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U.S. DEPARTMENT OF ENERGY

OCRWM

YUCCA MOUNTAIN

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

TPO MEETING

PRESENTED BY

ROBERT M. NELSON, JR.
ACTING PROJECT MANAGER

102

FEBRUARY 25, 1994

9404060201

Enclosure 1B

AGENDA

- Where is the Project going?
- Where are we going organizationally?
- Other concerns

WHERE IS THE PROJECT GOING?

- Funding
  - OCRWM Funding Profile
  - YMP Funding Profile

OCRWM FUNDING PROFILE ($M)

	FY93	FY94	FY95	FY96
YMP	242	260	381	470
Advanced Technology for Near Term Storage Spent fuel storage, transportation, waste acceptance	38	32	57	59
Program Management & Compliance	100	89	95	102
TOTAL	380	381	533	631

YMPFUND.129NELSON.PM4/2/22/94

YMP FUNDING PROFILE ($M)

	WBS	FY95	FY96
1.2.1	Systems Engineering	6.9	7.4
1.2.2	Waste Package	14.8	15.5
1.2.3	Site Investigations	83.9	100.0
1.2.4	Repository	10.9	18.0
1.2.5	Regulatory	24.7	26.0
1.2.6	ESF	101.0	115.0
1.2.7	Test Facilities	11.0	19.0
	NTS	15.0	14.3
1.2.9	Project Management	16.8	17.0
1.2.10	Financial/Technical Assistance	29.2	33.7
1.2.11	QA	9.4	9.6
1.2.12	Information Management	10.8	11.3
1.2.13	Safety & Health	3.5	3.8
	Environmental	13.0	16.4
1.2.14	Institutional	4.0	4.5
1.2.15	Support Services	23.4	29.0
	YMPO Facility*	3.0	30.0
	TOTAL	381.3	470.5

* The lease of the BOA Center expires 3/97. FY95 includes $1M for design of federal space. $2M for design of participant space. FY96 includes $30M commitment for 10 year lease ($10M federal, $20M participant)

YMPFUND.129NELSON.PM4/2/22/94

WHERE ARE WE GOING ORGANIZATIONALLY?

- Status of DOE organization
  - Expectation for approval
  - Open issues
- Phase III organization
  - Construction management
  - Clarification of roles
- Other
  - Transfer of work - D.C. to Nevada

OTHER CONCERNS
(OVERRUNS AND UNDERRUNS)

- TBM Progress
- Other
  - Assuring good public interaction
    - AUG (2/11/94)
    - Upcoming OCRWM Stakeholders Meeting

YUCCA MOUNTAIN NEWS ITEMS

TODAY'S DATE IS: February 25, 1994

1. RADIOACTIVE WASTE PROGRAM NEEDS REVIEW, PANEL SAYS
   Las Vegas Review-Journal, 2/25/94

2. EDITOR, COLUMNIST SHOWED LACK OF PROFESSIONALISM ON TV SHOW
   Las Vegas Sun, 2/24/94

3. WE NEED STORAGE SITE FOR NUCLEAR WASTE
   The New York Times, 2/14/94

4. LAYNE PLANS BID FOR LIEUTENANT GOVERNOR
   Las Vegas Review-Journal, 2/23/94

NEVADA NEWSPAPER SOURCES:	CIRCULATION:	
Las Vegas Review-Journal	140,269 Daily	208,789 Week
Las Vegas Sun	62,735	208,789
Henderson Home News		16,000
Austin Reese River Reveille		500
Death Valley Gateway Gazette		5,500
Elko Free Daily Press	6,700	
Eureka Sentinel		500
Lincoln County Record		1,500
Mason Valley News		3,850
Moapa Valley Progress		2,800
Pahrump Valley Times		5,500
Record Courier (Gardnerville)	7,000	7,000
Tonopah Times		2,502
Reno Gazette-Journal	60,976	72,398
Carson City Nevada Appeal	10,268	11,480
Sparks Tribune	7,000	10,000
Ely Daily Times	2,392	2,600
Inyo Register		3,000

**For further information or assistance please contact:
Corey Lieber, Institutional and External Affairs, SAIC,
phone (702) 794-7246, FAX (702) 794-7623**

Radioactive waste program needs review, panel says

By Keith Rogers
Review-Journal

The federal radioactive waste management program needs an independent review soon to ensure funds are being spent on the most important studies to determine if Yucca Mountain is safe for storing nuclear waste, a presidential panel said Thursday.

The Nuclear Waste Technical Review Board said it believes Department of Energy officials are overdesigning facilities planned for an exploratory tunnel that is being dug at Yucca Mountain, 100 miles northwest of Las Vegas.

The task could be "accomplished more quickly and at less cost if the surface and subsurface support facilities and utilities were reduced in scale and simplified," the 10-member panel said in a letter Thursday to Congress.

"Simply increasing the program's funding will not ensure that adequate funds will be allocated to the most important site-characterization activities or to other critical research," the letter says, noting that the program needs reshaping "regardless of future funding scenarios."

In calling for the review, the letter says the program's bulky structure affects its efficiency.

"The program's organizational structure is multilayered, program entities are geographically dispersed, and responsibility for decision making is spread among too many managers. The result is a lack of overall integration," says the letter signed by panel Chairman John E. Cantlon.

The program employs 2,790 scientists, engineers, technicians, administrators and support staff spread among about 35 contractors, several national laboratories and various government agencies.

The letter to House Speaker Thomas Foley, Senate President Pro Tem Robert Byrd and Energy Secretary Hazel O'Leary was released the same day as a statement from O'Leary.

O'Leary's statement says the 1998 target date for the government taking possession of spent fuel from civilian nuclear power reactors might not be realistic, and the department should address "equity considerations" for taking possession of the waste after 1998.

The Civilian Radioactive Waste Management Office should "explore, in a public proceeding, options for offsetting a portion of the financial burden that would be assumed by utilities associated with the costs incurred through continued on-site storage resulting from delays," O'Leary said.

The panel's letter and O'Leary's statement follows comments made earlier this week by Sen. J. Bennett Johnson, D-La., chairman of the Senate Energy and Natural Resources Committee, who said he doubts Congress will lift budget restrictions on the Yucca Mountain project.

The Energy Department has proposed a $532.9 million budget this year for nuclear waste studies, an increase from last year's $380.7 million budget.

In its letter to Congress, the Nuclear Waste Technical Review Board also recommended the government maintain the momentum of site characterization activities that peaked last year with blasting of a starter tunnel in Yucca Mountain. The tunnel will be used to launch a large boring machine.

The letter's third recommendation says the public's views "must be integrated into the program while key decisions are being made, not afterward."

Editor, columnist showed lack of professionalism on TV show

I agree with SUN Managing Editor Sandra Thompson's evaluation of the recent display of unprofessionalism by two Las Vegas Review-Journal employees, Laura Wingard and Jon Ralston, on a recent "Nevada Week in Review."

There is no place in a progressive culture for these two. They do not provide a credible counterpoint to anything.

Wingard, who is now the R-J city editor, formerly covered the DOE beat, where she had a reputation for being a stenographic reporter who merely parroted the rhetoric of DOE managers. Her lack of initiative and journalistic principles gave DOE assurance that none of its activities would ever be investigated.

Now, recent initiatives by DOE to declassify documents, combined with local courtroom testimony from downwinders, show what really happened. So much for the fourth estate striking a balance for truth in our society.

As for Ralston, he is cut from the same fabric as the "gas bags" and "gadflies" that he loves to write about. The only difference between him and them is ... his vocabulary is better.

Name withheld

The New York Times, 2/14/94

We Need Storage Site For Nuclear Waste

A16

To the Editor:

I am as concerned as you are in "Safeguard All Plutonium Now" (editorial, Feb. 2) about the possible proliferation of nuclear materials from the dismantled nuclear arsenals of the United States and the former Soviet Union. No one is eager to see the nuclear community expand, especially to include such countries as North Korea, Iran, Iraq or Libya. I think that it is so vital that the likes of Saddam Hussein or Kim Il Sung not have a nuclear option at their disposal that I would be willing to accept the Clinton Administration's suggestion that materials from dismantled nuclear weapons be permanently stored in the United States.

I do, however, want to point out a major problem with such a plan.

There is no facility now in the United States that is suitable for storing nuclear materials permanently. I have been very critical of the plan by Hazel O'Leary, the Secretary of Energy, to import spent nuclear fuels into the United States for that reason, among others. I especially object to her decision to store such materials at the Savannah River site in South Carolina, a facility suited for production and reprocessing, not storage.

It is my position that the Department of Energy should proceed with the development of Yucca Mountain in Nevada as a permanent repository for nuclear waste. The Department of Energy has already spent more than $1 billion to turn Yucca Mountain into a storage site capable of holding 77,000 tons of nuclear waste for 10,000 years. It strikes me as common sense that we develop a permanent storage site for nuclear fuel before we begin accepting nuclear materials from throughout the world.

I hope that you continue to use your editorial page to advocate the nonproliferation of nuclear materials. I also hope that you will join me in calling for the construction of the Yucca Mountain repository. It is a project that is necessary, not only for the safe and secure storage of nuclear materials, but also for a safe and secure world.

STROM THURMOND
U.S. Senator from South Carolina
Washington, Feb. 3, 1994

Layne plans bid for lieutenant governor

Views still being drafted

By Jane Ann Morrison
Review-Journal

Las Vegas Republican Bruce Layne, an insurance agency owner, said Tuesday he wants to become Nevada's next lieutenant governor and serve as the people's watchdog.

"I'd be vocal. I'd be a watchdog of the people. I'd be a link between the Legislature and the citizens," Layne told about 60 supporters at a 15-minute announcement speech at the University of Nevada, Las Vegas.

The lieutenant governor's race will be crowded this year. For health reasons, Lt. Gov. Sue Wagner, a Republican, is not seeking re-election.

Other Republicans expected to run include entertainment lawyer John Mason of Incline Village; neurosurgeon and university Regent Lonnie Hammargren of Las Vegas; and former Las Vegas Councilman Steve Miller. Democrats interested in the seat are former Las Vegas Mayor Bill Briare and North Las Vegas Councilwoman Mary Kincaid.

Layne, 48, stressed three issues: being tough on crime, promoting excellence in education and cutting government waste.

He said building a prison in Lovelock and not opening it is a "glaring example" of wasteful government spending.

Gov. Bob Miller, a Democrat, decided not to open the prison to help balance the budget when facing a revenue shortfall in 1992.

★★★★★★ ELECTION '94

In an interview after his speech, Layne said he didn't know what he would have done in that situation.

"I have just started studying (the budget)," he said. "There are areas that can be reallocated if we need it for crime or education," he said. He offered no specifics and said "talk to me in another month or two."

Layne said he plans to spend about $500,000 on the race for the part-time job that pays $20,000 annually.

His positions include:

—Opposing a high-level nuclear waste repository at Yucca Mountain. "I'll fight against it."

—Opposing an Oregon group trying to pass an anti-gay initiative in Nevada. He was uncertain how he would feel if the initiative had been started by Nevadans. "That's an issue I'm going to have to study more."

—Supports the Gibbons Tax Restraint Initiative, which would require tax increases be approved by a two-thirds vote of the Legislature, rather than a simple majority. But a downside, he said, is that political partisanship could play a role in tax policies.

Layne has been active with the UNLV Foundation and Alumni Board. He is vice chairman of the Nevada Athletic Commission, the nonlawyer member of the Nevada State Bar Disciplinary Committee and a member of the Judicial Selection Committee. He was a founding member of Southern Nevada Clean Communities and is active with the Chamber of Commerce and the Nevada Development Authority.

Jeff Scheid/Review-Journal

Bruce Layne, owner of insurance agency Layne and Associates, talks Tuesday after announcing he is a Republican candidate for lieutenant governor.

TPO MEETING

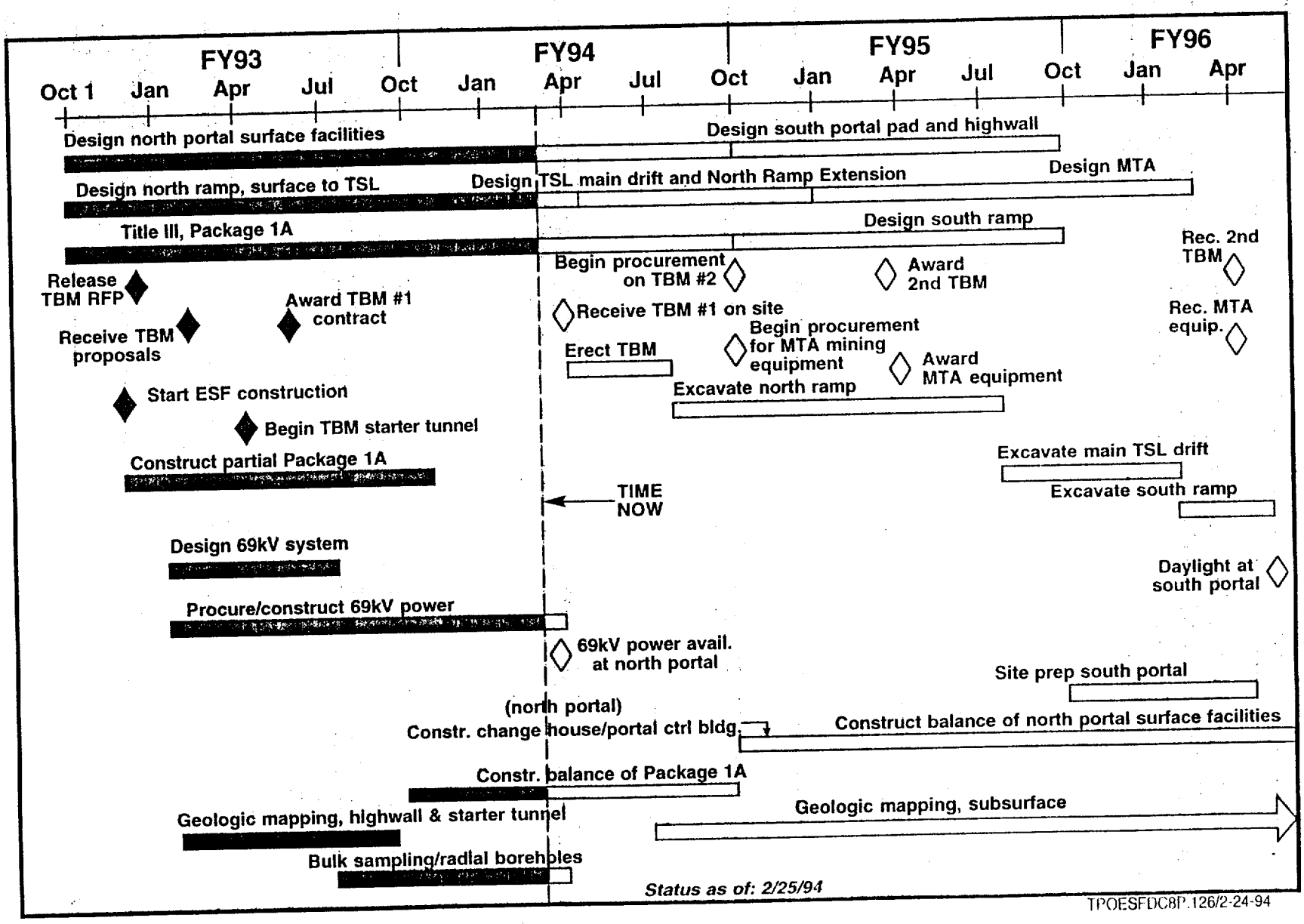
STATUS OF ESF

PRESENTED BY
TED PETRIE
DEPUTY DIRECTOR, ENGINEERING AND DEVELOPMENT DIVISION
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

FEBRUARY 25, 1994

Enclosure 1C

PLANNED ESF DESIGN/CONSTRUCTION ACTIVITIES
FY 93 - 96



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	4/26/94(E)

SESFPM6P6/PM5.126/2 24-94

SLIPPAGE OF PACKAGE 2C 90% REVIEW DUE TO:

- Requirements of Package 1A re-work more than anticipated
- Resources to support review/resolution for Package 2A and 2B more than anticipated
- New scope tasks added to design backlog:
  - Mapping Platform specifications
  - Bow Ridge Fault Investigations
  - Muckpile Relocation Study

ESF CONSTRUCTION MILESTONES

Milestone/Activity	Planned	Expected
Award TBM contract	4/15/94	5/27/93(A)
Complete 61 meters (200ft) starter tunnel	9/20/93	9/9/93(A)
Alcove #1 construction complete	--	--
Receive final TBM shipment	4/4/94	4/4/94(E)
Start TBM operations	8/8/94	8/8/94(E)

SESFDM6P11/PM5.126/2-24-94

ESF PLANNED ACTIVITIES FY94

As needed to support TBM operations:

- 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 Packages 1 and 2
- Start design of Package 8A (TSL Main Drift)

TPO MEETING

FEBRUARY 94 STATUS (FY 94)

SITE CHARACTERIZATION PROGRAM

PRESENTED BY
DENNIS R. WILLIAMS, CHIEF
SITE INVESTIGATIONS BRANCH

FEBRUARY 25, 1994

Enclosure 1D

Planning and Control System (PACS)

Summary Schedule - Current Status

SORT: code7.es
GROUP: RSED FCN

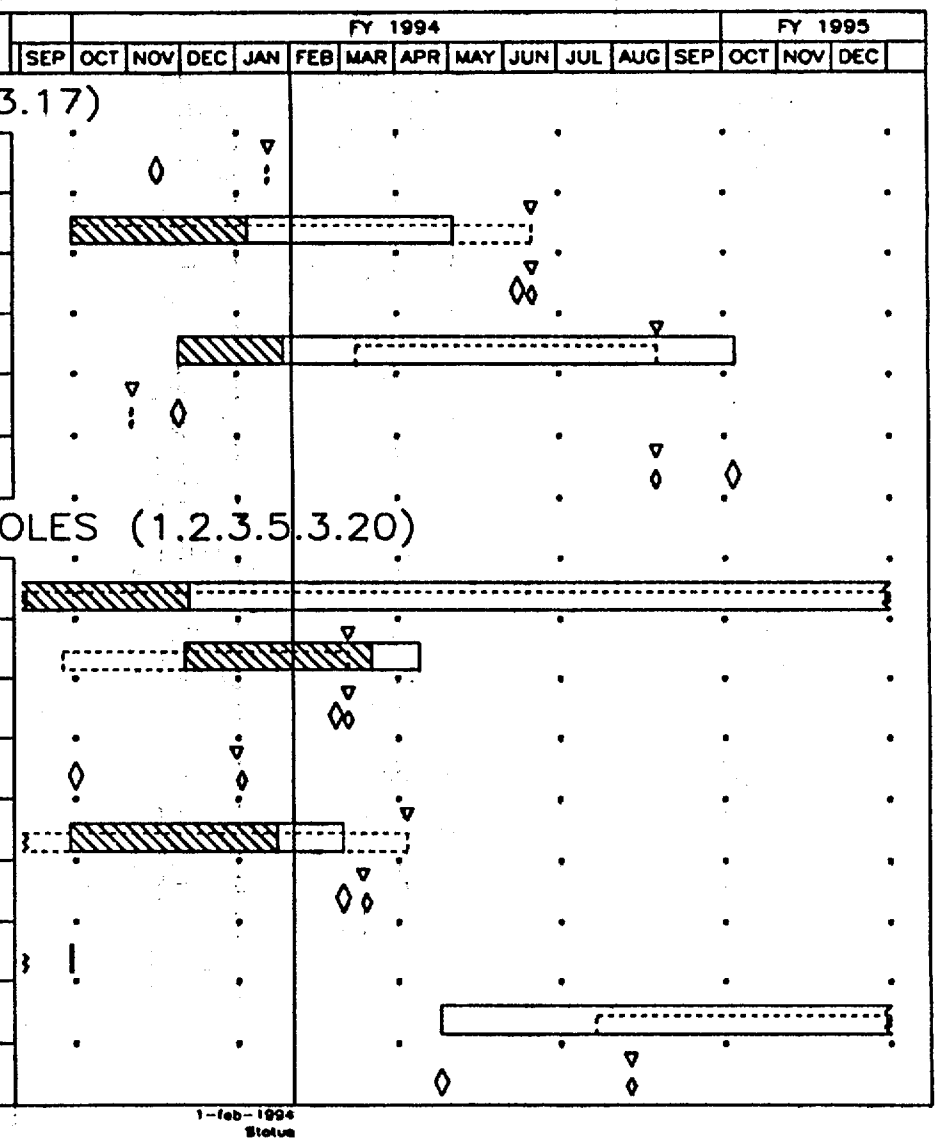
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

- Baseline Network: sum94b
- Current Network: sumire
- ▽ Rev. Finish
- Progress
- Critical

Current Status Date 1-feb-1994

Activity	Description	Start	Finish	Base_Start	Base_Finish
SYSTEMATIC DRILLING PROGRAM (1.2.3.5.3.17)					
T532	BEGIN SYSTEMATIC PROGRAM DRILLING	18-jan-1994	18-jan-1994	17-nov-1993	16-nov-1993
B1AA01	SD-12 JP/ENV/DRILLING	30-sep-1993	15-jun-1994	30-sep-1993	2-may-1994
OR11	COMPLETE SD-12 BOREHOLE - MILESTONE	16-jun-1994	15-jun-1994	8-jun-1994	7-jun-1994
B1AA02	SD-9 JP/ENV/DRILLING	9-mar-1994	24-aug-1994	29-nov-1993	6-oct-1994
JP1515	SD-9 INFORMATION REQUST LETTERS OUT	2-nov-1993	2-nov-1993	29-nov-1993	28-nov-1993
B1AA02A1	COMPLETE SD-9 BOREHOLE - MILESTONE	24-aug-1994	23-aug-1994	6-oct-1994	5-oct-1994
SOIL & ROCK PROPERTIES RAMP BOREHOLES (1.2.3.5.3.20)					
B1AC	SOIL & ROCK PROPERTIES RAMP BOREHOLES	18-nov-1992	23-may-1995	9-jul-1992	13-jun-1995
B1AC01	NRG-7 JP/ENV/DRILLING	24-sep-1993	3-mar-1994	2-dec-1993	12-apr-1994
OR10	COMPLETE NRG-7 BOREHOLE - MILESTONE	4-mar-1994	3-mar-1994	25-feb-1994	24-feb-1994
T049	COMPLETE NORTH RAMP BOREHOLES	3-jan-1994	30-dec-1993	1-oct-1993	30-sep-1993
B1AC02	NRG-8A, B & C (DRILLING ON HOLD)	1-jul-1993	5-apr-1994	28-sep-1993	28-feb-1994
B1AC02A	BEGIN FIELD WORK NRG-8A,B & C	14-mar-1994	11-mar-1994	1-mar-1994	28-feb-1994
JP0500	YMPO ISSUES REQ FOR NRG 8A,B,C TPP/JP	28-jun-1993	28-jun-1993	28-sep-1993	28-sep-1993
B1AC04	SRG-1 JP/ENV/DRILLING	21-jul-1994	30-jan-1995	25-apr-1994	17-feb-1995
JP0300	YMPO ISSUES REQ FOR SRG-1 TPP/JP	9-aug-1994	8-aug-1994	25-apr-1994	22-apr-1994



Planning and Control System (PACS)

Summary Schedule – Current Status

SORT: code7,es
GROUP: RSED FCN

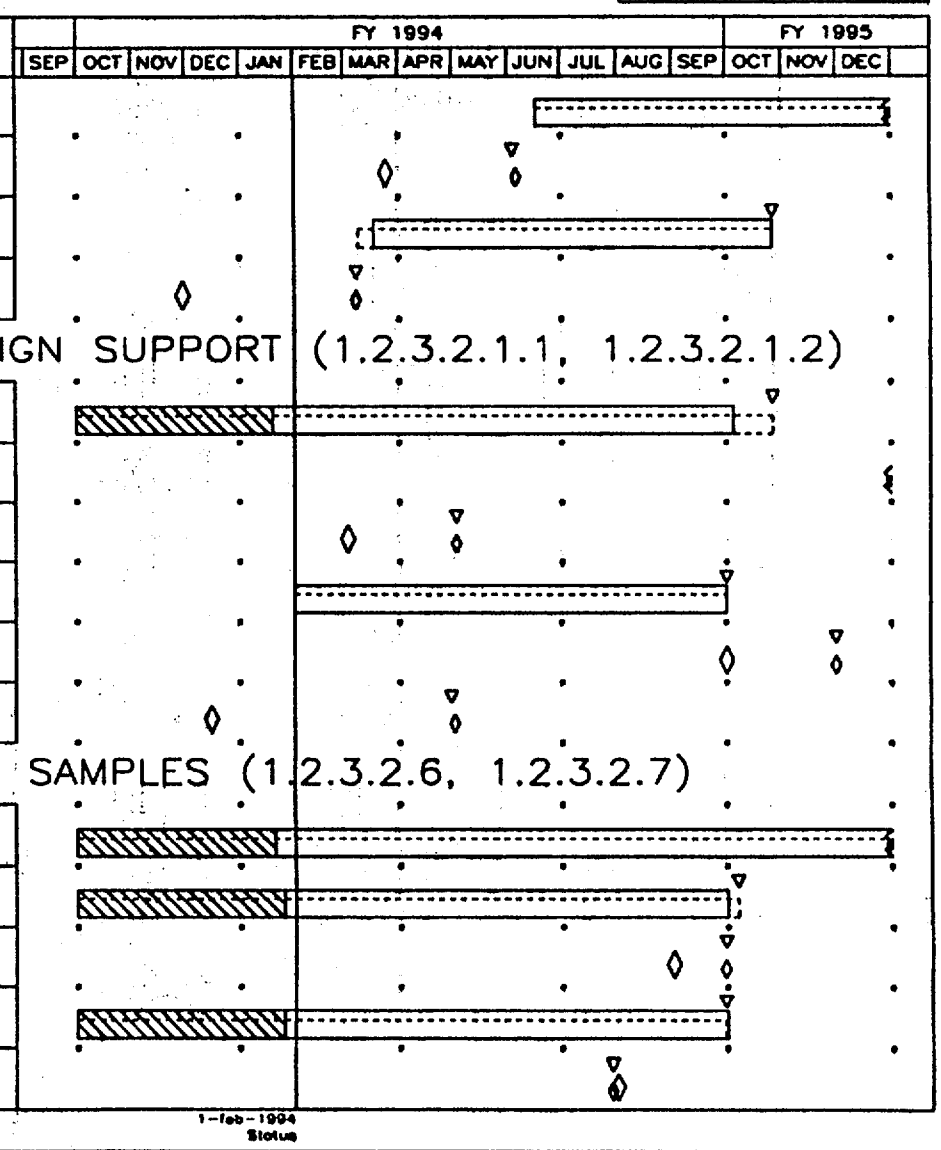
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

Baseline Network: sum94b — Progress
Current Network: sumire — ▽ Rev. Finish — Critical

Current Status Date 1-feb-1994

Activity	Description	Start	Finish	Base_Start	Base_Finish
B1ACD5	SRG-3 JP/ENV/DRILLING	17-jun-1994	9-jan-1995	17-jun-1994	9-jan-1995
JP1700	YMPO ISSUES REQ FOR SRG-3 TPP/JP	6-jun-1994	3-jun-1994	25-mar-1994	24-mar-1994
B1ACO6	SRG-4 JP/ENV/DRILLING	9-mar-1994	26-oct-1994	18-mar-1994	26-oct-1994
JP0050	YMPO ISSUED REQ FOR SRG-4 TPP/JP	8-mar-1994	7-mar-1994	30-nov-1993	29-nov-1993
STRATIGRAPHY/STRUCTURE FOR ESF DESIGN SUPPORT (1.2.3.2.1.1, 1.2.3.2.1.2)					
B1AE	STRATIGRAPHY/STRUCTURE FOR ESF DESIGN SUPPORT	1-oct-1993	26-oct-1994	1-oct-1993	4-oct-1994
T266	COMPLETE GEOCHEMISTRY FOR LAD	29-sep-2000	28-sep-2000	29-sep-2000	28-sep-2000
3GGF012M	ANALYSIS PPR: DATA-STARTER TUNNEL & NORTH PORTAL	3-may-1994	2-may-1994	3-mar-1994	2-mar-1994
3GGF121	conduct struct. mapping of selected areas- GDF	1-feb-1994	30-sep-1994	1-feb-1994	30-sep-1994
3GGF121M	REPORT/TDIF: MAPS OF SELECTED AREAS GDF ZONE	1-dec-1994	30-nov-1994	1-oct-1994	30-sep-1994
3GGU440M	ANALYSIS PPR: MAG/GRAV ACROSS GHOST DANCE FAULT	2-may-1994	29-apr-1994	16-dec-1993	15-dec-1993
LABORATORY TESTING OF ESF BOREHOLE SAMPLES (1.2.3.2.6, 1.2.3.2.7)					
B1AG	LABORATORY TESTING OF ESF BOREHOLE SAMPLES	1-oct-1993	16-oct-1995	1-oct-1993	29-aug-1995
32712D94	CONDUCT THERMAL EXP. TESTING TO SUPP. ESF DESIGN	1-oct-1993	6-oct-1994	1-oct-1993	30-sep-1994
OS91	RESULTS OF THERMAL EXPANSION TESTING & DATA	30-sep-1994	29-sep-1994	1-sep-1994	31-aug-1994
32714D03	CONDUCT FRACTURE EXPERIMENTS TO SUPP ESF DESIGN	1-oct-1993	29-sep-1994	1-oct-1993	30-sep-1994
OS101	SUBMIT SAND RPT ON DATA FROM RAMP BOREHOLES	29-jul-1994	28-jul-1994	1-aug-1994	29-jul-1994



Planning and Control System (PACS)

Summary Schedule – Current Status

SORT: code7.es
GROUP: RSED FCN

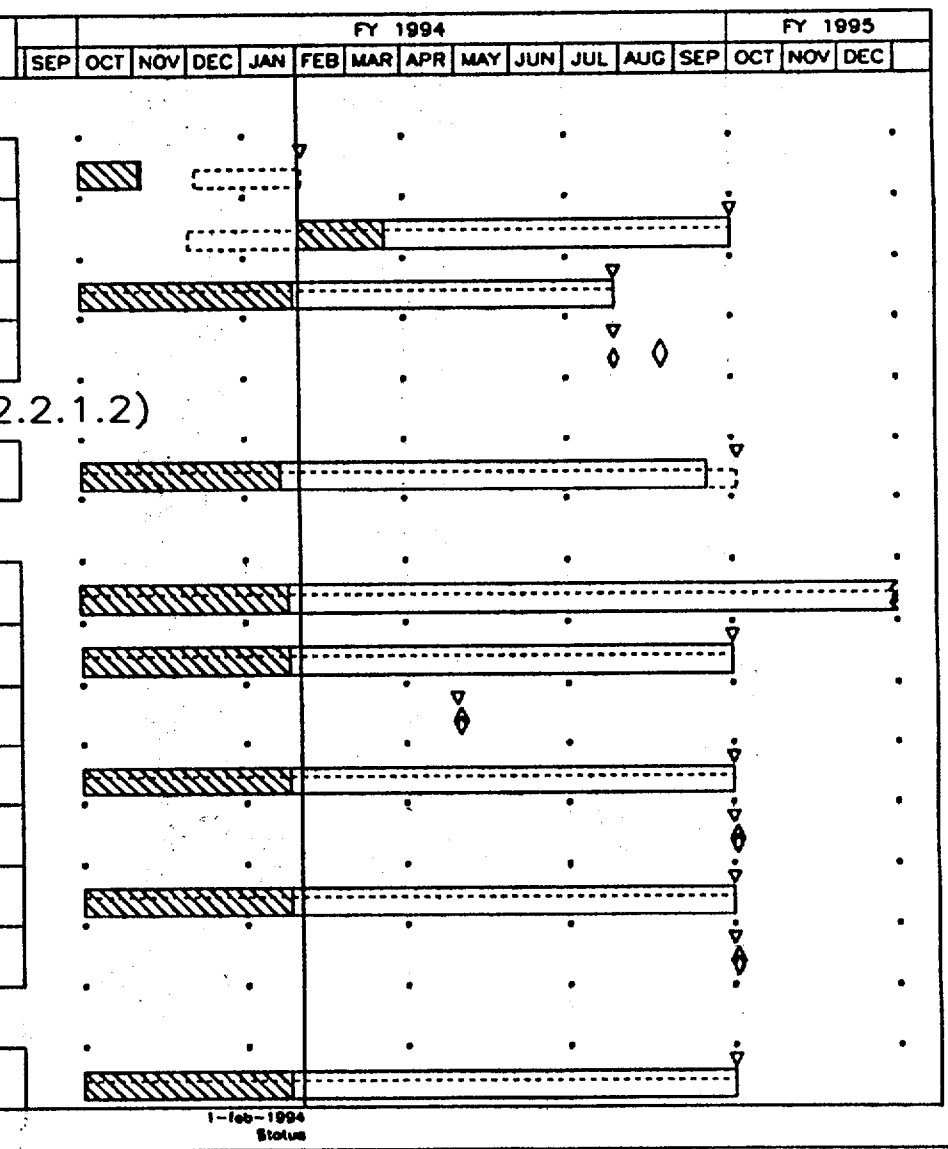
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

Baseline Network: sum94b
Current Network: sumire
Rev. Finish
Progress
Critical

Current Status Date
1-feb-1994

Activity	Description	Start	Finish	Base_Start	Base_Finish
GEOPHYSICS (1.2.3.11)					
RS2030	NORTH RAMP BOREHOLE LOGGING	5-dec-1993	2-feb-1994	1-oct-1993	4-nov-1993
3B300014	LASER-INDUCED BREAKDOWN SPECTR. ESF FIELD MEAS.	1-dec-1993	30-sep-1994	1-feb-1994	30-sep-1994
B1AI04	AQUIRE AND ANALYZE FIELD DATA FROM VSP	1-oct-1993	27-jul-1994	1-oct-1993	27-jul-1994
3GGF241M	ANLYS PAPER: ADDITIONAL SURFACE REFLECT IMAGING	28-jul-1994	27-jul-1994	23-aug-1994	22-aug-1994
GEOLOGIC MAPPING OF THE ESF (1.2.3.2.2.1.2)					
B2BA01	GEOLOGIC MAPPING FY-94	1-oct-1993	3-oct-1994	1-oct-1993	16-sep-1994
GEOLOGIC STUDIES (1.2.3.2, 1.2.3.4)					
B2BC	GEOLOGIC STUDIES	1-oct-1993	31-jan-1995	30-sep-1993	31-jan-1995
32111220	ANALYZE QUANTATATIVE MINERALOGY OF CORE (BAF)	1-oct-1993	30-sep-1994	1-oct-1993	30-sep-1994
3372	LAMS REPORT ON QUANT MINERALOGY IN UZ-16	2-may-1994	29-apr-1994	2-may-1994	29-apr-1994
32111209	TRACE MINERAL STUDIES (BA3)	1-oct-1993	30-sep-1994	1-oct-1993	30-sep-1994
3255	TRACE MINERAL STUDY (M3)	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
32112208	LONG TERM HEATING EXPERIMENTS (CAC)	1-oct-1993	30-sep-1994	1-oct-1993	30-sep-1994
4010	LETTER RPT ON LONG TERM HTG OF ZEO & GLASSES	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
ESF HYDROLOGY TESTS (1.2.3.3)					
B2BD	ESF HYDROLOGY TESTS	1-oct-1993	30-sep-1994	30-sep-1993	30-sep-1994



Planning and Control System (PACS)

Summary Schedule – Current Status

SORT: code7,es
GROUP: RSED FCN

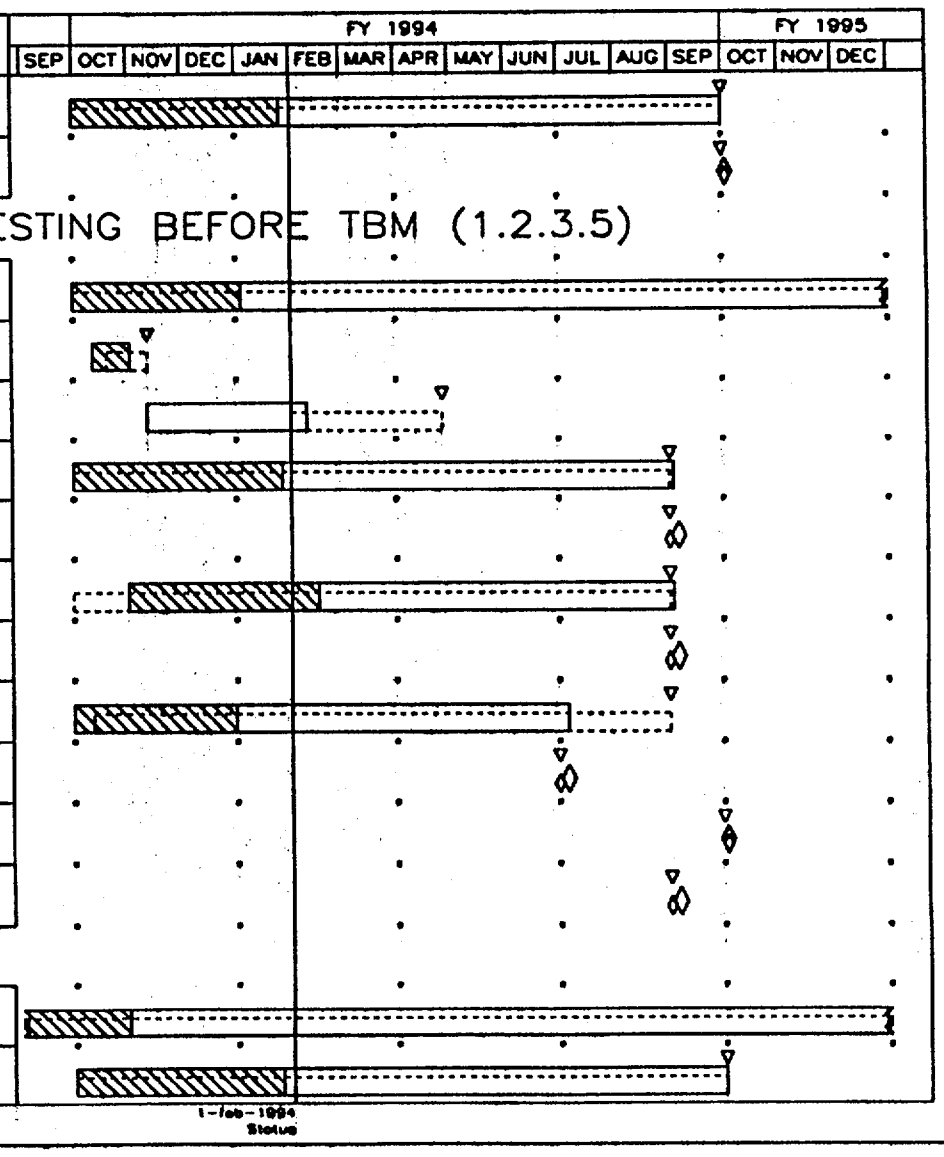
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

- Baseline Network: sum94b
- Current Network: sumlre
- ▽ Rev. Finish
- Progress
- Critical

Current Status Date 1-feb-1994

Activity / Start	Description / Finish	Base_Start	Base_Finish
33122138	ANALYZE CUTTINGS FROM SURFACE-BASED HOLES (H30)		
1-oct-1993	30-sep-1994	1-oct-1993	30-sep-1994
3417	PROGRESS REPORT ON CI-36 ANALYSIS		
3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
PNEUMATIC & HYDRAULIC PROPERTIES TESTING BEFORE TBM (1.2.3.5)			
B2BE	PNEUMATIC & HYDRAULIC PROPERTIES TESTING BEFORE TB		
1-oct-1993	29-dec-1997	1-oct-1993	31-dec-1996
OR33124A	DRILL HYDROCHEMISTRY HOLES 1ST ALCOVE		
20-oct-1993	11-nov-1993	12-oct-1993	1-nov-1993
OR33124B	RADIAL BOREHOLES 1ST ALCOVE		
1-feb-1994	26-apr-1994	12-nov-1993	9-feb-1994
3GUS014G	monitor occurrence & conduct perched-water tests		
1-oct-1993	31-aug-1994	1-oct-1993	2-sep-1994
3GUS014M	DATA TO LRC: 1ST-3RD QTR FY94 ESF PERCHED WATER		
1-sep-1994	31-aug-1994	6-sep-1994	2-sep-1994
B2BE04	ESF HYDRO-CHEMISTRY		
1-oct-1993	31-aug-1994	1-nov-1993	2-sep-1994
3GUS401M	DATA TO LRC: 1ST-3RD QTR FY94 ESF HYDROCHEMISTRY		
1-sep-1994	31-aug-1994	6-sep-1994	2-sep-1994
B2BE05	GAS PHASE TRACER TESTS		
12-oct-1993	31-aug-1994	1-oct-1993	5-jul-1994
3GGP05M	DATA TO LRC: 1ST & 2ND QTR FY94 GAS SAMPLE DATA		
1-jul-1994	30-jun-1994	6-jul-1994	5-jul-1994
3GUP066M	ANALYSIS PAPER: UZ-16 COMPLETION REPORT (P013)		
3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
3GUS021M	ANALYSIS PAPER: PERCHED WATER		
1-sep-1994	31-aug-1994	6-sep-1994	2-sep-1994
GEOCHEMISTRY EXPERIMENTS (1.2.3.4)			
B3CA	GEOCHEMISTRY EXPERIMENTS		
28-feb-1993	30-sep-1996	28-feb-1993	29-sep-1995
B3CA01	DISSOLVED SPECIES CONCENTRATION LIMITS		
1-oct-1993	30-sep-1994	1-oct-1993	30-sep-1994



Planning and Control System (PACS)

Summary Schedule – Current Status

SORT: code7,es
GROUP: RSED FCN

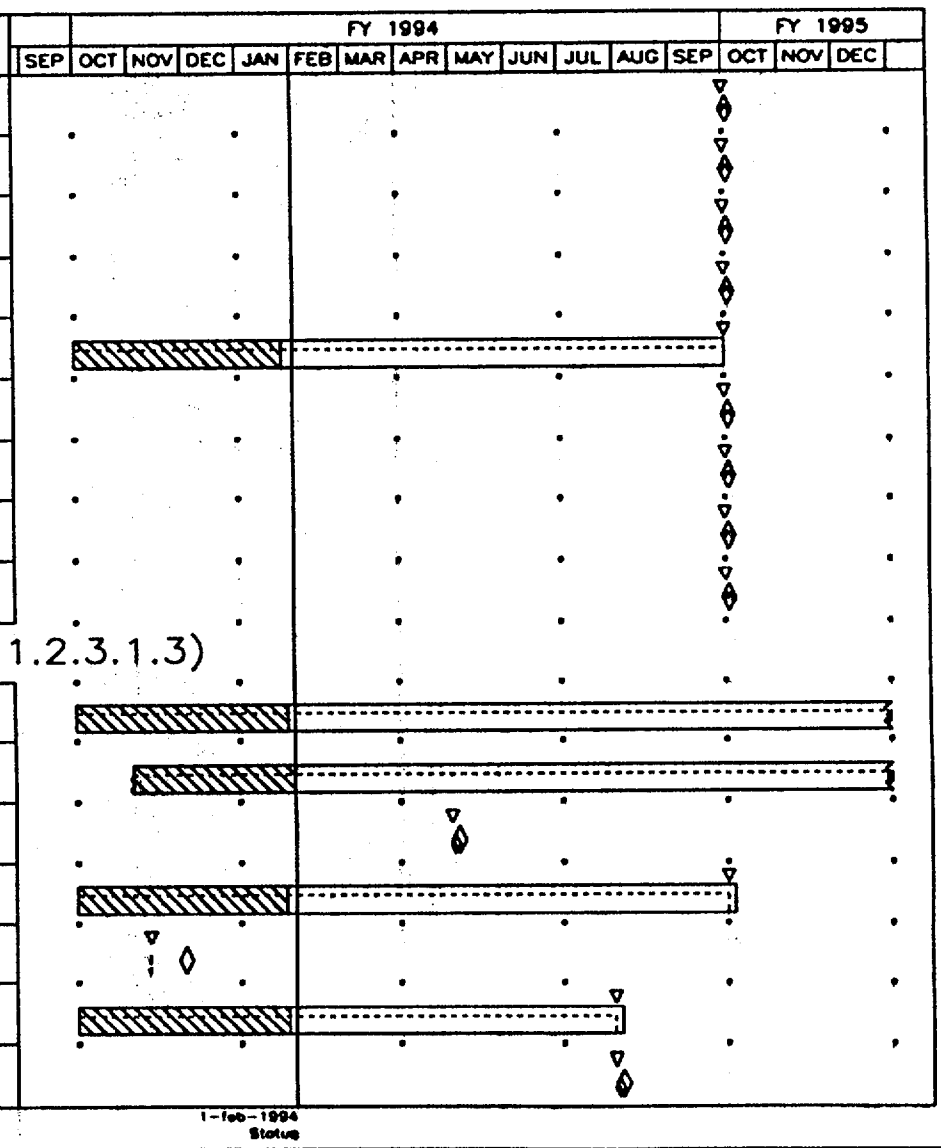
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

Baseline Network: sum94b
Current Network: sumire
Rev. Finish
Progress
Critical

Current Status Date
1-feb-1994

Activity	Description	Start	Finish	Base_Start	Base_Finish
3411	RPT SOLUBILITY OF Np, Pu, Am IN NEUT ELECTRO SOL	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
3412	RPT SOLUB COMPARISON OF Np, Pu, Am FROM UNDERSAT	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
3413	RPT Np SPECIA BY NMR/OTHER OPTICAL SPECTROSCOPY	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
4025	LETTER RPT THERMOCHEMICAL DATA ON ACTINIDES	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
B3CAQ2	DYNAMIC TRANSPORT COLUMN EXPERIMENTS	1-oct-1993	30-sep-1994	1-oct-1993	30-sep-1994
3041	KINETICS OF SORPTION ON CRUSHED TUFF COLS (M3)	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
3383	PROG REPORT: FILTRATION EXPERIMENTS YM TUFF (M3)	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
3414	EFFECT OF FRAC COATINGS ON RADIONUCLIDE TRANS	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
3415	RPT VAL BATCH SORP Kds FOR RADIONUC TRAN POR MED	3-oct-1994	30-sep-1994	3-oct-1994	30-sep-1994
HYDROLOGIC MONITORING (1.2.3.3.1.1.1, 1.2.3.1.3)					
B3CE	HYDROLOGIC MONITORING	1-oct-1993	3-jan-1995	1-oct-1993	3-jan-1995
B3CE01	PRECIP. & METEOR. MONITORING FOR REGION	1-nov-1993	29-sep-1995	2-nov-1993	29-sep-1995
3GRS033M	PUBLICATION: STREAMFLOW & PRECIP DATA FY91-93	2-may-1994	29-apr-1994	4-may-1994	3-may-1994
3GRS054	collect FY94 runoff and streamflow data	1-oct-1993	30-sep-1994	1-oct-1993	4-oct-1994
3GRS026M	FY93 RUNOFF DATA TO PDA	10-nov-1993	10-nov-1993	1-dec-1993	30-nov-1993
B3CE03	REGIONAL GROUND WATER FLOW SYSTEM	1-oct-1993	29-jul-1994	1-oct-1993	2-aug-1994
B3CE03A	REGIONAL HYDROCHEMICAL DATA TO LRC	1-aug-1994	29-jul-1994	3-aug-1994	2-aug-1994



Planning and Control System (PACS)

Summary Schedule – Current Status

SORT: code7.es
GROUP: RSED FCN

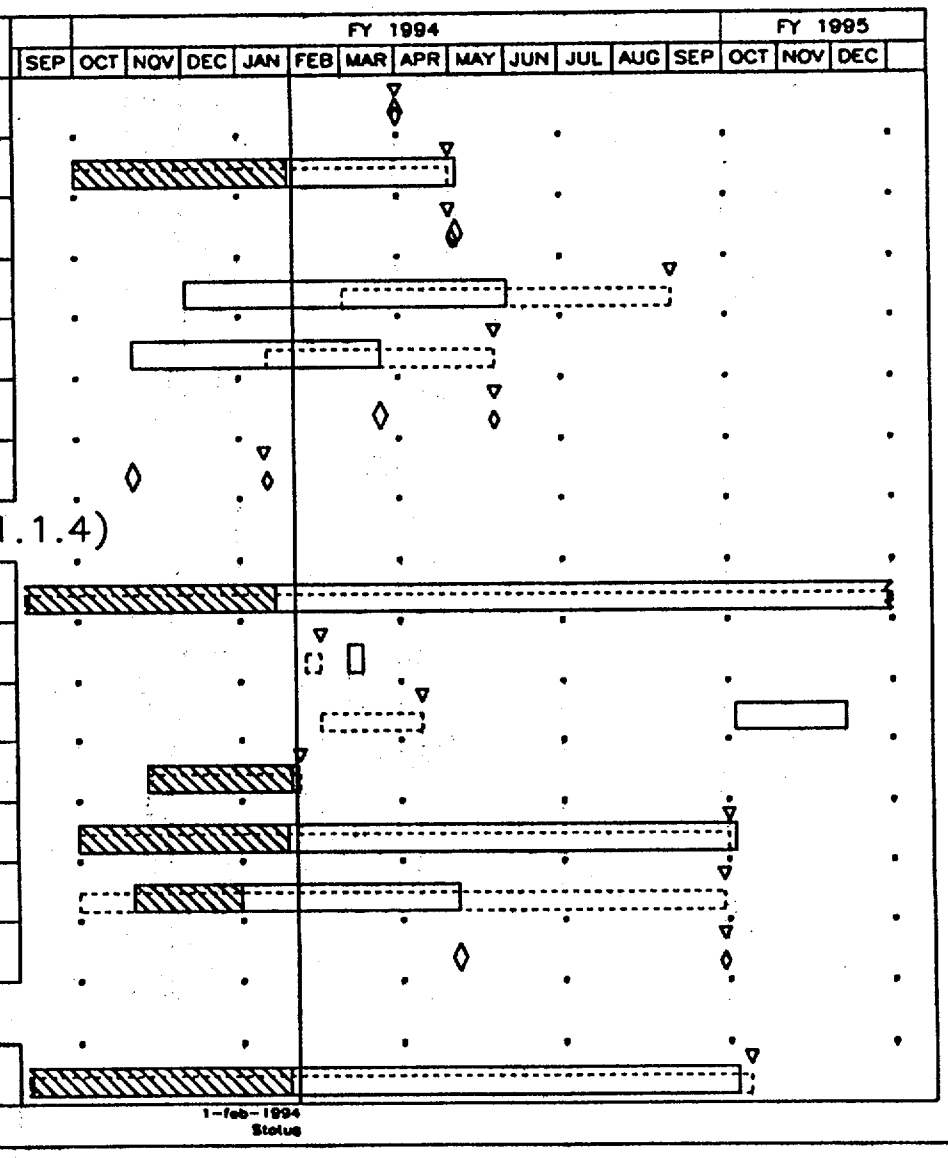
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

Baseline Network: sum94b
Current Network: sumire
Rev. Finish
Progress
Critical

Current Status Date 1-feb-1994

Activity	Description	Start	Finish	Base_Start	Base_Finish
3GRG078M	DATA TO TDB: PRE FY94 WATER-LEVEL DATA	1-apr-1994	31-mar-1994	1-apr-1994	31-mar-1994
B3CE04	UZ INFILTRATION	1-oct-1993	29-apr-1994	1-oct-1993	3-may-1994
3GUI375M	DATA TO LRC: FY93 NATURAL INFILTRATION DATA	2-may-1994	29-apr-1994	4-may-1994	3-may-1994
B3CE06	SZ HYDROCHEMISTRY	1-mar-1994	31-aug-1994	2-dec-1993	31-may-1994
B3CE07	NYE COUNTY COOPERATIVE DRILLING TPP&JP	17-jan-1994	24-may-1994	2-nov-1993	21-mar-1994
B3CE07A	NYE COUNTY COOPERATIVE TPP & JP COMPLETE	25-may-1994	24-may-1994	22-mar-1994	21-mar-1994
JP0900	YMPO ISSUES REQ FOR NYE-1 TPP/JP	17-jan-1994	14-jan-1994	2-nov-1993	1-nov-1993
C-WELL TESTING (1.2.3.3.1.3.1, 1.2.3.3.1.1.4)					
B4DA	C-WELL TESTING	1-oct-1992	17-dec-1996	1-oct-1992	17-dec-1996
OR35311F	C-WELL PIPE LOAD/HAUL/STRING	7-feb-1994	14-feb-1994	3-mar-1994	10-mar-1994
OR35311D	C-WELL COMPLEX DISCHARGE PIPELINE INSTALLATION	15-feb-1994	12-apr-1994	5-oct-1994	5-dec-1994
OR353BD4	C-WELL INTERFERENCE TESTING	9-nov-1993	2-feb-1994	9-nov-1993	1-feb-1994
3GWF050	prepare for convergent tracer test at C-holes	1-oct-1993	30-sep-1994	1-oct-1993	4-oct-1994
3GWM38CA	study scale effects	1-oct-1993	27-sep-1994	1-nov-1993	2-may-1994
3GWM38CM	REPORT ON SCALE EFFECTS AND INVERSION ALGORITHM	28-sep-1994	27-sep-1994	3-may-1994	2-may-1994
FRAMEWORK STUDIES (1.2.3.2.2.1.1)					
B4DC	FRAMEWORK STUDIES	28-jun-1993	11-oct-1994	28-jun-1993	4-oct-1994



Planning and Control System (PACS)

Summary Schedule – Current Status

SORT: code7,es
GROUP: RSED FCN

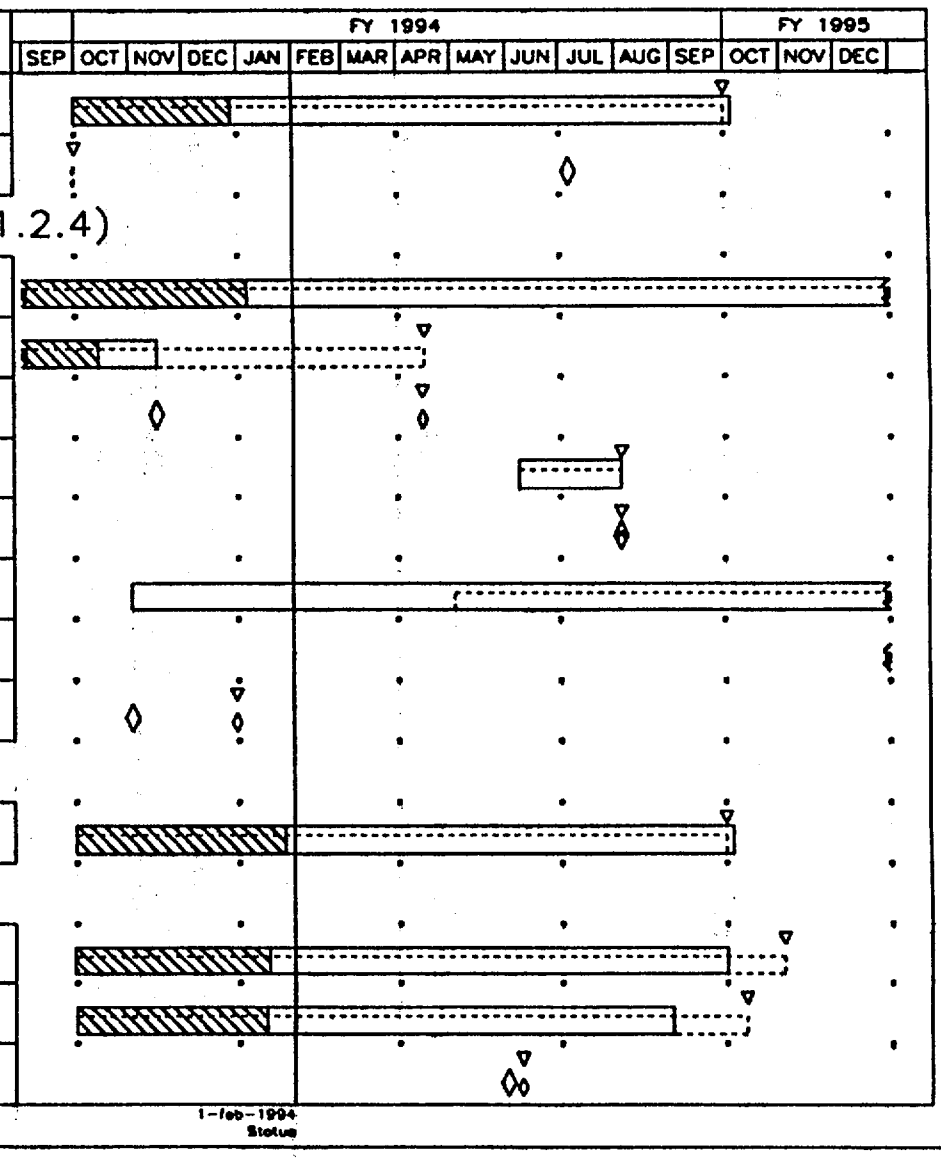
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

Baseline Network: sum94b — Progress
Current Network: sumlre — ▽ Rev. Finish — Critical

Current Status Date 1-feb-1994

Activity / Start	Description / Finish	Base_Start	Base_Finish
XB4DC02	VERT & LAT DIST OF STRAT UNITS IN SITE		
1-oct-1993	30-sep-1994	1-oct-1993	4-oct-1994
3GGU021M	PROGRESS REPORT: ANALYTICAL DATABASE		
30-sep-1993	30-sep-1993	6-jul-1994	5-jul-1994
UZ PERCOLATION (1.2.3.3.1.2.3, 1.2.3.3.1.2.4)			
B4DE	UZ PERCOLATION		
1-oct-1992	7-mar-1995	1-oct-1992	18-jan-1995
B4DE01	UZ-14 DRILLING PHASE 1&2		
29-jul-1993	15-apr-1994	29-jul-1993	15-nov-1993
XB4DE01A	COMPLETE UZ-14 DRILLING		
15-apr-1994	14-apr-1994	16-nov-1993	15-nov-1993
OR3535D4	UZ-16 COMPLETION (INST/STEM)		
8-jun-1994	3-aug-1994	8-jun-1994	3-aug-1994
XB4DE02A	COMPLETE UZ-16(INST/STEM)		
4-aug-1994	3-aug-1994	4-aug-1994	3-aug-1994
B4DE03	UZ-7A JP/ENV/DRILLING		
3-may-1994	24-jan-1995	2-nov-1993	6-feb-1995
XB4DE03A	COMPLETE UZ-7A DRILLING		
16-feb-1995	15-feb-1995	7-feb-1995	6-feb-1995
JP1900	YMPO ISSUES REQ FOR UZ-7A TPP/JP		
31-dec-1993	30-dec-1993	2-nov-1993	1-nov-1993
UZ INFILTRATION (1.2.3.1.2.1)			
B4DG01	UZ INFILTRATION		
1-oct-1993	30-sep-1994	1-oct-1993	4-oct-1994
GEOCHEMISTRY STUDIES (1.2.3.4)			
B4DK	GEOCHEMISTRY STUDIES		
1-oct-1993	1-nov-1994	30-sep-1993	30-sep-1994
B4DK01	EQ3/6 SUPPORT		
1-oct-1993	11-oct-1994	1-oct-1993	31-aug-1994
MOL59	CERTIFY EQ3 V.7.0		
9-jun-1994	8-jun-1994	1-jun-1994	31-may-1994



Planning and Control System (PACS)

Summary Schedule – Current Status

SORT: code7,es
GROUP: RSED FCN

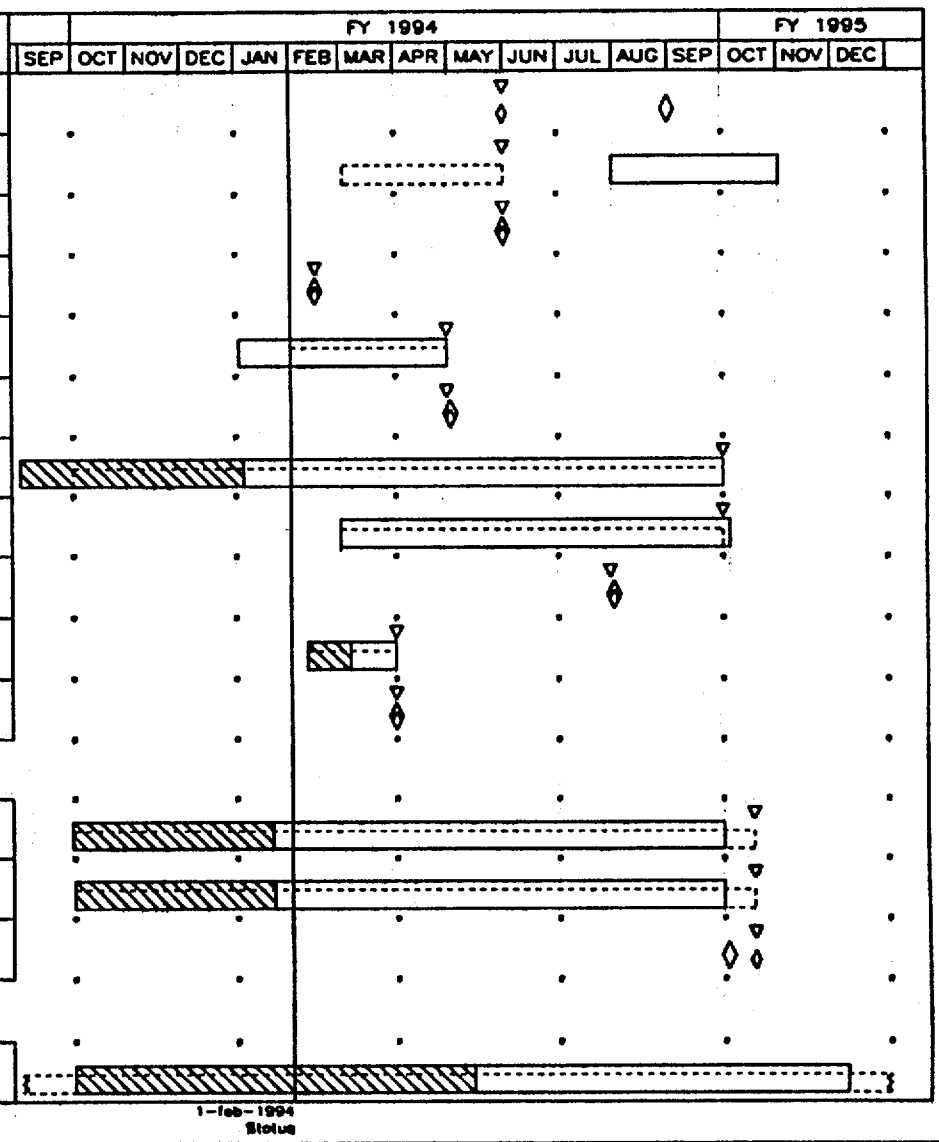
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

- Baseline Network: sum94b
- Current Network: sumlre
- ▽ Rev. Finish
- Progress
- Critical

Current Status Date 1-feb-1994

Activity / Start	Description / Finish	Base_Start	Base_Finish
3GPF118M	PUBLICATION: STAGE COACH RD FAULT		
1-jun-1994	31-may-1994	1-sep-1994	31-aug-1994
B4DM07	MIDWAY VALLEY STUDY		
3-mar-1994	31-may-1994	1-aug-1994	1-nov-1994
3GFP029M	PUBLICATION: MIDWAY VALLEY		
1-jun-1994	31-may-1994	1-jun-1994	31-may-1994
3GPF026M	REPORT/TDIF: QUATERNARY FAULT MAP		
15-feb-1994	14-feb-1994	15-feb-1994	14-feb-1994
3GSE005	develop tech proc: ID maximum background EQ		
1-feb-1994	29-apr-1994	3-jan-1994	29-apr-1994
3GSS105M	TECH PROCEDURE: METHODOLGY –ID MAX BACKGROUND EQ		
2-may-1994	29-apr-1994	2-may-1994	29-apr-1994
B4DM20A	HISTORICAL & CURRENT SEISMICITY		
1-oct-1993	30-sep-1994	1-sep-1993	30-sep-1994
3GSM165	install & operate strong motion array		
1-mar-1994	30-sep-1994	1-mar-1994	4-oct-1994
3GSM025M	PUBLICATION: CATALOG OF SEISMIC EVENTS –CY 1993		
1-aug-1994	29-jul-1994	1-aug-1994	29-jul-1994
3GSM157A	install second node		
10-feb-1994	31-mar-1994	10-feb-1994	31-mar-1994
3GSM24AM	DATA TO LRC: SEISMIC DATA		
1-apr-1994	31-mar-1994	1-apr-1994	31-mar-1994
VOLCANISM (1.2.3.2.5)			
B4DO	VOLCANISM		
1-oct-1993	17-oct-1994	30-sep-1993	30-sep-1994
B4DO01	BASALTIC VOLCANISM STUDIES		
1-oct-1993	17-oct-1994	1-oct-1993	30-sep-1994
3398	STRUCTURAL CONTROLS OF SITES OF BASALTIC VOL		
18-oct-1994	17-oct-1994	3-oct-1994	30-sep-1994
CLIMATOLOGY (1.2.3.6.2)			
B4DO	CLIMATOLOGY		
4-jan-1993	30-jan-1995	1-oct-1993	7-dec-1994



Planning and Control System (PACS)

Summary Schedule – Current Status

SORT: code7,es
GROUP: RSED FCN

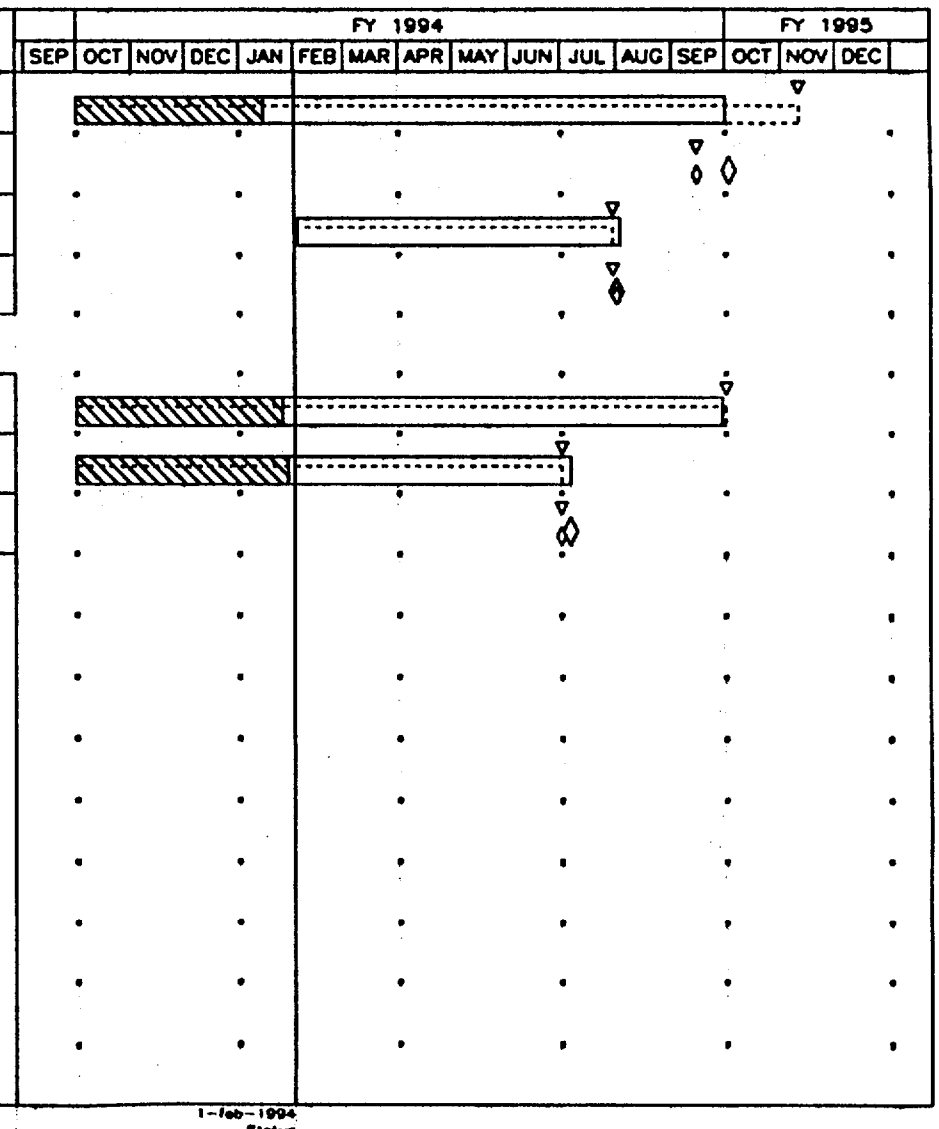
SELECTION: FY1994 RSED Priorities

Activity Bar Legend

Baseline Network: sum94b
Current Network: sumire
Rev. Finish
Progress
Critical

Current Status Date 1-feb-1994

Activity Start	Description Finish	Base_Start	Base_Finish
B4DQ01	VALIDATION OF CLIMATE MODEL		
1-oct-1993	10-nov-1994	1-oct-1993	30-sep-1994
0S97	CONTRACTOR RPT ON RESULTS OF CURRENT CLIMATE VAL		
15-sep-1994	14-sep-1994	3-oct-1994	30-sep-1994
B4DQ02	RADIO CARBON DATES/TDIF		
1-feb-1994	29-jul-1994	3-feb-1994	2-aug-1994
3GCL132M	PROVISIONAL RESULTS: RADIOCARBON DATING RESULTS		
1-aug-1994	29-jul-1994	1-aug-1994	29-jul-1994
RESOURCE ASSESSMENT (1.2.3.7)			
B4DR	RESOURCE ASSESSMENT		
1-oct-1993	30-sep-1994	1-oct-1993	28-sep-1994
3GNR020	conduct mineralztn logging from UZ-14 & UZ-16		
1-oct-1993	30-jun-1994	1-oct-1993	5-jul-1994
3GNR020M	ANLYS PPR:ALTERATIONS IN CORE FROM UZ-14 & UZ-16		
1-jul-1994	30-jun-1994	6-jul-1994	5-jul-1994



Site Characterization Field Activities in Progress

SCP ACTIVITY	TITLE	ACTIVITY
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
8.3.1.2.1.3	Regional Groundwater Flow System	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 (SBT drillholes, ESF)
8.3.1.2.2.3	Percolation in the Unsaturated Zone	UZ drilling/testing
8.3.1.2.2.4	Characterization of the Unsaturated Zone (ESF)	Hydrochemistry/Radial borehole 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 (SBT)	UZ drilling/testing

As of 2/25/94

Site Characterization Field Activities in Progress continued

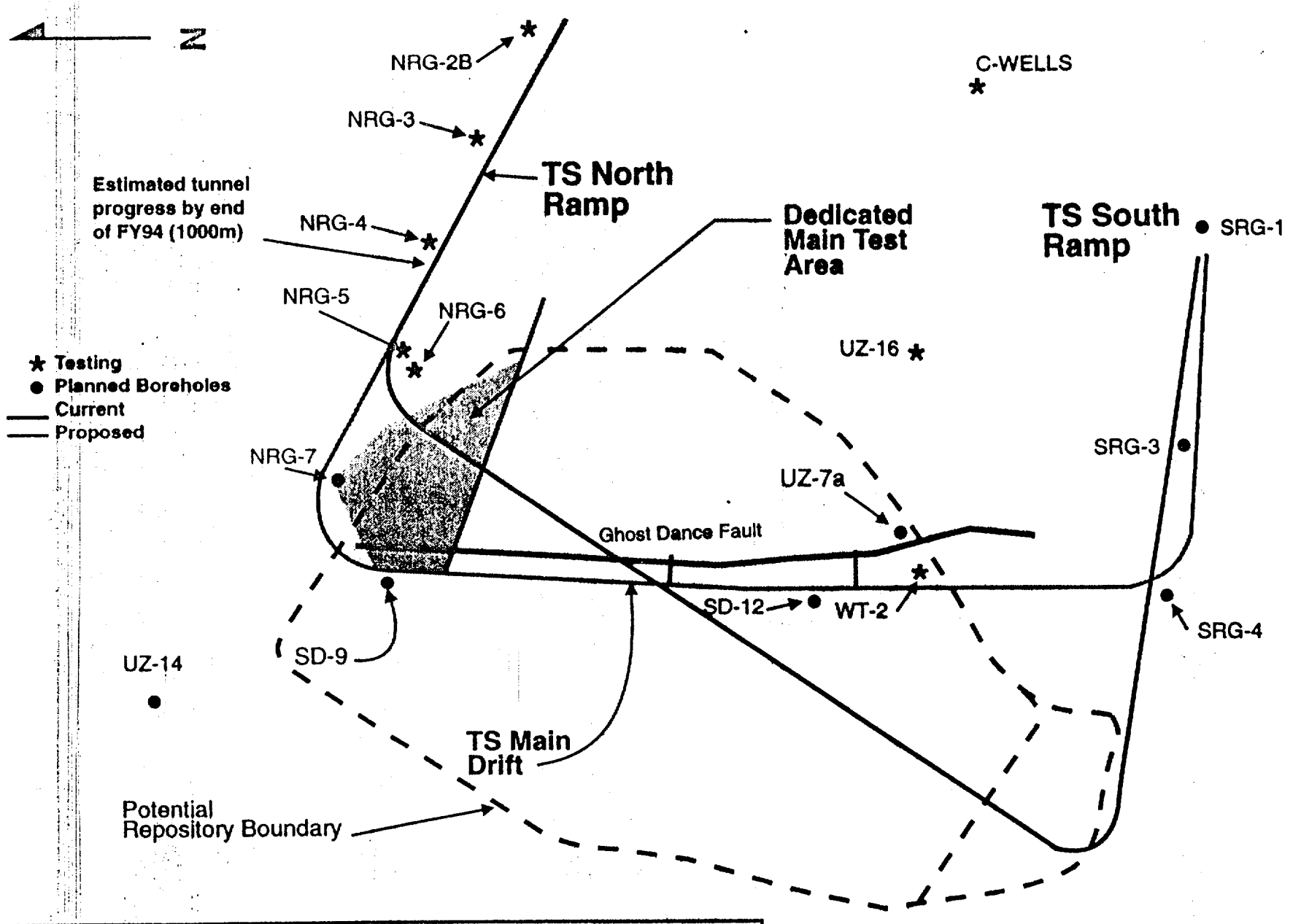
SCP ACTIVITY	TITLE	ACTIVITY
8.3.1.2.3.1	Site Saturated Zone Groundwater Flow System	On-going monitoring, C-well testing
8.3.1.2.3.2	Saturated Zone Hydrochemistry	On-going monitoring
8.3.1.3.2.1	Mineralogy, Petrology, and Rock Chemistry of Transport Pathways	ESF sampling
8.3.1.3.2.2	Mineralogic and Geochemical Alteration	ESF sampling
8.3.1.4.2.1	Characterization of Vertical/laterial Distribution of Stratigraphic Units in the Site Area	Core logging (on-going)
8.3.1.4.2.2	Structural Features Within Site Area	Surface & ESF mapping
8.3.1.4.3.1	Systematic Acquisition of Site Specific Subsurface Information	SD drilling/testing testing
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	Trenching, ramp exploration holes

As of 2/25/94

Site Characterization Field Activities in Progress continued

SCP ACTIVITY	TITLE	ACTIVITY
8.3.1.15.1.8	In Situ Design Vertification	Construction monitoring/ testing
8.3.1.17.4.2	Location and Recency of Faulting Near Prospective Surface Facilities	Trench logging
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 logging
8.3.4.2.4.4	Engineered Barrier System Field Test	Preparation of Fran Ridge Test Block

As of 2/25/94



Current and Proposed ESF Alignment and FY94 Proposed Drilling and Testing Programs

LYOTRD.CDR.124/12-10-93

ENGINEERING BARRIER SYSTEM LARGE BLOCK TEST Study Plan 8.3.4.2.4.4

- **Status:**
  - Three saw cuts finished; one saw cut to be completed.
- **Planned Activities:**
  - Complete preparations for the Large Block Test.

As of 2/25/94

C-WELL TESTING
Study Plan: 8.3.1.2.3.1

- **Status:**
  - Packer strings installed and tested in UE-25 c#1, c#2, and c#3.
  - Phase I pressure monitoring on-going since 1/20/94.
  - Discharge pipeline construction started.
- **Concerns:**
  - Upon completion of pipeline, further work may be constrained by crew availability.
  - Specifications for spreading basin delayed.
- **Planned Activities:**
  - Complete construction of pipeline and spreading basin.

As of 2/25/94

GEOPHYSICAL SEISMIC REFLECTION SURVEY
Study Plan: 8.3.1.4.2.1

- **Status:**
  - Planning begun for REECo to drill deep shotholes.
  - Committed funds to carry out activity in FY 1994.
- **Planned Activities:**
  - Drill deep shotholes in 3rd quarter FY 1994.
- **Concerns:**
  - BLM has not responded to land access requests since 8/92.
  - Ability to obtain subcontractor(s) for FY 1994.
- **Solution:**
  - Expedite contracting process.
  - Seek DOE/HQ assistance to obtain BLM land access.

As of 2/25/94

VOLCANISM STUDIES
Study Plans: 8.3.1.8.1.1 and 8.3.1.8.5.1

- **Status:**
  - LANL Technical Report (draft) completed 3/4/93 -- final report due 3/94.
  - Effects Studies (E3) underway.
  - Expert elicitation of E1 and E2 probability calculations and methodology underway.
  - Geophysics review underway: external consultant George Thompson -- Stanford University, preliminary results from Thompson indicate that additional geophysics may be required (magnetics and modeling).
- **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 2/25/94

ESF TESTING

- **Status:**
  - North Ramp completed to approximately Station 1+94' (60 meters) as of 9/10/93.
  - Alcove construction complete (34.8 m from centerline of main tunnel).
  - Geologic mapping, photography and sampling were completed in the Alcove.
  - Drilling of three test boreholes commenced on 2/11/94. First hole completed ahead of schedule on 2/22/94.
- **Planned Activities:**
  - Complete two remaining test boreholes.
  - Perform hydrochemistry and isotropic radial borehole tests.

As of 2/25/94

UZ PERCOLATION
USW UZ-16

- **Status**
  - Completed Drilling 3/11/93. TD 1686.16' (514 m).
  - Completed standard and prototype borehole geophysical logging in July, 1993; two zero-offset and two walk-away VSP using clamped geophone completed in 8/93.
  - Collected CO_2 sample for C_{14} dating (10/5/93).
  - Air permeability testing is ongoing.
- **Planned Activities:**
  - Continue air permeability testing.
  - Continue planning for walk-away VSP using 96 grouted geophones.

As of 2/25/94

UZ PERCOLATION
USW UZ-14

- **Status:**
  - Drilling started 4/15/93; suspended 1/10/94.
    - » Core Depth 1442.11 ft (440 m).
    - » Ream Depth 1421.64 ft (433 m).
  - Protective casing set in upper portion of hole.
  - Stratmaster drill rig being mobilized to continue drilling (2/22/94).
- **Planned Activities:**
  - Complete drilling to total depth (~2000 ft or 610 m).

As of 2/25/94

UZ PERCOLATION
USW UZ-7a

- **Status**
  - Planning initiated.
- **Planned Activities**
  - Begin drilling upon completion of SD-12.

As of 2/25/94

HISTORICAL AND CURRENT SEISMICITY - STUDY PLAN 8.3.1.17.4.1

- **Status:**
  - Seismicity is being continually monitored.
  - Historical earthquake catalog (1850-1978) being finalized.
  - Little Skull Mountain earthquake report being finalized.
- **Planned Activity:**
  - Continue to monitor seismicity.
  - 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 2/25/94

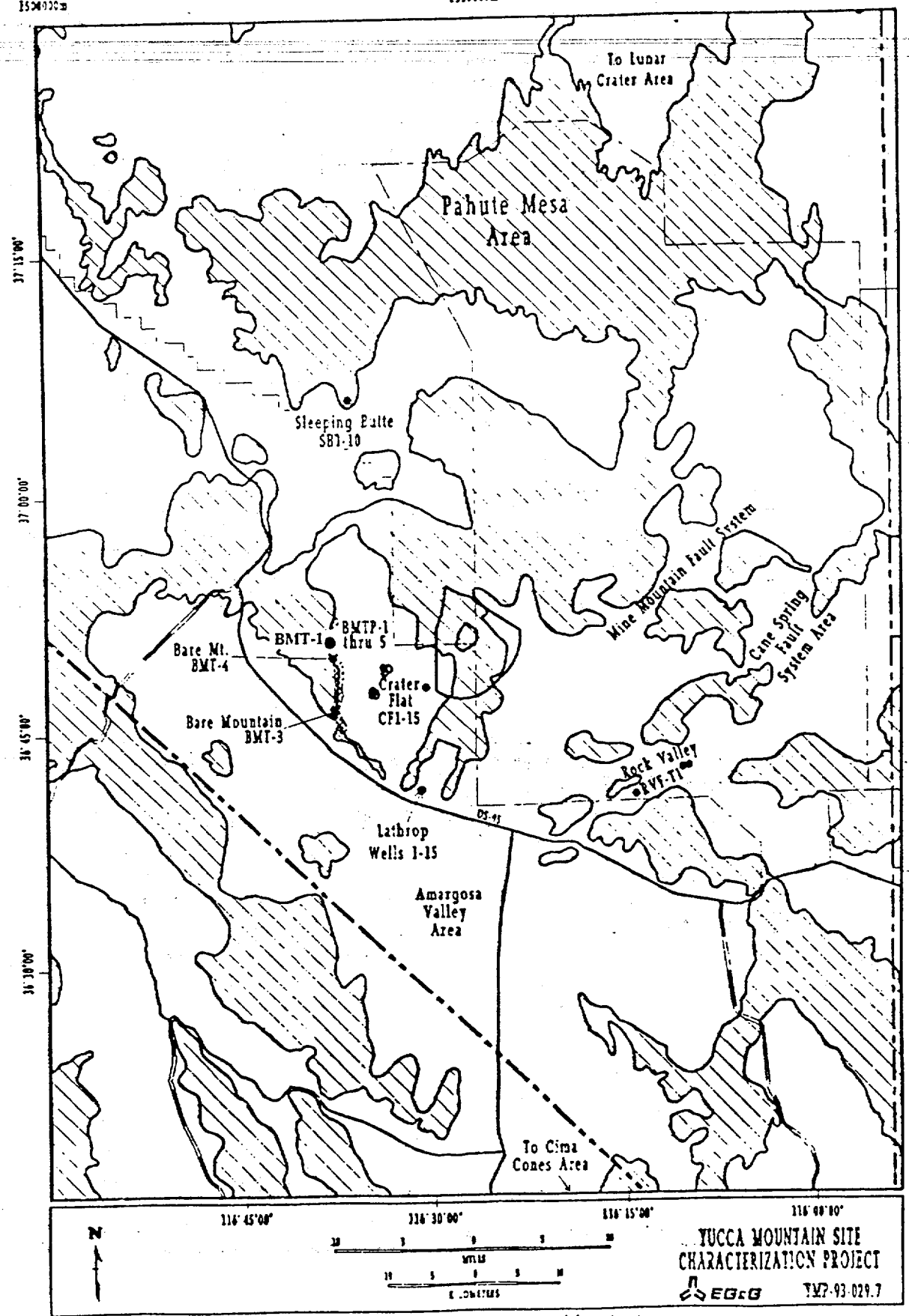


Figure 5.3 - Planned FY94 Trenches and Test Pits in Regional Investigations (Proposed locations).

MIDWAY VALLEY
Study Plan: 8.3.1.17.4.2

- **Status:**
  - Trench mapping and logging complete.
  - Soil description complete in all test pits in Midway Valley.
- **Planned Activities:**
  - Complete Midway Valley final report and provide to DOE by 5/31/94.

As of 2/25/94

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 and BMT-2 is underway.
- **Planned Activities:**
  - Excavate tests pits at Bare Mountain TP-1 through -5.
  - Excavate trench BMT-3.
- **Concerns:**
  - Delays in acquiring BLM permits for excavation at Bare Mountain.
  - May result in PACS milestone slips.

As of 2/25/94

QUATERNARY FAULTING - NE TRENDING FAULTS STUDY PLAN 8.3.1.17.4.4

- **Status:**
  - Environmental boundaries for Rock Valley fault trench locations laid out.
- **Planned Activities:**
  - Excavate Rock Valley trenches.
- **Concerns:**
  - Potential delays due to problems with land access approval from Nevada Test Site Office.
  - May result in PACS milestone slips.

As of 2/25/94

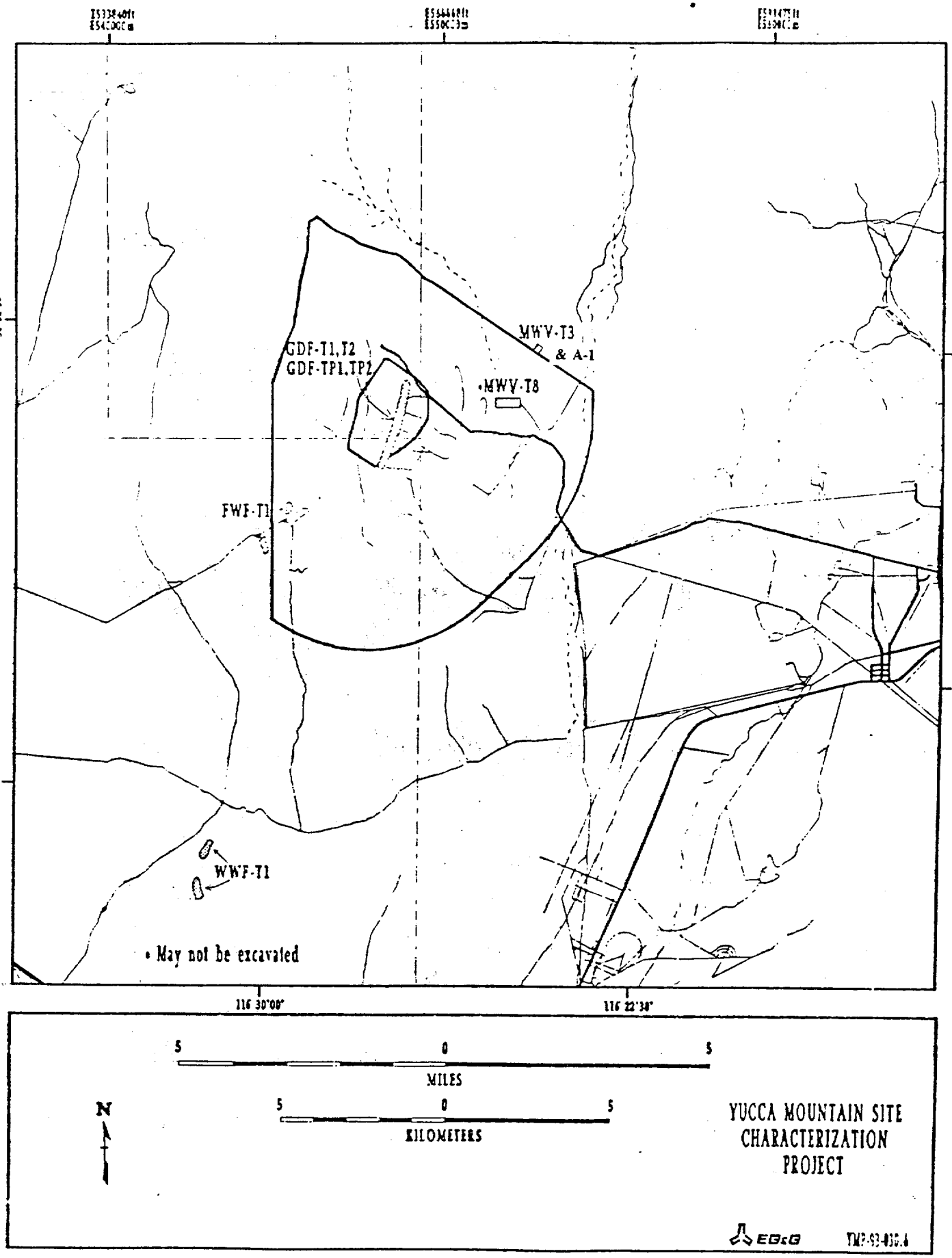


Figure 5.2 - Planned FY94 Trenches in the Site Area (Proposed Locations).
Note: locations shown on figure are approximate. Do not use for calculations.

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 12/10/93.
  - Planning for trenches across Ghost Dance fault is in progress.
- **Planned Activities:**
  - Trench mapping at MWV T-3 and A-1.
  - Borehole(s) at Stage Coach Road fault to constrain Quaternary slip rate on the fault.
  - Planning for boreholes at Stage Coach Road fault is in progress.

As of 2/25/94

VERTICAL AND LATERAL DISTRIBUTION OF STRATIGRAPHIC UNITS: GEOPHYSICS STUDY PLAN 8.3.1.4.2.1

- **Status:**
  - Completed logging (video, directional, density, neutron, caliper, induction logs) of the North Ramp boreholes, except NRG-7.
  - Developing log correlations for ramp boreholes in support of soil and rock studies and ESF design.
  - Acquired data for 3 shallow reflection seismic lines; carried out gravity and magnetic survey along one of the lines (along UZ-16 / WT-2 road).
- **Planned Activities:**
  - Prepare modified logging program for USW UZ-14, NRG-7, SD-9, SD-12, and UZ-7.
  - Complete interpretation of reflection, gravity and magnetic data.

As of 2/25/94

STRUCTURAL FEATURES
Study Plan: 8.3.1.4.2.2

- **Status:**
  - Ghost Dance fault pavement cleaning complete; initiated pavement mapping.
- **Related Activities:**
  - Vertical Seismic Profiling in WT-2, NRG-6 and UZ-16 to aid in defining the character of the Ghost Dance fault at depth.
- **Planned Activity:**
  - Continue mapping of Ghost Dance fault pavement.
  - Refine strategy for surface geologic mapping.

As of 2/25/94

SYSTEMATIC DRILLING PROGRAM
STUDY PLAN 8.3.1.4.3.1

- **Status:**
  - Initiated drilling of SD-12. Status as of 2/23/94:
    - » Core depth 100.59' (30.66 m).
    - » Ream depth 87.41' (26.64 m).
  - SD-9 - Pad construction started (2/14/94).
- **Planned Activities:**
  - Continue drilling SD-12.

As of 2/25/94

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 12/9/93 (SNL).
  - NRG-7a core depth 1324' (404 m) as of 2/23/93; Tsw_1/Tsw_2 contact at 763' (232 m).
  - Ramp borehole material properties testing data submittals to support ESF design are on schedule.
  - NRG-2c and 2d drilled/augered; SPT and sampling being carried out. Work in NRG-2c completed 2/16/94.
  - NRT-1 - backhoe (slot) trench excavated at bottom of dozer trench for further testing.
- **Planned Activities:**
  - Complete NRG-7a and NRG-2d; complete testing in NRT-1.
  - Initiate planning for SRG-4.

As of 2/25/94

STUDY PLAN STATUS

	Initial Plans	Revisions
Not Submitted to YMPO	35	0
In Screening Review	0	0
In Project Office Review	3	2
Awaiting Comment Resolution	3	3
In Project Office Verification Audit	5	1
Awaiting Project Office Approval	1	0
Awaiting Submission to the NRC	0	0
NRC Phase 1 Review	7	5
NRC Acceptance	50	6
Total:	104	17

As of 2/25/94

Site Suitability

TPO Presentation

Martha Pendleton
February 25, 1994

Enclosure 1E

Suitability Task Force
Schedule of near-term activities

March 4	Meeting to solicit input on options for addressing the applicability of 10 CFR 960
March 16	Receive written input from March 4 meeting
April 6	Task force recommendation complete
April 29	DOE position on the applicability of 10 CFR 960

10 CFR 960 Task Force
Draft agenda for March 4 meeting

- Welcome
- Opening remarks
- Solicitation of additional options for 10 CFR 960
- Discussion
- Solicitation of pros and cons for each option
- Discussion
- Summary and closing remarks

10 CFR 960 Task Force
List of invitees for March 4 meeting

- Yucca Mountain Project Office
- Office of Civilian Radioactive Waste Management
- Participants
  - Los Alamos National Laboratory
  - Livermore National Laboratory
  - Sandia National Laboratory
  - United States Geological Survey
  - M&O
- Affected Units of Government

Next Steps

Development of a Site Suitability Methodology

- Using the Early Site Suitability Evaluation as a model, the DOE will develop a plan for future interim evaluations of Site Suitability by August, 1994.

- The Plan will include:

  - A methodology for future interim Site Suitability evaluations.

  - An assessment of the site characterization data that will be needed to complete suitability evaluations.

  - A schedule for future evaluations.

STATUS OF THE LARGE-BLOCK TEST

DALE G. WILDER
TECHNICAL AREA LEADER
LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CA

(510) 422-6908

TPO Meeting

2/25/94

Enclosure 1F

"A Critical Issue..."

"...DOE's theoretical, untested understanding of the magnitude and consequences of..evaporation and condensation...of moisture...adjacent to the emplaced waste,..."

Sixth Report to the U.S. Congress and The U.S. Secretary of Energy, Nuclear Waste Technical Review Board, Dec. 1992

Issues requiring testing prior to ESF

- Validation test independent from those used for characterization (property values etc.) data, and developing or testing models.

  Developing and testing require "tweaking knobs" in the models to understand physics. For characterization the physics must be appropriate prior to testing.

- Early decisions based on model predictions (e.g., thermal loading, MPC, emplacement strategy) require incorporation in models of processes important to the outcomes. The models have not been adequately demonstrated.

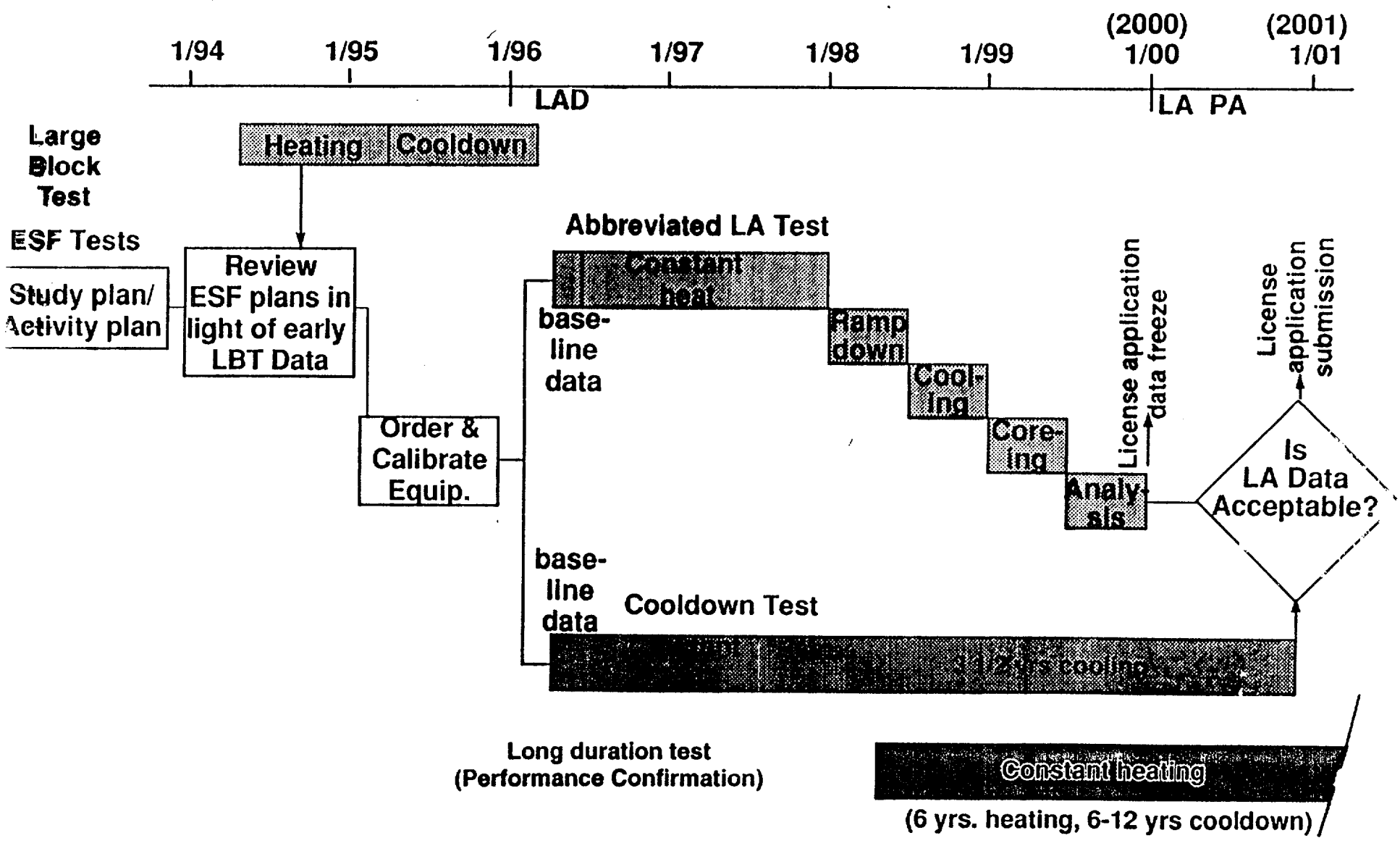
- ESF test planning.

  Confidence in models used for planning of ESF tests, instrument and technique evaluation prior to ESF test, and evaluation of scaling effects

Justification for LBT

- Model confidence-building & testing separate of characterization & ESF monitoring
- 3-D characterization & monitoring
- Geochemical sampling
- Schedule demands

Strategy Using Large Block Test



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DCLLNLDW20 125.NWTRB/7 13/14 93

Large Block Test Goals:

- Initial validation of thermo-hydrologic models
  -- dehydration/rehydration
  -- heat transport (conduction/convection)
  -- condensate movement
- Initial validation of geochemical model
  -- characterize fractures before and after test
  -- geochemical sampling during test
- Monitor coupling of hydrological, geochemical, and geomechanical processes
- Monitor Geomechanical Responses
  -- fracture deformation and initiation

Large Block Test Goals (cont.)

- Methodology-monitoring technique development
  - -- Instrumentation
  - -- Mini-prototype testing

- Specific Questions
  - – refluxing of water in the saturated zone
  - – condensate drainage/shedding
  - – effects of the coalescence of drying fronts on coupled processes

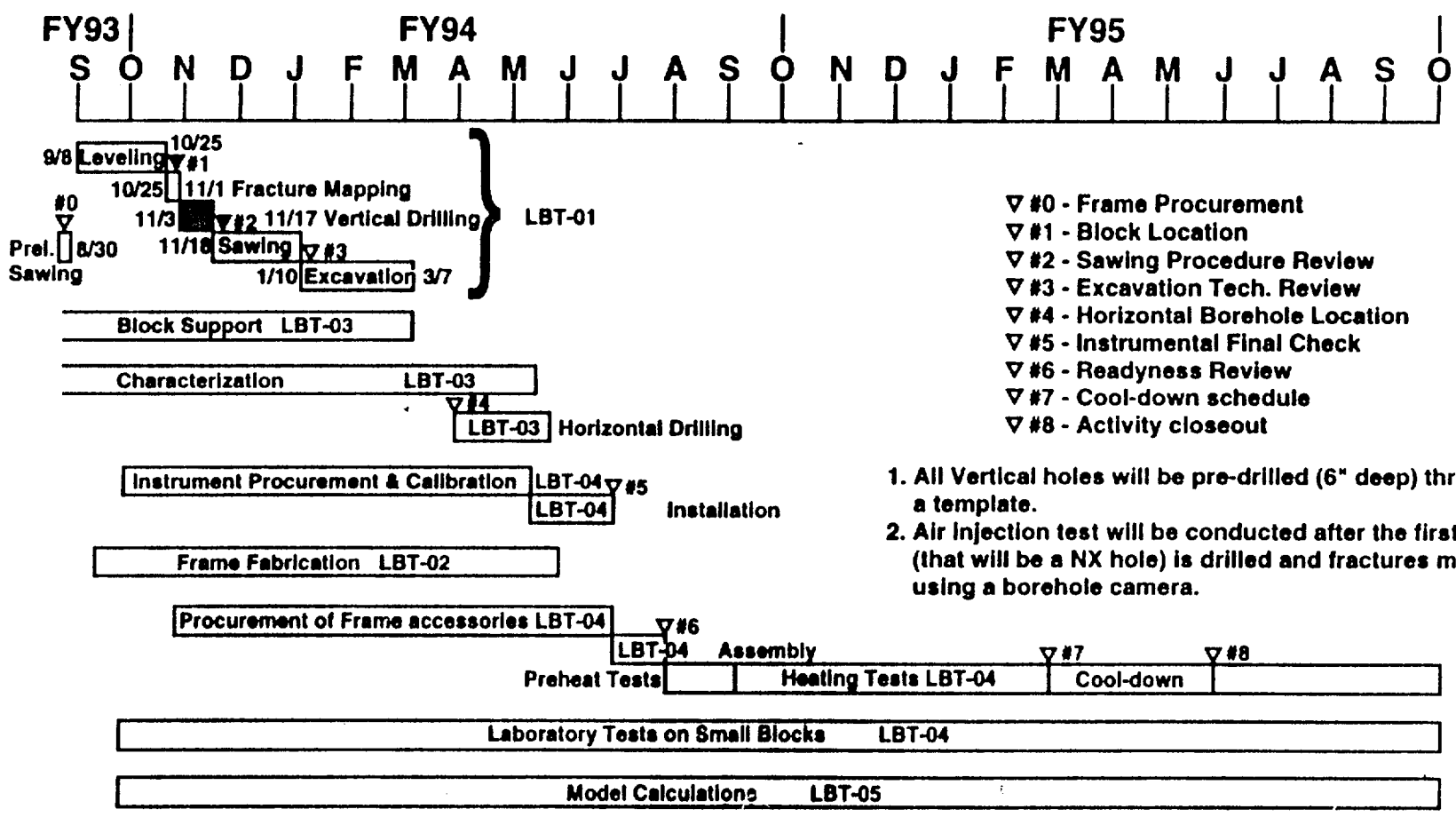
Test Scale Strategy

(see slide in 10/93 TRB presentation)

Lab scale

Block Scale

In Situ
- ESF scale
- Combined location for large scale
- Repository scale



- ∇ #0 - Frame Procurement
- ∇ #1 - Block Location
- ∇ #2 - Sawing Procedure Review
- ∇ #3 - Excavation Tech. Review
- ∇ #4 - Horizontal Borehole Location
- ∇ #5 - Instrumental Final Check
- ∇ #6 - Readyness Review
- ∇ #7 - Cool-down schedule
- ∇ #8 - Activity closeout

1. All Vertical holes will be pre-drilled (6" deep) through a template.
2. Air injection test will be conducted after the first hole (that will be a NX hole) is drilled and fractures mapped using a borehole camera.

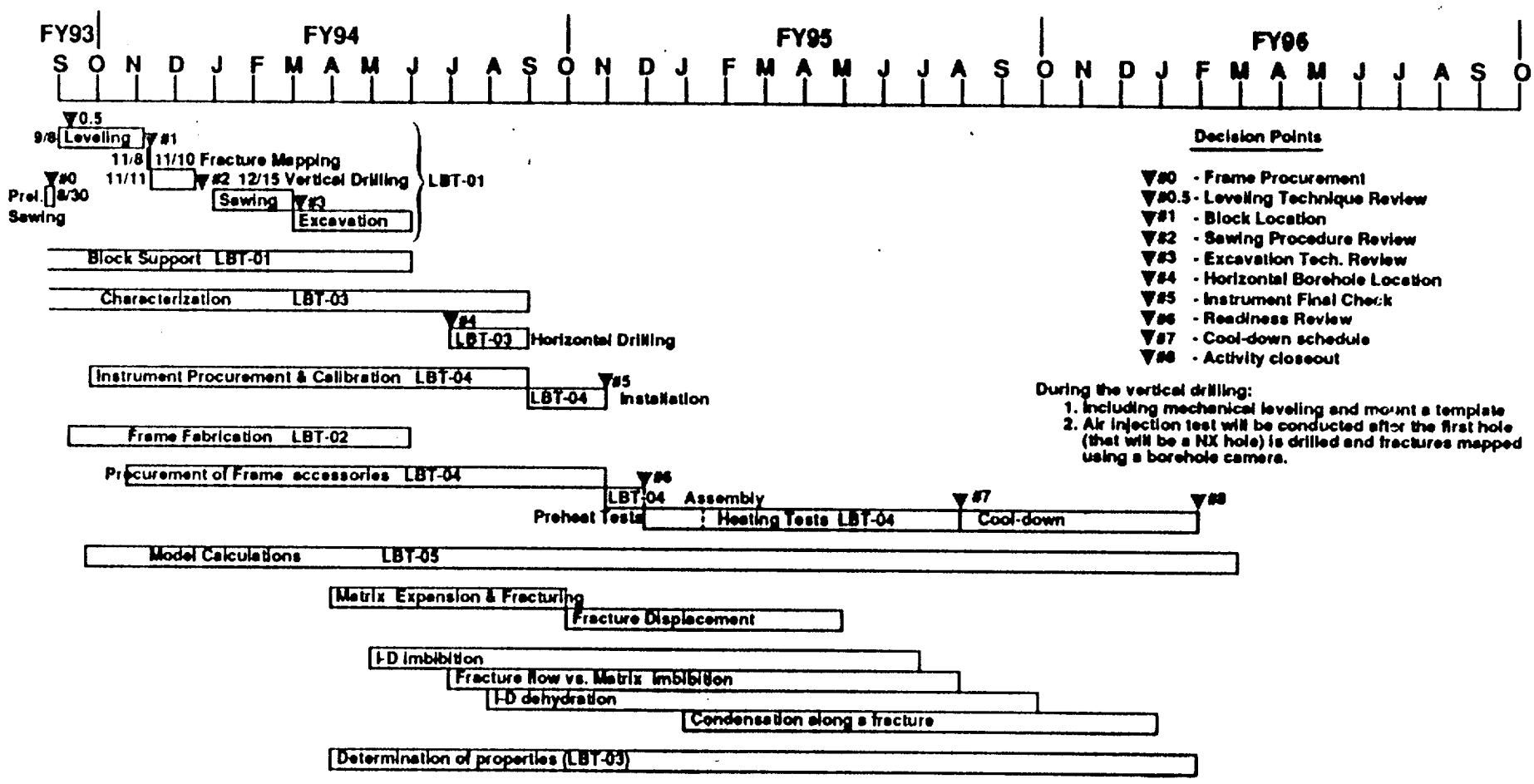


Figure 26. Schedules of activities in the LBT.

ES-1/3/94-WL#10-09

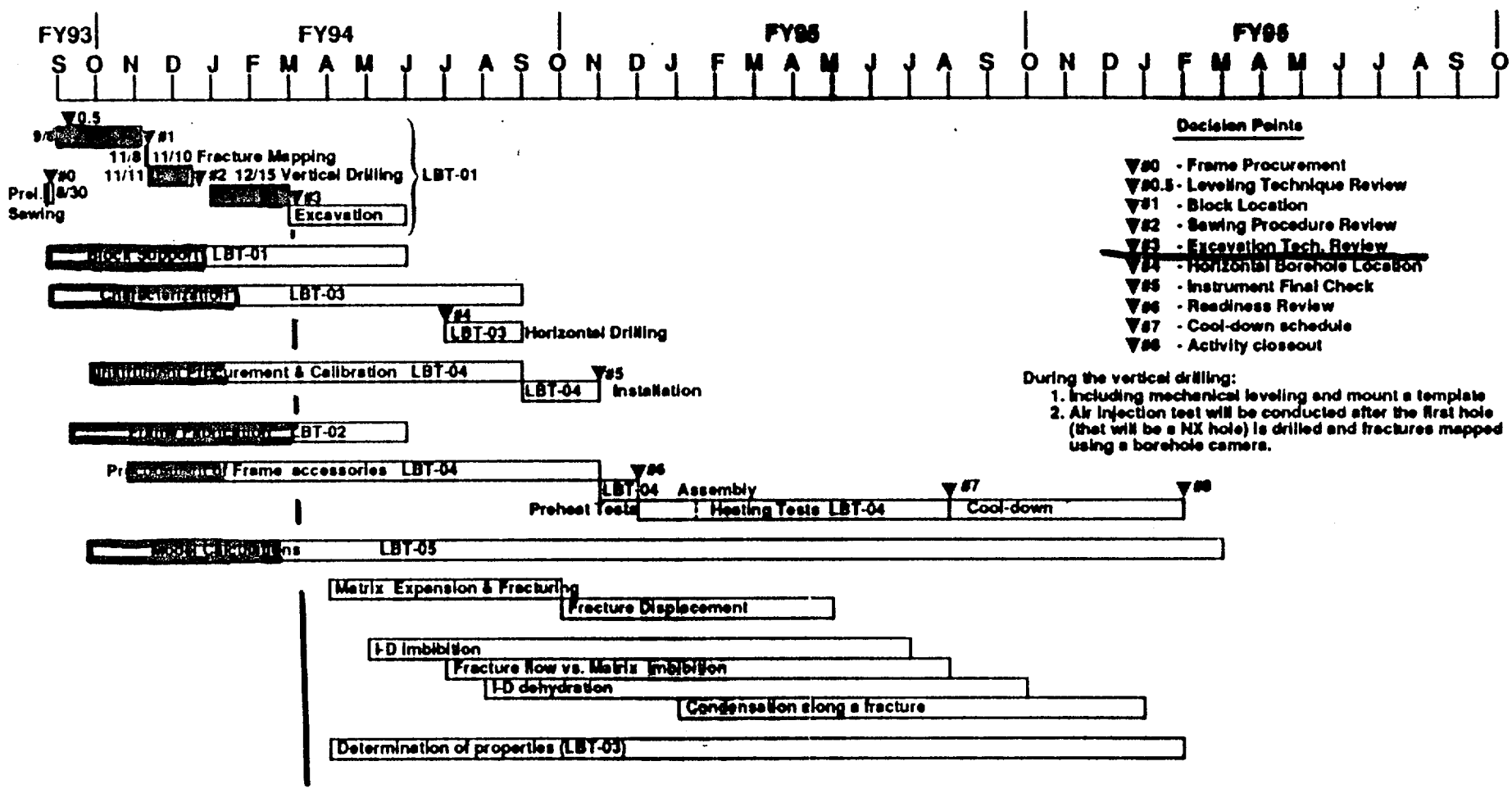


Figure 26. Schedules of activities in the LBT.

ES-1/3/94-WL#10-09

Review of Status

Test Concept and Location specifications completed

Test Planning and Controls
- SIP Approved 11/93
- ESF Study Plan in final comment resolution
- Activity Plan in approval cycle
- QA grading of Activities
- Continuing planning meetings
- Work Orders, Job Packages, & Test Planning pkg on track

Construction
- Benching and sump completed
- Sawing completed 2/25
- Test Frame under construction--June
- Accessories under design
- Vertical Boreholes completed
- Block support in design
- Foam construction support
- Excavation methods tested

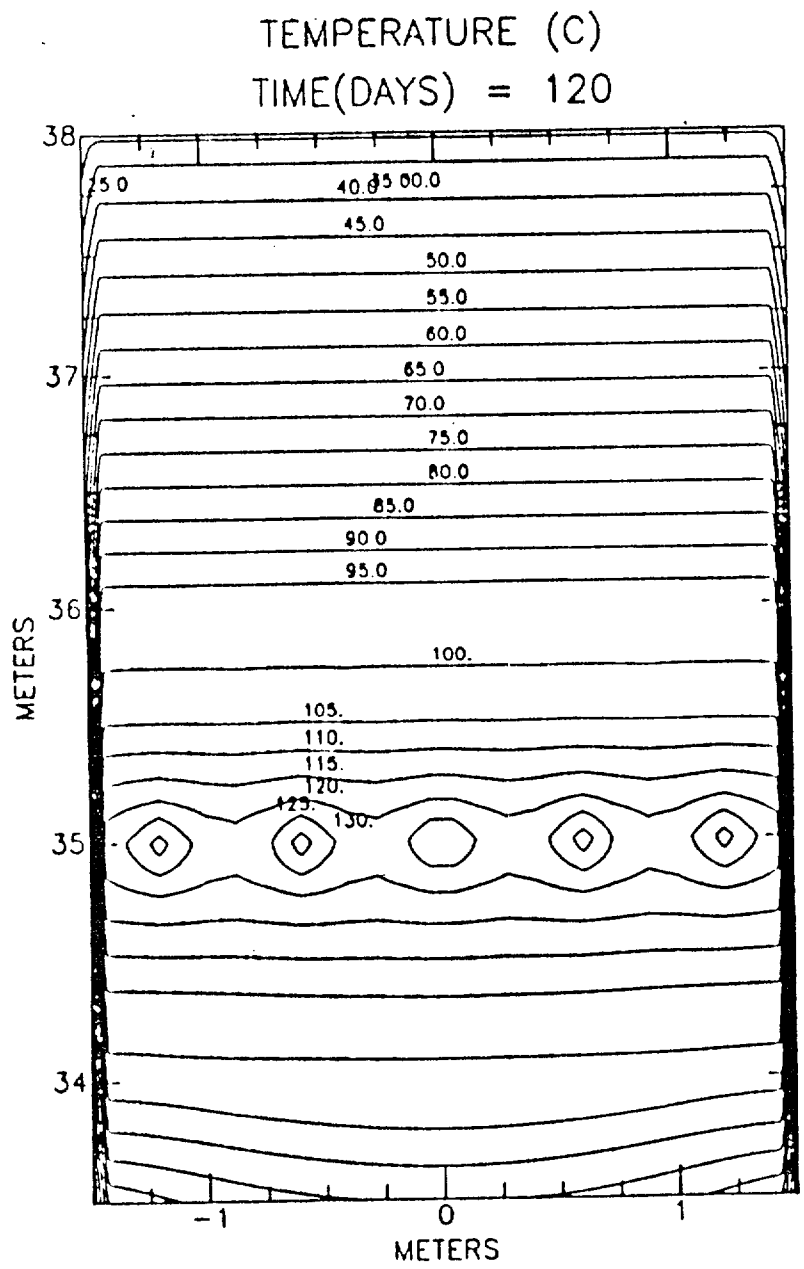
Review of Status, cont.

Characterization
- Fracture Mapping of surface completed
- Scoping test of saturation from surface samples completed
- Vertical boreholes logged-core samples selected
- Permeability Testing of Vertical Holes completed
- Neutron Gage Measurements of Vertical Holes completed
  - analyses waiting on receipt of core
- Block samples collected for cutting penetration analyses

Instrument Procurement
- Instrument development underway
- Instrument specifications and orders in prep
- DAS system orders placed
- Technical support identified--working on obtaining

Scoping Calculations performed

Large Block Test, Run No. 2, x-z Model, 5-23-93



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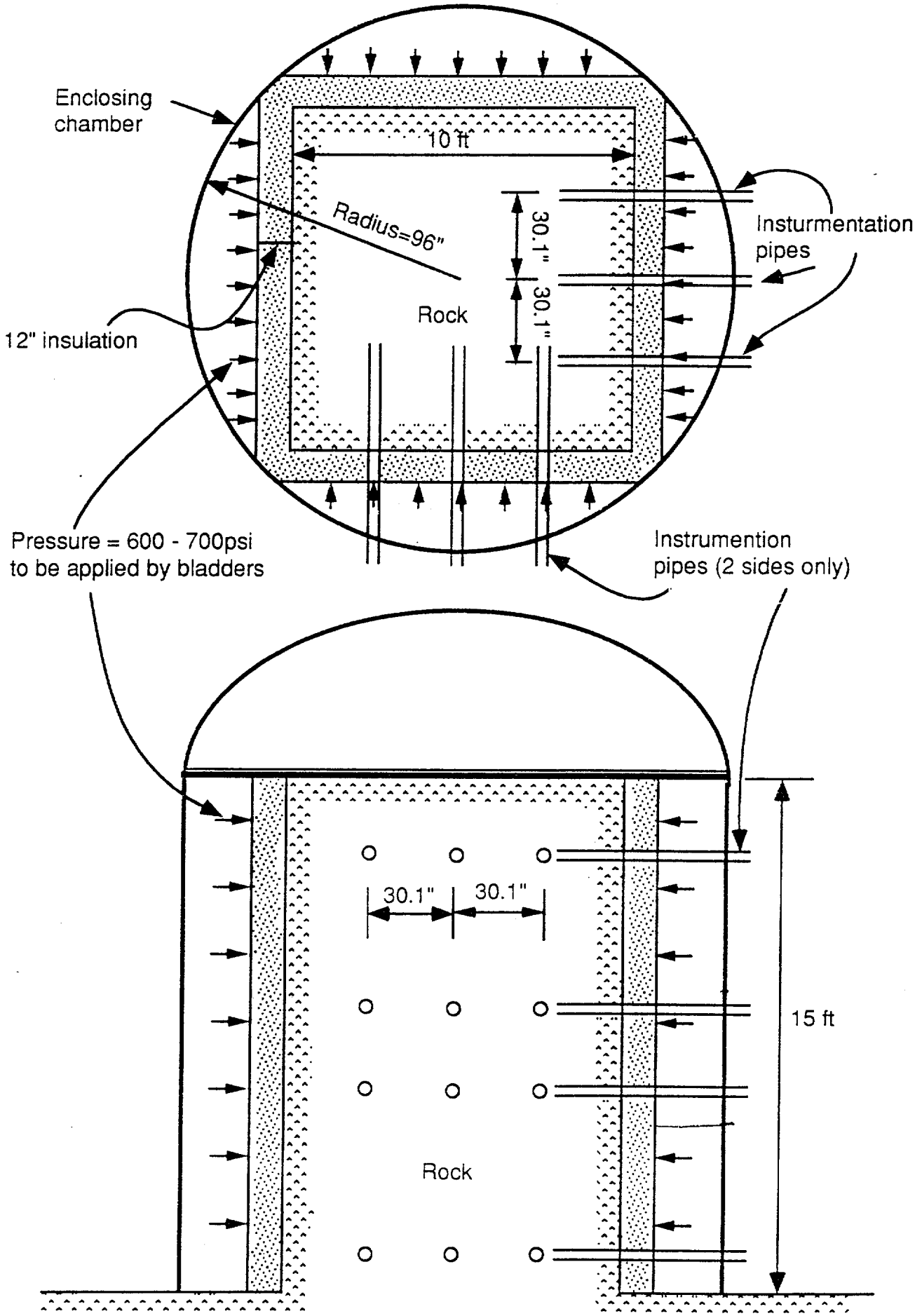
DCLLNLDW25 125 NWTRB/7-13/14-93

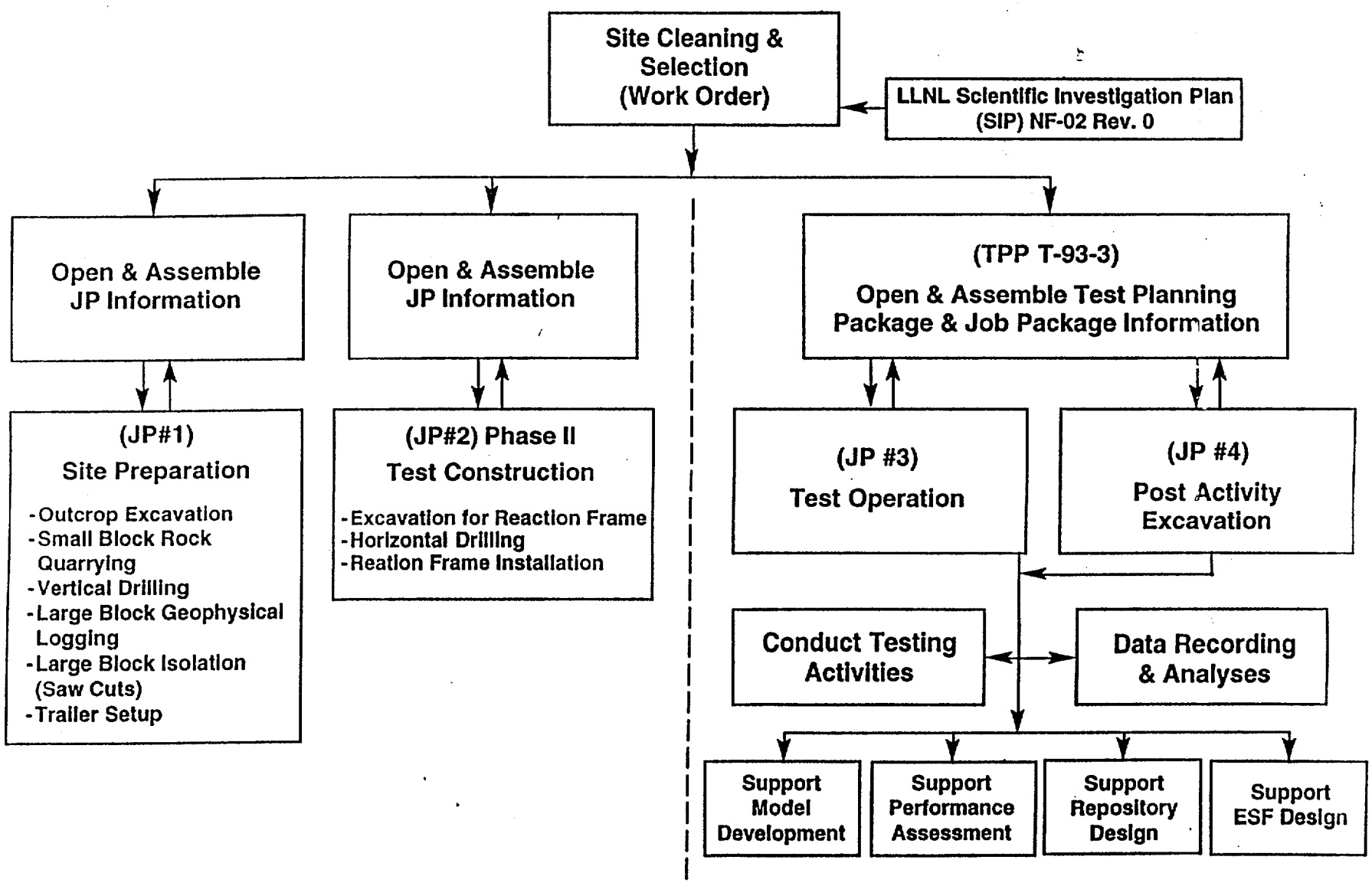

Enclosing chamber
10 ft
Radius=96"
30.1"
30.1"
Rock
Insturmentation pipes
12" insulation
Pressure = 600 - 700psi to be applied by bladders
Instrumention pipes (2 sides only)
30.1"
30.1"
15 ft
Rock

Quality Assurance

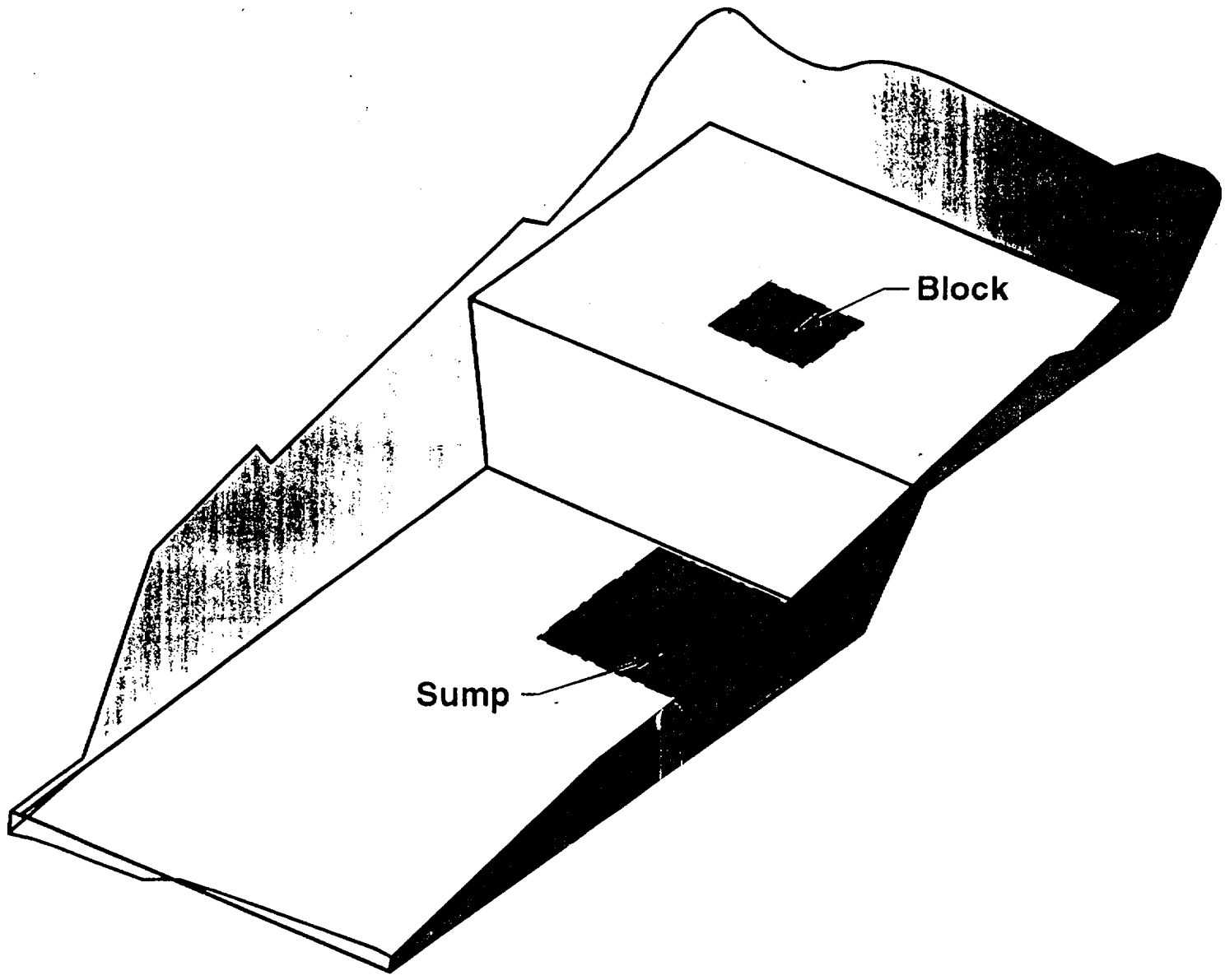
Grading of 8 activities completed

	Activity	Date	Q A?
LBT-01	Collect or Isolate Rock blocks	4/1/93	No
LBT-02	Design & Fabrication of a Loading Frame	8/10/93	No
LBT-03.1	Scoping Property Determination for Test Design & Planning Document	9/23/93	No
LBT-03.2	Characterization of Blocks	8/20/93	Yes
LBT-04.1	Scoping Laboratory Tests on Small Blocks	9/20/93	No
LBT-04.2	Main Testing of the Coupled TMHC Processes	8/20/93	Yes
LBT-05.1	Pre-Test Model Calculations	8/20/93	No
LBT-05.2	Post-Test Model Calculations	8/20/93	Yes

Test Control Logic Diagram



Benching For Large Block Test



ES10/14/93DW#9-01

Sawing

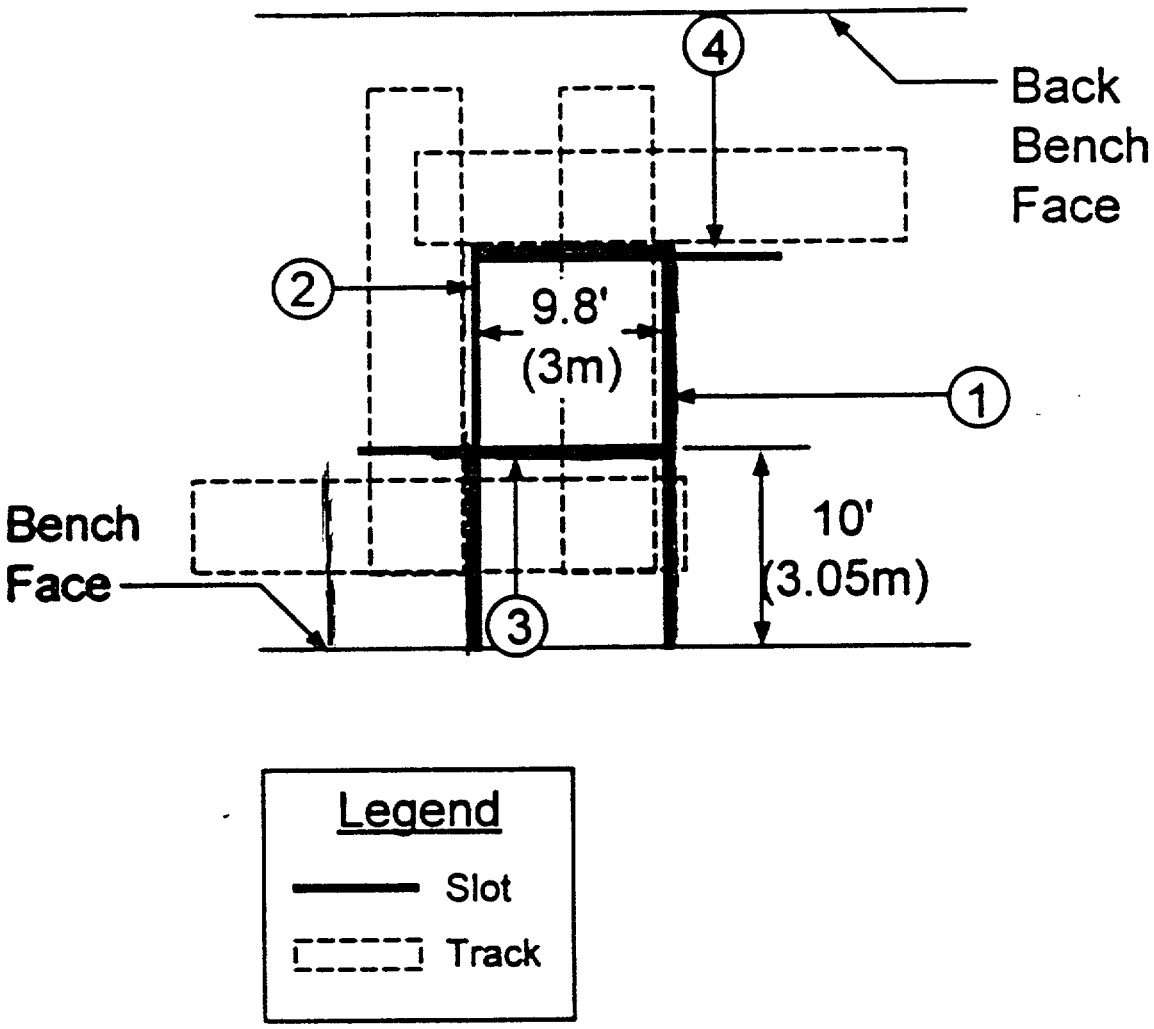
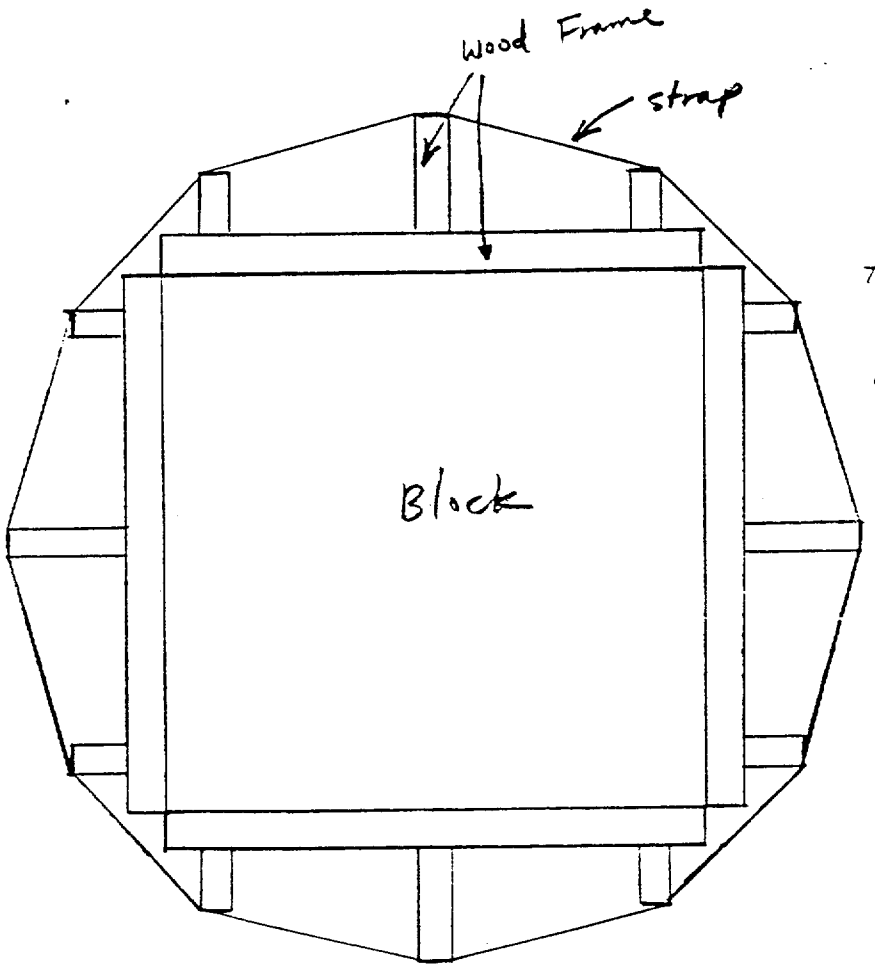


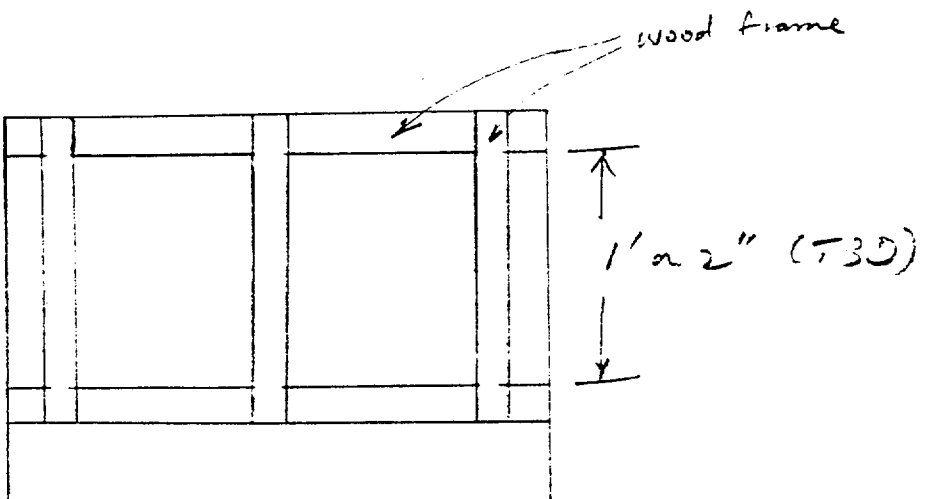
Figure 4. Illustration of Outcrop Area and Planned Sequence of Slot Cutting

Concepts of keeping the block together

TOP View



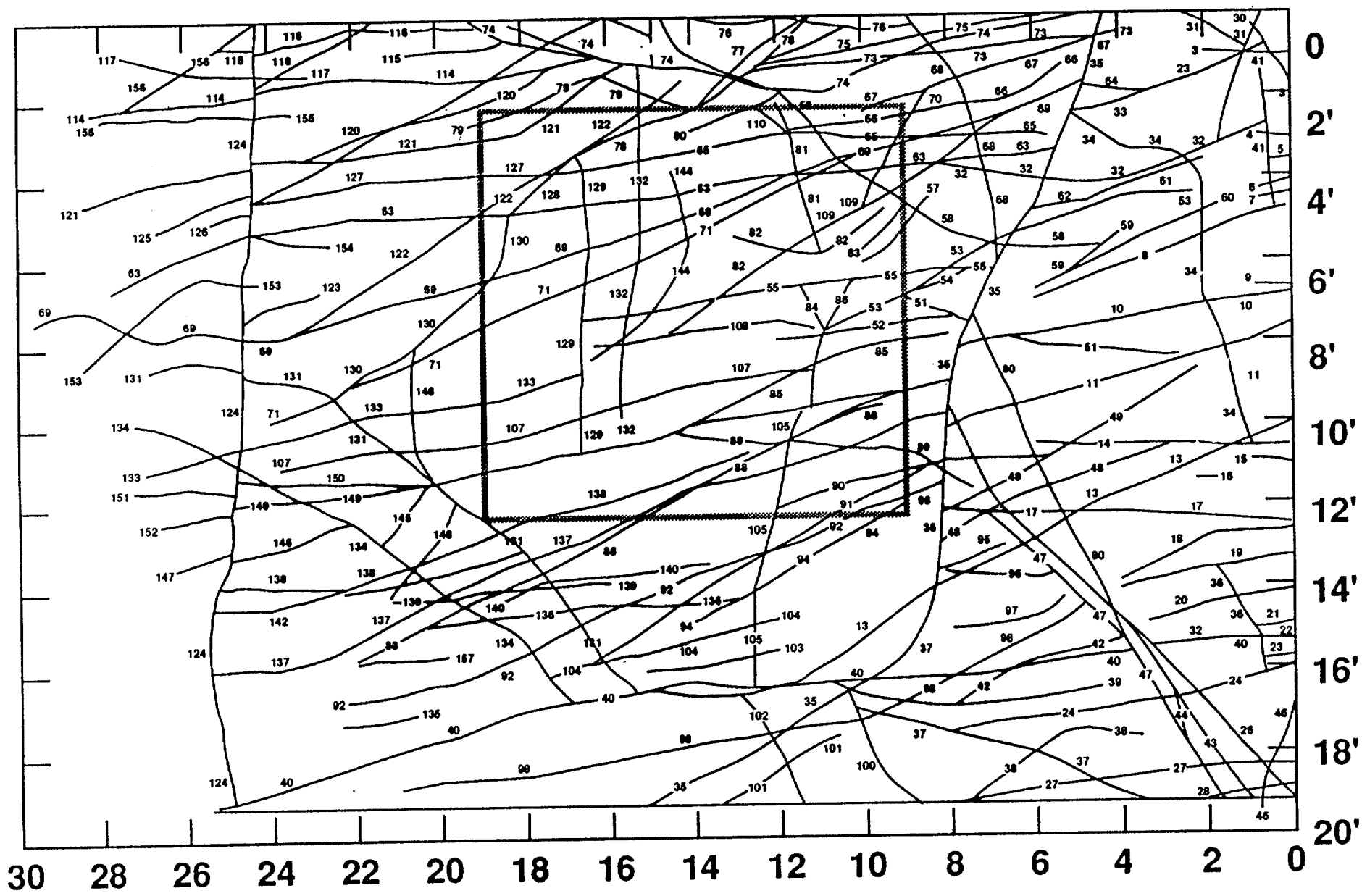
Max. load on the entire surface of each side is 31,000 lb



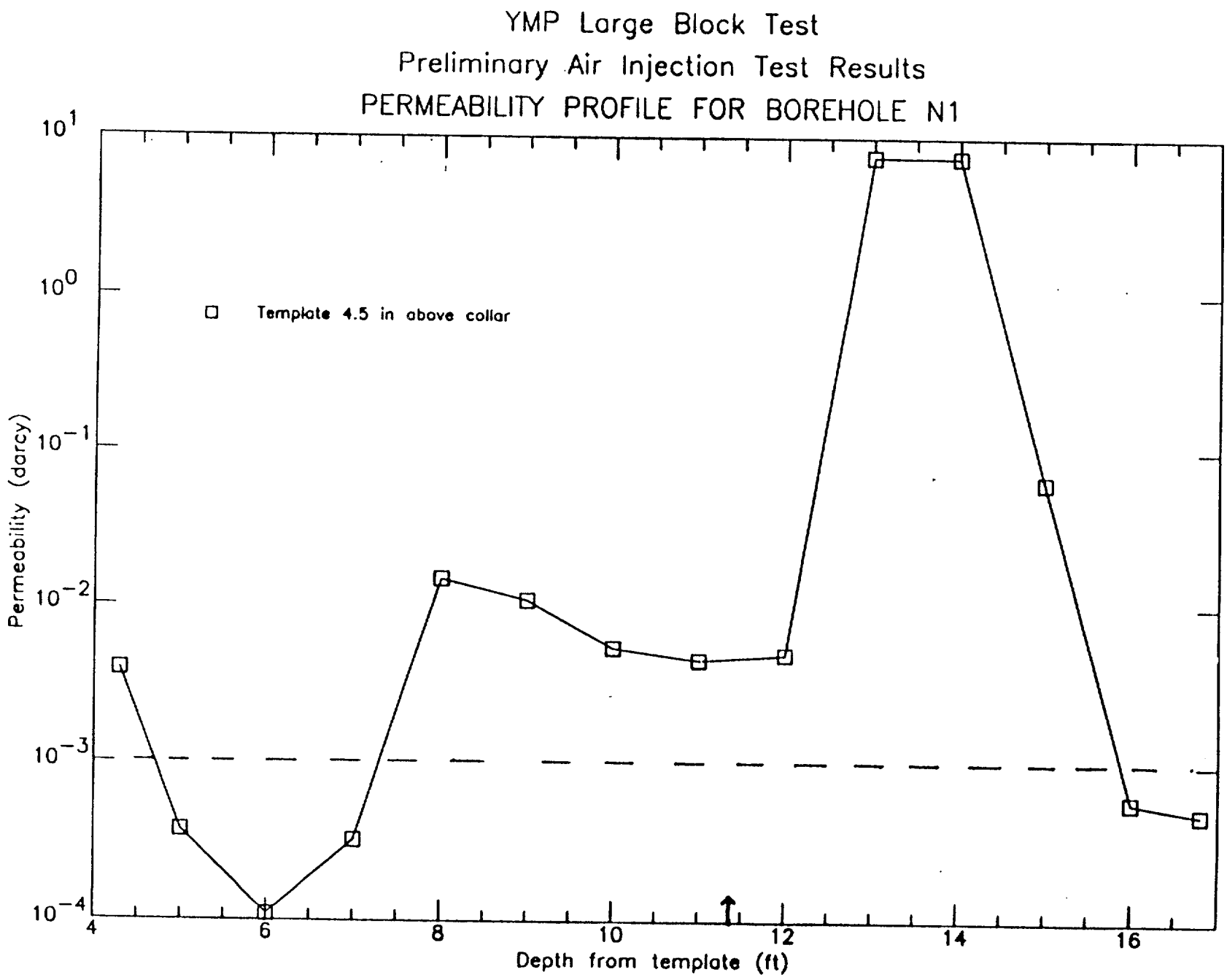
Front View

Block Characterization

Fracture Mapping
Pole diagrams
3-D representation



ES2/9/94WL#12-03



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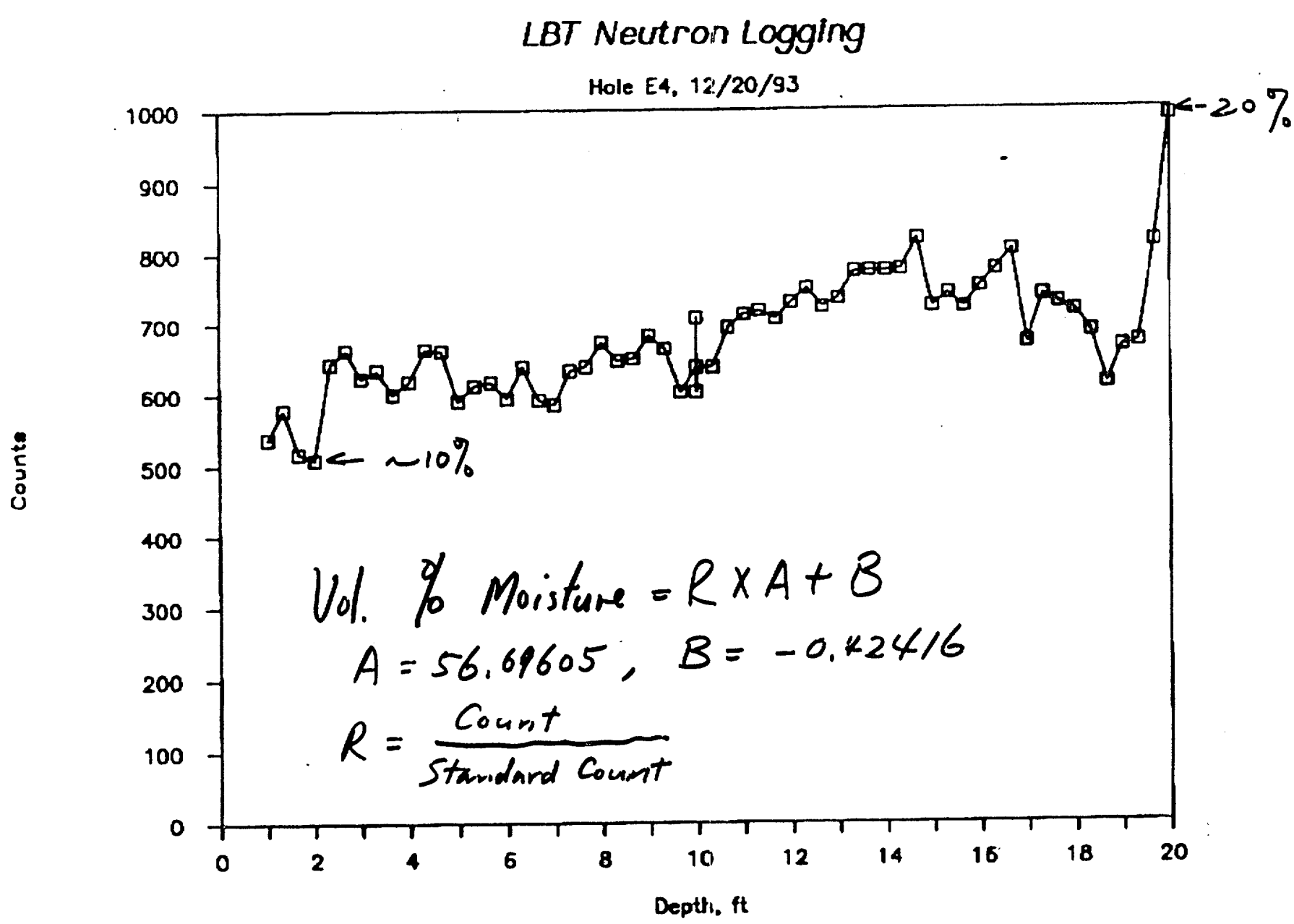

LBT Neutron Logging
Hole E4, 12/20/93
Counts
Depth, ft
0
100
200
300
400
500
600
700
800
900
1000
0
2
4
6
8
10
12
14
16
18
20
~10%
20%
Vol. % Moisture = R X A + B
A = 56.69605, B = -0.42416
R = Count / Standard Count

Instrumentation

- Temperature Measurements
- Displacement Measurements
- Electrical Resistivity Tommography
- Acoustic Emissions
- Confinement Pressure and Temperature Control
- Heat Exchanger System Monitor and Control
- Assorted Geomechanical / Geochemistry Measurements

Calibration

- Plan to use EG&G/REECo calibration facilities
  - Traceable to NIST
- Concern over possible closures

Data Acquisition

- 900 Channels
- Using "Dual Benefit" approach
  - SMIDS
    - LLNL Special Initiative under the Weapons Program to digitize data and expand the networking capabilties
  - EG&G support

Instrumentation

- Temperature Measurements
- Displacement Measurements
- Electrical Resistivity Tommography
- Acoustic Emissions
- Confinement Pressure and Temperature Control
- Heat Exchanger System Monitor and Control
- Assorted Geomechanical / Geochemistry Measurements

Temperature Measurements

- 340 channels measuring internal block thermal gradients
- 240 channels measuring outer surface boundary temperatures
- 100 channels measuring geochemistry experiments
  - Ambient to 130 Degrees Celsius temperature range
  - +/- 1 Degree Celsius Accuracy
  - 0.1 Degree Celsius Resolution
- A new inexpensive Temperature sensor is being evaluated to replace the standard thermocouple. The Resistance Temperature Device (RTD) will provide higher accuracy and fewer instrumentation connections. The RTD requires no isothermal reference. In many locations a "standard" conversion coefficient will return the required systematic accuracy.

Displacement Measurements

- Three boreholes with four anchor locations
  - 12 data channels
- Measurement maximum distance 4.5 meters
- Resolution 0.1 mm
- A new instrument technology is under development to incorporate laser distance measuring techniques to monitor rock displacements.

Electrical Resistivity Tommography

- Noted here because of the implications on all other measurements
- The DAS system must tolerate:
  - 300 volts of switched DC current across the block
  - Transient current spikes from the ERT experiments

Acoustic Emissions

- Noted here because of the implications on all other measurements
- Transient acoustic recorders will be provided by others

Confinement Pressure Measurement and Temperature Control

- Measurement of the pressure of confinement bladders
  - Estimated 40 channels
  - 600 psig +/- 14 psig pressure range
- Measure heat flux at block boundary
  - Control heaters to establish zero heat flux at block boundaries
  - Estimated 40 channels

Heat Exchanger System Monitor and Control

- Serial computer interface
  - Monitor exchange fluid temperature
  - Establish set point temperature
- Monitor temperature channels to calculate exchanger set point

Assorted Geomechanical / Geochemistry Measurements

- Pore Pressure measurements
  - 10 channels
  - 50 +/- 0.5 psig
- Humidity
  - 25 channels
- Geochemistry Sensors
  - 36 channels
- Fracture Movement Monitors
  - To Be Determined

Data Acquisition System

- Computer Processor System will be the SMID System developed in support of the LLNL Containment Program.
- Multitasking DEC processor can handling simultaneous control and monitor operations
- Graphical interfaces requires minimum operator training
- Power fail and recovery capabilities are built in
- Highly modular with ethernet support to LLNL
- Rewriteable Optical Disk provides flexibility, size, and reliability to the data archives system
- File transfer system is compatible with desktop Macintosh applications
- Data base will support instrument tracking and engineering conversions
- Pass word protected for data security

Front End Hardware

- Hewlett Packard relay scanner system provides channel isolation from ground loops as well as protection from the ERT experiment
- External Digital Multimeter provides system configuration flexibility
  - Interchangeability with minimum downtime
  - Rotation of multimeter for calibration
  - Simple upgrades with new requirements and accuracy

Data Acquisition

- 900 Channels
- Using "Dual Benefit" approach
  - SMIDS
    - LLNL Special Initiative under the Weapons Program to digitize data and expand the networking capabilties
  - EG&G support

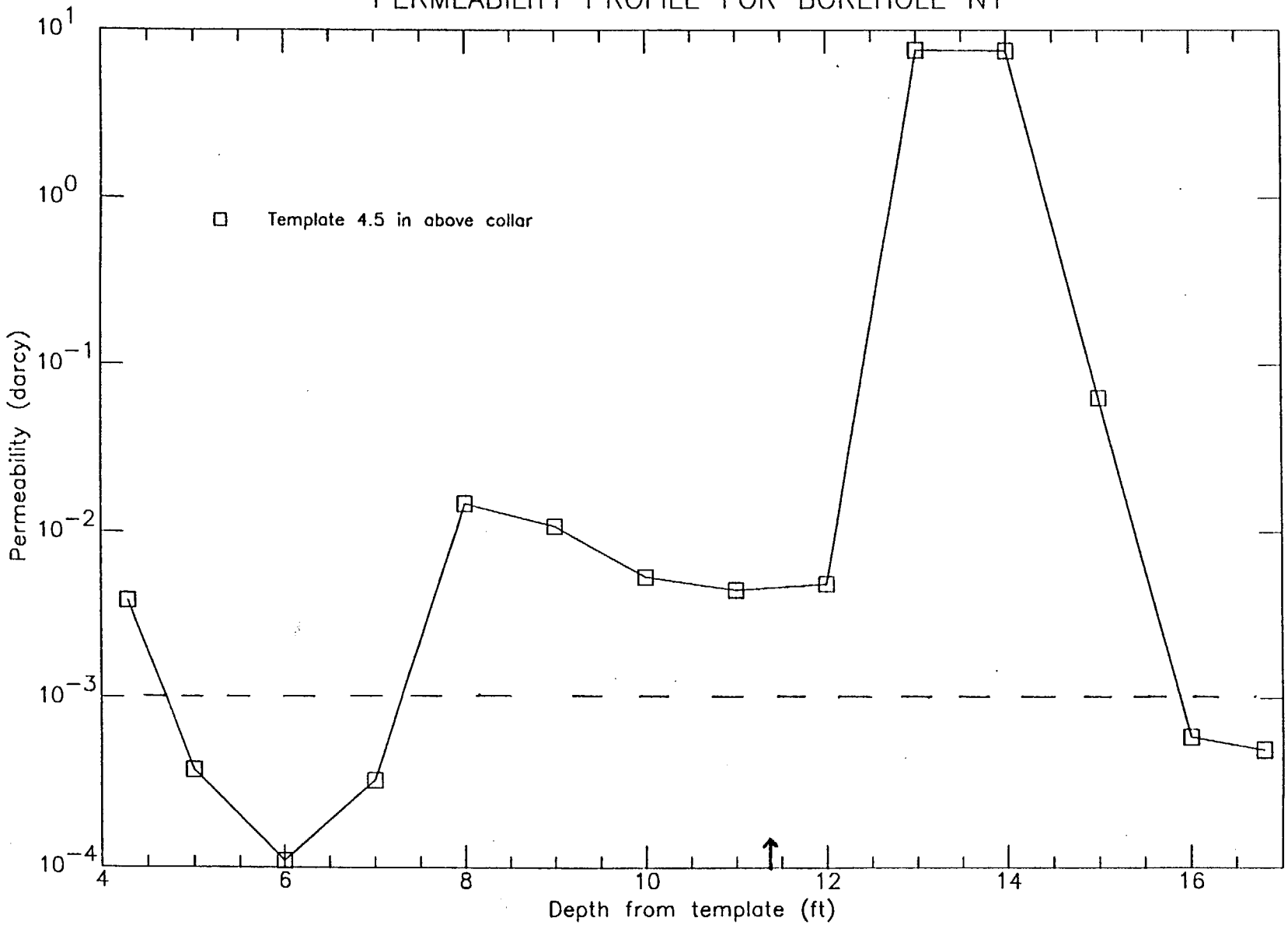
Calibration

- Plan to use EG&G/REECo calibration facilities
  - Traceable to NIST
- Concern over possible closures

YMP Large Block Test

Preliminary Air Injection Test Results

PERMEABILITY PROFILE FOR BOREHOLE N1



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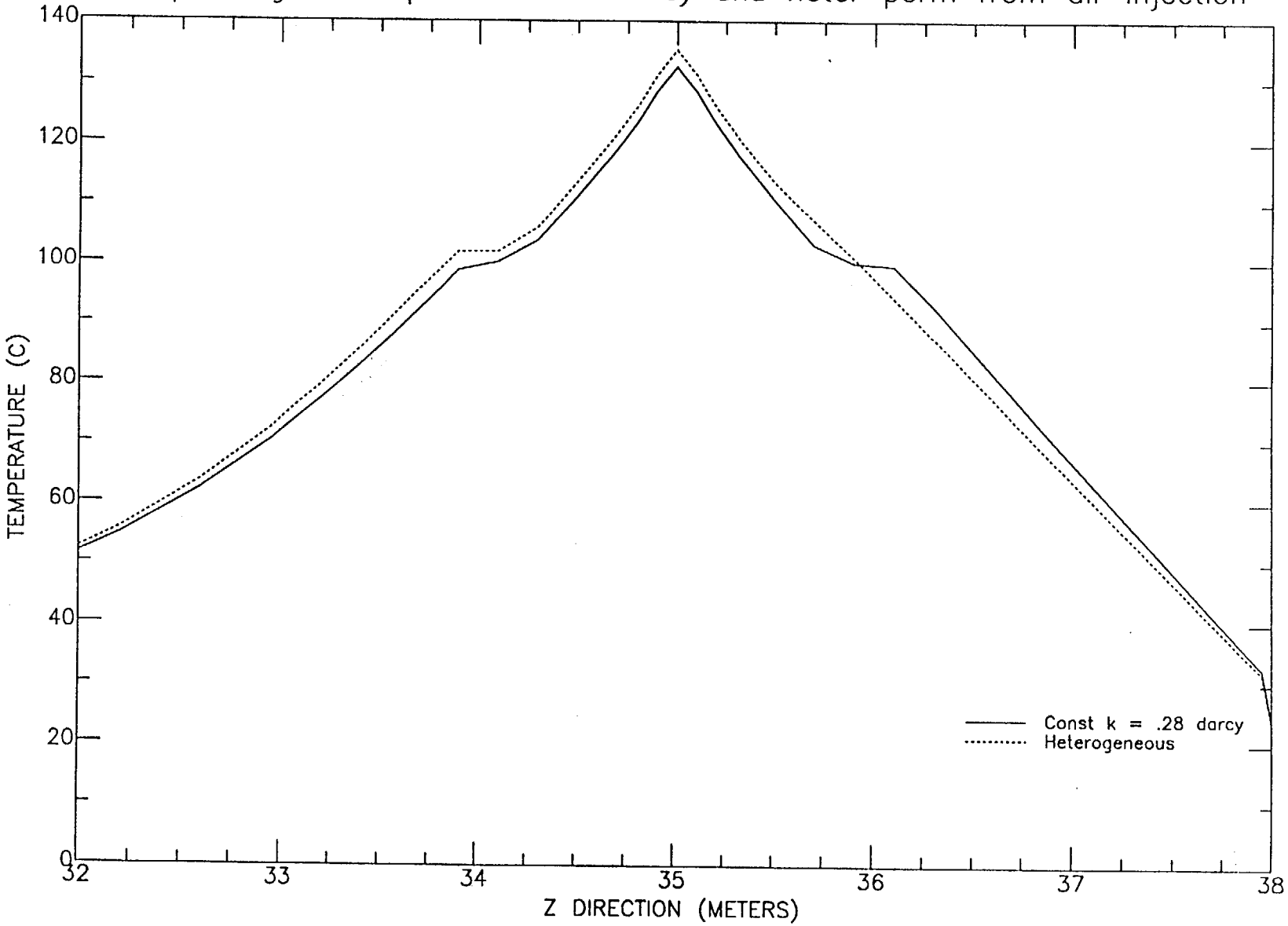
Large Block Test, Run No. 6, x-z Model, 6-21-93

EFFECT OF PERMEABILITY ON TEMPERATURE AT 120 DAYS

Temp using const perm of .28 darcy and heter perm from air injection



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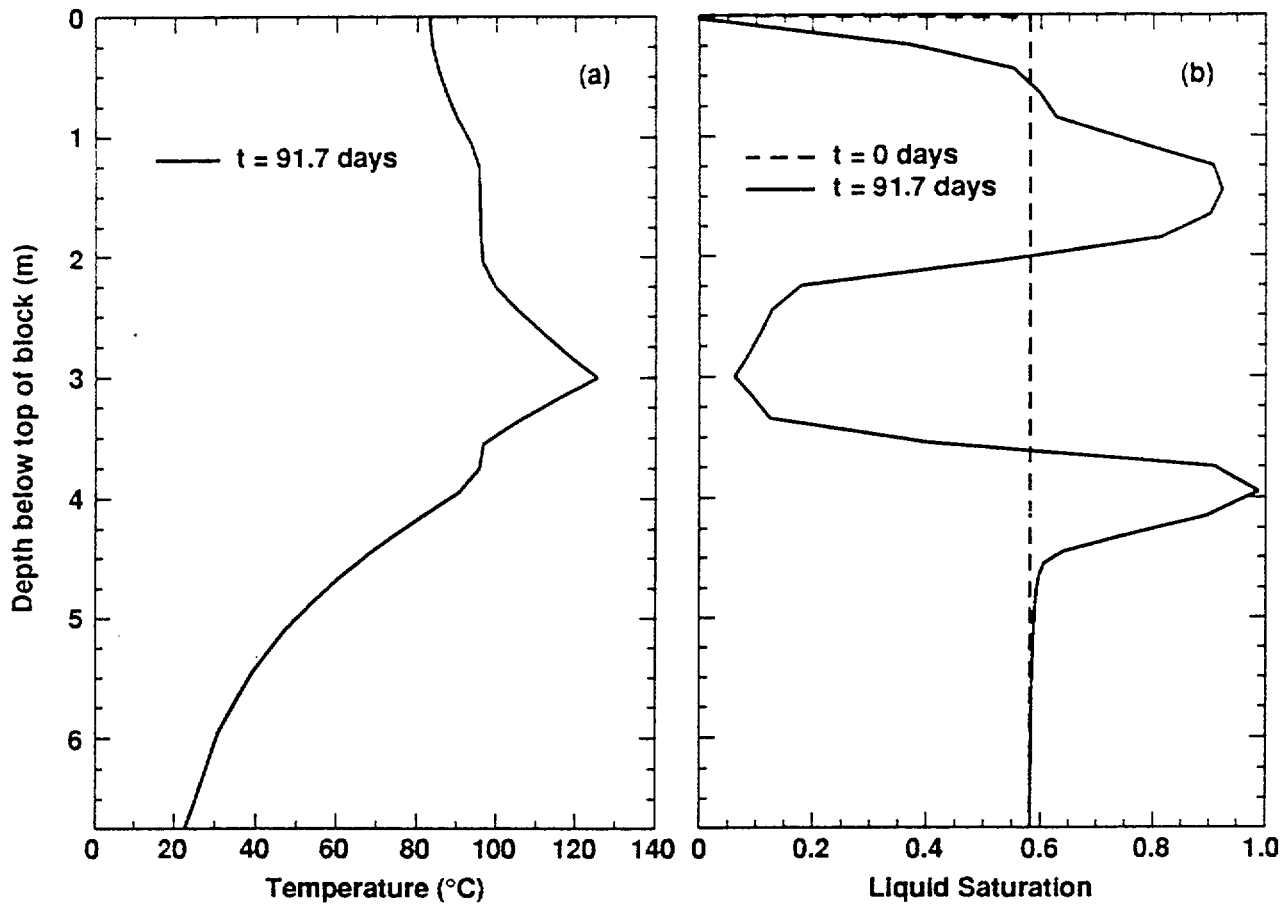


Figure 25. Vertical temperature profile (a) and liquid saturation profile (b) along the midline of the large-block test with 5 300-W heaters and a bulk permeability of 280 millidarcy at $t = 91.7$ days.

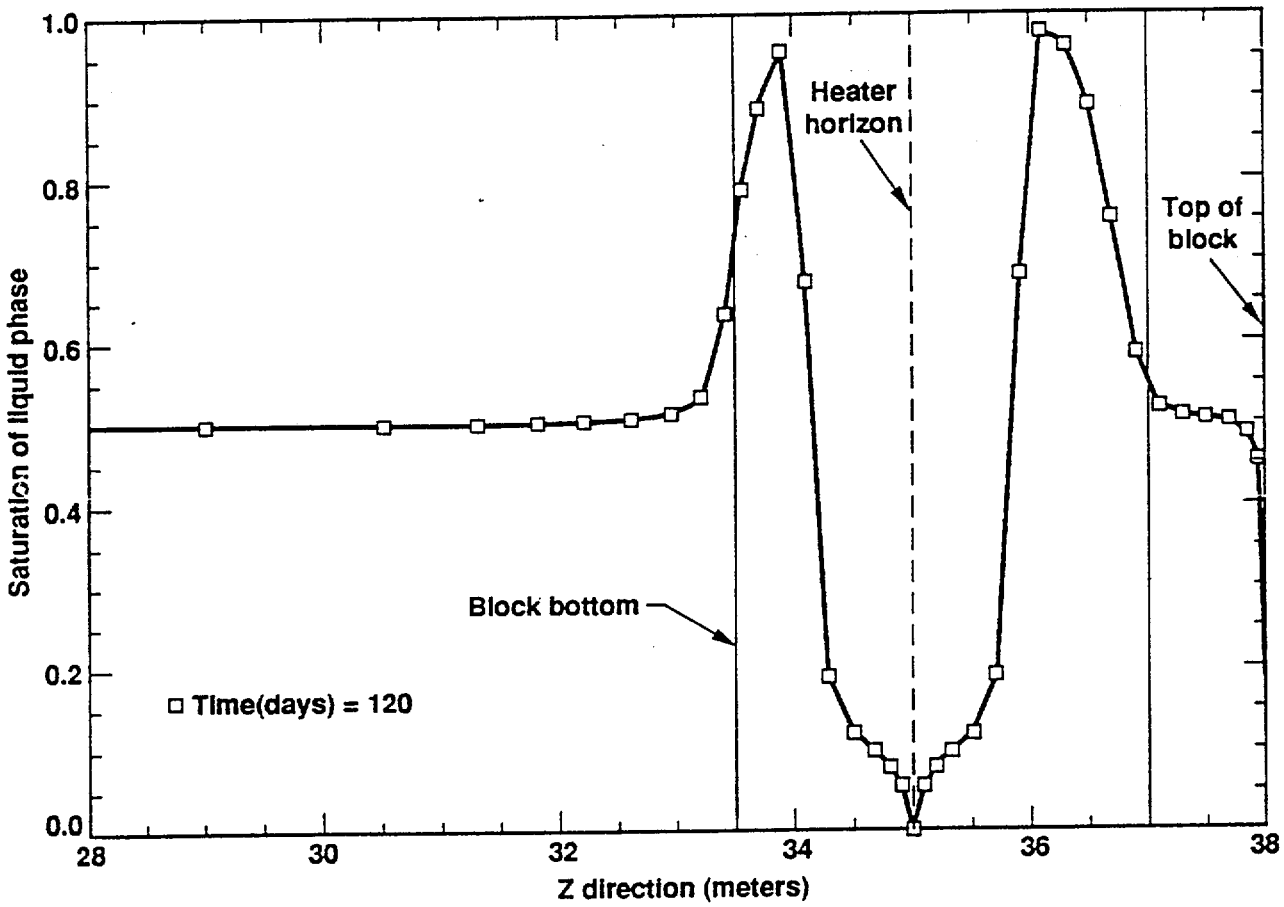
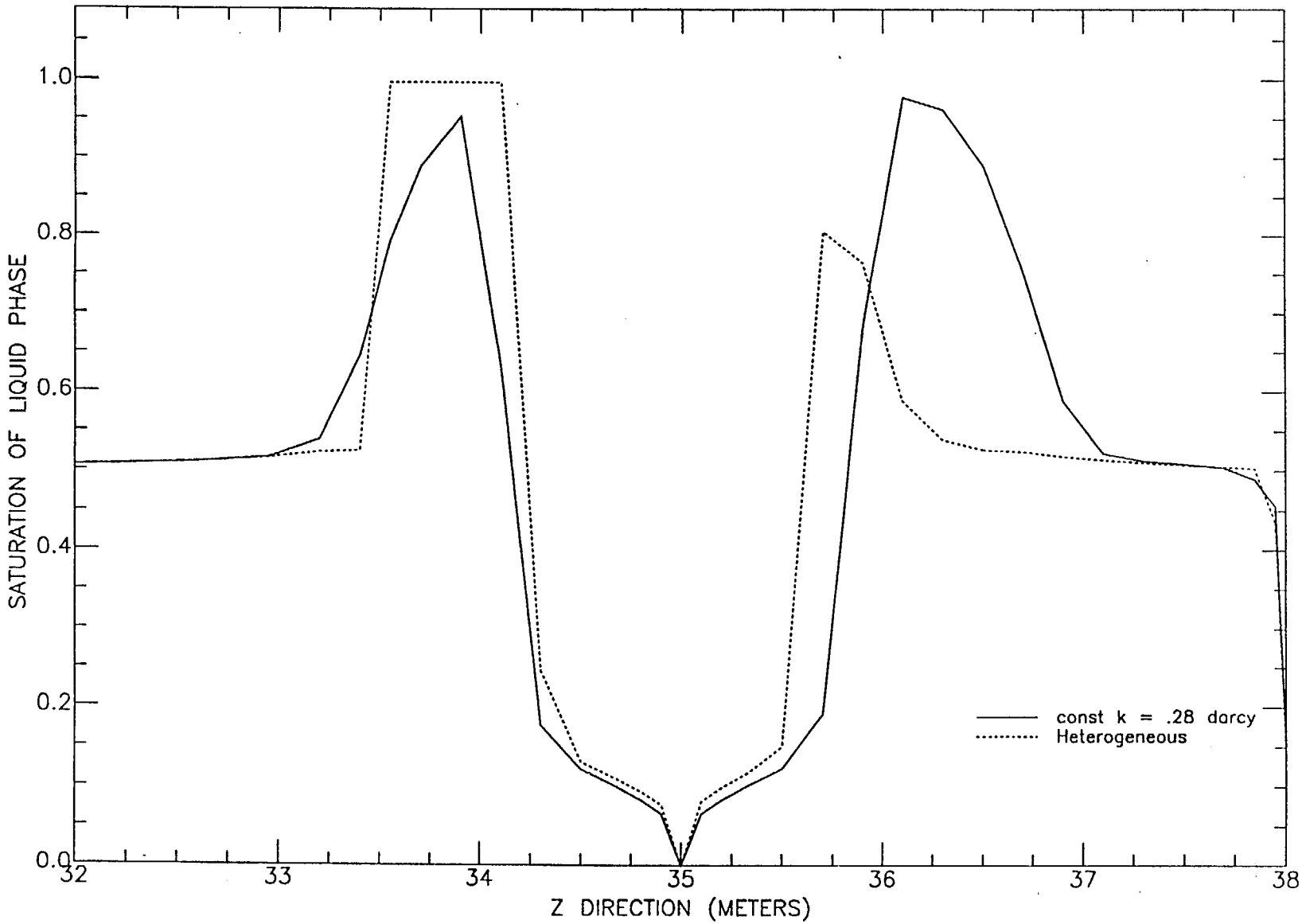


Figure 24. The preliminary result of the pre-test model calculation of the moisture distribution in a square column model.

Large Block Test, Run No. 6, x-z Model, 6-21-93

EFFECT OF PERMEABILITY ON WATER SATURATION PROFILE AT DAY 120

Saturation using const perm of .28 darcy and heterogeneous perm from air inj.



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Fri Jan 28 08:31:22 1994

THE TESTING OF THERMAL-MECHANICAL-HYDROLOGICAL-CHEMICAL PROCESSES USING A LARGE BLOCK

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D. A. Chesnut, W. E. Glassley, and J. J. Roberts
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P.O. Box 808
Livermore, CA 94550
(510) 422-7162

ABSTRACT

The radioactive decay heat from nuclear waste packages may, depending on the thermal load, create coupled thermal-mechanical-hydrological-chemical (TMHC) processes in the near-field environment of a repository. A group of tests on a large block (LBT) are planned to provide a timely opportunity to test and calibrate some of the TMHC model concepts. The LBT is advantageous for testing and verifying model concepts because the boundary conditions are controlled, and the block can be characterized before and after the experiment. A block of Topopah Spring tuff of about 3 x 3 x 4.5 m will be sawed and isolated at Fran Ridge, Nevada Test Site. Small blocks of the rock adjacent to the large block will be collected for laboratory testing of some individual thermal-mechanical, hydrological, and chemical processes. A constant load of about 4 MPa will be applied to the top and sides of the large block. The sides will be sealed with moisture and thermal barriers. The large block will be heated with heater in boreholes and guard heaters on the sides so that a dry-out zone and a condensate zone will exist simultaneously. Temperature, moisture content, pore pressure, chemical composition, stress and displacement will be measured through out the block during the heating and cool-down phases. The results from the experiments on small blocks and the tests on the large block will provide a better understanding of some concepts of the coupled TMHC processes. The progress of the project is also presented in this paper.

I. INTRODUCTION

A major concern for the disposal of high level nuclear wastes in deep geological formations is the quantity and quality of water (both liquid and vapor) that may contact waste packages. The Yucca Mountain Site Characterization Project (YMP) is investigating the Topopah Spring tuff at Yucca Mountain, Nevada, for its suitability as a host rock for the disposal of high level nuclear wastes. The host rock at the potential repository horizon is a partially saturated, fractured, densely welded, nonlithophysal tuff. Work to date suggests that the host rock at the potential repository horizon has a mean matrix porosity of 14% and a mean water saturation of 65%.[1] Therefore, the pores of the host rock are filled with both air and water.

The expected development of the near-field environment in a repository is discussed in the next two paragraphs. The radioactive decay heat from waste packages will increase the temperature in the rock mass in the near field of the repository. The temperature in the rock mass depends on the thermal load in the repository. Results from a heater test in G-Tunnel, Nevada Test Site[2] and model calculations[3] indicate that, above an areal power density (APD) threshold, the near-field environment of a nuclear waste repository will consist of a boiling/dry-out zone and a condensate zone. The rock in the near field will be subject to thermal loading that may change the fracture porosity and connectivity. Laboratory studies[4] and a field investigation[5] indicate that fractures are the main flow path for vapor/steam. Most of the water vapor will condense where temperatures are sufficiently low. A region of increased saturation is expected to form adjacent to and outside of the dryer region due to this condensation. In regions above the heater, for example, the drainage water may be evaporated, flow upward, be condensed, and flow downward again (refluxing).[3] In regions to the sides of the heaters, the condensed water may be shed.[6] In the condensate region and in the refluxing zone, rock-water interaction may occur. And the rock-water interaction will cause dissolution and re-deposition, which, in turn, will affect the movement of fluids within the rock mass.[7,8,&9]

These coupled thermal-mechanical-hydrological-chemical (TMHC) processes have to be understood before models can provide meaningful description of the near-field environment and predictions of the quantity and quality of water in the waste package environment.

Experiments are being designed to test, verify, calibrate, and validate some model concepts of the TMHC processes in the laboratory and in the field. A logical experimental sequence begins with experiments on small laboratory scale cores (usually a few centimeters in size), continues with laboratory experiments on small blocks (of a few tens of centimeters in size) and field experiments on large block (a few meters in size), and ends with in situ field experiments in Exploratory Studies Facility (ESF) (several tens of meters in size), as shown in Figure 1. Laboratory tests on small samples of intact rock and samples with single fractures are being conducted to test and develop conceptual models, such as dehydration and rehydration behavior, vapor diffusion, and liquid water imbibition, under controlled boundary conditions. Larger-scale tests that can incorporate more inhomogeneities, such as fractures, are needed to confirm and validate conceptual and numerical models. Eventually, in situ field tests in ESF will be performed to confirm models that will be used to predict the performance of an entire repository. Some of the tests shown in Fig. 1 may be performed concurrently. This paper presents the progress to date of the large block test (LBT). The LBT is designed to study some of the TMHC processes under controlled boundary conditions.[10] Therefore, it will provide a better and timely understanding of some concepts related to the coupled TMHC processes.

II. PURPOSE AND OBJECTIVES OF THE LBT

The LBT is designed to create controlled boundary conditions so that some of the coupled TMHC processes can be observed and some conceptual models can be tested. We will make observations on: 1) dominant heat transfer mechanism, 2) coincidence (or lack thereof) of the dry-out zone and the boiling-point isotherm, 3) re-wetting of the dry-out zone and the cooling of the region, 4) refluxing of the condensate water above the heated zone, 5) the effect of rock-water interactions and the thermal-mechanical processes on the movement of fluid.

The LBT will provide tests on a block of rock which is closer in scale to the repository than previous heater test blocks,[11] will be able to be characterized from five exposed surfaces and multiple boreholes, and will be dismantled after testing for further characterization, especially for studying rock-water interactions. The LBT will also provide an opportunity for testing the performance of waste package materials in the thermal-hydrological-chemical environment of the block.

The LBT is expected to meet three objectives:

1) It will improve understanding of the coupled TMHC processes included in models that predict the long-term, near-field performance of a nuclear waste repository.

2) It will provide preliminary data for the development of those models, which will be more rigorously tested under full Quality Assurance controls in the EBSFT.

3) It will develop and evaluate measurement systems and techniques to be used in the EBSFT.

The LBT will not replace the EBSFT. Neither will it simulate the in situ conditions in a repository, such as mechanical stresses, mineralogical composition on fracture surfaces, etc. Therefore, the evaluation of testing methodology and instruments will be at risk because the instruments will not be in the environment expected to exist in ESF. The LBT will not simulate emplacement modes either.

III. DESCRIPTION OF THE LBT

The LBT consists of two parts: (1) laboratory tests on small blocks of intact rock and blocks with single fractures, quarried from the region adjacent to the large block, to study the thermal hydrological, mechanical, and chemical processes and (2) an attempt at integrated macroscopic simulation and evaluation of the coupled TMHC processes in a large block.

A. Block Size Determination and Site Selection

A block size is chosen to be at least 3 m on each side and at least 4.5 m tall. The dimensions were determined by applying similar criteria that will be used for the EBSFT, that sufficient number of fractures are included in a test region[12] and that it allows for a zone of condensate to form above the coalesced boiling front above heater zone. If fracture densities at Fran Ridge are similar to those in the potential repository horizon, a block of about 3 m on a side will include at least 10 fractures.

Pre-test calculations have been performed for a block with five horizontal heated holes, each containing a 2.44-m-long, 300-watt heating element, spaced by 0.61 m in a horizontal plane located about 1.5 m from the bottom of the block. The result shows (see Figure 2) that a dry-out zone of about 0.75 m immediately above and below the heater plane can be generated after full-power heating for about 4 months with adiabatic conditions on the sides and a constant 20°C on the top. The maximum temperature attained is about 135°C. A condensate zone about 1.25 m thick will exist adjacent to the dry-out zone. We expect that condensate refluxing may occur along fractures in the condensate zone above the heater plane. Based on these a block size of 3 m square and 4.5 m tall is determined.

While a larger block would be desirable, the thickness of load-retaining frame plates becomes excessive for blocks greater than 3 m in size.

A site at Fran Ridge was selected for the large block. Three considerations were applied in the site selection: the rock type, fracture characteristics, and accessibility. The rock type exposed at Fran Ridge is the same as the densely welded, fractured, Topopah Spring tuff just below the lithophysal/nonlithophysal contact. The fracture density, as observed on the outcrop, is at least one fracture per 30 cm. Both of these two characters meet the criteria for a large block site. An outcrop at the southeastern end of Busted Butte, just south of Fran Ridge, was also inspected. The rock type at the Busted Butte site is closer to that at the potential repository horizon, and the fracture density is also similar. But the accessibility of the Fran Ridge site is superior to the Busted Butte site. Figure 3 shows the location of the Fran Ridge site. The large block is located north of Pit #1 of the US Geological Survey Fracture Mapping site.

B. Isolation of the Large Block

A belt saw will be used to saw four vertical slots that will form the boundary of the large block. The rock surrounding the block will be excavated, so that a 3 x 3 x 4.5 m block will be free standing, as shown in Figure 4.

The techniques of using a belt saw in the field have been developed by Sandia National Laboratories at Albuquerque, New Mexico. A preliminary sawing using a 2 m-long cutting bar was very successful. A commercial belt saw with a 4.9 m-long cutting bar will be used to saw four vertical slots. Each slot will be about 3 m long, 4.9 m deep, and about 4.4 cm wide. In order to use the belt saw, a work area of about 12 x 12 m will be leveled to within 15 cm. A wall of about 4.9 m in height will be created roughly parallel to one of the sides of the block, as shown in Figure 5. Controlled blasting was used to level the work area. The block location was chosen, based on the fracture distribution and configuration. In deciding the block location, the stability of the block after the sawing and excavation was the main concern.

Pre-test model calculations indicate that the bulk permeability of the block should be at least 10^{-15} m^2 in order to create a dry-out zone by heating from the heaters within the block. Air injection tests were conducted after the first vertical hole was drilled. The results indicate that for most parts of the block (in term of depth) the permeability is above 5×10^{-15} m^2 (5 milidarcy).

After all 17 vertical holes were drilled, neutron logging was conducted in some of the holes to estimate the moisture content in the block. Neutron logging will be performed later at various stages of the block preparation to estimate the initial moisture content of the block before the experiment starts. According to pre-test model calculations, a water saturation level of at least 50% by volume is required in order to maintain condensate refluxing. Water may be added to the block if its initial moisture content is not enough.

A sawing procedure has been developed to minimize the adverse effect of sawing on the integrity of the block (see Job Package JP-93-10, YMP). Dunnage bags will be put in the slots during the sawing to protect the block, if necessary. The sawing will start from the previously described high-wall (Fig. 5) so that the water carrying the cuttings can be drained. After the sawing, the rock surrounding the block will be excavated. Mechanical excavation methods will be used to remove the rock near the block. The block will be supported as the excavation progresses. Some small blocks of rock, about 30 cm in size, will be collected from region adjacent the large block for laboratory tests.

C. Characterization of the Block

The large block will be characterized as completely as possible. The distribution of fractures, mineralogical composition of the matrix and the fracture coating, mechanical and hydrological properties, and the initial moisture content will be characterized. The fracture traces on the five surfaces and on the drill cores from the instrument holes will be used to determine the distribution of fractures within the block. The coating on the fractures extending beyond the block will be analyzed, so that the mineralogical composition of the coating on the fractures within the block can be inferred. The properties of the matrix to be determined include porosity, permeability, moisture retention curves, electrical resistivity vs moisture content, stress-strain curves, and acoustic wave velocity. The initial moisture content of the block will be determined using neutron logging.

D. Tests on Small Blocks

Blocks of Topopah Spring tuff collected during the excavation will be used for laboratory experiments to investigate thermal-hydrological, thermal-chemical, and thermal-mechanical processes. Blocks of the tuff with sizes up to several tens of centimeters will be machined that can be joined together to form block-assemblies containing a single saw-cut with controlled aperture. Blocks with a suitable natural fracture will also be used. One block assembly will be used at a time for the experiment. These experiments include: fracture flow vs. matrix imbibition as a function of the fracture aperture, one-dimensional imbibition and dehydration, condensation

along fractures, and geomechanical responses to heating. The following paragraphs contain greater detailed explanations of these experiments.

For the fracture flow vs. matrix imbibition experiment, water will be applied to a fracture, and the wetting front will be determined both along the fracture and in the matrix by using electrical resistivity tomography (ERT)[4] and x-ray tomography.[13,14] The experiment will be done for various fracture apertures and various initial moisture contents, at room temperature, elevated uniform temperature, and under a thermal gradient. Water that flowed through the fracture will be collected for chemical analyses to determine pH; Cl^-, HCO_3^-, F^-, Si, Na, and K. The fracture surfaces will be examined before and after the experiment for evidence of rock-water interaction.

In the one-dimensional imbibition experiment, a block assembly with controlled fracture aperture will be brought in contact with water at one end of the fracture. The experiment will be conducted at elevated temperatures. The moisture distribution will be determined using ERT and x-ray tomography. The imbibition direction will either be against gravity, with gravity, or perpendicular to gravity.

There are three types of experiment in the investigation of the dehydration process: one-dimensional dehydration in both intact and fractured samples and condensation of vapor along a fracture. In the first two experiments both intact blocks and block assemblies with controlled fracture aperture will be used. The sample will be sealed with a moisture barrier on all of the outside surfaces except one side, which will serve as the moisture exit from the sample. A sample with known initial moisture content will be heated from the end opposite the open end. Temporal and spatial distributions of temperature, moisture content, and pore fluid pressure will be monitored. In the experiment to investigate condensation along a fracture, a thermal gradient will be maintained in the sample so that condensation along the fracture can occur. ERT and x-ray tomography will be used to monitor the moisture distribution in the sample. The fracture surfaces will be examined before and after the experiment for evidence of rock-water interactions.

For the study of thermal-mechanical responses, a block of intact or fractured rock will be put under constant triaxial loads and heated either uniformly or from one end. Stress-strain curves will be determined. Displacement of the matrix and across fractures during the heating phase will be measured. Acoustic emissions will be monitored to detect thermal fracturing. The fracture surfaces will be examined before and after heating for evidence of changes in the fracture properties.

E. Large Block Tests of the Coupled TMHC Processes

Tests in the large block will be used to investigate the macroscopic phenomena of the coupled TMHC processes that are affected by multiple fractures, fracture connectivity, scale, and matrix heterogeneities. The large block will first be characterized for its fracture intensity and configuration, as described earlier. Horizontal heater holes and instrument holes will be drilled. Figure 6 shows the instrument holes and heater holes in the block. Instruments will also be installed outside the holes. Installation of instruments, data acquisition, test procedures, and data analyses will be discussed next.

1. Installation of Instruments. Resistance temperature devices (RTD) will be used to measure temperature in the block. A bundle of RTDs will be grouted with cement in temperature holes that are 3.8 cm in diameter. Some of the RTDs will be put in thin-walled stainless steel tubes so that they can be calibrated or replaced during the test. The Rapid Evaluation of K and Alpha (REKA) thermal probe, to be used to determine the thermal conductivity and thermal diffusivity,[15] will also be installed in some of the temperature holes. Extensometers, displacement transducers, stress transducers, and acoustic emission transducers will be either grouted or mounted on a SEAMIST membrane in the geomechanical holes (both 7.6 and 3.8 cm in diameter). Humidity sensors (including resonant cavities and Humicap) and pressure transducers will be installed in a packer system in the moisture content hole (7.6 cm in diameter). The moisture content hole will also be used to measure air permeability. Microelectrode array sensors will monitor pH, Eh, Cl-, and water sampling discs will be mounted on the outer surface of a SEAMIST membrane and pushed against the wall in the geochemistry holes (both 7.6 and 3.8 cm in diameter). Coupons of the waste package material, such as carbon steel and copper, will also be instrumented with the chemical sensors and put in the geochemistry holes. The neutron logging holes (3.8 cm in diameter) will be kept open by using a Teflon tube liner . The annular space between the liner and the borehole wall will be sealed with cement grout. One 2.44-m-long, 300-watt heating element will be installed in each heater hole (3.8 cm in diameter). Coupons of the waste package material will be put in the heater holes. The opening of the heater holes will be plugged to prevent heat loss and develop a hydrological sink. ERT electrodes will be grouted in the ERT holes (both 7.6 and 3.8 cm in diameter).

In addition to the instruments in the holes, the following devices will be mounted on the block surfaces: a temperature control/moisture collecting system at the top, and ERT electrodes, acoustic transducers, and guard heaters

on the sides of the block. The guard heaters will be used to maintain a boundary condition as close to adiabatic as possible.

After installation of the instruments and heaters, the block will be sealed with thermal and moisture barriers on its four side surfaces. Flat jacks will be used as a loading device on the top, and bladders will be used to load the sides. The prefabricated load-retaining frame will be assembled around the block section by section. The electrical wires of instrument and high-pressure lines will be brought out through pre-drilled holes in the load-retaining frame and also through trenches under the frame.

2. Data Acquisition. There are two data acquisition modes: automated data acquisition by a data acquisition system (DAS) and individual data acquisition. The data to be acquired by the DAS include temperature, pressure, displacement, wattage, voltage output from chemical sensors and Humicaps, etc. Data to be collected individually include neutron logging, REKA, resonant cavity, acoustic emission and velocity, ERT, and air permeability. Water sampling will also be conducted manually.

3. Test Procedures. The DAS will start collecting data at least one week before loads are applied to the block. The DAS will continue throughout the test duration. In the preload period at least one set of the manual data will be obtained. Then the block will be loaded with a peak stress of about 4 MPa, both vertically and horizontally, at ambient temperature. At least one set of the manual data will be acquired when the block has reached an equilibrium to the loads. Also in this period, at least one set of stress-strain curve of the block will be obtained. Then the heaters within the block will be energized at full power for at least 6 months, followed by a natural cool-down period, in which the heaters are turned off. The block is considered cooled when its maximum temperature decreases to within 5°C above the ambient temperature. The natural cool-down phase may take several months. During the heating phase, the temperature at the top of the block will be maintained at about 80°C. Pre-test model calculations indicate that the maximum temperature in the heater zone will be about 135°C. One of the criteria for determining the heating duration, the maximum temperature, and the temperature at the top of the block is to establish a dry-out region, a condensate region, and a relatively undisturbed region simultaneously in the block for at least 2 months, so that enough data and samples can be acquired. During the heating phase, a constant load will be maintained on the block. The manual data and water samples will be collected every two weeks. Vapor that exits the block will be collected for measuring its amount and chemistry. The external loads on the block will be released after the block is cooled.

After the test the block will be mechanically dismantled so that the fracture surfaces and some portions of the matrix can be examined for evidence of chemical processes and alterations due to the heating and cooling. Instruments that can be recovered will be re-calibrated.

4. Data Analyses. Data reduction and analysis will begin when the data are available and will continue throughout the testing duration. The chemical effect of all man-made materials on the test will be studied and included in the data analyses.

Post-test model calculations will also be performed to analyze the test results. In this case V-TOUGH and NUFT will be used to model thermal-hydrological processes. The results of this experiment will also be used for model concept development and to verify model calculations using thermal-hydrological-chemical codes, such as EQ3/6, BASIN II, and PRECIP. A thermal-mechanical model, such as Fast Lagrangian Analysis of Continua (FLAC), will be used to analyze the observed thermal-mechanical responses. A physical model will be set up to interpret the coupled processes.

IV. CURRENT STATUS AND DISCUSSION

The load-retaining frame is expected to be delivered in the middle of May 1994. All scientific planning documents of the LBT are in place. All vertical instrument holes have been drilled. Air injection tests indicate that the permeability of the block will be sufficient for generating a dry-out zone in the time frame of the experiment, based on the pre-test model calculations. Sawing of the block will start in early January of 1994. A tentative schedule is shown in Figure 7.

The information obtained so far indicates that the LBT will provide an earlier (relative to EBSFT) opportunity for testing some numerical models used to understand the coupled TMHC processes. For model calibration and verification, the LBT has advantages over in situ field testing in that the experimental conditions can be better controlled, there is easier three-dimensional accessibility to the test region, and the test region (the block) can be better characterized both before and after the testing.

ACKNOWLEDGEMENTS

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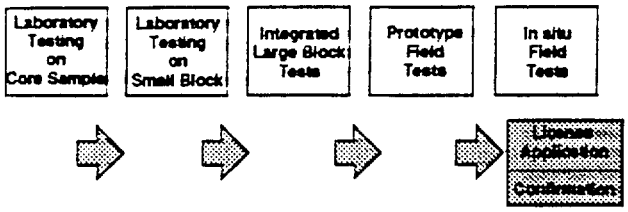


Figure 1. Logical testing sequence leading toward license application and confirmation of a repoitory

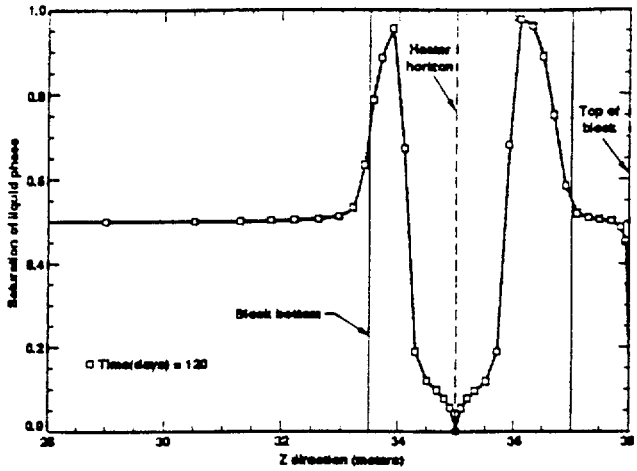


Figure 2. The preliminary result of the pre-test model calculation of the moisture distribution in a square column model.

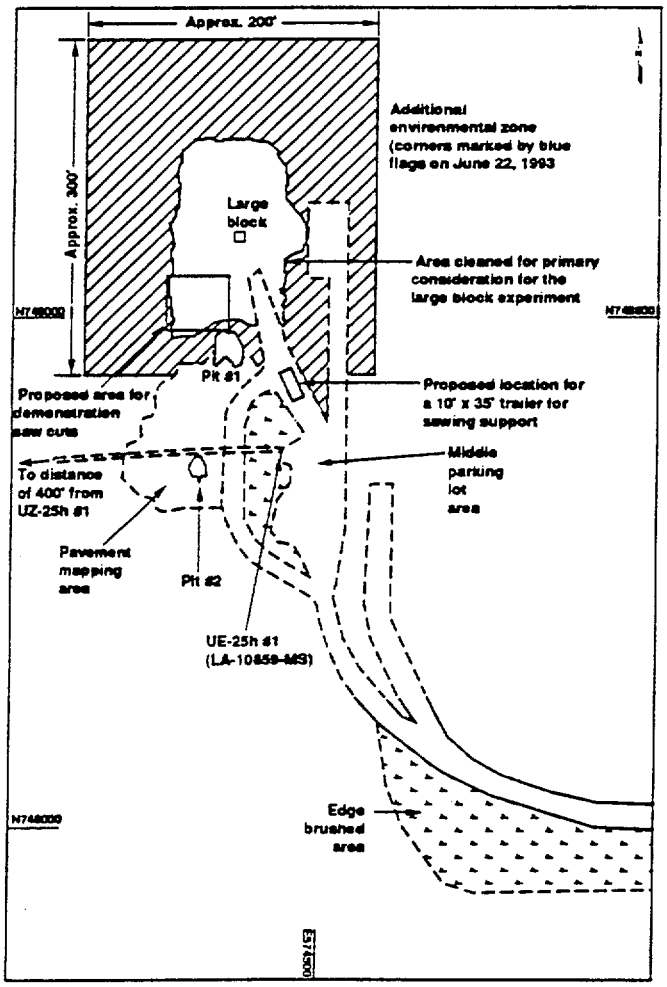


Figure 3. Location of the Fran Ridge Site.

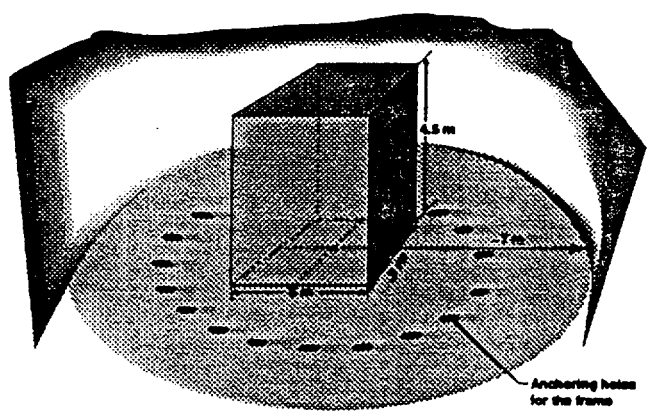


Figure 4. Diagram showing the block and its surrounding area.

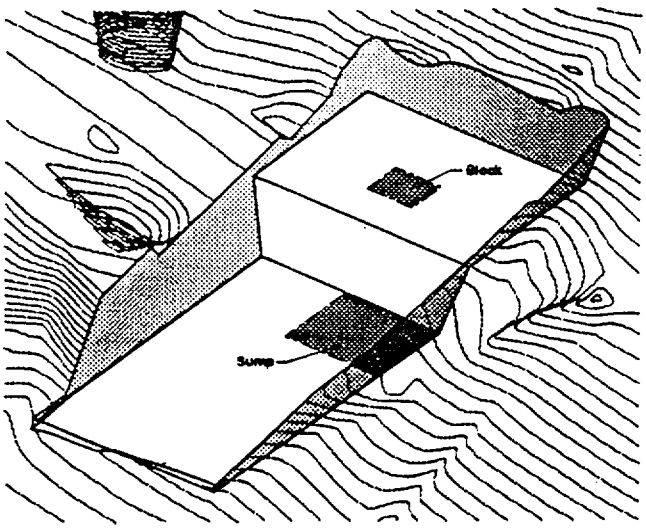


Figure 5. Sketch of the outcrop area after leveling.

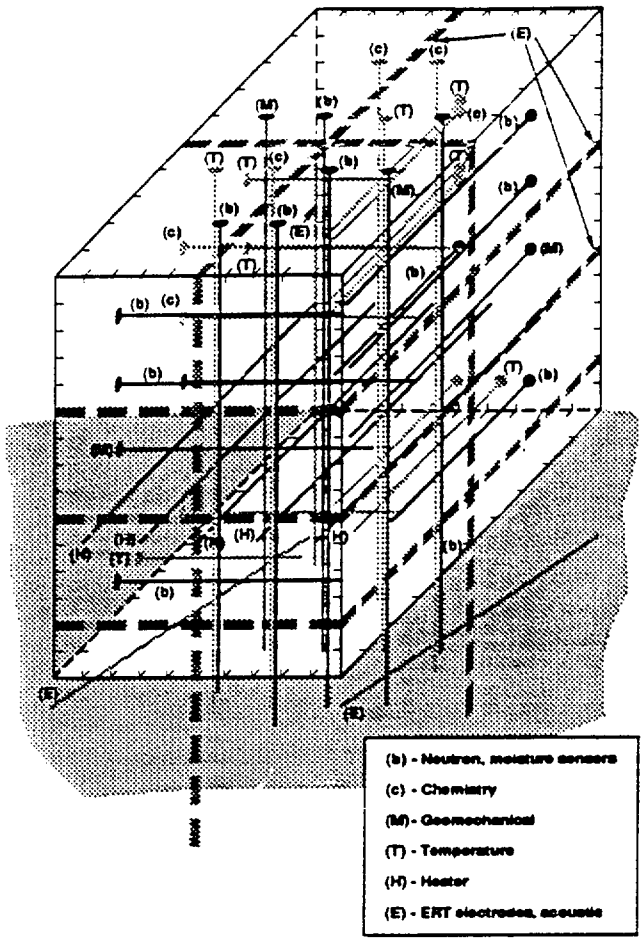


Figure 6. Instrumentation holes in the large block.

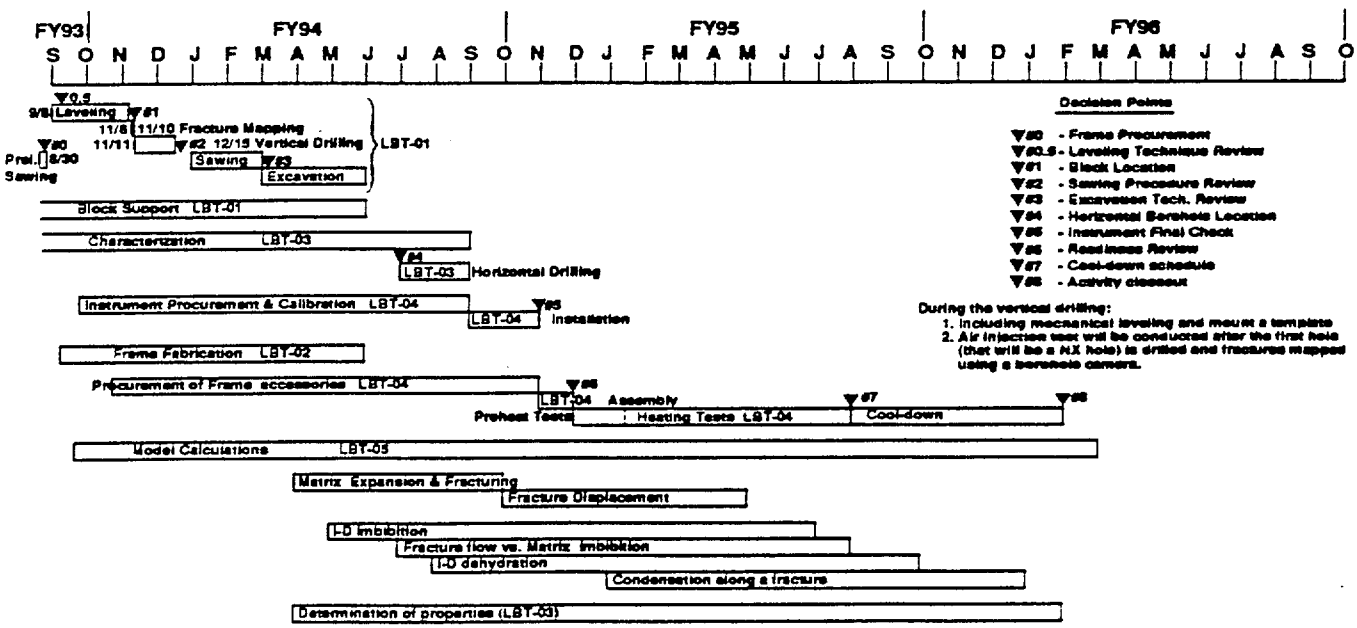


Figure 7. Schedules of activities in the LBT.

CONCEPUTAL MODEL OF SATURATED-ZONE FLOW SYSTEM

Richard R. Luckey
U.S. Geological Survey
Las Vegas; February 25, 1994

Enclosure 1G

ORGANIZATION

- ☞ Background of Conceptual Model Report
- ☞ Hydrologic Units
- ☞ Large Hydraulic Gradient
- ☞ Vertical Gradients
- ☞ Progress

BACKGROUND

HISTORICAL CONCEPT (CIRCA. 1986)

- ☞ **"Intermediate Model"**

- ☞ **Level II Milestone P-932**
  - C-Well Testing Completed
  - Large Hydraulic Gradient Characterized
  - Seismic Line and G-5 Defined Deep Geology

- ☞ **"Road Map" to Complete SZ Site Characterization**

BACKGROUND

EVOLVED CONCEPT (CIRCA. 1993)

- ☞ **SIP's and Study Plans Came Along**
- ☞ **Site Characterization Delayed**
- ☞ **Pre-"Preliminary Model"**
  - Milestone Date NOT Moved
  - "State of Knowledge" Still Report in Order
  - Conceptual Model Evolving

CONCEPTUAL MODEL REPORT

MAJOR TOPICS

- Hydrologic Units
- Potentiometric Surface
- Hydraulic Data
- Hydrochemical Data
- Paleohydrology
- Uncertainty/Future Needs

CONCEPTUAL MODEL REPORT

DOES NOT PRESENT

- ☞ Numerical Model
- ☞ Model Grid
- ☞ Model Boundaries
- ☞ Code Selection

HYDROLOGIC UNITS

DEFINITION

- ☞ Upper Yucca Mountain Volcanic Aquifer
- ☞ Upper Yucca Mountain Confining Unit
- ☞ Lower Yucca Mountain Volcanic Aquifer
- ☞ Lower Yucca Mountain Confining Unit
- ☞ Carbonate Aquifer

- ☞ Some Link to Stratigraphic Units
- ☞ Some Link to Thermal/Mechanical Units

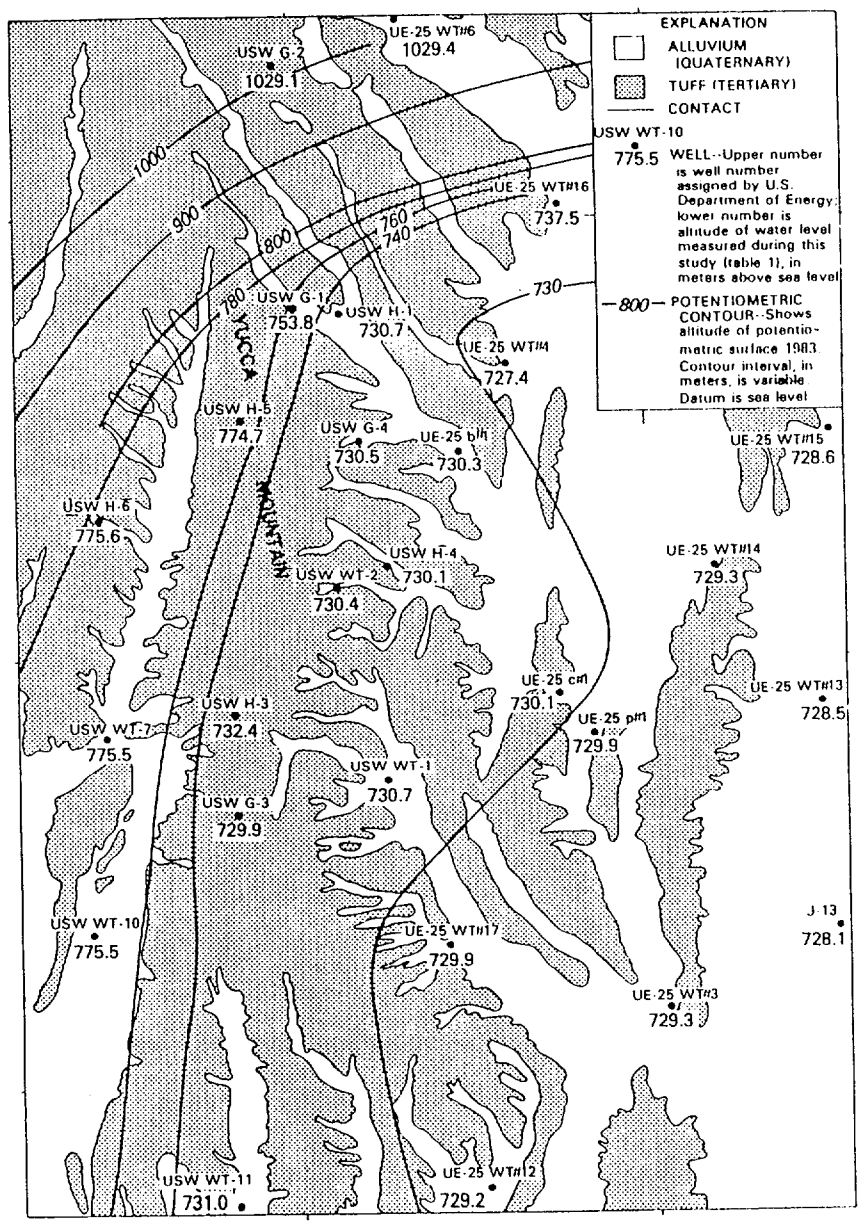
HYDROLOGIC UNITS

COMPARISON OF UNITS

- **Upper YM Aquifer**
  - Densely Welded Topopah Spring
- **Upper YM Confining Unit**
  - Basal Vitrophere of Topopah Spring
  - Calico Hills
  - Uppermost Prow Pass
- **Lower YM Aquifer**
  - Crater Flat Tuff (Prow Pass, Bullfrog, Tram)
- **Lower YM Confining Unit**
  - Bedded Tuffs, Lavas, and Breccia
  - Lithic Ridge Tuff
  - Older Tuffs and Flows
- **Carbonate Aquifer**

LARGE HYDRAULIC GRADIENT

(ROBISON, 1984)



LARGE HYDRAULIC GRADIENT

ALTERNATE CONCEPTUAL MODELS

☞ **No Big Deal Model**

- Flow is in Calico Hills
- Calico Hills is Tight Elsewhere on NTS
- Tight ⇒ Large Hydraulic Gradient

☞ **Drain Model (Fridrich and Dudley)**

- Buried Graben Under Northern YM
- Northern Boundary Fault Drains Water to Carbonate Aquifer
- Supported by Gravity and Aeromagnetic Data; Supports Low Heat Flow Beneath YM

☞ **Semi-Perched Model (Ervin and Luckey)**

- Trying to Contour Two Different Surfaces
  - * Upper YM Volcanic Aquifer to North
  - * Lower YM Volcanic Aquifer to South
- Water Levels in Upper YM Confining Unit Difficult to Interpret

VERTICAL GRADIENTS

DATA

- ☞ **Measured at Ten Sites**

- ☞ **Both Upward and Downward**
  - Downward at b#1, G-4, H-1, H-6
  - Upward at c#3, p#1, H-1, H-3, H-4, H-5, H-6, J-13
  - Note H-1 and H-6 on both lists

- ☞ **Varies from ≈0.1 meter to > 50 meters**

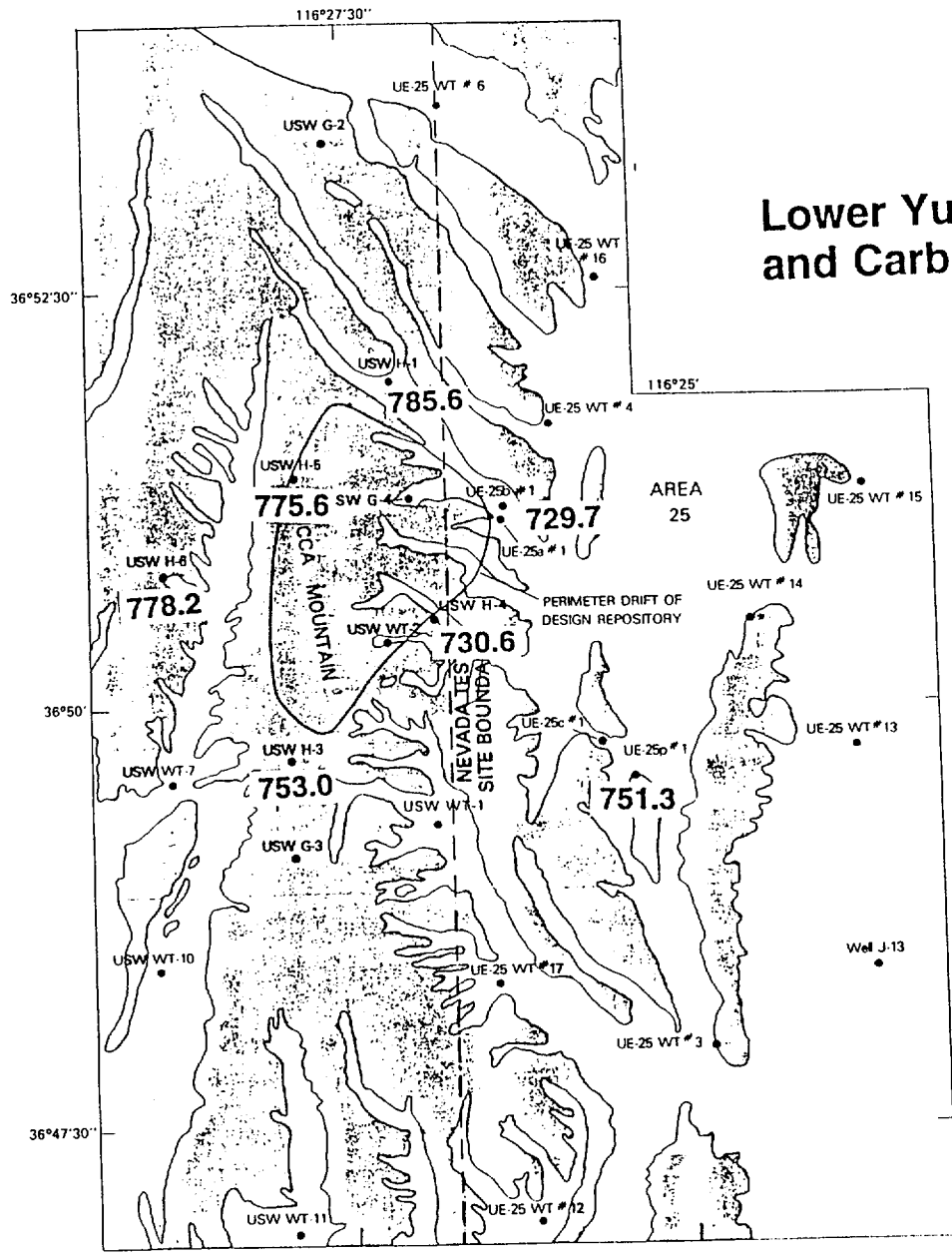
VERTICAL GRADIENTS

GENERALIZATIONS

- ☞ Definite Upward at p#1 between Carbonate Aquifer and Lower YM Aquifer
- ☞ Hint of Upward at J-13 between Lower and Upper YM Aquifers
- ☞ Both Upward and Downward within Lower YM Aquifer
- ☞ Definite Upward between Deep Lower YM Confining Unit and Lower YM Aquifer

VERTICAL GRADIENTS

DEEPEST POTENTIOMETRIC LEVELS



Lower Yucca Mt. Confining Unit and Carbonate Aquifer

Richard R. Luckey, U.S. Geological Survey

PROGRESS

☞ **Report Now Being Written**

- 75% of Sections Completed
- 50% of Sections Integrated
- Currently 100 Draft Pages; Expect 20-25 More
- Author Group Review Starts 3/18

☞ **Goal -- Technical Review by 3/31/94**

- Optimistic, But Attainable
- Tied to DOE Preliminary Model; Slipped 12 Months
- No Need to Slip this Report 12 Months

ersion: 1/16/94

PROGRESSING FROM CONCEPTUAL MODELS OF GAS CIRCULATION IN THE VADOSE ZONE TO CONFIDENT CHARACTERIZATION

A SCIENTIFIC ROUNDTABLE INTERACTION ON YUCCA MOUNTAIN PNEUMATIC CONTINUITY
Sponsored by the Yucca Mountain Affected Units of Local Government
January 26 and 27, 1993 - Thomas and Mack Center - Las Vegas, Nevada

PRELIMINARY AGENDA

January 26th - Wednesday

12:30 pm **I. INTRODUCTION**

A. Welcome and Basis for Convening Workshop — Les Bradshaw (Nye County)
B. Workshop Organization and Ground Rules — Phil Niedzielski-Eichner - Facilitator
C. Gas Pathway Regulatory Considerations — Mal Murphy (Lane Powell Spears Lubersky)

1:00 pm **II. WHAT ARE THE PARAMETERS OF THE ISSUE?**

A. State of Nevada — Carl Johnson
B. Nuclear Regulatory Commission — William Ford
C. Department of Energy — [Russ Dyer (DOE/YMP)][1]
D. Radionuclides Transportable in Gas-Phase — [Rich von Konynenburg (LLNL)]

2:15 pm **III. WHAT IS GENERALLY KNOWN ABOUT GAS FLOW PHENOMENA AT YUCCA MOUNTAIN?**

A. Blowing Wells: Interpretations and Gas compositions
B. Fracture density distribution: Evidence, Stratigraphy and Structure
C. Thermal Signature of Moist Air Discharge at Land Surface

Co-Convener: Marty Mifflin (Mifflin and Associates)
Mike Charnack (USGS)

Panel: Larry Anna (USGS)
[Alan Flint (USGS)]
Cady Johnson (M&O)
Charlie Peters (USGS)
Rick Spengler (USGS)
Ed Weeks (USGS)

5:30 pm **END OF FIRST DAY**

January 27th - Thursday

8:30 am **III. WHAT ARE NUMERICAL MODEL REQUIREMENTS**

A. Boundary Conditions and Parameter Requirements
B. Pre and Post Emplacement Repository Modeling Requirements

Convener: Duane Chesnut (LLNL)

Panel: Bo Bodevarison (LBNL)
Tom Buschek (LLNL)
[Ben Ross/Joe Gottlieb (Disposal Safety)]
Ed Peterson (S-Cubed)
George Zyvoloski (LANL)

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[1] Bracketed names indicate individuals who have been invited but not confirmed.

Version: 1/16/94

11:00 am **IV. FIELD DATA AND STRATEGIES NECESSARY FOR CHARACTERIZATION AND LICENSING**

A. Database Strategies/Methodologies
   1. Existing gas composition/distribution (isotopic and geochemical datasets)
   2. Natural gas discharge (thermal evidence)
   3. Confined pneumatic system responses (open and closed well studies)
   4. Repository scale boundary conditions (stratigraphic and structural controls)

B. Disturbed versus Undisturbed System Field Data Strategies
   1. Repository scale testing
   2. Local scale testing

Convener: Dave Cox (Advanced Resources International)

Panel: Tom Buschek (LLNL)
Joe Dlugosz (DOE)
Cady Johnson (M&O))
[Keith Kersch (SAIC)]
Gary LeCain (USGS)
Marty Mifflin (Mifflin and Associates)
Ed Peterson (S-Cubed)

12:00 pm **LUNCH**

1:30 pm **IV. FIELD DATA AND STRATEGIES NECESSARY FOR CHARACTERIZATION AND LICENSING (Con't)**

3:30 pm **V. SUMMARY IMPRESSIONS**

A. What is Really Important to Know?
B. What can be determined?
   1. Boundary Conditions?
   2. Natural Undisturbed Gas Distribution?
   3. Pneumatic Permeability/Effective Porosity?
C. Will Pneumatic Continuity Data Important to Licensing Be Lost if Tunneling Proceeds as Currently Planned?
D. What, if any, additional surface-based tests are needed?

Discussion Facilitator: Phil Niedzielski-Eichner
Technical Issues Clarification: [Larry Ramspott (TRW)]
Participants: All Conveners, Panelists and Workshop Attendees

5:00 pm **END OF WORKSHOP**

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENCLOSURE 3A

JAN 21 1994

MEMORANDUM FOR: C. William Reamer, Acting Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

FROM: Charlotte Abrams, Senior Project Manager
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management

SUBJECT: FORTHCOMING NUCLEAR REGULATORY COMMISSION/U.S. DEPARTMENT OF ENERGY (DOE) YUCCA MOUNTAIN SITE VISIT *

DATE: February 1-2, 1994

TIME: February 1 - 6:30 a.m. - 5:15 p.m.
February 2 - 6:15 a.m. - 5:30 p.m.

LOCATION:** Nevada Test Site and Yucca Mountain area, Nevada

PURPOSE: To visit and hold discussions at specific locations/features relevant to a DOE topical report on "Evaluation of the Potentially Adverse Condition 'Evidence of Extreme Erosion during the Quaternary Period' at Yucca Mountain, Nevada," and to better understand field relations used to support analyses presented in the topical report. See Enclosure 1 for the site visit itinerary.

PARTICIPANTS:

NRC	DOE	State of Nevada
C. Abrams	T. Bjerstedt	C. Johnson
H. Lefevre	C. Einberg	T. Hickey, NV Legislative Committee
J. Trapp	S. Leroy	

* Interactions between NRC and DOE are open to members of the public, Petitioners, intervenors, or other interested parties wishing to attend as observers pursuant to the spirit of "Open Meeting Statement of NRC Staff Policy," 43 Federal Register 28058, dated June 28, 1978, which details the open meeting policy for applicants and licensees.

9402010039

** Permission to gain access to the facilities at Yucca Mountain must be obtained from DOE, Yucca Mountain Project Office (YMP). Those persons wishing to attend the site visit should mail or fax the information requested on the enclosed form (Enclosure 2) to Ms. Carlene Hill, SAIC, 101 Convention Center Dr., Las Vegas, NV 89193, Fax (702) 794-5348, Verify (702) 794-7375, at least 14 days prior to the site visit.

Affected Local Governments

L. Bradshaw, Nye County, NV
D. Bechtel, Clark County, NV
V. Poe, Mineral County, NV
C. Schank, Churchill County, NV
R. Williams, Lander County, NV
B. Mettam, Inyo County, CA
M. Baughman, Lincoln County, NV
F. Mariani, White Pine County, NV
P. Niedzielski-Eichner, Nye County, NV
L. Fiorenzia, Eureka County, NV
J. Hoffman, Esmeralda County, NV
M. Murphy, Nye County, NV

for Charlotte E. Abrams, Senior Project Manager
Repository Licensing and Quality Assurance Directorate
Division of High-Level Waste Management

cc: S. Goldberg, OMB
D. Weigel, GAO
F. Parker, NAS
W. Barnard, NWTRB
A. Kadak, ACORN
R. Nelson, YMPO
J. Meder, NEV

Enclosures: Site Visit Itinerary
Site access form

ENCLOSURE 1

ITINERARY
SITE VISIT FOR EROSION TOPICAL REPORT TOPICS
FEBRUARY 1-2, 1994#

Tuesday, February 1, 1994

6:00 a.m.	Depart Beatty, Nevada
6:35	Arrive at Steve's Pass for overview of visit introduction of trip organizers and opening remarks
7:00	Depart for Solitario Canyon through Crater Flat
7:45	Solitario Canyon to visit and discuss: Oldest dated boulder deposit on west slope of Yucca Mountain (YMW-3); Reference Figure 4 of Topical Report (TR) [requires 1-1.5 hour hike from vehicles to deposit and back; moderately strenuous]
10:45	Drive to Trench through Solitario Canyon fault (SCFT-2)
11:05	Discuss thick carbonate deposits and pediment surface at SCFT-1 (also carbonate deposits and pediment surface, if time allows)
11:45	Drive to Trench CF-1
11:55	Discuss exposure of alluvium at CF-1
12:15	Drive to NTS Gate 510, via Steve's Pass (LUNCH will be during drive to Gate 510 or as opportunity allows)
1:00	Badging at NTS Gate 510
1:15	Drive to Field Operations Center (FOC)
1:30	Break at FOC
1:45	Drive to Yucca Mountain
2:15	East Flank of YM to visit and discuss: - Hillslope boulder deposits on Boundary Ridge (YME-2); Reference Figure 5 of TR

2:50	-	Hillslope boulder deposit at head of Abandon Wash (YME-1) Reference figures 3 and 5 of TR; [1 hour hike to deposit and back]
4:15	-	Discussion of Sand Ramp History in area
4:30	Drive to Mercury or Gate 510	
5:15	Exit Gate 510	

Participants will be expected to provide their own lunches and beverages on both days of the visit. Water will be available.

ITINERARY
DOE/NRC SITE VISIT FOR EROSION TOPICAL REPORT TOPICS
FEBRUARY 1-2, 1994

Wednesday, February 2, 1994

6:00	Breakfast at Mercury Cafeteria (for those persons lodging in Mercury)
6:15	Badging at Gate 510 for those traveling from Beatty
6:30	Drive to Skull Mountain
7:00	Meet at Skull Mountain, SKM 1 and SKM 3 for overview of varnish deposits from road; Reference Figure 6 in TR.
7:30	Drive to Little Skull Mountain
7:40	Little Skull Mountain Pass to visit and discuss cross section of hillslope colluvial boulder deposit (LSM-1); reference Figure 5 of TR
8:20	Drive to Forty Mile Wash vista
8:40	Forty Mile Wash to discuss Tertiary and Quaternary geologic history
8:55	Drive to Forty Mile Wash rim
9:05	Forty Mile Wash to discuss Tertiary and Quaternary geologic history [10 minute walk]; Reference Figure 13 in TR
9:50	Drive to Coyote Wash
10:00	Coyote Wash to visit and discuss canyon cutting and Holocene geologic history
10:50	Drive to Jake Ridge
11:15	Jake Ridge to visit and discuss 1984 erosion event and role of infrequent erosion events on landscape
11:45	Drive to Buckboard Mesa [LUNCH will be eaten during drive to Buckboard Mesa or as opportunity allows.]
1:20	Buckboard Mesa to visit and discuss oldest dated hillslope colluvial boulder deposits in Yucca Mountain area (BM-1) and upper Forty Mile Canyon History (1 hour hike to deposit and back); Reference Figures 5 and 10 from TR
3:20	Depart for wrap-up session in Mercury or TBD

4:10	Wrap-up Session (location TBD) - NRC staff available to answer questions related to preliminary comments on the TR. - Questions and comments from State and affected Counties - DOE closing remarks
5:15	Depart for Mercury Gate 100, return NTS badges, and return to Las Vegas, NV

Notes:

1. A block of rooms has been reserved in Mercury for trip participants.
   - Reserved block of 50 rooms in Mercury for night of Feb 1: $10.00 per night.
   - Reserved block of 15 rooms in Mercury for night of Feb 2 for those attending Nye County field trip on Feb 3.

2. Security arrangements:
   Feb 1; Enter Gate 510 at 1:00 p.m. and exit Gate 510 at 5:15
   Feb 2; Enter Gate 510 at 6:15 a.m. and exit Mercury Gate 100 at 5:15

3. Everyone should bring their own lunches and ice-coolers as we will be eating on the fly.

4. Security Information should be received no later than January 21, 1994. Send it to Ms. Carlene Hill via facsimile at 702-794-5348 (see form, Enclosure 2), or by mail to:

   TMSS
   Institutional and External Affairs
   101 Convention Center Drive
   Suite 407
   Las Vegas, NV 89109

5. No foreign nationals are allowed to spend the night on NTS.

6. Fuel is available in Mercury. It is cash only for non-government and non-test site assigned government vehicles.

7. Please plan for cold temperatures.

8. Four days prior to the site visit, DOE will assess weather conditions and make a call if conditions warrant postponing the interaction. If weather is bad, attendees or their organizations will be notified (via NTS badging list) of postponement. Only those that have submitted security information will be notified initially, and a follow-up letter would be sent to NRC with the new dates for the visit.

9. An informal fieldtrip will be lead by Nye County Nuclear Waste Repository Project Office Consultant Marty Mifflin on February 3. Persons wishing to participate should provide their own transportation. An itinerary will be available from the Nye County Project Office after January 20.

BADGING INFORMATION REQUIRED FOR ACCESS TO THE NEVADA TEST SITE FOR U.S. CITIZENS ONLY

NAME OF GROUP _____ DATE OF VISIT _____

_____

LAST NAME FIRST NAME MIDDLE INITIAL (MI) (IF NO MI WRITE NMI)

SOCIAL SECURITY NO. _____

DATE OF BIRTH _____ PLACE OF BIRTH _____

NATURALIZATION CERTIFICATE NUMBER _____

JOB TITLE _____

COMPANY NAME _____

COMPANY ADDRESS _____

_____

PHONE # _____

HOME ADDRESS _____

_____

PHONE # _____

CITIZENSHIP _____

NOTE: ORIGINAL NATURALIZATION CERTIFICATE IS REQUIRED AT TIME OF BADGING

ENCLOSURE 2

DRAFT

Day One NRC Field Trip
January 31 (Monday), 1994

6:00 A.M.	Eat breakfast in Beatty, NV
7:00	Leave Beatty, NV for gate 510 at NTS
7:35	Arrive at Gate 510 for badging
8:00	Depart Gate 510 for Little Skull Mountain
8:20	Pass between Little Skull Mountain and Skull Mountain. Stop to investigate varnished deposits to North and South of Jackass Flat Highway.
11:00	Leave Little Skull Mountain
11:10	Arrive Rock Valley. Stop for discussion at east side of Rock Valley along Jackass Flat Highway.
11:30	Depart Rock Valley for Lunch in Mercury
11:45	Lunch in Mercury
12:30 PM	Arrive U.S.G.S. Core Library in Mercury for discussion of geology at overview map.
1:00	Leave Mercury for 40 Mile Wash
1:30	Arrive 40 Mile Wash. Stop in Wash just north of Yucca Crest Highway for evaluation of alluvial and colluvial deposits.
2:30	Leave 40 Mile Wash for Fran Ridge Overview
2:45	Fran Ridge. Stop for overview of erosion. (Get location from Paul Prestholt)
3:00	Arrive at Yucca Mountain stone stripes and investigate.
4:45	Leave for Yucca Crest
5:20	Leave Yucca Crest for egress from Gate 510.
6:40	Return to Exchange Club in Beatty, NV

ITINERARY

Regional Evidence for Age of Landforms, Cyclic Erosion
February 3, 1994

(Detailed handouts on stops are separate)

	Overnight February 2 in Pahrump, Nevada (Saddles West)
7:00 a.m.	Meet in front of Saddles West.
7:10 a.m.	Leave, travel west towards Shoshone, California, on Nevada Highway 372 which turns into California Highway 178.
7:30 a.m.	Turnoff for Stop 1 (to Chappo Spring). #1 geomorphic surface and 160 ± 10 ka ash.
9:00 a.m.	Return to Highway 178, west to Stop 2. View of Lava Creek B and Bishop tephras along the way.
9:15 a.m.	Stop 2. Shoshone Town Dump. #1 geomorphic surface, dates on BK soil horizon..
9:45 a.m.	Back to Highway 178, south on Highway 127 to Stop 3.
10:30 a.m.	Stop 3. 2/3 mile traverse by foot to #2 geomorphic surface, fault zones, geomorphic surface #1, coarse gravels of this surface.
12:30 p.m.	Lunch at this site (will carry makings/beverages).
1:00 p.m.	Leave to travel north on Highway 127 to Death Valley Junction, continue north to turnoff near Stateline to Fairbanks Spring (northermost spring of Ash Meadows group).
2:00 p.m.	Stop at Fairbanks Spring. Discuss age relationships, compare landforms and apparent histories of Tecopa basin and Amargosa Desert.
2:30 p.m.	Leave, continue east to Crystal, then to U.S. 95 and on to the Indian Springs area.
3:30 p.m.	Stop briefly to review desert varnish on gravels near Indian Springs (stop optional depending on time).
4:00 p.m.	Continue southeast to Corn Creek badlands stop. Relationship of terrace gravels inset into well dated 7-9 ka paleodischarge deposits with well developed varnish on the desert payments of the gravel terrace. This is a key locality where available time for varnish formation is constrained to less than 9,000 years.
6:30 p.m.	Arrive in Las Vegas.

FINAL AGENDA

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

DOE TECHNICAL PROGRAM REVIEW

February 14-18, 1994
Stardust Hotel
Las Vegas, NV

Monday, February 14, 1994

8:00 am	Dignitary Introductions and Opening Remarks	R. Nelson
8:15	Framework Overview	R. Dyer
8:35	Meeting Conduct and Objectives	R. Dyer
8:45	Introduction for 1.2.3 Site Investigations and 1.2.3.2 Geology	R. Dyer
9:00	1.2.3.2.2 Rock Characteristics	M. Tynan
10:10	1.2.3.9.5 3-D Model	M. Tynan
10:30	BREAK	
10:45	1.2.3.2.3 Erosion	T. Bjerstedt
11:15	1.2.3.2.5 Volcanism and Post-Closure Tectonics	J. Nesbit T. Sullivan
12:30	LUNCH	
1:45	1.2.3.2.6 Surface Characteristics - Soil and Rock Properties	T. Sullivan
2:15	1.2.3.7.2 Thermal and Mechanical Properties	M. Tynan
2:45	BREAK	
3:00	1.2.3.2.8 Preclosure Tectonics	T. Sullivan J. Nesbit
4:15	Discussion of 1.2.3.2 Geology	R. Dyer
5:00	ADJOURN	
5:00-7:00	Poster Sessions No Host Bar	

Tuesday, February 15, 1994

8:00 am	Opening Remarks	R. Dyer
8:05	Introduction to 1.2.3.3 Hydrology	C. Newbury
8:15	1.2.3.3.1.1 Description of Regional Hydrologic System	C. Newbury
8:45	1.2.3.3.1.2 Unsaturated Zone Hydrology	J. DLugosz
10:00	BREAK	
10:15	1.2.3.3.1.3 Saturated Zone Hydrology	R. Patterson
11:15	Discussion of 1.2.3.3	R. Dyer
11:45	LUNCH	
1:00	1.2.3.7.2 SCP's Human Intrusion Study Plan	T. Bjerstedt
1:30	1.2.3.11 Geophysics	M. Tynan
2:00	Discussion of 1.2.3.2.7 and 1.2.3.2.11	R. Dyer
2:30	BREAK	
2:45	Introduction to Mineralogy, Petrology and Geochemistry	A. Simmons
2:50	1.2.3.2.1 Mineralogy and Petrology	A. Simmons
3:55	1.2.3.4 Geochemistry	A. Simmons
4:55	1.2.3.10 and 1.2.3.12 Altered Zone and Near Field Environment Studies	A. Simmons
5:40	Discussion of 1.2.3.2.1, 1.2.3.4, 1.2.3.10 and 1.2.3.12	A. Simmons
6:10	ADJOURN	
6:10-7:10	Poster Sessions No Host Bar	

Wednesday, February 16, 1994

8:00 am	Opening Remarks	R. Dyer
8:05	Introduction to 1.2.5 and 1.2.11	S. Jones
8:10	1.2.11 Quality Assurance	R. Spence
8:25	1.2.5.6 Site Evaluation and 1.2.5.2 Licensing	A. Gil
9:20	1.2.5.3 Technical Data Management	A. Simmons
10:00	BREAK	
10:15	1.2.5.4 Performance Assessment	E. Smistad
11:10	Discussion of 1.2.5 and 1.2.11	S. Jones
12:15	LUNCH	
1:30	Introduction to Radiological/Meteorological/Climatological Studies	W. Dixon
1:40	1.2.3.6 Climatology	R. Crawley
2:25	1.2.13.4 Radiological Studies	W. Dixon
2:45	BREAK	
3:00	1.2.13.4 & 1.2.13.5 Meteorological Studies	W. Dixon
3:30	Discussion of Radiological/Meteorological/Climatological Studies	W. Dixon R. Dyer
4:00	International Program	R. Levich
5:00	ADJOURN	
5:00-7:00	Poster Sessions No Host Bar	

Thursday, February 17, 1994

8:00 am	Opening Remarks	R. Dyer
8:05	Introduction to Engineering and Design	W. Simecka
8:20	MGDS Design Process Overview	D. Stucker
9:20	1.2.2 Waste Package Development	M. Smith
10:05	BREAK	
10:20	1.2.4 MGDS Surface Design Program	J. White
10:40	1.2.4 MGDS Subsurface Design Program	J. White
11:30	MGDS Wrap Up	D. Stucker
11:45	LUNCH	
1:00	1.2.6 ESF Design	J. Replogle
2:00	1.2.1 Systems	D. Royer
3:30	BREAK	
3:45	Wrap-Up Discussion of Engineering and Design	W. Simecka
4:15	ADJOURN	
4:15-7:00	Poster Sessions No Host Bar	

Friday, February 18, 1994

8:00 am	Opening Remarks	R. Dyer
8:05	Panel Discussion involving TPOs and DDs	R. Dyer
	M. Bishop M. Blanchard G. Bodvarsson S. J. Brocoum J. A. Canepa W. L. Clarke W. R. Dixon L. D. Foust L. R. Hayes S. B. Jones R. Levich E. Lundgaard R. Nelson L. E. Shephard W. B. Simecka M. D. Voegele	
10:20	BREAK	
10:35	Panel Discussion Continues	R. Dyer
11:35	Summary of Meeting Accomplishments	R. Dyer
12:00	ADJOURN	