ENCLOSURE 1C

9402080017 940121

TPO MEETING

STATUS OF ESF

PRESENTED BY

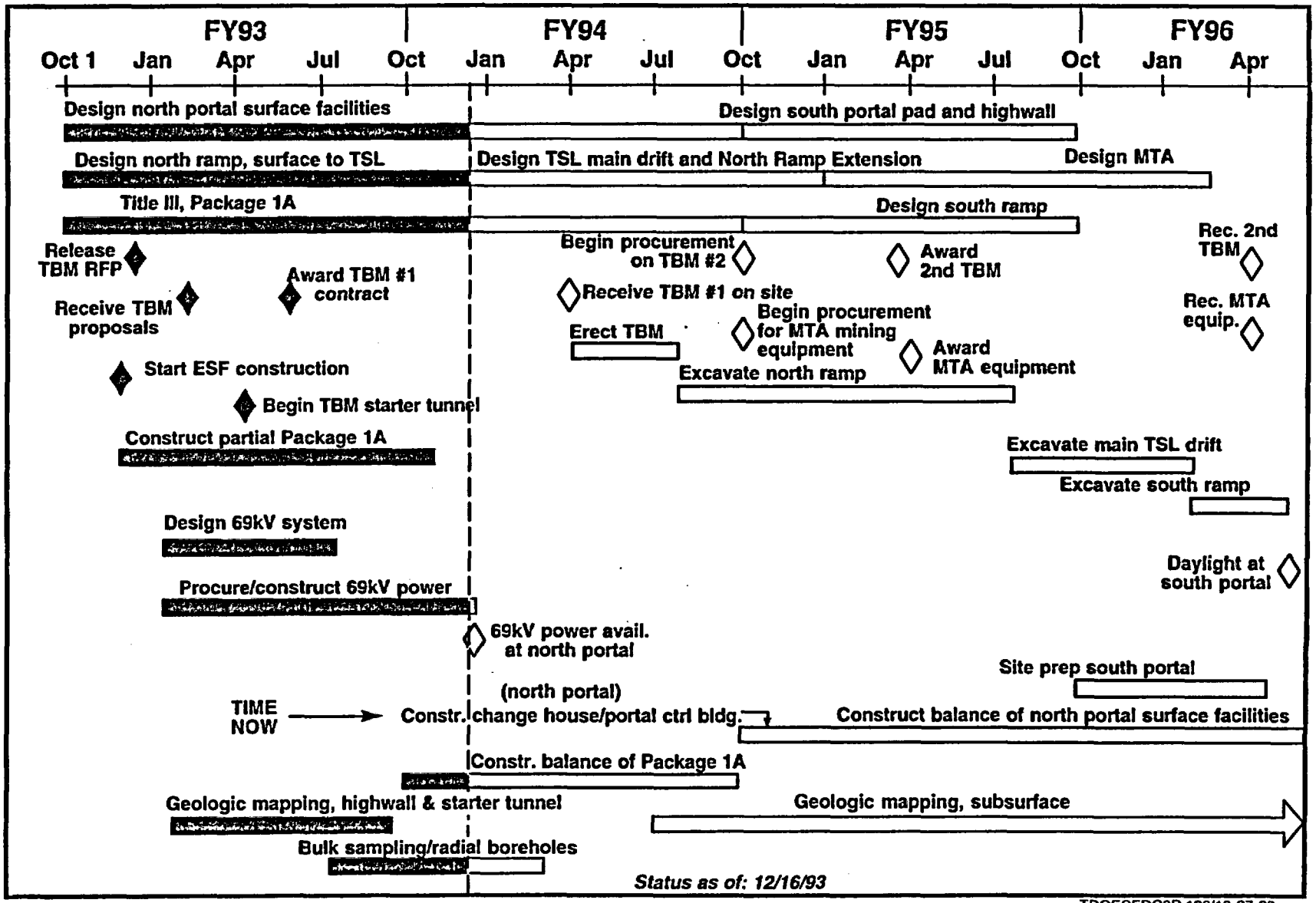
DR. WILLIAM B. SIMECKA

DIVISION DIRECTOR, ENGINEERING AND DEVELOPMENT DIVISION
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

DECEMBER 16, 1993

102

PLANNED ESF DESIGN/CONSTRUCTION ACTIVITIES
FY 93 - 96



TPOESFDC8P.126/10-27-93

ESF DESIGN MILESTONES

Milestone/Activity	Planned	Expected
Start Title II design activity Packages 1 and 2	10/1/92	10/1/92(A)
Start 50% review, Package 1B	4/12/93	4/12/93(A)
Start 50% review, Package 2	4/22/93	4/19/93(A)
Start 90% review, Package 2A	7/19/93	7/19/93(A)
Start 90% review, Package 1B	8/11/93	8/2/93(A)
Start 90% review, Package 2B	11/15/93	12/13/93(A)
Start 90% review, Package 2C	2/21/94	2/21/94(E)

ESF CONSTRUCTION MILESTONES

Milestone/Activity	Planned	Expected
Start excavation of North Ramp starter tunnel	4/2/93	4/2/93(A)
Award TBM contract	4/15/93	5/27/93(A)
Award underground construction contract	10/15/92	8/2/93(A)
Complete 61 meters (200ft) starter tunnel	9/20/93	9/9/93(A)
Receive final TBM shipment	4/4/94	4/4/94(E)

ESF ACCOMPLISHMENTS

- Design
  - Started 90% Design Review for Package 2B (M&O)
  - Submitted design package 2A to YMPO for acceptance (M&O)
  - Released early procurement package for geologic mapping platform and gantry

ESF PLANNED ACTIVITIES FY94

- Procure and install water system
- Procure and install sanitary sewer system
- Procure surface conveyor system
- Prepare and install compressed air system
- Prepare and install electrical distribution system
- Complete 69kV system
- Erect Switchgear building
- Receive and set up Tunnel Boring Machine

ESF PLANNED ACTIVITIES FY94

(CONTINUED)

- Operate TBM for approximately 1 month
- Install subsurface utilities
- Procure spares for TBM
- Procure and install rail system
- Complete design of Package 1, 2 and 8B (North Ramp extension)
- Start design of Package 8A (TSL Main Drift)

TPO MEETING

DECEMBER 93 STATUS (FY 94)

SITE CHARACTERIZATION PROGRAM

PRESENTED BY
J. RUSSELL DYER, DIRECTOR
REGULATORY AND SITE EVALUATION DIVISION

DECEMBER 16, 1993

ENCLOSURE 1D

* = actual
.... = current
— = planned

Planning and Control System (PACS)

SUMMARY NETWORK 1.2.3

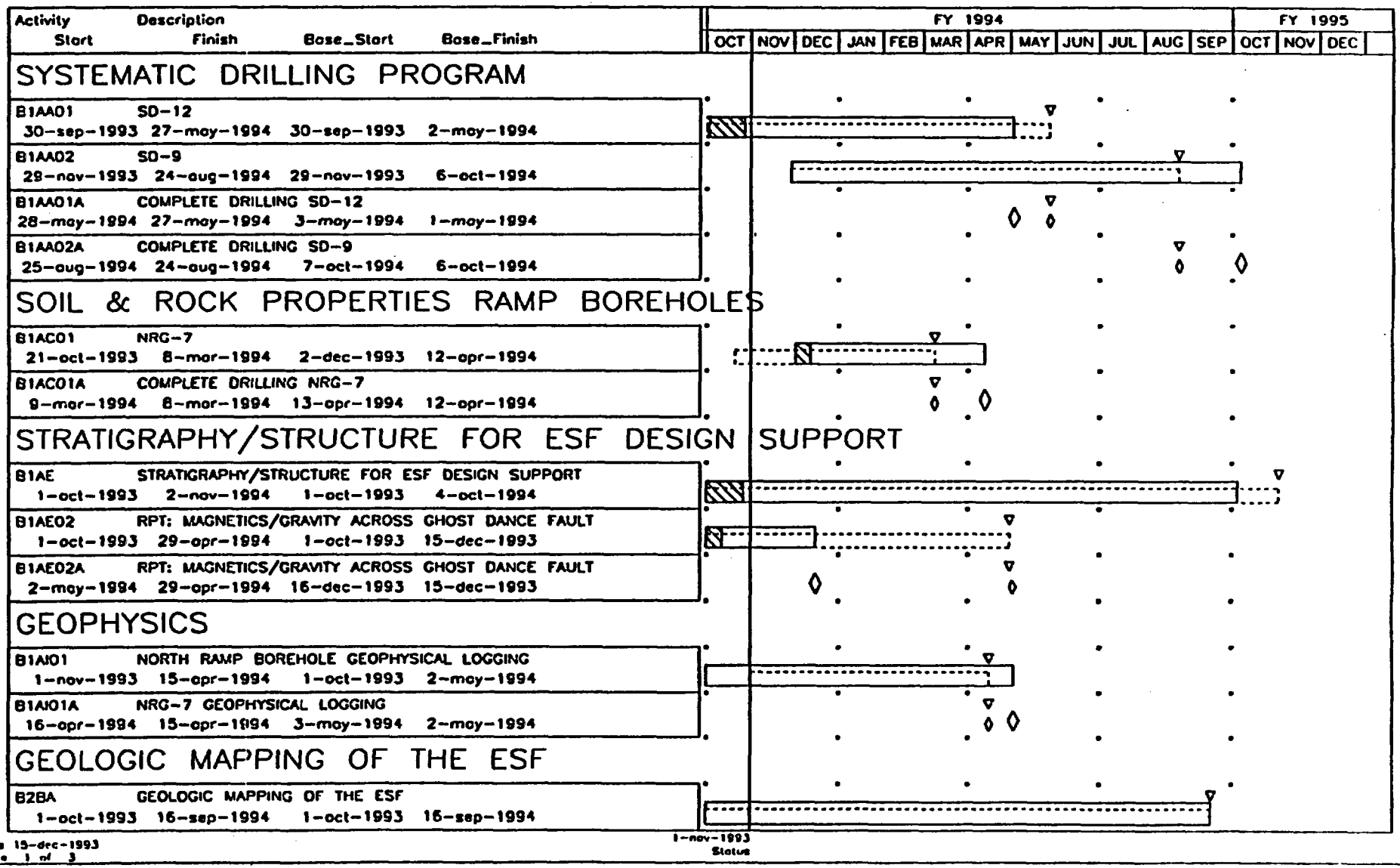
SORT: code5,es
GROUP: code5

SELECTION: FY1994 RSED Priorities

Activity Bar Legend

Baseline Network: z3sumb — Progress
Current Network: z3sum — Rev. Finish — Critical

Current Status Date
1-nov-1993



Planning and Control System (PACS)

SUMMARY NETWORK 1.2.3

SORT: code5,es
GROUP: code5

SELECTION: FY1994 RSEO Priorities

Activity Bar Legend

Baseline Network: z3sumb — Progress
Current Network: z3sum — Rev. Finish — Critical

Current Status Date
1-nov-1993

Activity	Description	Start	Finish	Base_Start	Base_Finish
B2BA01	GEOLOGIC MAPPING FY-94	1-oct-1993	5-oct-1994	1-oct-1993	16-sep-1994
B2BA01A	COMPLETE FY-94 GEOPHYSICAL LOGGING	6-oct-1994	5-oct-1994	17-sep-1994	16-sep-1994
GEOLOGIC STUDIES					
B2BC	GEOLOGIC STUDIES	1-oct-1993	30-sep-1994	30-sep-1993	30-sep-1994
PNEUMATIC & HYDRAULIC PROPERTIES TESTING BEFORE TBM					
B2BE	PNEUMATIC & HYDRAULIC PROPERTIES TESTING BEFORE TB	1-oct-1993	23-jan-1997	1-oct-1993	31-dec-1996
B2BE01	DRILL HYDRO-CHEMISTRY HOLES 1st ALCOVE	20-oct-1993	19-nov-1993	12-oct-1993	1-nov-1993
B2BE02	RADIAL BOREHOLES 1st ALCOVE	22-nov-1993	29-jul-1994	12-nov-1993	2-aug-1994
B2BE02A	COMPLETE BOREHOLES 1ST ALCOVE	17-feb-1994	16-feb-1994	11-feb-1994	10-feb-1994
GEOPHYSICS					
B2BI	GEOPHYSICS	1-oct-1993	7-jun-1994	1-oct-1993	7-jun-1994
B2BI01	STANDARD & PROTO TYPE ESF LOGGING	1-oct-1993	7-jun-1994	1-oct-1993	7-jun-1994
B2BI02	SURFACE BASED GEOPHYSICAL LOGGING	1-oct-1993	7-jun-1994	1-oct-1993	7-jun-1994
TECTONICS/SEISMICITY MEASUREMENTS					
B3CC01	HISTORICAL & CURRENT SEISMICITY	1-sep-1993	30-sep-1994	1-oct-1993	4-oct-1994
C-WELL TESTING					
B4DA	C-WELL TESTING	1-oct-1992	17-dec-1996	1-oct-1992	17-dec-1996

FY 1994: OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
FY 1995: OCT NOV DEC

1-nov-1993
Status

Planning and Control System (PACS)

SUMMARY NETWORK 1.2.3

SORT: code5.es
GROUP: code5

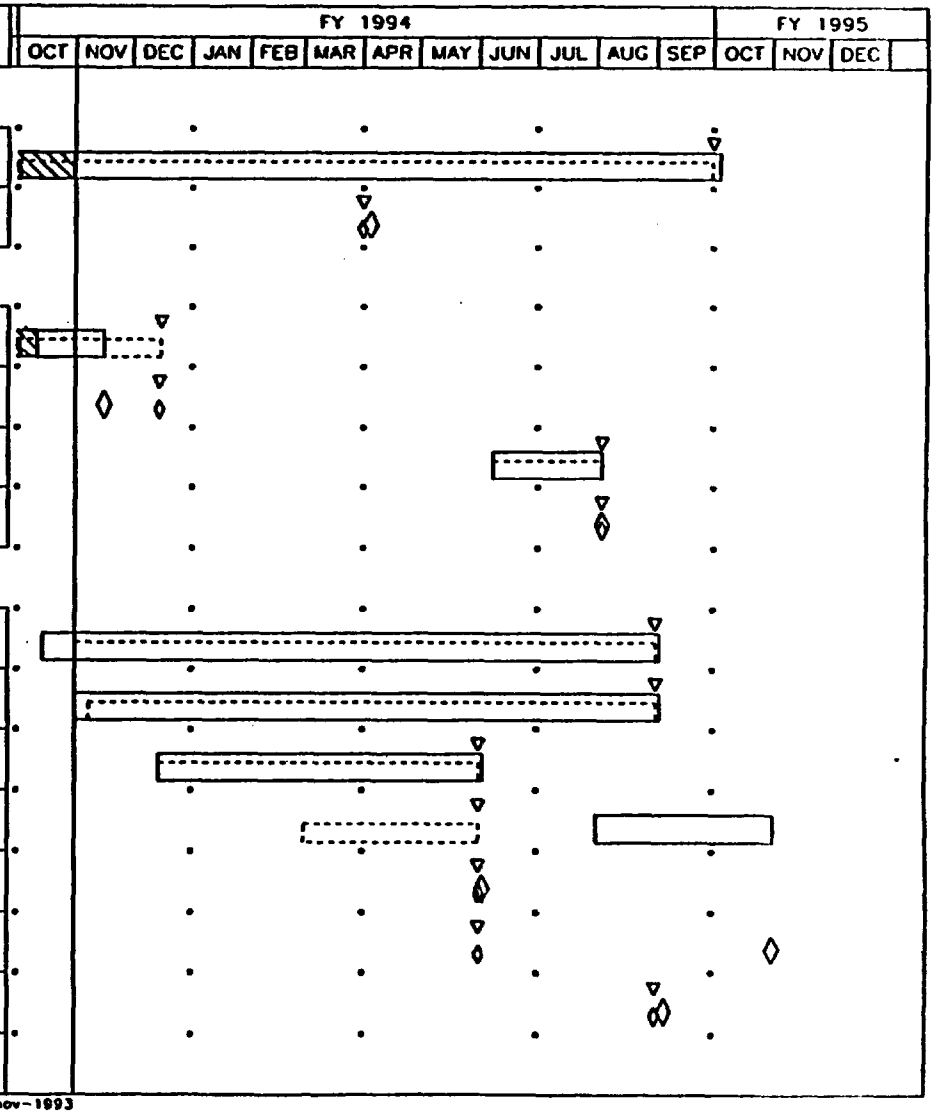
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

Baseline Network: z3sumb — Progress
Current Network: z3sum — Rev. Finish — Critical

Current Status Date
1-nov-1993

Activity / Start	Description / Finish	Base_Start	Base_Finish
FRAMEWORK STUDIES			
B4DC	FRAMEWORK STUDIES		
28-jun-1993	30-sep-1994	28-jun-1993	4-oct-1994
B4DC01	SELECT SEISMIC CONTRACTOR		
1-apr-1994	31-mar-1994	5-apr-1994	4-apr-1994
UZ PERCOLATION			
B4DE01	UZ-14		
29-jul-1993	15-dec-1993	29-jul-1993	15-nov-1993
B4DE01A	COMPLETE UZ-14 DRILLING		
15-dec-1993	14-dec-1993	16-nov-1993	15-nov-1993
B4DE02	UZ-16		
8-jun-1994	3-aug-1994	8-jun-1994	3-aug-1994
B4DE02A	COMPLETE UZ-16(INST/STEM)		
4-aug-1994	3-aug-1994	4-aug-1994	3-aug-1994
TECTONICS			
B4DM05	GHOST DANCE FAULT STUDY		
1-nov-1993	31-aug-1994	15-oct-1993	2-sep-1994
B4DM02	BARE MOUNTAIN STUDY PROGRAM		
8-nov-1993	31-aug-1994	1-nov-1993	2-sep-1994
B4DM03	BOW RIDGE FAULT STUDY		
15-dec-1993	31-may-1994	15-dec-1993	2-jun-1994
B4DM07	MIDWAY VALLEY STUDY		
1-mar-1994	31-may-1994	1-aug-1994	1-nov-1994
B4DM03A	FINAL RPT: BOW RIDGE FAULT		
1-jun-1994	31-may-1994	3-jun-1994	2-jun-1994
B4DM07A	FINAL SUMM RPT:/TDIF MID-VALLEY		
1-jun-1994	31-may-1994	2-nov-1994	1-nov-1994
B4DM05A	PROGRESS REPORT GHOST DANCE FAULT		
1-sep-1994	31-aug-1994	6-sep-1994	2-sep-1994



Site Characterization Field Activities in Progress

SCP ACTIVITY	TITLE	ACTIVITY
8.3.1.3.2.1	Mineralogy, Petrology, and Rock Chemistry of Transport Pathways	Outcrop Sampling
8.3.1.2.1.1	Precipitation and Meteorological Monitoring for Regional Hydrology	On-going measurements
8.3.1.2.1.2	Runoff and Streamflow	On-going measurements
8.3.1.2.2.1	Unsaturated Zone Infiltration	Logging of neutron access holes; ponding tests
8.3.1.2.2.2	Water Movement Tracer Tests	Cl-36 measurements
8.3.1.2.2.3	Percolation in the Unsaturated Zone	UZ drilling/testing
8.3.1.2.2.6	Gaseous Phase Movement in the Unsaturated Zone	UZ drilling/testing
8.3.1.2.2.7	Unsaturated Zone Hydrochemistry	UZ drilling/testing
8.3.1.2.3.1	Site Saturated Zone Groundwater Flow System	On-going monitoring
8.3.1.2.3.2	Saturated Zone Hydrochemistry	On-going monitoring

As of 12/16/93

Site Characterization Field Activities in Progress continued

SCP ACTIVITY	TITLE	ACTIVITY
8.3.1.3.2.2	Mineralogic and Geochemical Alteration	Outcrop Sampling
8.3.1.4.2.2	Structural Features Within Site Area	Surface & ESF Mapping
8.3.1.8.5.1	Characterization of Volcanic Features	Test pits, Trenching
8.3.1.14.2	Soil and Rock Properties of Potential Location of Surface Facilities	Test pits, trenching, ramp, exploration holes
8.3.1.15.1.8	In Situ Design Infiltration	Construction monitoring
8.3.1.17.4.2	Location and Recency of Faulting Near Prospective Surface Facilities	Trench mapping testing
8.3.1.17.4.3	Quaternary Faulting Within 100 km of Yucca Mountain	Surface mapping
8.3.1.17.4.4	Quaternary Faulting in NE-Trending Fault Zones	Surface mapping
8.3.1.17.4.6	Quaternary Faulting Within Site Area	Trench Mapping
8.3.1.17.4.10	Geodetic Leveling	Traversing

As of 12/16/93

C-WELL TESTING
Study Plan: 8.3.1.2.3.1

- **Status:**
  - Packer strings installed and tested in UE-25 c#3.
  - Preliminary installation and testing of packer strings underway in UE-25 c#2.
- **Concerns:**
  - Packer string on UE-25 c#2 was pulled and defective packer tubing replaced. Packer string on UE-25c#3 will also have to be pulled to replace defective tubing.
- **Planned Activities:**
  - Begin pipeline construction; move USGS equipment from Raymond Quarry to NTS.

As of 12/16/93

GEOPHYSICAL SEISMIC REFLECTION SURVEY Study Plan: 8.3.1.4.2.1

- **Planned Start Date:**
  - FY 1994.
- **Status:**
  - Activity scheduled for FY 1994.
- **Concerns:**
  - Ability to obtain subcontractor(s) for FY 1994; availability of funds in FY 1994.
- **Solutions:**
  - Reduce number of RFP's (of 3 originally planned).
  - Encourage USGS to expedite contracting process; identify additional FY 1994 funds for seismic lines, address impacts of potential test delay.
  - Plan for REECo to drill deep shotholes.

As of 12/16/93

VOLCANISM STUDIES
Study Plans: 8.3.1.8.1.1 and 8.3.1.8.5.1

- **Status:**
  - LANL Technical Report (draft) completed March 4, 1993 -- final report due December 17, 1993.
  - Effects Studies underway.
  - Geophysics review underway: external consultant George Thompson -- Stanford University, preliminary results from Thompson indicate that additional geophysics may be required (magnetics and modeling).
  - Expert elicitation of E1 and E2 probability calculations and methodology underway.
- **Concerns:**
  - Geochronology Problems: 40Ar/39Ar data will soon be finalized for Lathrop Wells; Potential Magma Chambers can be investigated by Teleseismic Tomography.
- **Solutions:**
  - Continue Geochronology Program -- Completing Lathrop Wells Study and starting Sleeping Butte/ Crater Flat Study.

As of 12/16/93

ESF TESTING

- **Status:**
  - North Ramp completed to approximately Station 1+94' (60 meters) as of September 10, 1993.
  - Alcove construction underway. Wire mesh and rock bolts installed. Alcove walls washed prior to USBR mapping. Instrumentation holes drilled. Preparing for shotcrete (at Alcove Station 0+90' (27 meters)). Alcove completion awaiting delivery of drilling equipment.
  - Geologic mapping, photography and sampling were initiated in the Alcove.
  - Hydrochemistry testing underway.

As of 12/16/93

ESF Testing Planning Prioritization

ESF TEST PLANNING--PHASE I

TCO Test Event Name	Test Name --(SCP Activity	WBS Number SCP Number	Construction or Deferred	Start Date in Field
Geologic Mapping - North Portal Wall and Slot	Underground Geologic Mapping	1.2.3.2.2.1.2 8.3.1.4.2.2 R2	Construction	Completed June, 1993

ESF TEST PLANNING--PHASE II

Geologic Mapping - Starter Tunnel	Underground Geologic Mapping	1.2.3.2.2.1.2 8.3.1.4.2.2 R2	Construction	April 2, 1993
Perched Water - Started Tunnel (contingency)	Perched Water Testing in the ESF	1.2.3.3.1.2.4 8.3.1.2.2.4 R1	Construction	Contingency April 2, 1993
Consolidated Sampling - Starter Tunnel	Matrix Hydrologic Properties Testing	1.2.3.3.1.2.3 8.3.1.2.2.3	Construction/ Deferred	May 3, 1993
	History of Mineralogic and Geochemical Alteration of YM	1.2.3.2.1.1.2 8.3.1.3.2.2	Construction/ Deferred	May 1993
	Chloride and Chlorine-36 Measurements of Percolation at Yucca Mountain	1.2.3.3.1.2.2 8.3.1.2.2.2 R1	Construction/ Deferred	May 1993
Construction Monitoring - Starter Tunnel	Evaluation of Mining Methods	1.2.4.2.1.1.4 8.3.1.15.1.8	Construction	April 2, 1993
	Monitoring of Ground Support Systems	1.2.4.2.1.1.4 8.3.1.15.1.8	Construction	April 22, 1993

As of 12/16/93

ESF Testing Planning Prioritization continued

ESF TEST PLANNING--PHASE IIA

TCO Test Event Name	Test Name--(SCP Activity	WBS Number SCP Number	Construction or Deferred	Start Date in Field
Radial Borehole Testing	Radial Borehole Tests in the ESF	1.2.3.3.1.2.4 8.3.1.2.2.4	Deferred	January 1994
Hydrologic Testing	Hydrochemistry Tests in the ESF	1.2.3.3.1.2.4 8.3.1.2.2.4	Construction/ Deferred	Nov 1993
Hydrologic Properties of Major Faults	Hydrologic Properties of Major Faults Encountered in the ESF	1.2.3.3.1.2.4 8.3.1.2.2.4	Construction/ Deferred	TBD

As of 12/16/93

UZ PERCOLATION
USW UZ-16

- **Status**
  - Completed Drilling March 11, 1993. TD 1686.16' (514 m).
  - Testing Underway:
    - » CO_2, CH_4, SF_6 monitored during evacuation of Tracer gas (October 1- 8) to achieve borehole conditions.
    - » CO_2 collection for C_{14} dating (October 5, 1993).
  - Gas composition changes monitored from 4 intervals.
  - Completed standard and prototype borehole geophysical logging in July, 1993; two zero-offset and two walk-away VSP using clamped geophone completed in August 1993.
- **Planned Activities:**
  - Continue Testing (Air Permeability).
  - Planning continues for walk-away VSP using 96 grouted geophones; May, 1994 test date expected.

As of 12/16/93

UZ PERCOLATION
USW UZ-14

- **Status:**
  - Drilling Started April 15, 1993.
  - Core Depth as of December 13,1993 - 1442.11' (440 m); Ream Depth 1421.64' (433 m).
  - Phase IV concrete grouting completed, Phase V - borehole has been plugged below 1315' (401 m) and casing set.
- **Planned Activities:**
  - LM-300 to be de-mobilized, moved to SD-12 in January.
  - UZ-14 to be completed to TD~2000' (610 m) for water table data at a later date.

As of 12/16/93

HISTORICAL AND CURRENT SEISMICITY - STUDY PLAN 8.3.1.17.4.1

- **Status:**
  - Seven additional digital stations to be installed in the spring or summer of FY 1994 as part of the second node digital upgrade.

As of 12/16/93

MIDWAY VALLEY
Study Plan: 8.3.1.17.4.2

- **Status:**
  - Soil description complete in all test pits in Midway Valley.
- **Planned Activities:**
  - Complete Midway Valley final report and provide to DOE by May 31, 1994.

As of 12/16/93

QUATERNARY FAULTING - REGION
Study Plan: 8.3.1.17.4.3

- **Status:**
  - Preparation of strip map along Bare Mountain fault is nearly complete.
  - Mapping of Furnace Creek fault is in progress.
  - Mapping of trench BMT-1 is underway, see photo (South Wall BMT-1).
- **Planned Activities:**
  - Excavate Tests Pits at Bare Mountain TP-1 through -5.
  - Excavate trench BMT-3.

As of 12/16/93

QUATERNARY FAULTING - NE TRENDING FAULTS STUDY PLAN 8.3.1.17.4.4

- **Status:**
  - Trench locations on Rock Valley fault identified by USGS and provided to DOE.
- **Planned Activities:**
  - Excavate Rock Valley trenches in February, 1994.

As of 12/16/93

QUATERNARY FAULTING - SITE AREA
Study Plan: 8.3.1.17.4.6.2

- **Status:**
  - Trenches at MWV T-3 and A-1 at the north end of Paintbrush Canyon fault on the west side of Alice Ridge were completed December 10, 1993.
  - Plans for trenches across Ghost Dance fault are being finalized by USGS.
- **Planned Activities:**
  - Trench mapping at MWV T-3 and A-1.

As of 12/16/93

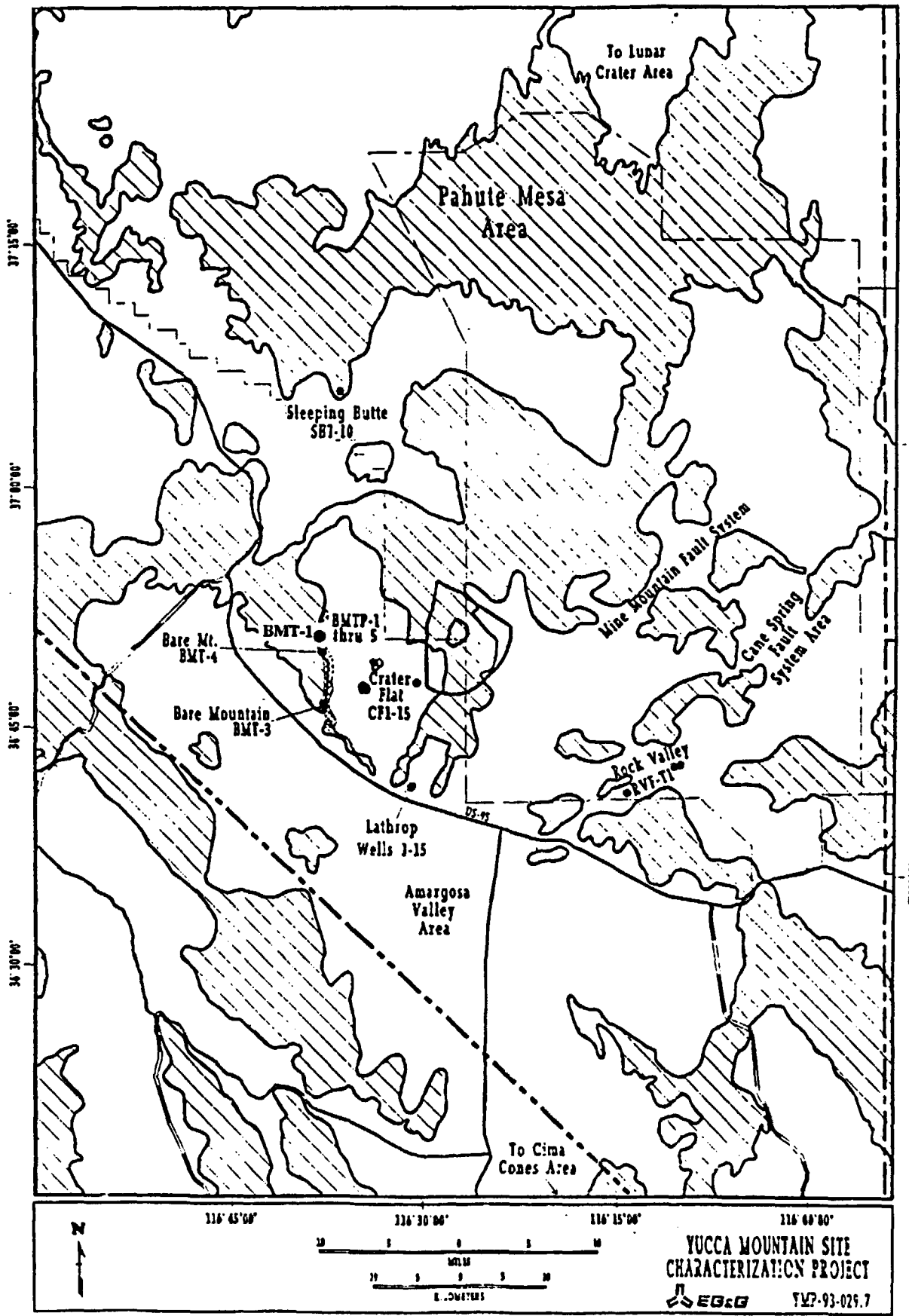


Figure 5.3 - Planned FY94 Trenches and Test Pits in Regional Investigations (Proposed locations).

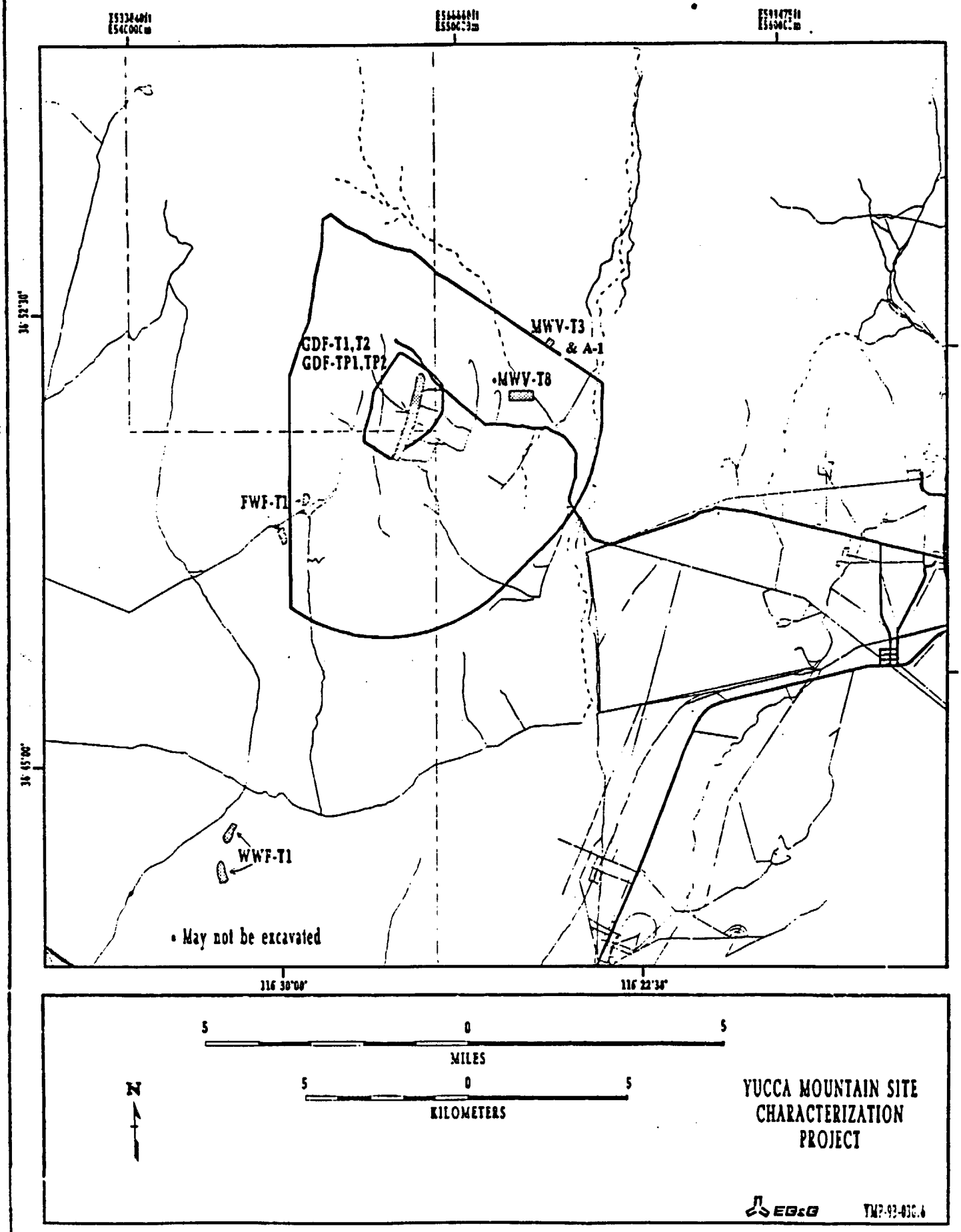


Figure 5.2 - Planned FY94 Trenches in the Site Area (Proposed Locations).
Note: locations shown on figure are approximate. Do not use for calculations.

VERTICAL AND LATERAL DISTRIBUTION OF STRATIGRAPHIC UNITS / STUDY PLAN 8.3.1.4.2.1

- **Status:**
  - Completed logging (density, neutron, caliper, induction logs) of the North Ramp boreholes December 8, 1993 except directional surveys.
  - Developing log correlations for ramp boreholes in support of soil and rock studies and ESF design.
- **Planned Activities:**
  - North Ramp borehole directional surveys planned for January, 1994.
  - Preparing modified logging program for USW UZ-14.

As of 12/16/93

STRUCTURAL FEATURES
Study Plan: 8.3.1.4.2.2

- **Status:**
  - Ghost Dance fault pavement cleaning complete pending inspection.
- **Planned Activity:**
  - Initiate Ghost Dance fault pavement mapping, December, 1993.
- **Related New Activities:**
  - Three shallow reflection seismic profiles completed for road extending from west of USW -WT2 to UE-25 UZ-16, along Yucca Crest, and near North Ramp alignment to define character of Ghost Dance fault at repository level depths. (10/28/93)
  - VSP completed in WT2, NRG-6 and UZ-16; good velocity and stratigraphic control for interpretation of Ghost Dance Fault location.
  - Gravity and magnetic profiles acquired (completed) parallel to one of the high resolution seismic lines (WT2-UZ-16) crossing the Ghost Dance fault zone.

As of 12/16/93

SYSTEMATIC DRILLING PROGRAM STUDY PLAN 8.3.1.4.3.1

- **Status:**
  - SD-12 pad and ramp complete, LM-300 to be mobilized in January.
  - SD-9 Pad - planning in progress.

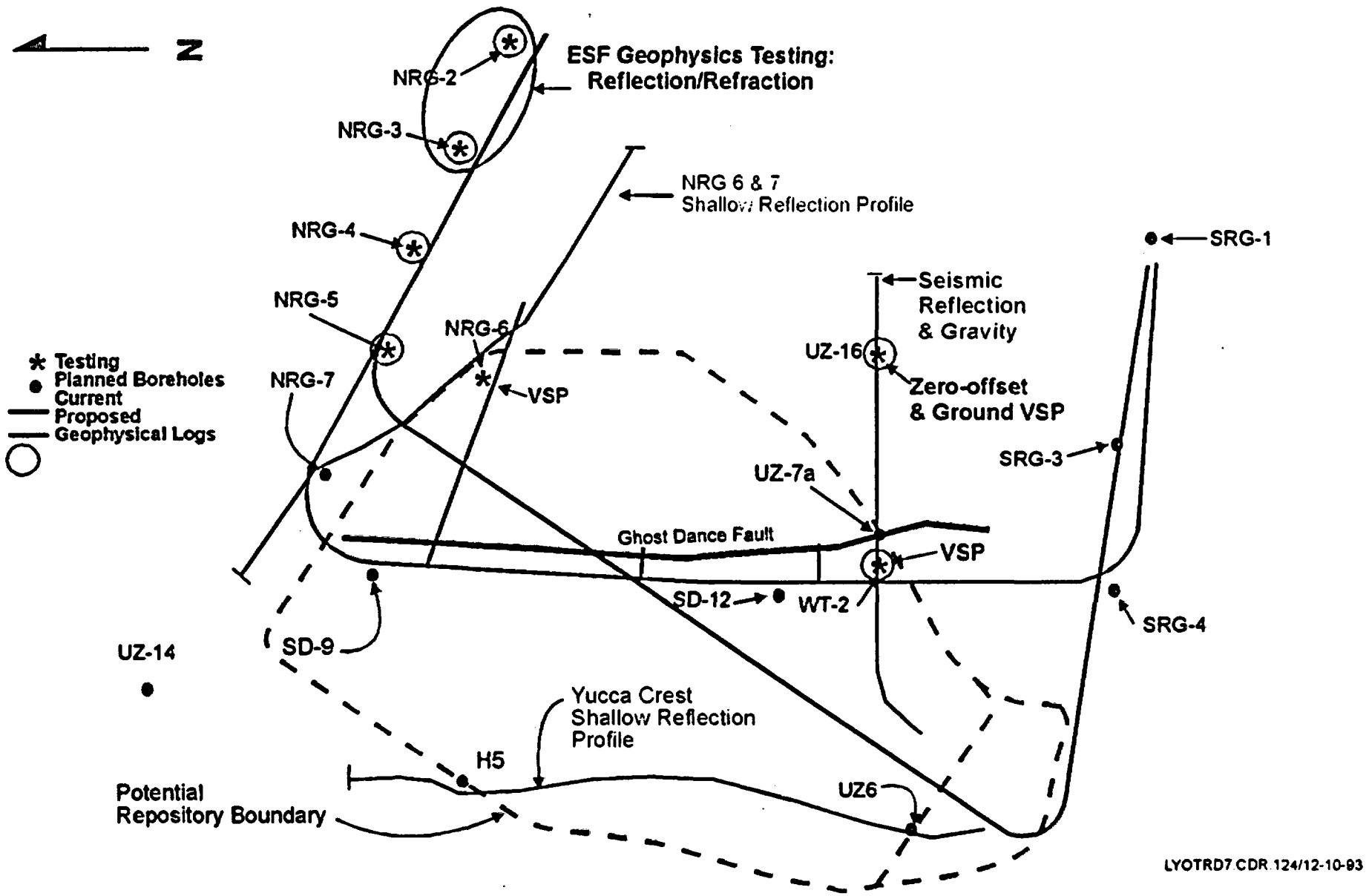
As of 12/16/93

SOIL AND ROCK PROPERTIES
RAMP BOREHOLES / Study Plan: 8.3.1.14.2

- **Status:**
  - Three seismic reflection lines across Bow Ridge fault at NRG-2 complex completed December 9, 1993 (SNL).
  - NRG-7a core depth 802.62' (245 m) as of December 13, 1993, Tsw_1/Tsw_2 contact at 763' (232 m); core recovery in Upper Lithophysal (Tsw_1) averaging 67%.
  - Ramp borehole material properties testing data submittals to support ESF design are on schedule.
- **Planned Activities:**
  - NRG-2c, NRG-2d auger holes at Exile Hill planned for January.
  - Trenches NRT-1, NRT-2 at Exile Hill excavated December 13 - December 17, 1993.
  - North Ramp cross section to be delivered to YMPO in January.

As of 12/16/93

Current and Proposed ESF Alignment
Completed FY93/94 Geophysics Testing Program



STUDY PLAN STATUS

	Initial Plans	Revisions
Not Submitted to YMPO	38	0
In Screening Review	0	0
In Project Office Review	0	1
Awaiting Comment Resolution	4	2
In Project Office Verification Audit	5	1
Awaiting Project Office Approval	0	1
Awaiting Submission to the NRC	0	0
NRC Phase 1 Review	8	5
NRC Acceptance	49	5
Total:	104	15

As of 12/16/93

Att from FY94 AWP Plan

#48 ESTIMATED SCHEDULE FOR THE SUBMISSION OF STUDY PLANS TO THE NRC DURING FY 1994

*** Indicates study plan will be submitted to the NRC for the first time**

TO BE SUBMITTED:

Early FY 1994

Characterization of the YM UZ in the ES, R2
Characterization of Igneous Intrusive Features*
Fluid Flow in Unsaturated, Fractured Rock, R1
Laboratory Determination of the Mechanical Properties of Fractures*
Characterization of the Site Ambient Thermal Conditions*

Mid FY 1994

Ground Water Chemistry Model*
Batch Sorption Studies and Development of Sorption Models*
Dynamic Transport Column Experiments*
Characterization of Future Regional Climates and Environments*
Excavation Investigations, R1
Ground Motion from Regional Earthquakes and UNE's*
Engineered Barrier System Field Tests*

Late FY 1994

Three Dimensional Rock Characteristics Models*
Characterization of Modern Regional Climate*
Laboratory Determination of the Mechanical Properties of Intact Rock, R1
In-Situ Thermomechanical Properties*
→ In-Situ Mechanical Properties*
Characterization of Site Ambient Stress Conditions, R1
Tectonic Models and Synthesis*
Characterization of Chemical and Mineralogical Changes in the Postemplacement Environment*
Hydrologic Properties of the Waste Package Environment*
Effects of Man-Made Materials on Water Chemistry*

→ dropped - not funded.

STATUS OF COST REDUCTION EFFORTS

PRESENTED TO
TPO MEETING

PRESENTED BY
R. GLENN VAWTER
DEPUTY SITE MANAGER, M&O

DECEMBER 16, 1993

ENCLOSURE 1E

YMP has several ongoing efforts to examine cost reduction strategies

MAJOR COST REDUCTION/ COST ANALYSIS INITIATIVES

- YMP cost reduction study
- Infrastructure Reduction Assessment Team (IRAT)
- Bottoms up "Belt Tightening"
- Value Engineering
- Cost Reduction Steering Committee
- YMP cost classification

YMP COST REDUCTION STUDY CONSIDERED 144 COST CENTERS IN SIX AREAS

Design, Construction and Operations

Testing Programs

Infrastructure

Performance Assessment/Regulatory

Early Decisions

Environmental

COST REDUCTION STUDY - FINAL REPORT
TOTAL POTENTIAL SAVINGS (UNESCALATED $)
FROM MISSION 2001 COST PROFILE

Within Program Control (Category 1)		Outside Program Control (Category 2)	
A	B	A	B
$254.9M - $288.4M	$512.9M	$44.5M - $135.5M	$2.6B

A = Near term implementation, simple, potentially non-controversial

B = Longer term implementation, complex, potentially controversial

INFRASTRUCTURE REDUCTION ASSESSMENT TEAM (IRAT) FORMED TO EVALUATE NON-SCIENTIFIC COSTS

- IRAT found current field work initiation process
  - Governed by multiple procedures
  - Requires numerous signatures for initiation of work or a change

- IRAT recommended combining
  - AP 5.21Q Field Work Activation
  - AP 5.32Q Test Planning and Implementation Requirements
  - AP 5.37 Job Package Engineering Cost Estimates
  - AP 6-22Q Job Package Completion and Records

- Gertz approved recommendation and requested
  - One procedure focusing on "high level' requirements that apply across the Project
  - A checklist to indicate that the necessary prerequisites have been satisfied
  - A user friendly process

EXAMPLES OF "BELT TIGHTENING"

ESF Cost Reduction Study

Design, Construction, Operations Working Group; Category (1A)

- Reduced number of TBMs from 4 in Mission 2001 to to 2 in current planning
  - ~$25M savings

- Scaled back power upgrade (no new line to YM Site and reduction in upgrade to NTS power distribution system)
  - ~$15M savings

EXAMPLES OF "BELT TIGHTENING"

(CONTINUED)

Surface Based Drilling Programs

- Doubled depth per shift of LM300 by
  - Integrating information from bit testing program
  - Better drilling controls
  - Improving teamwork

- Reduced number of single purpose boreholes by
  - Working with designers and scientists to jointly pick location of multi-purpose hole
  - Using first 1200' of SD-12 to provide ESF design data
  - Using lower 900' to provide samples for systematic drilling program (i.e. geostatistical sampling distribution)
  - ~$.5M savings per hole

EXAMPLES OF VALUE ENGINEERING

ESF Design

- Value engineering (VE) used to evaluate alternatives to initial design of ESF starter tunnel box cut stabilization
- Initial design for ARMCO corrugated liner ~ $1M
- VE efforts considered safety, aesthetics, redesign efforts and time
- Recommended alternative
  - Reduces length of reinforcement
  - Uses off-the-shelf precast roof units
  - Minimizes redesign
  - Potential savings ~ $640K

COST REDUCTION STEERING COMMITTEE

- Formed in late FY 93
- Representatives from all participants
- Chartered to develop cost reduction initiatives for approval by YMPO management
- Action teams formed
- Results expected next year

ESF Design Data Input, Design Verification, and Construction Monitoring

Dave S. Kessel
YMP Management Department

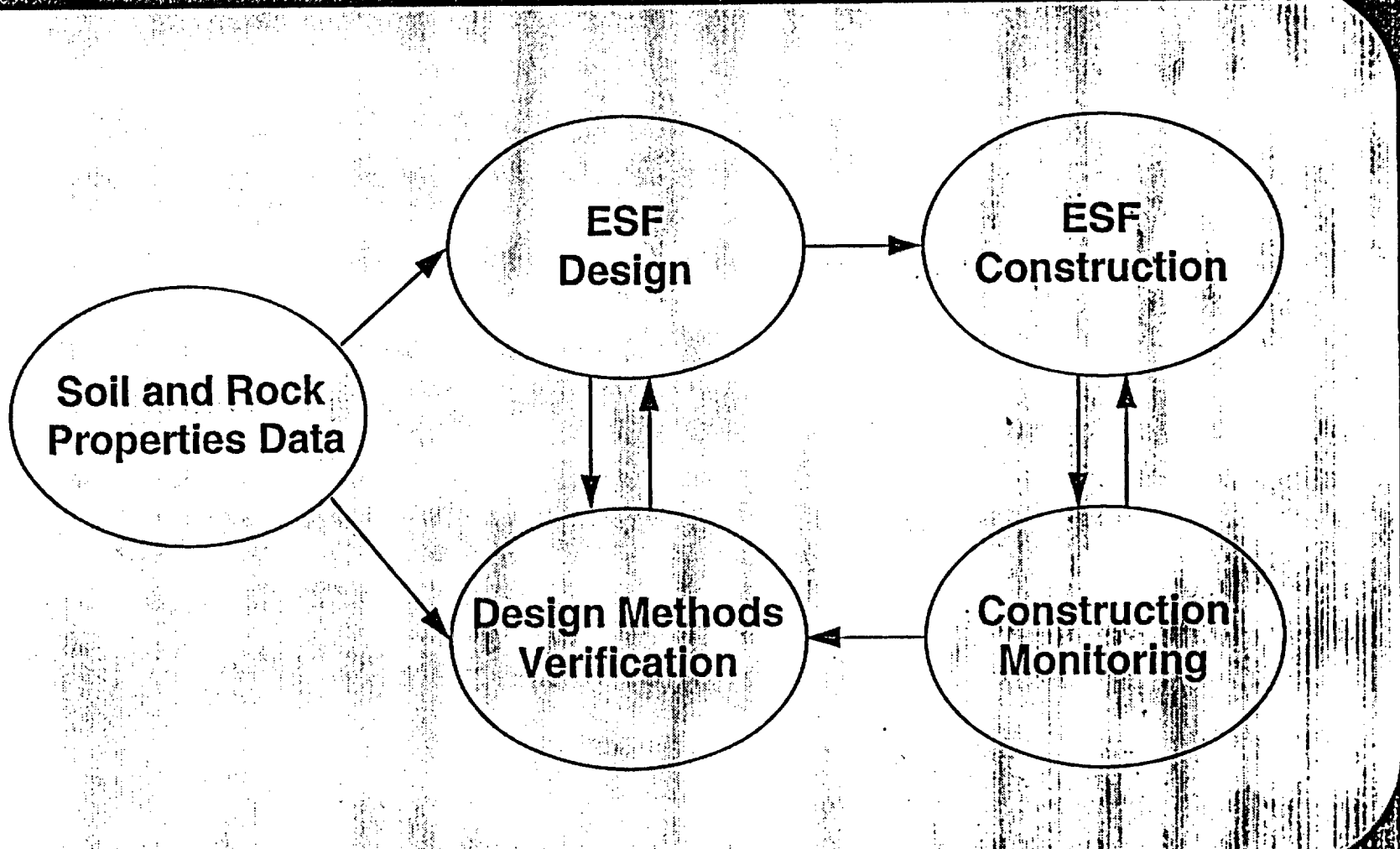
John Pott
YMP Performance Assessment Applications Department

TPO Meeting
December 16, 1994
Las Vegas, Nevada

Sandia National Laboratories

ENCLOSURE 1F

ESF Design Data Input, Design Verification and Construction Monitoring



Soil & Rock Properties

- Geological and Geotechnical Data Provides Input to ESF Design
- Stratigraphic Cross Sections
- Rock Mass Quality (RQD, Q, RMR)
- Rock Mechanical/Thermal Properties
- Rock Mass Mechanical Properties
- Detailed Characterization of Localized Conditions as Required

Current Geotechnical Information

- Encountered ~ 90 ft Thick Interval of Nonlithified Ash Flow and Air Fallout Tuff in NRG-2B
- North Ramp will Encounter This Material After Crossing the Bow Ridge Fault
  - Potentially Impacts 250 ft of the Ramp Construction
- Existance of Nonlithified Material is Also Inferred by Data from Holes NRG-2, NRG-2A and NRT-2

Planned Characterization Activities

- High-Resolution Seismic Reflection and Refraction Survey
- Borehole Video Survey of Hole Stability as the Casing is Removed from Hole
  - NRG-2B
  - NRG-2A
- Trenches NRT-1 and NRT-2
- Drilling of NRG-2C, NRG-2D and NRG-2E
  - Drilled with Soil Auger
  - Intermittent Sampling and Borehole Testing

Parameters to be Obtained from Trenches

- Soil Classification and Stratigraphy
- Bulk Samples for Laboratory Testing and Characterization
  - Gradation
  - Moisture Content
  - Void Space
  - Grout Compatibility
  - Post-Grouting Strength

Parameters to be Obtained from Trenches

- In Situ Density
- Penetrometer Tests
  - Unconfined Compressive Strength
- Plate Bearing Tests
  - Allowable Bearing Pressure
- In Situ Grout Tests

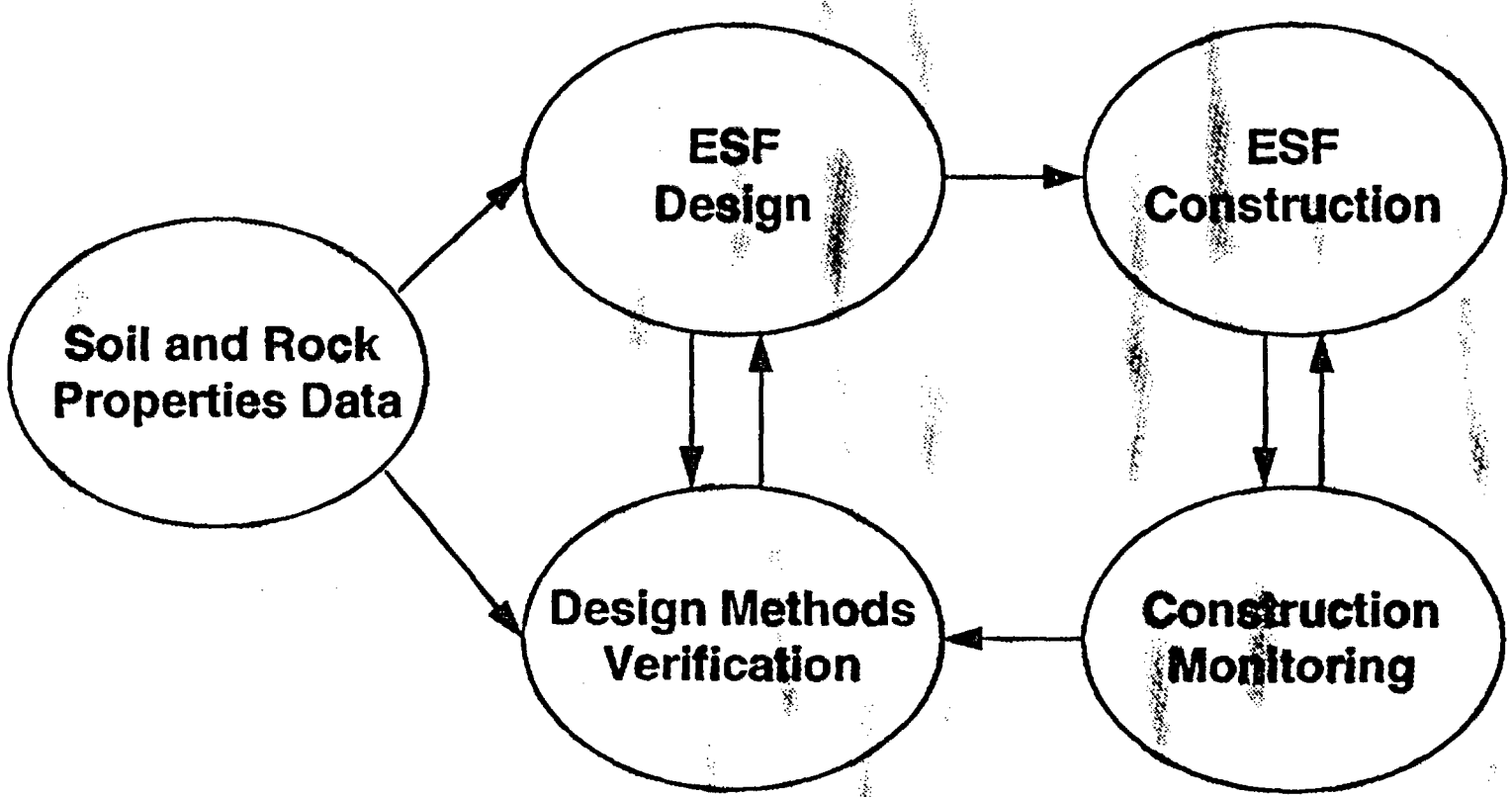
Parameters to be Obtained from Boreholes

- Stratigraphy and Soil Classification
- Samples for Laboratory Testing and Characterization
  - Gradation
  - Moisture Content
  - Void Space
  - Shear Strength
  - Suction Pressure
  - Permeability
  - Grout compatibility
  - Post-Grouting Strength

Parameters to be Obtained from Boreholes (cont.)

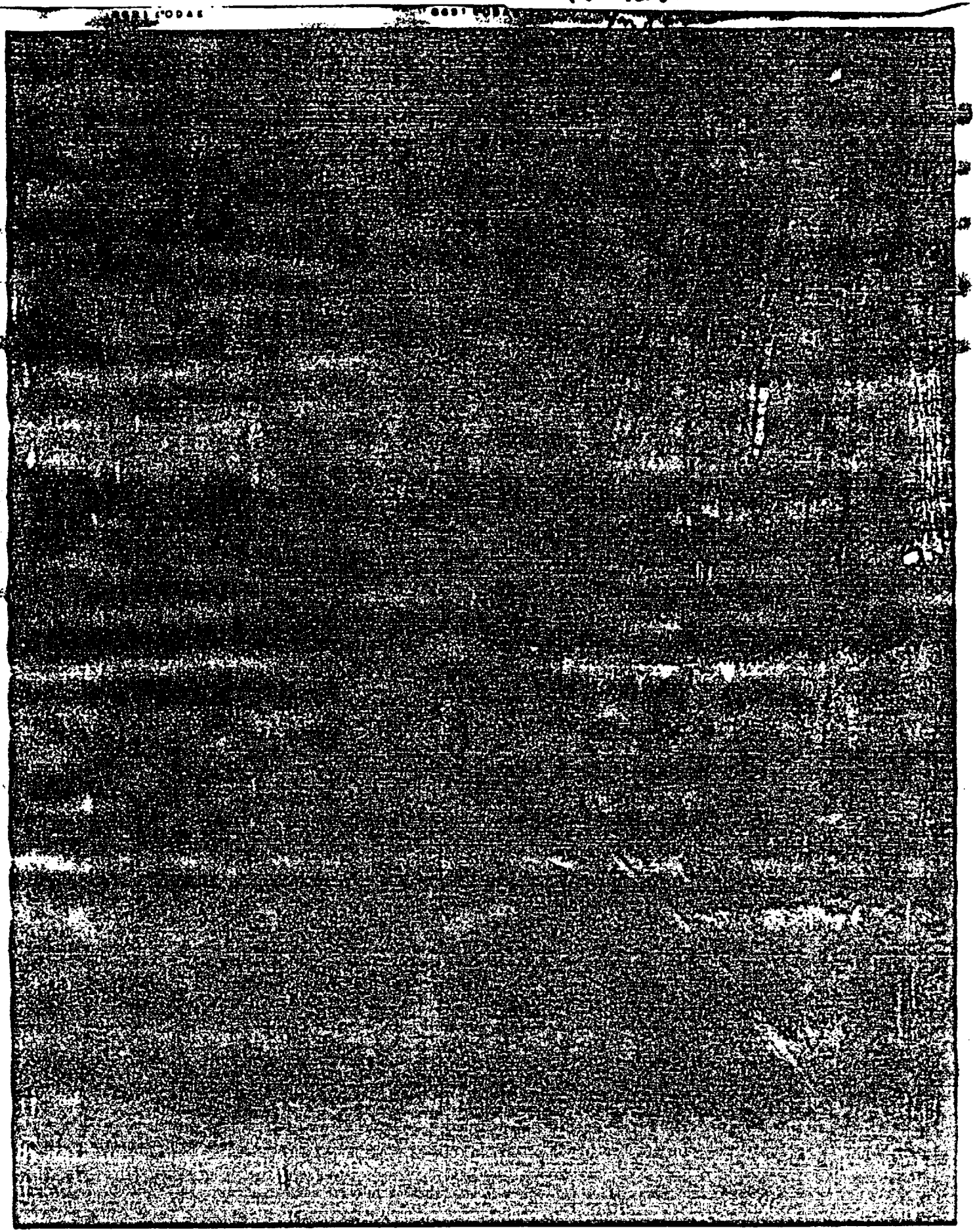
- In Situ Permeability
- Standard Penetration Resistance Allowable Bearing Pressure
- In Situ Grout Tests

ESF Design Data Input; Design Verification and Construction Monitoring



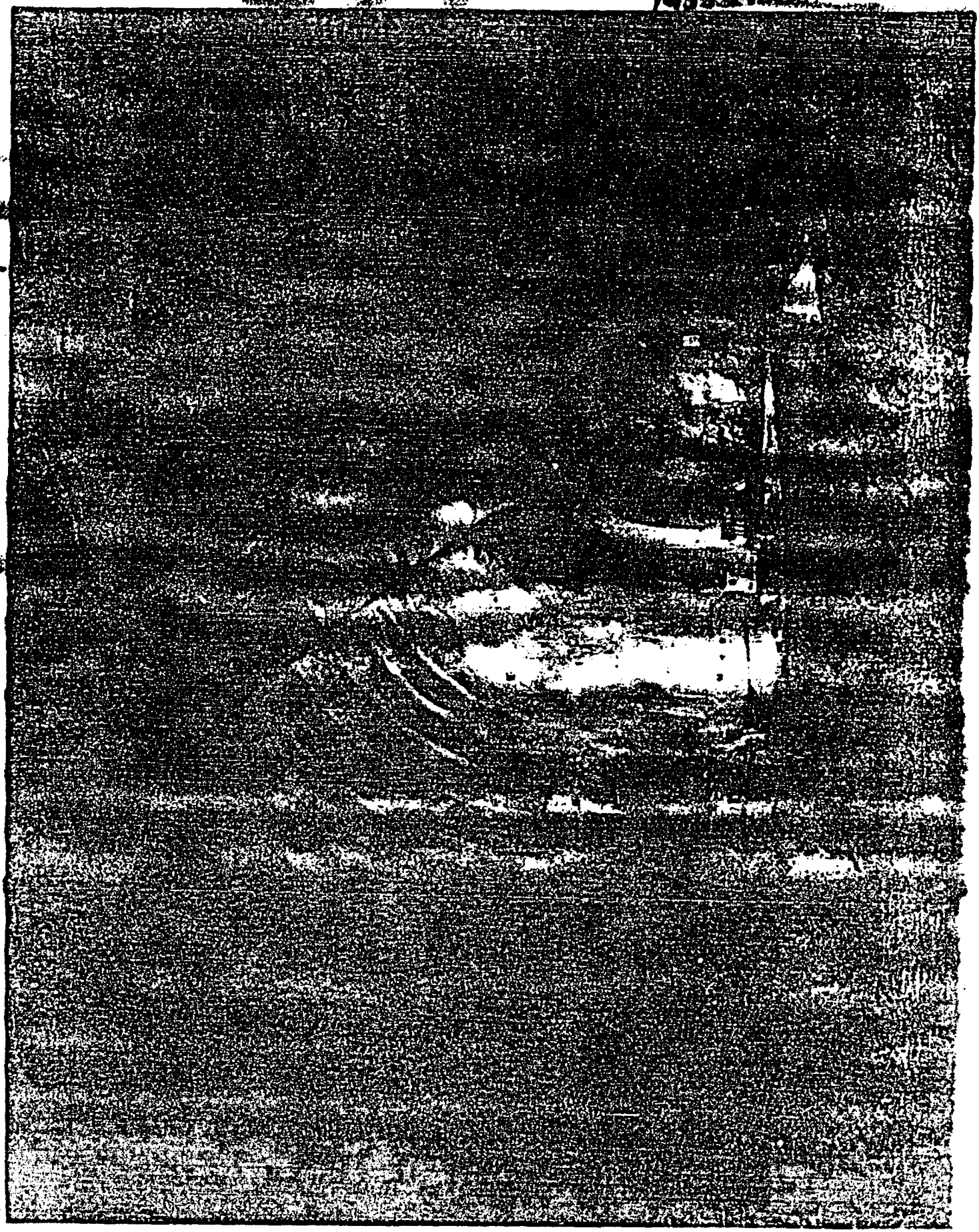
AERIAL ESP FOR AL FACILITIES

FW 16081



YM-5597 28 SEP 93

NIGHT SHOT OF ESF STARTER TUNNEL
VIEW FROM PORTAL TO W.P. FACE
@1+92



Two Closely Related Activities

Design Verification (WBS 1242114)

- Study Plan 8.3.1.15.1.8
- Permanently Installed Instruments
- Data to be Used to:
  - Verify ESF Design Methodology
  - Safety Evaluations
  - Basis for Repository Design

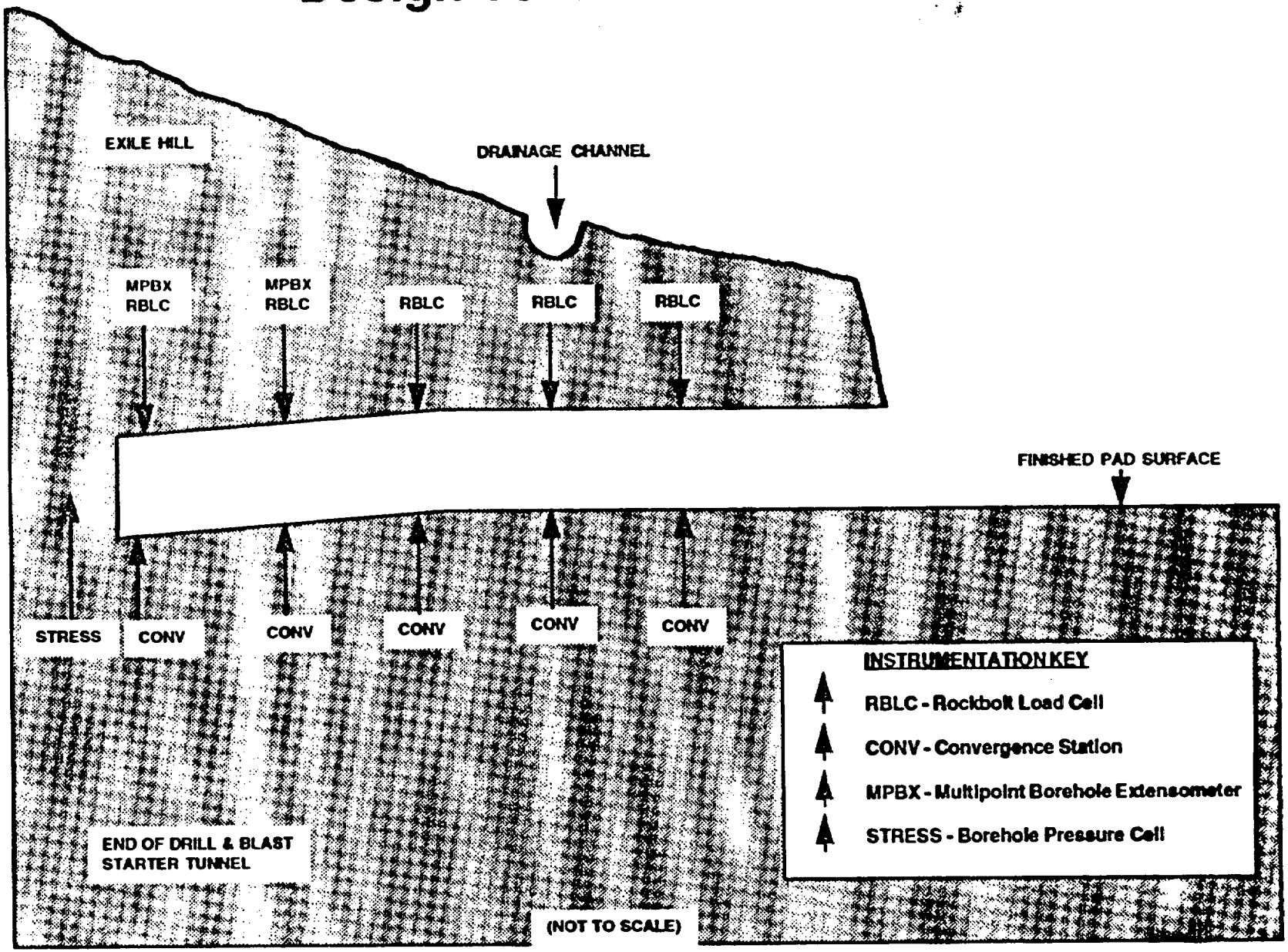
Construction Monitoring

- No Study Plan
- Temporarily Installed Instruments
- Data to be Used to:
  - Supply Information to the M&O for Their Safety Evaluations

Design Verification Activities

ACTIVITY	INSTRUMENTATION
Blast (Seismic) Monitoring	Seismograph
Blast Damage Assessment	Borehole Televiewer
Rock Mass Quality	Measuring Tape
Monitoring Ground Support	Rock Bolt Load Cells
Monitoring Drift Stability	Convergence Pins MPBX Stress Gages

Design Verification Instrumentation



Design Verification Activities
Data Flow

Blast (Seismic) Monitoring: Verify Drill & Blast Construction Methodology

- Data Provided to Constructor
  - Used In LLNL Large Block Experiment

Blast Damage Assessment: Verify Drill & Blast Construction Methodology

- Currently Being Conducted

Rock Mass Quality: Correlate With Data From Other Activities.

- Report Submitted to M&O (10-6-93)
  - M&O Using to Evaluate Their Ground Support Design
- Report Submitted to SNL PDA with associated TDIF (10-6-93)

Design Verification Activities
Data Flow

Rock Bolt Load Cells: Verify Ground Support Selection Methodology

- Data Provided Weekly to Constructor
- Monthly Submittals to SNL PDA with associated TDIFs

Convergence Pins: Determination of Drift Stability

- Data Provided Weekly to Constructor
- Monthly Submittals to SNL PDA with associated TDIFs

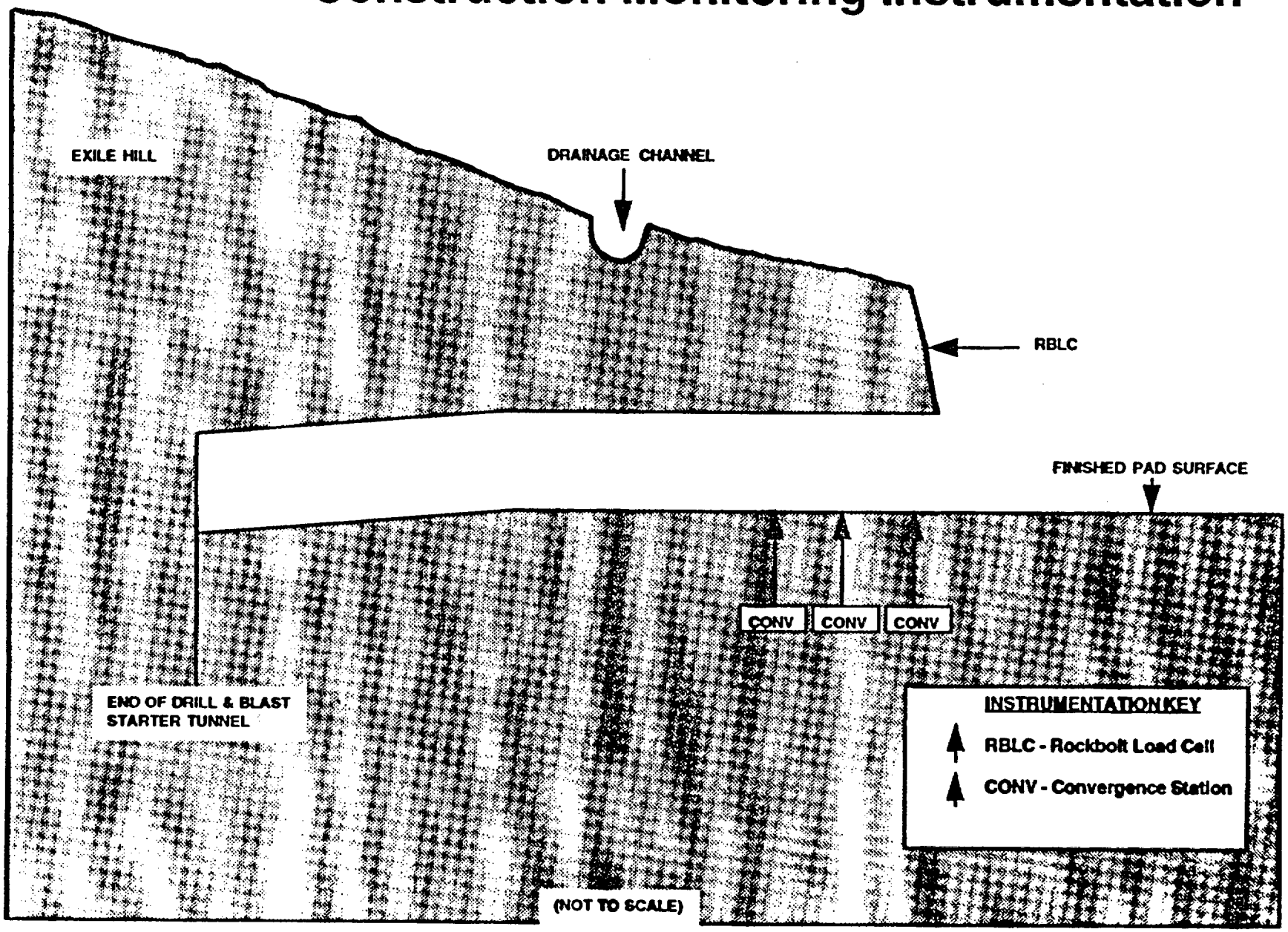
MPBX: Determination of Drift Stability

- Instruments Currently Being Installed

Stress Gages: Determination of Drift Stability, Verify Analytic Methods

- Instruments Currently Being Installed

Construction Monitoring Instrumentation



Construction Monitoring Activities
Data Flow

Rock Bolt Load Cells: Provide Data for M&O Safety Evaluations

- Data Provided Weekly to Constructor
- Weekly Submittals to SNL PDA with associated TDIFs

Convergence Pins: Provide Data for M&O Safety Evaluations

- Data Provided Weekly to Constructor
- Weekly Submittals to SNL PDA with associated TDIFs

Concluding Remarks

Future Plans

Sand Report of All Data Collected Up to March 1994 (June 1994)

Regular Data Submittals from Installed Instruments

Design Verification of ESF Alcove/NRST Construction

Design Verification of ESF North Ramp Construction

Access Convergence Test in North Ramp (Study 8.3.1.15.1.5.1)

Revised stratigraphic nomenclature and macroscopic identification of lithostratigraphic units at Yucca Mountain, Nevada

An Open-File Report in progress for publication

David Buesch	USGS Las Vegas
Richard Spengler	USGS Denver
Thomas Moyer	SAIC Nevada Test Site
Jeffery Geslin	SAIC Nevada Test Site

Summary presented to YMP TPO meeting, December 16, 1993

ENCLOSURE 1G

Introduction Summary

Revised nomenclature for the southwestern Nevada volcanic field
Application of this nomenclature to the Yucca Mountain Project

Criteria for identification of lithologic units

Correlation of lithostratigraphic, thermal-mechanical, and hydrogeologic units

Revised stratigraphic nomenclature of the southwestern Nevada volcanic field

Sawyer and others, in review (has Directors approval)

Previous	Proposed
Paintbrush Tuff (formation)	Paintbrush Tuff Group
Tiva Canyon Member	Tiva Canyon Tuff (formation)
Yucca Mountain Member	Yucca Mountain Tuff
Pah Canyon Member	Pah Canyon Tuff
Topopah Spring Member	Topopah Spring Tuff

Hierarchy of symbol nomenclature

1 Age	T Tertiary
2 Group	p Paintbrush Group
3 Formation	t Topopah Spring Tuff
4 unit - change in magma chemistry or eruption dynamics	r crystal-rich unit
5-6 zones welding and crystallization	v vitric
6-7 subzone	1 vitrophrye subzone
7-8 interval	

Tpcplnc2 - Tiva Canyon Tuff, crystal-poor (unit), lower-nonlithophysal (zone) columnar (subzone), clay-altered pumice (interval)

Macroscopic criteria for identifying lithostratigraphic formations, zones, and subzones

Phenocrysts (result of magma chemistry)

Abundance: Crystal-rich (> 10%) versus crystal-poor (< 5%)

Mineral assemblage: Felsic (sanidine, plagioclase, quartz)
Mafic (biotite, pyroxene, hornblende)
Accessory (sphene)

Textures and structures associated with deposition

Grain shape and composition, sorting and grading of grains, imbrication, cross-bedding
Pyroclastic flow (poorly sorted, ash-rich); Fallout tephra (well sorted)

Zones of welding and crystallization (post deposition)

Welding: Nonwelded, Partially welded, Moderately welded, Densely welded

Crystallization: Vitric zone
Zone of high-temperature crystallization (spherulites, granophyre, color)
Zone of vapor-phase crystallization and alteration (corroded pumice)
Lithophysal zone (lithophysae and light-gray rims, and light-gray spots)

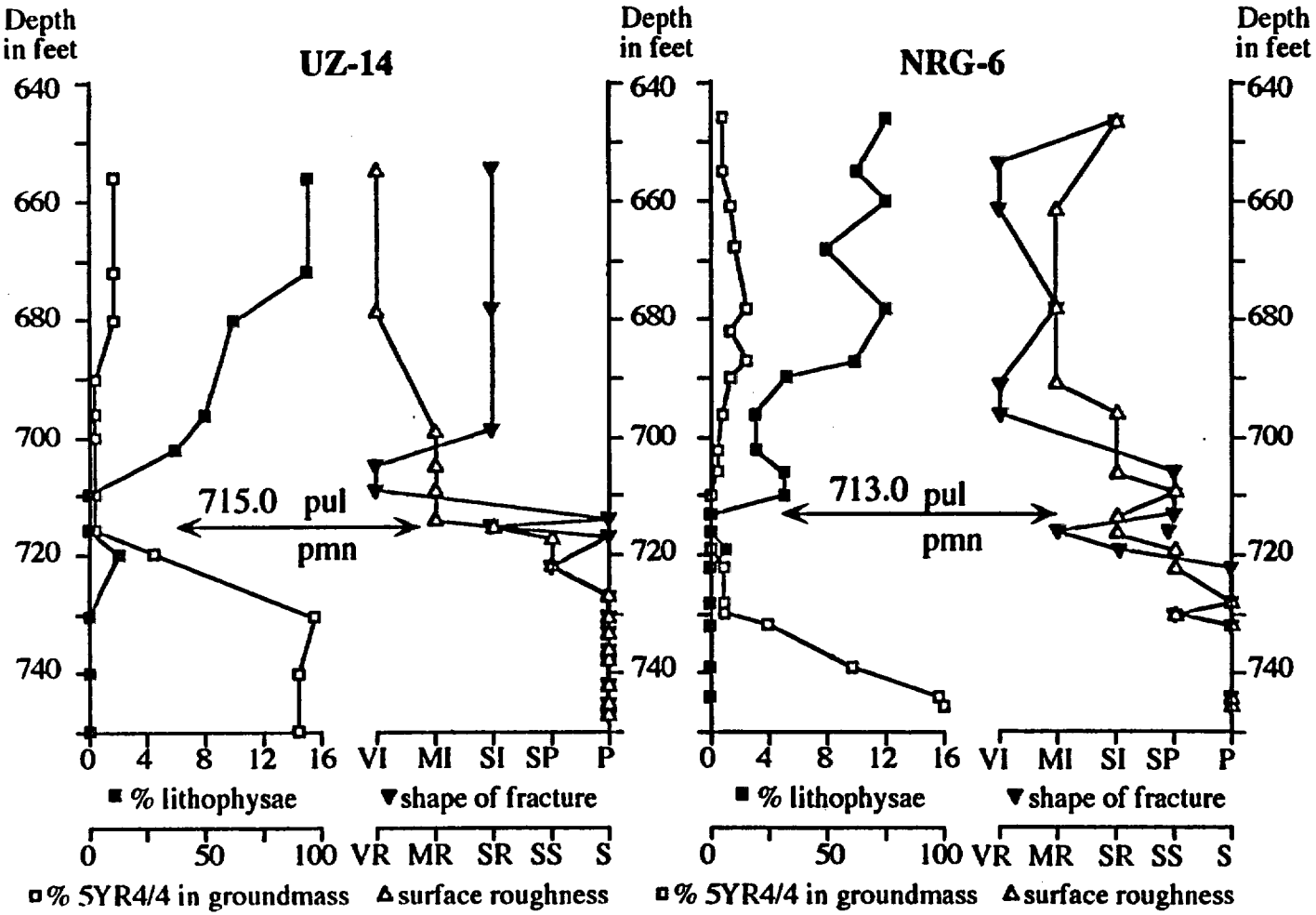
Geometry and surface roughness of fractures (mechanical properties)

Geometry (in core): High-angle (nonlithophysal zones) versus low-angle (lithophysal zones)
Planar (nonlithophysal zones) versus Irregular (lithophysal zones)

Surface roughness (semiquantitative): High (Tpclnh), Moderate (Tpcll), Low (Tpcmn, Tpclnc)

Roughness coefficients of freshly broken surfaces in lithostratigraphic zones of the Tiva Canyon Tuff from surface exposures and qualitative roughness of samples from core.

Zone	Roughness coefficient in surface exposures	Zone/subzone	Roughness coefficient in subsurface
upper cliff			
> 10 m from base	7 - 18	crystal-rich nonlithophysal	rough to very rough
< 10 m from the base	3 - 6	lithophysae-bearing	semi-smooth
upper lithophysal	6 - 10	upper lithophysal	semi-rough
middle nonlithophysal		middle nonlithophysal	smooth to semi-smooth
upper contact	2 - 4		
lower contact	2 - 8		
lower lithophysal	8 - 12	lower lithophysal	rough
lower nonlithophysal		lower nonlithophysal	
hackly	12 - 18	hackly	very rough
		columnar	semi-smooth
		vitric	
		vitrophyre	smooth to semi-smooth
		moderately welded	semi-smooth
		nonwelded	semi-smooth


Depth in feet
UZ-14
640
660
680
700
720
740
715.0 pul
pmn
0 4 8 12 16
VI MI SI SP P
■ % lithophysae
▼shape of fracture
0 50 100
VR MR SR SS S
□ % 5YR4/4 in groundmass
△surface roughness
Depth in feet
NRG-6
640
660
680
700
720
740
713.0 pul
pmn
0 4 8 12 16
VI MI SI SP P
■ % lithophysae
▼shape of fracture
0 50 100
VR MR SR SS S
□ % 5YR4/4 in groundmass
△surface roughness
Depth in feet
640
660
680
700
720
740

Stratigraphic nomenclature:
Correlation of lithostratigraphic units

Scott and Bonk, 1984			Buesch and others, in review	
Topopah Spring Member	**Tpt**		**Tpt**	**Topopah Spring Tuff**
caprock zone	tc		tr_	crystal-rich unit
			trv	virtic zone
nonwelded			rv3	nonwelded
		→	rv2	moderately welded
vitrophyre			rv1	vitrophyre
devitrified				
rounded zone	tr	→	trn	nonlithophysal zone
thin lithophysal zone (at top): ttl		→	trl	lithophysal zone
			tp_	crystal-poor unit
		→	tpf	lithic-rich zone
rounded zone (continued)		→	tpun	upper nonlithophysal zone
red lithophysal zone	trl		tpul	upper lithophysal zone
other facies: tul, tll, tl				
nonlithophysal zone	tnl		tpmn	middle nonlithophysal zone
orange-brick lithophysal: tobl			ml	middle lithophysal subzone
other facies: tgnl, to, tb, tob, tbob				
grayish-red lithophysal zone	tgrl		tpll	lower lithophysal zone
other facies: torl, tml, tpbl, trbb,tbol				
mottled zone	tm		tpln	lower nonlithophysal zone
			tpv	vitric zone
vitrophyre zone	tv		pv3	vitrophyre
		→	pv2	moderately welded
partially welded zone	tpw		pv1	nonwelded to partially welded

Stratigraphic nomenclature:
Correlation of lithostratigraphic units

Scott and Bonk, 1984			Buesch and others, in review	
Tiva Canyon Member	**Tpc**		**Tpc**	**Tiva Canyon Tuff**
caprock zone	ccr		cr_	crystal-rich unit
			crv	virtic zone
nonwelded			rv3	nonwelded
		→	rv2	moderately welded
vitrophyre			rv1	vitrophyre
			crn	nonlithophysal zone
brown devitrified		→	rn4	subvitrophyre
yellow-brown devitrified		→	rn3	pumice-poor
brown-gray devitrified		→	rn2	mixed-pumice
upper cliff zone	cuc	→	rn1	upper lithophysal transition
			cp_	crystal-poor unit
upper lithophysal zone	cul		cpul	upper lithophysal zone
clinkstone/rounded step zone	cks/crs	→	cpmn	middle nonlithophysal zone
middle lithophysal : cml				minor lithophysal subzones
other facies: clc, cgks, crks cuks, clks				
lower lithophysal zone	cll		cpll	lower lithophysal zone
			cpln	lower nonlithophysal zone
hackly zone	ch	→	lnh	hackly zone
columnar zone	cc	→	lnc	columnar zone (3 intervals)
			cpv	vitric zone
vitrophyre			pv3	vitrophyre
flattened pumice		→	pv2	moderately welded
basal		→	pv1	nonwelded to partially welded

Zones of welding (W)

- Moderately to Densely (o-lithophysae)
- Partially to moderately
- Partially
- Nonwelded

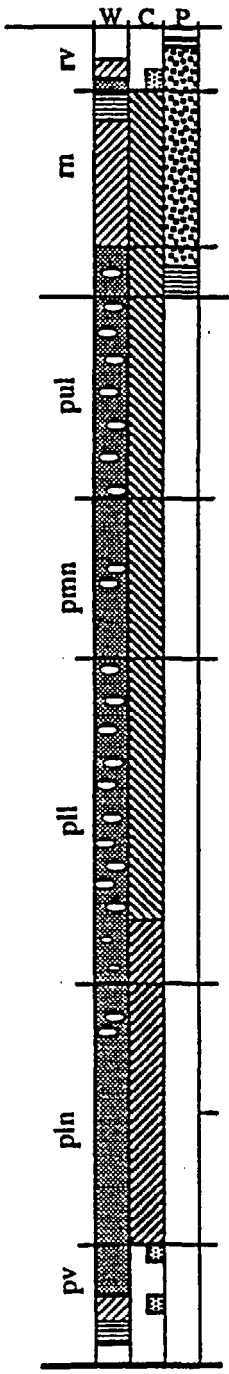
Zones of crystallization (C)

- Devitrified / Devit. + vapor-phase mins.
- Vitric / Vitric + vapor-phase mins.
- Altered (a) / to clay (c) / to zeolite (z)

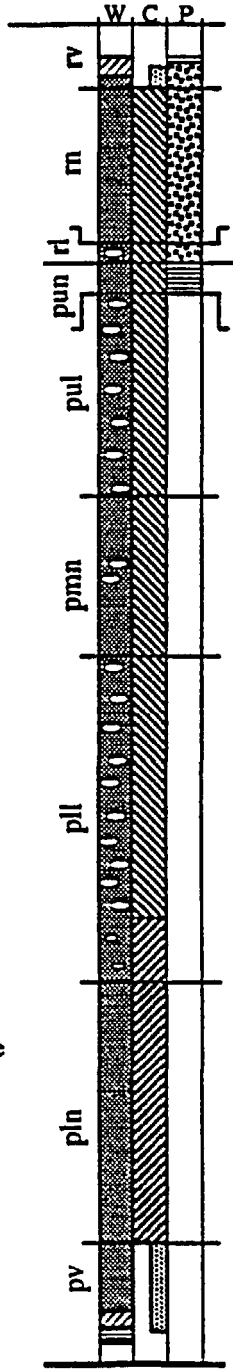
Phenocryst content (P)

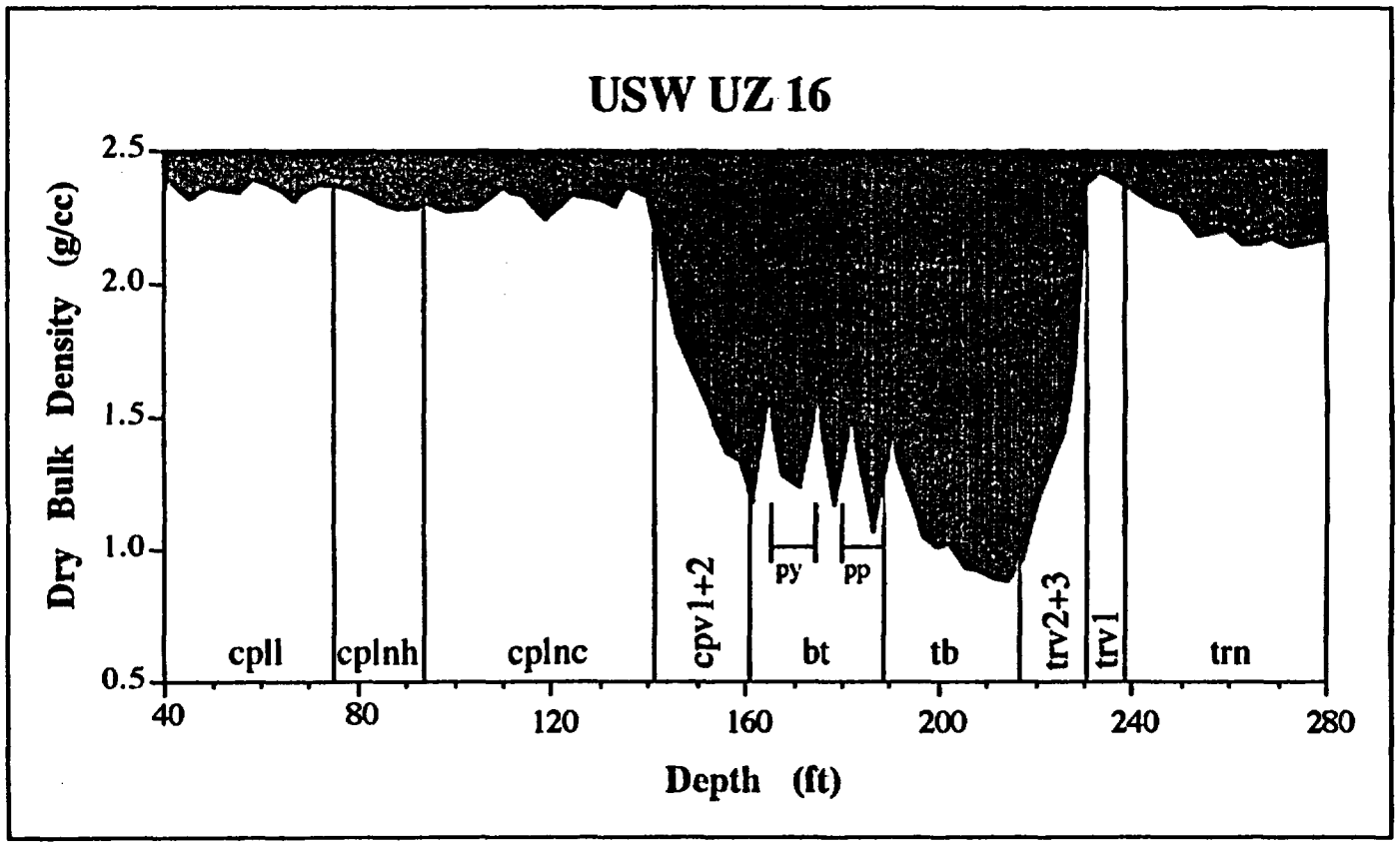
- > 10 percent
- 5 - 10 percent
- < 5 percent

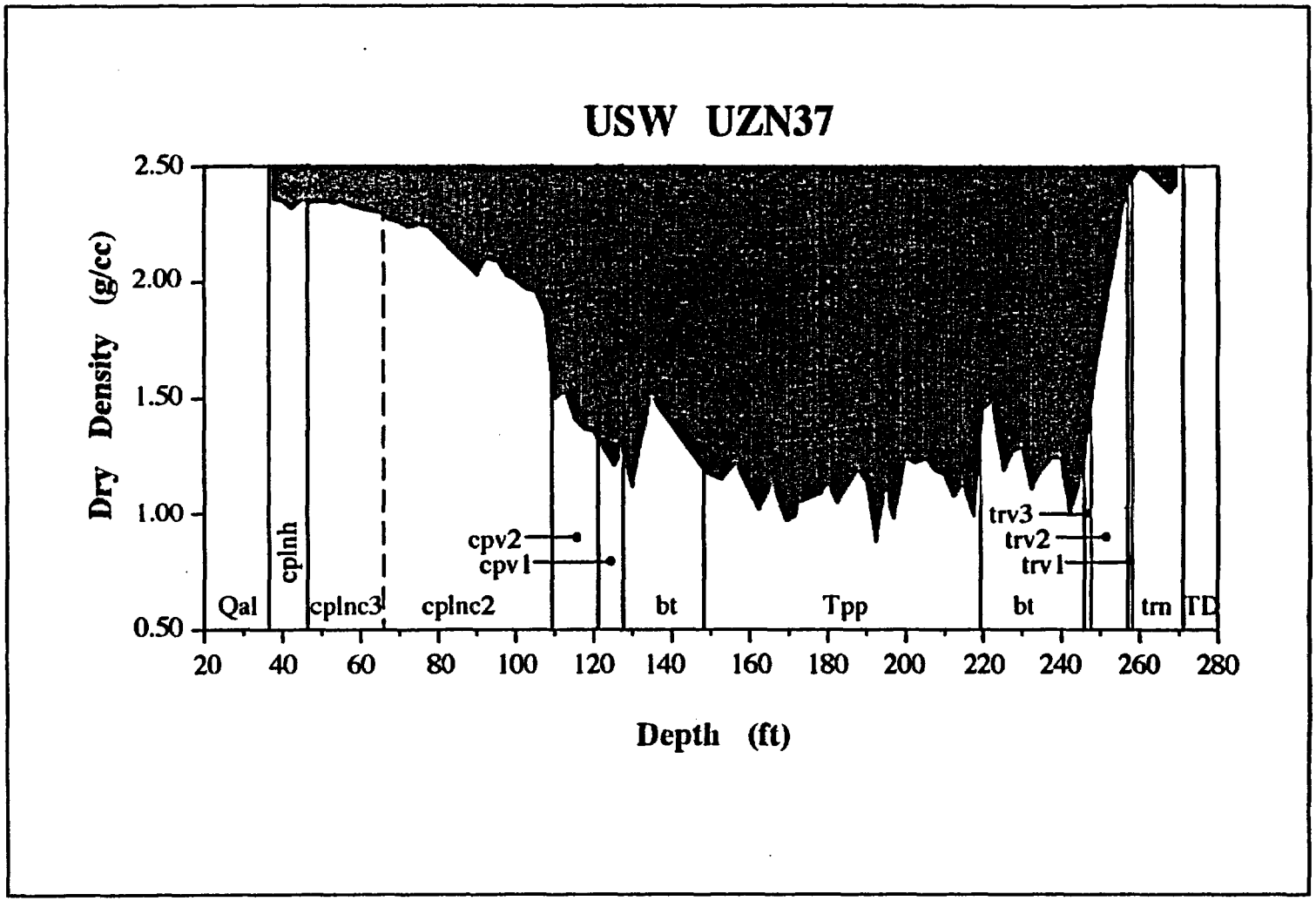
Tiva Canyon Tuff (Tpc) (100 - 150 m thick)



Topopah Spring Tuff (Tpt) (250 - 350 m thick)




USW UZ 16
Dry Bulk Density (g/cc)
2.5
2.0
1.5
1.0
0.5
cpll
cplnh
cplnc
cpv1+2
py
pp
bt
tb
trv2+3
trv1
trn
40
80
120
160
200
240
280
Depth (ft)


USW UZN37
Dry Density (g/cc)
2.50
2.00
1.50
1.00
0.50
20
40
60
80
100
120
140
160
180
200
220
240
260
280
Depth (ft)
Qal
cplnh
cplnc3
cplnc2
cpv2
cpv1
bt
Tpp
trv3
trv2
trv1
bt
trn
TD

Conclusions

Revised stratigraphic nomenclature for the Yucca Mountain Project is simplified, systematic, and detailed

Identification of lithologic units

Formations (Tiva Canyon, Yucca Mountain, Pah Canyon, Topopah Spring)

Zones: Tiva Canyon = 7 Topopah Spring = 9

Subzones: Tiva Canyon = 13 Topopah Spring = 6

Multiple criteria enables more consistant identification than with single criteria.

- mineral assemblage
- depositional textures
- welding and crystallization
- fracture geometry and roughness

Correlation of lithostratigraphic, thermal-mechanical, and hydrogeologic units occurs at boundaries of lithostratigraphic zones or subzones produced from welding and crystallization

Conclusions

Geologic history of deposition, welding, crystallization (high-T° and lithophysal development, and low-T°), and faulting controls the hydrogeologic and thermal-mechanical characteristics of rocks

Identification and continued revision of lithologic units involves interaction with hydrogeologic and thermal-mechanical studies

Lithostratigraphic units provide a detailed framework from which hydrogeologic and thermal-mechanical can be group

Lithostratigraphic units can be mapped and provide boundary conditions for models that examine variations within the lithostratigraphic units

Civilian Radioactive Waste Management System

Management & Operating Contractor

TRW Environmental Safety Systems Inc.

The University/Community College of Nevada System Employment and Intern Program at YMP

C. Dale Van Natta

December 16, 1993

B&W Fuel Company
Duke Engineering & Services, Inc.
Fluor Daniel, Inc.

INTERA Inc.
JK Research Associates, Inc.
E. R. Johnson Associates, Inc.

Logicon RDA
Morrison Knudsen Corporation
Woodward-Clyde Federal Services

ENCLOSURE 1H

1993 Program

- UNLV - Informal
- UNR - Formal (11 students)
- CCSN - None

Issues & Concerns

- Institutionalize Program for Entire System
- Stable Funding
- Summer Employment vs Internships
- Interview Process
- Housing

UNR Proposal

• Administration	$ 42,000
• Interns	
– Undergraduates (5)	41,000
– Graduates (10)	133,000
– Faculty Placements (1)	26,000
– Professional Exchange (1)	7,000
	$249,000

Recommendations

1. **Institutionalize a Student Employment Program for the University and Community College System**

   - **1994 Summer Employment**

     Cost: Undergraduates = $1500/mo

     Graduates = $2000/mo

   - **Part-time Work Program**

     Cost: Varies

   - **Need: Position Descriptions by January 10**

Recommendations (cont'd)

2. **Partially Fund UNR Intern Proposal in 1994**

   Cost: Undergraduates = $1500/mo

   Graduates = $2000/mo

   Need: Position Descriptions by January 10

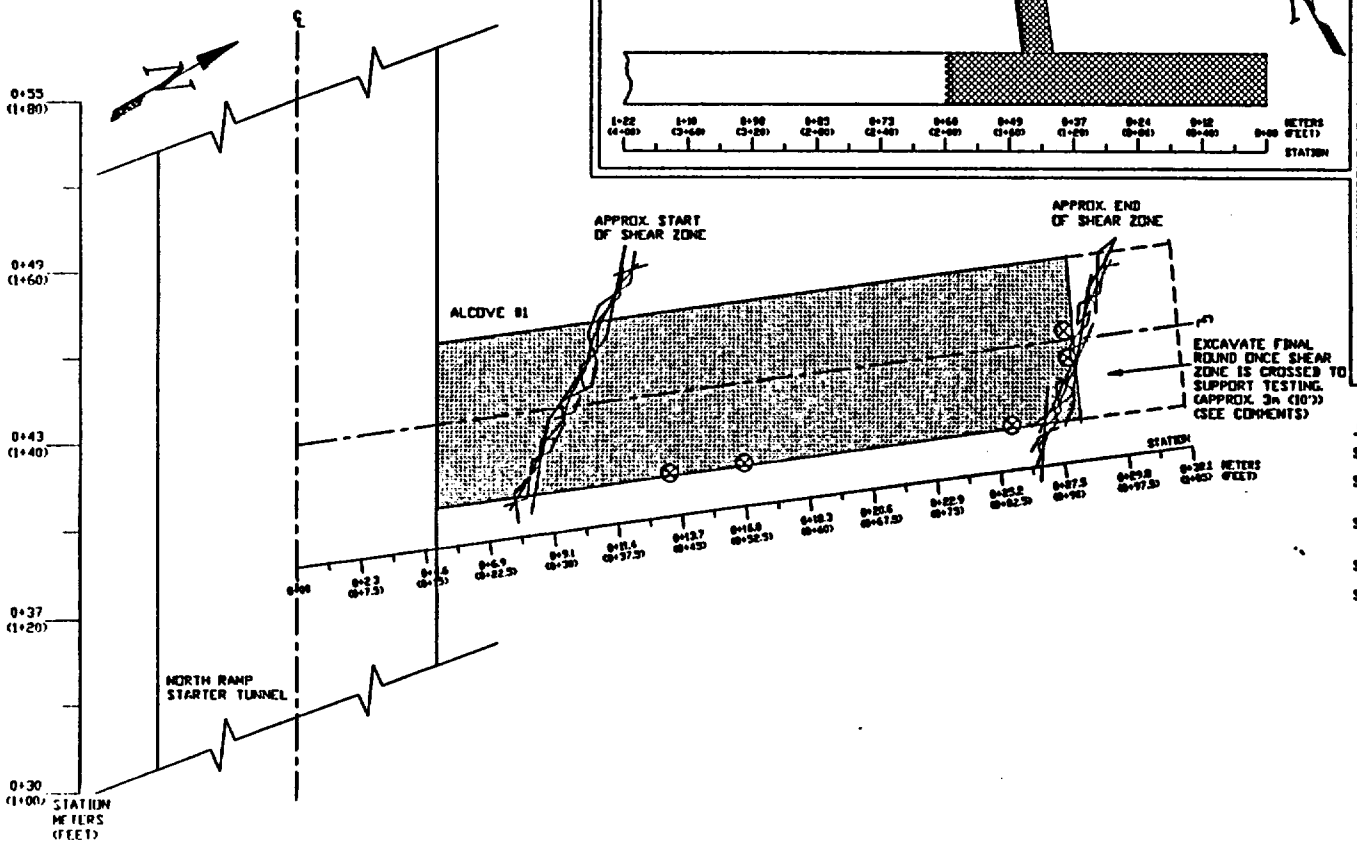
3. **Institutionalize and Fully Fund University and Community College System Intern/Cooperative Program in 1995**

   Cost: Approximately $500,000

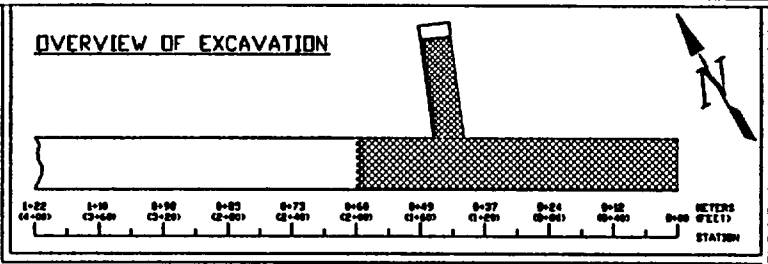
Proposed 1994 Schedule

- January 10 — Position Descriptions
- January 20 — Campus Advertisements
- February 15 — Application Deadline
- March 1-20 — Interviews
- May 1 — Offers Completed

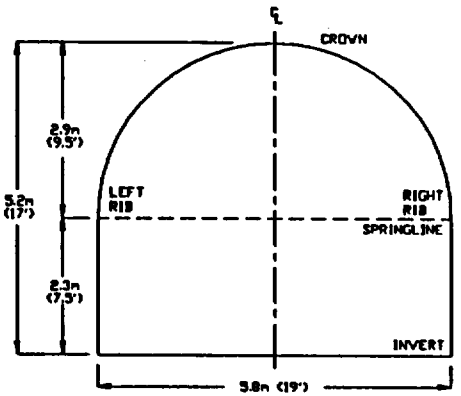
DETAILED ALCOVE SECTION - TOP VIEW



OVERVIEW OF EXCAVATION



ALCOVE SECTION A-A



SAMPLE BAR CODE #	DATE COLLECTED	LOCATION
SPC 80500782	12/9/93	CS 0+13.6 (44.6'), 2 m (6.6') ABOVE INVERT, RIGHT RIB
SPC 80500779	12/9/93	CS 0+28 (92'), 2.5 m (8.2') FROM THE LEFT RIB AND 2.1 m (7') ABOVE INVERT AT FACE
SPC 80500778	12/9/93	CS 0+28 (92'), 2.1 m (7.1') FROM THE RIGHT RIB AND 2.0 m (6.7') ABOVE INVERT AT FACE
SPC 80500777	12/9/93	CS 0+25.7 (84.3'), 1.8 m (6') ABOVE INVERT, RIGHT RIB
SPC 80500776	12/9/93	CS 0+16.1 (52.9'), 1.9 m (6.3') ABOVE INVERT, RIGHT RIB

GRAPHIC SCALE

3.1 (10) 0 3.1 (10) 6.2 m (20 FT.)

LEGEND:

- CENTER LINE OF RAMP
- UNEXCAVATED MATERIAL
- EXCAVATED RAMP
- SAMPLE LOCATION
- CONVERGENCE PINS
- LOAD CELLS
- PHOTOGRAMMETRY TARGET LOCATIONS
- MAPPING PROGRESS
- EXCAVATION PROGRESS

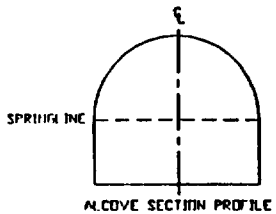
COMMENTS:

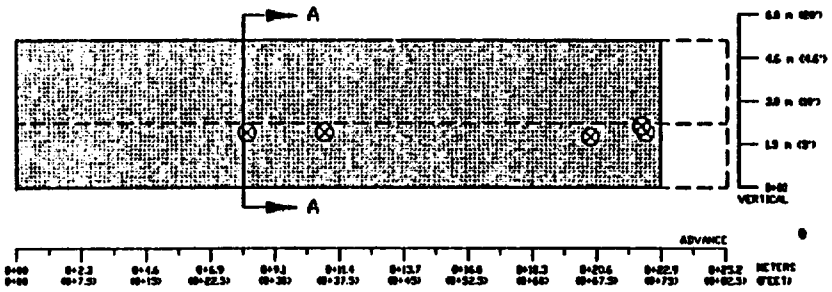
ALCOVE CENTER LINE AT 0+43m (CS 1+40)

ALCOVE EXCAVATION TO APPROX. 23 m (75')

THE REQUIRED DEPTH OF ALCOVE #1 WILL BE DETERMINED IN THE FIELD AFTER EXCAVATION HAS ADVANCED THROUGH THE SHEAR ZONE.

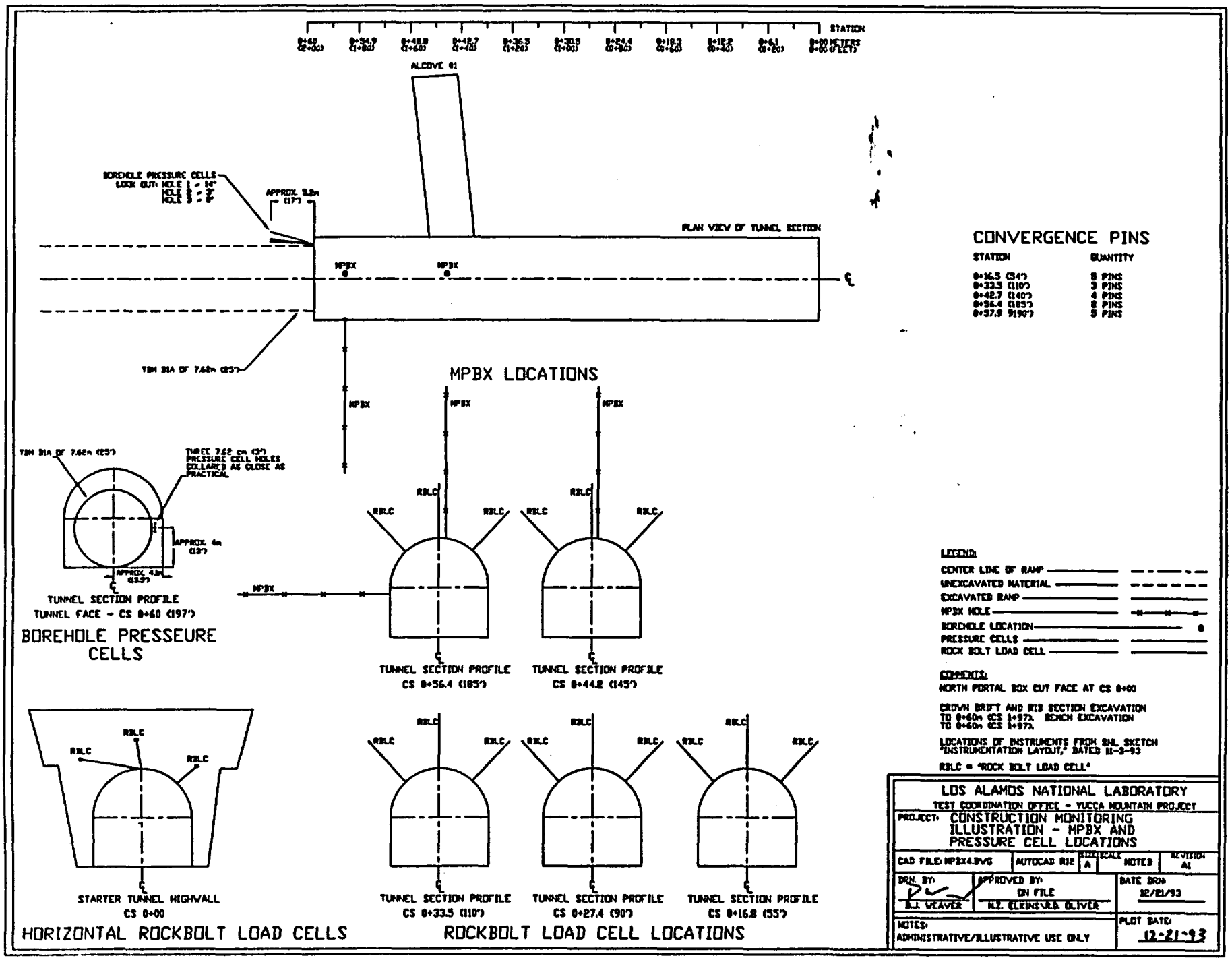
ALCOVE #1 DETAIL FOR SAMPLE LOCATION





LOS ALAMOS NATIONAL LABORATORY TEST COORDINATION OFFICE - YUCCA MOUNTAIN PROJECT			
PROJECT: GEOLOGIC MAPPING/CONSOLIDATED SAMPLING AND CONSTRUCTION MONITORING IN ALCOVE #1			
CAD FILE: ALCRPRT6.DWG	AUTOCAD R12	SIZE/SCALE: A NOTED	REVISION: A1
DRN. BY: B.J. VEAVER	APPROVED BY: N.Z. ELKINS/R.B. OLIVER	DATE DRN: 12-14-93	
NOTES: ADMINISTRATIVE/ILLUSTRATIVE USE ONLY			

ENCLOSURE 2
TWS-EES-13-LV-12-93-44
ATTACHMENT 2
1 PAGE



CONVERGENCE PINS

STATION	QUANTITY
0+16.5 (54')	8 PINS
0+33.5 (110')	8 PINS
0+42.7 (140')	8 PINS
0+56.4 (185')	8 PINS
0+57.9 (190')	8 PINS

LEGEND:
- CENTER LINE OF RAMP
- UNEXCAVATED MATERIAL
- EXCAVATED RAMP
- MPBX HOLE
- BOREHOLE LOCATION
- PRESSURE CELLS
- ROCK BOLT LOAD CELL

COMMENTS:
NORTH PORTAL BOX CUT FACE AT CS 0+00

CROWN DRIFT AND RIB SECTION EXCAVATION TO 0+60m (CS 1+97'). BENCH EXCAVATION TO 0+60m (CS 1+97').

LOCATIONS OF INSTRUMENTS FROM SNL SKETCH "INSTRUMENTATION LAYOUT," DATED 11-3-93

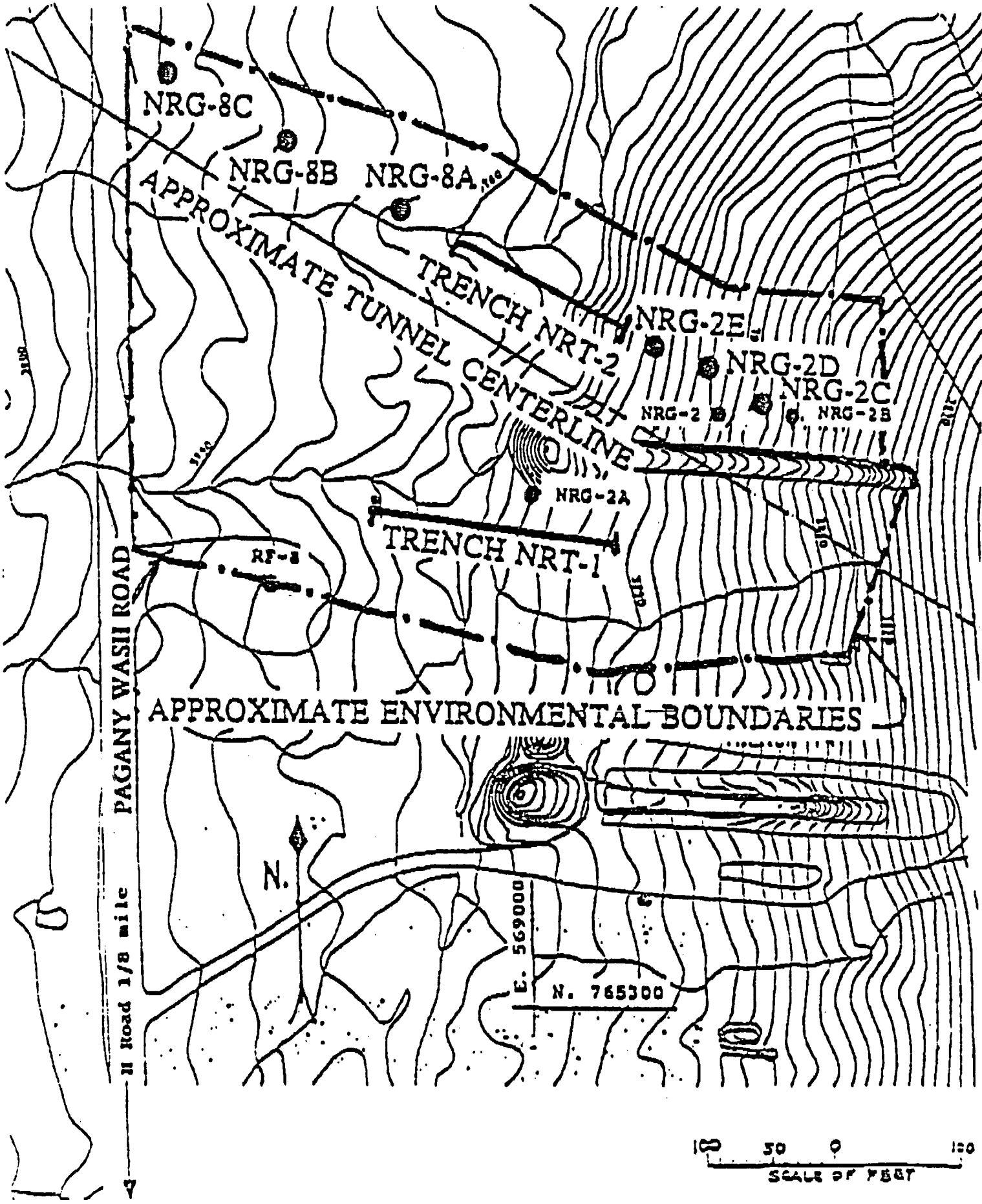
RBLC = "ROCK BOLT LOAD CELL"

LOS ALAMOS NATIONAL LABORATORY TEST COORDINATION OFFICE - YUCCA MOUNTAIN PROJECT			
PROJECT: CONSTRUCTION MONITORING ILLUSTRATION - MPBX AND PRESSURE CELL LOCATIONS			
CAD FILE: MPBX4.DWG	AUTOCAD R12	SIZE: A	SCALE: NOTED
REVISION: A1			
DRN. BY: B.J. WEAVER	APPROVED BY: ON FILE N.E. ELKINS/R.B. OLIVER	DATE DRN: 12/21/93	
NOTES: ADMINISTRATIVE/ILLUSTRATIVE USE ONLY		PLOT DATE: 12-21-93	

ENCLOSURE 3
TWS-EES-13-LV-12-93-55
ATTACHMENT 1
1 PAGE

Enclosure

ENCLOSURE 4



MAP OF PROPOSED TRENCH AND
BOREHOLE LOCATIONS NEAR THE BOW RIDGE FAULT

VI. Final Comments by Chairman Hickey.

VII. Adjournment.

* Denotes items on which committee will take action.

Note: We are pleased to make reasonable accommodations for members of the public who are disabled and wish to attend the meeting. If special arrangements for the meeting are necessary, please notify the Research Division of the Legislative Counsel Bureau, in writing, at the Legislative Building, Capitol Complex, Carson City, Nevada 89710, or call Lyndi Payne at 687-6825, as soon as possible.

Notice of this meeting was posted in the following Carson City, Nevada, locations: Blasdel Building, 209 East Musser Street; Capitol Press Corps, Basement, Capitol Building; Carson City Courthouse, 198 North Carson Street; Legislative Building, Main Lobby; and Nevada State Library, 401 North Carson Street. Notice of this meeting was FAXED for posting to the following Las Vegas, Nevada, locations: Clark County Library, 4020 So. Maryland Parkway; and Clark County Office, 225 Bridger Avenue.

Code:HLRW-ag1

STATE OF NEVADA
LEGISLATIVE COUNSEL BUREAU

LEGISLATIVE BUILDING
CAPITOL COMPLEX
CARSON CITY, NEVADA 89710
Fax No.: (702) 687-3962

JOHN R. CROSSLEY, Director
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LEGISLATIVE COMMISSION (702) 687-6800
JOSEPH E. DINI, JR., Assemblyman, Chairman
John R. Crossley, Director, Secretary

INTERIM FINANCE COMMITTEE (702) 687-6821
WILLIAM J. RAGGIO, Senator, Chairman
Daniel G. Miles, Fiscal Analyst
Mark W. Stevens, Fiscal Analyst

Wm. GARY CREWS, Legislative Auditor (702) 687-6815
ROBERT E. ERICKSON, Research Director (702) 687-6825
LORNE J. MALKIEWICH, Legislative Counsel (702) 687-6830

MEETING NOTICE AND AGENDA

Name of Organization: Nevada Legislature's Committee on High-Level Radioactive Waste (NRS 459.0085)

Date & Time of Meeting: November 12, 1993
9:30 a.m.

Place of Meeting: Cashman Field Center
850 Las Vegas Blvd., N., Room 208
Las Vegas, Nevada

AGENDA

I. Opening Remarks and Introductions by the Chairman Senator Thomas J. Hickey

*II. Approval of the Minutes of the February 27, 1992, Meeting in Las Vegas, Nevada.

*III. Discussion of Role of Committee and Member Assignments.

IV. Reports to Committee:

A. Update and status of United States Department of Energy (DOE) scientific and technical studies on:

1. Geology
2. Hydrology
3. Geoengineering
4. Geochemical. (DYER)

B. Update and status of the Nuclear Regulatory Commission review of the DOE scientific and technical studies and explanation of any areas of concern or dispute. (JUSTUS)

C. Update and status of Nevada's Nuclear Project Office activities and identification of those areas of concern or dispute with the DOE scientific and technical studies.

D. Update and status of activities of the affected local governments.

E. National Conference of State Legislatures - Update.

V. Public Comments.

VI. Final Comments by Chairman Hickey.

VII. Adjournment.

* Denotes items on which committee will take action.

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Code:HLRW-ag1

NRC'S HIGH-LEVEL WASTE REPOSITORY PROGRAM

Philip S. Justus
Sr. On-Site Licensing Representative
Division of High-Level Waste Management
Office of Nuclear Material Safety and Safeguards
Las Vegas, Nevada

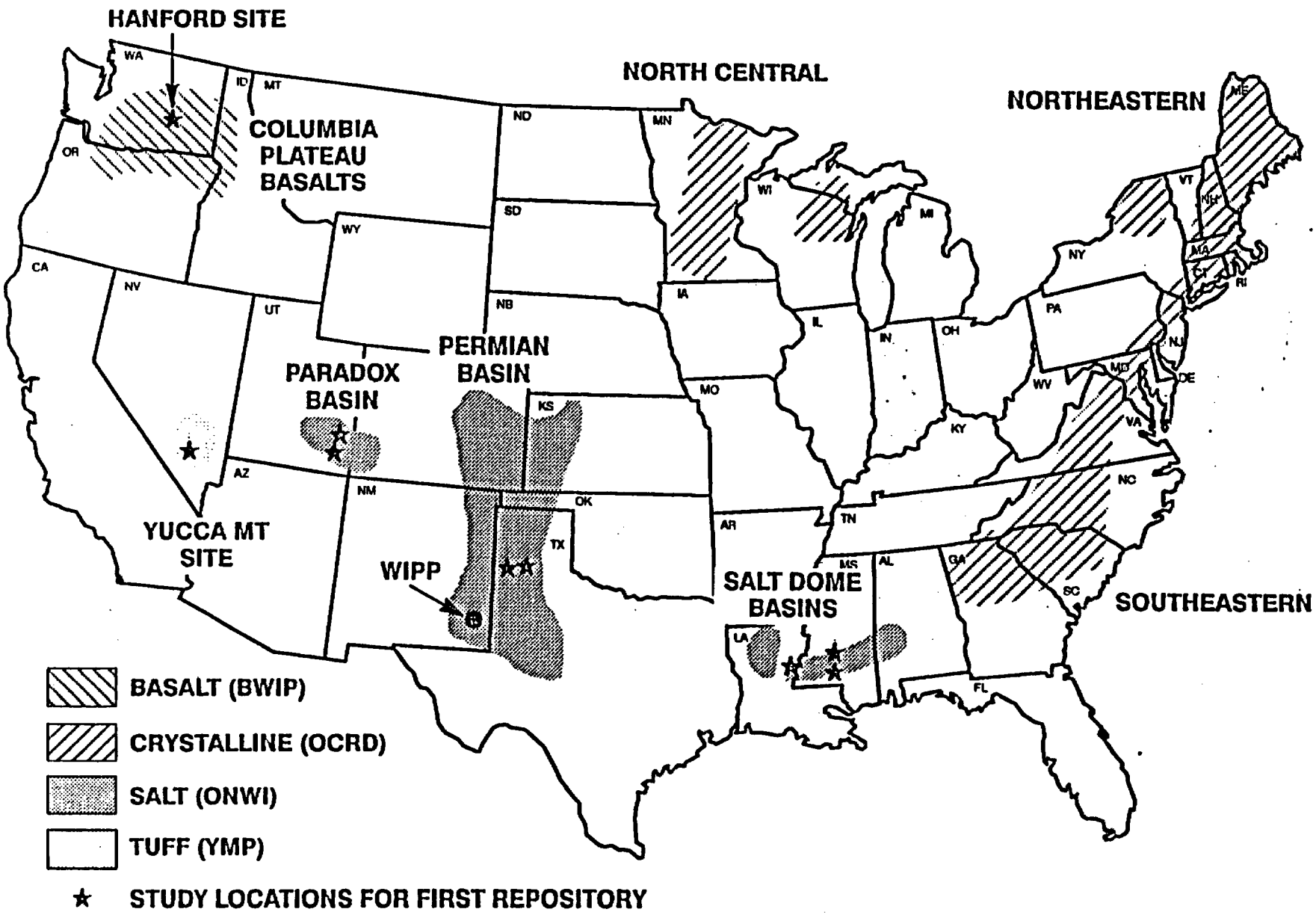
ENCLOSURE 5B

11/12/93

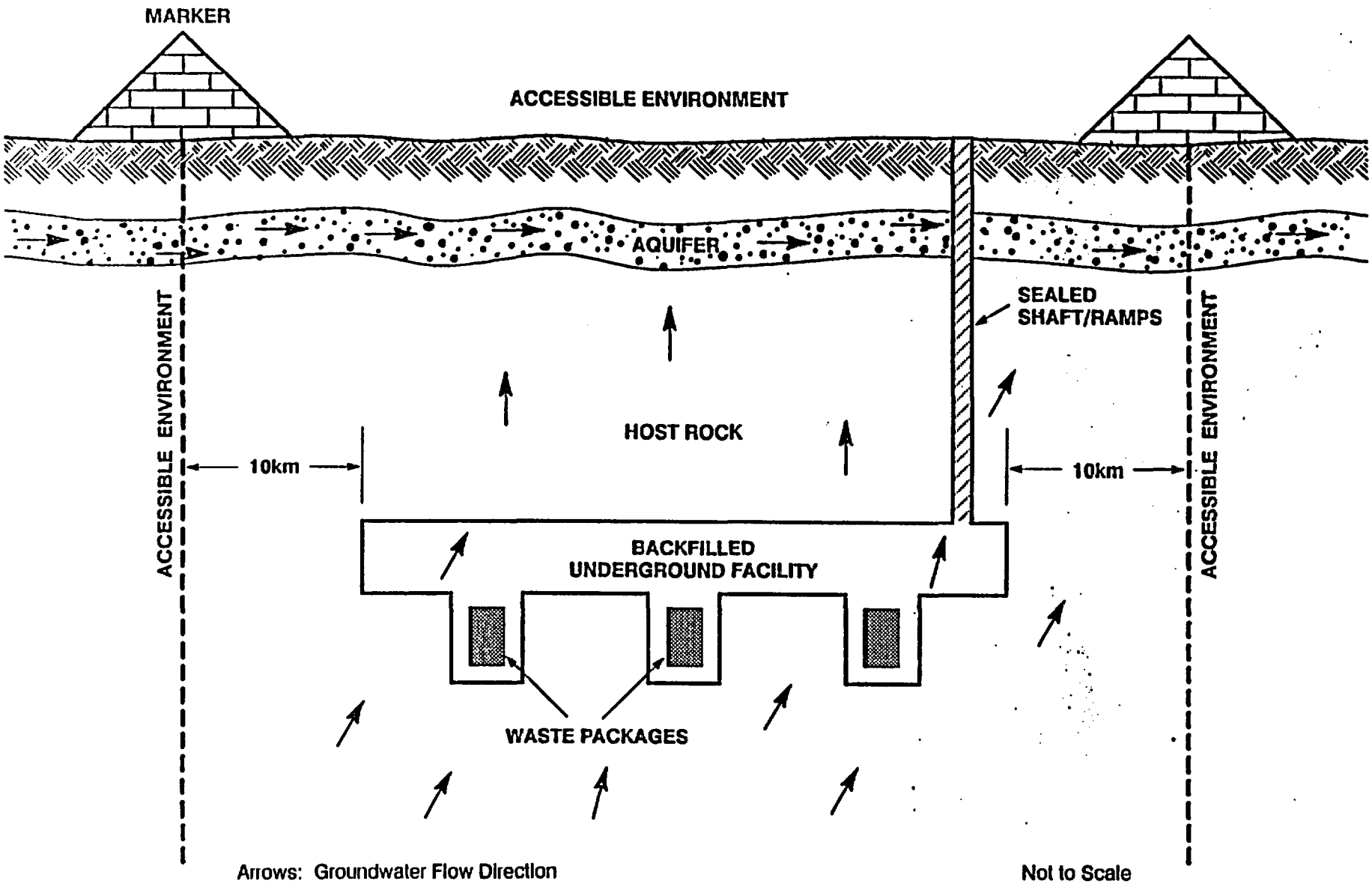
OUTLINE OF NRC PRESENTATION ON HLW

- NRC PERSPECTIVE OF HLW DISPOSAL
- OVERVIEW OF NRC
- INDEPENDENT REGULATORY ROLE
- IMPLEMENTATION OF NRC HLW PROGRAM
- QUALITY ASSURANCE
- LICENSE APPLICATION REVIEW PLAN
- CONCLUSIONS

REGIONS CONSIDERED FOR DISPOSAL OF HIGH-LEVEL RADIOACTIVE WASTE

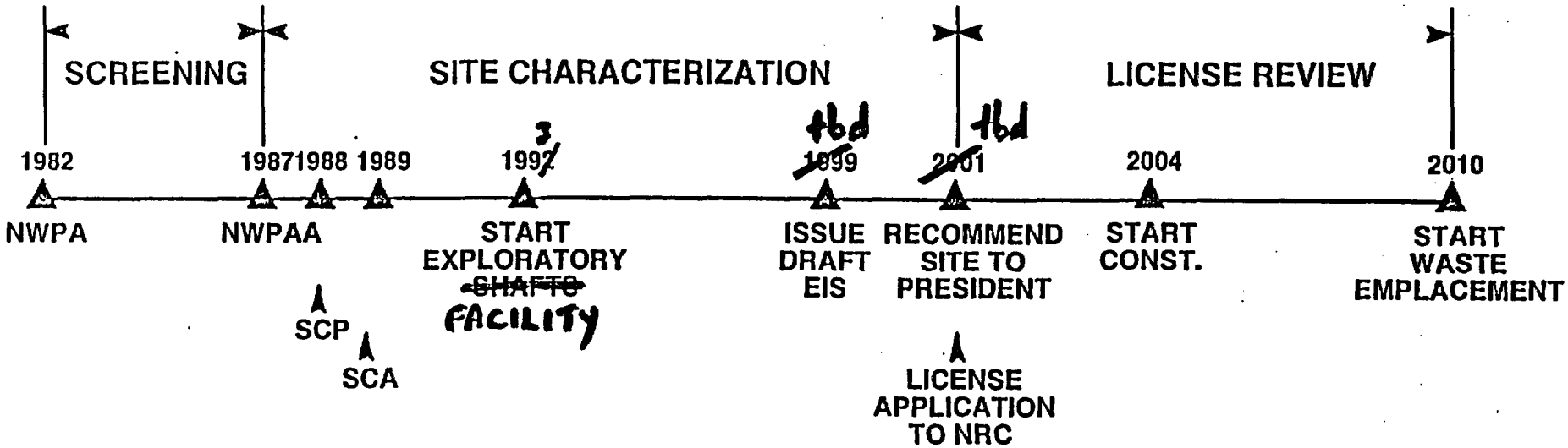


ELEMENTARY REPOSITORY CONCEPT



GEOLOGIC HLW REPOSITORY PROGRAM

DOE SCHEDULE



HIGH–LEVEL WASTE REPOSITORY PERFORMANCE CRITERIA

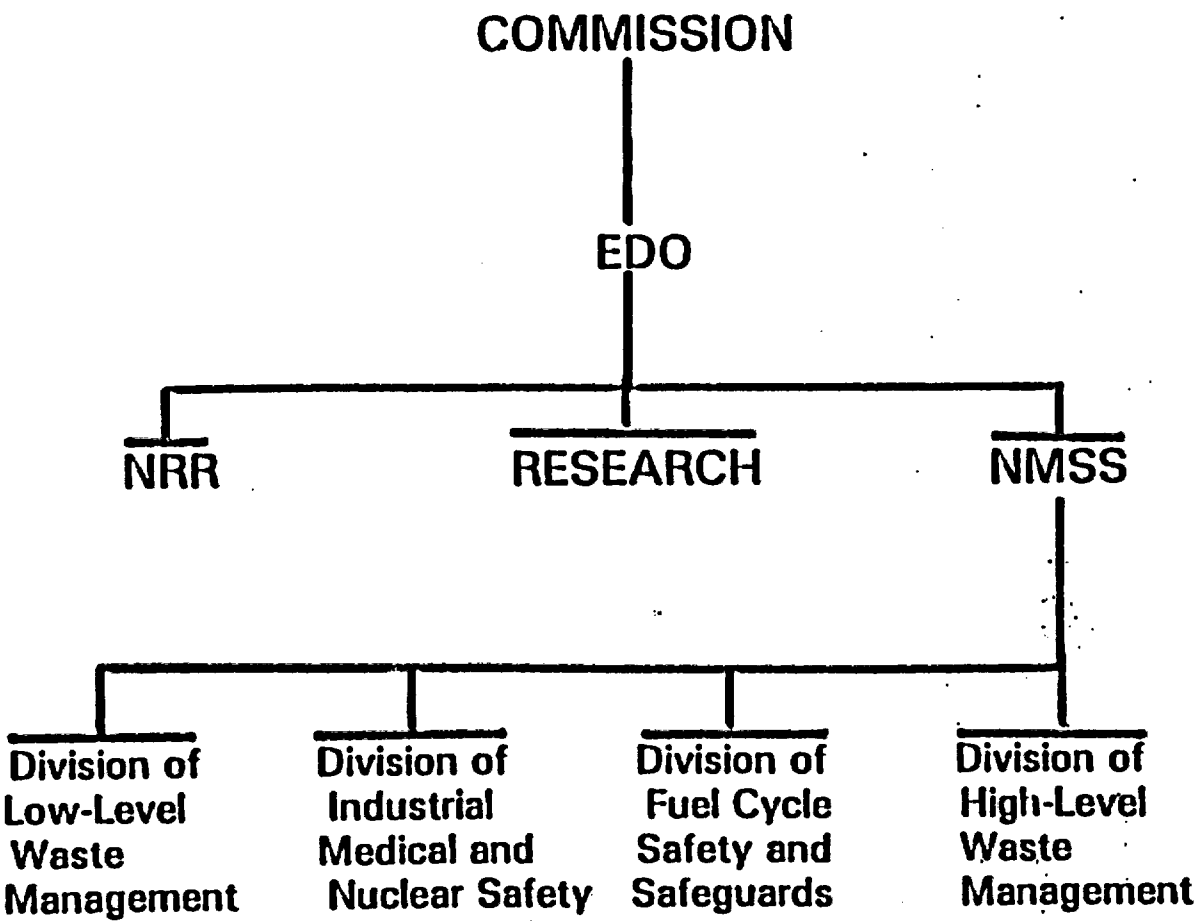
QUANTITATIVE

EPA	NRC
LIMITS AMOUNTS OF EACH RADIONUCLIDE RELEASED TO ENVIRONMENT	WASTE PACKAGES PROVIDE CONTAINMENT FOR 300 TO 1000 YEARS LIMITS RATE OF EACH RADIONUCLIDE RELEASED GROUND WATER TRAVEL TIME TO ACCESSIBLE ENVIRONMENT AT LEAST 1,000 YEARS

BACKGROUND ON NRC

- Independent regulatory agency
- Established through Energy Reorganization Act of 1974
- Approximately 3,000 staff members
- Responsible for licensing of civilian use of radioactive materials
  - Reactors
  - Special nuclear, source, and byproduct material
  - Transportation
  - Low-level and high-level waste

U.S. NRC ORGANIZATION
MAJOR PROGRAM OFFICES



NRC'S INDEPENDENT REGULATORY ROLE

- o Develops Regulation and Guidance
  - 10 CFR Part 60
  - License Application Format and Content Regulatory Guide
  - License Application Review Plan
- o Pre-application Review
  - Early identification and resolution of issues at the staff level
  - Pre-licensing consultation to help enable the Department of Energy (DOE) to provide complete and high quality license application
  - Prepare preliminary site characterization sufficiency comments to be included in DOE's recommendation to the President
- o Review of license application
  - Burden of proof on DOE to provide complete and high quality license application that demonstrates compliance with 10 CFR Part 60
  - NRC reviews license application and determines acceptability of DOE demonstration of compliance

NRC POSITION ON PRE-LICENSING

- As the Commission noted in its development of 10 CFR Part 60, during site characterization there would be no facility for storage of HLW, and therefore, no basis for the exercise of the Commission's Licensing Authority. (46 Federal Register 13971, 13975, February 25, 1981).

- Furthermore, the Commission stated that "The Commission cannot direct the Department to comply with the provisions for involving it during site characterization activities." (44 Federal Register 70408, 70409, December 6, 1979).

- However, the Commission also noted that "[A]though the Commission cannot direct the Department to comply with the provisions for involving it during the site characterization activities, any failure to do so is likely to result in imprudent expenditures and subsequent delays, and ultimately could result in the denial of the application for the proposed site."

HOW NRC STAFF IS IMPLEMENTING ITS PRE-APPLICATION RESPONSIBILITIES FOR REPOSITORY REGULATION

- o Multi-disciplinary reviews
- o Independent modeling and research
- o Open interactions with DOE, the State, the public, and any affected Indian tribes/units of local government
  - Procedural Agreement
  - Meetings
  - Technical Exchanges
  - Site Visits
- o Quality Assurance reviews and observations
- o Two On-site Representatives

RECENT NRC PUBLIC INTERACTIONS ON HLW

AUG	24	AULG	NV	SELECTED HLW ISSUES
SEP	17	DOE	DC	DESIGN CONTROL MTG.
SEP	20-23	DOE	NV	WASTE PACKAGE WORKSHOP
OCT	4-5	DOE	NV	DESIGN CONTROL TECH EXCH.
OCT	13-15	DOE	NM	NEAR-FIELD HYDROGEOCHEMISTRY TECH. EXCH.
OCT	19-20	TRB	NV	ESF DESIGN PROCESS
NOV	9-10	NAS	NV	COMM. EPA STANDARD REVISION
NOV	12	LEGIS.	NV	LEGISLATIVE COMM. MTG. CURRENT ISSUES

NEAR-FUTURE NRC PUBLIC INTERACTIONS ON HLW

NOV	17	DOE	DC	SEISMIC HAZARD TECH. EXCH.
NOV	18	DOE	DC	MEETING ON FUTURE MEETINGS
NOV	30	DOE	NV	90% DESIGN REVIEW ESF TUNNEL
DEC	7	DOE	DC	ESF DESIGN CONTROL AND DESIGN PROCESS TECH. EXCH.
DEC	9	NYE	NV	PNEUMATIC TESTING ISSUES WORKSHOP
DEC	14-16	NRC	NV	ACNW MEETING ON UNSATURATED ZONE HYDROLOGY

Observation of the Design Review for Package 2A

- o Use of Judgement Instead of Data and Analyses

  - Determination of Importance Evaluation (DIE)
  - Amount of Water that can be Added During Construction
  - Effects of Drill and Blast on Permeability

- o Models May Not Be Sufficient for Recognized Phenomena

  - Continuum Codes for Rock Falls
  - Continuum Codes for Fracture Flow
  - Static Analyses for Dynamic Loads

- o Level of Conservatism is not Explained

  - Tunnel Support is Based on Mines and Highway Tunnels
  - Lack of Dynamic Analyses are Based on Mines and Tunnels

- o Specifications of the DIE may be Tough to Meet

  - Water use may not be Metered Correctly
  - Pressure Grouting is not Defined

- o Some Calculations may not Meet the Criteria of the Procedure

IMPORTANCE OF DOE QA

- o NRC Cannot Review or Inspect Everything
- o DOE QA
  - Provides the Framework for a Structured and Systematic Method of Obtaining Facts and Data and Performing Analyses, and Documenting These Activities
  - Provides Assurance That Work is Done Properly
- o DOE Records
  - Supporting Documentation for NRC Licensing Decision
  - Provide Traceability of Work
- o Lack of Complete Records Could Raise Issues in Licensing

STRUCTURE AND CONTENT OF THE LICENSE APPLICATION REVIEW PLAN

- Guidance to staff in conducting its reviews
- Both generic and specific to Yucca Mountain
- 100 individual review plans
- Structure

PART A: License Application Review Strategy
PART B: Review Plans for General Information
PART C: Review Plans for the Safety Analysis Report
- Natural Systems (Geologic, Hydrologic, Geochemical, Climatological, and Meteorological Subsystems)
- Geologic Repository Operations Area
- Engineered Barrier Systems
- Overall System Performance Assessment
- Repository Operations
- Other (Performance Confirmation, Land Ownership and Control Quality Assurance, and Emergency Planning)

LICENSE APPLICATION REVIEW STRATEGY

- Determine the completeness and acceptability of DOE's license application
- Finish review within the first 18 months of the three-year mandated time period for the Commission's construction authorization decision
- Document the findings with respect to compliance with 10 CFR Part 60 in the safety evaluation report

CONCLUSION

- Facing several challenges in the program
- Helping to ensure DOE considers regulatory aspect in site characterization
- Building staff review capability

U.S. DEPARTMENT OF ENERGY

OCRWM

YUCCA MOUNTAIN

SITE CHARACTERIZATION

PROJECT

YUCCA MOUNTAIN PROJECT UPDATE

PRESENTED TO

NEVADA LEGISLATIVE COMMITTEE
ON HIGH-LEVEL RADIOACTIVE WASTE

PRESENTED BY

RUSS DYER

ACTING PROJECT MANAGER

NOVEMBER 12, 1998

ENCLOSURE 5C