

*Rec'd with letter dtd.
11/2/95*

MINUTES OF THE SEPTEMBER 13, 1995
U.S. NUCLEAR REGULATORY COMMISSION/U.S. DEPARTMENT OF ENERGY
TECHNICAL MEETING ON THE EXPLORATORY STUDIES FACILITY

On September 13, 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 constructing DOE's Exploratory Studies Facility (ESF) at Yucca Mountain: tunnel boring, the drilling, testing and sampling program, and the status of the ESF design. The meeting, held by videoconference between DOE facilities in Washington, D.C. and Las Vegas, Nevada, was convened at noon EDT. Other attendees represented the State of Nevada Nuclear Waste Project Office; the Nevada Nuclear Waste Task Force; Clark County, Nevada; the Nuclear Waste Technical Review Board; DOE's Civilian Radioactive Waste Management System Management and Operating Contractor; 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 first presentation was an update on construction of the ESF north ramp. Progress continues to be ahead of schedule. In good ground the tunnel boring machine (TBM) has progressed 100-130 feet per day, taking advantage of the conveyor in both good and bad ground. The baseline target for FY 1995 was reached on August 22, 1995. The higher production rate of the TBM was attributed to the use of the conveyor, additional modifications to the TBM and to the ground support system as well as to the better ground conditions encountered. The use of steel lagging is not necessary under Category 1 conditions. Wire mesh with rock bolts is used under Category 1 conditions. In Alcove 3 rock bolts were used for very good conditions and in Alcove 2 modified steel sets were used. Attachment 3 provides details on progress of the tunnel boring machine (TBM) and on TBM modifications that have been incorporated. In response to a question from a prior meeting about ESF water use during tunnel boring, it was stated that peak usage occurred during long TBM stoppages, but there appear to have been no issues of concern recently. In response to questions from the current meeting regarding tracking the usage of organic chemicals, DOE stated that organic usage is highly limited; more specific information on usage and limits on the usage will be reported later. It was also noted that using the mapping gantry allows the mapping to keep up with the TBM. The presentation ended with the showing of recent photographs of ESF activities.

Next, DOE reported on the status of surface-based testing and updated the ESF drilling, sampling and testing program as of September 13, 1995. 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. Test Alcove #2 was completed in July, 1995 and the first borehole penetrating Bow Ridge Fault was drilled in August. Excavation of Test Alcove #3 was completed in August. This alcove will investigate the bedded tuffs below the Tiva Canyon tuff. Excavation of Alcove #4 is tentatively scheduled for mid-October. Alcoves #5 and #7 may not be constructed depending on availability of funding. ESF testing activities include Nye County's installation of instrumentation on the TBM to monitor humidity, temperature, and barometric pressure. In general, the current unit being penetrated is less brittle and the blocks are larger and more stable. Included among geologic conditions being investigated is a

possible fumarole. Attachment 4 also includes photographs of drilling, sampling and testing.

A discussion of the status of ESF design followed. Progress on ESF design packages, schedule for design of Alcove #4, drawings for the interface of the ESF with the repository, design analyses for the main drift excavation, and the updated design control process were discussed. In response to a question from the NRC staff, the example of DOE's new design control process flow shown on pages 14 to 23 of Attachment 5 was discussed in detail. In a review of a design package using this process, each comment from a reviewer is responded to. If there are interfacing comments, reviewers are contacted; design meetings are held if necessary, but normally there is no meeting of reviewers in general. NRC is part of this process only as an observer. As observer, NRC would receive copies of products such as design input lists and enhanced analyses supporting drawings and specifications. DOE noted that the interchange among reviewers on Package 2C (page 18 of Attachment 5) was good; however, it is expected that the response process for the new smaller design packages will be less cumbersome. Updates of the procedure NLP-3-10, Field Change control, and NLP-3-18, Documentation of QA were described.

The meeting concluded at 1:50 PM EDT.

Pauline P. Brooks 10/30/95
Pauline P. Brooks
High-Level Waste & Uranium Recovery
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission

Chrt E. Einberg 10/30/95
Christian E. Einberg
Regulatory Integration
Division
Office of Civilian Radioactive
Waste Management
U.S. Department of Energy

DOE/NRC ESF TECHNICAL MEETING

SEPTEMBER 13, 1995

LAS VEGAS ATTENDANCE LIST

Name	Organization	Phone
W.A. DeLoach, Jr	MTO/TRW	4-7756
Carl L. Beaton	DOE/AMSL	702-794-5118
APRIL GIL	DOE/AMSL	(702) 794-7622
Alden Segrest	MIP/AIE	702-794-1904
Nancy Treichel	NV Nuclear Waste Task Force	702-248-1127
Steve Fishman	NV NWRD	702/687-3744
Clad Slunn	NRC OR	702/388-6125
PAUL HARRINGTON	DOE/AMEFO	702-794-7785
Tim Howe	DOE/AMSL	702-794-7967
William Boyle	DOE/AMSP	702-794-7595
Bob Sundifer	WEO/State Const. & Opns	702-794-1869
RICHARD D. SNELL	MFO/ENG. & INTEG	702-794-5360
Richard L. Crow	DOE/AMEFO	4-7787
F. J. TISENBAUMER	CLARK COUNTY	702 455-5175
R. D. (Bill) Seddon	AEC Technology	702-295-9151
AL DAGNI	MIP/RIL	702-295-9394

Meeting Notice

AGENDA

NRC-DOE TECHNICAL MEETING

EXPLORATORY STUDIES FACILITY DESIGN AND CONSTRUCTION

VIDEOCONFERENCE

Bank of America Center, Blue Room, Las Vegas, Nevada
Forrestal Building, Room DC1 (3E077), Washington, DC

SEPTEMBER 13, 1995

9:00 PDT (Noon EDT)	Opening Remarks	DOE, NRC, NV, AULG
	ESF Construction Update	DOE
	Drilling, Testing, and Sampling Program	DOE
	ESF Design Status	DOE
	- Design Progress Update	
	- Design Review Process	
	- Design Products for Main Drift Excavation	
	Closing Remarks and Discussion	DOE, NRC, NV, AULG
11:15 PDT (2:15 EDT)	Adjourn	

YUCCA
MOUNTAIN
PROJECT

Studies

Exploratory Studies Facility Construction Status

Presented to:
DOE/NRC Technical Exchange

Presented by:
Robert M. Sandifer
Manager, Site Construction and Operations
CRWMS Management and Operating Contractor



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

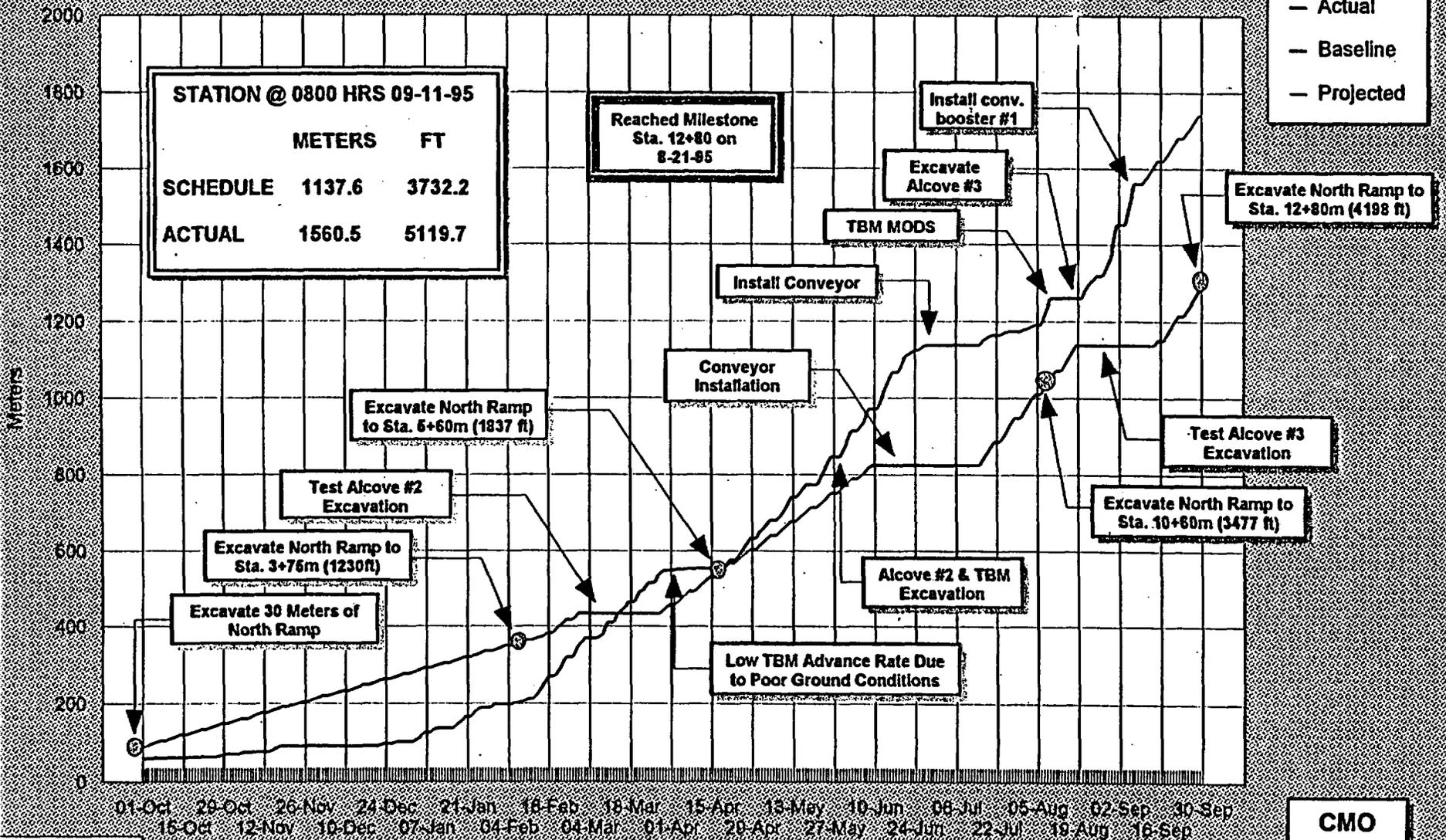
September 13, 1995

Tunnel Work Status

- FY95 baseline year target of 12 + 80 meters at 0747 hours on Tuesday, 8/22/95.
- The station of the TBM is \checkmark ¹⁶⁺²¹¹ on 9/13/95 at 8:00 am. Average advance per operating day since 7/19/95 is 14.0M/day. Average advance per operating day since conveyor went into service (7/26/95) is 16.9M/day.
- Installed 250 HP tunnel ventilation fan at portal.
- Incorporated following TBM modifications:
 - Triple shoe grip
 - Flap gates at horizontal grippers
 - Lower gripper ski nose
 - Hydraulic line upgrades and add accumulators
- First Booster drive in conveyor installed 9/8/95.
- Inspected head of TBM on 8/5/95 and performed seven work day hardfacing head repair placing TBM back into operation on 8/21/95.

TBM Progress

Baseline vs Actual



CMO

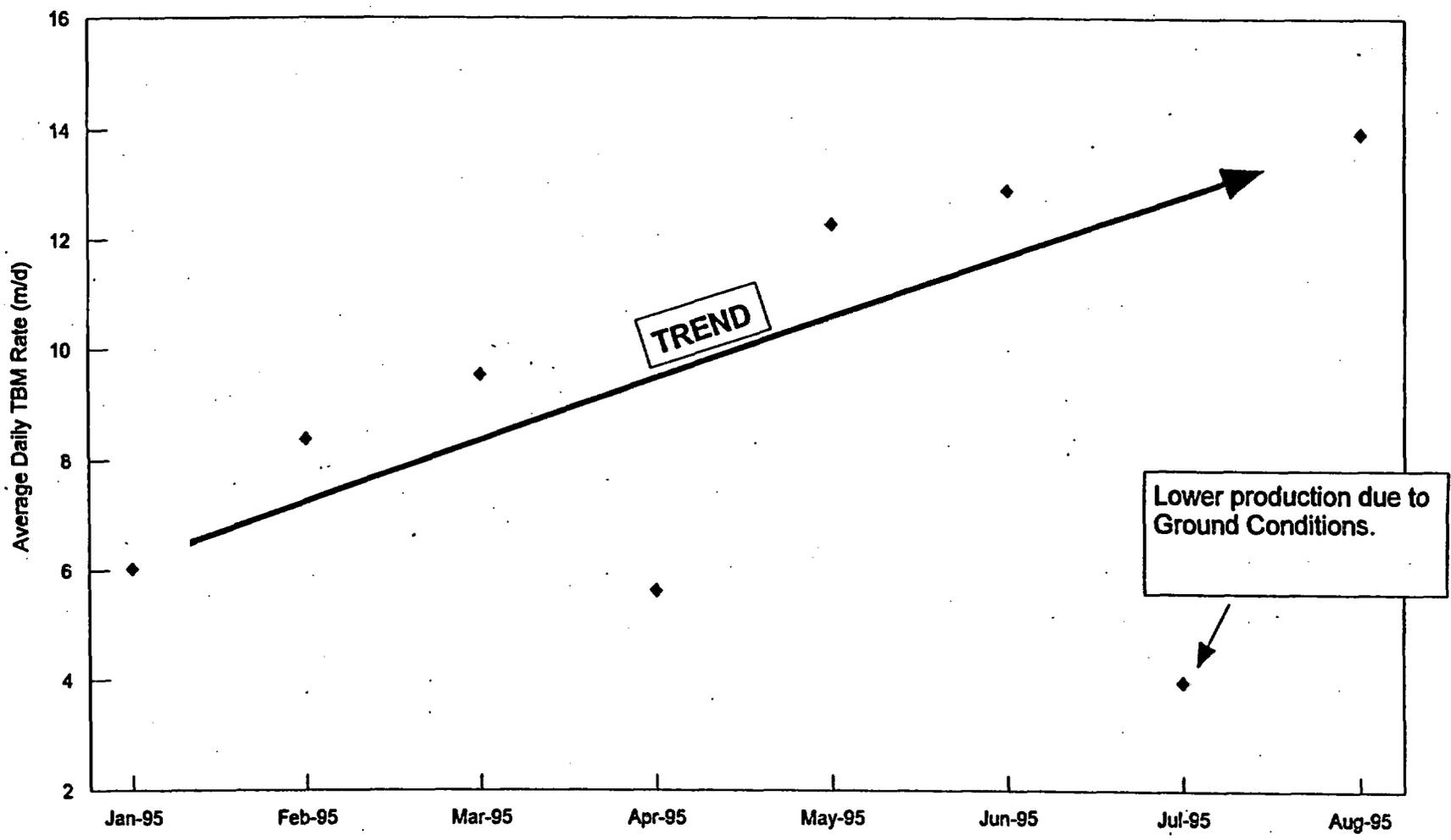
ESF Construction Progress

Completion Dates

Activity	Baseline	Actual
FY95 Milestone 12+80 M	9/29/95	8/22/95
Alcove #2	7/17/95	7/26/95
Subsurface Conveyor Operations	7/25/95	7/26/95
Alcove #3	9/12/95	8/24/95
Alcove #4	10/5/95	Design needs criteria from TCO Planned Start of construction approx. 3 weeks

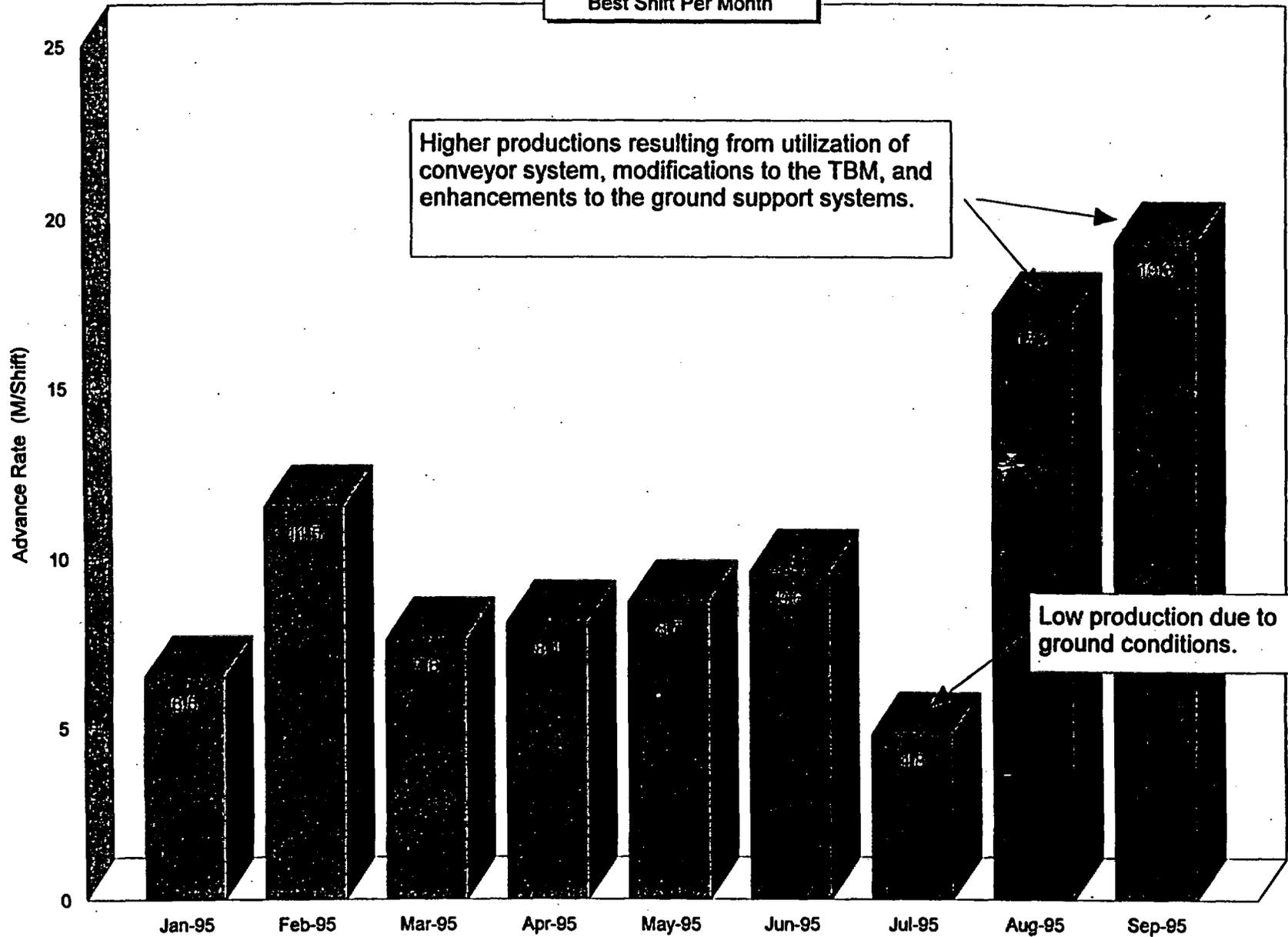
TBM Production

Average Rate per TBM Operating Day



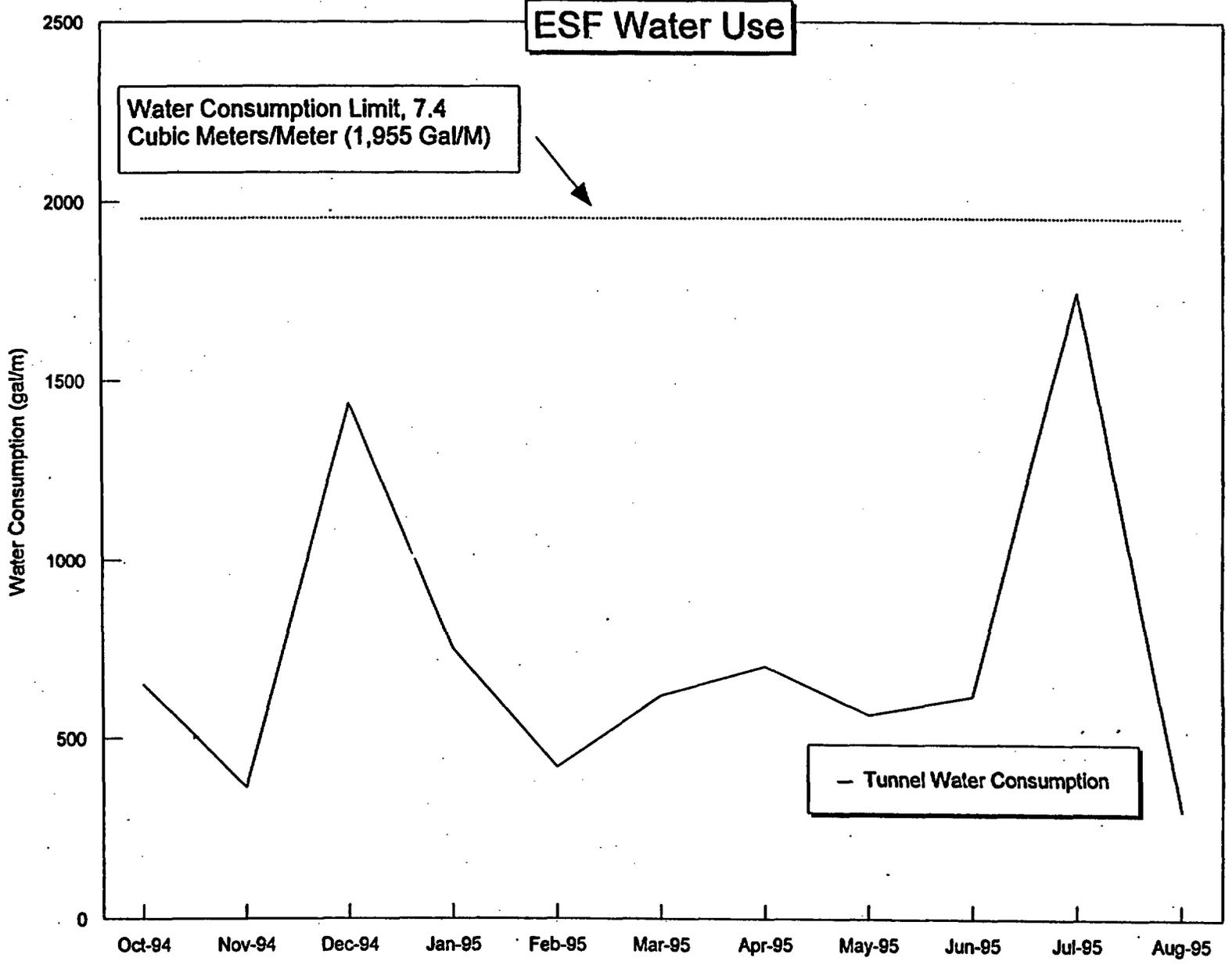
TBM Production

Best Shift Per Month



Surface Work Status

- Muck storage stockpile extended at pad.
- Change house work continues on exterior siding and roof panels, interior stud walls, rough-in mechanical and electrical work.
- Switchgear building roof complete and exterior trim and flashings in process.
- Booster pump station continues with piping activities, the two (2) storage tanks were tested with water pumped from well J-13.
- Exile Hill tanks are now being filled with water from the Booster Pump Station. Vaults and piping well under way with backfill from Exile Hill to pad scheduled for mid-September.
- Sanitary sewer to the leech field started on 8/18/95.



Construction Photos

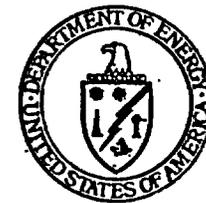
YUCCA
MOUNTAIN
PROJECT

Studies

SBT Activities in the Vicinity of the Repository

Presented to:
DOE/NRC Technical Exchange

Presented by:
William Boyle
Geoengineering Team Lead
U.S. Department of Energy



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

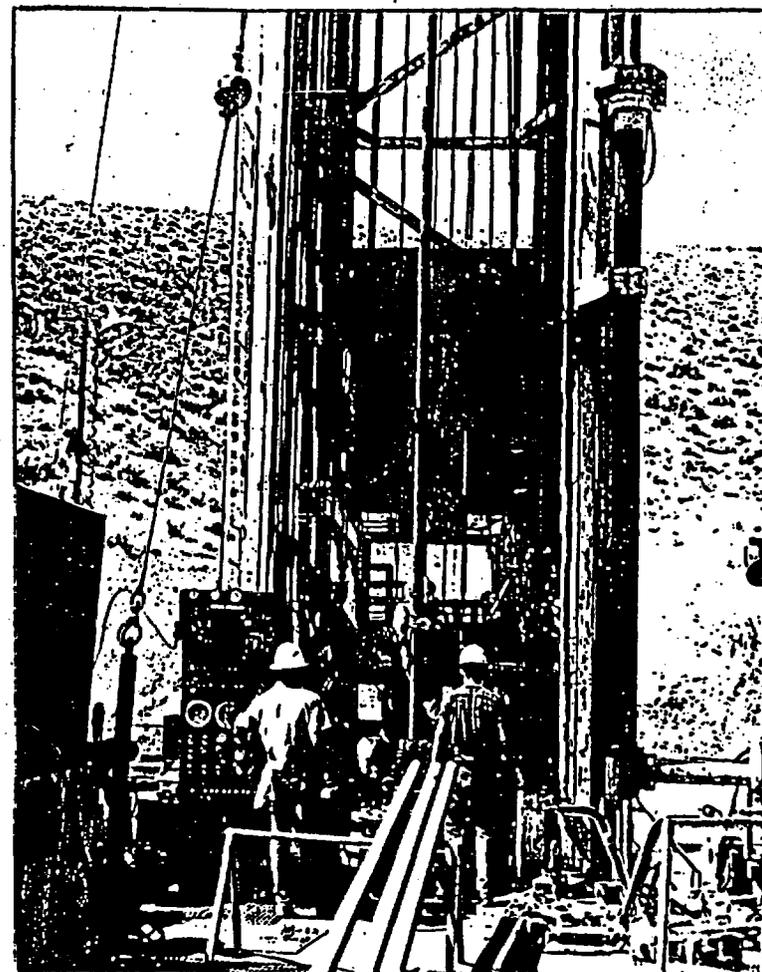
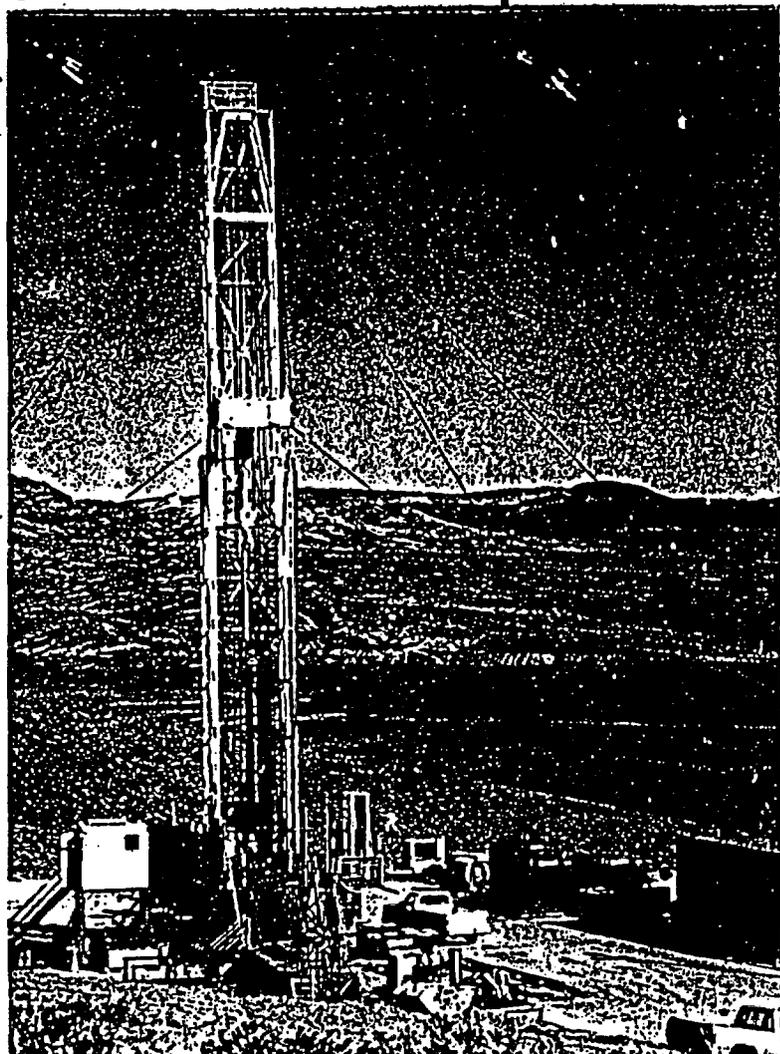
ber 13, 1995

Attach

Drilling\Sampling\Testing Completed July 1, 1995 - August 31, 1995

SD-7

**Tested perched water zone above
1630 ft and drilled to a depth of 1660 ft.**



SD-12

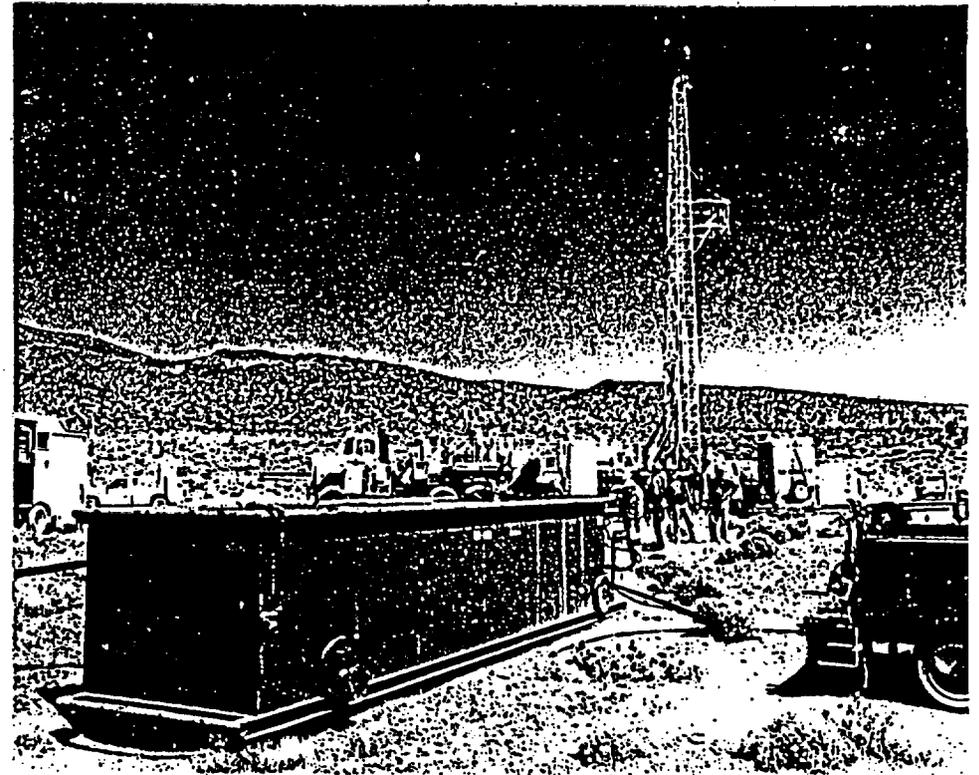
**Reinitiated drilling and
proceeded to a total depth of 2260 ft.**

Drilling\Sampling\Testing Completed July 1, 1995 - August 31, 1995

WT-12 Conducted workover of existing borehole and ran pump tests.



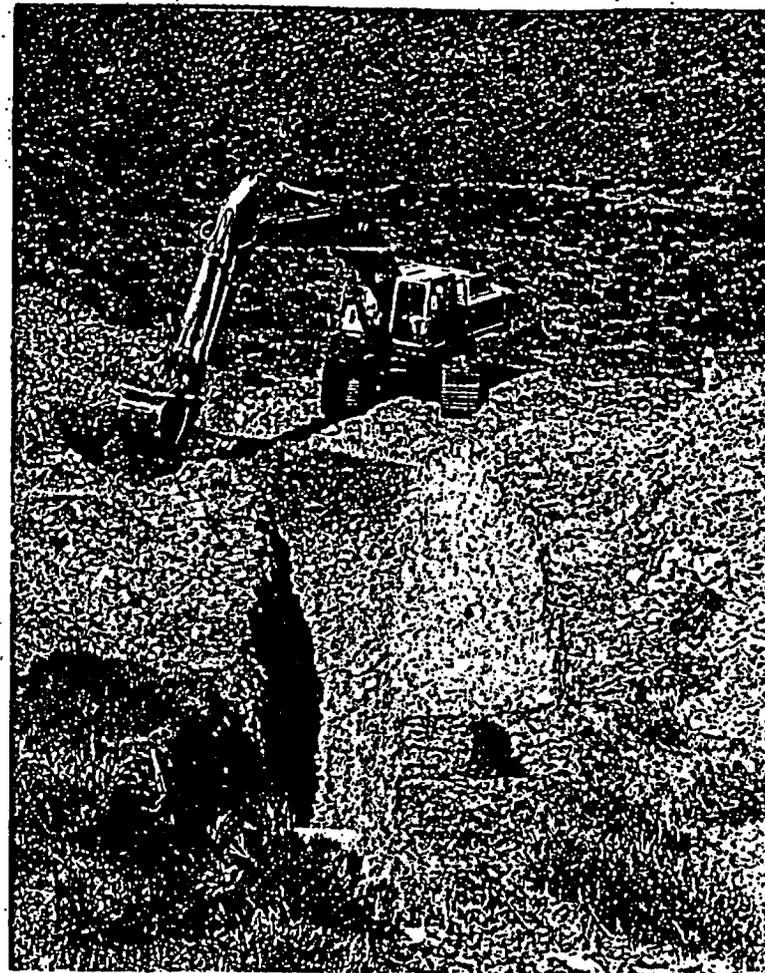
Water samples from WT-12



WT-12 rig and holding tank

Drilling\Sampling\Testing Completed July 1, 1995 - August 31, 1995 (Continued)

- **Ghost Dance Fault Trenches
Constructed trenches
T3 and T5 for
geologic mapping.**

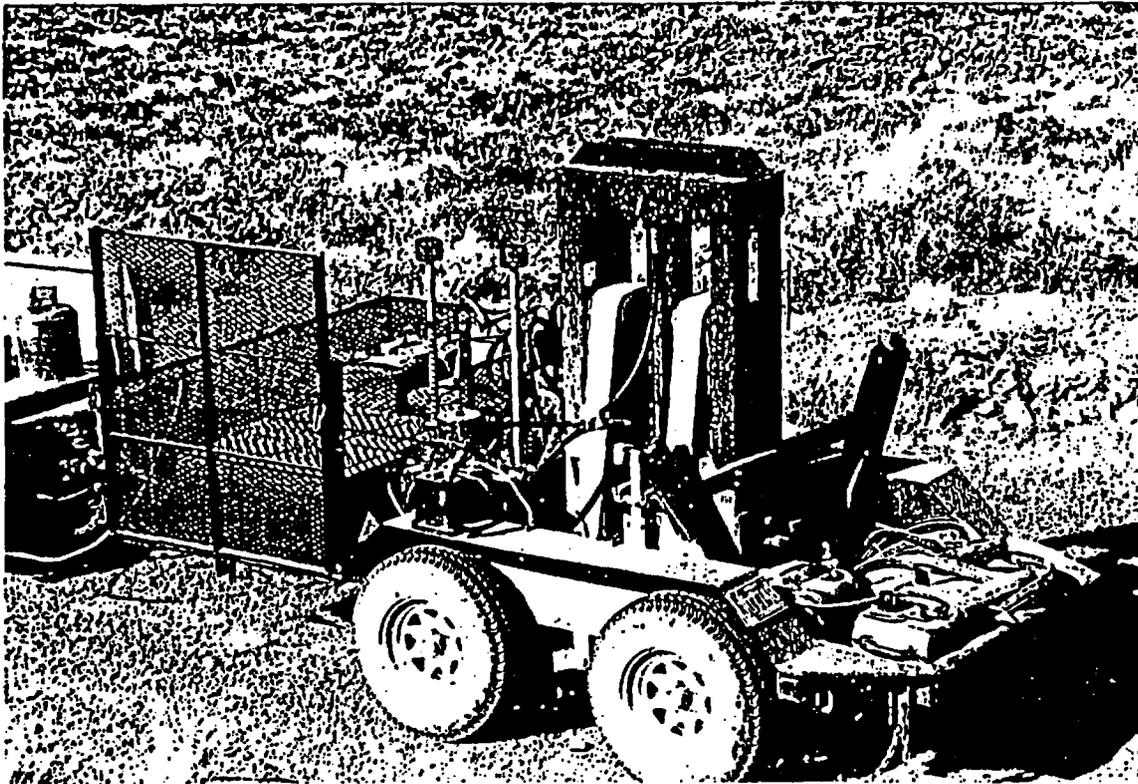


**Ghost
Dance
Fault
Trench
T-3a**

- **Sleeping Butte Trenches
Constructed trenches for
geologic mapping.**

Drilling\Sampling\Testing Completed July 1, 1995 - August 31, 1995 (Continued)

- **UZ-16 VSP
Upgraded roads for Vertical Seismic Profile testing.**



**LBL
Seismic
Thumper**

- **Repository Area Surface Geophysics, Phase II
Conducted seismic reflection surveys.**

Drilling\Sampling\Testing Completed
July 1, 1995 - August 31, 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 Completed July 1, 1995 - August 31, 1995

- **SD-7** **Run #1, Logs & Video**
- **SD-12** **Video**
- **WT-12** **Logs & Video**
- **C#3** **Caliper only**

Drilling\Sampling\Testing Planned September 1, 1995 - November 30, 1995

- SD-7** **Continue drilling.**
- SD-12** **Complete drilling to a total depth of approximately 2260 ft and install wellhead box for pneumatic instrumentation.**
- WT-24** **Begin drilling and progress to approximately 1500 ft.**
- WT-10** **Workover existing borehole and run pump test.**

**Drilling\Sampling\Testing Planned
September 1, 1995 - November 30, 1995**

WT-12

**Workover existing borehole and
complete pump test.**

UZ-16 VSP

Acquire Vertical Seismic Profile data.

UZ-7a

**Install and stem pneumatic
instruments.**

**Repository Area
Surface Geophysics,
Phase II**

Complete seismic reflection surveys.

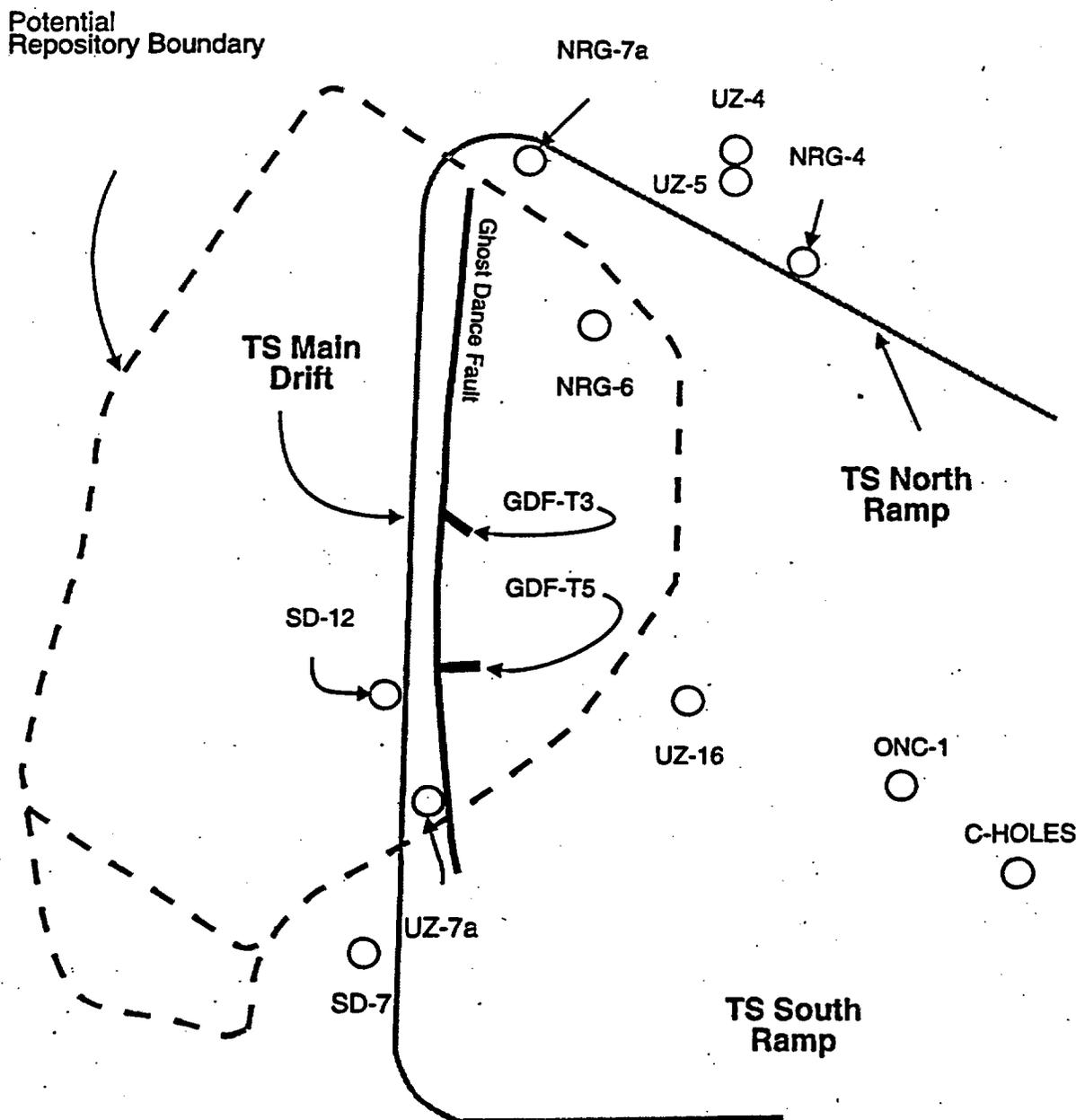
**Drilling\Sampling\Testing Planned
September 1, 1995 - November 30, 1995
(Continued)**

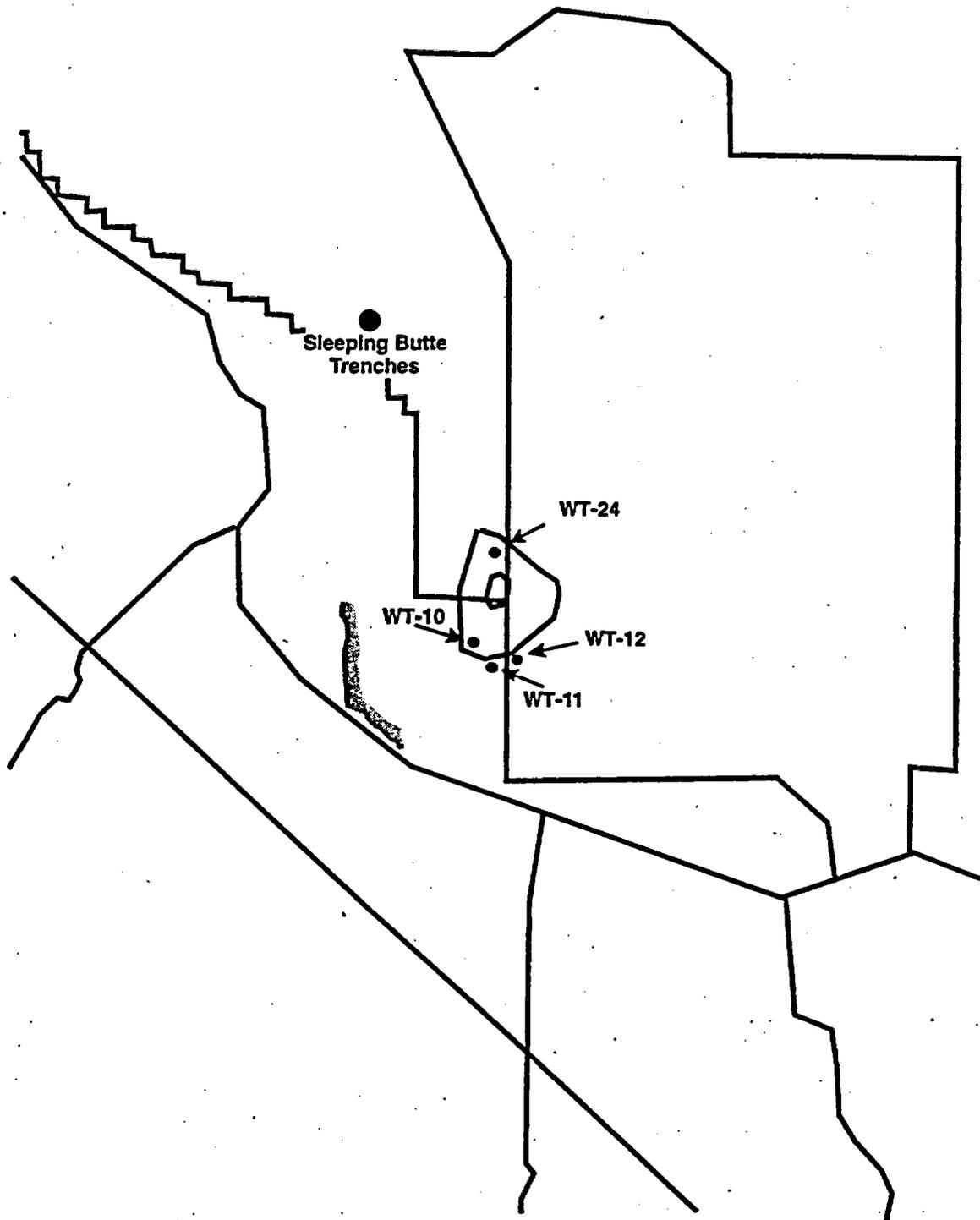
- **Monitoring of Pneumatic Instrumentation**
 - **NRG-4 (Nye County)**
 - **NRG-6**
 - **NRG-7a**
 - **ONC#1 (Nye County)**
 - **UZ-4**
 - **UZ-5**
 - **UZ-7a**

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

- **SD-7** **Run #2, Logs & Video**
- **SD-12** **Logs & Video**
- **WT-10** **Logs & Video**
- **WT-11** **Logs & Video**

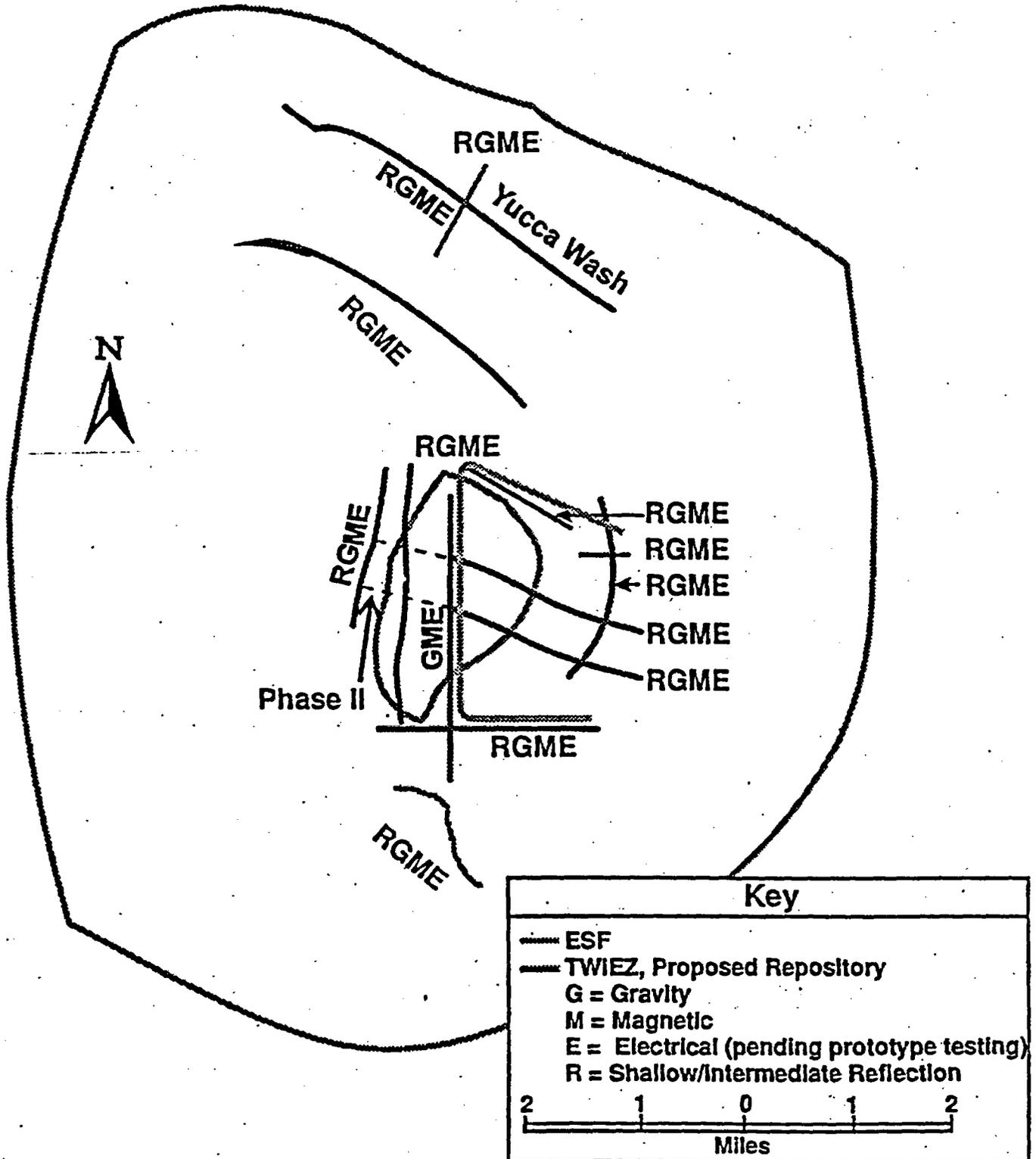
SBT Activities in the Vicinity of the Repository





SBT Activities in the YM Region

SCHEMATIC MAP 1995 GEOPHYSICS PROGRAM



ESF TEST ACTIVITIES SUMMARY

ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES

I. GEOHYDROLOGY (PERMEABILITY) TESTS

RECENT ACCOMPLISHMENTS:

ALCOVE #1

- CROSS-HOLE PRESSURE TESTING WAS INITIATED IN ALCOVE #1 IN LATE APRIL, 1995.
- PRIMARY TESTING (CROSS-HOLE) IN ALCOVE #1 WAS COMPLETED BY END-JULY (ANISOTROPIC RADIAL BOREHOLES). ALCOVE #1 HAS ENTERED LONG-TERM MONITORING PHASE.

ALCOVE #2

- EXCAVATION OF ALCOVE #2 (HYDROLOGIC PROPERTIES OF THE BOW RIDGE FAULT) BEGAN IN MID-MAY; ALCOVE REACHED FINAL (DESIGN) DEPTH OF 43 METERS ON JULY 11 AND FINAL CLEAN-UP WAS COMPLETED ON JULY 26..
- DRILLING (DRY CORING) OF THE FIRST BOW RIDGE FAULT PENETRATION BOREHOLE IN ALCOVE #2 BEGAN ON AUGUST 16. FINAL DEPTH IS 26.3 METERS, ACHIEVED ON AUGUST 24.

ESF TEST ACTIVITIES SUMMARY

ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES

I. GEOHYDROLOGY (PERMEABILITY) TESTS (Cont.)

RECENT ACCOMPLISHMENTS (Cont.):

ALCOVE #3

- FINAL LOCATION (CS 7+56) FOR ALCOVE #3 (CONTACT RBT) WAS SELECTED BY TEST ORGANIZATION AND A/E REPRESENTATIVES DURING JUNE-JULY.
- EXCAVATION OF ALCOVE #3 BEGAN ON AUGUST 17 USING AN ALPINE MINER-50. EXCAVATION WAS COMPLETED ON AUGUST 25 (FINAL DEPTH 36.5 METERS).

ESF TEST ACTIVITIES SUMMARY

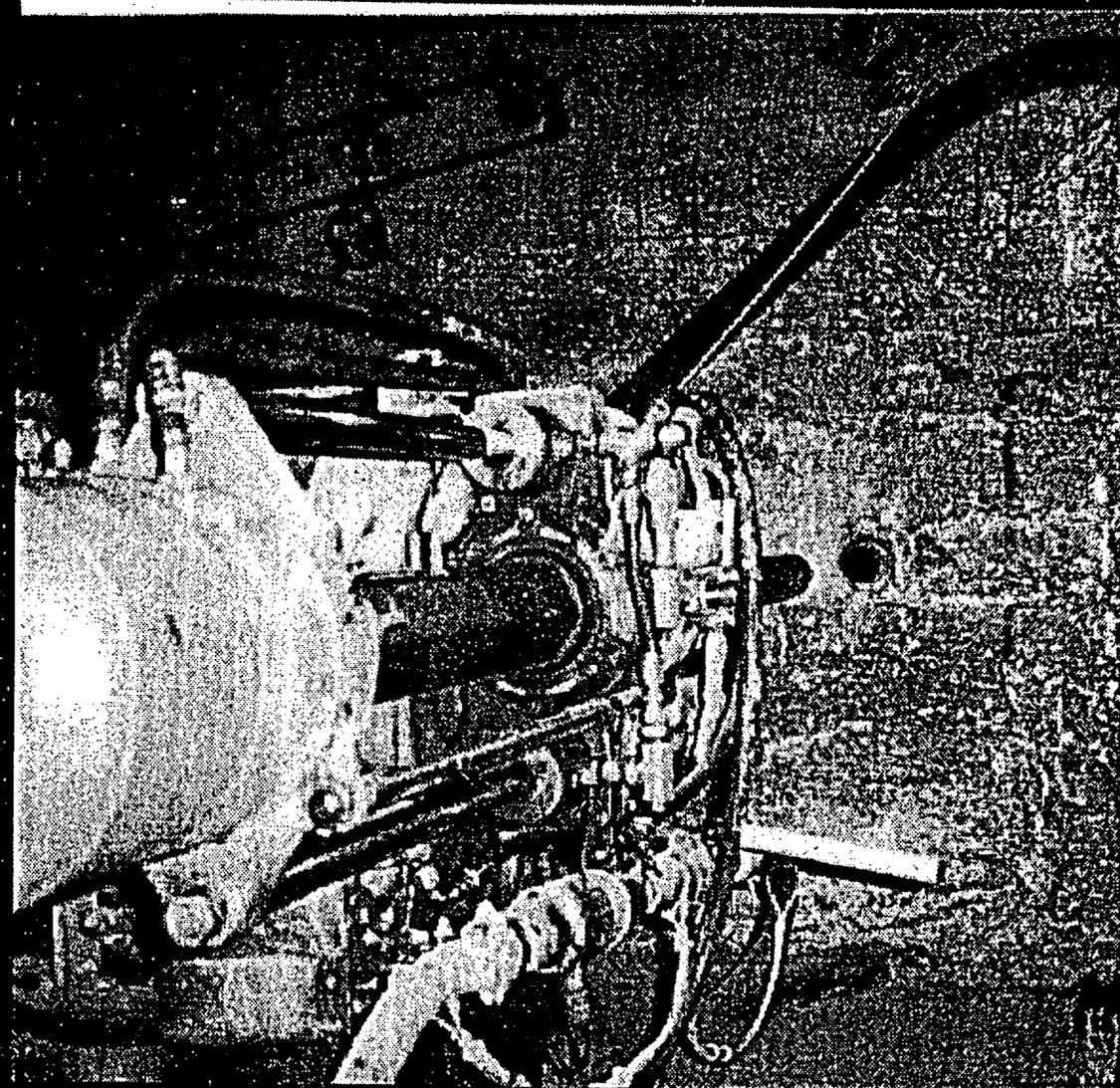
ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES

I. GEOHYDROLOGY (PERMEABILITY) TESTS (Cont.)

NEAR-TERM OBJECTIVES:

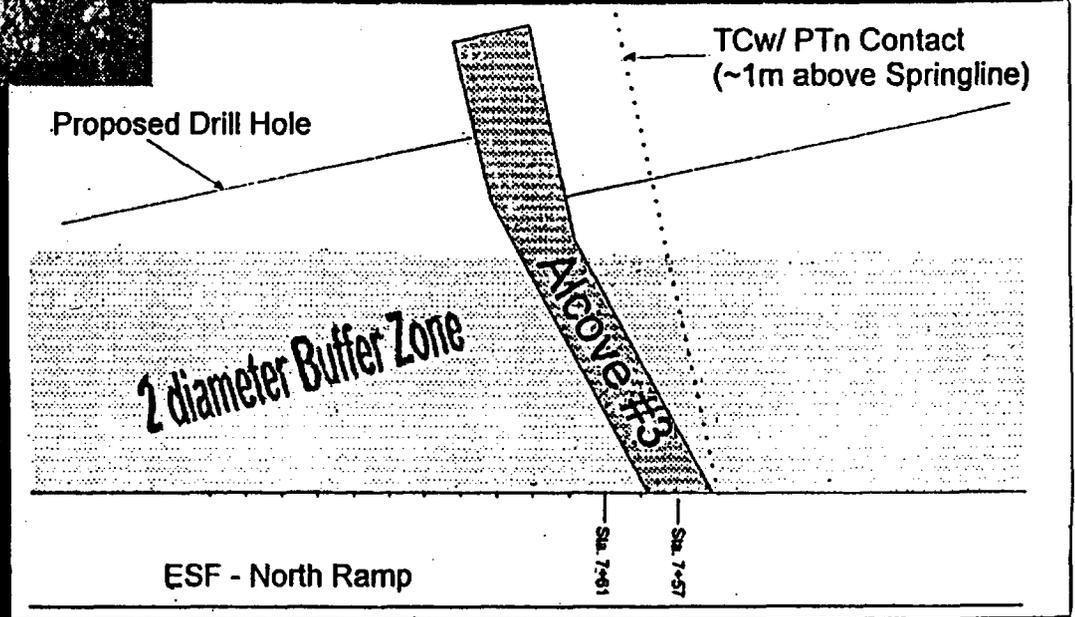
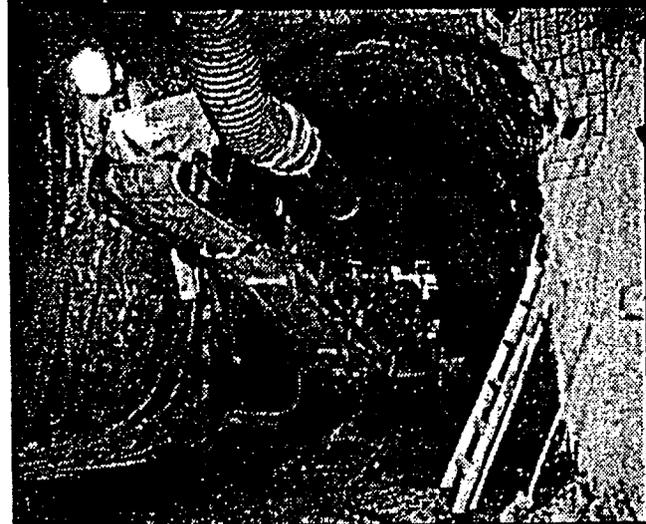
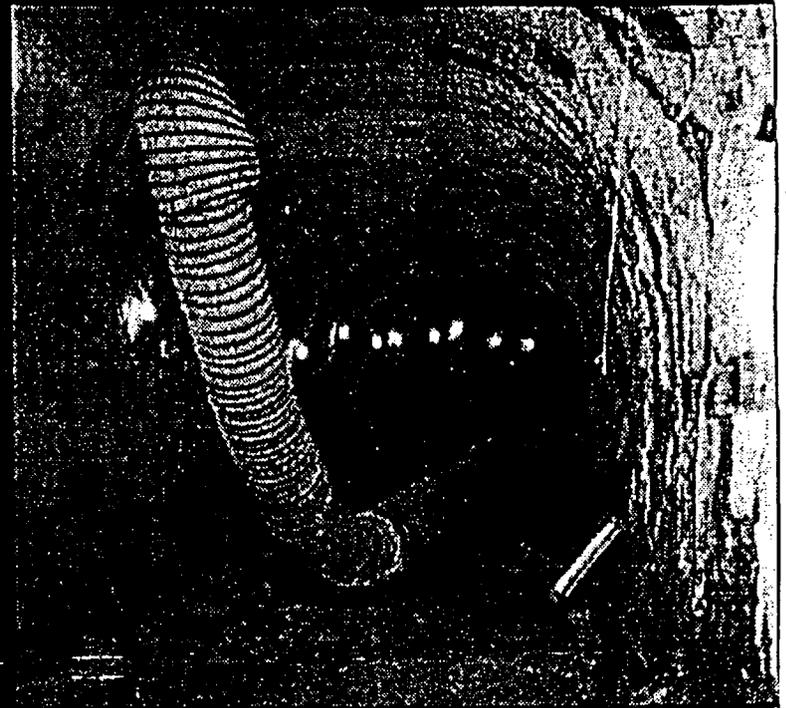
- **CORE DRILLING FOR BOW RIDGE FAULT TESTING (ALCOVE #2) IS UNDERWAY; TESTING (SINGLE-HOLE/HYDROCHEMISTRY) WILL BEGIN IN SEPTEMBER. DRILLING OF ADDITIONAL BOREHOLES (2 AND 3) WILL BEGIN OCTOBER-NOVEMBER.**
- **INITIAL TESTING (SATURATION SAMPLING) IN ALCOVE #3 WILL BEGIN IN SEPTEMBER. INITIAL CORE DRILLING WILL BE INITIATED BY MID-OCTOBER.**
- **LOCATION AND DESIGN MODIFICATION CRITERIA FOR ALCOVE #4 (BEDDED TUFF/TOPOPAH CONTACT RBT) IS ONGOING. MODIFICATION TO PRELIMINARY LAYOUT IS CONSIDERING PROXIMITY OF SURFACE BOREHOLE NRG-4 AND ONGOING NYE COUNTY TESTING. EXCAVATION OF ALCOVE #4 IS TENTATIVELY SCHEDULED FOR MID-OCTOBER.**

CORING ACTIVITIES IN ESF ALCOVE #2



CORING BEGAN ON THE FIRST HOLE IN ALCOVE #2 ON AUGUST 16, 1995. THE HOLE IS IDENTIFIED AS ESF-AL#2-HPF#1. TWO ADDITIONAL 30 METER ROTARY CORED HOLES WILL BE DRILLED FOR TESTING OF THE BOW RIDGE FAULT ZONE.

ALCOVE #3 EXCAVATION - PROGRESS



ALCOVE #3 IS LOCATED AT CS 7456 AND WAS COMPLETED TO A DEPTH OF 36.5 METERS MEASURED FROM THE CENTER LINE OF THE NORTH RAMP ON AUGUST 25, 1995. THE PURPOSE OF ALCOVE #3 IS TO PERFORM HYDROLOGIC PERMEABILITY TESTING OF THE LITHOHYDROLOGIC CONTACT BETWEEN THE TIVA CANYON WELDED UNIT AND THE UPPER PTn UNIT.

EXPLORATORY STUDIES FACILITY - TEST LOCATIONS

TBM TESTING

- HYDROCHEMISTRY TESTS IN THE ESF
- CONSOLIDATED SAMPLING
- UNDERGROUND GEOLOGICAL MAPPING
- PERCHED-WATER TESTING IN THE ESF (CONTINGENCY)
- CONSTRUCTION MONITORING

NORTH PORTAL

ALCOVE #1

- HYDROCHEMISTRY TESTS
- RADIAL BOREHOLE TESTS (ANISOTROPIC)

ALCOVE #2

- HYDROCHEMISTRY TESTS
- HYDROLOGIC PROPERTIES OF MAJOR FAULTS (BDW RIDGE)

9 DEFERRED ALCOVES
IN THE NORTH RAMP

ALCOVE #3

- HYDROCHEMISTRY TESTS
- RADIAL BOREHOLE TESTS (TIVA CANYON/PTn CONTACT)

POSSIBLE NORTH RAMP EXTENSION

- DIFFUSION TESTS IN THE ESF
- PERCOLATION TESTS IN THE ESF
- CONSOLIDATED SAMPLING
- UNDERGROUND GEOLOGICAL MAPPING
- RADIAL BOREHOLE TESTS IN THE ESF
- HYDROCHEMISTRY TESTS IN THE ESF
- CONSTRUCTION MONITORING

ALCOVE #4

- HYDROCHEMISTRY TESTS
- RADIAL BOREHOLE TESTS (PTn/TSw CONTACT)

ALCOVE #5

- HYDROCHEMISTRY TESTS
- HYDROLOGIC PROPERTIES OF MAJOR FAULTS (DRILL HOLE WASH)

SOUTH PORTAL

ALCOVE #6

- HYDROCHEMISTRY TESTS
- HYDROLOGIC PROPERTIES OF MAJOR FAULTS (SUNDANCE/GHOST DANCE)

THERMAL TESTING REGION

- THERMAL/MECHANICAL PROPERTIES
- NEAR-FIELD HYDROLOGIC/GEO MECHANICAL PROPERTIES
- EXCAVATION INVESTIGATIONS
- SEQUENTIAL DRIFT MINING
- SINGLE-ELEMENT HEATER TESTING
- PLATE-SOURCE THERMAL TESTING
- EMPLACEMENT DRIFT THERMAL TESTING

ALCOVE #7

- HYDROCHEMISTRY TESTS
- HYDROLOGIC PROPERTIES OF MAJOR FAULTS (GHOST DANCE)

MAIN DRIFT

4 DEFERRED ALCOVES
IN THE MAIN DRIFT

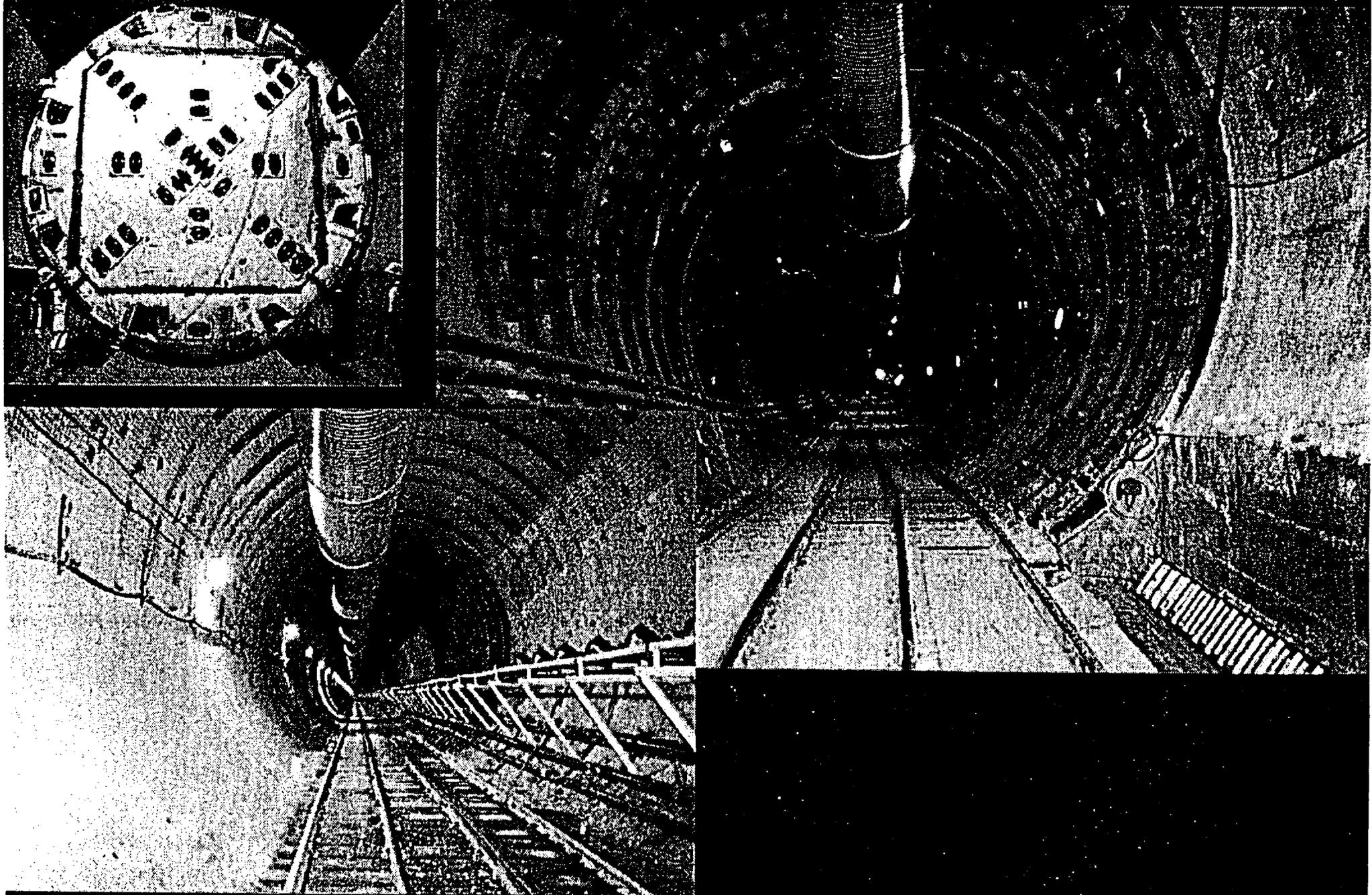
13 DEFERRED ALCOVES
IN THE SOUTH RAMP

SOUTH RAMP

FINAL DECISIONS ON DEFERRAL:

NOTES: TEST/EXCAVATION, AND TESTING IN DEFERRED ALCOVES IS DEPENDENT ON OBSERVATIONS DURING EXCAVATION, EVALUATION OF EARLY TEST RESULTS, AND PROGRAM PRIORITIES.

EXCAVATION STATUS - ESF NORTH RAMP



ON SEPTEMBER 6, 1995, THE FACE OF THE TBM WAS AT STATION 14.96 METERS.

ESF TEST ACTIVITIES SUMMARY

ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES

II. CONSTRUCTION MONITORING ACTIVITIES

RECENT ACCOMPLISHMENTS:

- INSTRUMENTATION (CONVERGENCE PINS, STRAIN GAGES, AND ROCK BOLT INSTRUMENTATION) BEHIND TBM GROUND SUPPORT INSTALLATION CONTINUES BEYOND CS 13+00; DATA IS BEING SUBMITTED TO A/E.
- MPBX AND SPBX INSTALLATIONS IN TBM MAIN TUNNEL CONTINUE.
- FIRST AUTOMATED DATA ACQUISITION STATION (DAS) IS BEING INSTALLED; DAS WILL SERVICE INSTRUMENTATION IN ESF STARTER TUNNEL AND ALCOVE #1.
- ROCK MASS MOVEMENT AND CONVERGENCE MONITORING WAS CONDUCTED CONTINUOUSLY DURING EXCAVATION OF ESF ALCOVE #3.
- DIESEL EMISSIONS AND VENTILATION EXHAUST STUDIES WERE COMPLETED UNDERGROUND IN APRIL; DATA WERE ANALYZED AND REPORTED TO DIE MANAGEMENT IN MAY; DIE MODIFICATIONS AND CONSTRUCTION SPECIFICATION REVISIONS HAVE BEEN COMPLETED, AND DIESEL USAGE HOLDS HAVE BEEN LIFTED FOR NORTH RAMP EXCAVATION.

ESF TEST ACTIVITIES SUMMARY

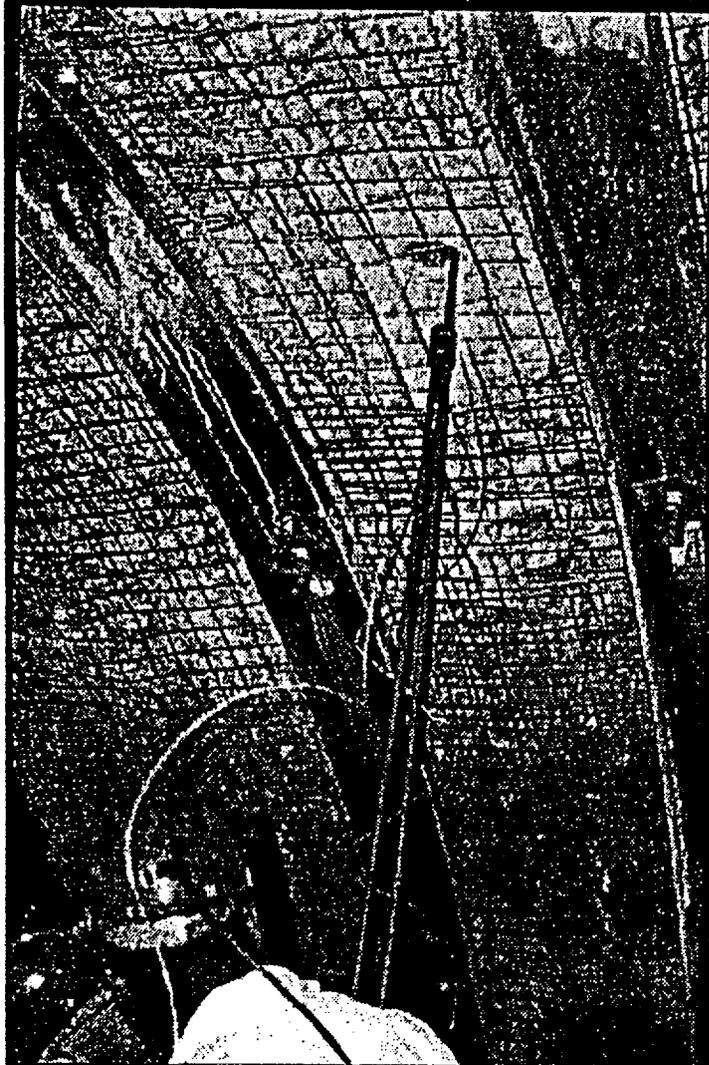
ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES

II. CONSTRUCTION MONITORING ACTIVITIES (Cont.)

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 ROCK MASS QUALITY DETERMINATIONS IN MAIN TUNNEL.**
- **PLAN MONITORING SUPPORT FOR ALCOVE #4 EXCAVATION.**

CONSTRUCTION MONITORING IN THE ESF



AS OF SEPTEMBER 6, 1995, 30 STEEL SETS HAVE BEEN INSTRUMENTED WITH 6-POINT CONVERGENCE PINS AND A TOTAL OF 360 STRAIN GAUGES. 5 MPBXs AND 3 SPBXs 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. ROCK MASS QUALITY SCAN LINES ARE CONDUCTED ON 5 METER INTERVALS BEHIND THE TBM SHIELD. CONVERGENCE MONITORING ACTIVITIES HAVE ALSO BEEN PERFORMED IN EACH OF THE THREE TEST ALCOVES.

ESF TEST ACTIVITIES SUMMARY

ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES

III. OTHER ESF TESTING ACTIVITIES

RECENT ACCOMPLISHMENTS:

- **GEOLOGIC MAPPING OF TBM TUNNEL, ALCOVE #2 AND ALCOVE #3 IS CONTINUING FROM GANTRY SYSTEM BEHIND TBM SHIELDS AND FROM LIFTS (ALCOVE MAPPING).**
- **FULL-SCALE SAMPLE COLLECTION CONTINUES THROUGH CS 12+50.**
- **DRILLING OF INSTRUMENT HOLES ON THE LARGE BLOCK TEST AT FRAN RIDGE HAS BEEN COMPLETED (54 HOLES).**
- **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 THE TESTING TEAM; INITIAL DESIGN CRITERIA HAVE BEEN SUBMITTED TO THE A/E.**
- **SEISMIC INSTRUMENTATION HAS BEEN INSTALLED IN ALCOVE #1.**
- **NYE COUNTY REPRESENTATIVES INSTALLED A HUMIDITY/TEMPERATURE/BAROMETRIC PRESSURE MONITOR ON THE TBM.**

ESF TEST ACTIVITIES SUMMARY

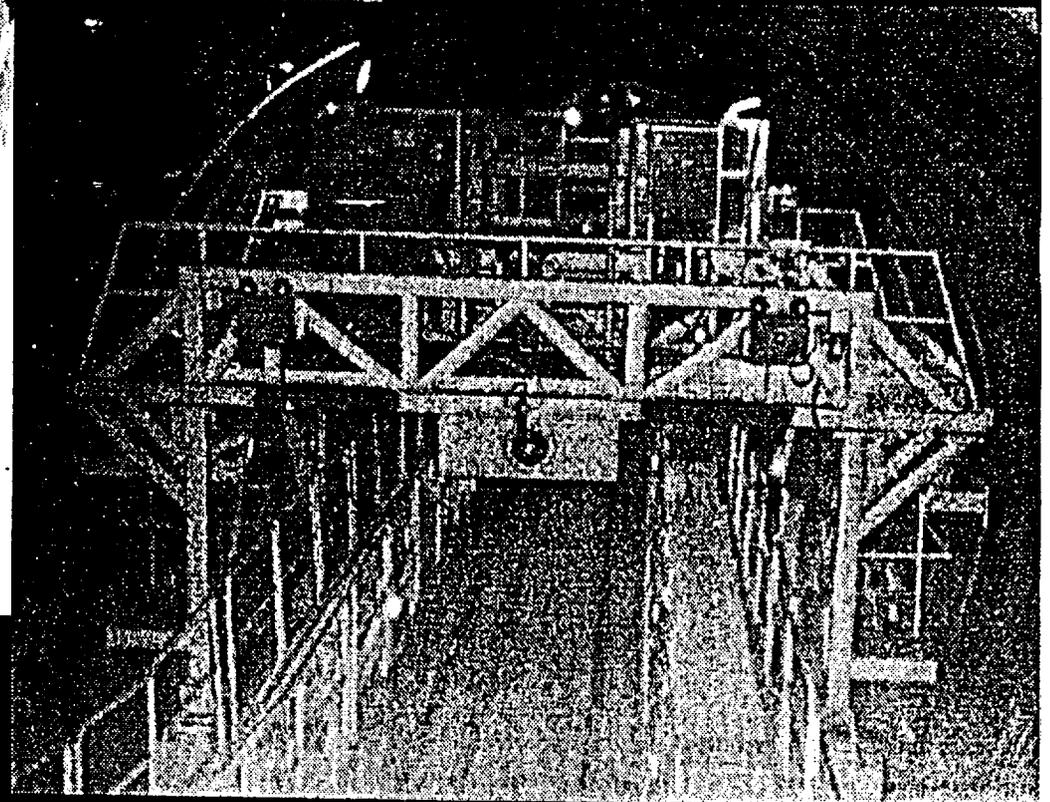
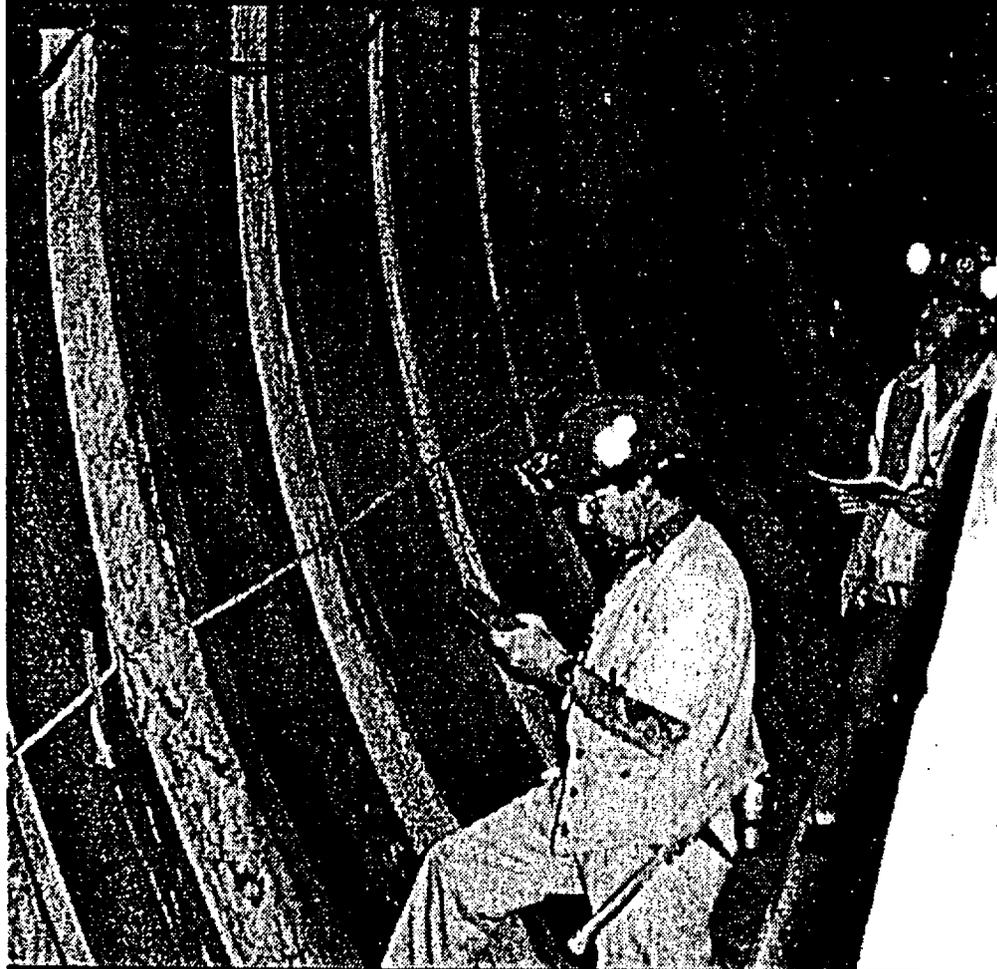
ACCOMPLISHMENTS AND NEAR-TERM OBJECTIVES

II. OTHER ESF TESTING ACTIVITIES (Cont.)

NEAR-TERM OBJECTIVES:

- **FULL-SCALE MAPPING AND SAMPLING OF TOPOPAH SPRING WELDED UNIT #1 BEHIND TBM WITH CONVEYOR SYSTEM WILL CONTINUE.**
- **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 SEPTEMBER 6, 1995: FULL PERIPHERY MAPPING COMPLETED TO
TUNNEL PHOTOGRAMMETRY COMPLETED TO
ROCK MASS QUALITY CLASSIFICATION COMPLETED TO
DETAILED LINE SURVEY COMPLETED TO

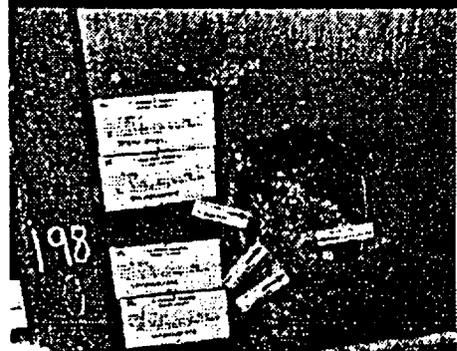
- CS 14+00 m
- CS 14+20 m
- CS 14+06 m
- CS 14+20 m

CONSOLIDATED SAMPLING IN THE ESF



LIST OF STUDIES SUPPORTED BY CONSOLIDATED SAMPLING PROGRAM:

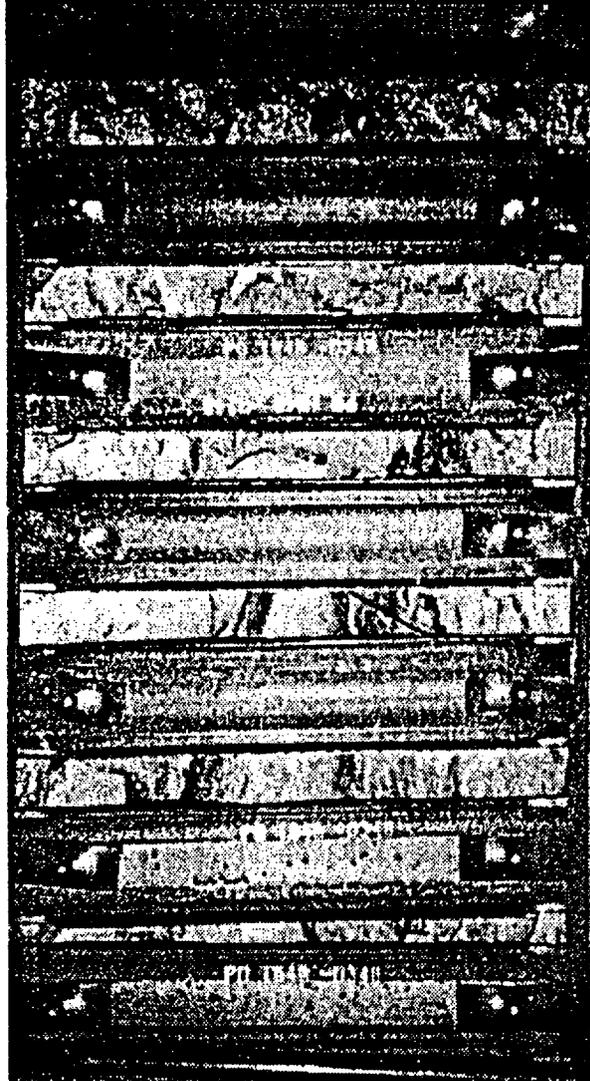
- LABORATORY DETERMINATION OF MECHANICAL PROPERTIES OF INTACT ROCK
- LABORATORY DETERMINATION OF THE MECHANICAL PROPERTIES OF FRACTURES
- IN-SITU DESIGN VERIFICATION
- CHARACTERIZATION OF THE EFFECT OF INTRODUCED MATERIALS ON CHEMICAL AND MINERALOGICAL CHANGES IN THE POST-EMPLACEMENT ENVIRONMENT
- WATER 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



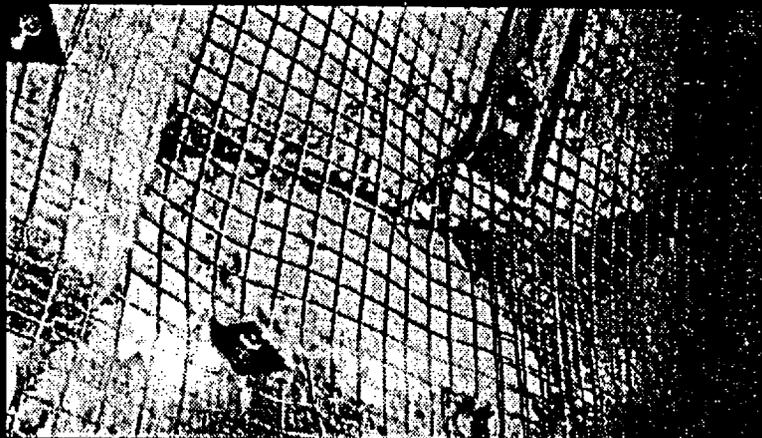
AS OF SEPTEMBER 6, 1995, 855 SAMPLES HAVE BEEN COLLECTED IN THE STARTER TUNNEL, ESF NORTH RAMP AND AL COVES IN SUPPORT OF 14 STUDY PLANS.

RECENT GEOLOGIC CONDITIONS IN THE ESF

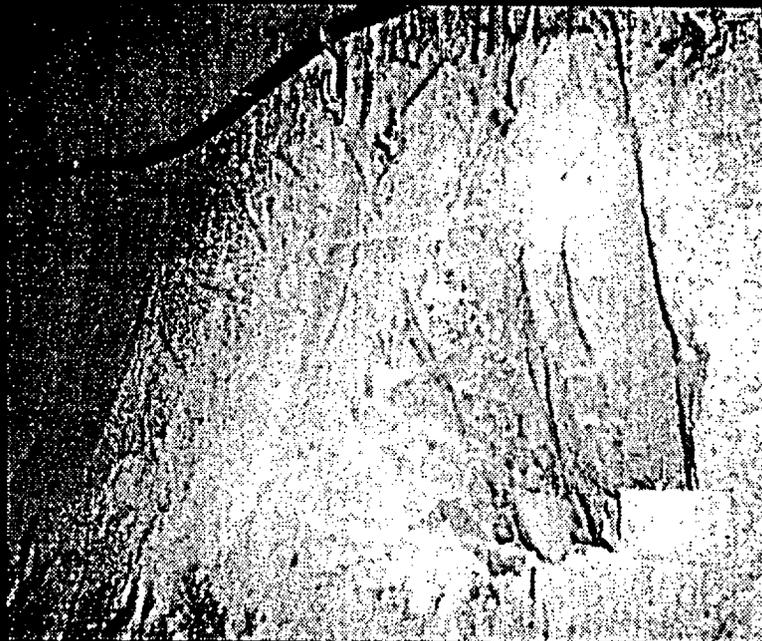
VARIABLE GROUND CONDITIONS IN THE TSw1 UNIT



BLOCKY GROUND CONDITIONS AT CS 13+36



KEY BLOCK GROUND CONDITIONS AT CS 14+22



GROUND CONDITIONS AT CS 12+60



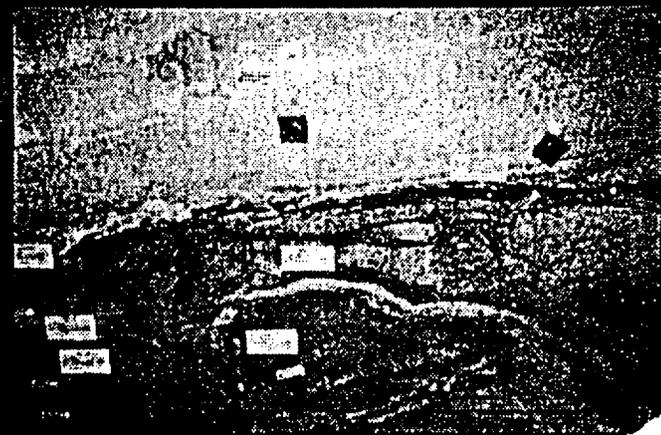
KEY BLOCK GROUND CONDITIONS AT CS 14+22

RECENT GEOLOGIC CONDITIONS IN THE ESF

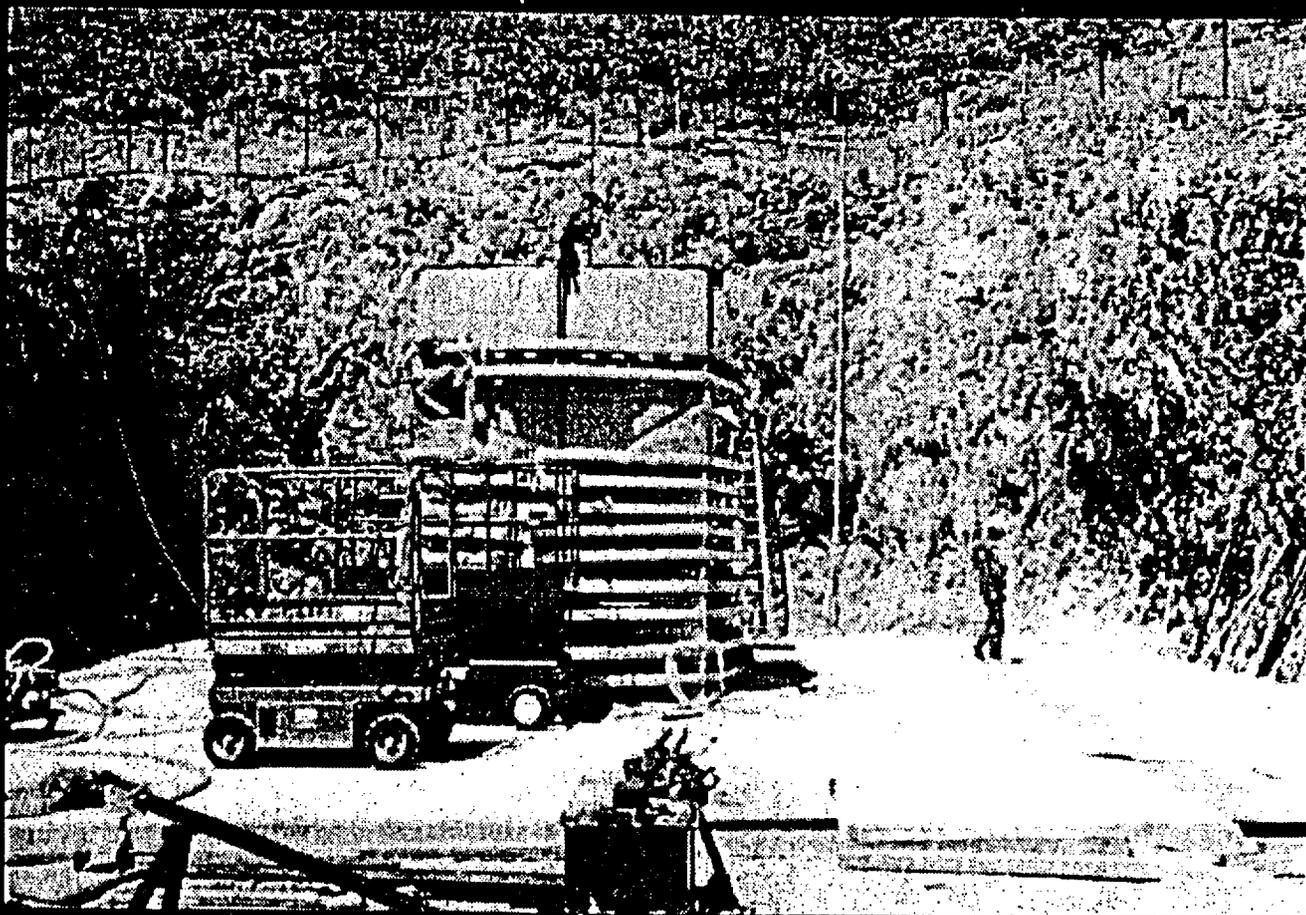
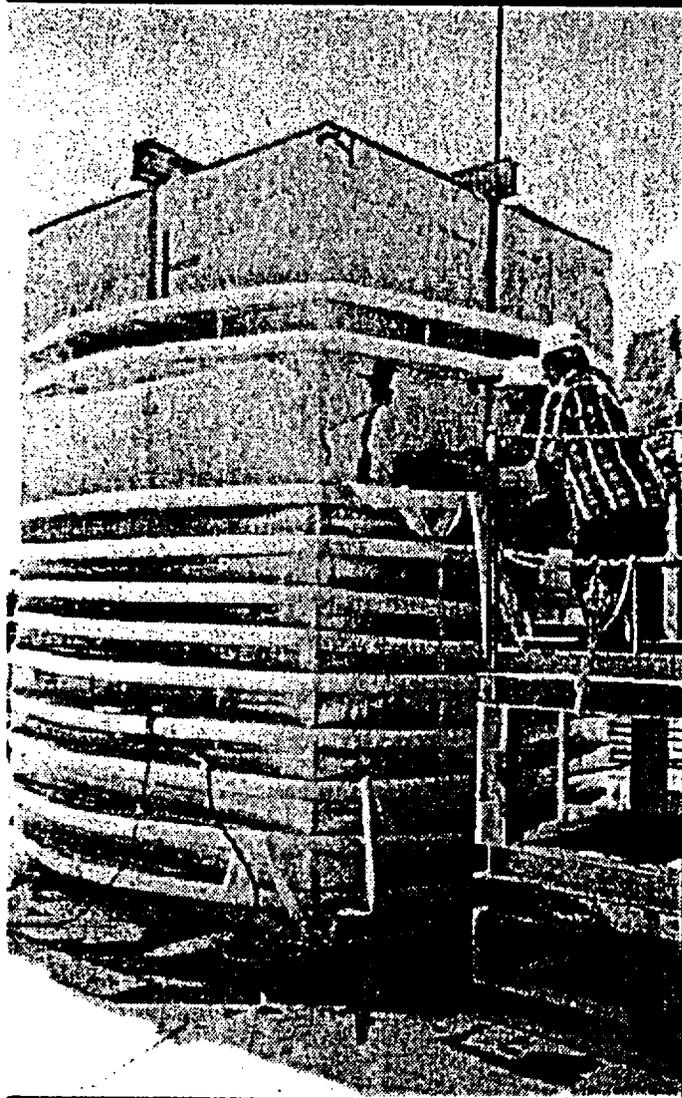
FUMAROLE



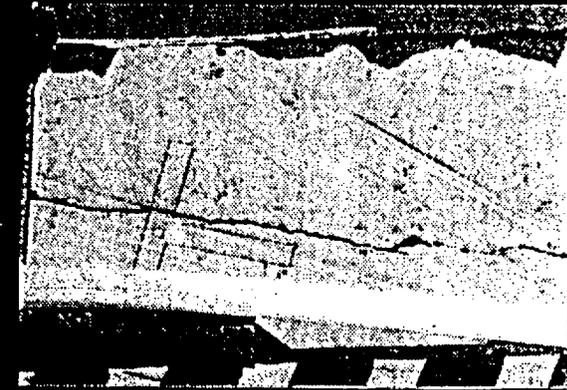
FUMAROLE ENCOUNTER AT APPROX. 10+35 METERS



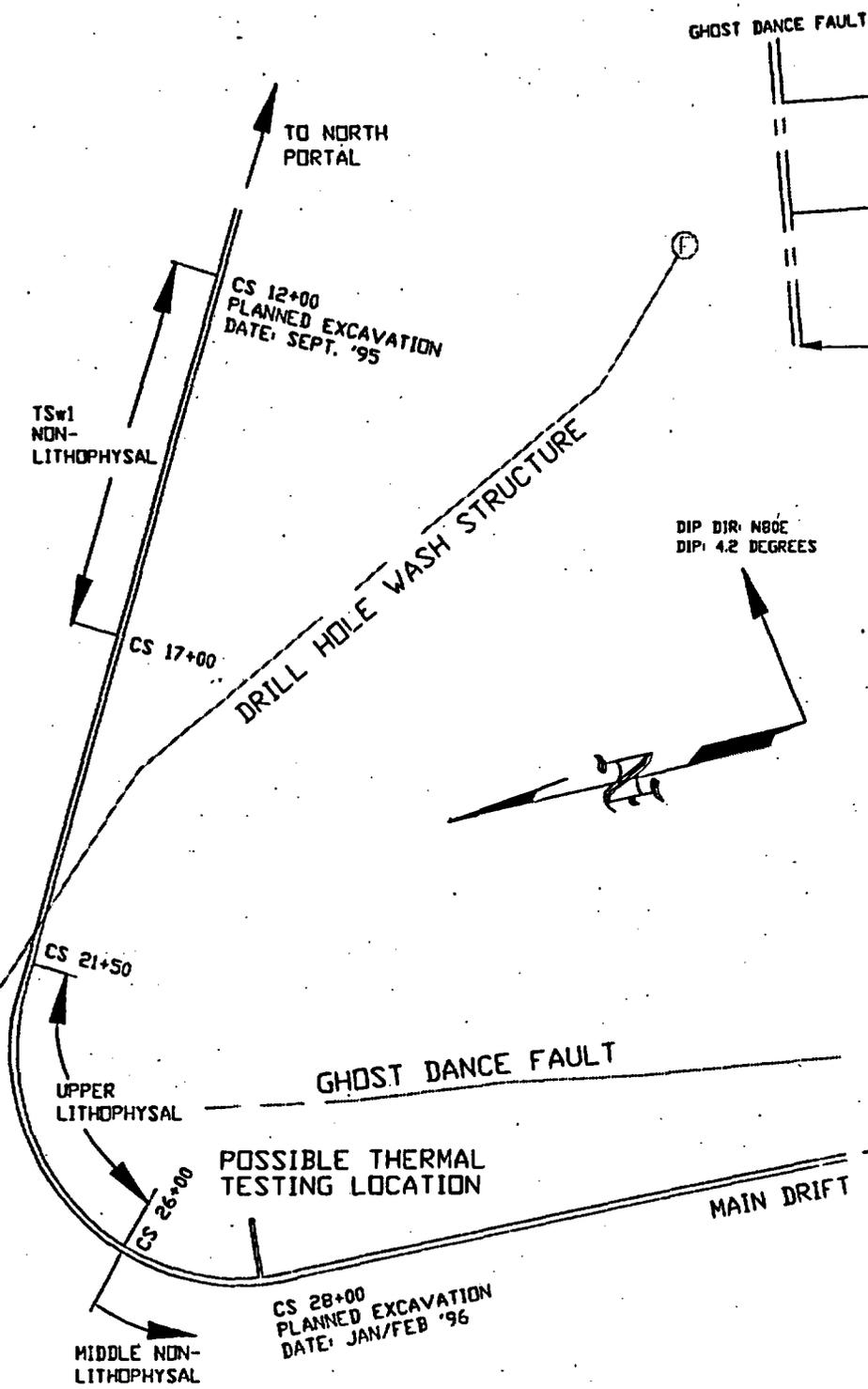
LARGE BLOCK TESTS AT FRAN RIDGE



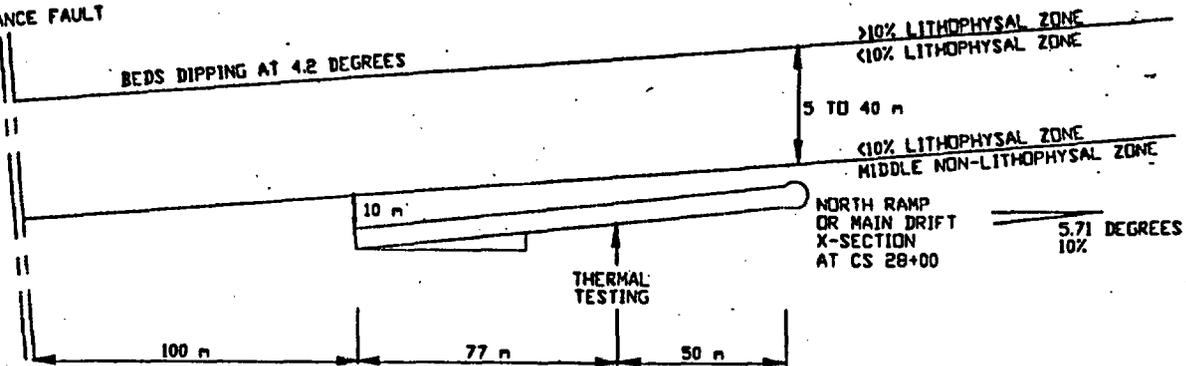
HORIZONTAL CORING OF HEATER AND INSTRUMENTATION EMPLACEMENT HOLES IN THE BLOCK WAS COMPLETED IN AUGUST AND WORK CONTINUES WITH TRAILER, POWER AND SITE SUPPORT FACILITY SET-UP. THE GOALS OF THE TEST ARE TO GAIN INFORMATION ON THE COUPLED THERMAL-MECHANICAL-HYDROLOGICAL-CHEMICAL PROCESSES THAT WILL BE 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



GHOST DANCE FAULT

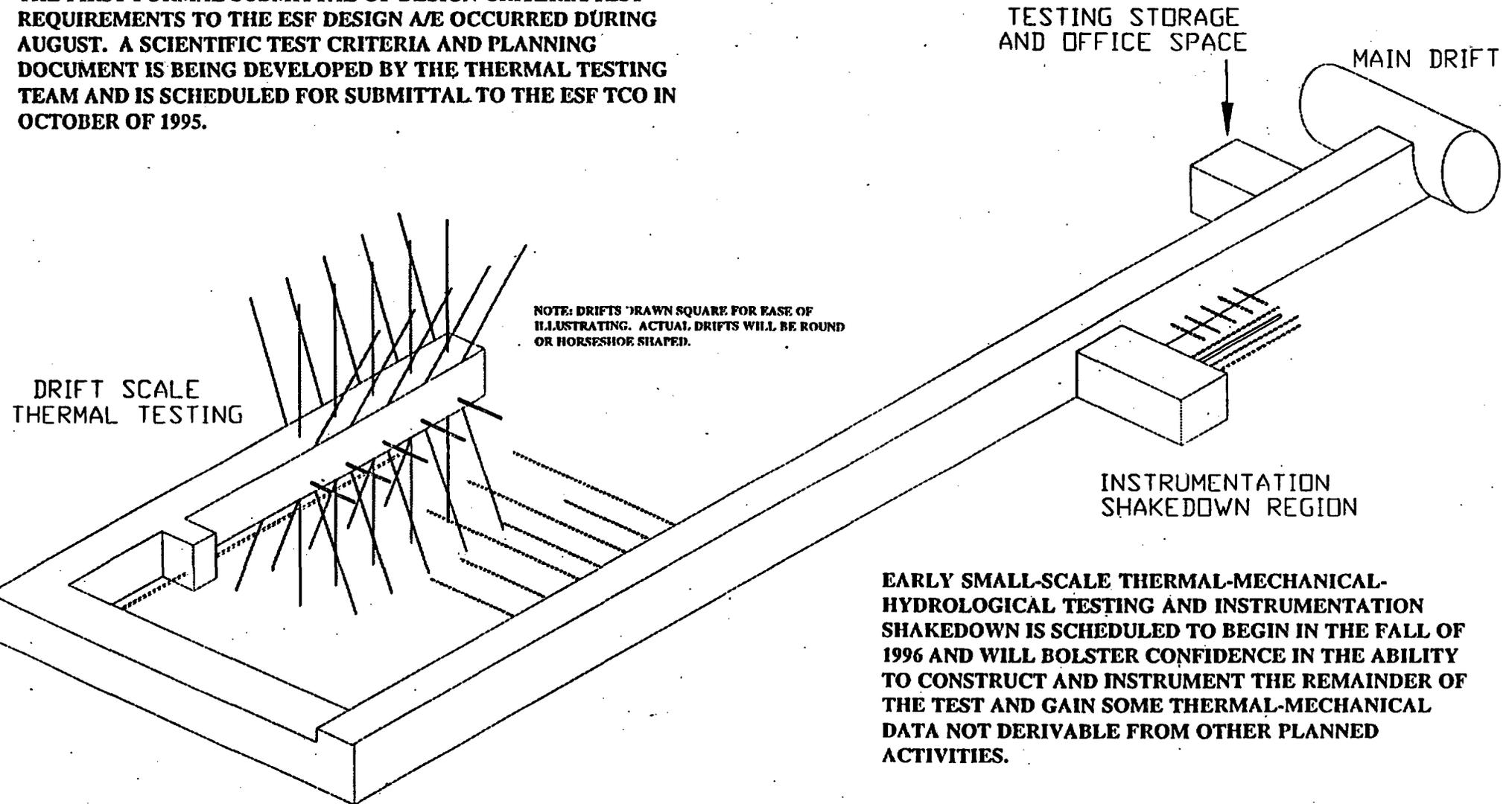


PROFILE VIEW OF POSSIBLE BREAKOUT DRIFT (TO THE EAST)

THERMAL TESTING IN THE ESF

CONCEPTUAL LAYOUT APPROVED BY TEST ORGANIZATIONS

THE FIRST FORMAL SUBMITTAL OF DESIGN CRITERIA/TEST REQUIREMENTS TO THE ESF DESIGN A/E OCCURRED DURING AUGUST. A SCIENTIFIC TEST CRITERIA AND PLANNING DOCUMENT IS BEING DEVELOPED BY THE THERMAL TESTING TEAM AND IS SCHEDULED FOR SUBMITTAL TO THE ESF TCO IN OCTOBER OF 1995.



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.

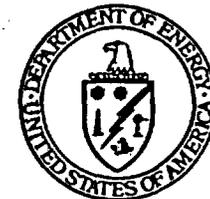
YUCCA
MOUNTAIN
PROJECT

Studies

Exploratory Studies Facility Design Status

Presented to:
DOE/NRC Technical Exchange

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



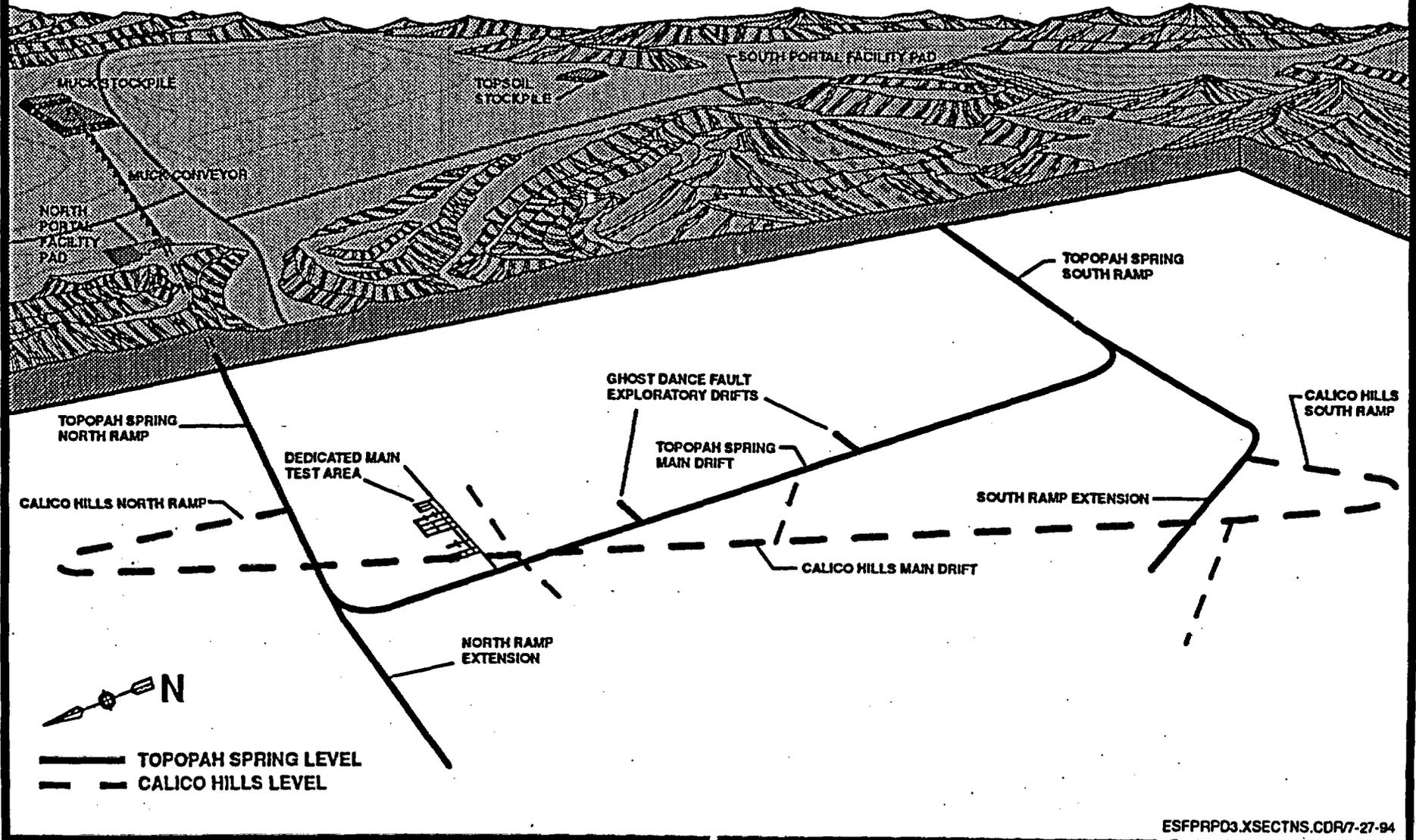
U.S. Department of Energy
Office of Civilian Radioactive
Waste Management

September 13, 1995

Scope

- **Design Progress Update**
- **Design Products for Main Drift Excavation**
- **Design Control Process Update**

Exploratory Studies Facility Design



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

- **Alcoves #3 Design Status**
 - Excavation completed August 25, 1995
- **Alcove #4 Design Status**
 - Awaiting criteria letter from Test Coordination Office
 - Layout and ground support drawings will be updated via Engineering Change Request to reflect final design
 - Expected Schedule

9/15/95	Receive criteria letter from TCO
9/29/95	Layout & Ground Support sketches complete
10/06/95	Engineering Change Request approved

Design Progress Update

- **GROA/ESF Interface Drawings**
 - **7 drawings, 2 analyses**
 - **Submit for baselining before end of FY95**
 - **Developing technical report to define changes**
 - » **Currently in review**
 - **Develop coordinate geometry analysis to define layout**
 - » **Currently in review**
 - **Revise/develop drawings in accordance with results of analysis and conclusions of technical report**
 - » **Drafts complete and will enter review cycle upon approval of the analyses**

Design Progress Update

- **GROA/ESF Interface Drawing Changes**
 - **Removed slight curve in Main Drift**
 - **Removed two slight breaks in grade of Main Drift**
 - **Remove Potential Waste Main**
 - **Remove South Ramp Extension**
 - **Remove Imbricate Fault Drift**
 - **Remove ESF Main Test Area**
 - **Change alignment of North Ramp Extension**
 - **Make minor adjustments to North Ramp alignment**

Design Progress Update

- **GROA/ESF Interface Drawing Changes** (continued)
 - **Modify Calico Hills access from 2 ramps to single vertical shaft**
 - **Adjust shape of GROA layout (decrease width at south end)**
 - **Change spacing of emplacement drifts from 30.5m to 22.5m**

DESIGN PRODUCTS FOR MAIN DRIFT EXCAVATION

Design Analyses for Main Drift Excavation

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

<u>Analysis Title</u>	<u>Ext Rvw</u>	<u>Approval</u>
Geology - ESF TS Loop	5/23/95(A)	6/19/95(A)
ESF Layout Calculation	6/12/95(A)	7/07/95(A)
Shotcrete & Rockbolt Material Dedication	7/19/95(A)	9/07/95
General Construction Methods	7/24/95(A)	8/18/95 (A)
Layout and Sizing of ESF Alcoves & Refuge Chambers	8/07/95(A)	8/25/95(A)

Design Analyses for Main Drift Excavation

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

<u>Analysis Title</u>	<u>Ext Rvw</u>	<u>Approval</u>
ESF Ground Support Design	8/14/95(A)	9/06/95(A)
Ground Support - Structural Steel Material Dedication	9/15/95	10/02/95
Ground Support - Structural Steel	9/19/95	10/02/95
Invert Segment	9/27/95	10/20/95

Design Drawings and Specifications for Main Drift Excavation

- **Main Drift Design Output Estimated Schedule**

<u>Outputs</u>	<u>Ext Rvw</u>	<u>Issue</u>
Main Drift Plan and Profile drawings	8/16/95(A)	9/12/95
Revised Subsurface General Construction specification	9/22/95	10/16/95
Revised ESF Ground Support specifications and drawings	9/27/95	10/23/95
Revised Steel Set Drawings	10/26/95	11/21/95
Revised Steel Set & Accessories specification	10/26/95	11/21/95

DESIGN CONTROL PROCESS UPDATE

Design Control Process

Old Way

Products reviewed in large packages

Products presented in large design review meetings

NRC participated in review meetings as observers

BFD prepared (or revised) for each design package

New Way

Products reviewed individually or in small groups as they are completed

Design review meetings held if deemed necessary

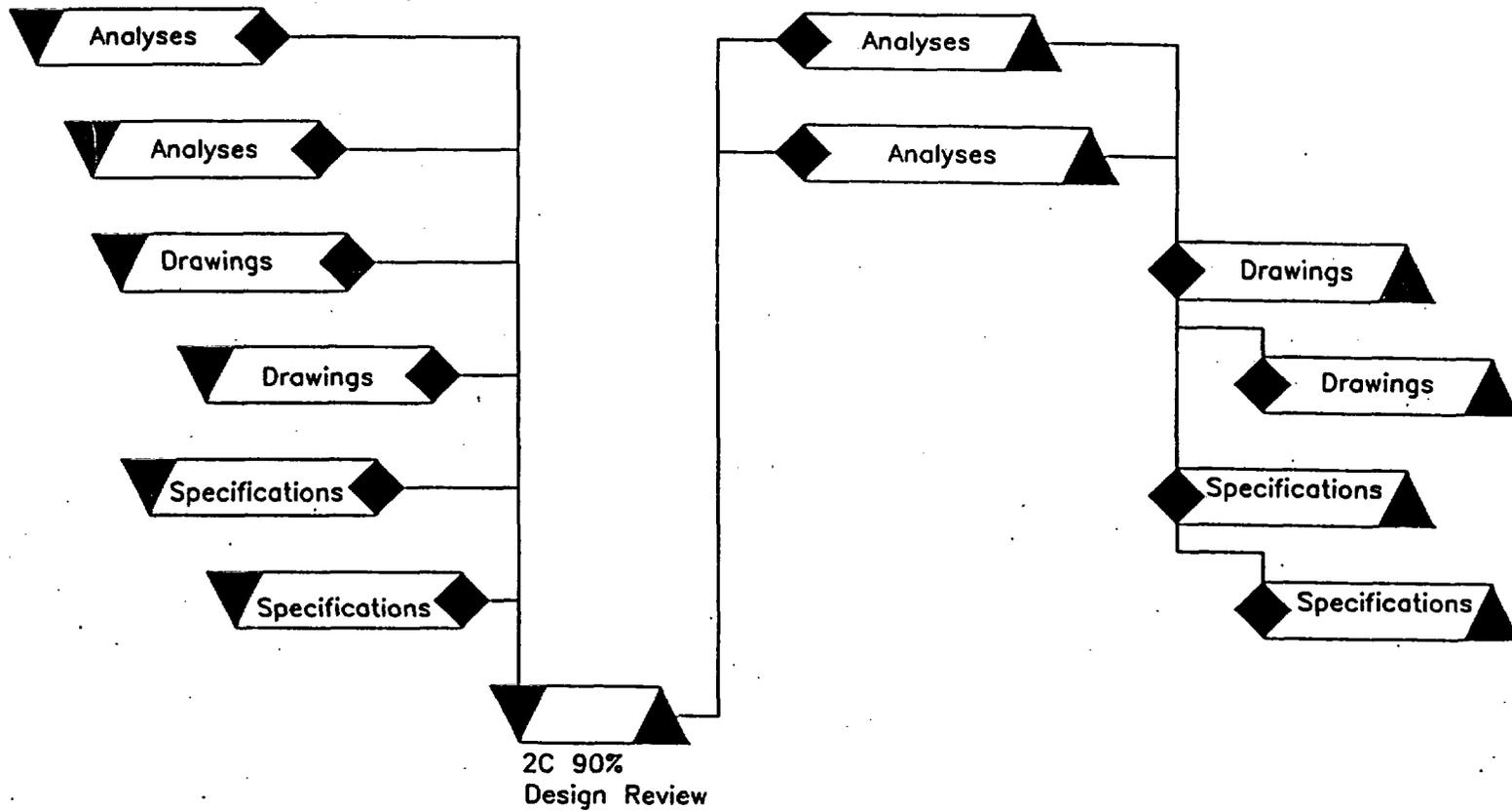
NRC provided copies of products as completed; still in observer role

Design input lists and enhanced analyses support drawings and specifications

Design Control Process

Design Review vs. External Review

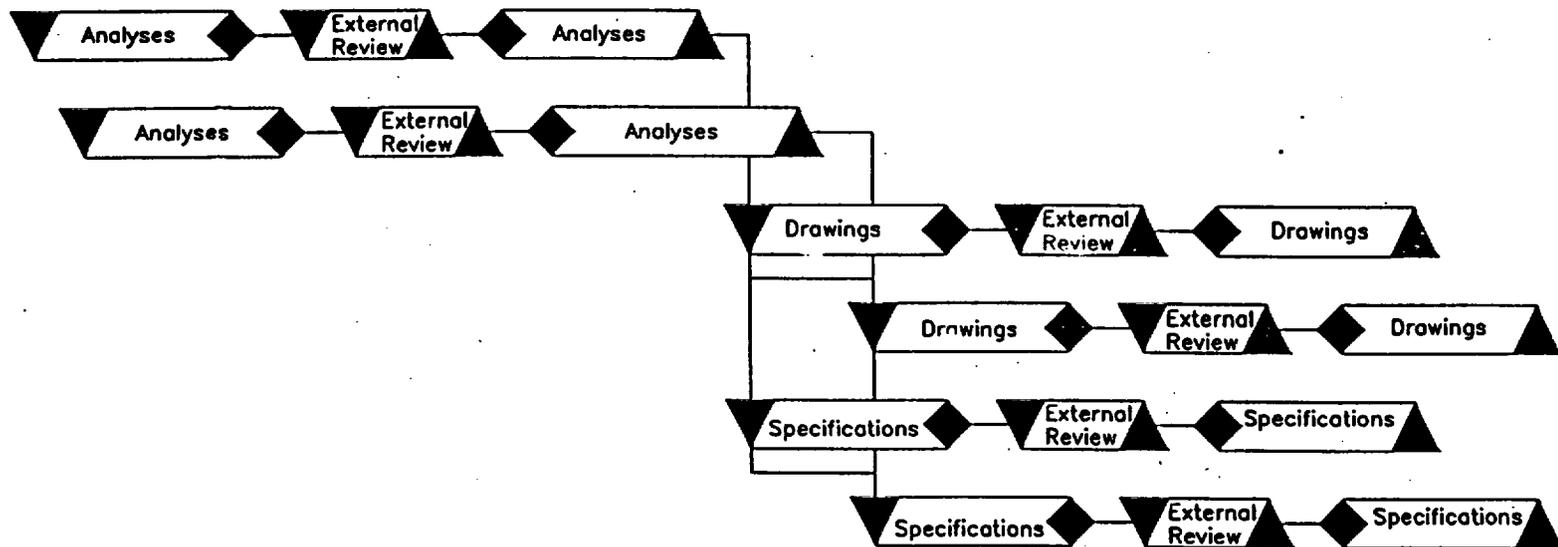
Process utilized for Package 2C



Design Control Process

Design Review vs. External Review

Process currently in use



Design Control Process

Example of Process Flow

- **ESF Layout Calculation**

- Incorporates ESFDR Rev. 1, ICN 2 (5/08/95) criteria
- Revision to 2C analysis began 1/95
- External Review

- » **Reviewers**

- YMSCO Engineering & Field Operations
- YMSCO Environmental, Safety & Health
- YMSCO Scientific Programs
- YMSCO Suitability & Licensing
- Yucca Mountain Quality Assurance
- DOE/HQ Systems Engineering
- Test Coordination Office
- Construction (REECo and Kiewit/PB)

Design Control Process

Example of Process Flow

- **ESF Layout Calculation (continued)**
 - **External Review (continued)**
 - » **Review began 6/12/95**
 - » **No significant issues were raised in review**
 - » **Comments incorporated; review closed 7/06/95**
 - **Approved 7/07/95**
 - **Used as input by Main Drift Plan & Profile Drawings**

Design Control Process

Example of Process Flow

- **Main Drift Plan & Profile Drawings**
 - **Incorporated results of ESF Layout Calculation**
 - **External Review**
 - » **Reviewers**
 - YMSCO Engineering & Field Operations**
 - YMSCO Environmental, Safety & Health**
 - YMSCO Scientific Programs**
 - YMSCO Suitability & Licensing**
 - Yucca Mountain Quality Assurance**
 - DOE/HQ Systems Engineering**
 - M&O Quality Assurance**
 - M&O Regulatory & Licensing**
 - M&O Systems Engineering**
 - Test Coordination Office**
 - Construction (REECo and Kiewit/PB)**

Design Control Process

Example of Process Flow

- **Main Drift Plan & Profile Drawings (continued)**
 - **External Review (continued)**
 - » **Review began 8/16/95**
 - » **Significant comments**
 - » **Revise notes to emphasise fault locations, borehole and geological information is for reference only**
 - » **Revise notes to state geological information is based on the USGS Lynx model YMP.R2.0(95).**
 - » **Comments incorporated; review closed 8/28/95**
 - **Approved 9/08/95**

Design Control Process Updates

- **NLP-3-10, Field Change Control**
 - Streamlined field change process
 - Simplified change evaluation form
 - Made procedure more user-friendly
- **NLP-3-18, Documentation of QA Classification/Controls on Drawings, Specifications, Design Analyses and Technical Documents**
 - Simplified process for identification of features on drawings, specifications and analyses which are subject to quality provisions and their interfaces
 - Eliminated ambiguities

Design Control Process

- **NLP-3-26, Impact Reviews of Revisions of Documents and Field/Laboratory Data that affect the MGDS Development Organization**
 - Evaluate changes to key design input documents for design impact
 - Evaluate Field/Laboratory Data for design impact