12/16/92

NOTE TO: Joe Holonich

FROM: Philip Justus

SUBJECT: REPORT ON YUCCA MOUNTAIN PRO JECT MANAGER'S AND TECHNICAL PROJECT OFFICER'S MEETING 11 DECEMBER 1992 LAS VEGAS, NEVADA

I attended the subject PM/TPO Meeting with John Gilray. The agenda (Enclosure 1) and handouts provided by each presenter (Enclosures 2-6) are attached.

There are items of interest for M. Nataraja, Keith McConnell, David Brooks and their respective Branch Chiefs. Charlotte Abrams will be especially interested in the detailed status reports on eleven surface-based testing (SBT) items in Enclosure 4. Highlights of each agenda item are provided below:

Enclosure 2. C. Gertz - Project Status. Revised FY93 Budget breakout by participant. Note the new total of $242,660,000 is down $2M from previously reported figures (went to support MRS).

A management approach to obtain "convergence of OGD activities" is outlined. Included are three new management positions for YMPO: (1) site evaluation person, (2) NEPA compliance person, (3) License Application person.

Enclosure 3. W. Simecka - ESF Status. Note the Schedule for ESF Design/Construction Activities for 92/93.

Enclosure 4. J.R. Dyer - SBT Status. Note the Schedule for SBT activities for 91/92/93 and detailed status of eleven of them.

Enclosure 5. P.A. Witherspoon - Chernobyl Cleanup. Ukraine has begun site selection process for its power plants' and Chernobyl wastes.

Enclosure 6. D. Bish - Mineral Alteration Studies. Note recommendation that thermal models include the effect of reversibility of water loss in zeolites and smectities. Significant interactions at 40-100 degrees Celsius can occur in fractures. The "altered zone" (read - 'disturbed zone') starts at the waste package - tuff boundary and extends to ambient regime.

Enclosures: As stated

cc: C. Abrams w/o enclosures

(Rev. 1, 12/8/92)

AGENDA

YUCCA MOUNTAIN PROJECT - PROJECT MANAGER'S/TPO MEETING

DECEMBER 11, 1992, FRIDAY

SAIC CONFERENCE ROOM 450

TIME	WHAT	WHO	EXPECTED OUTCOME
9:00-9:15	Welcome & Introductions o Review Agenda o Discuss Date for Next Meeting	C. Gertz	
9:15-10:00	Status of Yucca Mountain Site Characterization Project	C. Gertz	Understand Current Status of Program and Project
10:00-10:15	Status of Design Effort Supporting the Exploratory Studies Facility (ESF)	W. Simecka	Understand Current Status of ESF Design Effort
10:15-10:30	Status of Surface Based Testing (SBT) Program (activities planned during next 90 days)	R. Dyer	Understand Current Status of SBT Program
10:30-10:45	BREAK		
10:45-11:30	Effects of the Chernobyl Disaster of 1986 on the Surface and Groundwater in the Ukraine	P. Witherspoon	Understand Current Status of the Groundwater Contamination Problems
11:30-12:00	Mineral Stability: Thermal Studies of Past, Present, and Future Mineral Alterations	D. Bish	Understand Implications on the Thermal Loading Decision
12:00-12:30	~~Water-Rock Interaction in New Zealand Hydrothermal Systems: Reconnaissance Efforts at Validating Geochemical Models~~ POST-PONED	W. Glassley	Understand Current Status of Geochemical Model Development
12:30	ADJOURN FOR LUNCH		

JOE H

JOE H

RAJ

DAVE

DAVE

charlotte- all

TPO MEETING

Presented By

CARL GERTZ

PROJECT MANAGER

DECEMBER 11, 1992

APRTPG.CPG/10-21-92

TOPICS

- November 30 - Start of ESF site preparation
  - ESAAB - November 16, 1992
- '93 Yucca Mountain Budget Distribution
  - OMB Budget Meeting (FY94) - November 12
- NWTRB/ESF Meeting - November 4-5
- Convergence Task Force Update
- Recent Public Interactions
- OCRWM Fellowship Program
- Upcoming Events

NOVEMBER 30, 1992
START OF ESF SITE PREPARATION

YUCCA MOUNTAIN PROJECT
BUDGET DISTRIBUTION

APRTPG.CPG/10-21-92

YMP
F/Y 1993 BUDGET SPLITS ($K)

DATE: 10-Dec		REECO	LBL	PNL	USGS	EGG	DRI	TMSS	RSN	LANL	M&O	LLNL	SNL	OTHER	TOTAL
121	MGDS M&I	101			85				60	40	5048	175	165		5674
122	WASTE PACKAGE										1560	6630	51		8241
123	SITE	9277	506	300	18072	50		5631	1800	8934	1983	380	1292	1157	49382
124	REPOSITORY										2276		2077		4353
125	REGULATORY	55	885	150	1055	2320		460	20	700	11260	1267	5153	361	23686
126	EXPLORATORY STUDIES FACILITY	31105						80	2521	1531	12905		202	134	48478
127	TEST FACILITIES	4099						2420	1440					1000	8959
129	PROJECT MANAGEMENT	1250			1450			2883	1340	1100	6706	1225	1204		17158
1210	FINANCIAL & TECH ASSISTANCE													17600	17600
1211	QA	1404			1900			839	1050	1200	1649	726	1184		9952
1212	INFORMATION MGMT	350			536			4750	150	748	3866	250	642		11292
1213	ENV, HEALTH & SAFETY	986			450	2950	800	7670	100		398			145	13499
1214	INSTITUTIONAL							3150			353				3503
1215	SUPPORT SERVICES	4621			250	176		6765	800	553	3105	483	518	546	17817
	YMP UNFUNDED LIABILITIES													3066	3066
	PARTICIPANT TOTAL	53248	1391	450	23798	5496	800	34648	9281	14806	51109	11136	12488	24009	242660

NWTRB/ESF MEETING
NOVEMBER 4-5, 1992

UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
1100 Wilson Boulevard, Suite 910
Arlington, VA 22209

Agenda
Panel on Structural Geology & Geoengineering
Workshop on the Exploratory Studies Facility (ESF) Design and Construction Strategy

Plaza-Suite Hotel
4255 South Paradise
Las Vegas, NV 89109
(702) 369-4400

November 4 & 5, 1992

The Nuclear Waste Technical Review Board's (the Board) fourth and fifth reports to Congress and the Secretary of Energy discuss the need for access to the underground as a key part of the early assessment of the suitability of Yucca Mountain as a potential site for a deep geologic repository for the nation's spent nuclear fuel and defense high-level waste. The reports also recommended that strategies be developed to allow underground construction and testing to proceed with reduced budgets. In recent months, the Board has emphasized the need to minimize start-up costs of tunneling so that limited funds could be applied to starting tunneling with a single tunnel boring machine in late fiscal year (FY) 1993 or early FY 1994. The Department of Energy (DOE) has recently allocated the FY 1993 funds and developed plans to accomplish such a result. The purpose of this Board-sponsored workshop is to define and discuss the technical merits, costs, and schedules of strategies for underground construction and testing in the ESF.

This workshop is organized around four sessions that are intended to bring together construction, testing, and management perspectives. In an effort to seek broad and open participation, a major portion of each session is devoted to round-table discussions following minimum introductory presentations.

<u>Wednesday, November 4, 1992</u>

8:00 A.M. **Welcome**
Clarence R. Allen
Nuclear Waste Technical Review Board (NWTRB)

Opening Remarks
John E. Cantlon
Chairman, NWTRB

Overview and Intent of the Workshop
Edward J. Cording, NWTRB

Session 1 begins with an introductory presentation that will briefly review the baseline configuration, construction sequence, cost, and schedule for the ESF. This will be followed by a short presentation of the proposed FY 1993 plans for proceeding with the development of the ESF. The round-table discussion follows, with active participation by all attendees encouraged.

Baseline Configuration
William Simecka, Department of Energy (DOE)

- ESF preliminary design
- Phased approach to implementing the baseline configuration
- Baseline cost and schedule

FY 1993 Approach for Developing the ESF
Carl Gertz, Yucca Mountain Site Characterization Project Office (YMPO)

- FY 1993 Yucca Mountain Project $244.7M budget
- Early access to the underground

Round-table Discussion

Given reduced budgets, what strategies can be defined to allow the construction of the baseline configuration, and surface and underground site-characterization programs to proceed toward the goal of early determination of site suitability and efficient ESF development?

Approaches to constructing the baseline configuration (layouts, methods, phasing, costs, and schedules) for:

- Portals, surface facilities, site preparation
- Ramps and access drifts to main test level
- Access to Calico Hills and other levels
- Excavation of side drifts and tunnel enlargements
- Constraints on construction of the ESF/proposed repository site: organics, concrete, shotcrete, grouts, water, potential for subsidence
- Nuclear weapons testing facility construction standards applied to the ESF
- Utilities (power lines, vent line, fire/water line, cable trays, etc.)
- Safety codes

Alternatives strategies for developing the ESF:

- Maximizing use of tunnel boring machines
- Size and turn radius of access tunnels
- Geometry and location of alcoves
- Excavating alcoves and turnouts

- Ventilation requirements
- Excavation slopes, mucking, and transportation
- Construction of separate access to the Calico Hills formation

KEY PARTICIPANTS:
Carl Gertz, YMPO
Thomas Statton, Woodward/Clyde, Management & Operations (M&O)
Thomas Blejwas, Sandia National Laboratories
Neil Dahmen, The Robbins Company
Lok Home, Boretec, Inc.
James Friant, Colorado School of Mines
Joseph Sperry, NWTRB consultant
Hugh Cronin, NWTRB consultant
S.H. Bartholomew, NWTRB consultant

11:45 A.M. LUNCH

12:45 P.M. Overview of Session 2 - Exploration and Testing

A key part of the ESF development strategy is the definition of what early exploration and testing are needed, and how the ESF can best be used to accomplish key elements of the site-suitability and site-characterization programs. The session will start with a presentation on integrated testing evaluation, followed by a presentation on the need for an alternative testing facility and its functions. Round-table discussion by all workshop participants will then explore the proposed tests to be conducted in the ESF and their relevance to the issue of early assessment of site suitability.

Integrated Testing Evaluation
Russ Dyer, DOE
- Early testing priorities

Why an Alternative Testing Facility?
William Simecka, DOE
- Thermal testing
- Excavation testing

Round-table Discussion

Testing to be conducted in the ramps, alcoves, main test level, and in Calico Hills formation

- What are we testing for?
  - — Regulatory compliance?
  - — Scientific confidence through exploration?
  - — Scientific confidence through testing?

- What should be the early, high priority objectives for observation or testing in the ESF?
- What are the testing priorities and requirements for:
  - observations across faults?
  - observations across lithologic boundaries?
  - observations in ramps and drifts?
  - testing in alcoves?
  - underground drilling and testing?
  - main test level activities?
- Can the tunnel boring machine be advanced through the ESF without delays for testing?
- How can a balance between surface-based and underground testing be maintained?
  - Where does required testing in deep, dry drillholes fit in?
  - Can the ESF be used for tests that were formerly part of the surface-based program?
- What should be the timing of access to the Calico Hills?
- Should there be direct access to Calico Hills outside the geologic repository operational area?
- Should early access to Pah Canyon be considered?
- What are the constraints on construction of the ESF/proposed repository site in terms of organics, concrete, shotcrete, grouts, water, and potential for subsidence?

KEY PARTICIPANTS:
William Simecka, DOE
Russell Dyer, DOE
Uel Clanton, DOE
Lawrence Hayes, U.S. Geological Survey
Thomas Statton, Woodward/Clyde (M&O)
Scott Sinnock, TRW (M&O)
Ned Elkins, Los Alamos National Laboratory
Dale Wilder, Lawrence Livermore National Laboratory
Thomas Blejwas, Sandia National Laboratories

6:00 P.M. **RECESS**

Thursday, November 5, 1992

8:00 A.M. **Overview of Session 3 - Management and Acquisition Strategies**

This session is directed toward a review of the process of design, construction, construction management, contract type, and possible alternative means of obtaining an early delivery of construction at minimum cost. The session opens with a short presentation explaining the current process being used at Yucca Mountain in terms of roles, responsibilities, and authority.

The Yucca Mountain ESF Design and Construction Program - Management and Implementation
William Simecka, DOE

Round-table Discussion

Alternative management and acquisition strategies
- Roles, responsibilities, and authority
- Equipment and material acquisition, mark-ups
- Fixed price contracts, cost reimbursable contracts, target cost/schedule incentive fees, award fees
- Disputes review board

KEY PARTICIPANTS:
Carl Gertz, YMPO
William Simecka, DOE
James Allen, Morrison-Knudsen, M&O
Robert Pritchett, Reynolds Electrical and Engineering Co.
Dale Frasier, Reynolds Electrical and Engineering Co.
Joseph Sperry, NWTRB consultant
Hugh Cronin, NWTRB consultant
Robert M. Matyas, NWTRB consultant
S. H. Bartholomew, NWTRB consultant

11:45 A.M. **LUNCH**

12:45 P.M. **Overview of Session 4 - The Design and Construction of ESF Alternative Scenarios and Strategies**

The purpose of this session is to seek definition or direction on promising strategies for development of the ESF. Integration of construction, testing, and management strategies is emphasized in this wrap-up discussion. All workshop attendees are encouraged to take part.

Round-table Discussion

- Are there promising alternative strategies to developing the ESF?
- What are the implications of the testing requirements vs. constructibility, cost, and schedule?
- Can the excavation process be implemented without delay for testing?
- What is the impact of repository design evolution on the ESF design in terms of planning for changes in location and size of potential repository excavations?
- Is there a precedence for the government buying a tunnel boring machine, then asking a contractor to build a tunnel using an award fee type contract?
- What are the incentives for the contractor to perform?
- Are there alternative strategies for acquisition of underground construction?
- What are the constraints on construction of the ESF/proposed repository site in terms of organics, concrete, shotcrete, grouts, water, and potential for subsidence?

KEY PARTICIPANTS:
All workshop attendees

6:00 P.M. **ADJOURNMENT**

Convergence Task Force

CONVERGENCE TASK FORCE FOCUSED ON ACHIEVING

- Clarification of Repository Program Goals
  - Site Suitability Evaluation
  - NEPA process
  - Licensing
- Clarification of functional responsibilities between implementing and oversight offices
- Recognition of need for program guidelines to ensure appropriate external party involvement
- Operational efficiency

REPOSITORY PROGRAM CONVERGENCE GOALS

Successful and timely implementation of:

- The site evaluation process resulting in compliance with 10 CFR 960 and earliest possible determination of site suitability
- The NEPA process in compliance with NEPA and 10 CFR 1021
- The licensing process in compliance with 10 CFR 60 and 10 CFR 2 and,
- If the site is found suitable,
- Completion of the site recommendation and approval process and submittal of the EIS and LA to the NRC

OGD DELEGATED RESPONSIBILITY FOR:

- Development of detailed strategies and implementation plans to achieve Repository Program Goals
- Development of top-level Convergence Strategy to tie together implementation plans for Repository Program Goals

OVERALL APPROACH EMPHASIZES

- Public Health and Safety
- Scientific and Engineering Integrity
- Approved QA Program
- Public Trust and Confidence
- Program Integration

Within the above context

Timely achievement of goals at lowest possible cost

OVERALL APPROACH

Conduct a site investigation, design, and performance assessment program that is technically sound, procedurally correct, and cost-effective and that is iteratively evaluated and focused on what is needed for convergence, taking into account the interrelationships among the site evaluation, NEPA, and licensing processes

ELEMENTS OF APPROACH

- Conservatism in demonstrating compliance
- Broadening of scientific and public acceptance
- Establishment of single point regulatory responsibility
- Iterative evaluation and focusing of site investigation, design, and PA program
- Timely initiation of NEPA process
- Ongoing identification and monitoring of regulatory needs
- Early identification and resolution of issues
- Focused process of technical interactions
- Early planning for licensing proceeding and potential litigation

EMPHASIZE COMPREHENSIVE NRC ROLE

- NRC statutory responsibility cuts across entire regulatory process

- Site evaluation:
  - NRC concurred on 10 CFR 960 and must concur on any changes
  - NRC comments on sufficiency of site data must be included in SRR

- NEPA compliance:
  - NRC must adopt DOE's EIS, to the extent practicable, or issue its own EIS

- Licensing:
  - NRC reviews the LA prior to authorizing construction of repository
  - LSS Administrator must certify that all relevant information has been included in LSS prior to licensing

OGD MANAGEMENT APPROACH

- Implement management principles of DOE Order 4700.1
- Delegate responsibility for:
  - Site Evalaution Process Implementation
  - NEPA Compliance Process Implementation
  - Licensing Process Implementation
- The three positions report directly to the OGD Associate Director/Yucca Mountain Project Manager
- The three positions are independent of technical line organizations (site investigation, design, performance assessment)

OGD MANAGEMENT APPROACH

(CONTINUED)

To implement this responsibility, the OGD Associate Director will:

- **Develop detailed implementation plans for each process**
- **Define specific responsibilities of the three positions, including interfaces within OCRWM and with external groups**
- **Define budget and staffing authority for the three positions**
- **Create the three positions and select appropriate individuals**
- **Formally delegate authority to the three individuals**

RECENT PUBLIC INTERACTIONS

RECENT PUBLIC INTERACTIONS

- **Public Update Meetings held**
  - Las Vegas (300 people)
  - Amargosa Valley (50 people)
  - Reno (50 people)
- **Undersecretary, Hugo Pomrehn visit #2**

OCRWM FELLOWSHIP PROGRAM

APRTPG.CPG/10-21-92

December 1, 1992

To: Carl Gertz

From: Carol Hanlon

Subject: Graduating OCRWM Fellows

Dear Carl,

Thank you for taking time last Monday to discuss with me the OCRWM Fellowship Program and considering possible strategies for placing our graduating fellows in program positions, especially at the Yucca Mountain Project Office or YMP participants. At that time, we discussed the fact that we currently anticipate that seven fellows will complete their graduate degrees by August 31, 1993. We also discussed the fact that non-availability of FTE's seems to be impacting the hiring of one of this year's fellows, Mark Banks. Mark completed his Master's degree in Nuclear Engineering at the University of Arizona this year, and performed his practicum at Sandia National Laboratories. We are concerned that, as yet, Mark has not been placed in a permanent position. We have extended his practicum through December, 1992, with the understanding that if positions become available at Sandia, he will be among candidates considered for permanent hire.

As you suggested, I am providing you with one-page resumes on our graduating fellows for your information and review. In addition, I am including a resume and background package on Mark Banks, who has indicated that he would be very interested in positions available with the Yucca Mountain Project Office in Las Vegas. I hope that this information will be sufficient for you to use in opening discussions with Yucca Mountain TPOs regarding the placement of these graduating fellows. I would welcome the opportunity to attend a TPO meeting where the subject of increasing the effectiveness of the OCRWM fellowship program and placing graduate fellows in program positions, and would be happy to provide a brief introduction on the subject, or provide you with other information that would be helpful to you.

We are currently very interested in increasing the effectiveness and efficiency of this fellowship program, as applications for new fellowships will be evaluated in February, along with practicum assignments. In addition, we are striving to ensure that all of are graduating fellows will be hired in program positions. Therefore, I sincerely appreciate the assistance and consideration you have given to this subject, and will welcome your assistance.

Should you have questions or wish to have additional information, please don't hesitate to contact me on 202-586-2284.

Sincerest regards,

Carol

Carl, Many thanks for your assistance!

Upcoming Events

UPCOMING EVENTS

• Nuclear Waste Technical Review Board Meeting	January 5-6, 1993
• American Nuclear Society	January 14, 1993
• Waste Management '93	February 28 - March 4, 1993
• High-Level Waste Conference	April 26-30, 1993

TPO MEETING

EXPLORATORY STUDIES FACILITY (ESF) STATUS

PRESENTED BY
DR. WILLIAM SIMECKA
DIRECTOR, ENGINEERING AND DEVELOPMENT DIVISION
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

DECEMBER 11, 1992

ESF CONSTRUCTION IS UNDERWAY

TPOESFDS2.126/12-11-92

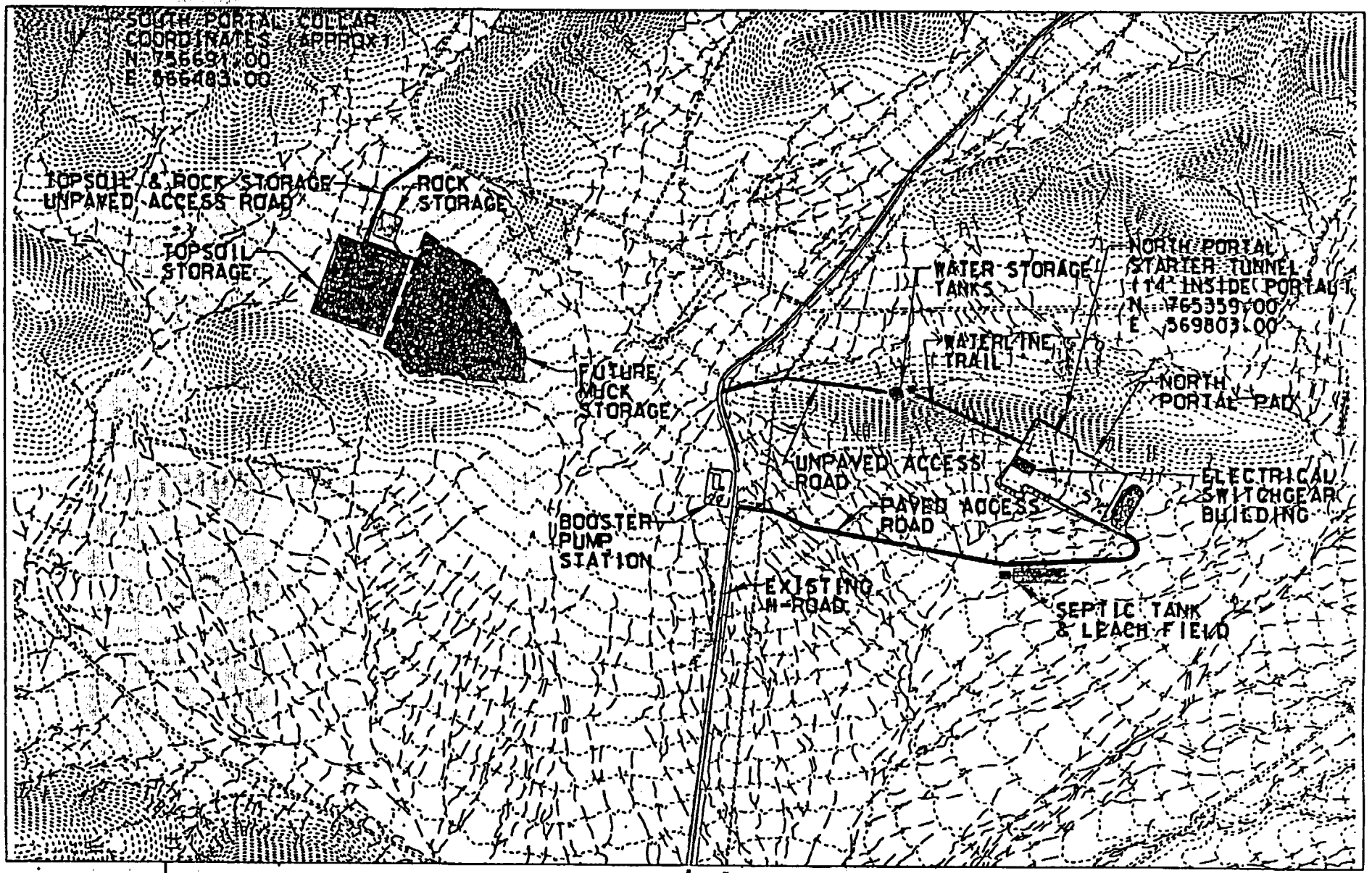
RECENT EVENTS

- The initial portion of ESF Design Package 1A was issued for construction, (20 NOV 92) enabling YMP to initiate construction activity on 25 NOV 92

- The review process is underway for the balance of Package 1A. Release for construction expected by 21 DEC 92

- The specification for the first Tunnel Boring Machine (TBM) has been completed, and the Request For Proposal (RFP) is expected to be issued on 18 DEC 92

- ESAAB approval to begin construction was received 25 NOV 92



ESF PACKAGE 1A
OVERALL SITE
PLAN
REFERENCE
YMP-025-1-CIVL-PL111

equitord /u... r/ymp025ia.dgn 05-AUG-1992

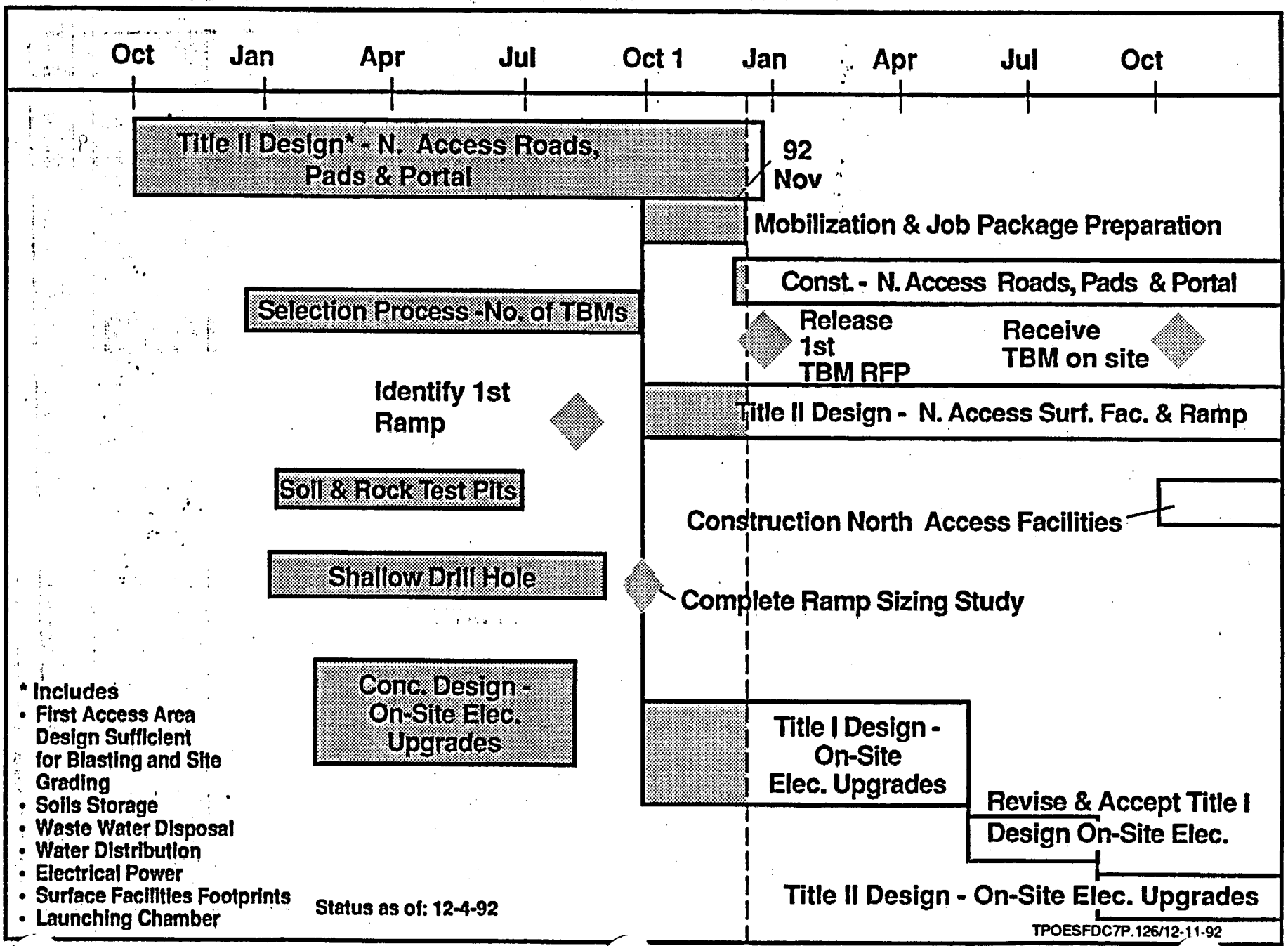
ESF TITLE II DESIGN

- CRWMS M&O has assumed full responsibility for ESF design, effective 1 DEC 92
- M&O will complete 18 unfinished classification analyses on Design Package 1A
- M&O will perform design of Package 1B (north portal surface facilities) and Package 2 (north ramp, surface to Topopah Spring Level)

ESF CONSTRUCTION

- All readiness review open items closed (25 NOV 92)
- Site preparation activities started (25 Nov 92)
- ESF subsurface contractor selection (source selection board recommendation) due (24 DEC 92)
- Starter tunnel excavation scheduled to begin (2 APR 93)

PLANNED ESF DESIGN/CONSTRUCTION ACTIVITIES FY 1992 & 1993



TPO MEETING

FY 93 NOVEMBER STATUS

SURFACE BASED TESTING PROGRAM

PRESENTED BY
J.R. DYER
DIVISION DIRECTOR
REGULATORY AND SITE EVALUATION DIVISION

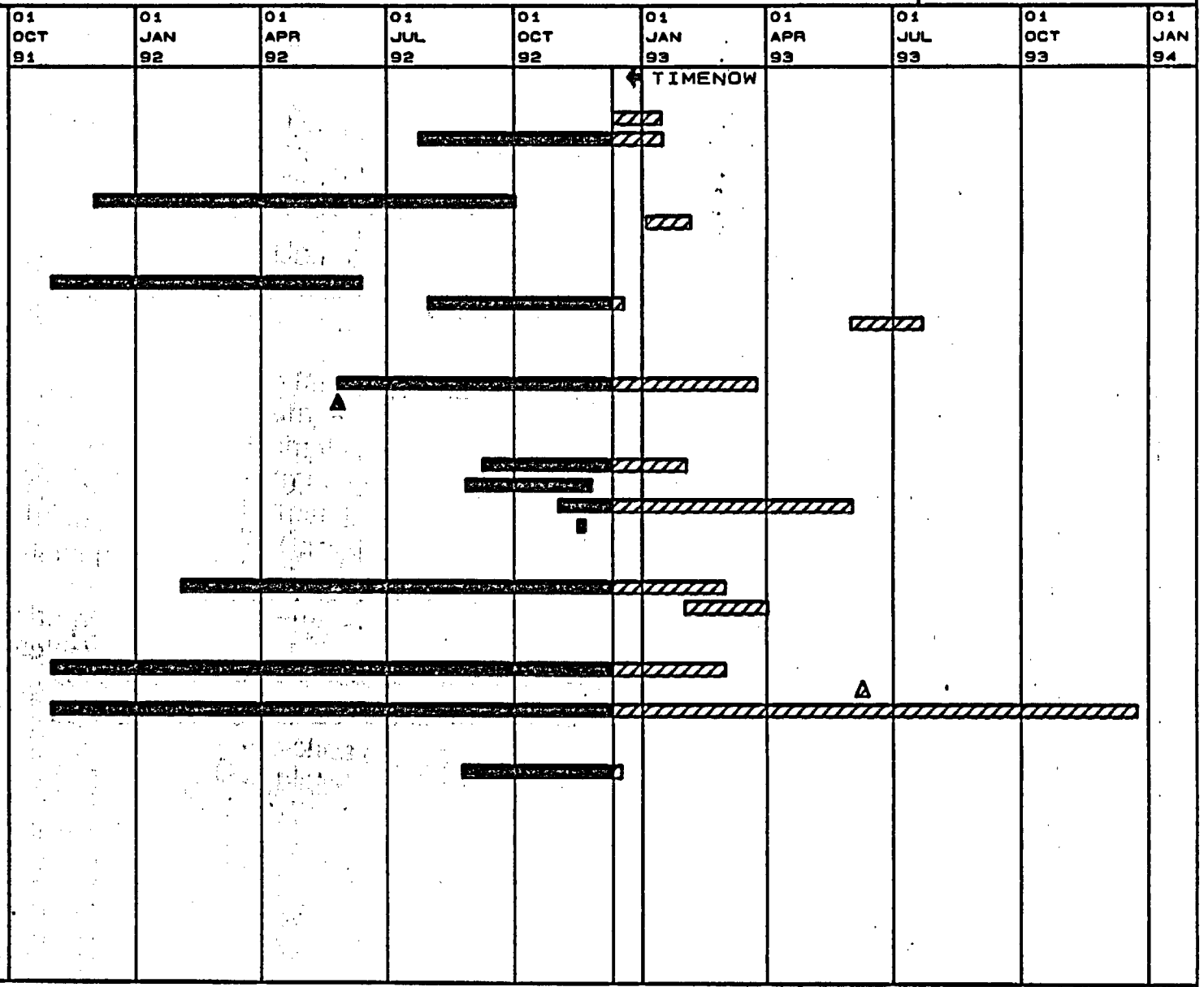
December 11, 1992

Report: SURFBAR
Project: SURFTEST
Time Now: 11DEC92
Date: 11DEC92
Page: 1

YUCCA MOUNTAIN PROJECT
SURFACE BASED TESTING

OCRWM

TASKS	START	FINISH
MIDWAY VALLEY		
TRENCH MWV-T7	11DEC92	14JAN93
TRENCH MAPPING	24JUL92	15JAN93
QUATERNARY FAULTING - REGION		
PREREQUISITES	02DEC91	01OCT92
TRENCH EXCAVATION	04JAN93	04FEB93
UNSATURATED ZONE - INFILTRATION		
UZ INFILTRATION-PHASE I	01NOV91	12JUN92
UZ INFILTRATION-PHASE IIA	31JUL92	18DEC92
UZ INFILTRATION-PHASE IIB	01JUN93	21JUL93
UNSATURATED ZONE - PERCOLATION		
UZ - 16 DRILLING	27MAY92	24MAR93
T531		27MAY92
SOIL AND ROCK PROPERTIES		
TEST PITS-PHASE II	08SEP92	01FEB93
PAVEMENT AT NRG-1	27AUG92	25NOV92
NRG -2 THRU -6	02NOV92	01JUN93
NRG-1 GEOPHYSICS	16NOV92	20NOV92
GEOPHYSICS		
PREREQUISITES	03FEB92	01MAR93
COLLECT DATA	01FEB93	04APR93
VOLCANISM		
ISSUE RESOLUTION REPORT	01NOV91	01MAR93
NRC TE		09JUN93
TEST PITS	01NOV91	23DEC93
FRAN RIDGE PIT MAPPING	24AUG92	16DEC92



Legend
- -In progress
- -Planned
- -Critical

Russ Dyer, Division Director

Signatures
Prep: 12/11/92
Aprv: 12/11/92

Surface Based Testing
FY 92
Accomplishments

Drillhole	Status	Depth
UZ-16	Drilling Ongoing (TD: 1663')	860 feet
Neutron Boreholes	Phase I Complete	50-200 feet
	Phase II Ongoing	50-200 feet
Ramp Boreholes	NRG-1 complete	150 feet
JF-3	Complete	1140 feet

Test Pits/Trenches	Status	Length
Midway Valley	28 test pits completed	-----
Trench MWV-T5	Complete	1100 feet
Trench MWV-T6	Complete	20 feet
Trench 14D	Complete	~200 feet
Trench MWV-T4 (old 17)	Complete	100feet
Soil & Rock Test Pits Phase I	33 Complete	-----
Soil & Rock Test Pits Phase II	39 Complete	-----
Volcanism Trenches	2 Complete	500 feet
Volcanism Test Pits (Lathrop Wells & Cima Volcanic fields)	37 Complete	----
Crater Flat	3 trenches complete	~100 feet
Stagecoach Road fault	3 trenches complete	~100 feet
Fran Ridge Test Pits	Complete	----

Surface Based Testing
FY 92
Accomplishments
continued

Pavements	Status
Busted Butte	Four pavements cleared
Fran Ridge	Complete
North Portal Access	Complete

Seismic Studies	Status
55 station seismic network	Transition from USGS to UNR Complete
Little Skull Mountain Earthquake (6/92)	Portable instruments deployed and still collecting aftershock data

Borehole Security

30 boreholes secured as of October 19, 1992

MIDWAY VALLEY
SP 8.3.1.17.4.2

Status:

Mapping of trench MWV-T4 (Trench 17) in progress

Soils Descriptions in test pits in progress

Final interpretation of data from gravity and magnetic surveys conducted by USGS is in progress

Trenches MWV-T5, MWV-T6 and MWV-T7 have been mapped and backfilled to make way for ESF construction

Planned Activities:

Next excavations in Spring 1993

As of 12/11/92

QUATERNARY FAULTING - REGION
SP: 8.3.1.17.4.3

Planned start date:	February 1993 - Trenching
Status:	Study plan approval imminent
	USGS has identified two trench sites on the Bare Mountain fault
	Land access and environmental compliance reviews are in progress
Concerns:	Start date delayed due to delays in Study Plan approval
Solutions:	Complete YMPO approval of Study Plan
	Expedited NRC Phase I review of Bare Mountain activity

As of 12/11/92

QUATERNARY FAULTING - SITE AREA
SP: 8.3.1.4.2.2

Status:	Exposures of Paintbrush Canyon fault west of Busted Butte have been cleared--mapping in progress
	Three trenches have been completed in Crater Flat--mapping in progress
	Three trenches across Stagecoach Road fault have been completed--mapping in progress
Planned Activities:	FY 93 Program being developed
Concerns:	Trenches in Crater Flat vandalized Estimate ~ $10K to replace survey targets and re-photograph

As of 12/10/92

UNSATURATED ZONE
NATURAL INFILTRATION
SP: 8.3.1.2.2.1

Status:	Completed seven phase 2 boreholes (N-31, N-32, N-63, N-33, N34, N-57, N-59) as of 12-10-92 N-61 in progress, 14' depth on 12/9/92
Concerns:	None
Solutions:	N/A
Planned Activities:	Plan to complete N-61 by 12/18/92. Last two boreholes (N-62, N-39) may not be drilled until North Ramp boreholes are completed. Infiltration Testing at N-85 (Hold for tracer permit)

As of 12/10/92

UNSATURATED ZONE PERCOLATION

UZ - 16 (VSP2)

Status:	Started Drilling with LM-300 May 27, 1992 Coring depth to 1179.27 feet as of December 9, 1992 (TD: 1663') Revised Drilling procedure arrested deviation, holding near 2° since last TPO briefing
Concerns:	None
Solutions:	N/A

As of 12/10/92

SOIL AND ROCK PROPERTIES
RAMP BOREHOLES
SP: 8.3.1.14.2

Status:	NRG-1 Borehole Geophysics completed 11/20/92
	NRG-1 Borehole plugged & abandoned 11/25/92
	NRG-6 Borehole Started 11/23/92 depth of 71.47' on 12/9/92
Concerns:	Slow progress on NRG-6 due to compatability problems with PQ core barrel and PQ ODEX hammer
	Completion of additional test pits and percolation tests during December
Solutions:	Changed over to HQ size equipment
	Encourage USGS to complete
Planned Activities:	Borehole NRG-2 planned to start Jan 93

As of 12/11/92

GEOPHYSICAL REFLECTION SURVEY
SP: 8.3.1.4.2.1

Planned start date:	February 1, 1993
Status:	Test Planning Package has been initiated
	SCPB changes approved
	NRC Phase I review past due
	All data collection to be performed by subcontractor through contract
	Environmental compliance activities in progress
	Evaluation of Waste Isolation and Test Interference Complete
Concerns:	Award USGS Contract
Solutions:	Accelerate Contract process

As of 12/11/92

VOLCANISM STUDIES
SP: 8.3.1.8.1.1 and 8.3.1.8.5.1

Status:

Additional excavation at Lathrop Wells Cone completed October 16-21, 1992
37 trenches constructed: Lathrop Wells and Cima Volcanic Field
LANL Technical Report (draft) nearly complete -- prelude to upcoming NRC interaction
Responding to NRC Phase II comments on SP 8.3.1.8.1.1
Successful technical exchange with NRC on Phase II comments on SP 8.3.1.8.1.1
Effects Studies underway, plan increase in FY93

Concerns:

Uncertain Geochronology
Magma Chambers--Teleseismic Tomography

Solutions:

Continue Geochronology Program
Geophysics Review: External Consultant

Planned Activities:

Complete LANL technical report and responses to NRC comments on SP 8.3.1.8.1.1
Submit Study Plan 8.3.1.8.1.2

As of 12/11/92

BOREHOLE SECURITY

Status:	NRG-1, RF9, RF-10, and RF-11 plugged and abandoned under the borehole security program 11/25/92 prior to initiation of ESF pad construction
Planned Activities:	RF-3, RF-3b and RF-5 near proposed ESF facilities will be plugged first week in January

As of: 12/11/92

FRAN RIDGE PIT MAPPING
SP: 8.3.1.4.2.2

Status:	Pit excavation, pavement cleaning, and stereophotography are complete Detailed site mapping is 30% complete
Concerns:	Mapping not completed because of higher priority needs (NRG-1 pavement)
Solutions:	Complete mapping before any deterioration of cleaned pavement
Planned Activities:	Prepare new schedule for completion of pavement mapping

As of 12/11/92

C-WELL TESTING
Study Plan: 8.3.1.2.3.1

Status:
USGS to begin prototype testing at Raymond Quarry 12/92 (Nr. Fresno, CA)
LANL indicates readiness

Concerns:
Eventual modification of tracer injection permit (NDEP)
Long-term effluent management
-- storage and distribution
Completion of crosshole tomography
Stability of Interim Power Supply

Solutions:
Submit expanded tracer list to NDEP, supported by technical rationale for proposed substances

Planned Activities:
Develop QA procedures during prototyping (USGS/LBL)
Complete 5-Zone Packer strings (USBR)
Conduct Interparticipant Meeting on C-Well Tests in Dec/Jan

As of 12/11/92

NOTES FROM TRIP OF P. A, WITHERSPOON TO KIEV, UKRAINE JULY 13-23, 1992

Summary

During the period July 13-23, 1992, I was able to have a series of technical meetings with scientists and engineers in several research institutes in Kiev, Ukraine. I went to Ukraine as a private citizen and had no financial support from any governmental agency. As a hydrogeologist and geological engineer, I wanted to confer with responsible parties in Ukraine who could advise me on the status of the groundwater contamination problems that have arisen as a result of the Chernobyl disaster of 1986.

Arrangements for these meetings were made informally before I left California through the excellent assistance of Dr. Boris Faybishenko, who is currently working at the University of California. Prior to coming to Berkeley, Dr. Faybishenko had worked for over 25 years at the Kiev State University, and having been directly involved in Chernobyl, he knew the principals I should meet and was able to set up a two-week schedule of meetings at key institutes. The Ukraines provided an impressive array of publications and reports of recent work and arranged several field trips. The report that follows summarizes results on a daily basis, and an Appendix includes a compilation (partly in Russian) of the more important items.

The most important result that I gained from these meetings is the fact that there is a significant accumulation of radionuclides in the Dnieper River system that poses a potential threat of contamination to the water supplies of 35 million people in central Ukraine. An analysis of the factors that contribute to this contamination and of the remedial action that should be taken will be of great benefit to the Ukraines. The technology that will be developed should also be of benefit in many other countries.

A large amount of field data on the occurrence of radionuclides in soils and waters of the Kiev-Chernobyl area has been gathered. However, it is not clear that the Ukraines have a complete picture how radionuclides have moved away from the disaster area and migrated into the surface and ground water systems. Nor is it clear whether this migration of radioactivity that is already a threat to the Dnieper River system may ultimately pose a threat to the Black Sea. Soil profiles seem to suggest that radionuclides do not migrate far below the surface, yet significant levels of radioactivity have already been found in both shallow and deep ground waters. A specialized study of organic-mineral complexes in the soil waters of the vadose zone has isolated

Summary (con't)

and identified 18 amino acids that are complexed with radionuclides.

Geologic risk maps are being developed in the Ukraine that start with an analysis of megastructures as interpreted from lineaments as seen in satellite photos. The lineaments are up to a 1,000 km or more in length and are supposedly evidence of weaknesses in the Earth's shallow crust. Ground truth is being developed from detailed geophysical studies and geological investigations that include statistical analyses of the geomorphologic variations associated with the lineaments.

The Ukraines have five nuclear power plants in operation and one plant in the Crimea that is fully constructed but may not be put in operation because of its location in what is now considered to be a hazardous site. They indicated that they have storage space for only two more years of spent fuel from the power plants. Before the breakup of the Soviet Union, they apparently were planning to ship their spent fuel out of the Ukraine, but that may no longer be possible. They are therefore starting to look for a repository site and are considering two rock types: salt and granitic rocks.

December 9, 1981

"The reported negative coefficient of thermal expansion for nonwelded tuff may be incorrect."

"It is unlikely that the reported negative coefficient of thermal expansion is a true material property of tuff."

Robert J. Wright
Senior Technical Advisor
High-Level Waste Tech. Dev. Branch
Division of Waste Management
Nuclear Regulatory Commission

Los Alamos Mineral Stability/Alteration Studies

- Mineral stability studies
- Long-term mineralogical alterations

Mineral Stability

- Temperature-P(H_2O) effects on clinoptilolite, mordenite, smectite, and volcanic glass under <u>non-ambient</u> conditions

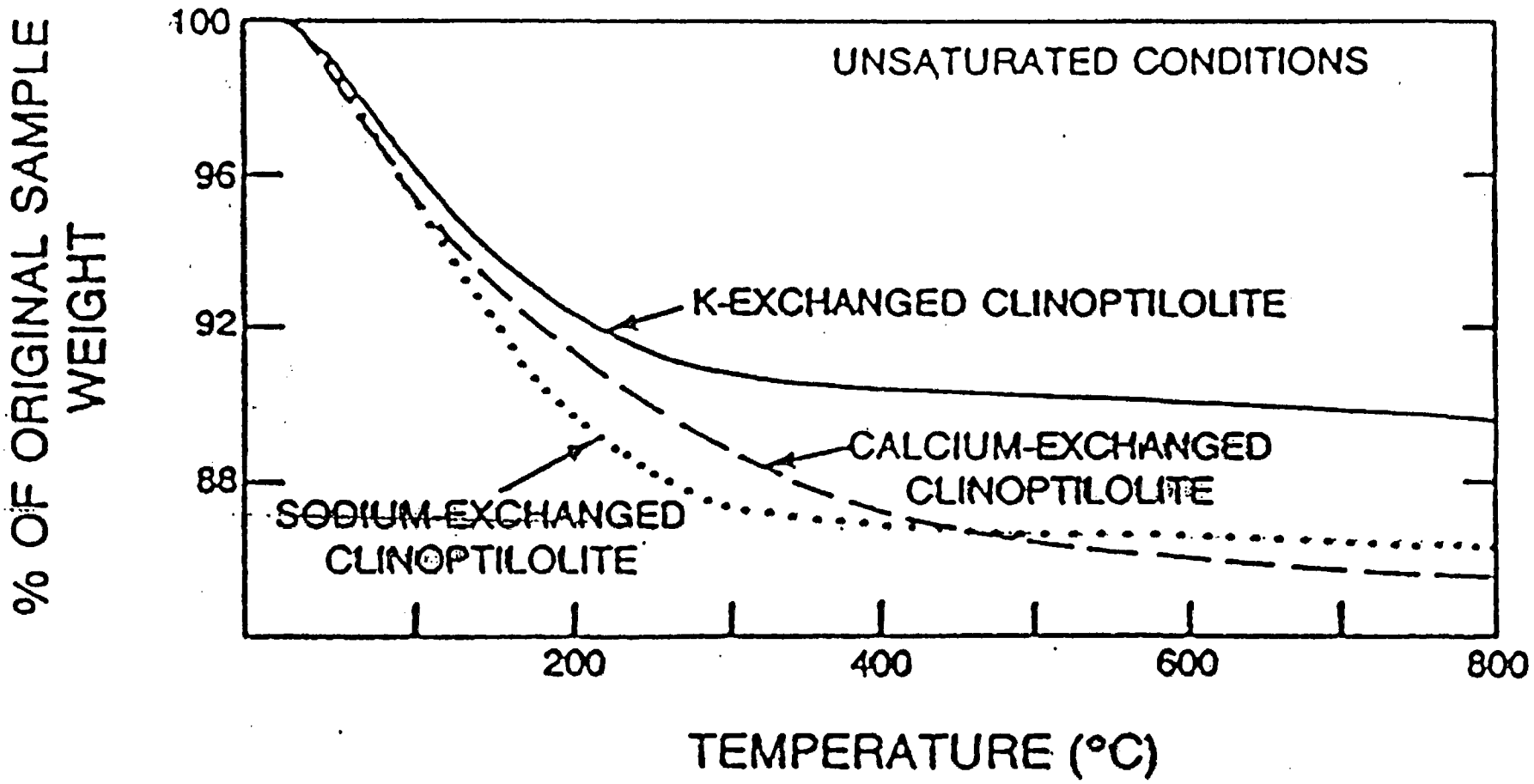
  -- dehydration-rehydration effects
  -- zeolite and smectite water content as a function of T, P(H_2O)
  -- kinetics of dehydration/rehydration reactions

  -- contraction/expansion reactions
  -- molar volume as a function of T, P(H_2O)

- Effects of heating on sorption properties

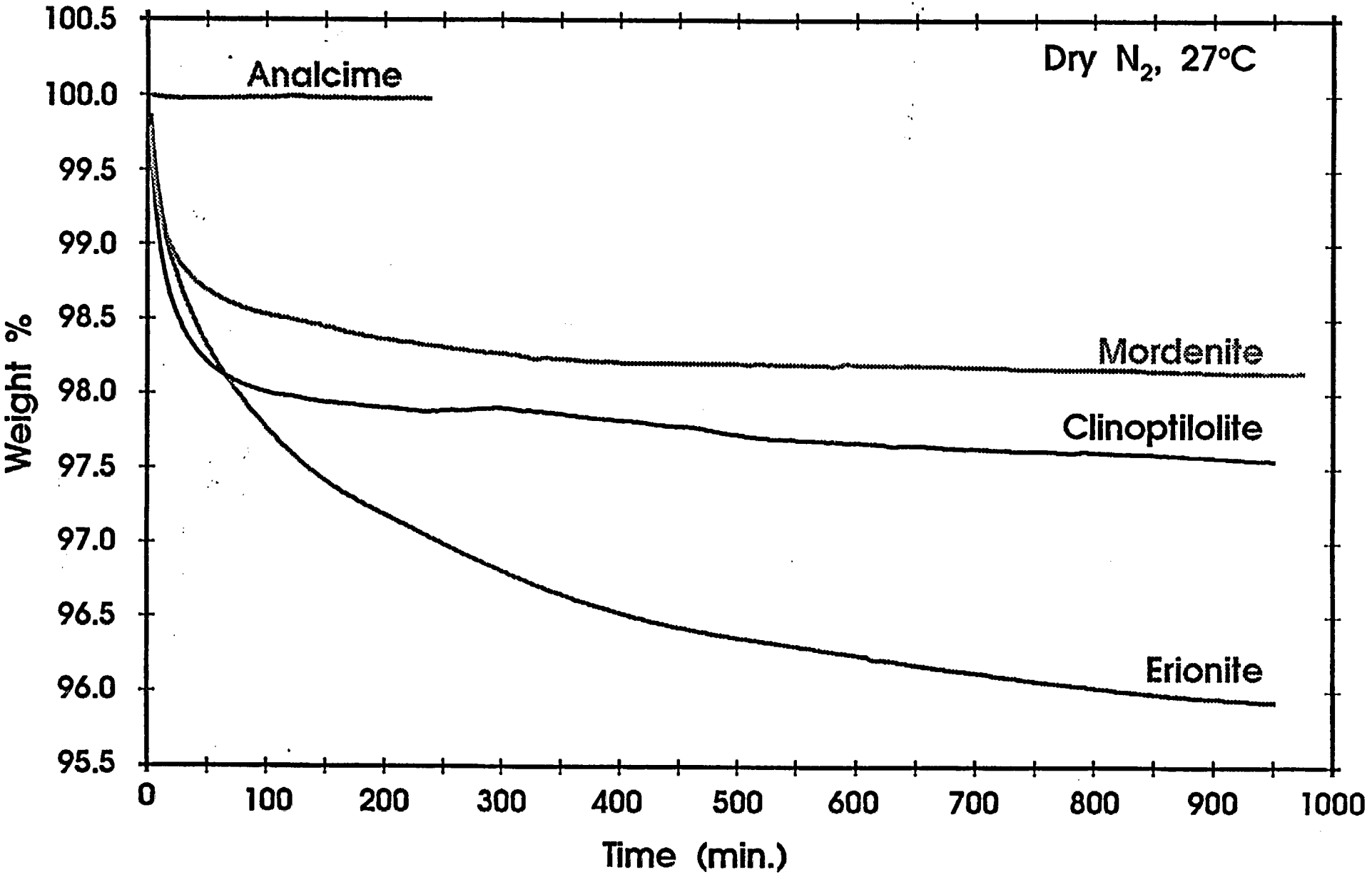
  -- do these dehydration and contraction reactions affect the sorption properties?

DEHYDRATION PROPERTIES OF CLINOPTILOLITE AS A FUNCTION OF COMPOSITION AND TEMPERATURE

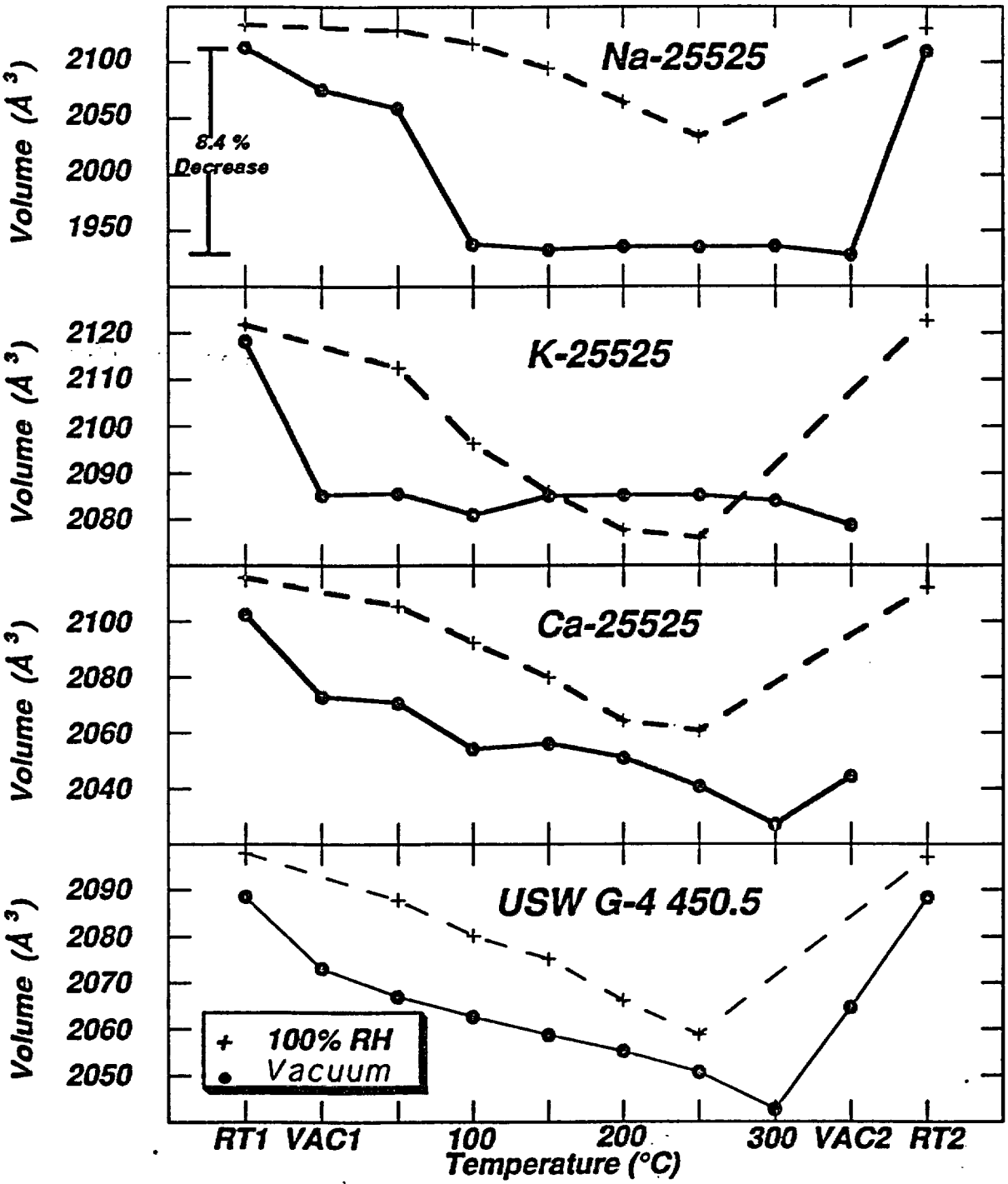


FROM BISH, 1985

Zeolite dehydration kinetics

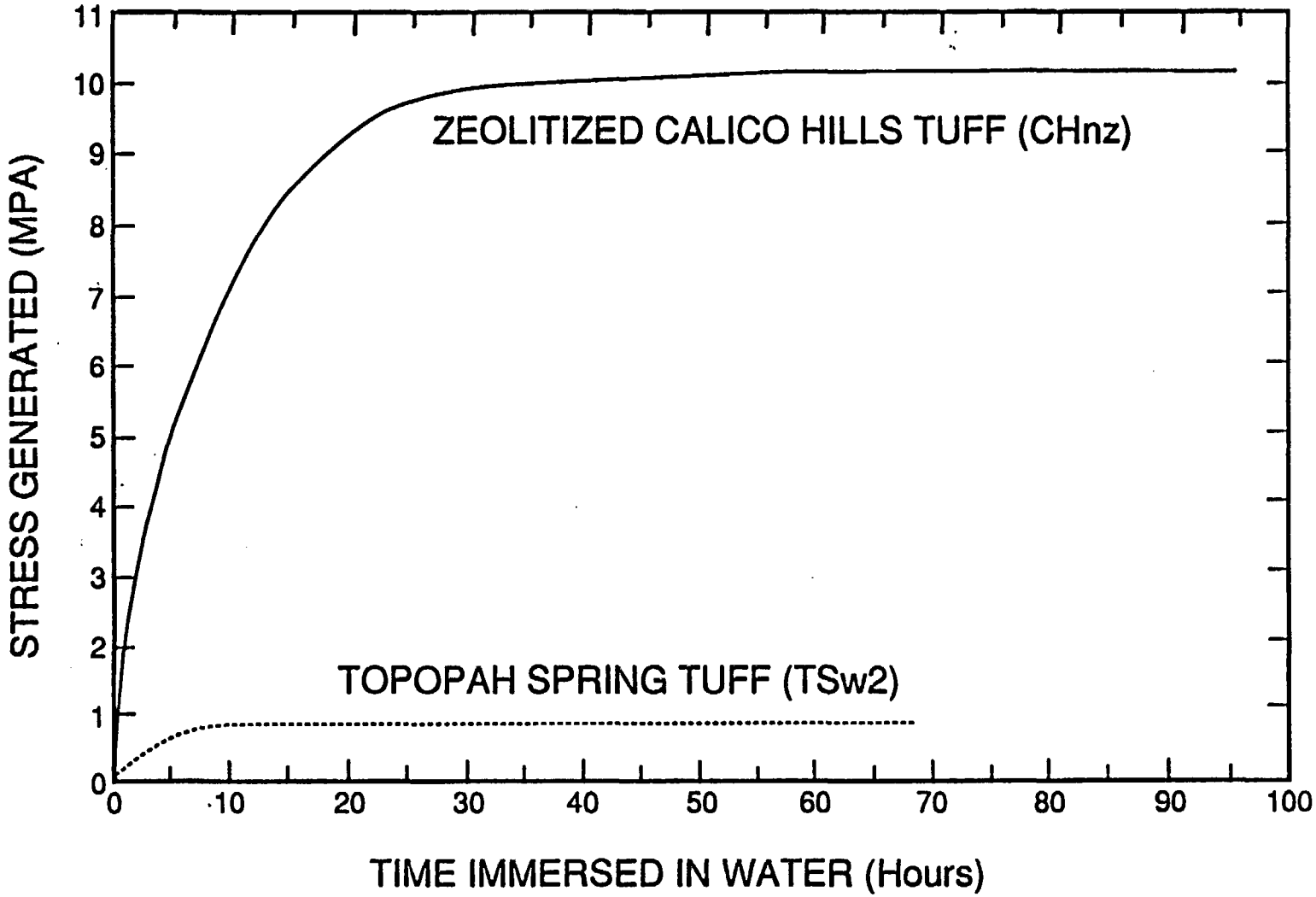


EFFECTS OF TEMPERATURE AND P_{H_2O} ON CLINOPTILOLITE UNIT CELL VOLUME



YUCCA MT. TUFF

AXIALLY CONFINED HYDRATION



Sorption Ratios (R_D)[1] for Heated and Unheated Clinoptilolite

	Unheated	105° C[2]	200° C[2]
Sr	19100 (9000)[3]	17000 (1800)	29000 (5200)
Cs	13700 (100)	22700 (1700)	37000 (2000)
Ba	433000 (8000)	418000 (65000)	244000 (31000)
Eu	1950 (100)	2800 (300)	2400 (100)

[1] $R_D = \frac{\text{activity on solid phase per unit mass of solid}}{\text{activity in solution per unit volume of solution}}$ (measured at 23°C)

[2] All heatings for 385 days, dry

[3] Values in parentheses are estimated standard deviations

Mineral Stability (cont.)

- Molar volume and amount of water in zeolites as f[T,P(H_2O)] feed into EQ3/6 modeling at Livermore

- Vitrophyre dehydration
  -- significant dehydration unanticipated
  -- 20% of F lost at 100°C (142 μg/g)

- Application of mineral stability studies depends on the thermal calculations
  -- expected T-P(H_2O) history; any overpressuring?

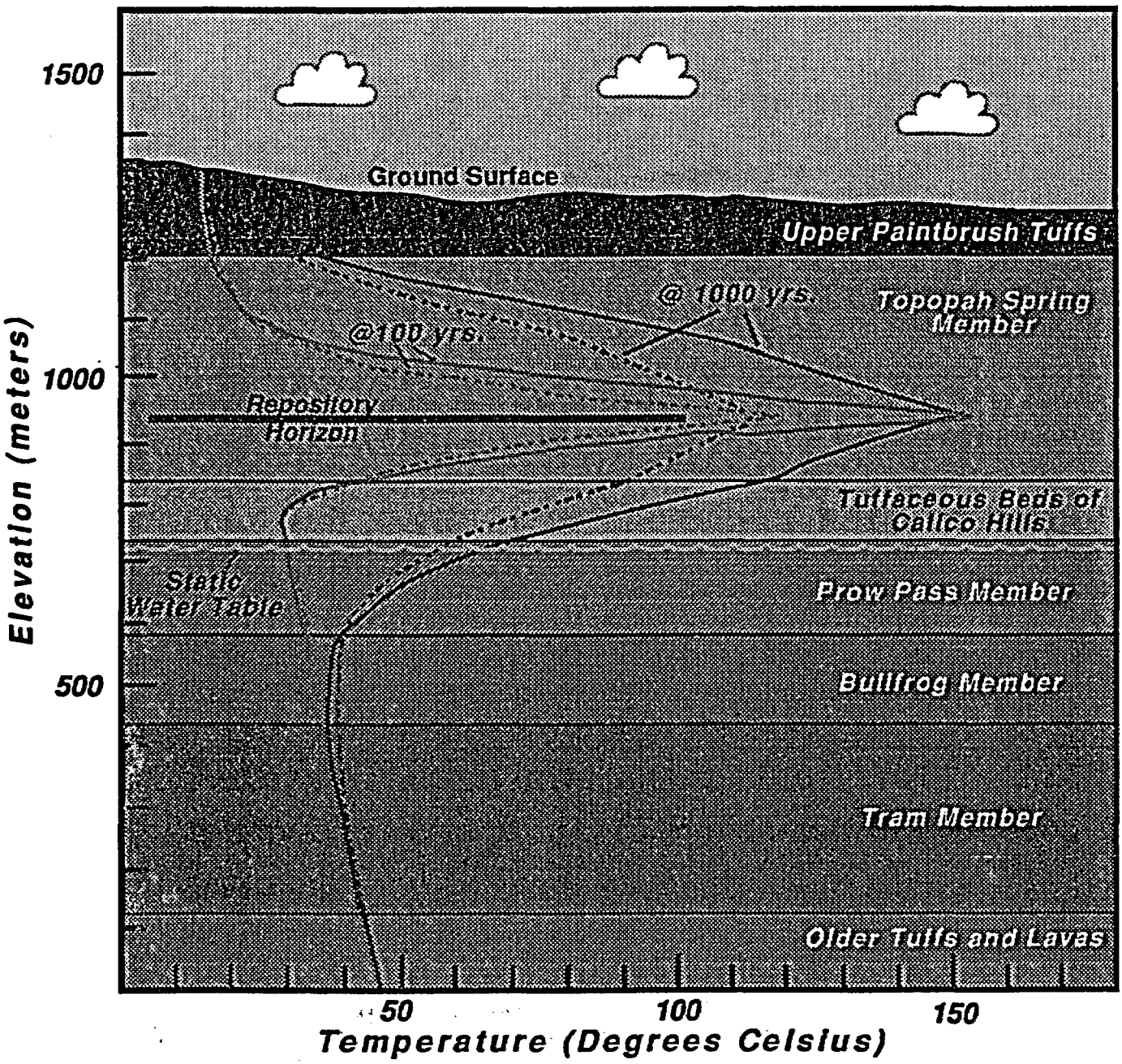
- Zeolites and smectites are active players when the rock is heated
  -- both zeolites and smectites <u>reversibly</u> give off H_2O
  -- this phenomenon should be incorporated in the thermal models

- Need zeolite volume and %H_2O at saturation (H_2O isotherm data)

Chemical Variations in Vitrophyre Sample USW G-4 1330 after Dry Heating for 3.3 Years [all values in μg/g except Na]

	unheated	100°C	400°C
Na	2.76(14)%	2.81(14)%	2.85(14)%
Br	1-3	1-3	1-3
Cl	688(150)	693(150)	744(164)
F	*733(44)*	*591(36)*	*275(17)*
P_2O_5	52(12)	55(13)	61(15)
S	21(5)	21(5)	23(6)

HEATING OF TUFFS IN THE VICINITY OF REPOSITORY DUE TO RADIOACTIVE DECAY OF WASTE



APD = 57 kW/a

APD = 80 kW/a

APD = Areal Power Density

Modified from Brandshaug (Figs. 6-1 and 6-2, SAND87-7079). Geologic contacts for USW G-4; position of repository and geotherms adjusted to stratigraphy in USW G-4.

Mineralogical Alteration

- Goal is to predict the effects of repository-induced temperature and $P(H_2O)$ changes on the present-day mineral assemblages.

  -- will the zeolites transform to higher-temperature, less sorptive phases (w/ lower molar volume and H_2O content)?

  -- e.g., will clinoptilolite transform to analcime?

  -- will the non-welded vitric tuff of Calico Hills react if in contact with warm (or hot) water shed from the potential repository?

  -- what times and temperatures are required to produce mineral reactions (e.g., clino to analcime, crist to quartz)?

Information on Mineralogical Alteration

- Using Yucca Mountain as a natural analogue
  - -- deeper mineral assemblages
  - -- alteration zone between Topopah Spring devitrified tuff and vitrophyre

- Deep paleohydrothermal system
  - -- provide temperatures of silica phase and zeolite reactions
  - -- timing of alteration event (~11 Mya)
  - -- information on the paleohydrologic system

- Topopah Spring alteration zone
  - -- dynamic alteration, concentrated around fractures
  - -- alteration to clino, smectite, and silica phases occurred at 40-100°C
  - -- significant interactions can occur within fractures

Mineralogical Alteration (cont.)

- **Short- and long-term heating experiments as a function of T and $P(H_2O)$.**

  -- scoping experiments under low H_2O:rock ratios (2:1)
  -- significantly different than previous experiments done by YMP
  -- will the nonwelded vitric Calico Hills tuff alter rapidly?
  -- will steam conditions produce unexpected results?
  -- provide guidance for future experiments to be done at Livermore

Important Conclusions

- There is no "magic" temperature, below which repository-induced heating will have no impact.
- Any repository-induced heating will change the water vapor pressure and will affect the zeolites and smectites.
- Reducing the thermal load will modify the nature and extent of these reactions, will not eliminate all reactions.
- The "altered zone" starts at the waste package-tuff boundary and extends out to the point where ambient conditions are reached.