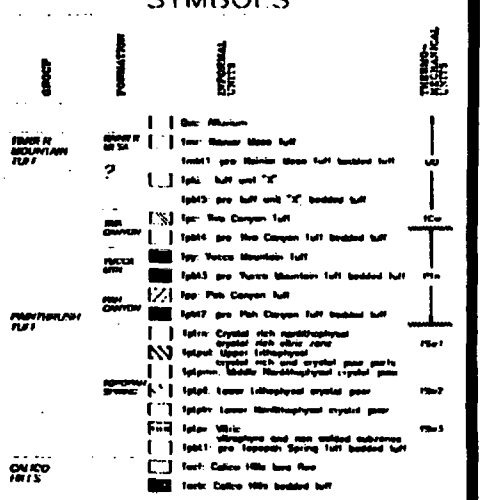
EXPLORATORY STUDIES FACILITY - TEST LOCATIONS



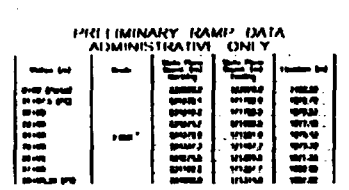
ADMINISTRATIVE RAMP CROSS SECTION: LITHOLOGY AND BOREHOLE PROJECTIONS

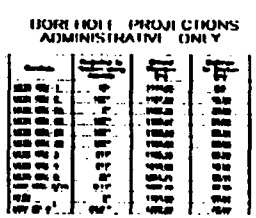






STRATIGRAPHIC NOMENCLATURE DEVELOPED BY USGS





FOR INFORMATION ONLY NOT CONTROLLED

ESF NORTH RAMP
YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT
CROSS SECTION ALONG RAMP FROM
0+00 to 78+00.38m (PI)

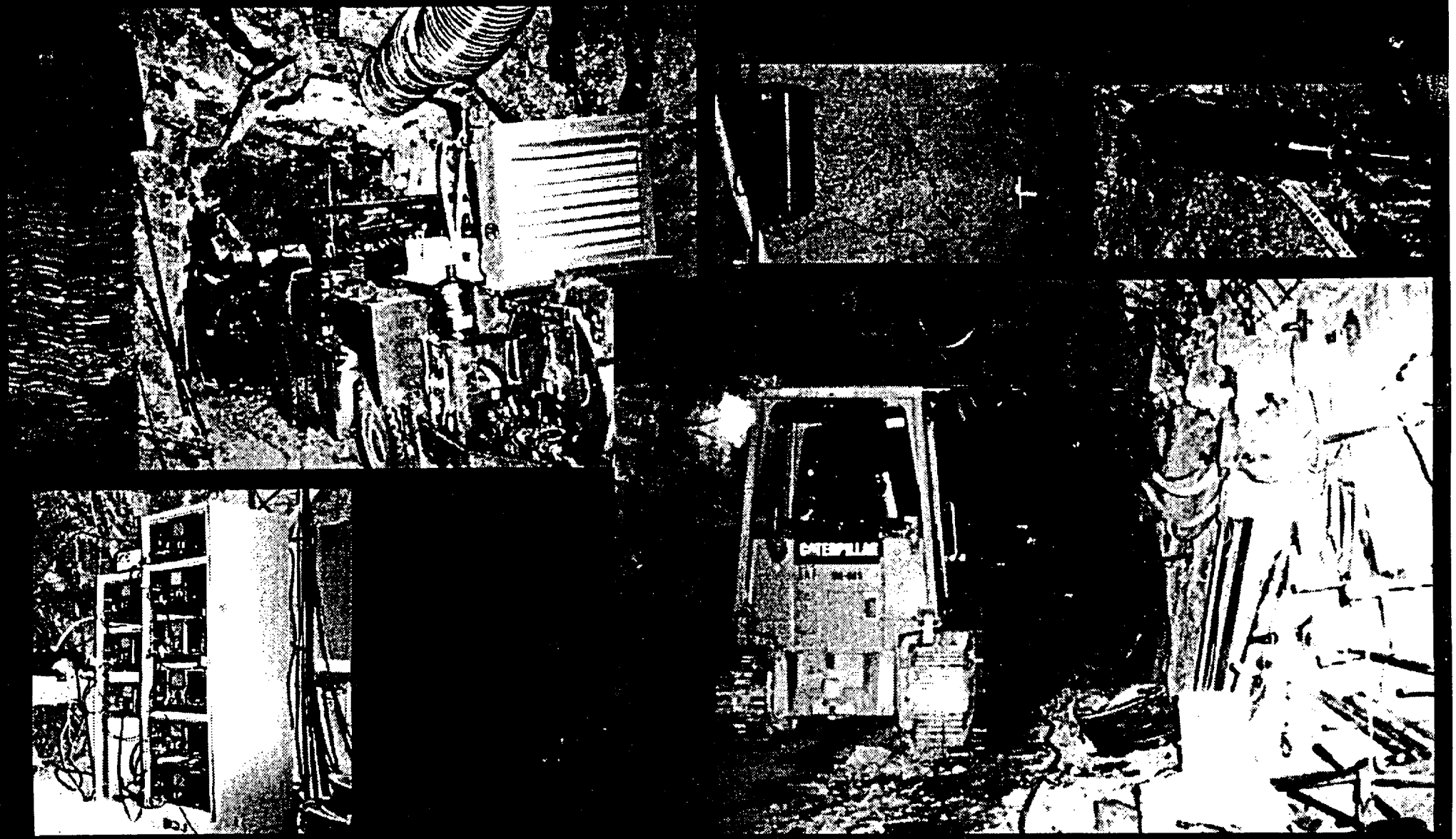
Sandia National Laboratories

GEOHYDROLOGY TESTING STATUS

ESF ALCOVE 1

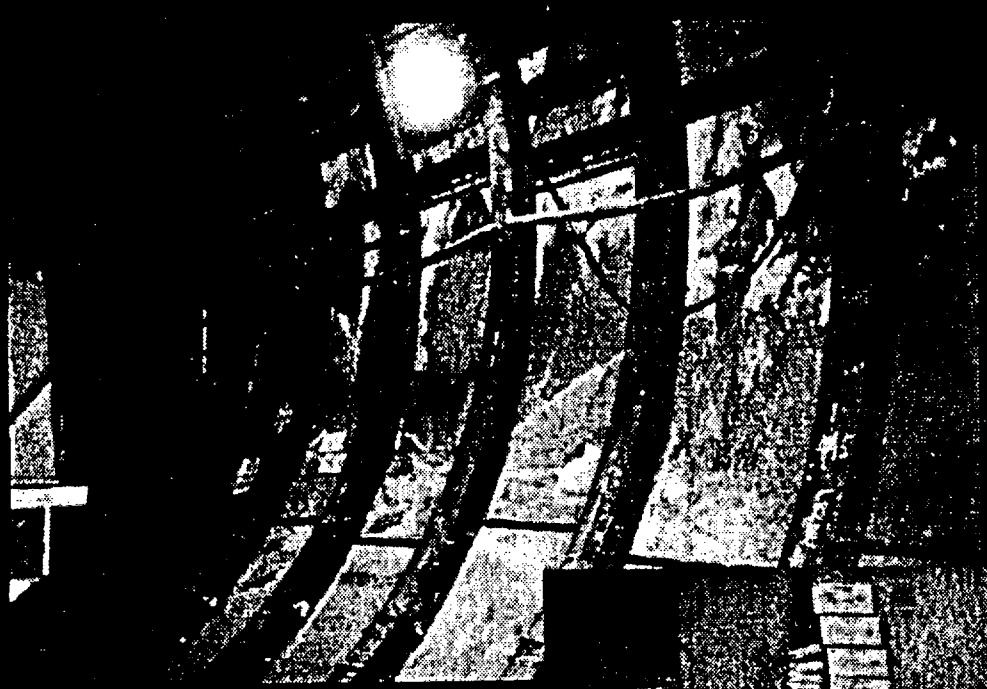
ESF ALCOVE #1, LOCATED AT APPROXIMATELY CS 0+40 m, WAS CONSTRUCTED TO INITIATE HYDROCHEMISTRY AND RADIAL BOREHOLE TESTING IN APRIL, 1994. CROSS-HOLE TESTING BEGAN IN APRIL, 1995. THE FIRST 10 METERS OF ALCOVE #1 IS BEING USED AS A DISPLAY AND INFORMATION AREA FOR UNDERGROUND TOURS OF THE ESF.

ESF ALCOVE 2

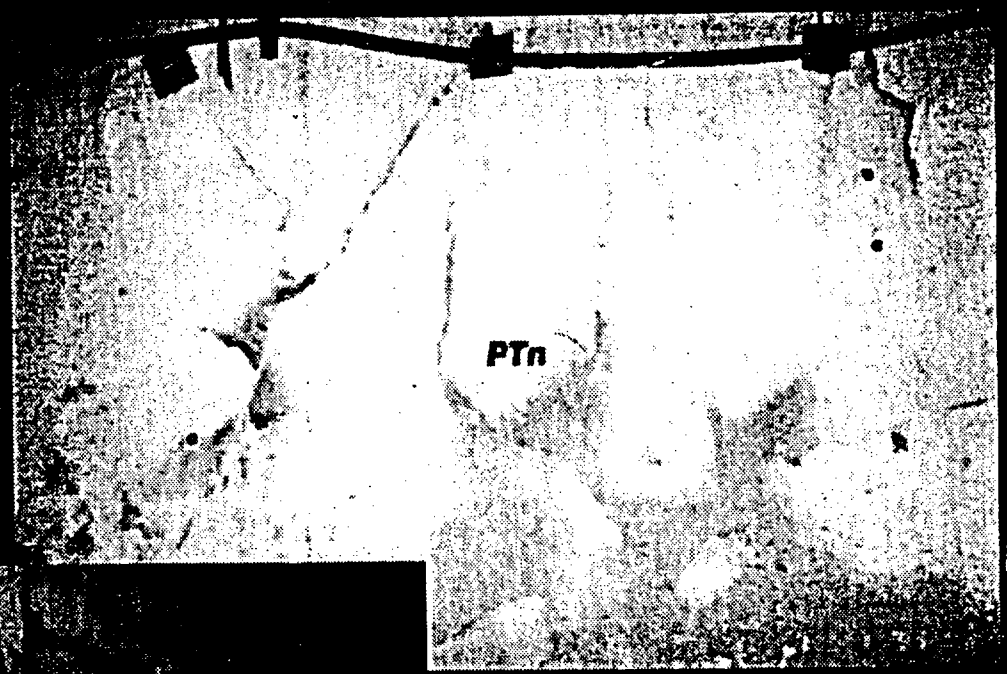


FINAL PREPARATION FOR ALCOVE #2 BEGAN IN MARCH, 1995 AND IS LOCATED AT APPROXIMATELY CS 1+70 m. THE ALCOVE WILL BE USED FOR THE TESTING OF HYDROLOGIC PROPERTIES OF THE BOW RIDGE FAULT. DURING THE CONSTRUCTION, SANDIA NATIONAL LABORATORIES IS MONITORING CONSTRUCTION EFFECTS WITH STRAIN GAGES AND ACCELEROMETERS. AS OF JULY 10, THE ALCOVE IS APPROXIMATELY 37 m LONG.

ESF ALCOVE 3



CS 7+70



CS 7+50

CS 7+60

ALCOVE #3 WILL BE PLACED SUCH THAT TWO GEOHYDROLOGIC FEATURES CAN BE TESTED: AT APPROXIMATELY 7+50, THE TIVA CANYON DENSELY WELDED TO UPPER PAINTBRUSH NONWELDED CONTACT (UPPER RIGHT) AND AT APPROXIMATELY 7+70, THE LITHOSTRATIGRAPHIC CRYSTAL POOR LOWER NONLITHOPHYSAL TO THE CRYSTAL POOR VITRIC ZONE CONTACT (UPPER LEFT). THE LOWER PHOTO SHOWS A POTENTIAL ALCOVE BREAKOUT LOCATION.

ESF TESTING ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES (CONT'D)

II. CONSTRUCTION MONITORING ACTIVITIES

RECENT ACCOMPLISHMENTS:

- INSTRUMENTATION (CONVERGENCE PINS, STRAIN GAGES, AND ROCK BOLT INSTRUMENTATION) BEHIND TBM GROUND SUPPORT INSTALLATION CONTINUES BEYOND CS 11+00; DATA IS BEING SUBMITTED TO A/E

- MPBX AND SPBX INSTALLATIONS IN TBM MAIN TUNNEL CONTINUE

- FIRST AUTOMATED DATA ACQUISITION STATION (DAS) HAS BEEN DELIVERED FOR INSTALLATION; DAS WILL SERVICE INSTRUMENTATION IN ESF STARTER TUNNEL AND ALCOVE #1

- BLAST MONITORING (OBSERVATION BOREHOLES, DOWN-HOLE ACCELEROMETERS, STEEL SET ACCELEROMETERS/STRAIN GAGES, AND TUNNEL MOUNTED SEISMOMETERS) WAS CONDUCTED FOR EACH ROUND DURING INITIAL EXCAVATION OF ALCOVE #2 (MAY, 1995); SEISMIC MONITORING WAS CONDUCTED (2 STATIONS) FOR ALL REMAINING ROUNDS TO COMPLETION (JULY)

- ON A BY-SHIFT BASIS, INSTRUMENT DATA FOR EACH ROUND WAS DOWN-LOADED, BY PI REPRESENTATIVES, REPRODUCED AND ENTERED USING APPROVED PROCEDURES, AND IMMEDIATELY PROVIDED TO A/E TITLE III REPRESENTATIVES FOR USE IN BLAST ROUND EVALUATIONS

- DIESEL EMISSIONS AND VENTILATION EXHAUST STUDIES WERE COMPLETED UNDERGROUND IN APRIL; DATA WERE ANALYZED AND REPORTED TO DIE MANAGEMENT IN MAY

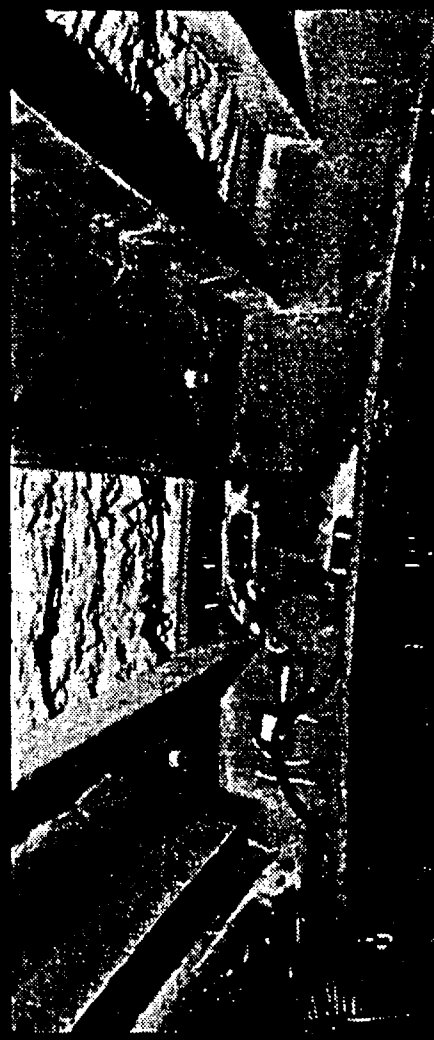
NEAR-TERM OBJECTIVES:

- CONTINUE GROUND SUPPORT/DRIFT STABILITY INSTRUMENTATION AND MONITORING BEHIND TBM AND IN EXCAVATED ALCOVES

- INITIATE IDS DATA COLLECTION USING DAS #1

- CONTINUE SCAN-LINE SURVEYS IN SUPPORT OF RQD DETERMINATIONS IN MAIN TUNNEL

CONSTRUCTION MONITORING IN THE ESF



AS OF JULY 10, 1995, 26 STEEL SETS HAVE BEEN INSTRUMENTED WITH 6-POINT CONVERGENCE PINS AND A TOTAL OF 324 STRAIN GAUGES. 4 MPBXs AND 1 SPBX HAVE BEEN INSTALLED IN THE ESF NORTH RAMP, AND 1 MPBX AND 2 SPBXs WERE INSTALLED IN ALCOVE #1 FOR THE MEASUREMENT OF ROCK DEFORMATION. RQD SCAN LINES ARE CONDUCTED ON 5 METER INTERVALS BEHIND THE TBM SHIELD.

ESF TESTING ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES
(Cont'd)

III. OTHER ESF TESTING ACTIVITIES

RECENT ACCOMPLISHMENTS:

- GEOLOGIC MAPPING OF TBM TUNNEL AND ALCOVE 2 IS CONTINUING FROM GANTRY SYSTEM BEHIND TBM SHIELDS AND FROM LIFTS (ALCOVE MAPPING)
- FULL-SCALE SAMPLE COLLECTION CONTINUES TO CS 10+60
- DRILLING OF INSTRUMENT HOLES AT FRAN RIDGE LARGE BLOCK TEST (LBT) CONTINUES (22 HOLES COMPLETED)
- FORMAL TEST PLANNING AND DESIGN FOR IN SITU THERMAL TESTING IN TOPOPAH SPRING (TSw2) WAS INITIATED IN JUNE, PRELIMINARY LOCATION AND TEST CONFIGURATION HAVE BEEN DEVELOPED BY TESTING TEAM

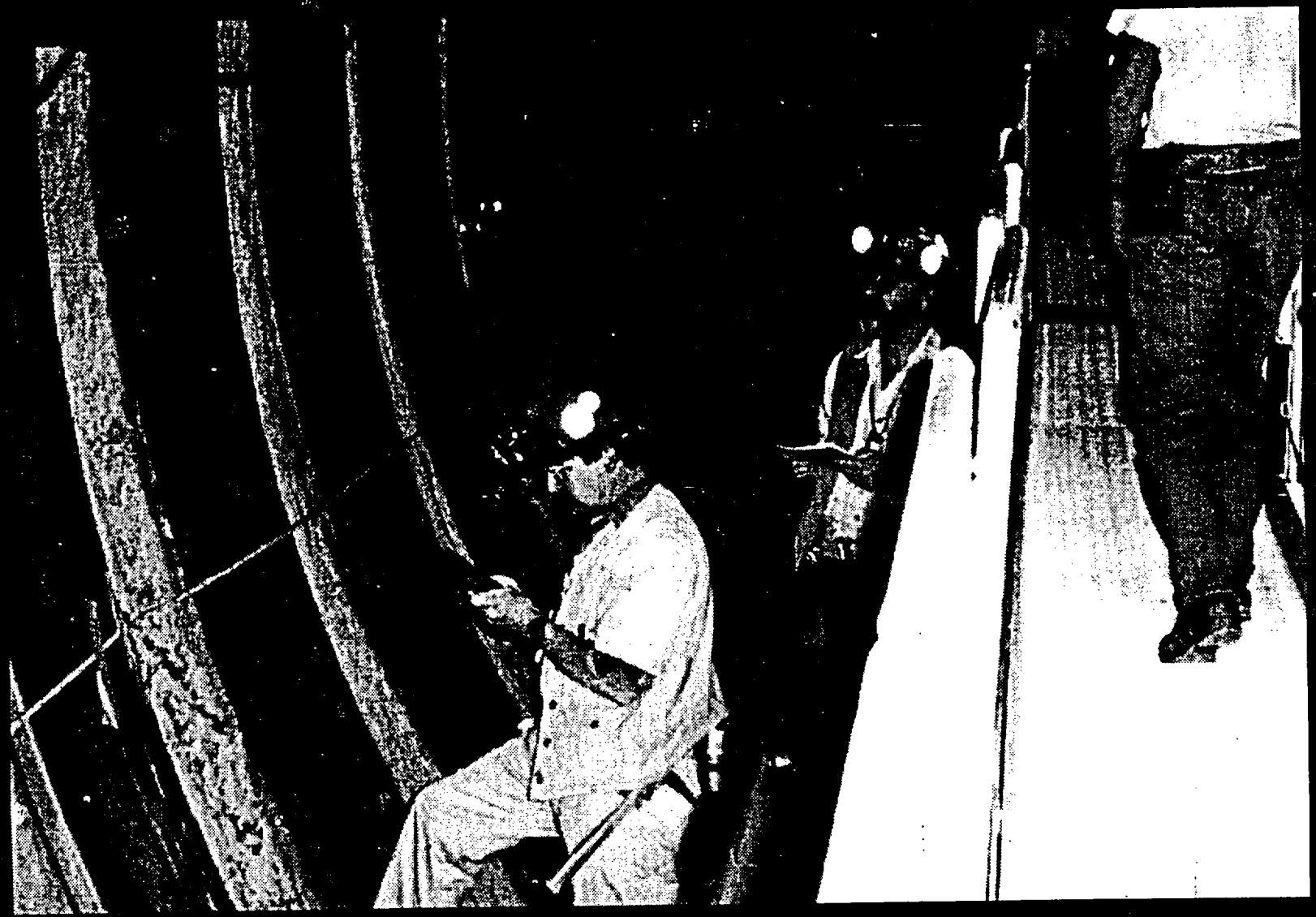
NEAR-TERM OBJECTIVES

- **FULL-SCALE MAPPING AND SAMPLING BEHIND TBM WITH CONVEYOR SYSTEM WILL COMMENCE LATE JULY**

- **FINAL PREPARATION OF LBT WILL BE COMPLETED IN FALL, 1995; TEST INITIATION SCHEDULED FOR EARLY CALENDAR 1996**

- **DESIGN CRITERIA DEVELOPMENT, FORMAL DESIGN, AND TEST LAYOUT/PLANNING FOR IN SITU THERMAL TEST TO CONTINUE THROUGH REMAINDER FY 1995**

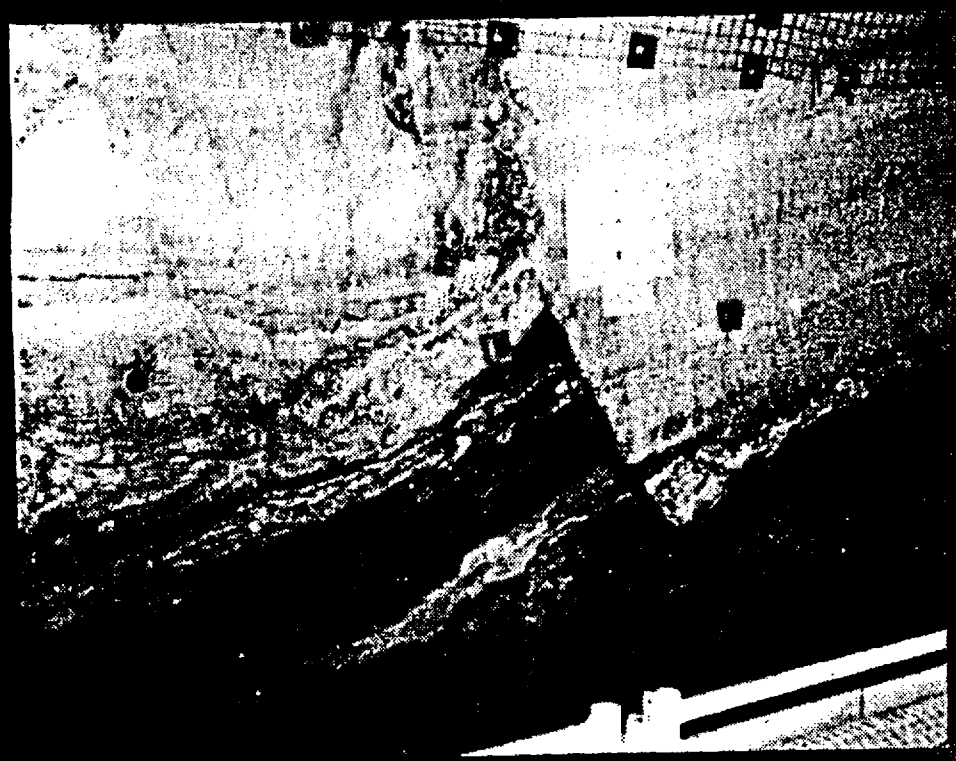
GEOLOGIC MAPPING IN THE ESF



AS OF JULY 10, 1995:

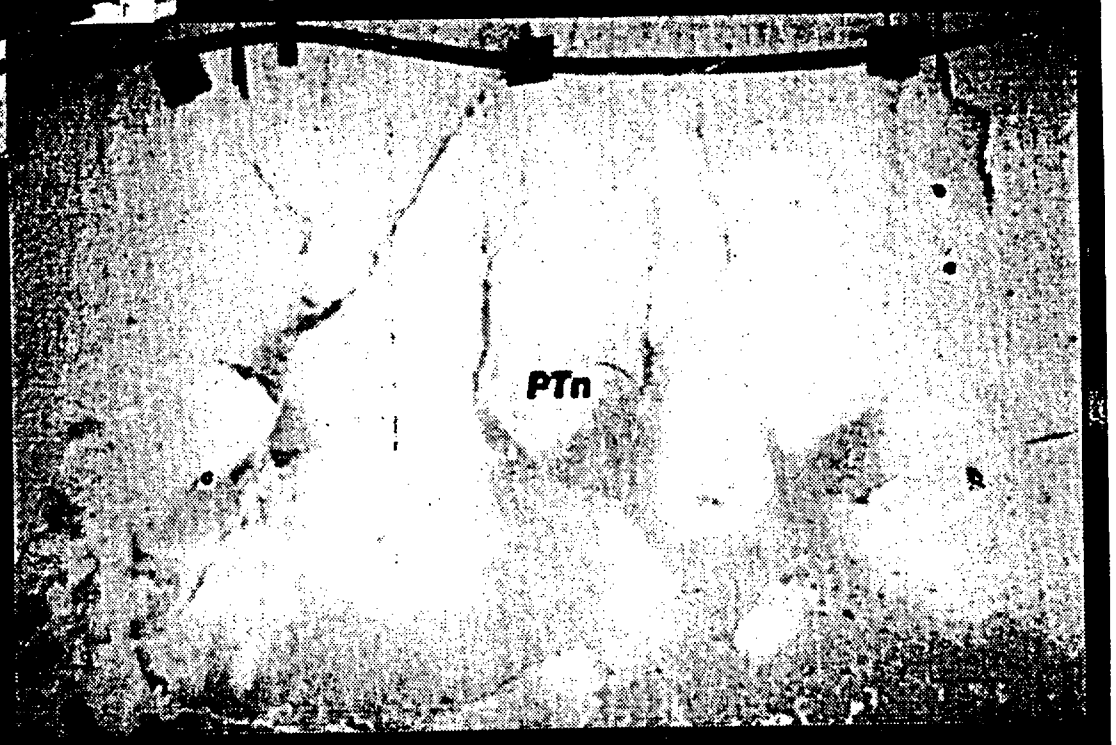
FULL PERIPHERY MAPPING COMPLETED TO	-	CS 10+50 m
TUNNEL PHOTOGRAMMETRY COMPLETED TO	-	CS 10+60 m
RQD CLASSIFICATION COMPLETED TO	-	CS 10+40 m
DETAILED LINE SURVEY COMPLETED TO	-	CS 10+41 m

RECENT GEOLOGIC CONDITIONS IN THE ESF



ALTERED TUFF (Tpbt2) BISECTED BY FAULT PLANE AT STATION 10+31 m, LEFT RIB

UPPER PAINTBRUSH NONWELDED (PTn) AT APPROX. CS 7+51 m



CONSOLIDATED SAMPLING IN THE ESF

LIST OF STUDIES SUPPORTED BY CONSOLIDATED SAMPLING PROGRAM:

- LABORATORY DETERMINATION OF MECHANICAL PROPERTIES OF INTACT ROCK
- LABORATORY DETERMINATION OF THE MECHANICAL PROPERTIES OF FRACTURES
- IN-SITU DESIGN VERIFICATION
- CHARACTERIZATION OF THE EFFECT OF INTRODUCED MATERIALS ON CHEMICAL AND MINERALOGICAL CHANGES IN THE POST-EMPLACEMENT ENVIRONMENT
- WATER MOVEMENT TESTS, REV. 1
- CHARACTERIZATION OF THE PERCOLATION IN THE UNSATURATED ZONE - SURFACE-BASED STUDY
- CHARACTERIZATION OF THE PERCOLATION IN THE UNSATURATED ZONE - ESF INVESTIGATION
- MINERALOGY, PETROLOGY, AND CHEMISTRY TRANSPORT PATHWAYS
- HISTORY OF MINERALOGIC AND GEOCHEMICAL ALTERATION OF YM
- BIOLOGICAL SORPTION AND TRANSPORT
- CHARACTERIZATION OF STRUCTURAL FEATURES IN THE SITE AREA
- CHARACTERIZATION OF YUCCA MOUNTAIN QUATERNARY REGIONAL HYDROLOGY
- UNSATURATED ZONE HYDROCHEMISTRY
- LABORATORY THERMAL PROPERTIES

AS OF JUNE 28, 1995, 668 SAMPLES HAVE BEEN COLLECTED IN THE STARTER TUNNEL, ESF NORTH RAMP AND ALCOVES IN SUPPORT OF 14 STUDY PLANS.

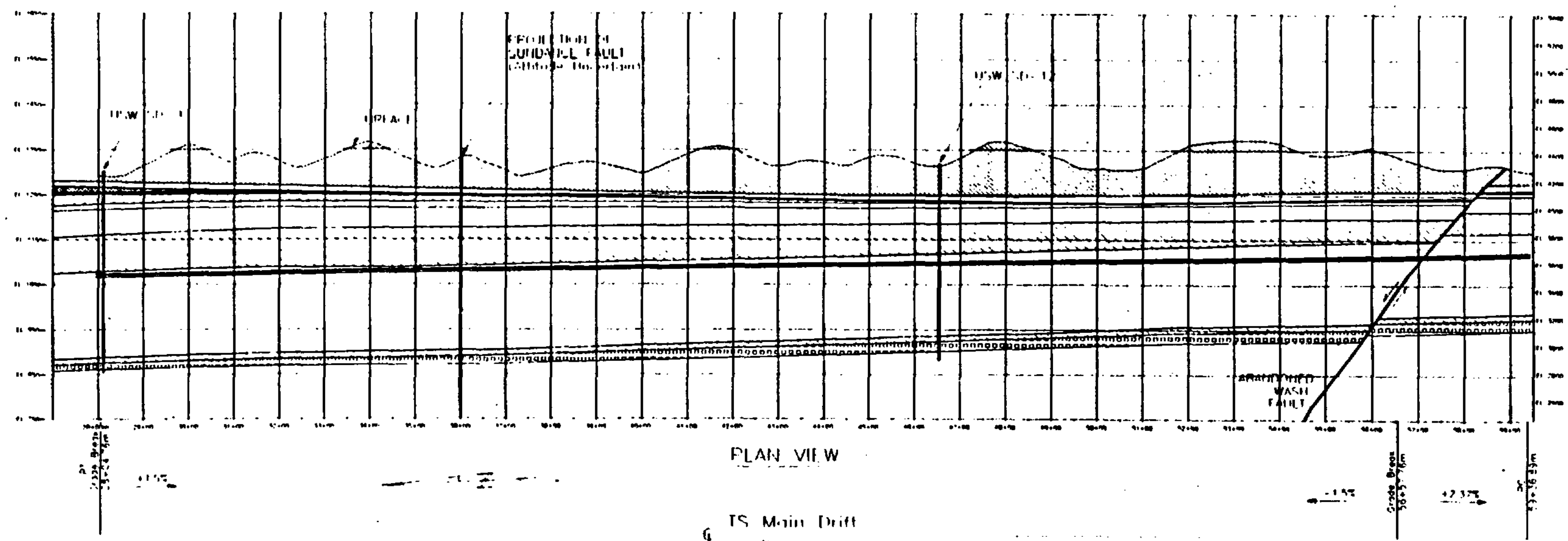
DIESEL EMISSIONS TESTING IN THE ESF

THE DIESEL EXHAUST EMISSIONS STUDY WAS CONDUCTED IN THE ESF NORTH RAMP AT STATION 0+70 m ON APRIL 29, 1995. THE STUDY WAS ESTABLISHED TO CARRY OUT ESF VENTILATION AIR COMPOSITION ANALYSIS BEFORE, DURING, AND AFTER THE OPERATION OF A LOCOMOTIVE DIESEL ENGINE PARKED IN THE TUNNEL'S VENTILATION AIR STREAM. AT RIGHT IS THE VOLATILE ORGANIC COMPOUNDS (VOC) SAMPLE BOTTLE.

ADMINISTRATIVE MAIN DRIFT CROSS SECTION: LITHOLOGY AND BOREHOLE PROJECTIONS

Produced by: Sandia National Laboratories

SECTION VIEW



STRATIGRAPHY[1]

LITHO-STRATIGRAPHIC UNITS	SYMBOL	THERMAL-MECHANICAL UNITS
Tiva Canyon tuff, undifferentiated, devitrified	Tpcun	TCw
Tiva Canyon tuff, crystal poor, ... to moderately welded	[illegible]	
Pre-Tiva Canyon tuff bedded tuff	Tpbt4	
Yucca Mountain tuff	Tpy	
Pre-Yucca Mountain tuff bedded tuff	Tpbt3	PTn
Pah Canyon tuff	Tpp	
Pre-Pah Canyon tuff bedded tuff	Tpbt2	
Topopah Spring tuff, crystal rich, ... to moderately welded	[illegible]	
Topopah Spring tuff, crystal-rich, devitrified, nonlithophysal (includes vitrophyre)	Tptrn	TSw1
Topopah Spring tuff, crystal poor, upper lithophysal (includes crystal rich lithophysal)	Tptpul	
Topopah Spring tuff, crystal poor, middle nonlithophysal	Tptpmn	
Topopah Spring tuff, crystal poor, lower lithophysal	Tptpll	TSw2
Topopah Spring tuff, crystal poor, lower nonlithophysal	Tptpln	
Topopah Spring tuff, crystal poor, vitrophyre subzone	Tptpv3	TSw3
Topopah Spring tuff, crystal poor, vitric, non welded to moderately welded	Tptpv 1&2	CHn

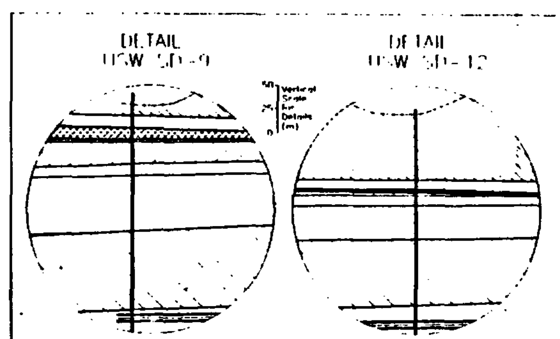
[1] Stratigraphic and thermal-mechanical units as defined by Buesch et al., USGS Open File Report 94-469, in press. Proposed Stratigraphic nomenclature and macroscopic identification of lithostratigraphic units of the Paintbrush Group exposed at Yucca Mountain, Nevada

LEGEND

PROPOSED TS MAIN DRIFT ALIGNMENT

Note: Stratigraphic contacts based on USGS LYNX Model (MP.R1). Not qualified data. Projections of stratigraphic contacts from USW SD-9 and USW SD-12. Qualified data.

DRILLHOLE CONTACTS BASED ON PROJECTING BOREHOLE ALONG DIP



PRELIMINARY TS MAIN DRIFT DATA ADMINISTRATIVE USE ONLY

Station (m)	Grade	State Plane Coord. (m) Northing	State Plane Coord. (m) Easting	Elevation (m)
28+04.76 (PT)	+1.5%	[illegible]	[illegible]	[illegible]
[illegible]	+2.37%	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]

BOREHOLE PROJECTIONS ADMINISTRATIVE USE ONLY

Borehole	Projected to Section along Azimuth	Ground Elevation (m)	Distance to Section (m)
USW SD-9	[illegible]	[illegible]	[illegible]
USW SD-12	[illegible]	[illegible]	[illegible]

BOREHOLE CONTACT PROJECTIONS

Borehole	Projection	Dip	Distance to Section (m)
USW SD-9	[illegible]	[illegible]	[illegible]
USW SD-12	[illegible]	[illegible]	[illegible]

FOR INFORMATION ONLY - NOT CONTROLLED

TS MAIN DRIFT
YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT
CROSS SECTION ALONG DRIFT FROM 28+04.76m (PT) to [illegible] (PC)

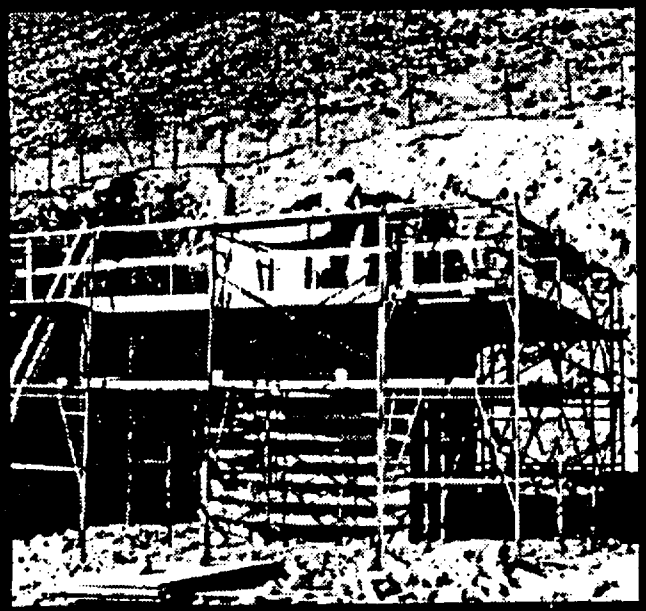
Sandia National Laboratories

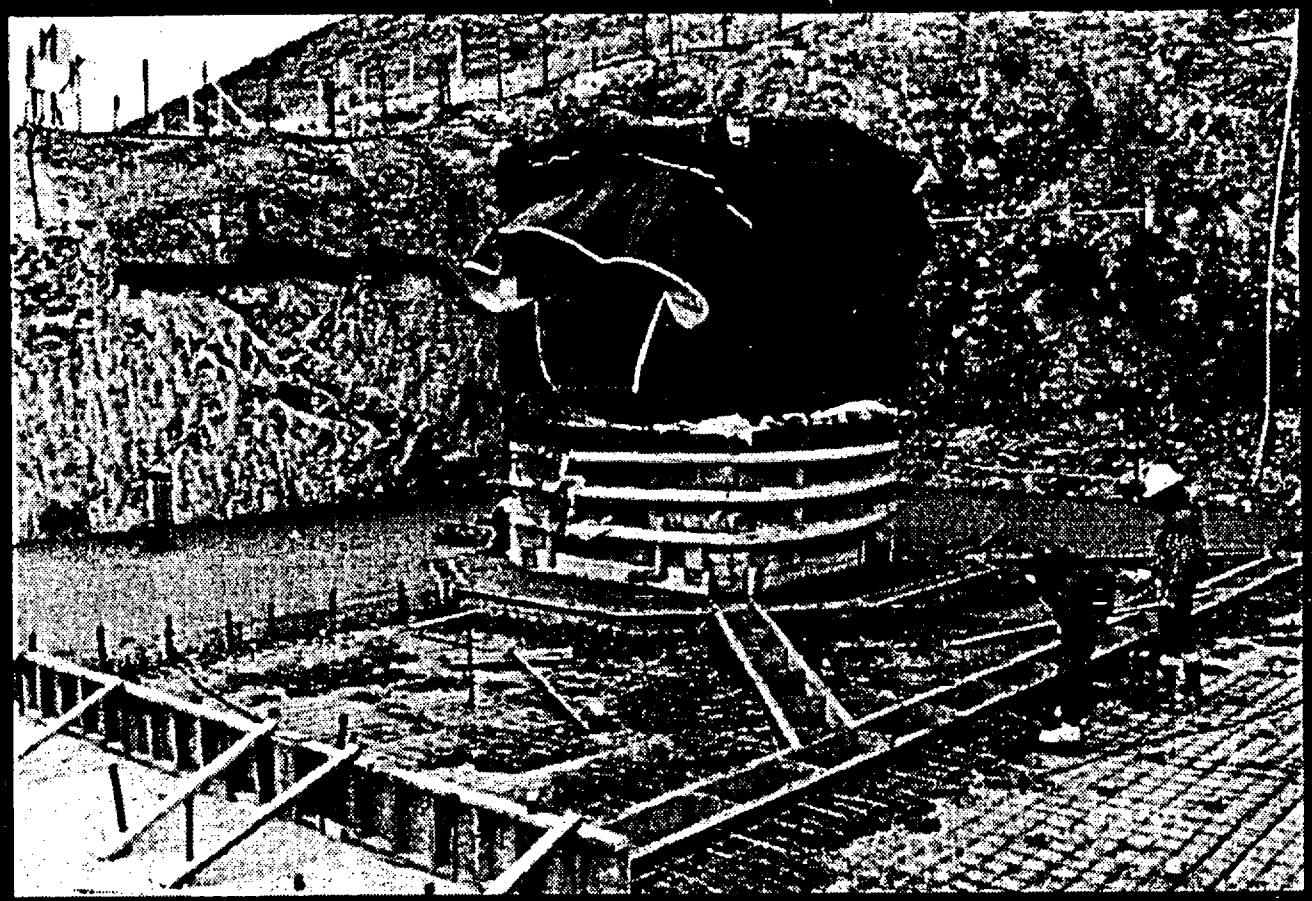
BASE DRAWING: USGS LYNX MODEL VERSION (MP.R1.), [illegible] SEPTEMBER 1994 | CHECKED BY: [illegible] HOR. SCALE: AS SHOWN VERT. SCALE: AS SHOWN

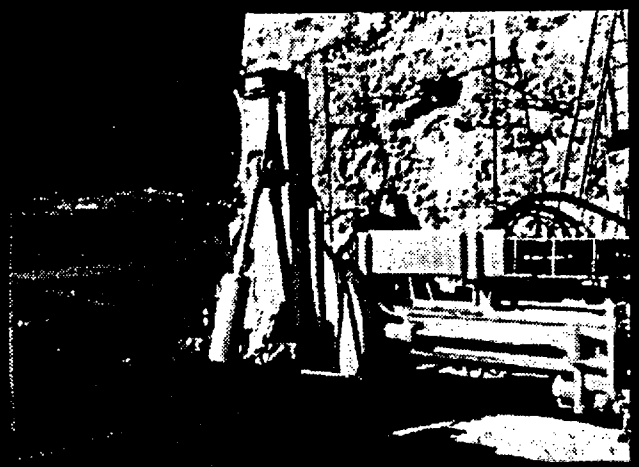
PRELIMINARY

AGAPITO ASSOCIATES, INC. | DRAWING NO. [illegible] FILE: [illegible] SHEET 1 OF 1

LARGE BLOCK TESTS AT FRAN RIDGE

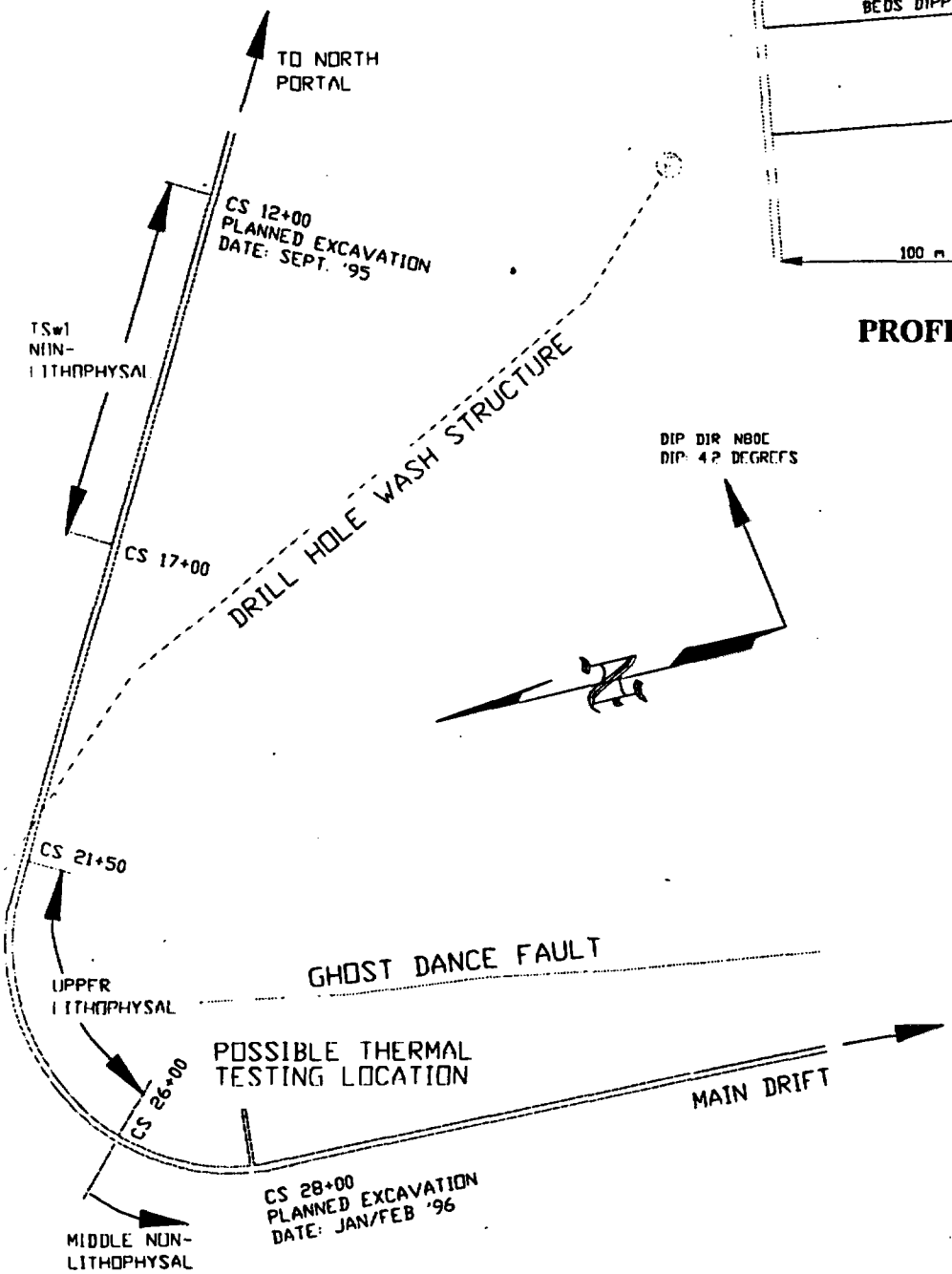


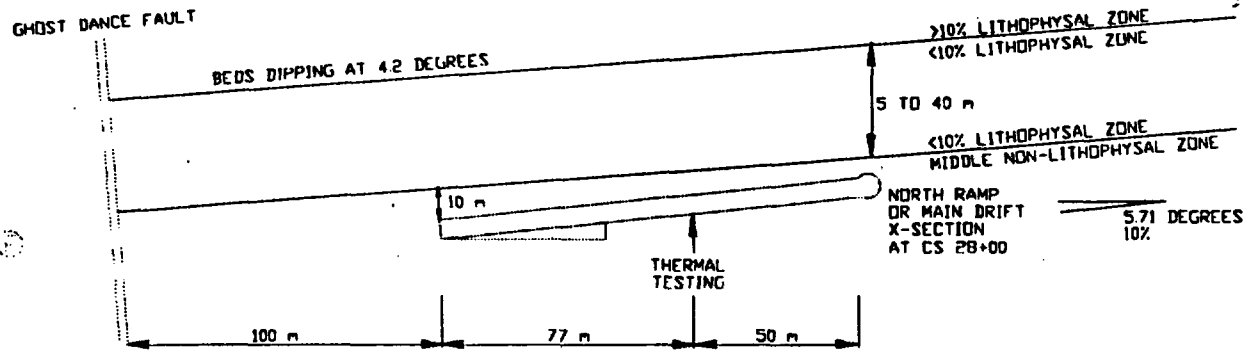




THE LARGE BLOCK TESTS AT FRAN RIDGE CONTINUE WITH THE CONSTRUCTION OF A CONCRETE PAD WITH CABLE WAYS AROUND THE BLOCK AND THE HORIZONTAL CORING OF HEATER AND INSTRUMENTATION EMPLACEMENT HOLES IN THE BLOCK. THE GOALS OF THE TEST ARE TO GAIN INFORMATION ON THE COUPLED THERMAL-MECHANICAL-HYDROLOGICAL-CHEMICAL PROCESSES THAT WILL BE ACTIVE IN THE NEAR-FIELD ENVIRONMENT OF A REPOSITORY; TO PROVIDE FIELD DATA FOR TESTING AND CALIBRATION MODELS; AND TO HELP IN THE DEVELOPMENT OF MEASUREMENT SYSTEMS AND TECHNIQUES.

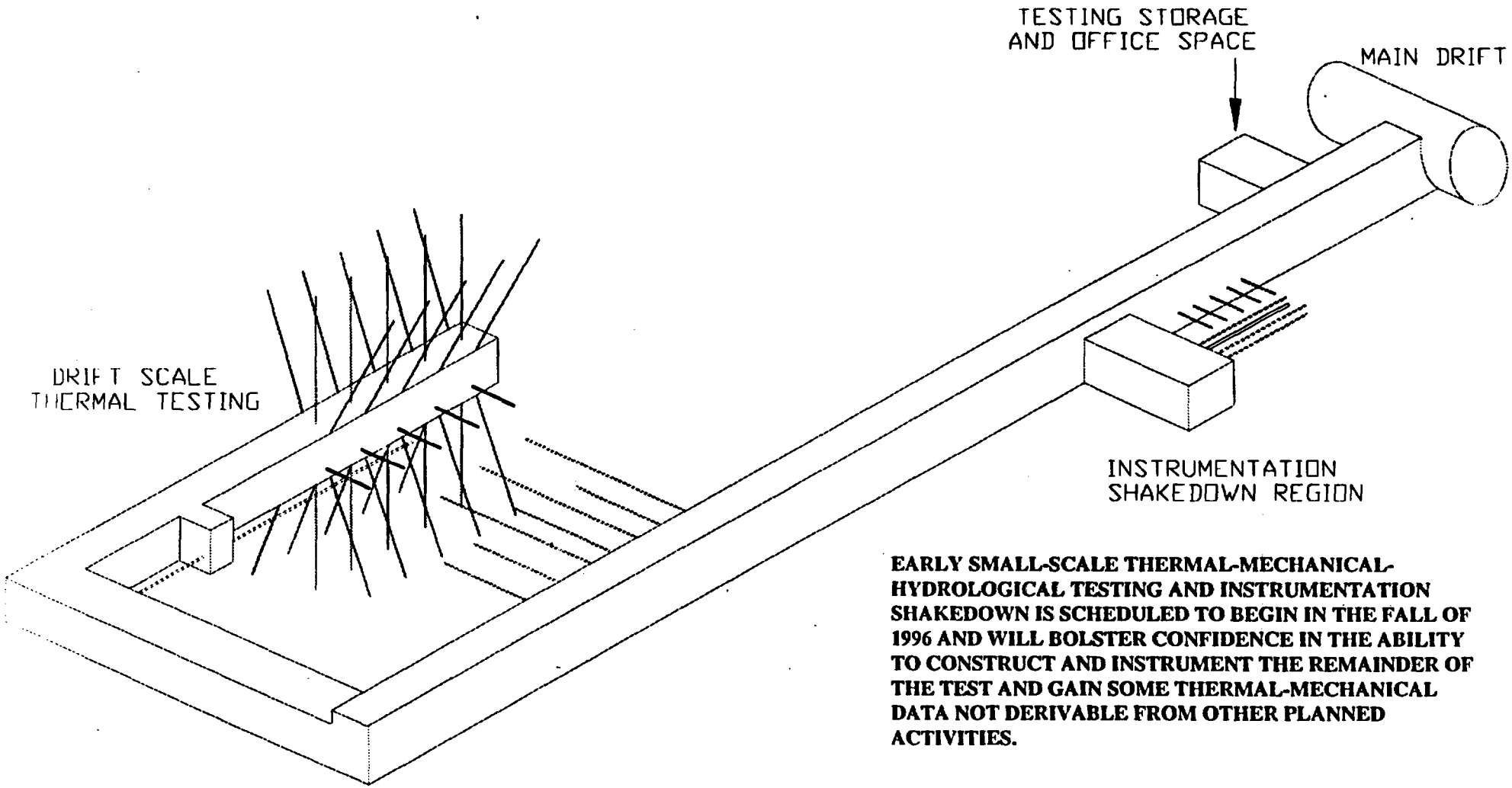
GEOLOGIC AND FACILITY LOCATION OF ESF THERMAL TEST





PROFILE VIEW OF POSSIBLE BREAKOUT DRIFT (TO THE EAST)

THERMAL TESTING IN THE ESF
CONCEPTUAL LAYOUT APPROVED BY TEST ORGANIZATIONS



EARLY SMALL-SCALE THERMAL-MECHANICAL-HYDROLOGICAL TESTING AND INSTRUMENTATION SHAKEDOWN IS SCHEDULED TO BEGIN IN THE FALL OF 1996 AND WILL BOLSTER CONFIDENCE IN THE ABILITY TO CONSTRUCT AND INSTRUMENT THE REMAINDER OF THE TEST AND GAIN SOME THERMAL-MECHANICAL DATA NOT DERIVABLE FROM OTHER PLANNED ACTIVITIES.

AS THE SHAKEDOWN/GEOMECHANICAL AREA IS BEING CONSTRUCTED AND INSTRUMENTED, CONSTRUCTION WILL CONTINUE ON THE THERMAL TEST FACILITY. THIS WILL INCLUDE A REPOSITORY EMPLACEMENT-SCALE, HEATED DRIFT WITH SIGNIFICANT THERMAL-MECHANICAL-HYDROLOGICAL INSTRUMENTATION, WING HEATERS AND A PLATE-LOADING COMPONENT. TESTING IS SCHEDULED TO BEGIN IN THE SPRING OF 1997.

YUCCA MOUNTAIN PROJECT

Studies

DOE-NRC Technical Exchange Meeting on The Exploratory Studies Facility

ESF Design Status

Presented by:

Alden M. Segrest
Manager, MGDS Development
CRWMS Management and Operations Contractor

July 19, 1995

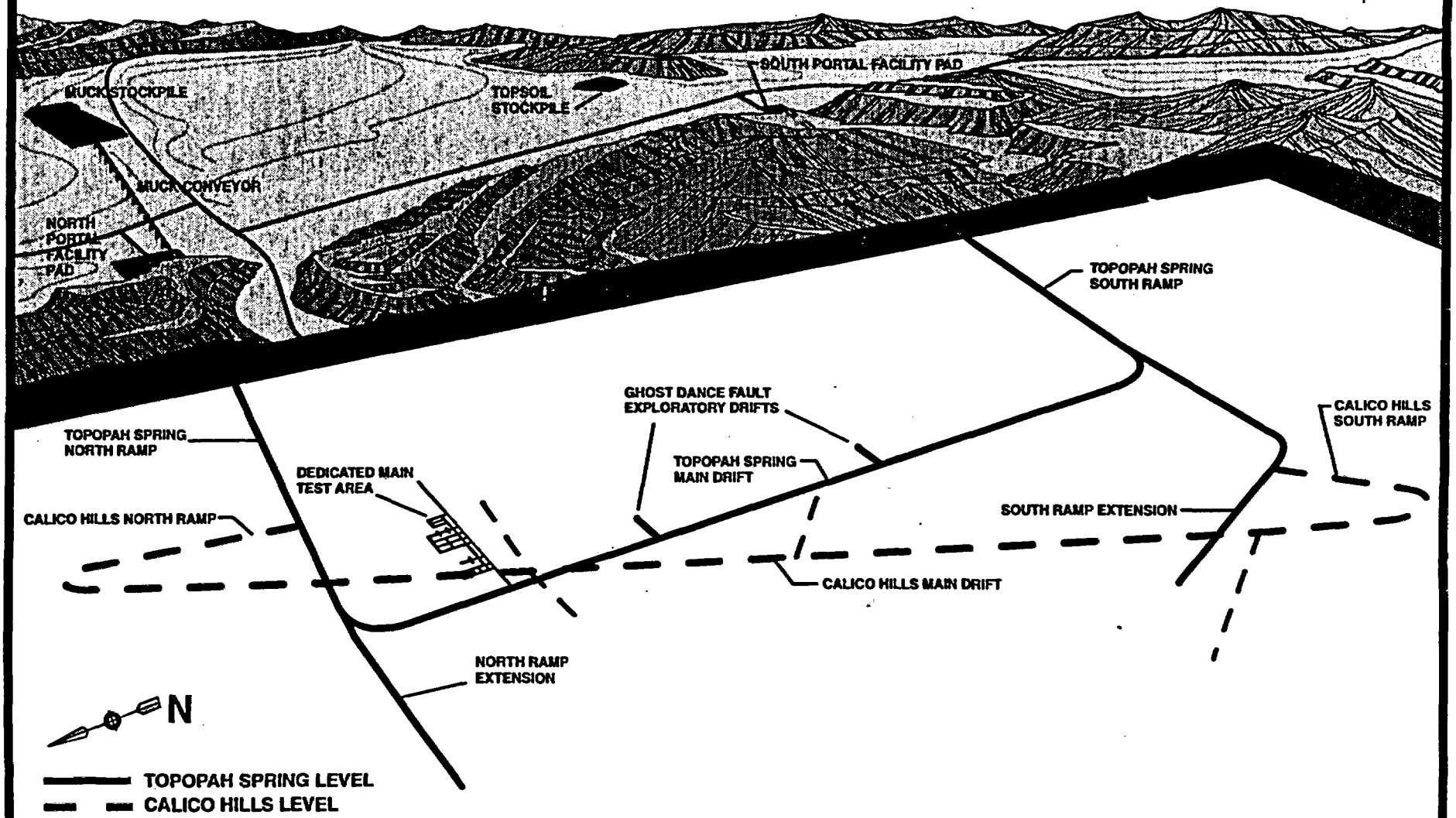
U.S. Department of Energy
Office of Civilian Radioactive
Waste Management

Attachment 5

Scope

- Design Progress Update
- Review and Approval Process Changes
- Design Control Process Update

Exploratory Studies Facility Design



ESFPRPD3.XSECTNS.CDR/7-27-94

Design Progress Update

- ESF Design Packages
  1. North Portal
  1E. Surface facilities at North Portal
  2. North Ramp from portal to Topopah Spring Level
  2C. North Ramp from portal to TSL, specifications & drawings
  3. South Portal
  4. South Ramp from portal to TSL
  5. North Ramp from Calico Hills (CH) turnout to CH level
  6. South Ramp from CH turnout to CH level
  7. Full length drift at the CH level
  8A. Main Drift at TSL
  8B. North Ramp extension drift
  9. Main Test Level core area
  10. Shaft at north end - Surface to Main Test Level

Design Progress Update

- North Portal Standby Power Generators (1E)
  - Reviews of design products included external organizations
  - Issued to constructor June 23, 1995
  - Construction deferred to FY96

Design Progress Update

- Integrated Data & Control System
  - All items for FY95 have been purchased
  - Front End Logger on schedule for installation before end of FY95
  - IDCS Specification Revision 01
    - » Provide requirements for tests to be fielded during next quarter
    - » Currently in checking

Design Progress Update

- Alcoves #3 Design Status
  - Drawings baselined in 1994 as part of Package 2C
  - Drawings to be updated via Baseline Change Proposal to reflect final design
  - USGS Design Criteria Letter expected to be issued by Test Coordination Office 7/21/95
  - Alcove Ground Support & Layout Analysis expected to be approved 7/28/95
  - BCP to Alcove Layout and Ground Support drawings scheduled for issue by 8/11/95
- Alcove #4 Design Awaiting Criteria Letter

Design Progress Update

- ESF Main Drift Design (8A)
  - Maximize reuse of North Ramp (2C) products
  - All primary (Main Drift) analyses scheduled to be approved by 8/15/95
  - Drawings and specifications will be developed as the analyses are approved
  - Schedule for issue of specifications and drawings is highly dependent upon approval of analyses

Design Progress Update

- **ESF Main Drift (8A) Analysis Estimated Schedule**

Analysis Title	Ext Rvw	Approval
Geology - ESF TS Loop	5/23/95	6/19/95
ESF Layout Calculation	6/12/95	7/06/95
Determination of Importance Evaluation	6/26/95	7/14/95
ESF Ground Support Design	7/19/95	8/03/95
General Construction Methods	7/27/95	8/16/95
Rockbolts/Shotcrete Material Dedication	7/28/95	8/22/95
Ground Support - Structural Steel	7/31/95	8/18/95

Design Progress Update

- **ESF Main Drift (8A) Analysis Estimated Schedule**

Analysis Title	Ext Rvw	Approval
ESF Alcove Design	8/01/95	8/24/95
Ground Support - Structural Steel Material Dedication	8/02/95	8/25/95
Invert Segment	8/07/95	8/30/95
Alcove Turnout Frame	8/16/95	9/08/95
Alcove Ground Support - Structural Steel	11/01/95	11/28/95

Design Progress Update

- **ESF Main Drift (8A) Design Output Estimated Schedule**

Outputs	Ext Rvw	Issue
Revised North Ramp Excavation and Layout drawings	8/01/95	9/07/95
Main Drift Layout & Excavation drawings	8/09/95	9/30/95
Revised Subsurface General Construction specification	8/28/95	9/29/95
Revised ESF Ground Support specifications and drawings	9/12/95	10/18/95

Design Progress Update

- GROA/ESF Interface Design
  - 6 drawings, 1 analysis, 1 technical report
  - Submit for baselining before end of FY95
  - Developing technical report to define changes
  - Develop coordinate geometry analysis to define layout
  - Revise drawings in accordance with results of analysis and conclusions of technical report
  - Currently in early stage of planning and analysis

Review and Approval Process Changes

Review and Approval Process Changes

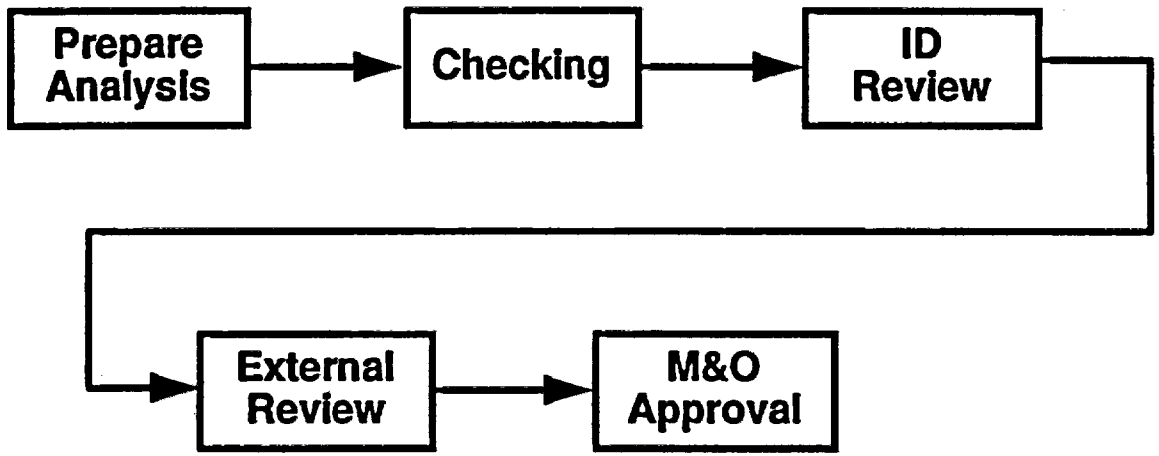
- Replace 50% and 90% reviews with M&O External Reviews for all new and major revisions to analyses, drawings and specifications
  - No Design Review meeting
  - Packages are distributed the day the review begins rather than two weeks prior
  - Duration of review is shorter due to the reduced scope of each review
- Eliminate DOE acceptance of design input sheets

Review and Approval Process Changes

- Delete requirement for BFD
- Eliminate requirements for DOE stamp and signature on each drawing and specification
- Other Changes Are Being Considered
  - DOE receive only approved products rather than participate in review and approval
  - Provide stakeholders and regulators with approved copies of products
  - Eliminate requirement for design outputs to be baselined

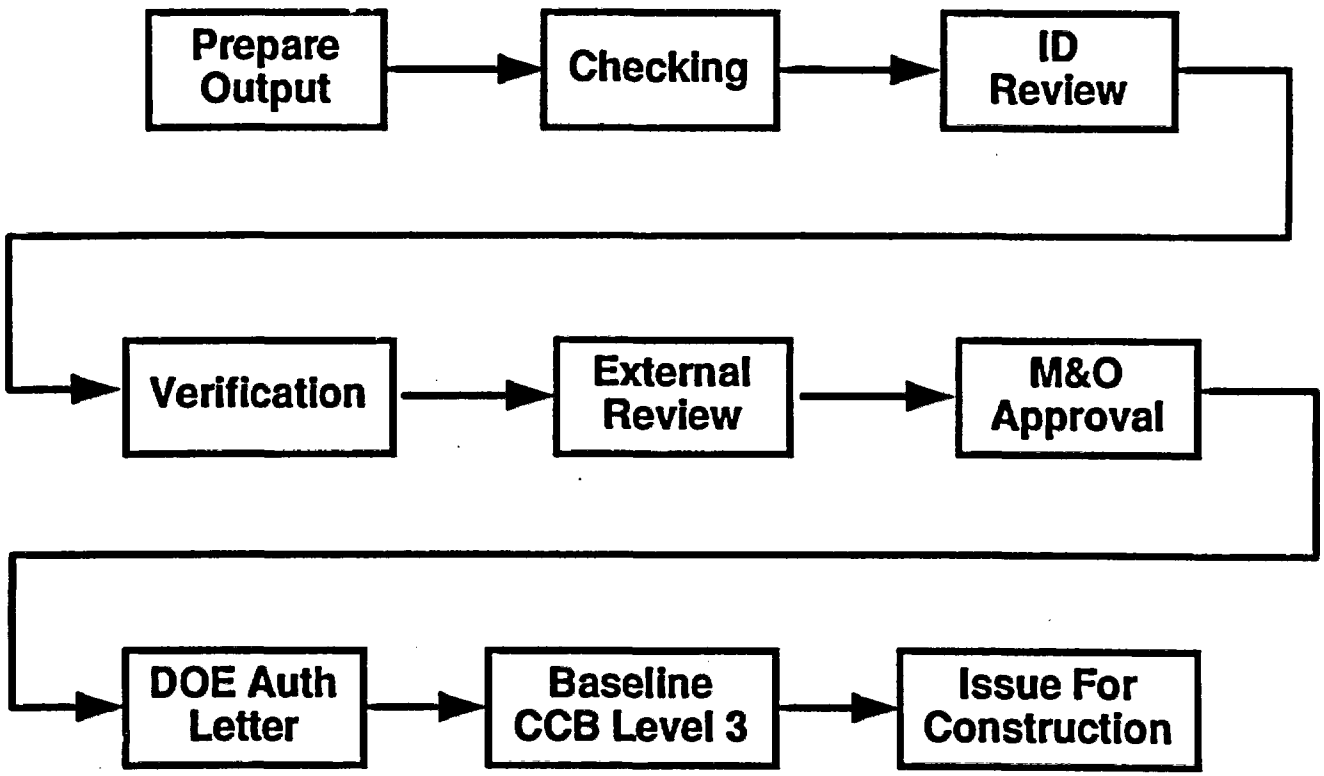
Review and Approval Process Changes

Proposed Design Analysis Development Process



Review and Approval Process Changes

Proposed Design Output Development Process



Status of Improvements Being Made to the Design Control Process

Design Control Process

- *Overall Problem*
  Lack of attention to details
- *Impact*
  Design documentation was not in compliance with QA procedure requirements
- *Lessons Learned*
  Culture shift emphasizing attention to details in all areas must be achieved

  Additional reviews are required to assure QA compliance in the short term; these will be lifted when process is functioning properly (recommendation has been made to delete one of the two extra reviews)

Design Control Process

- *Lessons Learned (continued)*
  Draft root cause analysis identified the following issues:
  - **Managing balance of quality, schedules and resources for reactive and routine workloads**
  - **Poor communications, integration & teamwork**
  - **Procedure implementation and development programs not functioning well**
  - **Many workers lack relevant nuclear experience**
  - **Problem identification and correction processes not effective**
  - **Management expectations and standards not defined and enforced**

Process Design Control

- ***Problem***
  Errors not found due to inadequate checking
- ***Impact***
  CAR YM-94-065 was written identifying errors which should have been found during checking
- ***Lessons Applied***
  An independent checking group was established 1/02/95 for the purpose of checking all design products

Design Control Process

Lessons Applied (continued)

- Checking Group progress:
  - Checking Group accomplishments have completed the remedial action specified in CAR YM-94-065 (CAR closed 6/06/95)
  - Continue checking for technical adequacy and procedural compliance of all design products
    - » Q products: 33 completed, 25 in process
    - » Non-Q products: 47 completed, 36 in process
  - Looking for trends and inconsistencies, communicating results and instructions back to designers and supervisors
  - Implemented grading system to measure quality of products submitted for checking
  - MGDS Design Guidelines Manual issued 5/29/95

Design Control Process

- ***Problem***
  Design control procedures difficult to use
- ***Impact***
  Verbatim compliance with QA requirements not accomplished
- ***Lessons Applied***
  New impact review procedure will be effective 7/21/95

  Procedures for preparation of non-Q design products currently in review awaiting submission of comments

  New engineering calculations procedure in development

Design Control Process

- ***Problem***
  Design analyses prepared in parallel with drawings and specifications
- ***Impact***
  Some specifications and drawings did not address all requirements contained in the analyses
- ***Lessons Applied***
  Design process and schedule modified to add more separation between preparation of analyses and preparation of drawings and specifications

  DIEs are reviewed at an external review earlier in the process (DIE for Main Drift was approved July 14, 1995)

Design Control Process

- ***Problem***
  Errors in BFD - difficulties in capturing all inputs and preparing accurate traceability matrices. BFD is a very difficult document to develop and revise
- ***Impact***
  Flowdown of requirements to design could not be demonstrated in some cases and document was prone to errors
- ***Lessons Applied***
  Simplify process for documenting basis for design

Design Control Process

- *Lessons Applied (continued)*

  Revise ESFDR to:

  - **Assign applicable requirements to the appropriate CI**
  - **More clearly identify 10CFR60 requirements**
  - **Identify which CIs are Q vs. non-Q**

  ESFDR revision scheduled to be submitted for review in September, 1995

Design Control Process

- Office of Product Integrity
  - Review design products as well as other M&O documents and processes
  - Have reviewed the following items to date, with the indicated number of recommendations:

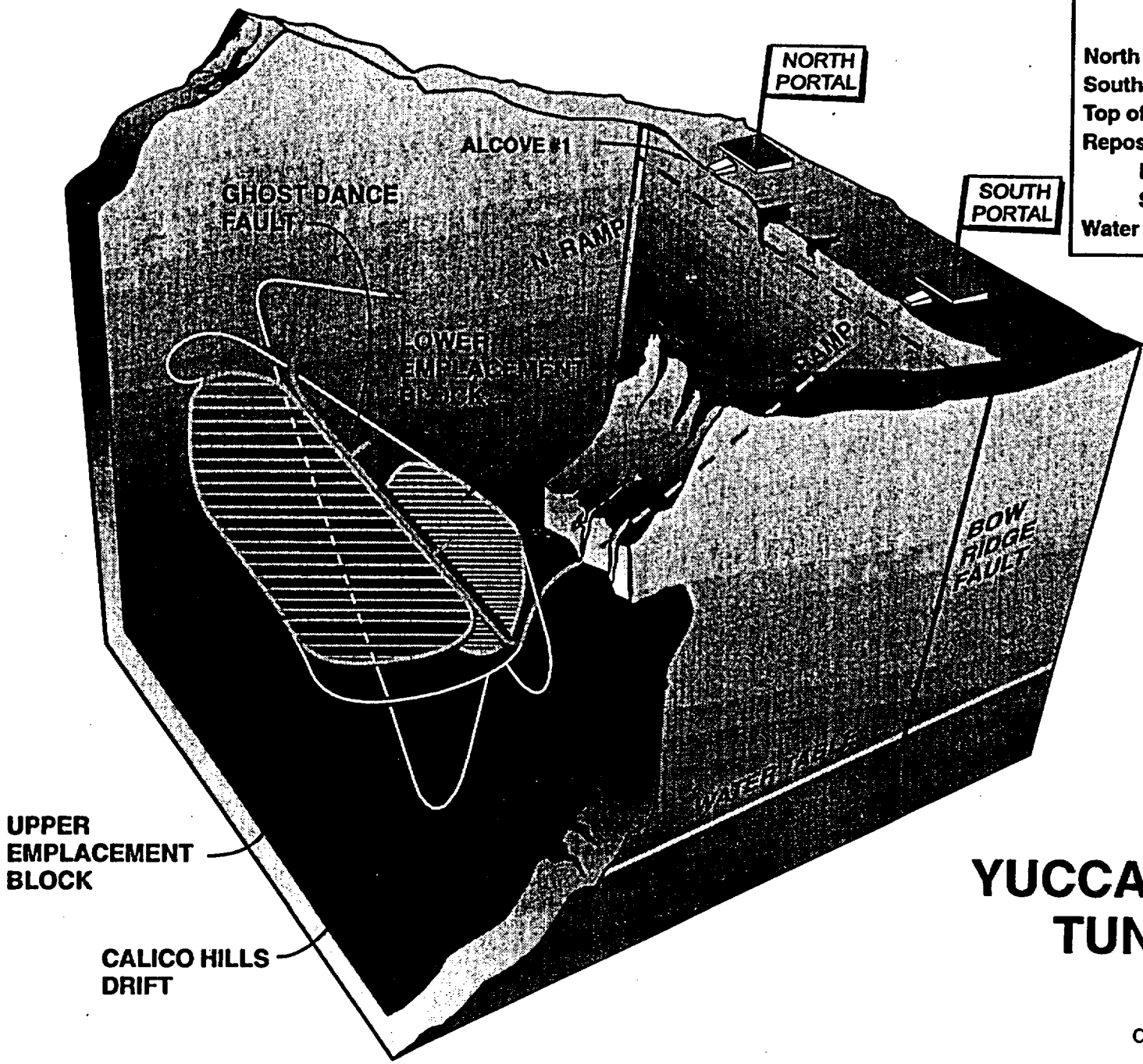
Document	Revws	Obs	Concern	Finding
Analyses	4	5	2	0
DIEs	9	14	1	1
Drawings	1	0	2	0
Processes	5	20	N/A	N/A
QA Classifications	5	3	4	0
Reports	2	9	3	0
Specifications	1	2	1	0

Design Control Process

- Office of Product Integrity (Continued)
  - *Observation* - an issue which appears to be limited to the document under review (no generic implication) and its resolution may be accomplished during a future revision of the document
  - *Concern* - an issue which appears to have impact on more than one document (generic in nature) and its resolution may be accomplished during a future revision of the document
  - *Finding* - an issue which has immediate impact on the document under review (regardless of generic impact) and requires resolution prior to issuance or continued used of the document

Design Control Process

- Office of Product Integrity (continued)
  - Overall Results of OPI reviews
    - » Greater involvement by line management needed to ensure adequate impact evaluations result when design inputs are revised and to ensure requirements in design outputs are implemented by the constructor
    - » Attention to detail has improved and products are acceptable; quality will continue to improve as individuals mature into new processes
  - Design Document Reviews - technical adequacy is acceptable but errors are found in supporting details (e.g., lack of consistency in documentation and incorrect references)
  - Reviews have been performed on checked and unchecked documents to assess effectiveness of the checking process



ELEVATIONS (Above Sea Level)	
North Portal	3,684 ft.
South Portal	3,790 ft.
Top of Mountain	5,000 ft. at Crest
Repository	
North End	3,494 ft.
South End	3,634 ft.
Water Table	2,400 ft.

YUCCA MOUNTAIN TUNNELING

Conceptual Illustration: Not to scale

VANDESFC CDH 12/12 27-95

PRELIMINARY PREDECISIONAL DRAFT

YUCCA MOUNTAIN PROJECT

Studies

DOE-NRC Technical Exchange Meeting on The Exploratory Studies Facility

Design Requirements Documents Revisions

Presented by:

M. Sam Rinskopf
Manager, Systems Engineering Requirements
CRWMS Management and Operations Contractor

July 19, 1995

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

Attachment 6

Requirements Documents

- Site Design & Test Requirements
  - Identifies surface and subsurface test facility requirements and testing objectives
  - Revision has:
    - » Identified SBT & ESF CIs & identified as Q or Non Q
    - » Allocated requirements to CIs & identified interfaces
    - » Captured Site Characterization Test objectives (including changes) in a separate volume
    - » Captured Program Approach
  - Status:
    - » Currently in QAP 6.2 comment resolution process,
    - » Concurrence draft sent out

Requirements Documents

- Engineered Barrier Design Requirements
  - Captures Engineered Barrier Segment design requirements
  - Revision has:
    - » Identified/defined Engineered Barrier Segment CIs
    - » Identified CIs as QA or Non QA
    - » Allocated requirements to CIs & identified interfaces
    - » Captured Program Approach and MPC requirements
  - Status:
    - » Currently in QAP 6.2 comment resolution process

Requirements Documents

- **Exploratory Studies Facility Design Requirements**
  - **Captures subsurface testing facility requirements**
  - **Revision will:**
    - » **Identify CIs as QA or Non QA**
    - » **Allocate requirements to CIs & identify interfaces**
    - » **Capture Program Approach**
  - **Status:**
    - » **Currently in revision development process**

Requirements Documents

- **Repository Design Requirements**
  - **Captures surface and subsurface facility requirements**
  - **Revision will:**
    - » **Identify CIs as QA or Non QA**
    - » **Allocate requirements to CIs & identify interfaces**
    - » **Capture Program Approach & MPC requirements**
    - » **Be broken into surface and subsurface volumes**
  - **Status:**
    - » **Currently in revision development process**