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

Received w/Ltr Dated 9/12/90

Reply to:

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Las Vegas, Nevada 89119
Tel: (702) 388-6125
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MEMORANDUM

DATE: August 20, 1990

FOR: John J. Linehan, Director, HLPD, Division of High-Level Waste Management, M/S 4 H 3

FROM: Paul T. Prestholt, Sr. OR - YMP

SUBJECT: YMP Site Report for the month of July, 1990

I. CALICO HILLS RISK-BENEFIT ANALYSIS

The final draft report on this activity is in preparation. There is no date at this time for release of a final report. Nothing new has been done on this task since the presentation at the NWTRB meeting in Atlanta, Georgia. Strategies 2 or 5 are recommended (see attachments I-A and I-B)

II. EXPLORATORY SHAFT (ESF) ALTERNATIVES STUDY

Since last months report (from the handout):

- General arrangement drawings and data sheets have been prepared for the 17 options identified.
- All requirements have been identified for use in evaluation of options.
- All influence diagrams have been developed by expert panels for use in evaluation of options.
- Requirements have been cross-correlated with the influence diagrams.

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PDR WASTE
WM-11 PDC

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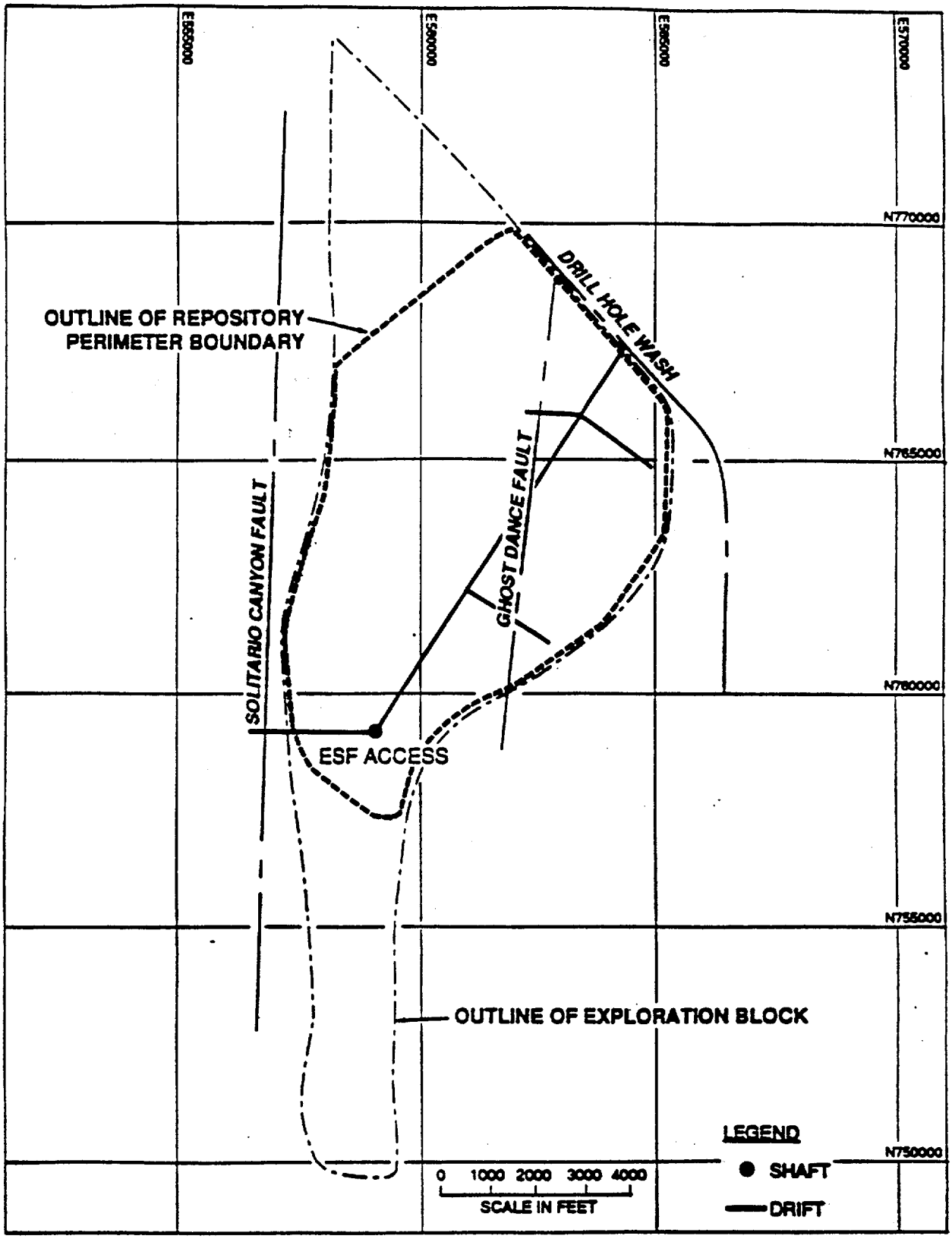
WM-11
NH03

STRATEGY NO. 2

INSIDE; S; EXTENDED DRIFTING; INTEGRATED WITH ESF



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CALICO HILLS STRATEGIES

(CONTINUED)

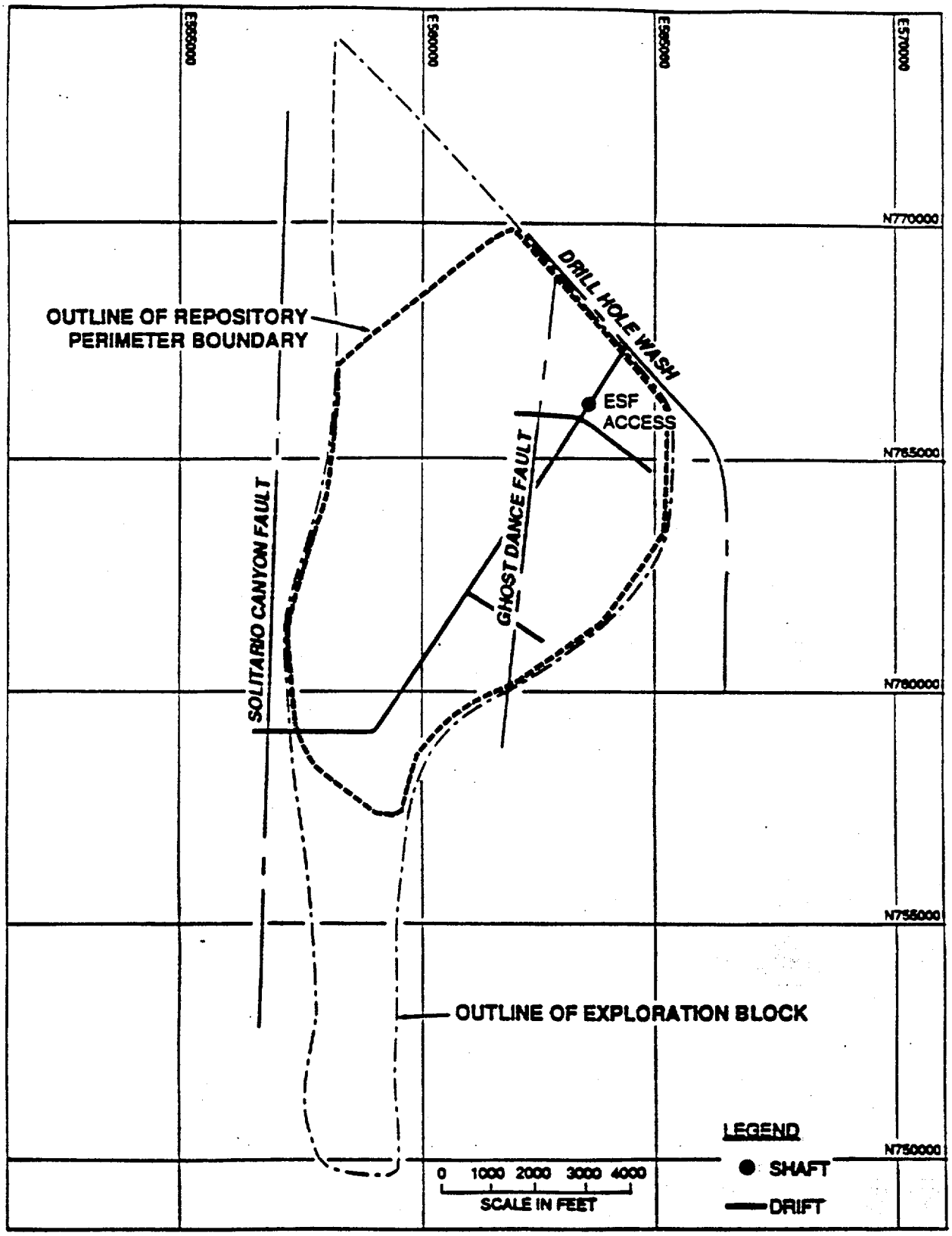
STRATEGY #2

- ATTEMPT TO MAXIMIZE TEST ACCURACY BY PROVIDING EXTENSIVE, REPRESENTATIVE DATA
- LARGEST EXTENT OF EXCAVATION CONSIDERED INSIDE THE BLOCK
- AS MUCH AS 19,000 FT OF DRIFTING EXPLORES:
  - GHOST DANCE FAULT
  - SOLITARIO CANYON FAULT
  - DRILLHOLE WASH
  - FAULTING TO THE EAST
  - FACIES TRANSITION

I-A (Cont'd)

STRATEGY NO. 5

INSIDE; NE; EXTENDED DRIFTING; INTEGRATED WITH ESF



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CALICO HILLS STRATEGIES

(CONTINUED)

STRATEGY #5

- SIMILAR TO STRATEGY #2, EXCEPT ACCESSES WOULD BE LOCATED IN THE SOUTH, WHERE THE CHn IS THICKER AND VITRIC
- PERFORMANCE IMPACTS MAY BE LESS THAN FOR STRATEGY #2
- USE OF BOTH #2 AND #5 ASSURES THAT AT LEAST ONE STRATEGY WITH HIGH TEST ACCURACY CAN BE INTEGRATED WITH ANY OPTION CONSIDERED IN THE ESF STUDY

Input from the Calico Hills Study was received by the team on June 30, 1990, and:

- General arrangement drawings have been modified to incorporate Calico Hills recommendation.
- Data sheets are being updated to incorporate Calico Hills recommendation.
- Influence diagrams impacted by the Calico Hills recommendation are being re-evaluated.

Status of the ESF Alternatives Study is (from the handout):

- Scoring of options has commenced. Scoring of key factors was delayed pending imput from the Calico Hills Study.
- Final scoring will recommence on August 16, 1990.
- Combined options will be analized and rank ordered, and a preferred option selected.
- Evaluation of options will consider obtaining early access to the Calico Hills Unit.

Attached is a chart showing interim and major milestones. (See attachment II).

III. SURFACE-BASED TESTING (SBT) PRIORITIZATION

The SBT Prioritization Task Force has three primary goals (from the handout):

1. Develop an explicit decision analysis method to prioritize surface-based testing in the initial phase of site characterization. Ensure early investigation of potentially adverse conditions and EEI, NRC, and State of Nevada concerns.

2. Recommend methods to re-prioritize testing at any point during site characterization. Include a method for deciding when to stop testing.

ESF ALTERNATIVES STUDY
INTERIM AND MAJOR MILESTONES

ACTIVITY NAME	ACTIVITY DESCRIPTION	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
YKO1M	ISSUE GUIDANCE		10/30																
YKO2M	COMPLETE IMPLEMENTATION PLAN				1/16														
YK0201	SNL COMPLETES DEF OF ESF/REP/TEST REQUIREMENTS						3/9												
YKO3M	MANAGEMENT REVIEW OF MAJOR OPTIONS IDENTIFIED							3/30											
YKO401	SNL COMPLETES FINAL SET OF ESF OPTIONS								4/30										
YKO402	SCORE OPTIONS 50% COMPLETE									6/11		E. 8/17							
YKO4M	DRAFT REVISION OF ESF REQUIREMENTS										6/29								
YKO501	SNL COMPLETES SENSITIVITY ANALYSIS											7/26	E. 11/12						
YKO502	SNL COMPLETES DRAFT REPORT ON ESF ALTERNATIVES												9/14	E. 12/7					
YKO503	SNL SUBMITS RECOMMENDATION TO DOE													10/12	E. 12/14				
YKO5M	RECOMMENDATION TO RW-1 ON SELECTION OF ESF CONFIG.														11/16	E. 1/15			
YKO6M	COMPLETE PRELIMINARY ALTERNATIVES REPORT														12/14	E. 1/31			
R6101	START FINAL ESF DESIGN																		3/30

△ DOE MILESTONE ⊙ SECRETARY MILESTONE

ID	MILESTONE DESCRIPTION	REFERENCE DATE	FORECAST DATE	ACTUAL DATE
YKO1M	ISSUE GUIDANCE	30 OCT 89		30 OCT 89
YKO2M	COMPLETE IMPLEMENTATION PLAN	16 JAN 90		05 DEC 89
YKO3M	MANAGEMENT REVIEW OF MAJOR OPTIONS IDENTIFIED	30 MAR 90		30 MAR 90
YKO4M	DRAFT REVISION OF ESF REQUIREMENTS	29 JUN 90		14 JUN 90
YKO5M	RECOMMENDATION TO RW-1 ON SELECTION OF ESF CONFIGURATION	16 NOV 90	15 JAN 91	
YKO6M	COMPLETE PRELIMINARY ALTERNATIVES REPORT	14 DEC 90	31 JAN 91	
R6101	START FINAL ESF DESIGN	30 MAR 91	30 MAR 91	

ESDSTP5P.A33/7-24/25-90

Attachment II

3. Recommend a draft method to assess site suitability at any point during site characterization. The method should be consistent with goals 1 and 2.

In order to achieve these goals, the task force (see attachment III-1 for task force members) has identified three primary tasks to evaluate possible site-suitability methods (from the handout):

1. Identify possible suitability-assessment methods to be evaluated.

   - Suitability criteria (required management input)
   - Timing options
   - Analysis techniques

2. Evaluate the feasibility and defensibility of the methods.

3. Recommend promising methods to DOE management.

The task force has begun task one of this effort.

The Task Force is approximately two months behind the schedule reported last month (attachment III-2)

IV. PROTOTYPE DRILLING

The acceptance tests for the LM-300 drilling rig are complete with the following results:

Criteria	Contract Specification	Test
Pull Back	238,500 lbs.	260,022 lbs.
Pull Down	30,000 lbs.	31,075 lbs.
Torque	250,000 in.-lbs. ($\pm$21,000 ft.-lbs.)	262,262 in.-lbs ($\pm$22,000 ft.-lbs.)

Rig performance exceeded specifications.

Our task force includes broad representation from project participants

Core Team

Dr. Steven Mattson (SAIC, team lead)
Dr. Bruce Judd (Decision Analysis Co.)
Dr. William Wilson (USGS)
Martha Pendleton (SAIC)
Dr. Scott Sinnock (SNL)
Dr. Robert Gamble (Weston)
August Matthusen (SAIC)

DOE Oversight and Management

Dr. J. Russell Dyer (YMP)
Dr. Jeffrey Kimball (HQ)
Dr. Jeremy Boak (YMP)
Scott Van Camp (HQ)

Technical and Regulatory Experts Available through Organizations

LANL, LLNL, ORNL, PNL, USGS , LBL, UCB, consultants

Over 60 individuals have participated to date

We will produce reports, recommendations, and products consistent with our implementation plan

Report	Date(s)
Intermediate status briefings	May 10, Aug 3, Oct 19
Letter reports	May 14, Jun 9
Final recommendations and report	Sep 28
Approval by RW-1	Nov 9

Approximately two months behind schedule

The next step is to build and install the pipe handling system.

The purpose of the pipe handling system is to allow drill pipe (stem) to be stacked vertically on the drill rig when it is necessary to pull the drill string from the hole to change bits, etc. This is a much quicker and safer way to handle the very heavy sections of drill pipe than laying the pipe down horizontally as was done during prototype testing at Apache Leap.

After this step is completed, a 1,000 to 1,500 foot hole will be hammer drilled in the Salt Lake City, Utah area. The purpose of this activity will be to test the drilling capability of the rig and to assure that the pipe handling system works as designed.

After final testing by Lang and acceptance by DOE, a 2,000 foot prototype borehole will be drilled at Apache Leap (probably). This hole will be cored full depth. This hole will be used to train DOE drill crews and assure that the drilling program is ready when surface-based testing can begin at Yucca Mountain.

V. ALTERNATIVE LICENSING STRATEGIES

The final report on the first phase of this activity is in final review at OCRWM. When this review is completed, a decision will be made whether or not to authorize a second phase.

VI. PERFORMANCE ASSESSMENT (PA)

During the July TPO-Project Manager meeting, Dr. Thomas Hunter preented an overview of the projects Performance Assessment (PA) activity. Dr. Hunter presented the PA framework from site information to total system performance (attachment VI-1). The current PA management documents include:

- SCP - 8.3.5, Performance Assessment Program
- PAMP - PA Management Plan
- PASP - PA Strategy Plan
- PAIP - PA Implementation Plan
- Lower level documents include work plans, scientific investigation plans, etc.

Dr. Hunter presented a PA road map that shows the progression of work from the EA and conceptual design to the license application and site suitability report (attachment VI-2). A cartoon showing the waste-isolation system (attachment VI-3) led to a depiction of the three components of total system performance (attachment VI-4).

The PA program's current emphasis is on applications and concepts and models (attachment VI-1). Applications include:

- Support for site characterization and design
- Related activities

Concepts and models include:

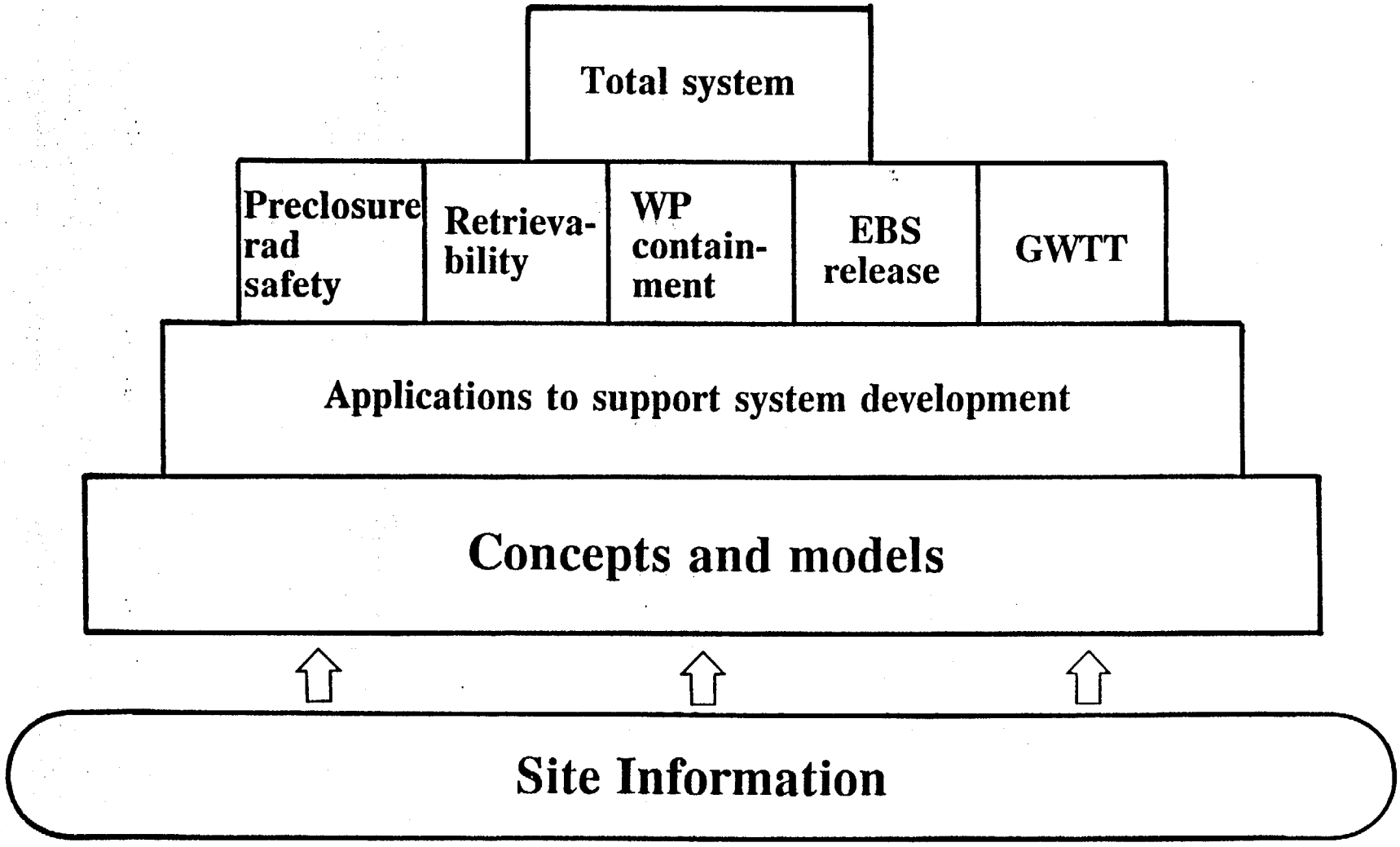
- Performance assessment development
- Basic concepts and models.

The enclosed handout package fleshes out the above concepts and presents a solid overview of the Project's PA program as it presently exists.

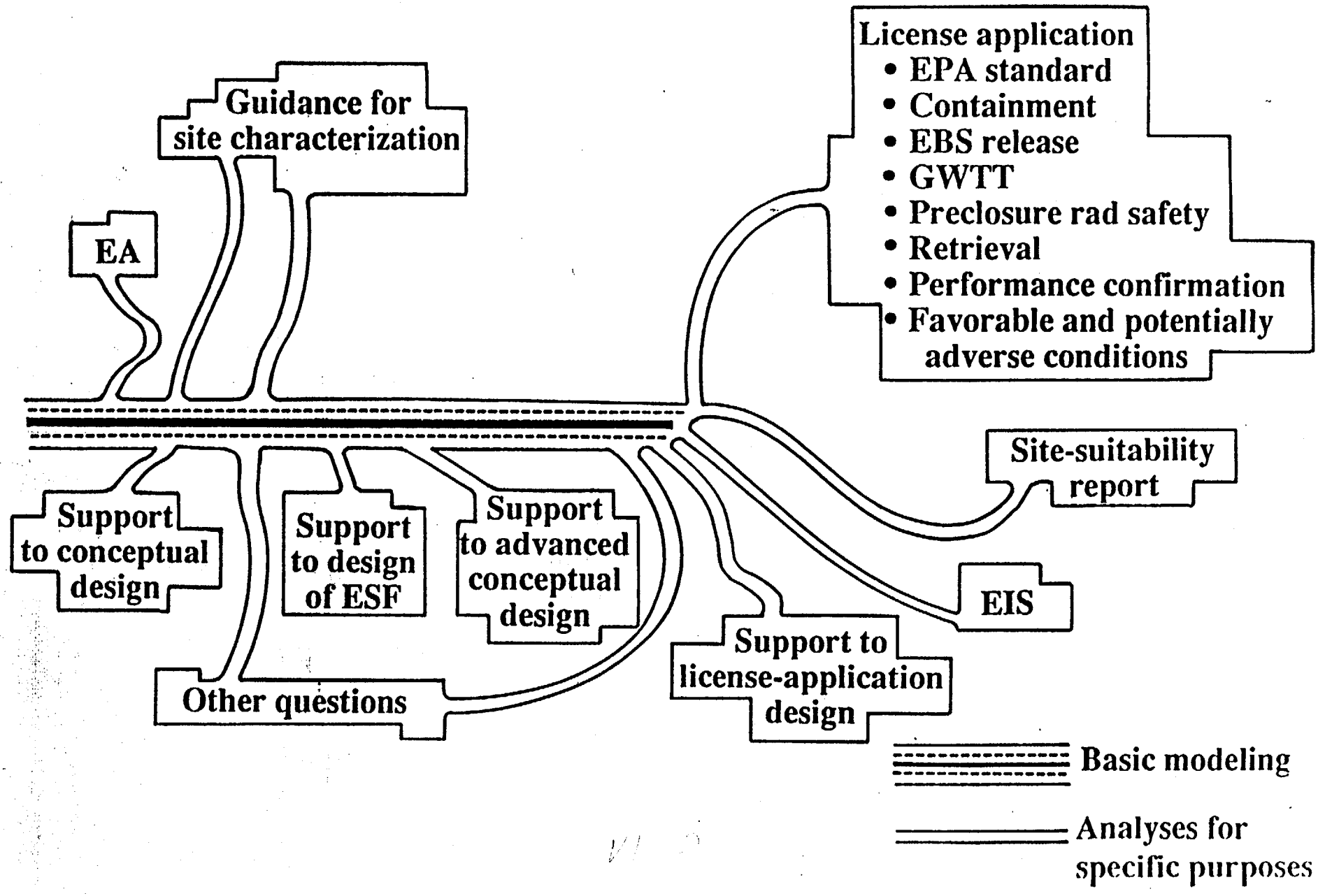
VII. GENERAL

A. On July 27, this office was visited by GAO representatives Gene Buchert and James Ohl. These gentlemen had discussions with YMPO staff and were particularly interested in the DOE prototype drilling program and the LM-300 drilling rig. They indicated that they will be following the LM-300 procurement process closely in the future.

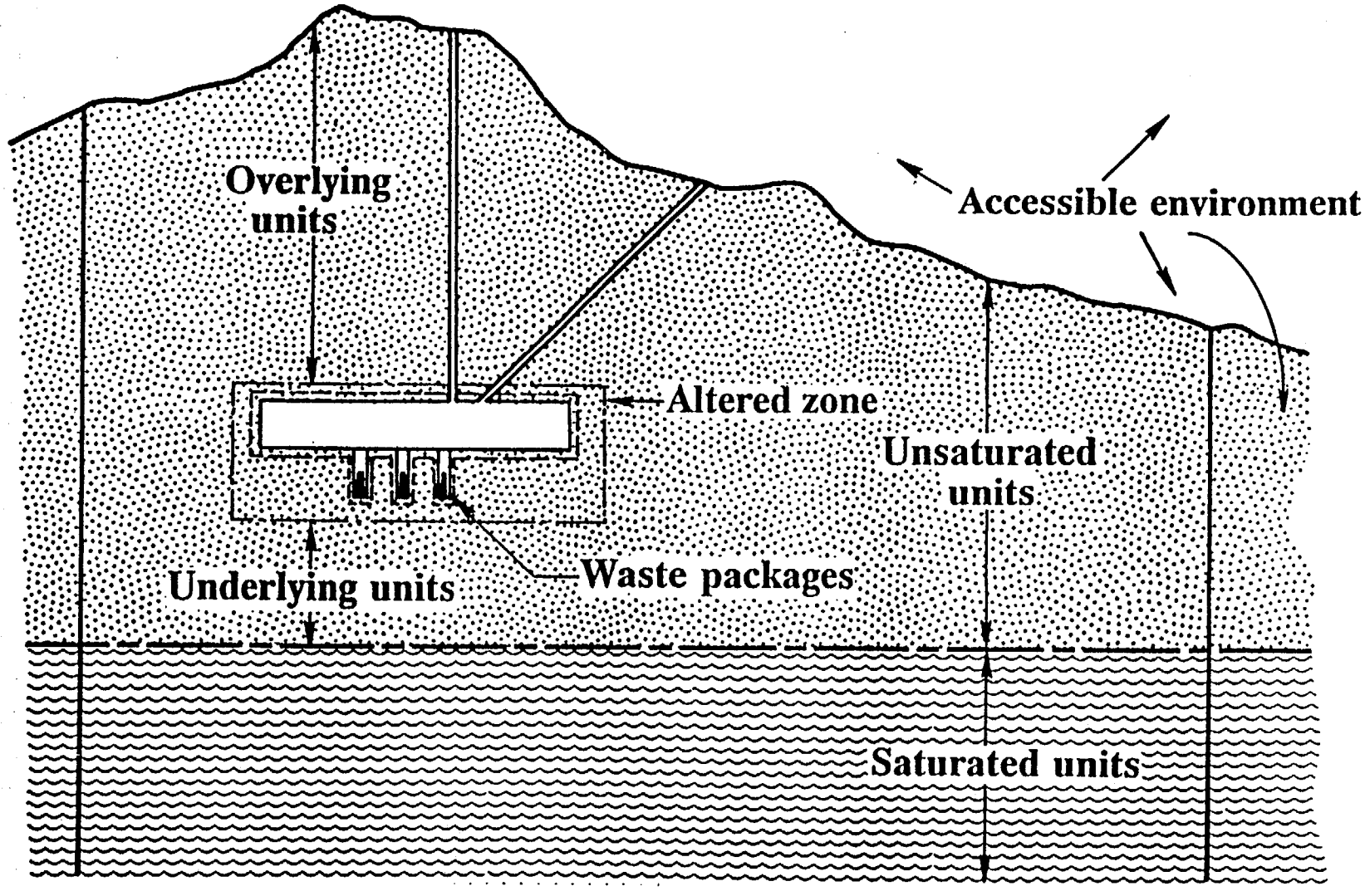
FRAMEWORK


Total system
Preclosure rad safety
Retrieva-bility
WP contain-ment
EBS release
GWTT
Applications to support system development
Concepts and models
Site Information

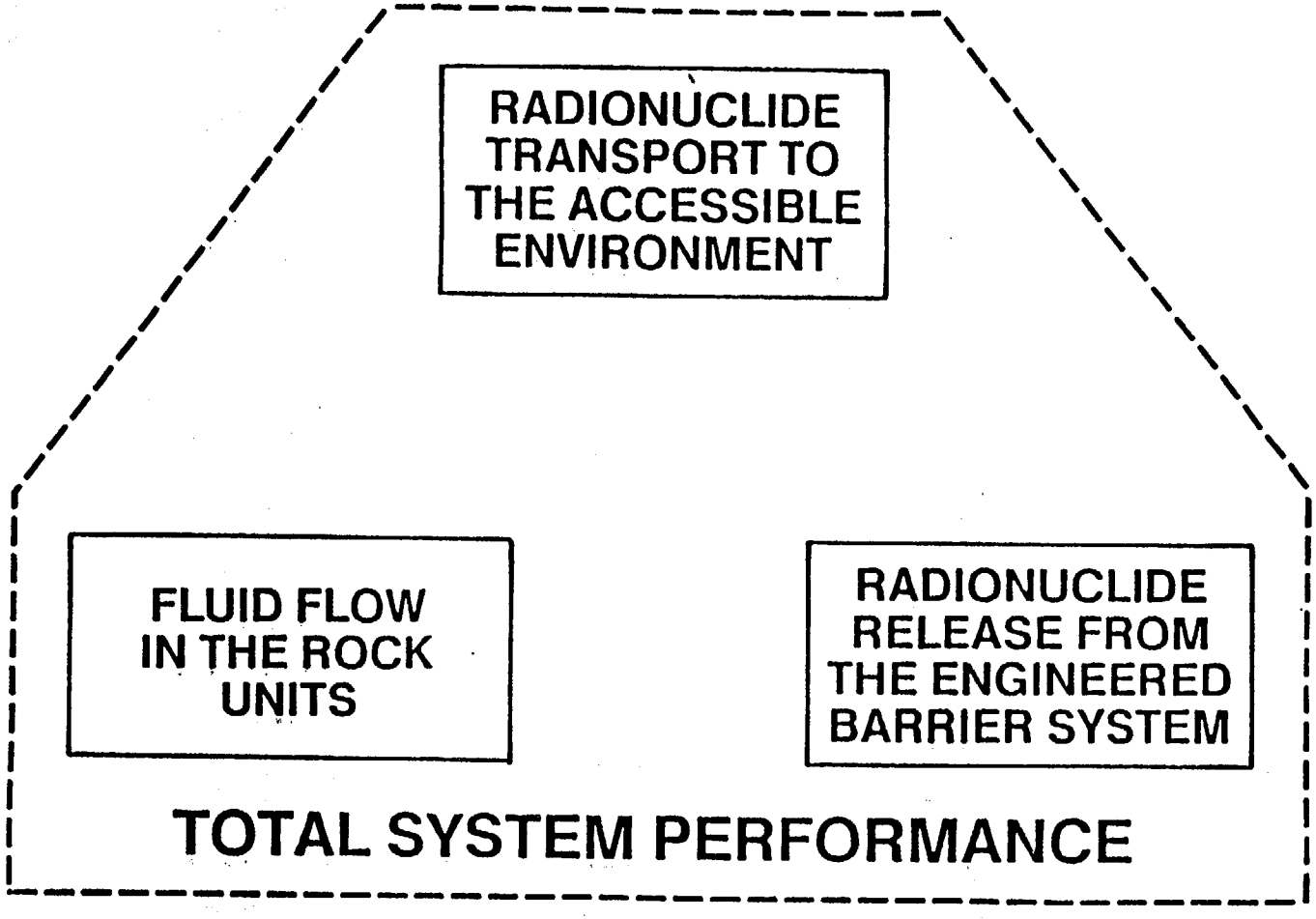
ROAD MAP FOR PERFORMANCE ASSESSMENT



WASTE-ISOLATION SYSTEM



TOTAL SYSTEM PERFORMANCE INCLUDES THREE PRIMARY COMPONENTS



Sandia National Laboratories

Mr. Buchert and Mr. Ohl indicated that they would like to visit us in the future to check their understanding of the DOE program with us. They pointed out that they were not trained in geotechnical disciplines and would appreciate any help we could give them.

B. There is a strong possibility that this office will be moving to space in the old (1931) post office on Stewart Street in downtown Las Vegas. It appears space has been allocated and we have submitted our requirements for modification of the offices to meet our needs. We should know for sure in FY 91.

C. I will be attending a systems engineering workshop given by YMPO on August 28 through 31.

D. On July 5, 1990, YMPO hosted congressional staff members on a tour of Yucca Mountain. Attachment VII-D-1 is a list of attendees. On July 24, 1990, YMPO held a meeting with the "American Committee on Radwaste Disposal". Attachment VII-D-2 is a list of those who attended this meeting.

E. Two activities are scheduled to begin at Yucca Mountain in January 1991 if the proper permits can be obtained. The project goal is to complete all prerequisites prior to this date. The activities are:

- Excavate new exploratory trenches in Midway Valley.
- Deepen Trench 14.

The Midway Valley trenching activity consists of two parts:

Part 1

- Prepare geologic map of the area.
- Locate, excavate and map exploratory trenches 30 to 100 feet long and test pits 3 to 5 feet long.
- Identify sites for long trenches.

Part 2

- Excavate and map long trenches.
- Prepare data report.

YUCCA MOUNTAIN CONGRESSIONAL TOUR
PARTICIPANT LIST
JULY 5, 1990

COOPER, BENJAMIN S.
Sr. Prof. Staff Member
Senate Committee on Energy
& Natural Resources

GRUNDY, RICHARD D.
Sr. Prof. Staff Member
Senate Committee on Energy
& Natural Resources

WASITIS, DOUGLAS A.
Minority Staff Ass't.
Subcommittee on Energy
& Water Development
House Committee on
Appropriations

ADAMSON, DANIEL M.
Prof. Staff Member
Subcommittee on Water, Power
& Offshore Energy Resources
House Committee on Interior
and Insular Affairs

GIGLIO, JOHN D.
Legislative Assistant
Senator Bob Graham
soon joining Staff of
Subcommittee on Nuclear
Regulation of Senate
Committee on Environment
& Public Works
(Graham chairs)

ERB, KARL
Assistant Director
Office of Science &
Technology Policy

COES, PUTNAM
OCRWM

TAPPER, JIM
Headquarters Congressional
Affairs

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AMERICAN COMMITTEE ON RADWASTE DISPOSAL (ACORD) MEETING LAS VEGAS, NEVADA, JULY 24, 1990

NAME	COMPANY
ROBERT AIKEN	PINNACLE WEST CAPITAL CORP.
EDWARD ALLISON	McAULIFFE, KELLY, RAFFAELLIT & SIEMENS
RICHARD BAHORICH	WESTINGHOUSE
DAVID BROWN	PHILADELPHIA ELECTRIC
EDWARD DAVIS	AMERICAN NUCLEAR ENERGY COUNCIL
E. LINN DRAPER	GULF STATES UTILITIES CO.
JOSEPH FARLEY	THE SOUTHERN COMPANY
CARLYLE FAY	WISCONSIN ELECTRIC POWER CO.
THEODORE GARRISH	THE FLANAGAN GROUP, INC.
WILLIAM HARRIS	U.S. COUNCIL FOR ENERGY AWARENESS
JAMES HOWARD	NORTHERN STATES POWER CO.
ANDREW KADAK	YANKEE ATOMIC ELECTRIC CO.
ALLEN KEESLER	FLORIDA POWER CORPORATION
FELIX KILLAR	U.S. COUNCIL FOR ENERGY AWARENESS
BRADLEY KOCH	NATIONAL RURAL ELECTRIC COOP. ASSN.
BYRON LEE	NUCLEAR MANAGEMENT & RESOURCES COUNCIL
LOUIS LONG	SOUTHERN COMPANY SERVICES

NAME	COMPANY
NEIL NORMAN	BECHTEL NATIONAL INC.
JOSEPH PAQUETTE	PHILADELPHIA ELECTRIC
EMILY SUE PURVIS	FLORIDA POWER CORP.
ABDON RUBIO	ELECTRIC POWER RESEARCH INSTITUTE
JOHN SCOVILLE	J.J. SCOVILLE & ASSOCIATES, INC.
CHARLES SEARS	NORTHEAST UTILITIES
SHERWOOD SMITH	CAROLINA POWER & LIGHT COMPANY
RICHARD SNELL	PINNACLE WEST CAPITAL CORP.
CAROL THORUP	NUCLEAR ASSURANCE CORP.
JOHN WATERS	TENNESSEE VALLEY AUTHORITY
RONALD WATKINS	NEBRASKA PUBLIC POWER DISTRICT

EEI STAFF

THOMAS KUHN
DAVID SWANSON
LORING MILLS
STEVEN KRAFT
CHRISTOPHER HENKEL

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Attachment VII-E-1 is a map of Midway Valley showing some trench locations.

Goals for the Calcite-Silica (trench 14) study include:

- Determine the ages, distribution, origin and paleohydrologic significance of calcite and opaline-silica deposits along faults and fractures in the vicinity of Yucca Mountain.
- At trench 14, investigate the vertical extent of veins exposed in the Bow Ridge fault zone.

Critical activities and milestones that must be achieved in order for YMPO to start field work are:

- Requirements document must be written.
- The October, 1990 gold star audit successfully completed.
- Trench specifications agreed upon.
- Job package approval obtained.
- Readiness review passed.

F. Attachment VII-F-1 & 2 show the new Lawrence Livermore National Laboratory Project Organization.

G. Meetings attended:

- July 2 - Meeting with Carl Gertz. Discussed DOE-Hq. reorganization; P.A. Appendix 7 visit, and QA audit of the USGS then in progress.
- July 3 - Meeting with David Dobson. Discussed Calico Hills Study Task Force recommendation Study Plans (still on track).
- Week of July 8 - at NRC-Hq.
- July 19 - NRC-DOE Management meeting - telecon.
- July 20 - Telecon on SEPDB and IGIS with King Stablein and Claudia Newbury, YMPO.

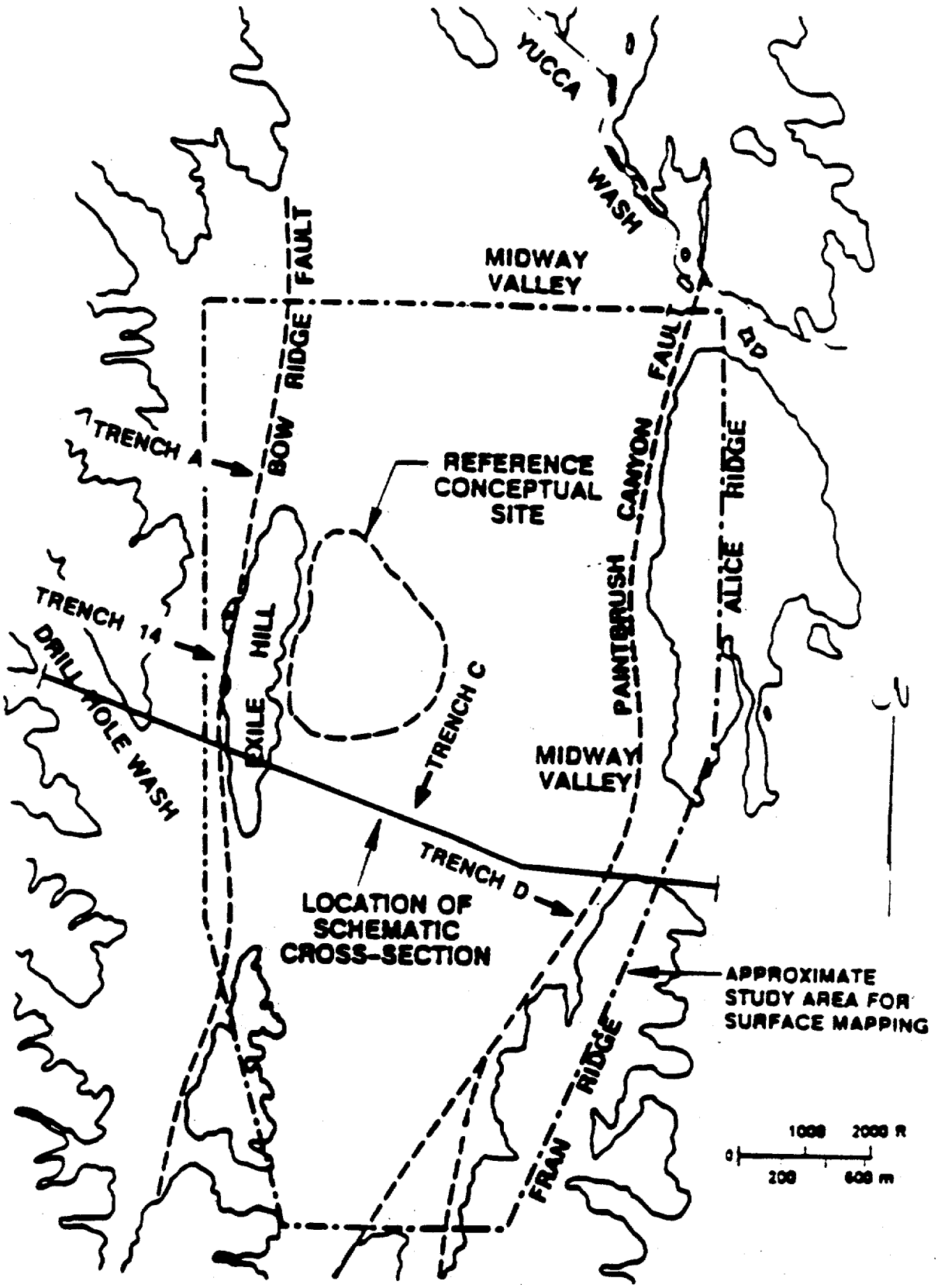

Figure 1: Locations of Trench 14 for calcite-silica studies and Trenches A, C, and D for Midway Valley study. Study area includes the reference conceptual site of Neal (1985).

LLNL Yucca Mountain Project Organization

LLNL–Yucca Mountain Project
Technical Project Officer,
Project Leader
L. J. Jardine

L. Ballou, Associate Project Leader
J. Blink, Assistant Project Leader
D. Chesnut, Technical Director

- Operations
- Regulatory
- Software Quality
- Quality Engineering
- Project Engineering

Quality Assurance
D. Short

Resource Planning and Project Control
J. Podobnik

- Budget/cost control
- Planning/scheduling
- Procurement

Project Administration
B. Bryan

- Records/document control
- Training
- Publications

Near-field Environment Characterization
D. Wilder

- Geochemistry
- Geomechanics
- Man-made materials
- Field Tests
- Hydrology

Materials Testing & Characterization
W. Clarke

- Metallic barriers
- Alternative barriers
- Container fabrication and closure

Waste Form Characterization
R. Stout

- Spent fuel
- Glass
- Thermochemical data
- PNL–MCC

Engineering & Systems Analysis
D. Ruffner

- Systems Engineering
- Design studies

Performance Analyses
D. Chesnut (acting)

- Near Field Scenarios
- Performance Assessments
- Integrated testing
- EQ 3/6: Code & data base

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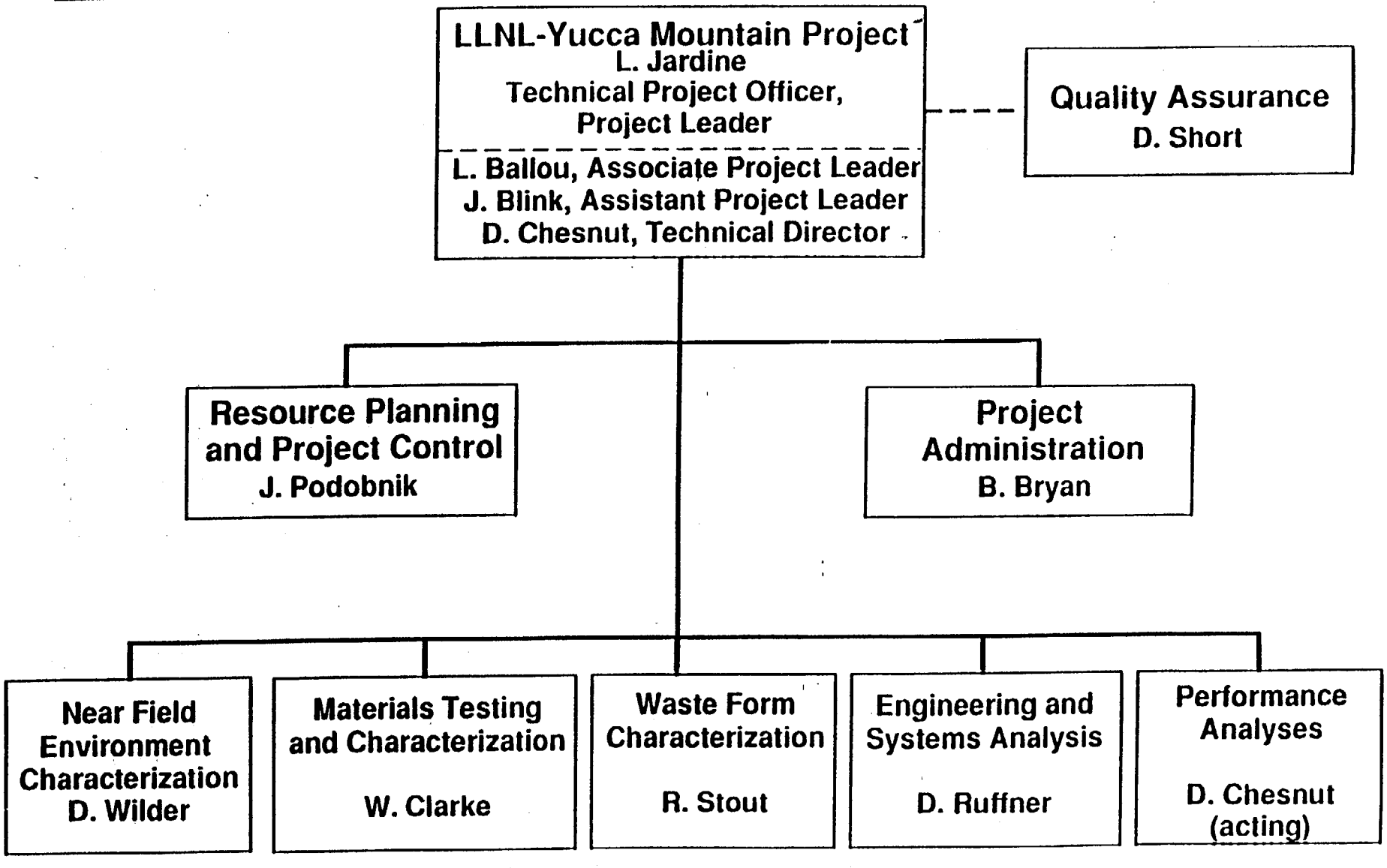
LLNL Yucca Mountain Project Organization



- July 20 - Meeting with Carl Gertz. Discussed International Waste Management Meeting. UNLV still hosting.
- July 24 - Meeting with Gene Buchert and James Ohl, GAO.
- July 30 - Meeting with Carl Gertz. Discussed GAO visit and LSS Appendix 7 meeting proposed.

There are no new issues that this office has identified that have not been brought to management's attention.

cc w/enc.: K. Stablein, M/S 4 H 3; J. E. Latz
cc w/o enc.: D. Shelor, C. P. Gertz, R. E. Loux, M. Glora, G. Cook, D. M. Kunihiro, D. Weigel, R. E. Browning, M/S 4 H 3; R. Bernero, M/S 7 A 4; H. Thompson, M/S 17 G 21; H. Denton, M/S 17 F 2; S. Gagner, M/S 2 G 5; L. Kovach, M/S NLS 260

Enclosures: Climate Modeling TPO Meeting 8/3/90 (Gelbard, SNL); Prototype Testing Engineered Barrier System Field Tests (Wilder, LLNL); Atlas Info; Overview of Performance Assessment (Hunter, SNL, 8/3/90); Status of ESF Alternatives Study, TPO 8/3/90 (Petrie); Prototype Drilling, TPO 8/3/90 (Clanton); Prioritization of Surface-based Testing, TPO 8/3/90

CLIMATE MODELING

Yucca Mountain Project
Project Manager-
Technical Project Officer Meeting
August 3, 1990

Fred Gelbard
Containment Modeling Division, 6429
Sandia National Laboratories
P. O. Box 5800
Albuquerque, New Mexico 87185
(505) 846-6271
FTS 846-6271

OUTLINE

1) Objective

2) Project Schematic

3) Global Climate Modeling

4) Regional Climate Modeling

5) Task Allocations

6) Schedule and Budget

7) Status and Summary

OBJECTIVE

Determine the probability distribution

of the

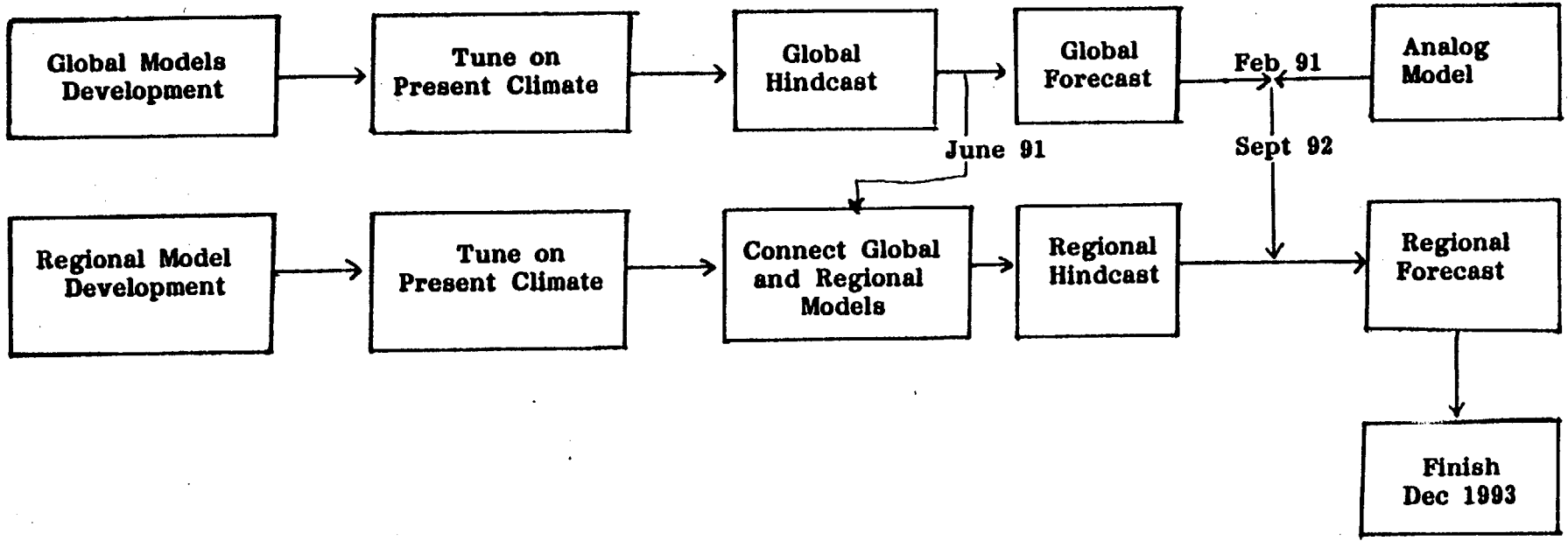
net water infiltration rate

(Precipitation - Evaporation - Transpiration - Run off)

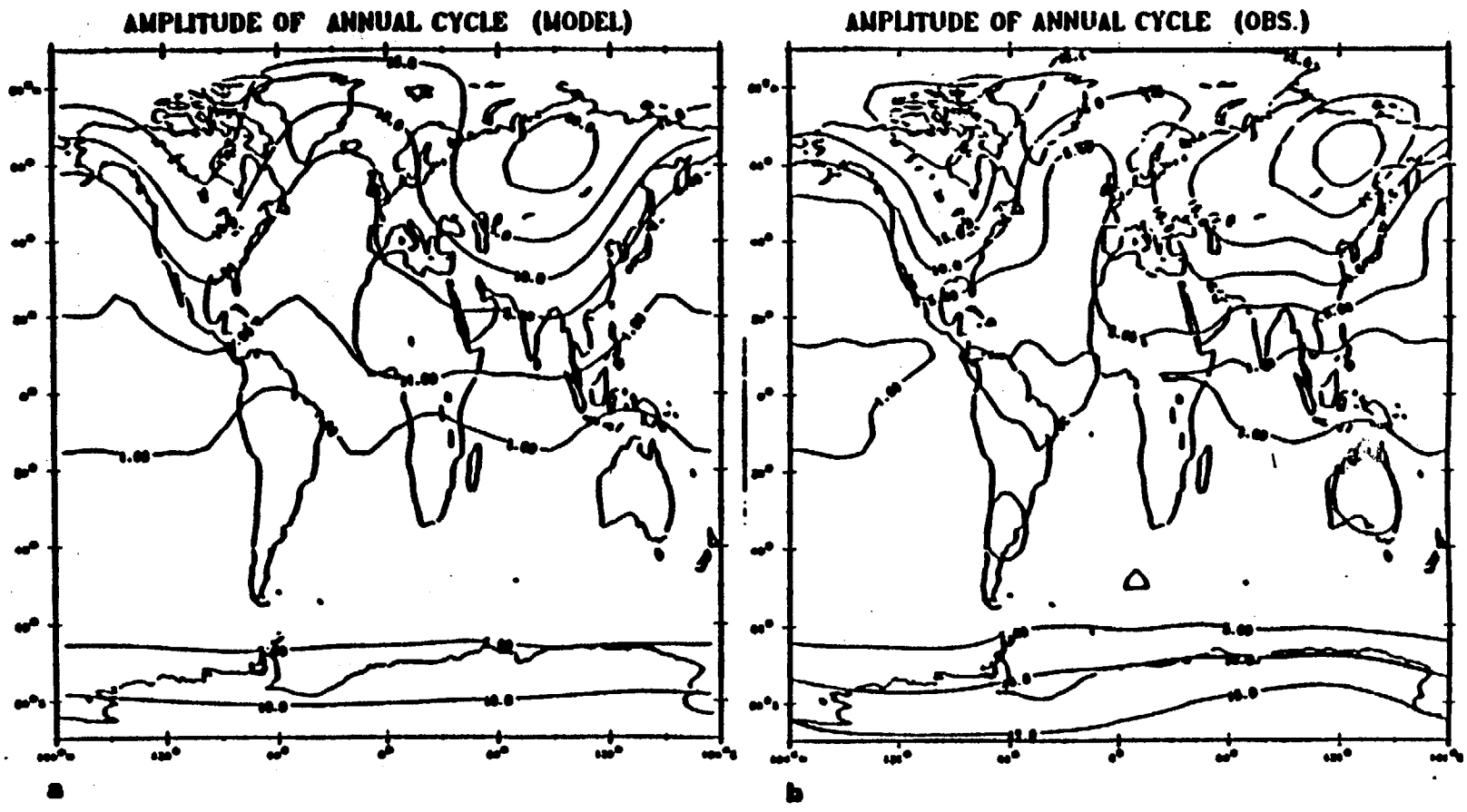
Climate Models

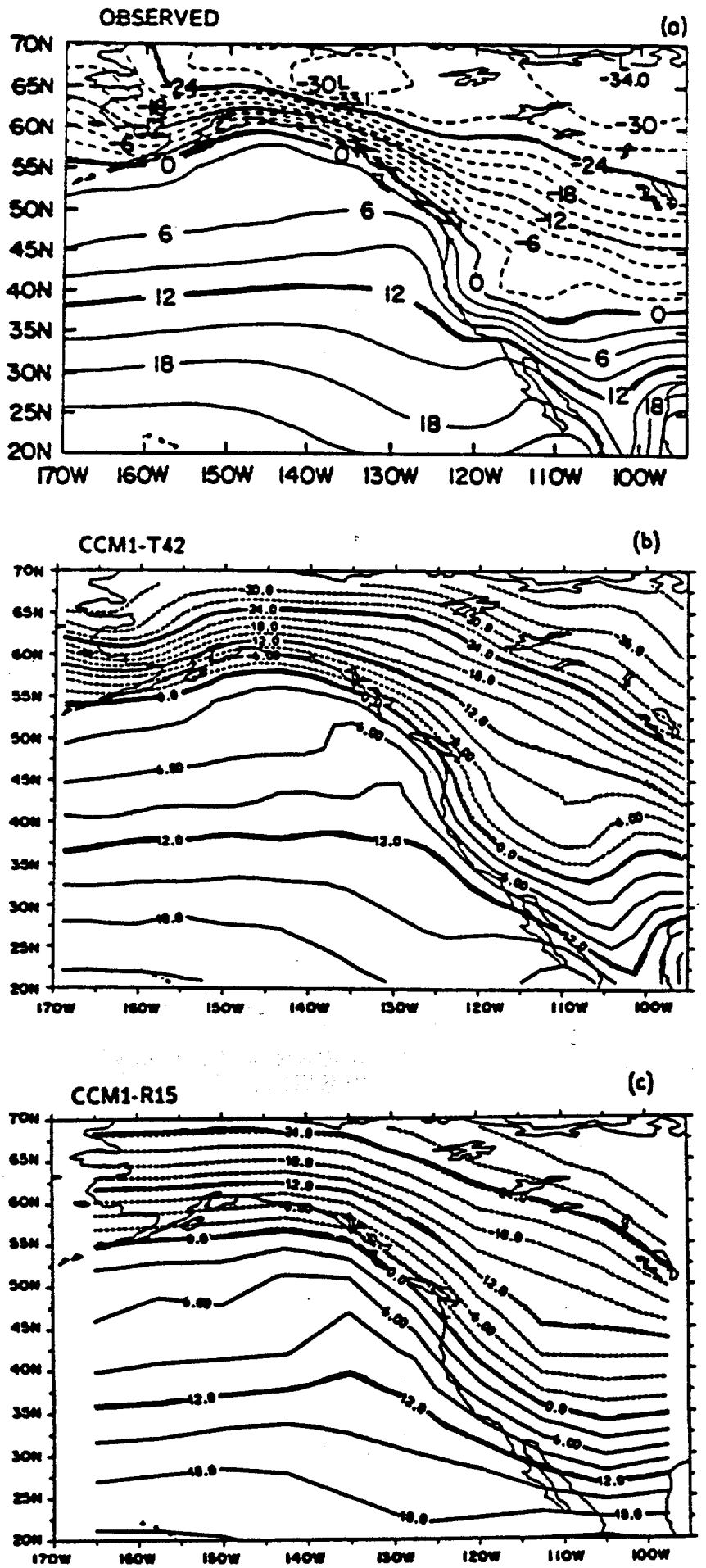
NAME	RESOLUTION	FEATURES
Analog	Global	Simple
Energy Balance	Two-Dimensional Global	Temperature Only Cheap
Low Resolution Model	Three-Dimensional	Precipitation etc. 5 layers
Global Circulation Model	Three-Dimensional	State of the Art 10-20 layers
Regional	Three-Dimensional	Detailed regional

PROJECT SEQUENCE

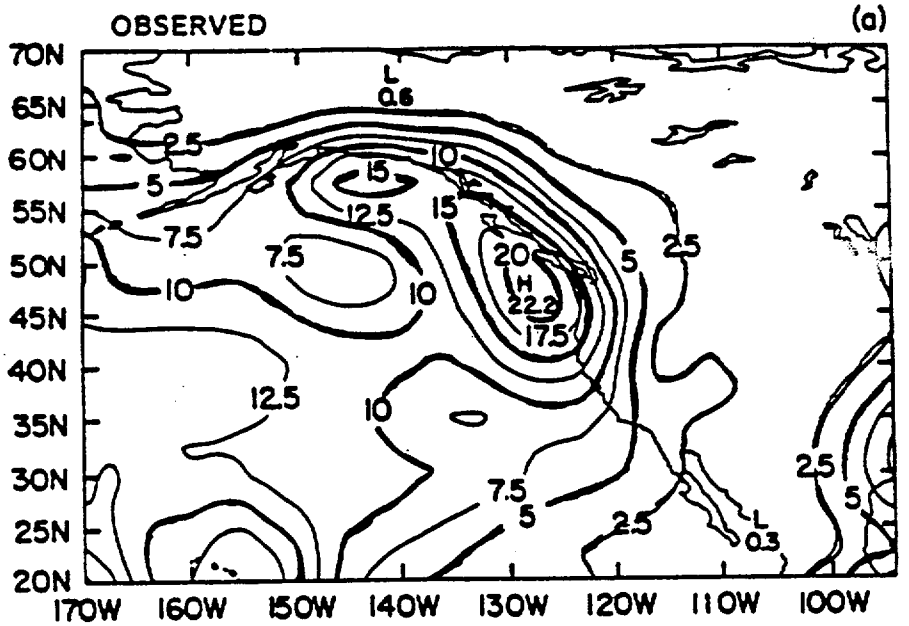


Comparison of Global Model to Observations

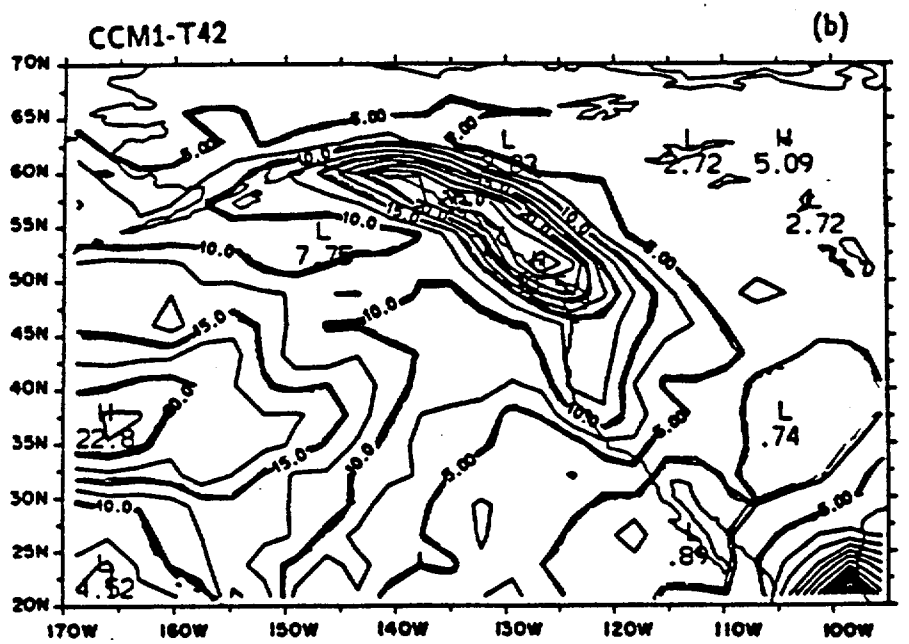


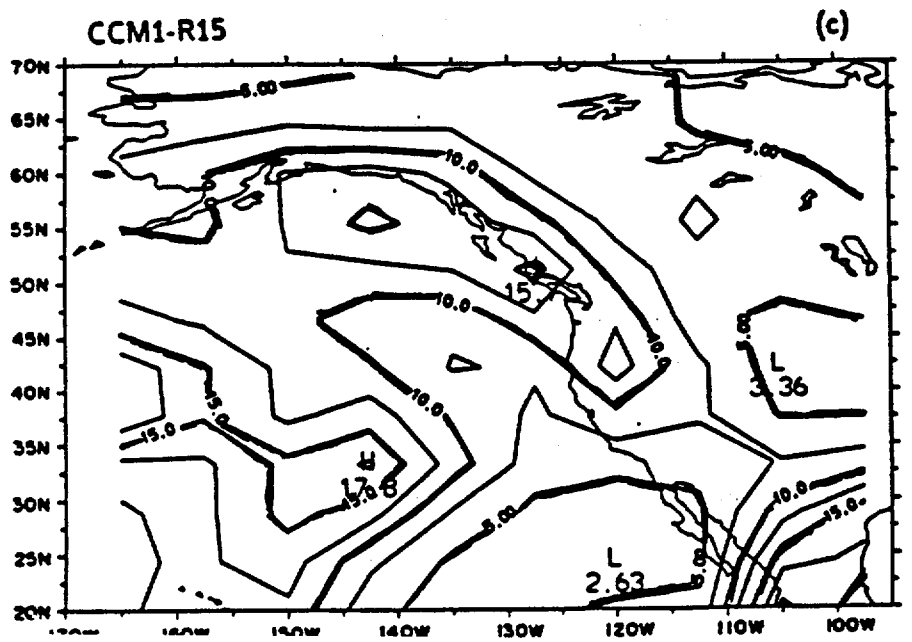


Temperature (C) (January)

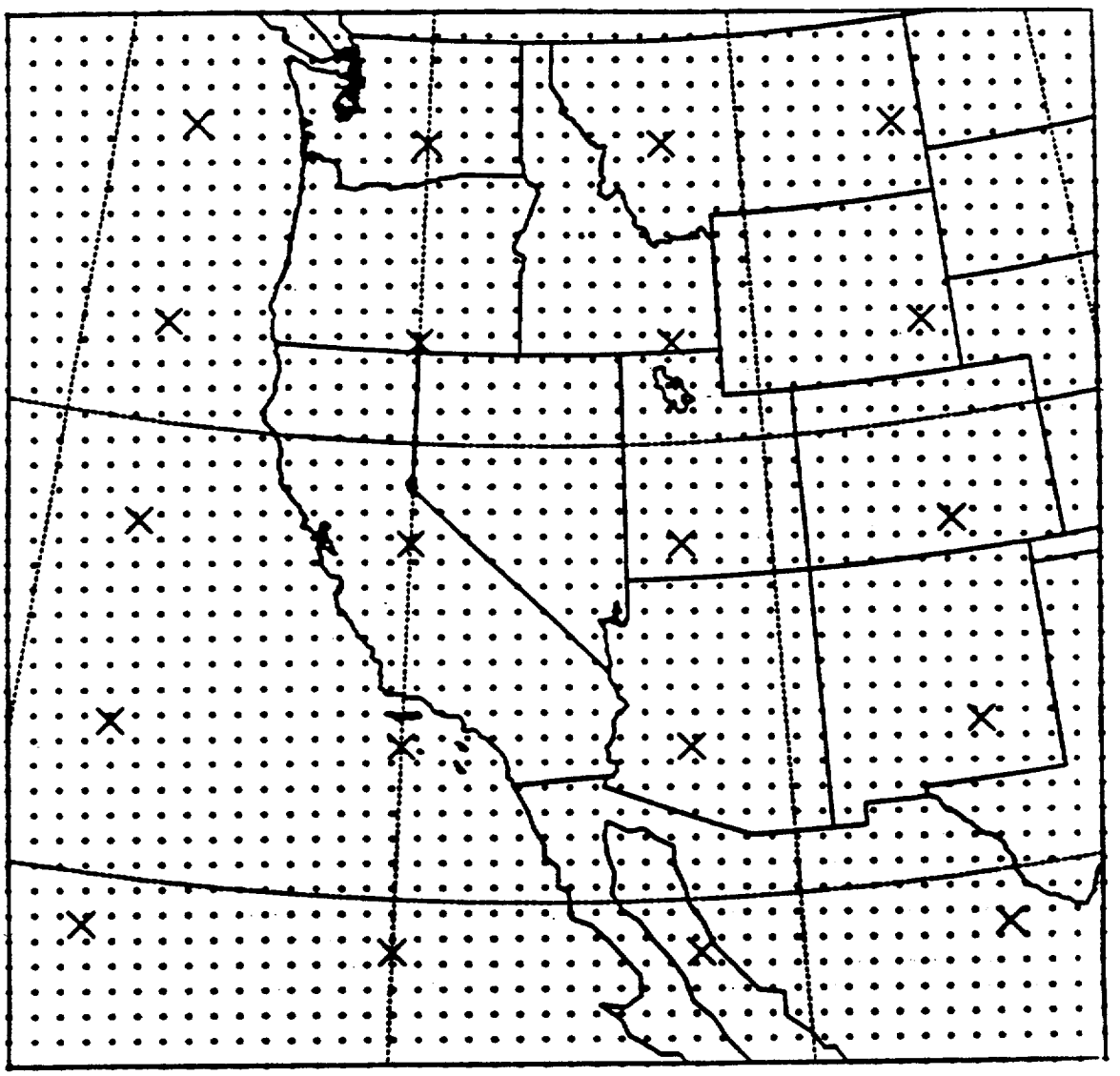


Precipitation (cm (January)





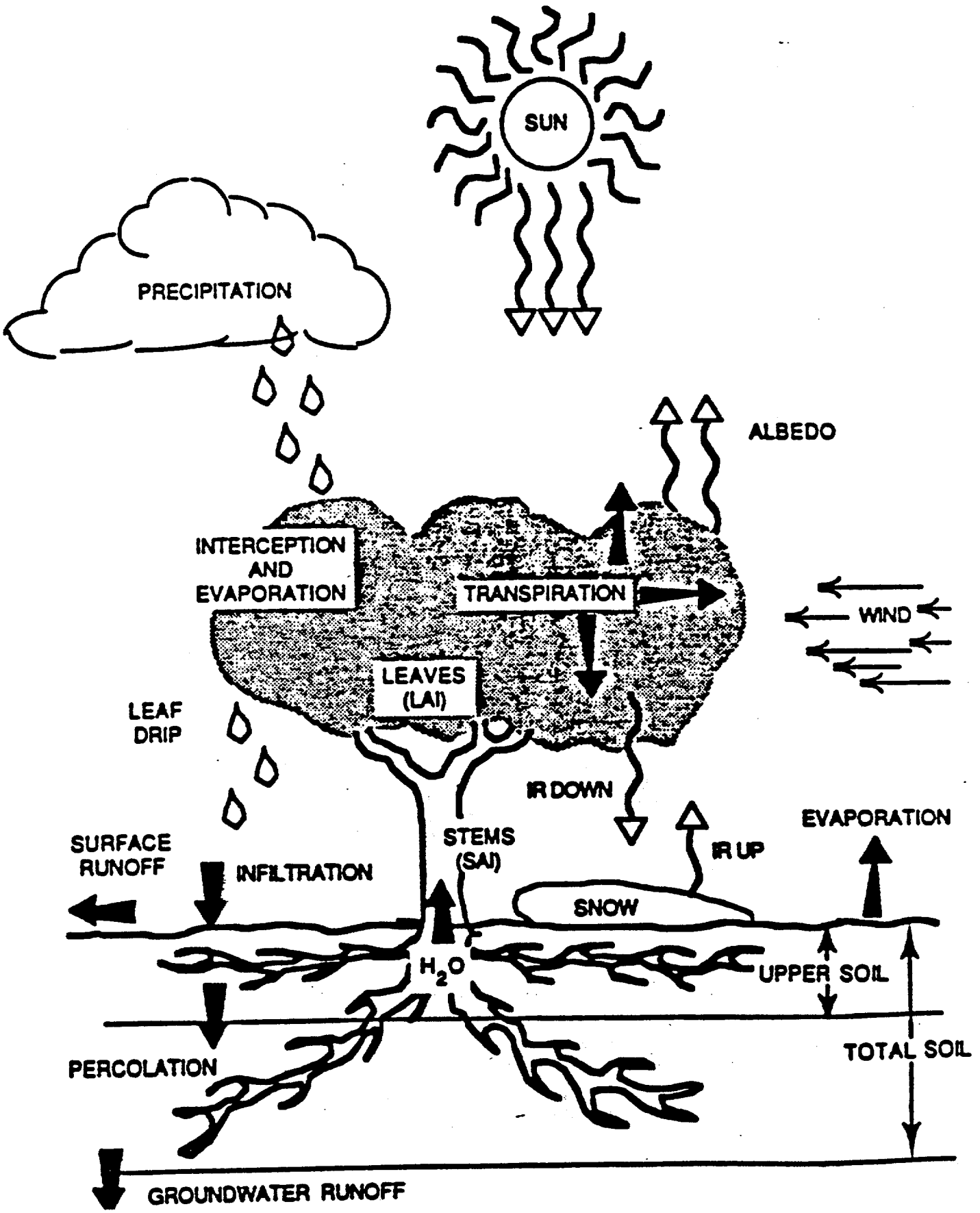
MODEL RESOLUTIONS



X Global Model Grid Point

• Mesoscale Model Grid Point

REGIONAL MODEL



Biosphere-Atmosphere Transfer Scheme (BATS)

Input from Atmospheric Model

- Wind, temperature, air density, and water vapor at the bottom level of atmosphere
- IR and solar radiant fluxes at the ground
- Precipitation

Output from BATS

- Ground and foliage temperature
- Soil water content

*** Surface fluxes of heat and water ***

ORGANIZATION CHART

Sandia National Laboratories

REGIONAL

National Center
for Atmospheric
Research

GLOBAL

Pacific Northwest Laboratory

Applied Research Corp. (Global)
University of Maine (Ice Sheet)
Lamont-Doherty (Paleoclimate)

BUDGET (K$)

Organization	FY91	FY92	FY93	TOTAL
Sandia	160	160	160	480
NCAR	516	446	446	1408
PNL	90	90	60	240
Univ. Maine	15	15	----	30
Lamont-D.	75	15	----	90
ARC	571	425	335	1331
TOTAL	1427	1151	1001	3579

Status and Summary

Completed

- Ice Sheet Modeling
- Global Energy Balance Modleing
- Contracts placed with NCAR and PNL
- Preliminary analog modeling result:
  Probably full glacial conditions
  in 60,000 years
- Response to comments on SCA and McDonnell

In Progress

- Study Plan (Dec 90)
- Implementing YMPO-approved QA plan at contractors
- Interaction with Performance Assessment (Aug 90)
- Global Hindcast (June-August 91)
- Regional Model Development (FY91)
- Complete Global Forecasts (Sept 92)
- Complete Regional Forecasts (Dec 93)

ATTACHMENT 16

INTEROFFICE MEMORANDUM

Date: 02-Aug-1990 05:41pm PST
From: [illegible]a Jennetta
JENNETTAA
Dept: Regulatory & Licensi
Tel No: 794-7895

TO: See Below

Subject: WEEKLY STATUS OF NWTRB/NRC INTERACTIONS

As a result of the 7/31 Interactions Scheduling meeting with the NRC, the meeting schedule has changed. The most significant development at the meeting is the scheduling of NRC interactions the day after NWTRB interactions on the same topic. Changes are noted in the COMMENTS column and identified by **bolded** script.

Additionally, the format of the Weekly Status of NWTRB/NRC Interactions has been modified to reflect the recent reorganization at HQ. A CONTACT column replaces the old PO CONTACT and HQ CONTACT columns, while a TECHNICAL LEAD column has been added.

If you have any questions, please call me at X4-7895.

Distribution:

TO:	Michael Glora	(GLORAM)
TO:	Candace Biddison	(BIDDISONC)
TO:	Linda Quering	(QUERINGL AT A1 AT YMV6)
TO:	David Dobson	(DOBSOND)
TO:	Susan Jones	(JONESS)
TO:	LINDA DESELL	(DESELLL AT A1 AT HQV1)
TO:	Beverly Plumley	(PLUMLEYB)
TO:	Mike Cloninger	(CLONINGERM)
TO:	Alma Romero	(ROMEROA AT A1 AT YMV6)
TO:	Uel Clanton	(CLANTONU)
TO:	Robert V. Barton	(BARTONR)
TO:	R. J. Maddox	(MADDOXR)
TO:	Ardyth Simmons	(SIMMONSA)
TO:	Michael D. Voegele	(VOEGELEM)
TO:	Jerry L. King	(KINGJ)
TO:	Jeffrey Weaver	(WEAVERJ)

STATUS OF NWTRB/NRC MEETINGS FOR WEEK ENDING 8/3/90

DATE/LOC.	TOPIC	TECHNICAL LEAD	CONTACT (SAIC SUPPORT)	PARTICIPANT SUPPORT	COMMENTS
* 7/31/90 Rockville, MD	NRC Meeting on Interactions Scheduling				**COMPLETED**
8/14/90 Rockville, MD	NRC Meeting on Regulatory Strategy				**POSTPONED** **At the 7/31 scheduling meeting, this interaction was again postponed. No anticipated date.**
8/28-29/90 Denver, CO	**NRC TE on UZ Hydrology and Hydrochemistry Testing**	**Newbury**	**Simmons (Jennetta)**	**USGS SNL LANL**	**As a result of the 7/31 scheduling meeting, the scope of this TE was changed to focus on the unsaturated zone only. Also, the date was moved back to 8/28-29 from the original 8/15-16.**
* 8/28-29/90 Pleasanton, CA	NWTRB Engineered Barrier System Panel Meeting	Cloninger	**Dobson (Morissette, Harrington, Jennetta)**	LLNL SAIC	A dry run **was held** in Den on 7/31-8/

* Indicates interaction is a "go".
BOLD indicates new information

DATE/LOC.	TOPIC	TECHNICAL LEAD	CONTACT (SAIC SUPPORT)	PARTICIPANT SUPPORT	COMMENTS
9/11-12/90 Los Alamos, NM	Radionuclide Adsorption Workshop	**Canepa**	**Livingston**	LANL LLNL	On the recommendation of the NWTRB, LANL is hosting a workshop on radionuclide adsorption in an unsaturated system. Scientists external to the Project but experienced in this area have been invited to attend. LLNL will participate, while the USGS and SNL will attend as observers. The NRC and State will also be invited to attend.
9/13/90 **Los Alamos, NM**	**NRC TE on Radionuclide Retardation and Modeling**	**Canepa**	**Simmons (Jennetta)**	**LANL** **LLNL**	**As a result of the 7/31 scheduling meeting, this TE will now be held after the LANL workshop.**
10/11-12/90	**NWTRB TE on SB Prioritization and Calico Hills**	**Dyer/Dobson**	**Simmons**	**SAIC**	**The scope of this TRB interaction will now focus on SBP and Calico Hills, not ESF Alternatives as previously scheduled. The change w[illegible]le at the 7/24-25 meeting.**
10/12/90	**NRC TE on SB Prioritization and Calico Hills**	**Dyer/Dobson**	**Simmons**	**SAIC**	**As a result of the 7/31 scheduling meeting, this TE replace the previously scheduled 9/11 TE. It will be held after the 10/11-12 NWTRB interaction.**

* Indicates interaction is a "go".
BOLD indicates new information

DATE/LOC.	TOPIC	TECHNICAL LEAD	CONTACT (SAIC SUPPORT)	PARTICIPANT SUPPORT	COMMENTS
10/22/90 Washington, DC	NWTRB Transportation Panel Meeting	TBD	TBD	TBD	
10/30-31/90 Albuquerque, NM	**NRC TE on Performance Assessment**	Dyer	**Simmons**	**SNL SAIC**	**Result of 7/31 scheduling mtg. Rescheduled from 7/18-19/90.**
11/1-2/90 Arlington, VA	NWTRB QA Panel Meeting	TBD	TBD	TBD	
11/8-9/90 Denver, CO	**NRC TE on Calico Hills Risk/Benefit Analysis**	**TBD**	**TBD**	**TBD**	**Result of 7/31 scheduling mtg.**
Nov-Dec Albuquerque, NM	**NRC TE on ESF Scoring**	**TBD**	**TBD**	**TBD**	**Result of 7/31 scheduling mtg. Will follow a proposed NWTRB interaction on the same topic.**
Oct-Dec Rockville, MD	NRC TE on Natural Resources	TBD	TBD	TBD	**Not scheduled at 7/31 meeting.**
Oct-Dec Rockville, MD	NRC TE on Scenario Development and CCDF	TBD	TBD	TBD	**Not scheduled at 7/31 meeting.**
Oct-Dec Rockville, MD	NRC TE on Radionuclide Retardation Testing and Modeling	TBD	TBD	TBD	**See 9/13/90 NRC TE.**

OTHER MEETINGS OF INTEREST

8/29-31/90	ACNW Meeting	Agenda to be determined.

* Indicates interaction is a "go".
BOLD indicates new information

ATTACHMENT 17

U.S. National Academy of Sciences

National Research Council

Board on Radioactive Waste Management
September 17-18, 1990
2101 Constitution Avenue NW
Auditorium
Washington, DC

SYMPOSIUM ON RADIOACTIVE WASTE REPOSITORY LICENSING

Due to widespread scientific concern and interest in the revisions planned during the remand of 40 CFR 191 ("Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Wastes"), the Board on Radioactive Waste Management will hold a symposium in September 1990 on Radioactive Waste Repository Licensing. The symposium, scheduled for 17-18 September 1990 at the NAS/NRC Building, 2101 Constitution Avenue N.W., Washington, D.C., will examine the status of repository licensing requirements in the United States and elsewhere, and especially the impact of recent information from efforts to implement the Waste Isolation Pilot Plant (WIPP) in New Mexico and to characterize the Yucca Mountain site in Nevada. Both 40 CFR 191 and 10 CFR 60 "Disposal of High-Level Radioactive Wastes in Geologic Repositories" will be considered.

The symposium will include contributions from Sweden, Canada, Switzerland, and other countries where investigations have shed further light on the safety analyses of repositories. In addition, the Board on Radioactive Waste Management has recently issued a report "Rethinking High-Level Radioactive Waste Disposal" that has examined many issues impacting the licensing process.

The symposium will feature critiques of the U.S. approach by the Department of Energy, the Nuclear Regulatory Commission, the Environmental Protection Agency, the Advisory Committee on Nuclear Waste, the Nuclear Waste Technical Review Board, and other interested parties, including states and environmental interest groups, and will consider approaches to reconciliation of the divergent viewpoints.

Prototype Testing
Engineered Barrier System Field Tests

D. G. Wilder
Near-Field Environment Characterization

Lawrence Livermore National Lab
FTS: 532-6908

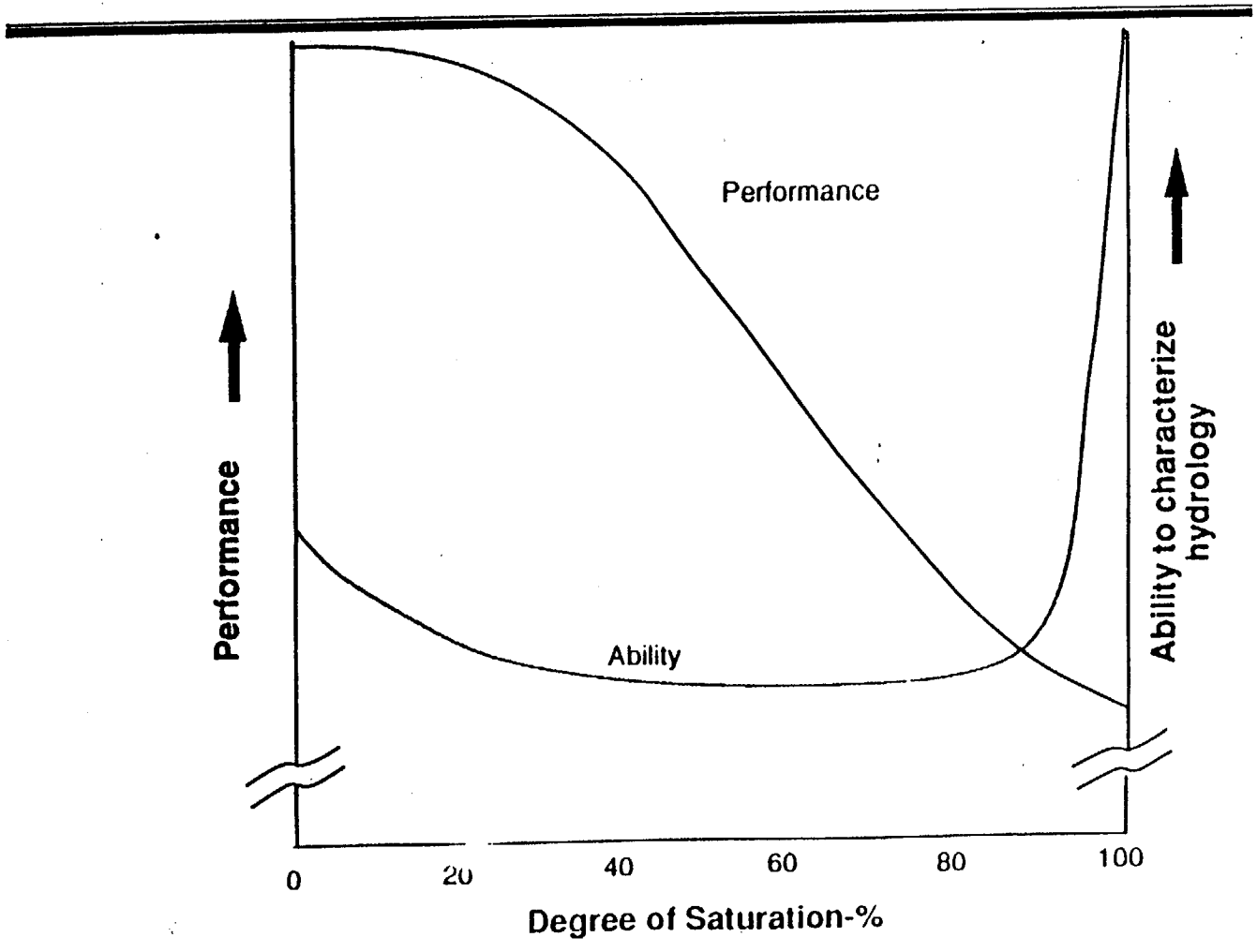
ATTACHMENT 13

Prototype Heater Test of the Environment Around a Simulated Waste Package

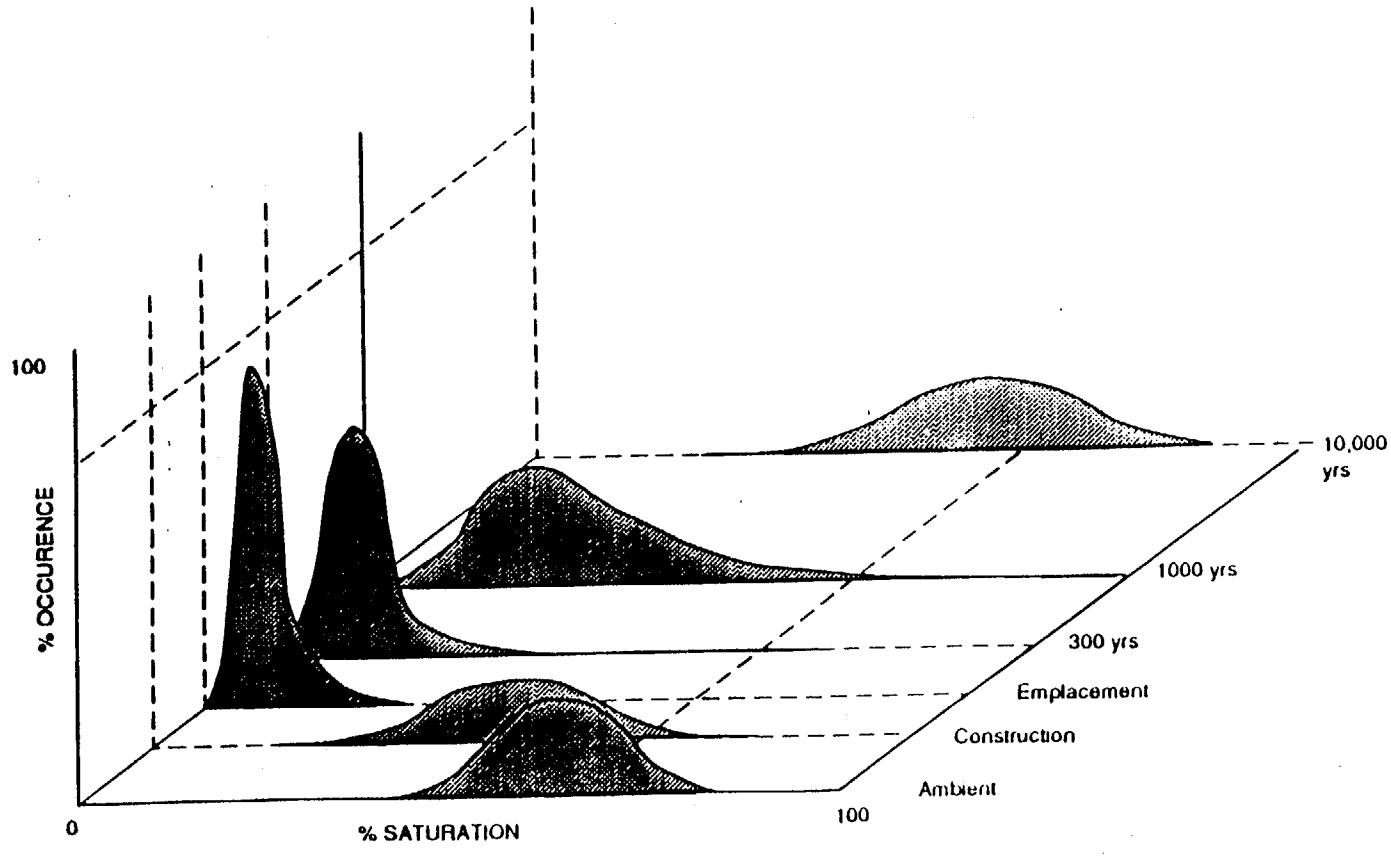
Abelardo L. Ramirez
Lawrence Livermore National Laboratory

International High Level Radioactive Waste Management Conference, Las Vegas, Nevada, April 8-12,1990

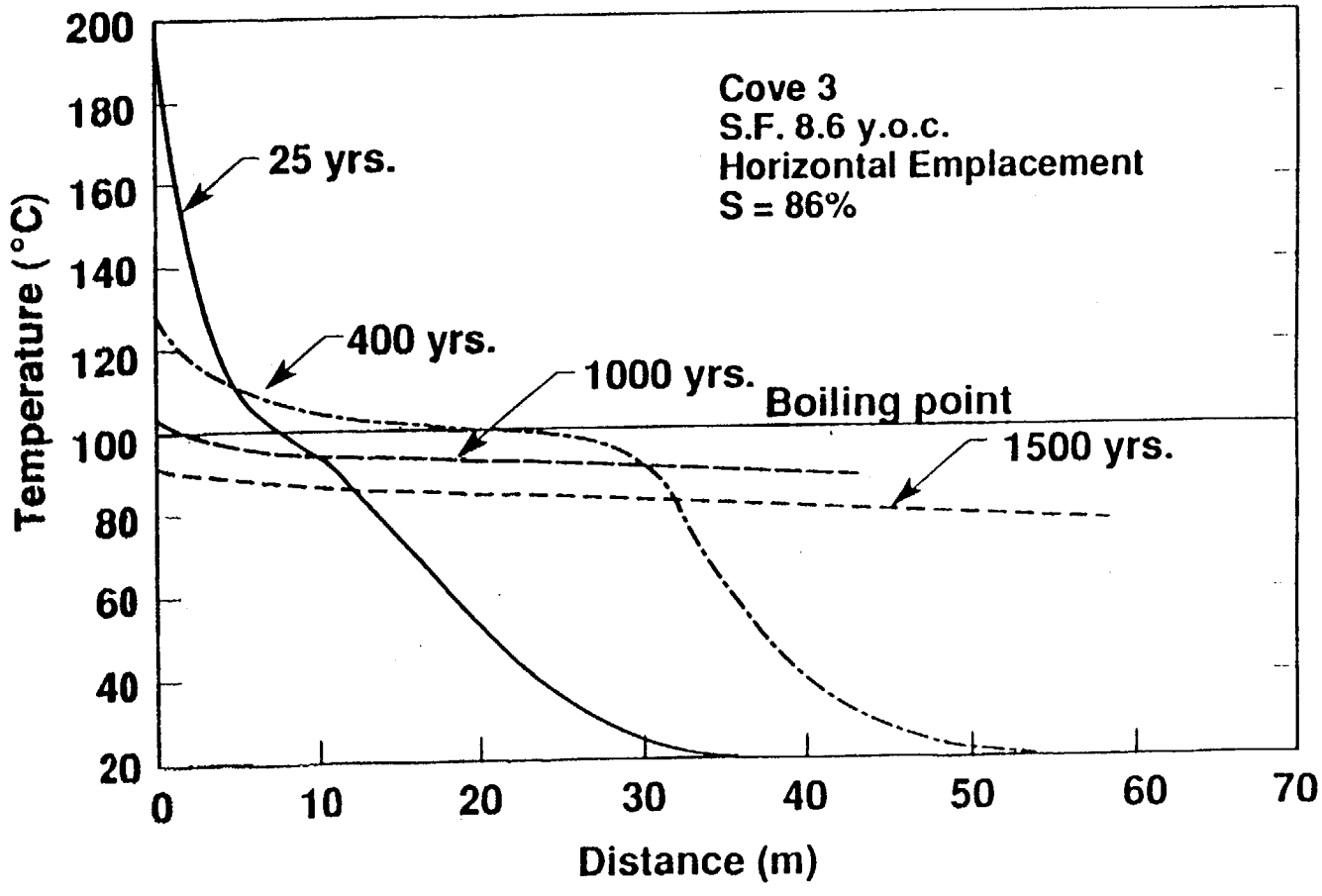
Need for Prototype Testing



Saturation of Rock around SF Boreholes
an example of changing environment with time

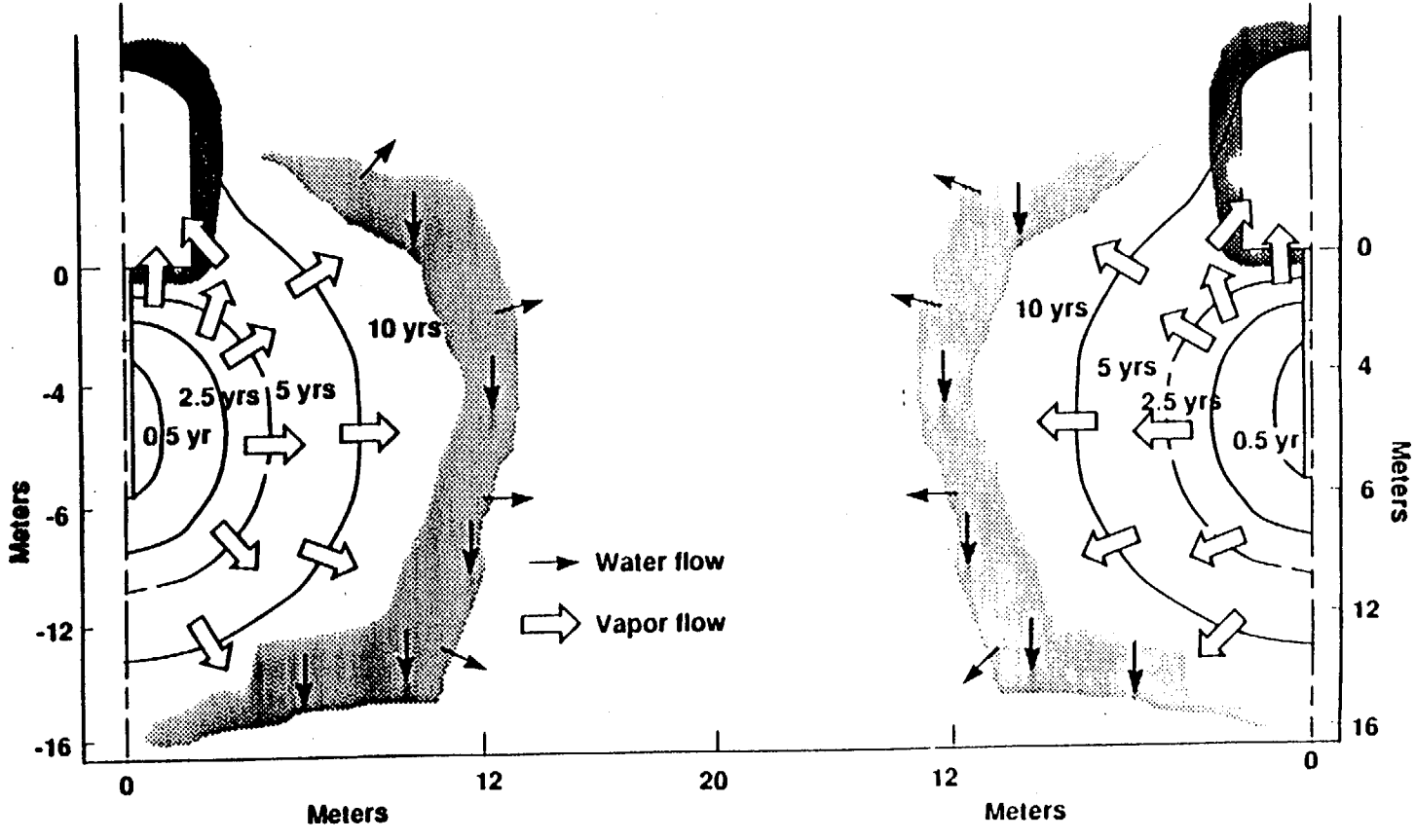


TEMPERATURE PROFILE



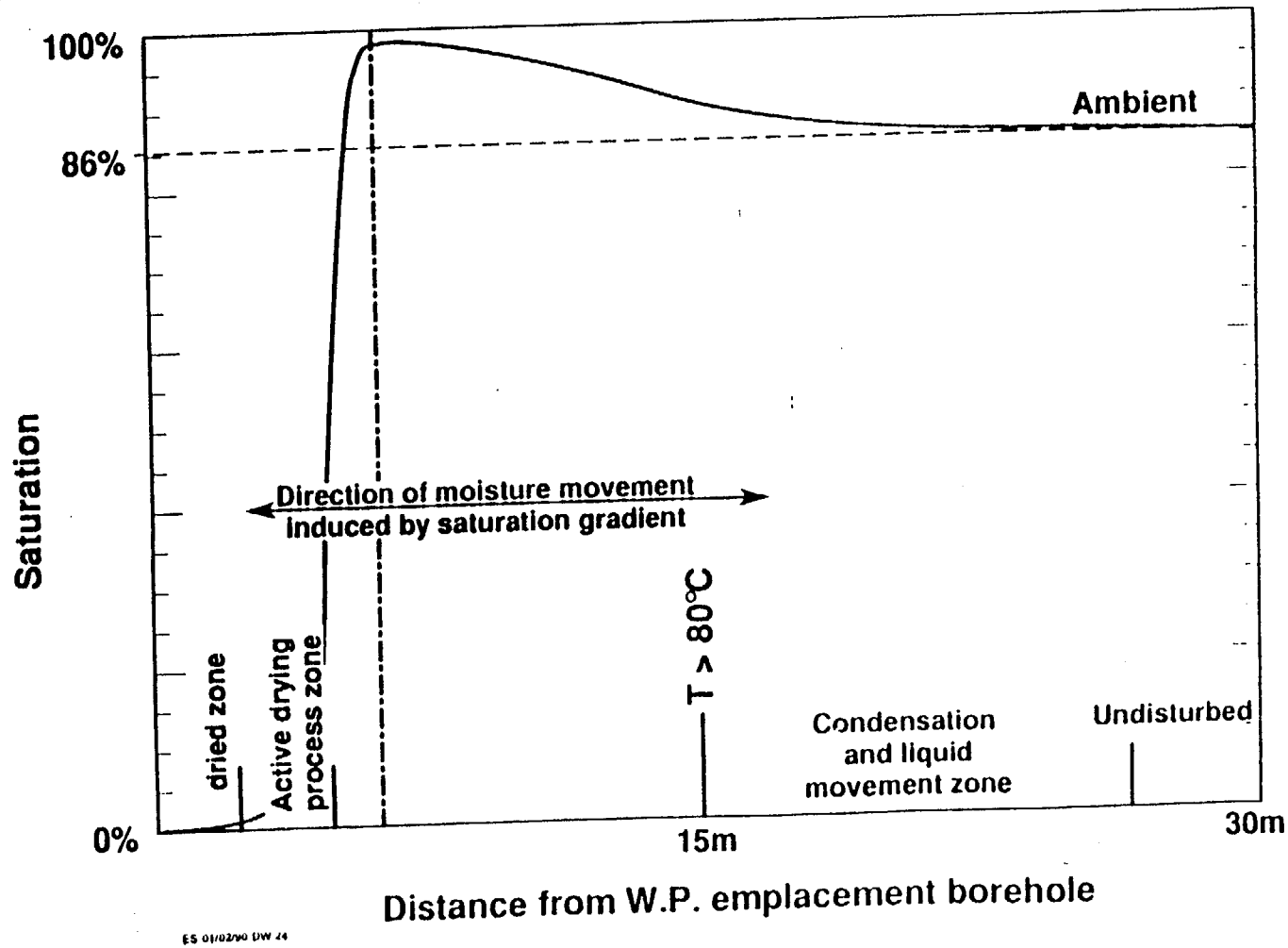
ES 01/0390 DW 23

Changing Environment with time
Boiling Point Isotherms
8 YOC Spent Fuel



ES-01/03/90-12b

Post-emplacement Saturation Conditions around typical Spent Fuel Canister



ES 01/02/90 DW 24

Near-Field Environment

- Emplacement environment

  Not ambient--perturbed by construction etc.

- WP environment emplacement perturbations will be changing with time

  -thermal, radiation, and chemical reactions are all f(t)

- Understanding ambient conditions is necessary to evaluate perturbed conditions

- A table containing singleWP environment parameter values is not possible. Rather the "table" will consist of functional relationships (e.g., saturation and temperatures as functions of time)

Issues of Near-Field Environment Waste Package Interactions

- Amount/transport of Water/water vapor
- Composition of water/water vapor
- Mechanical loading on container
- Thermal conditions (heat transfer, temperatures)
- Radiation-chemical effects
- Impact of Corrosion Products

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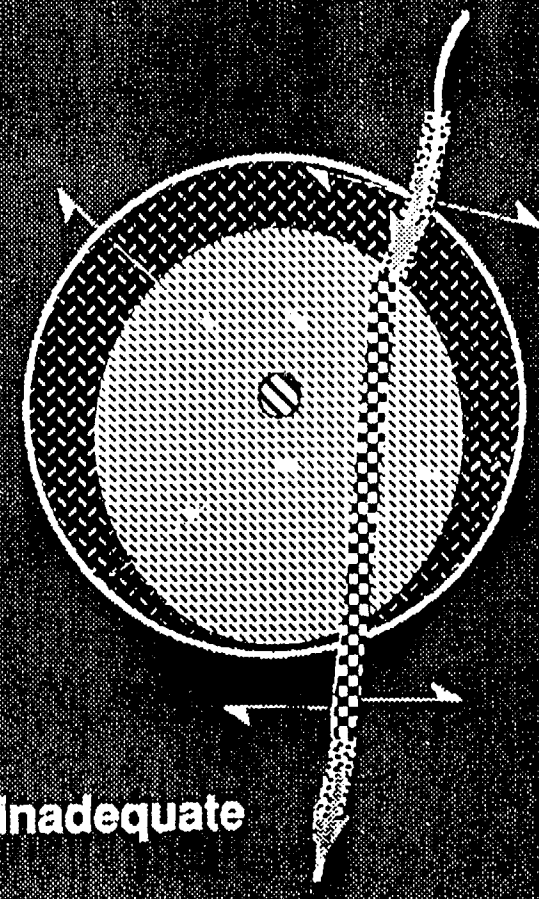
YUCCA MOUNTAIN PROJECT

There were some surprises

- Below heater rock dried faster as temperatures increased
  - -gravity, fractures
- Above heater rock rewetted faster as temperatures decreased
  - -steeper moisture gradient, gravity
- Capillary condensation played a major role during re-wetting
- Slight increases in rock permeability
- Several measurement problems: corrosion, inadequate calibration process, inconsistent results



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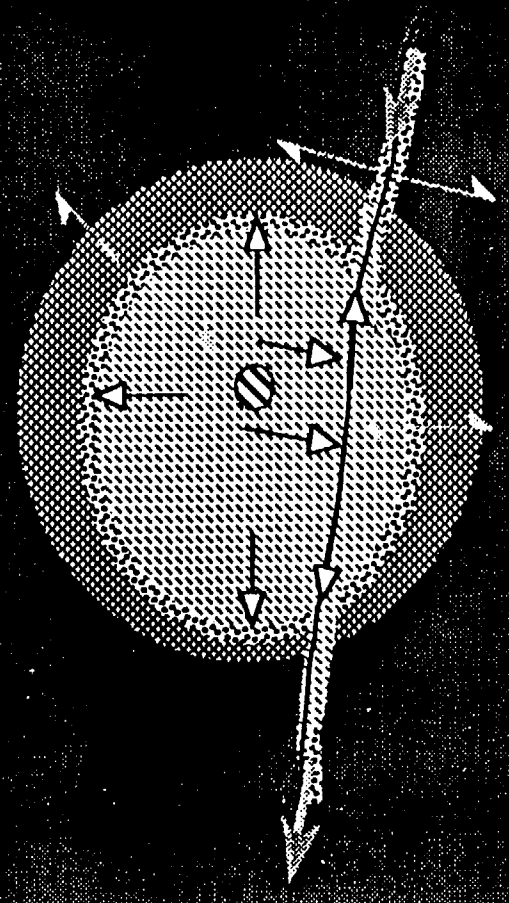
YUCCA MOUNTAIN PROJECT

Measurements confirmed elements of the conceptual model



- Dry region around heater, drying increases toward heater
- Saturation "halo" next to dry region and later dries as rock gets hotter
- Radius of dry region matched prediction of 0.6 - 0.7 m; total change is .16 g/cc
- Fractures have measurable effect on drying/ condensation front; re-wetting primarily along fractures
- Measured temperatures close to predictions; slight fracture effect where boiling occurrs

Conclusions

Concepts Confirmed

Suspicions Confirmed or New Things Learned

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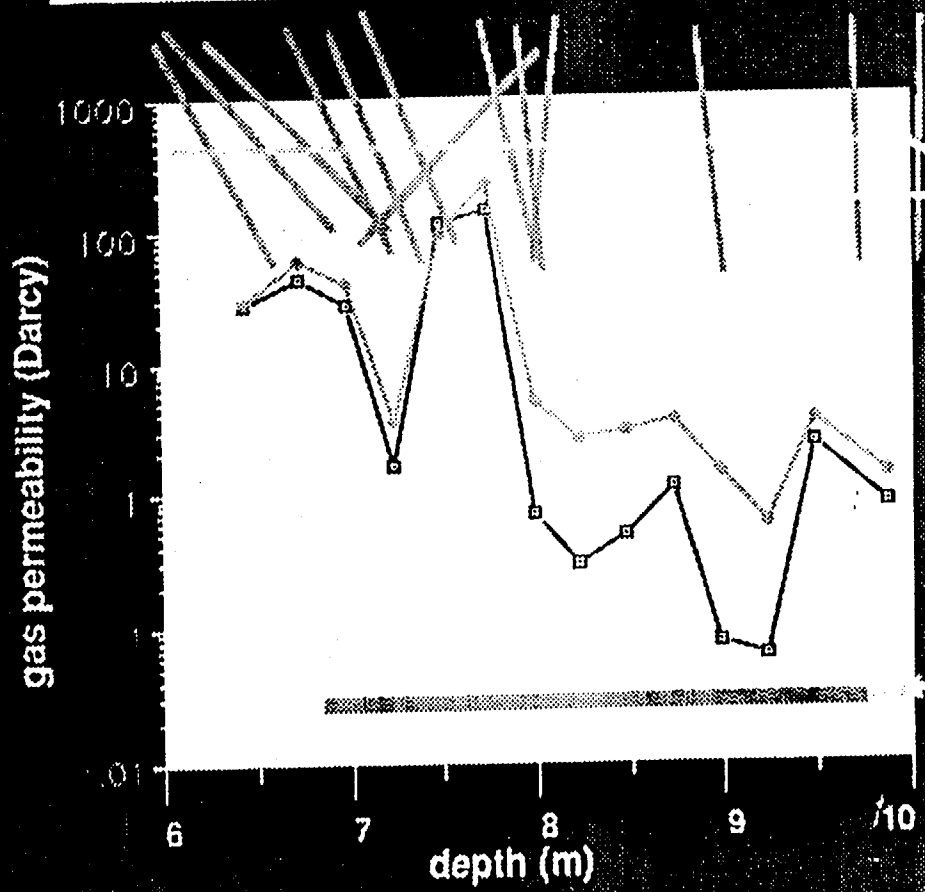
YUCCA MOUNTAIN PROJECT

Heating changed heater borehole permeability



Fractures mapped along heater borehole

Preheat values
Post heat values

Location of heater element

EBSFT Prototype Tests
G-Tunnel

Permeability

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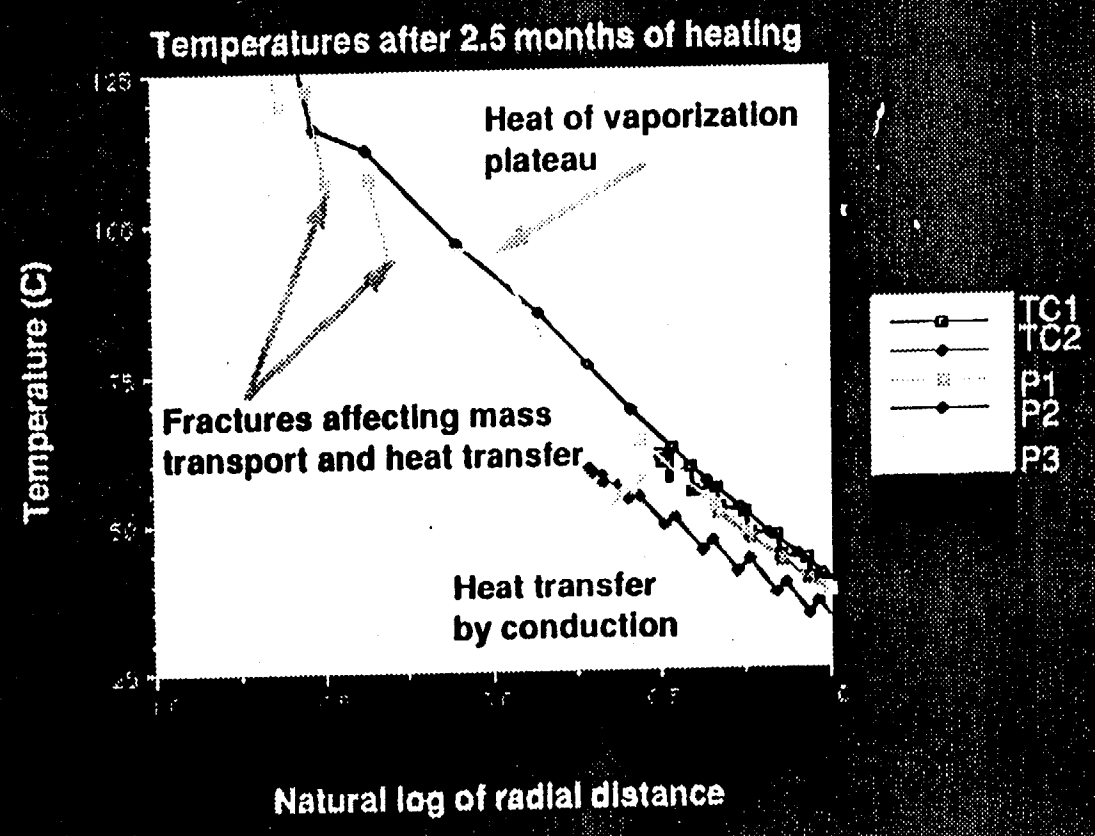
YUCCA MOUNTAIN PROJECT

Heat transfer by conduction and by mass transport



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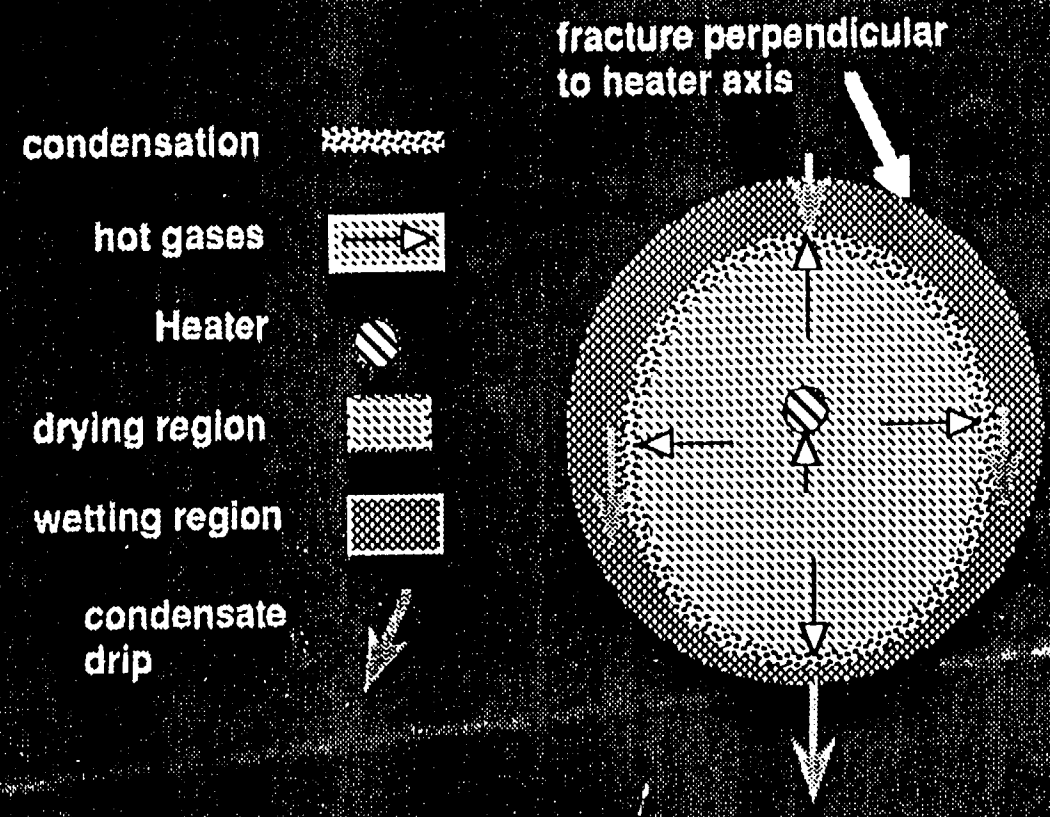
YUCCA MOUNTAIN PROJECT

Liquid in fractures may move from top to sides and bottom of boiling region



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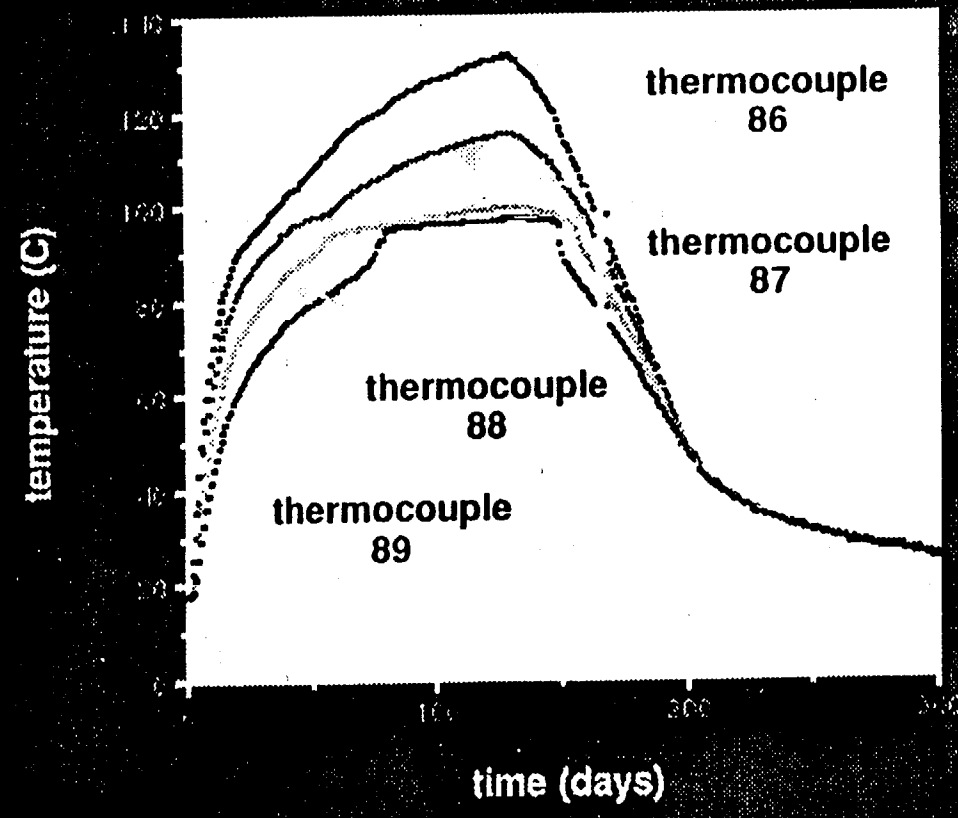
YUCCA MOUNTAIN PROJECT

Some locations remained at boiling temperature



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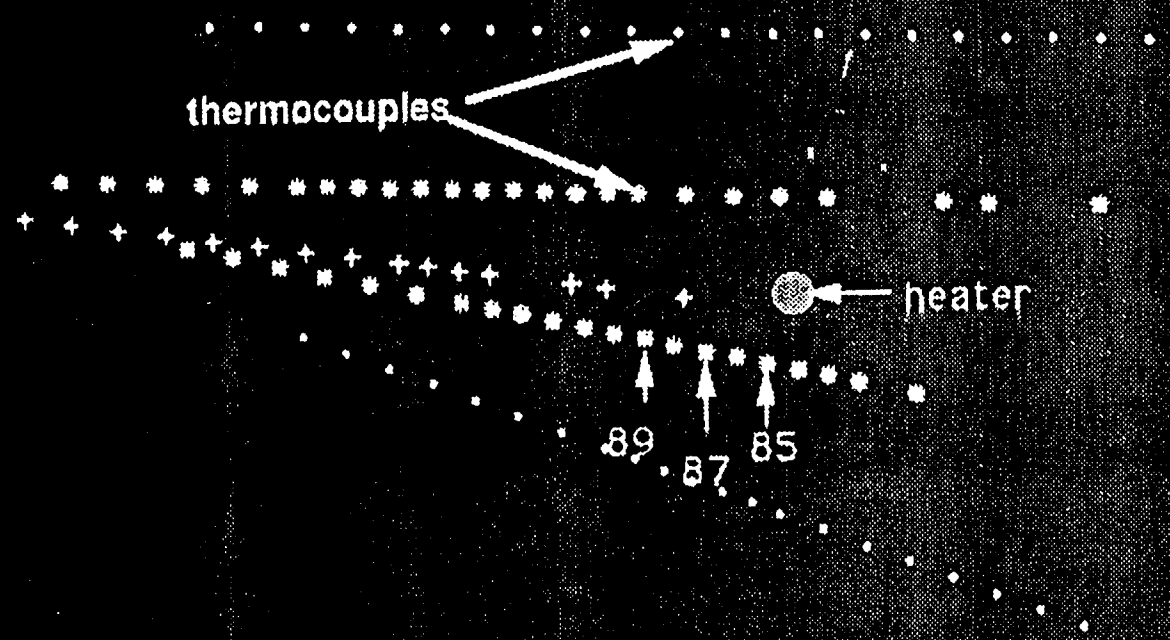
YUCCA MOUNTAIN PROJECT

Side view showing thermocouple locations



EBSFT Prototype Tests
G-Tunnel

Temperatures

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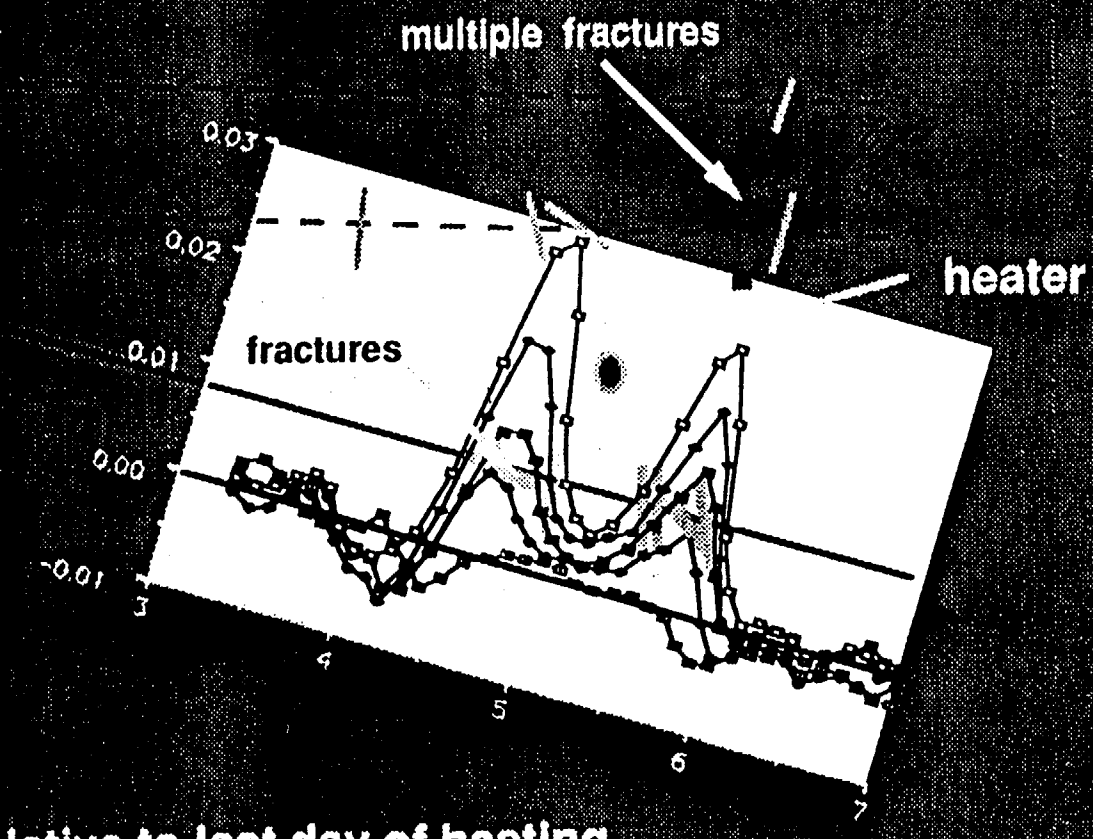
YUCCA MOUNTAIN PROJECT

Fractures increase the rate of re-wetting



2 meters

- day 146
- day 175
- day 202
- day 260
- day 301

Changes relative to last day of heating

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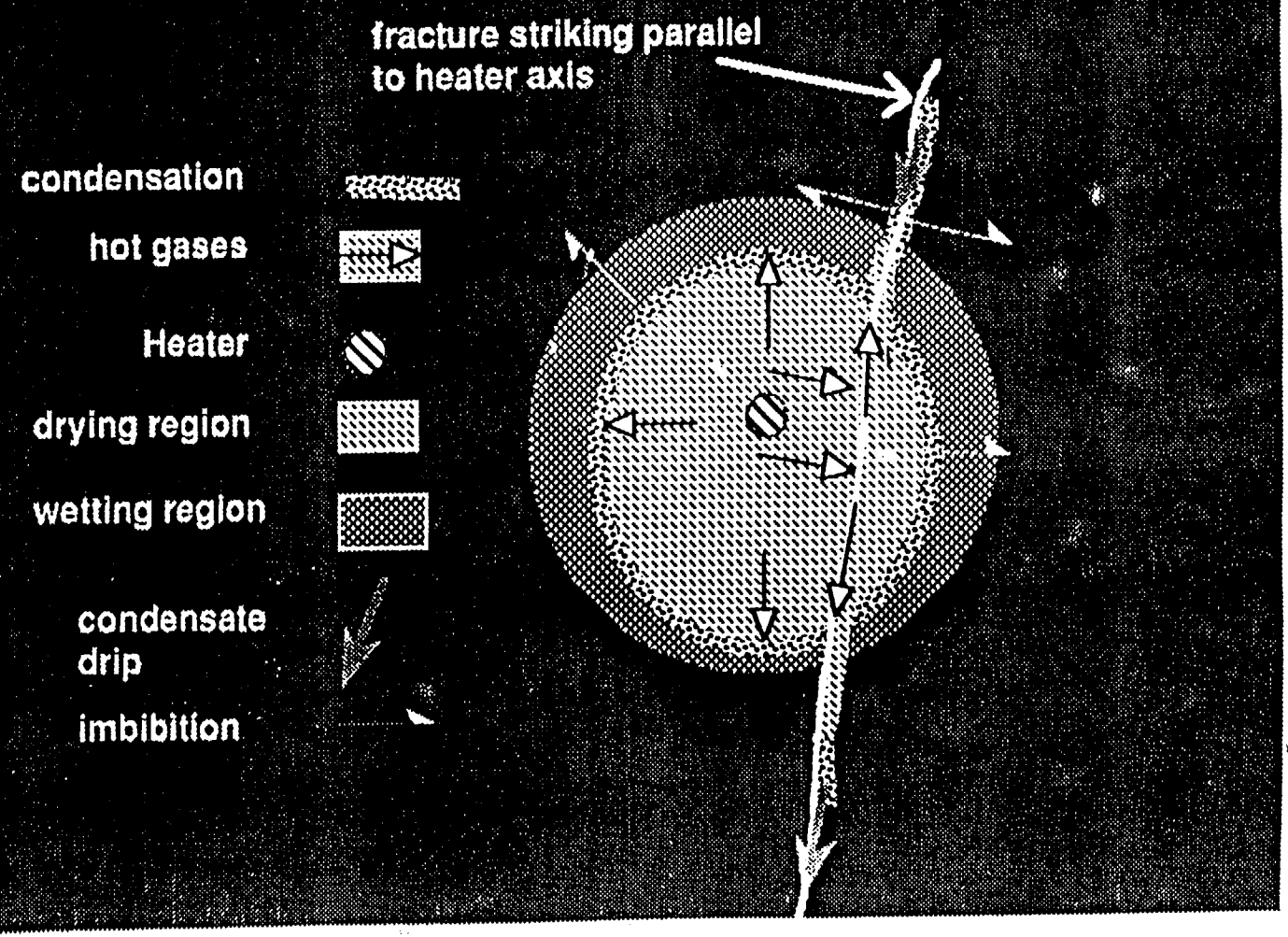
Fractures play an important role during drying



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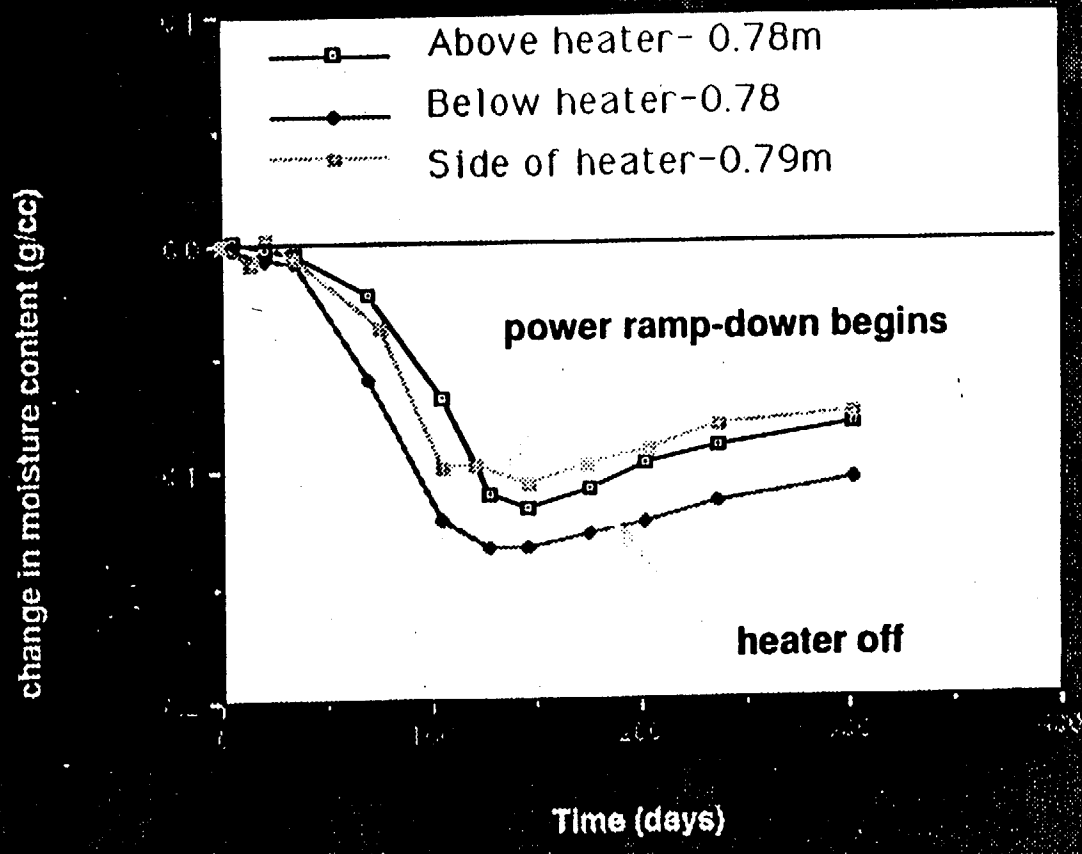
YUCCA MOUNTAIN PROJECT



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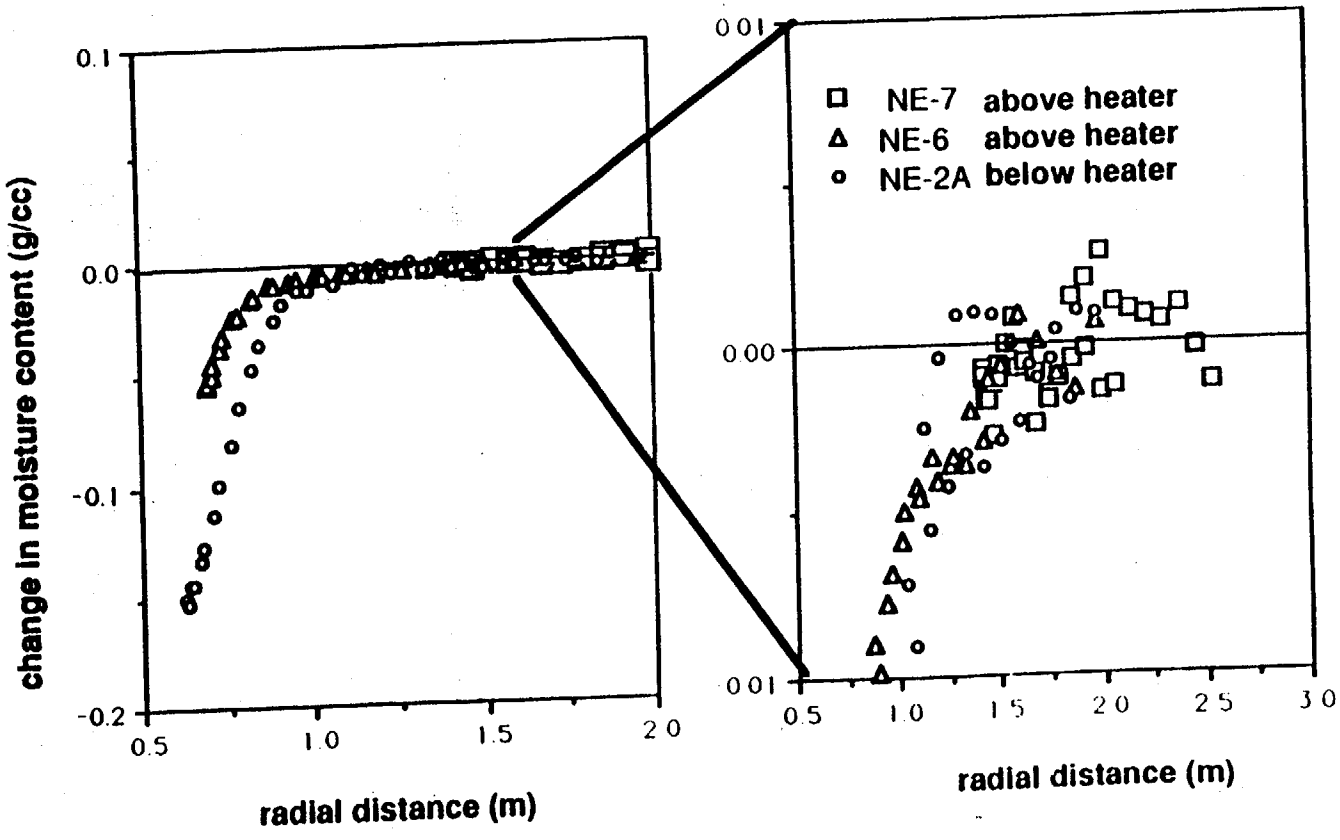
YUCCA MOUNTAIN PROJECT

Drying front advanced faster below the heater than above

Full power phase, 70 days after start of heating



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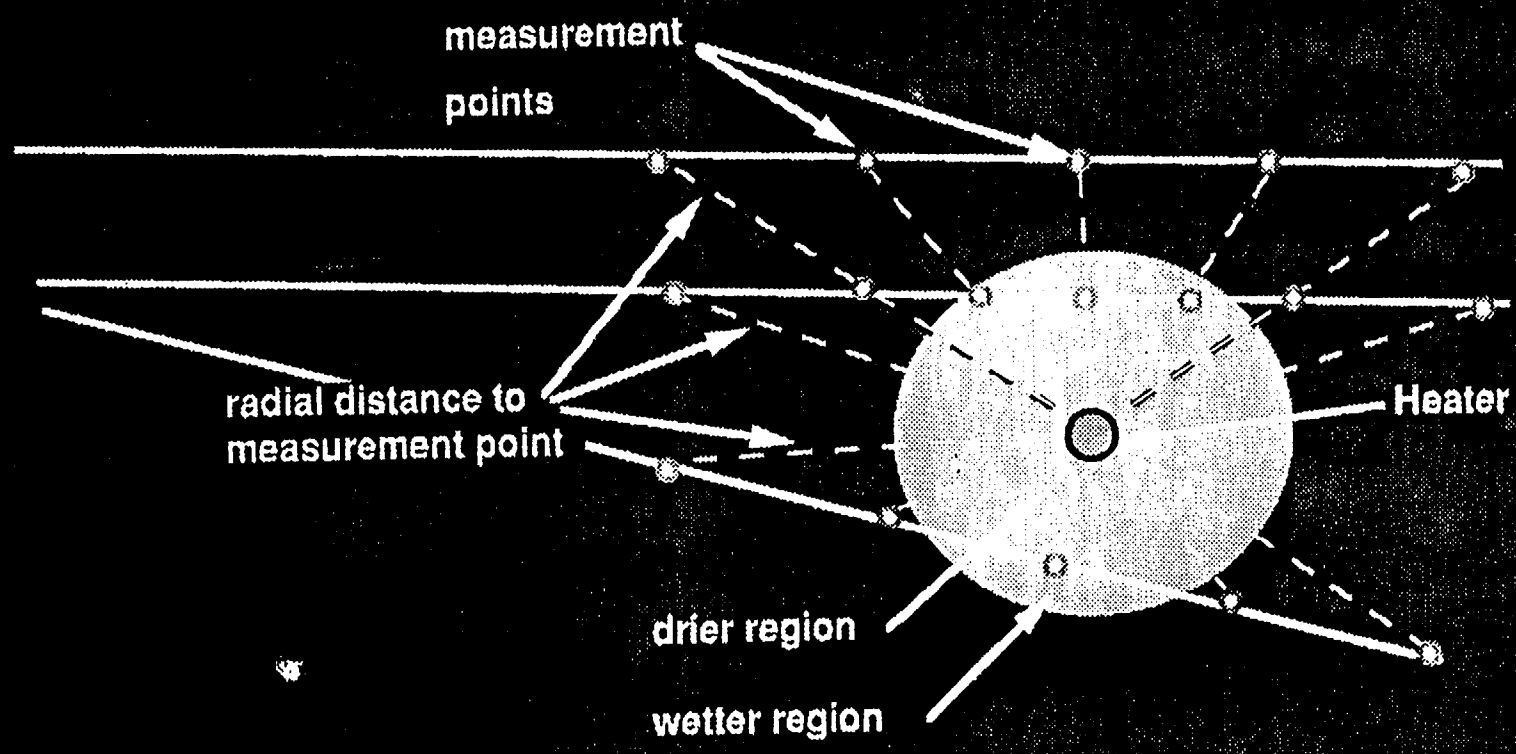
YUCCA MOUNTAIN PROJECT

Data from several boreholes are combined to form radial profiles



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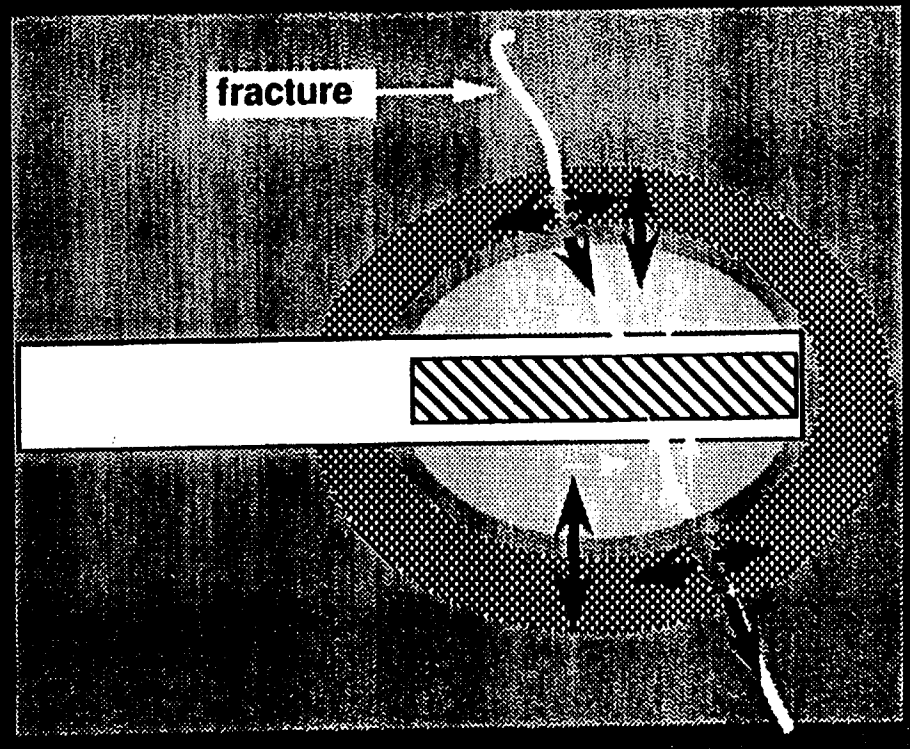
YUCCA MOUNTAIN PROJECT

Initial model



Heater

Drier rock

Wetter rock

Rock at ambient conditions

Condensation

Steam flow

Water flow

EBSFT Prototype Tests
G-Tunnel

Moisture Conditions

Various sensors monitored hydrothermal behavior of the rock

Temperature --thermocouples (approx. 120)

Moisture content -- dielectric , neutron, and gamma density logging

Steam pressure -- air pressure transducers

Matrix pore pressure -- psychrometers , microwave resonant circuits, capacitance sensors

Rock permeability-- air injection tests

Moisture invading heater borehole -- condensation trap

Fracture mapping -- core logging , borehole tv

Atmospheric pressure -- barometer

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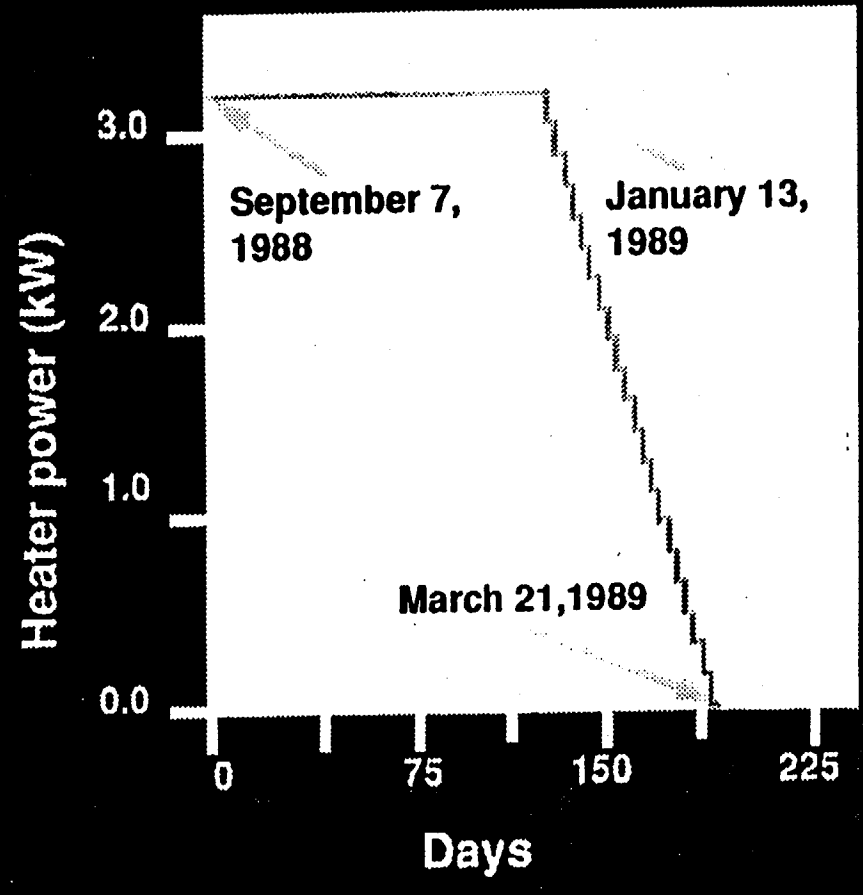
YUCCA MOUNTAIN PROJECT

Rock was perturbed by a heating & cooling cycle



- Heat load approx. = 1.0-1.2 kW per meter of heater length
- Boiling region diameter of approx-1.4 meters
- Heater on for 195 days, 128 days heating, 68 days of power ramp-down
- Cooling highly accelerated (compared to a spent fuel waste package)

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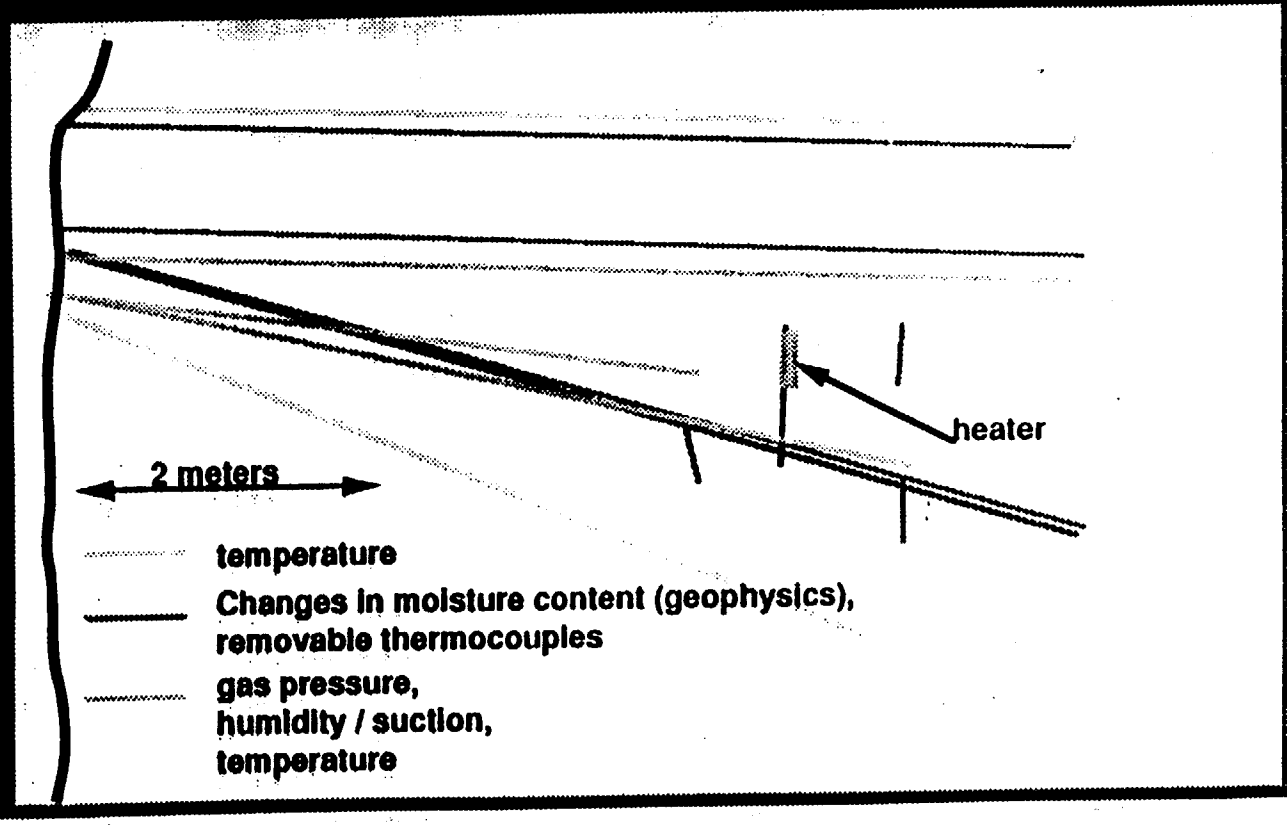
YUCCA MOUNTAIN PROJECT

View parallel to heater borehole axis



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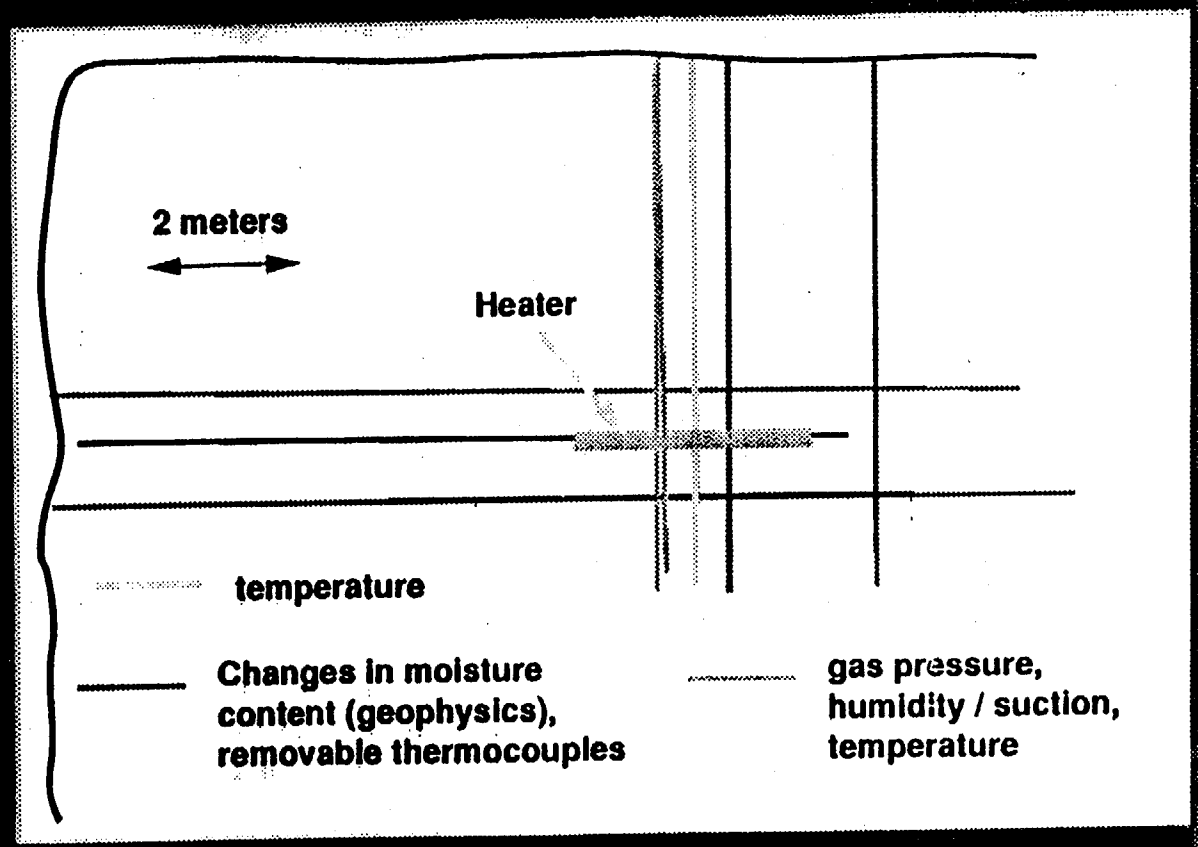
YUCCA MOUNTAIN PROJECT

Plan view of test region



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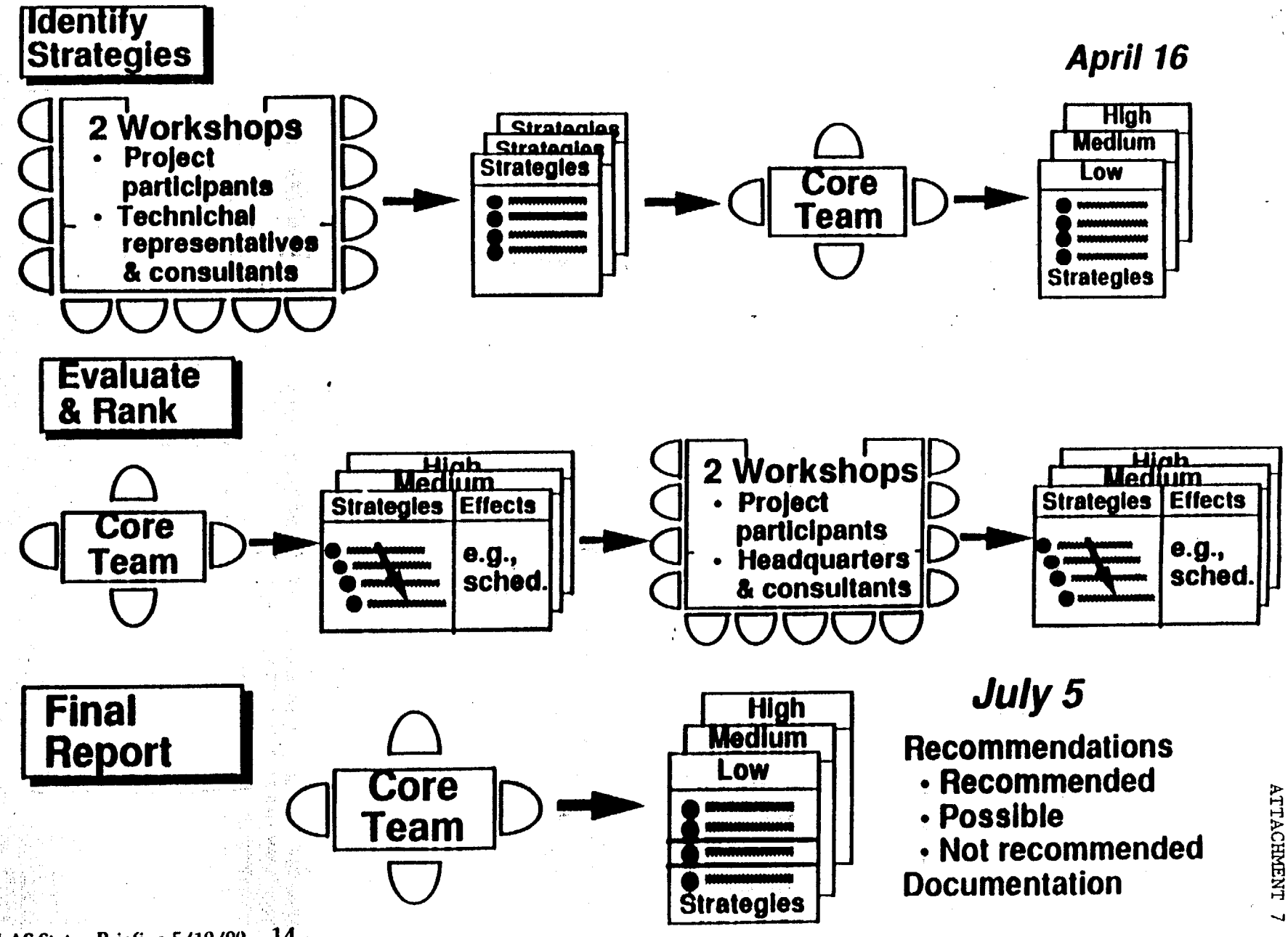
YUCCA MOUNTAIN PROJECT

Purpose is to evaluate the ability to characterize near field environment

- Evaluate technical feasibility of defining near field hydrothermal and geochemical environment during field testing
  - -measurement technique performance
- Provide in situ data to improve understanding of conceptual models for near field environment
  - -evaluate under realistic conditions
- Develop and Test Quality Assurance procedures



ATTACHMENT 7

RECOMMENDATIONS WERE DEVELOPED BASED ON TIMING FOR ACTION AND PRELIMINARY ATLAS EVALUATIONS

- ONLY ALTERNATIVES WITH PERCEIVED POSITIVE PRELIMINARY EVALUATIONS INCLUDED (I.E., GOOD IDEAS AS OPPOSED TO UNCERTAIN ONES)

- ORGANIZED BASED ON:
  - IMPLEMENTATION DIFFICULTY (HIGH - MEDIUM - LOW)
  - SITE ACCESS UNCERTAINTIES (EARLY - LATE - LATER)
  - NEED FOR SITE DATA (CONTINGENT ON EARLY FINDINGS)

ATLAS RECOMMENDATIONS

THE ATLAS TASK FORCE IDENTIFIED THREE RECOMMENDATIONS PERTAINING TO DOE ACTIONS DURING DIFFERENT PHASES OF THE PROGRAM

RECOMMENDATION 1 - FOCUS NEAR-TERM EVALUATIONS ON LICENSING ORGANIZATION AND PLANNING STRATEGIES

RECOMMENDATION 2 - EVALUATE A FLEXIBLE BASIS FOR DOE SITE CHARACTERIZATION

RECOMMENDATION 3 - EVALUATE CONTINGENCIES IN SITE CHARACTERIZATION AND CONSTRUCTION

EACH RECOMMENDATION EMBODIES SEVERAL DIFFERENT ALTERNATIVE STRATEGIES. DOE MUST DETERMINE WHICH OF THESE STRATEGIES TO APPLY (MANAGEMENT DECISION/FURTHER ANALYSIS)

NEXT LOGICAL STEP(S)

DOE MANAGEMENT COULD ADOPT CONCEPT OF TIME-PHASED IMPLEMENTATION OF ATLAS ALTERNATIVES, WHICH WOULD INVOLVE:

- DEVELOP AN ACTION PLAN TO ACT ON PRE-PERMIT ALTERNATIVES/IDEAS.
  (DOMINANTLY SCENARIOS IN RECOMMENDATION 1)

- REDIRECT TECHNICAL EMPHASIS OF EXISTING STUDY GROUPS (ESF, SBT, CHRB, ALS) TO PERFORM THE TYPE OF IN-DEPTH ANALYSES NEEDED TO EVALUATE SITE CHARACTERIZATION ALTERNATIVES.
  (DOMINANTLY SCENARIOS IN RECOMMENDATION 2)

- DEFER DECISIONS ON ALTERNATIVES THAT REQUIRE ADDITIONAL SITE DATA.
  (DOMINANTLY SCENARIOS IN RECOMMENDATION 3)

OVERVIEW OF PERFORMANCE ASSESSMENT

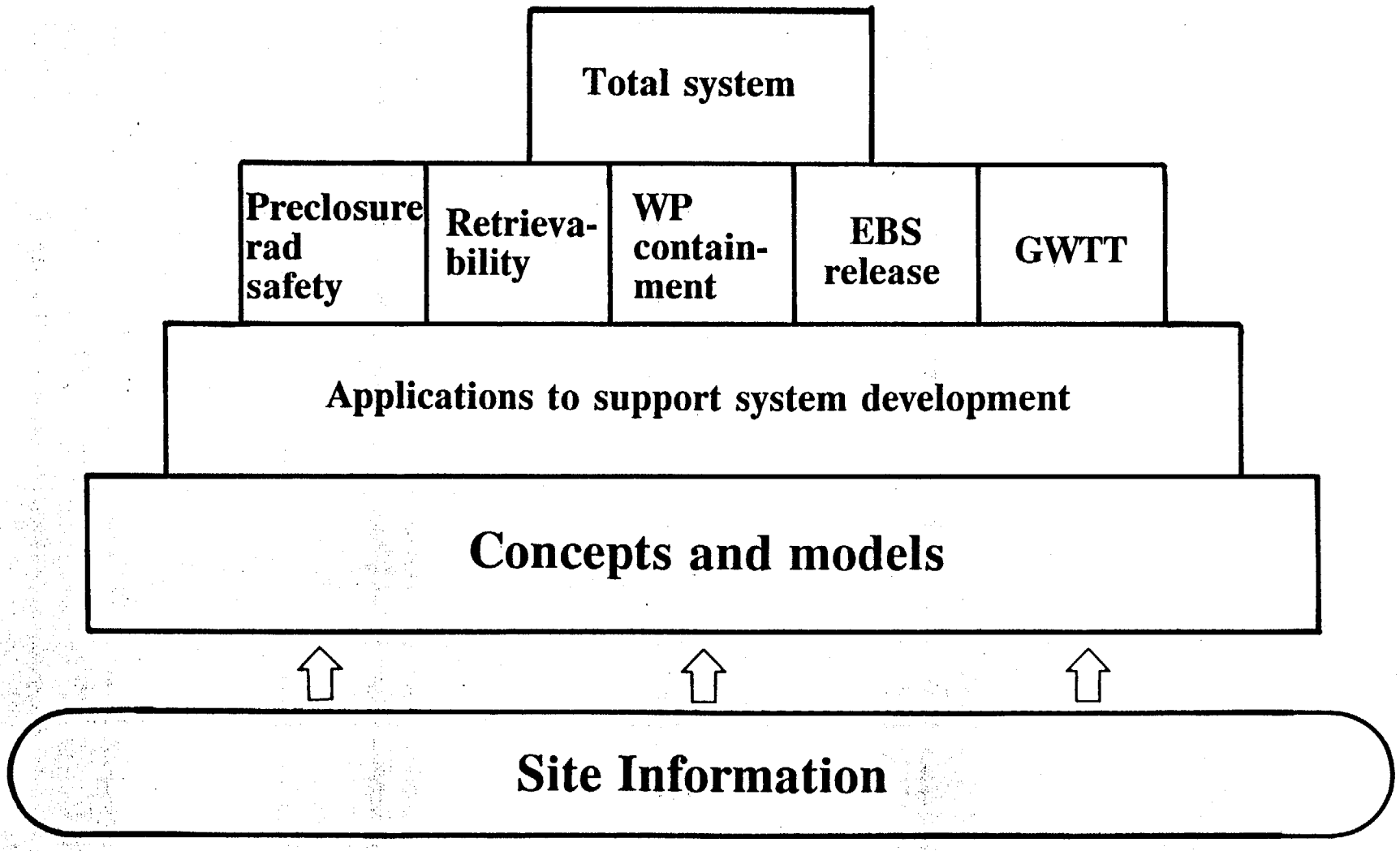
THOMAS O. HUNTER

SANDIA NATIONAL LABORATORIES

AUGUST 3, 1990

1. Framework
2. Current documents
3. Road map
4. System picture
5. Three components of total system
6. Fluid flow
7. EBS
8. Acc. environment
9. Methods must accommodate expected and disturbed
10. Each component can include a hierarchy
11. Probabilistic estimates of releases
12. Framework (emphasis on applications . . .)
13. Current emphasis
14. Applications: support
15. Objective III
16. Perf. measures and probabilities
17. Mechanism for PA support
18. General form of influence diagram
19. PA support to design requirements . . .
20. Support to requirements and testing
21. Design development
22. Applications: related activities
23. Concepts and models: PA development
24. Assessing compliance with EPA
25. Current scenario development
26. Tot-sys studies
27. Interpretation of GWTT
28. Model validation
29. Code development
30. PACE participants
31. PACE results
32. Concepts and models: basic concepts
33. Prelim estimate of curie discharge
34. Summary

FRAMEWORK


Total system
Preclosure rad safety
Retrieva-bility
WP contain-ment
EBS release
GWTT
Applications to support system development
Concepts and models
Site Information

CURRENT MANAGEMENT DOCUMENTS

SCP

- 8.3.5 Performance assessment program

PAMP (management)

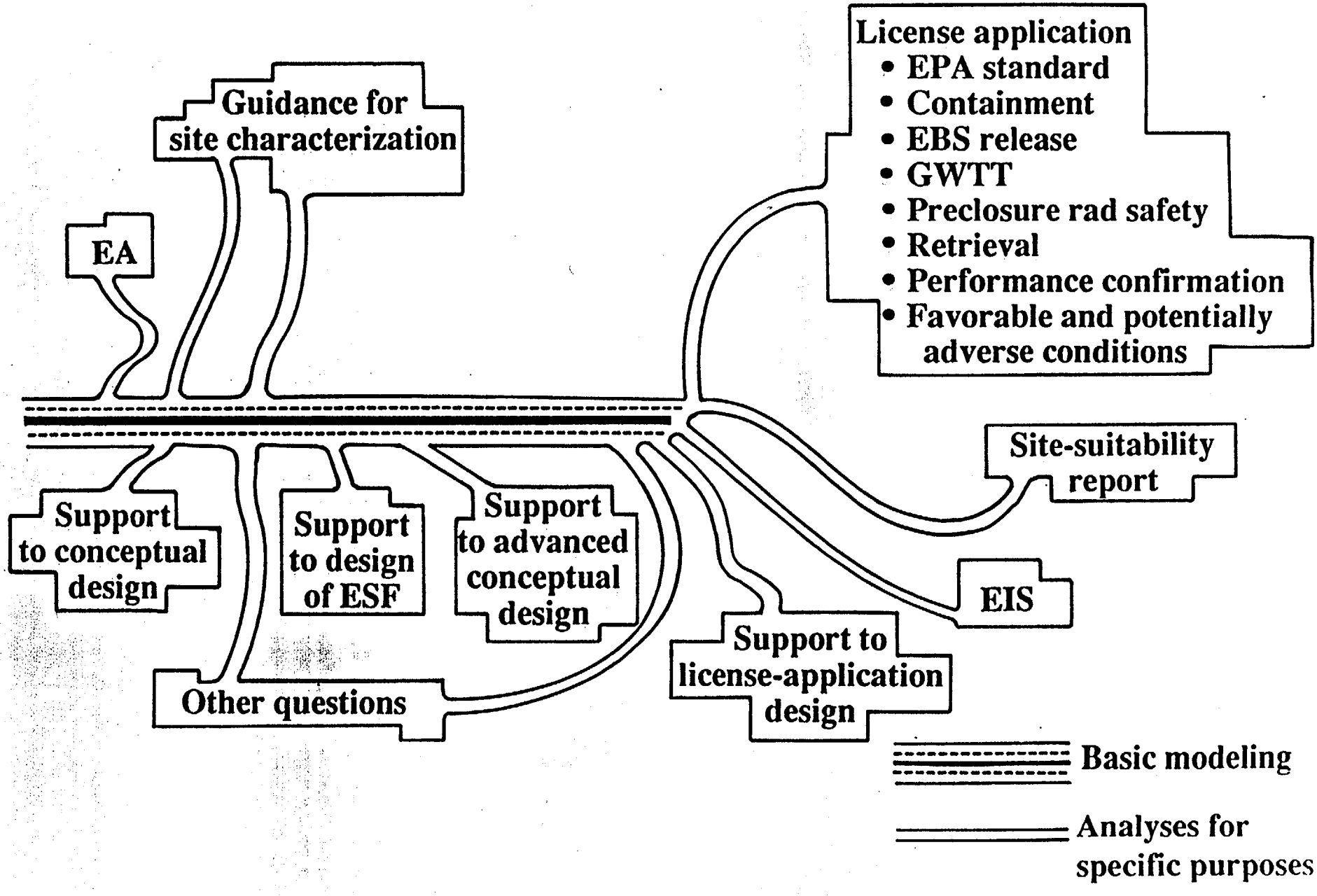
PASP (strategy)

PAIP (implementation)

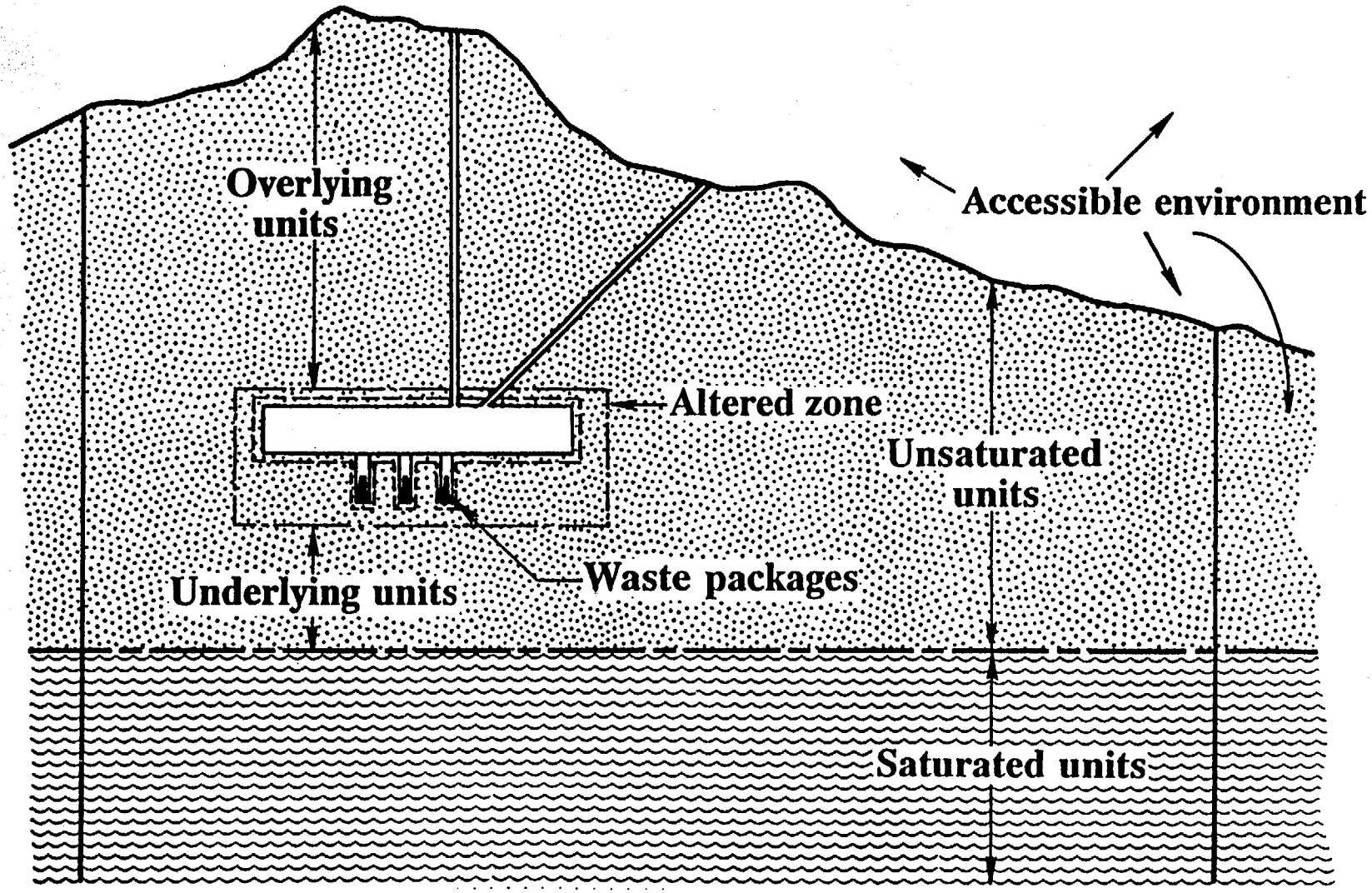
Lower-level documents

(Work plans, scientific investigation plans, . . .)

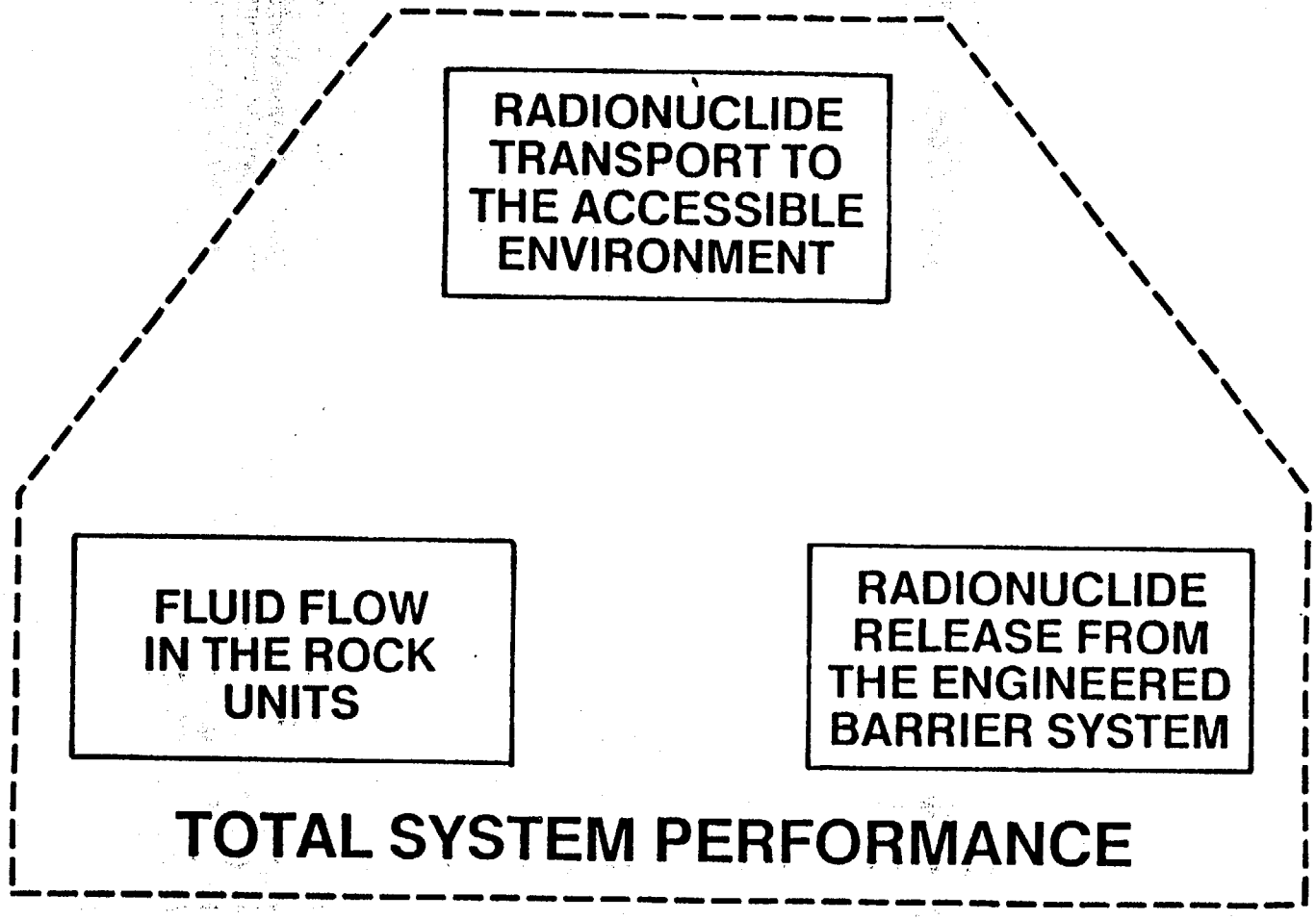
ROAD MAP FOR PERFORMANCE ASSESSMENT



WASTE-ISOLATION SYSTEM



TOTAL SYSTEM PERFORMANCE INCLUDES THREE PRIMARY COMPONENTS



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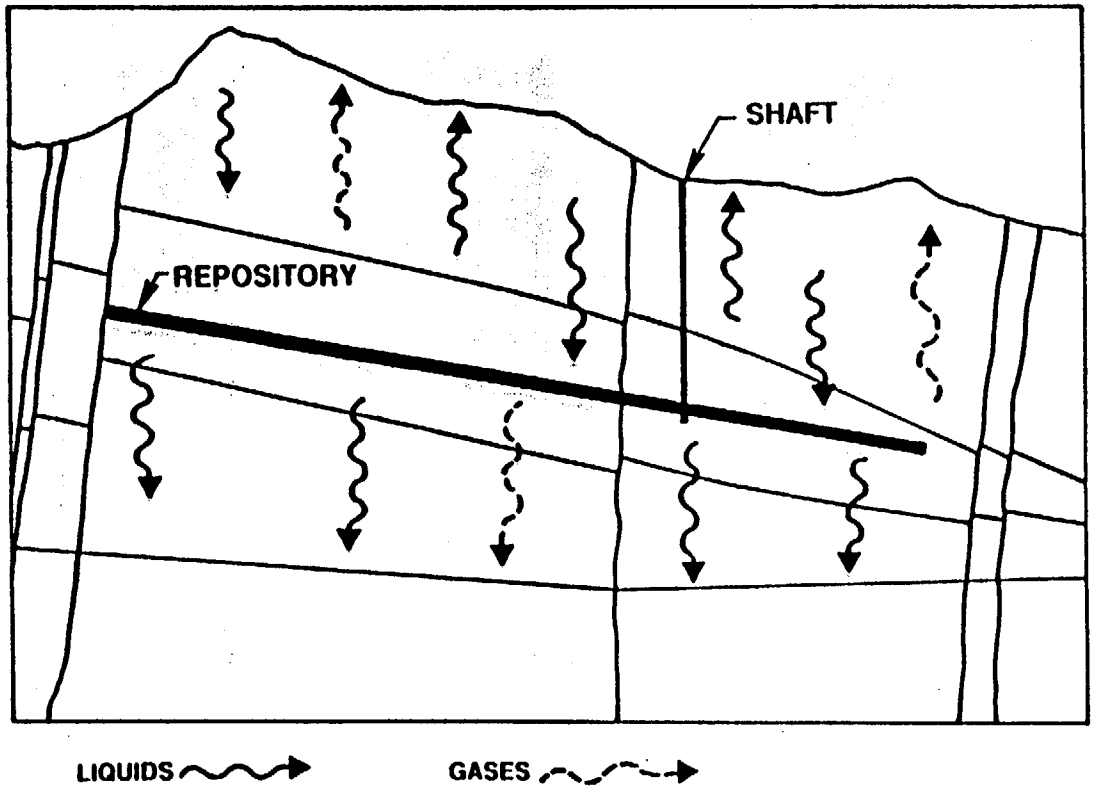
CONCEPTS AND MODELS FOR FLUID FLOW IN THE ROCK UNITS



FLOW MECHANISMS

- ROCK HYDROLOGIC PROPERTIES
- MATRIX/FRACTURE FLOW
- DRIVING POTENTIALS
- GAS-FLOW CHARACTERISTICS

FLUX IN THE UNSATURATED ZONE

- CLIMATIC CONDITIONS
- INFILTRATION
- PERCOLATION

PRIMARY RESULTS

FLUID VELOCITY DISTRIBUTIONS AND SATURATION CONDITIONS

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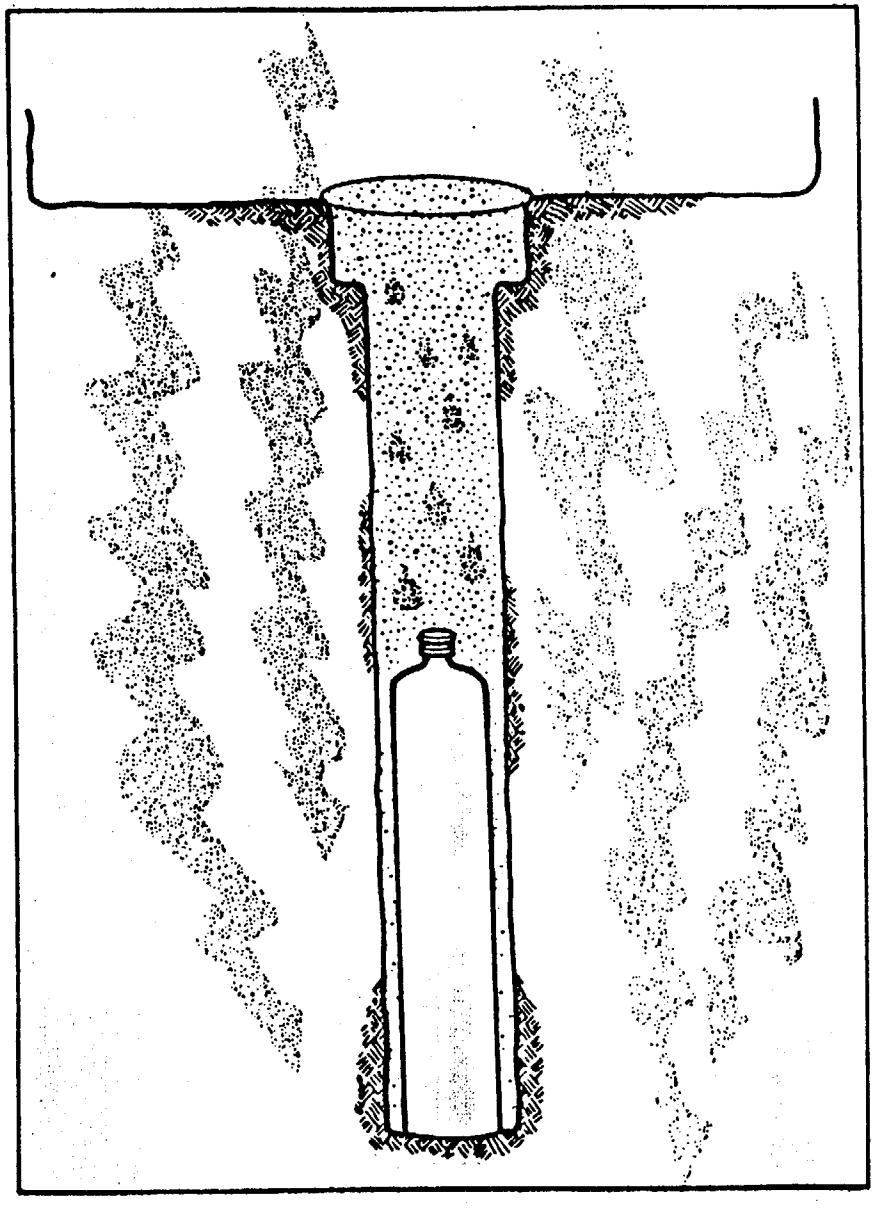
CONCEPTS AND MODELS FOR RADIONUCLIDE RELEASE FROM THE ENGINEERED BARRIER SYSTEM



WASTE PACKAGE LIFETIME

- LOCAL ENVIRONMENT
- DEGRADATION MODES AND RATES

RADIONUCLIDE RELEASE RATE

- FORM OF NUCLIDES
- AVAILABLE INVENTORY
- SOLUBILITY
- REACTION RATES

PRIMARY RESULTS

TEMPORAL AND SPATIAL DISTRIBUTIONS OF RADIONUCLIDE INJECTION INTO FLUID FLOW (SOURCE TERM DISTRIBUTION)

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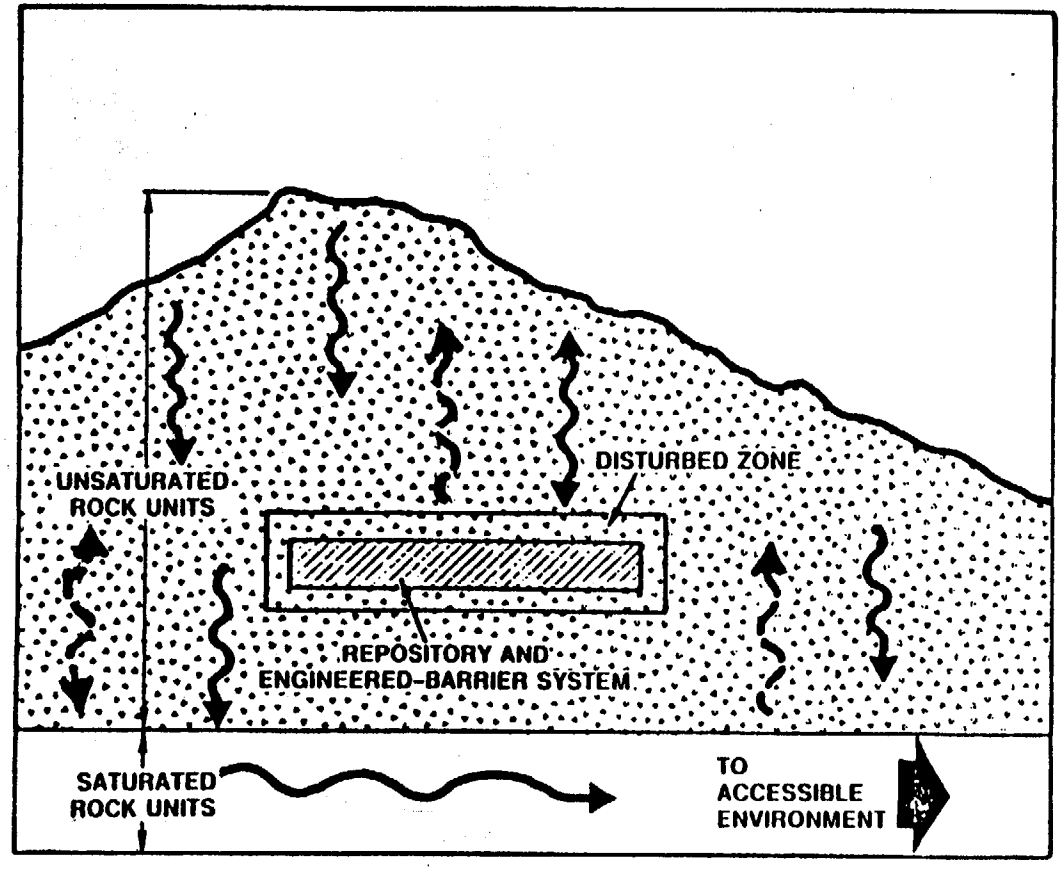
CONCEPTS AND MODELS FOR RADIONUCLIDE TRANSPORT TO THE ACCESSIBLE ENVIRONMENT



VELOCITY DISTRIBUTIONS

SOURCE TERM DISTRIBUTION

REPOSITORY IMPACTS

- ROCK DEFORMATION
- SEALS
- THERMAL EFFECTS

TRANSPORT PHENOMENA

- CHEMICAL RETARDATION
- MATRIX–FRACTURE COUPLING

PRIMARY RESULTS

RADIONUCLIDE CONCENTRATIONS AT THE ACCESSIBLE ENVIRONMENT AS A FUNCTION OF TIME

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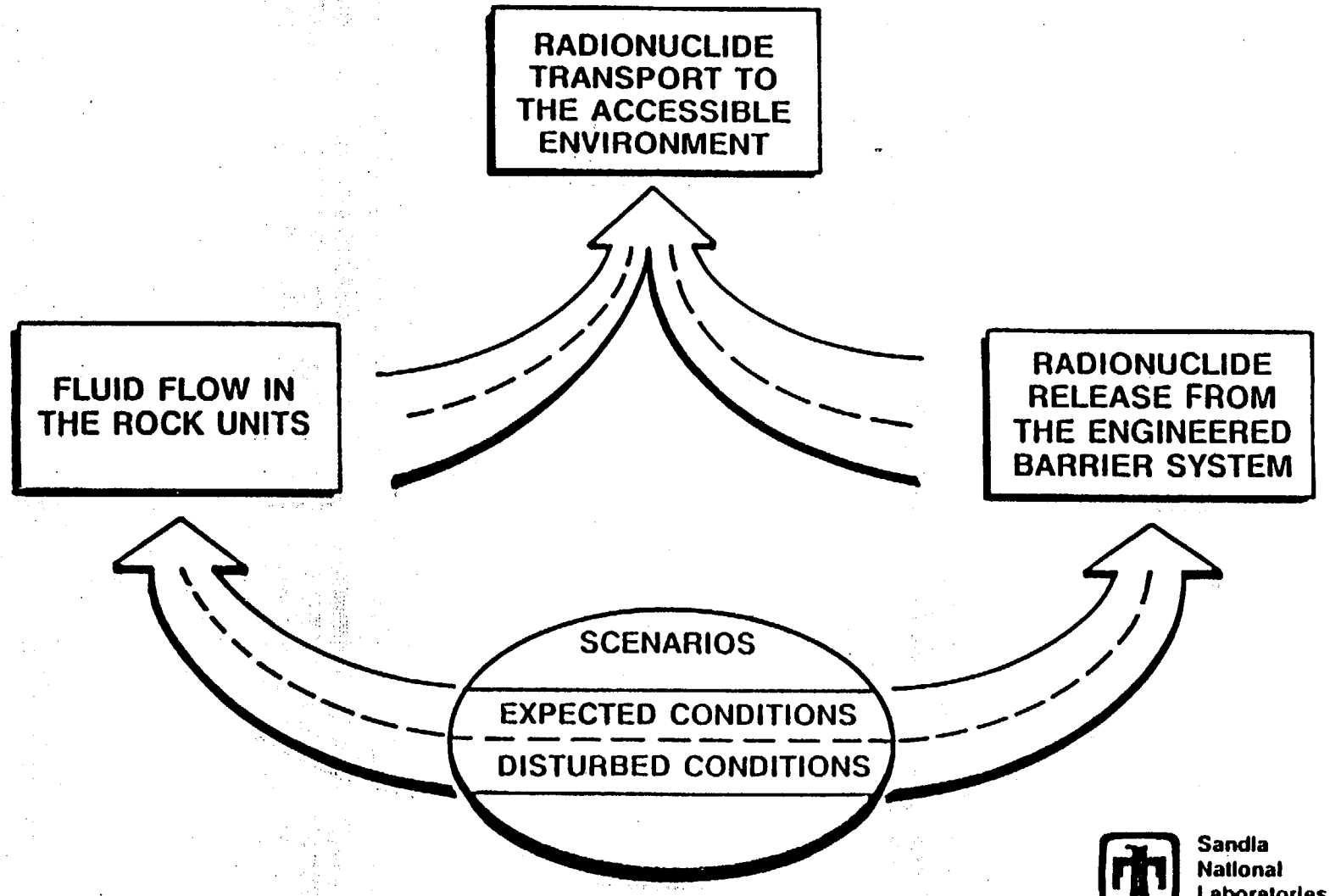
METHODS FOR PERFORMANCE ASSESSMENT MUST ACCOMMODATE EXPECTED AND DISTURBED SITE CONDITIONS



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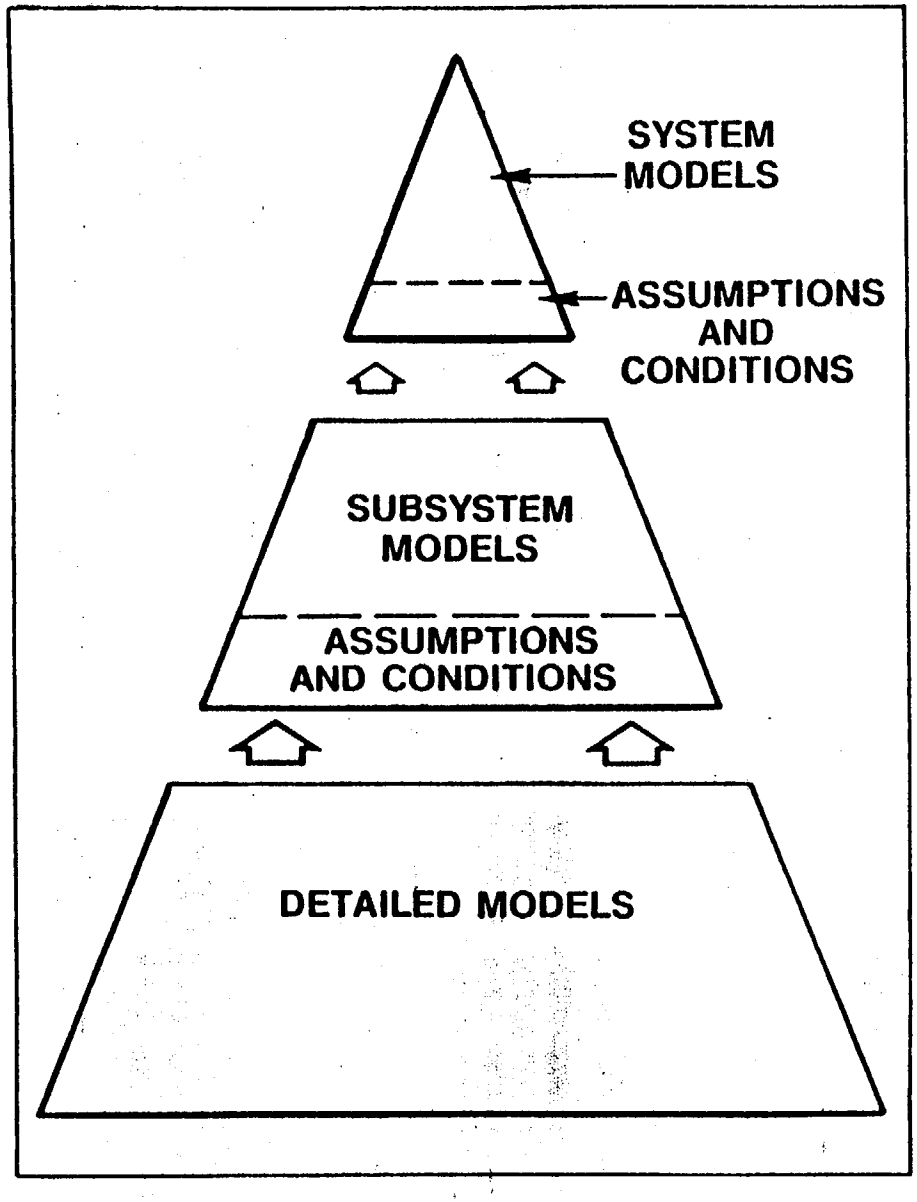
EACH COMPONENT CAN INCLUDE A HIERARCHY OF METHODS TO PREDICT PERFORMANCE



LEAST COMPLEX

- COMBINED SCENARIO TREATMENT
- BOUNDING ANALYSES OF SYSTEM
- MULTIPLE CALCULATIONS TO CREATE PDFs

LESS COMPLEX

- BOUNDING ANALYSES OF SUBSYSTEMS
- PROBABILISTIC AND DETERMINISTIC
- ONE OR TWO DIMENSIONAL
- INDIVIDUAL SCENARIO TREATMENT

MOST COMPLEX

- SPECIFIC PHENOMENA
- COUPLED INTERACTIONS
- ONE, TWO, OR THREE DIMENSIONS
- MECHANISTIC EFFECTS
- PRIMARILY DETERMINISTIC ANALYSES

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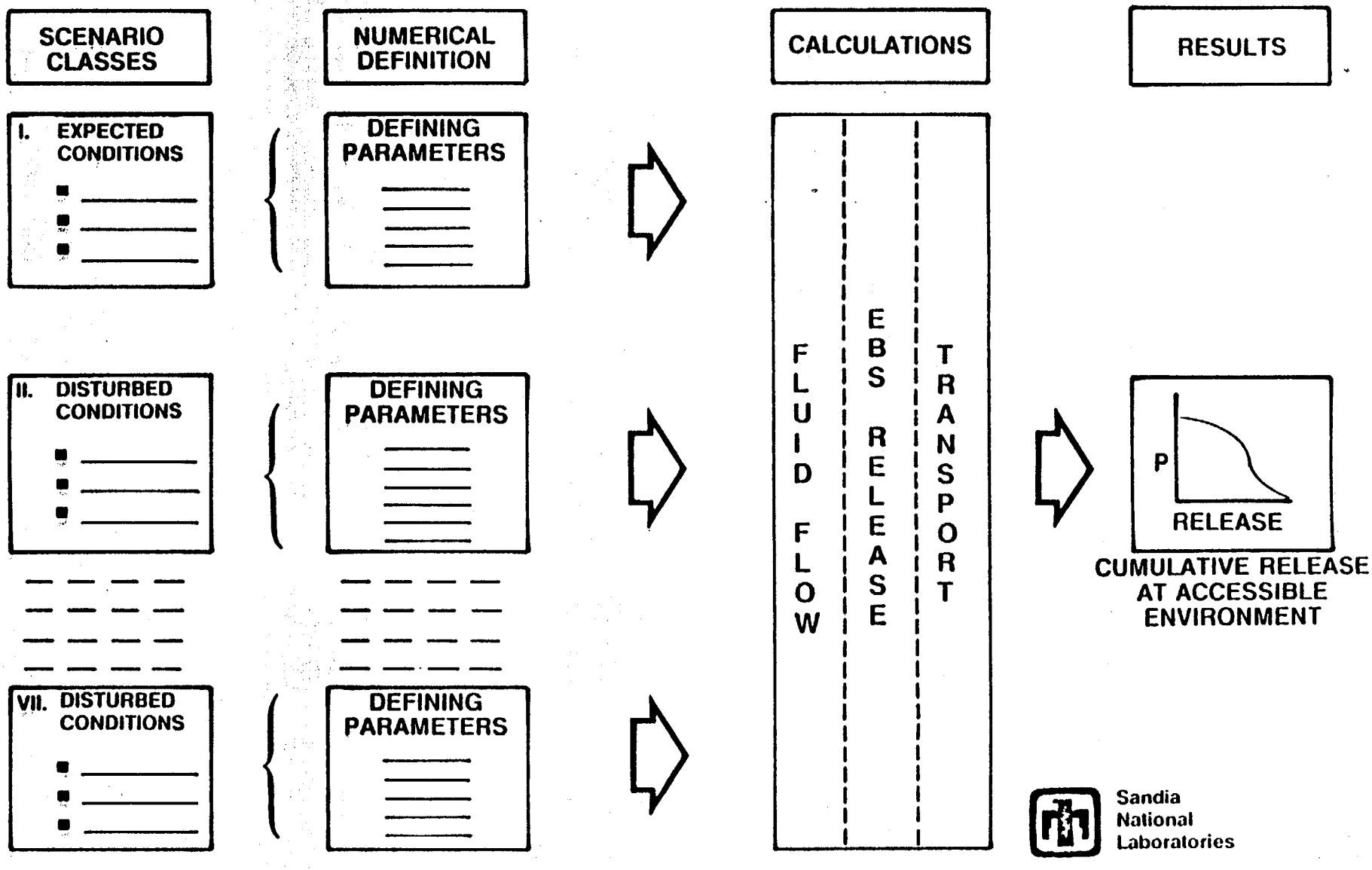
PROBABILISTIC ESTIMATES OF RELEASES WILL INCORPORATE MULTIPLE SCENARIO CLASSES



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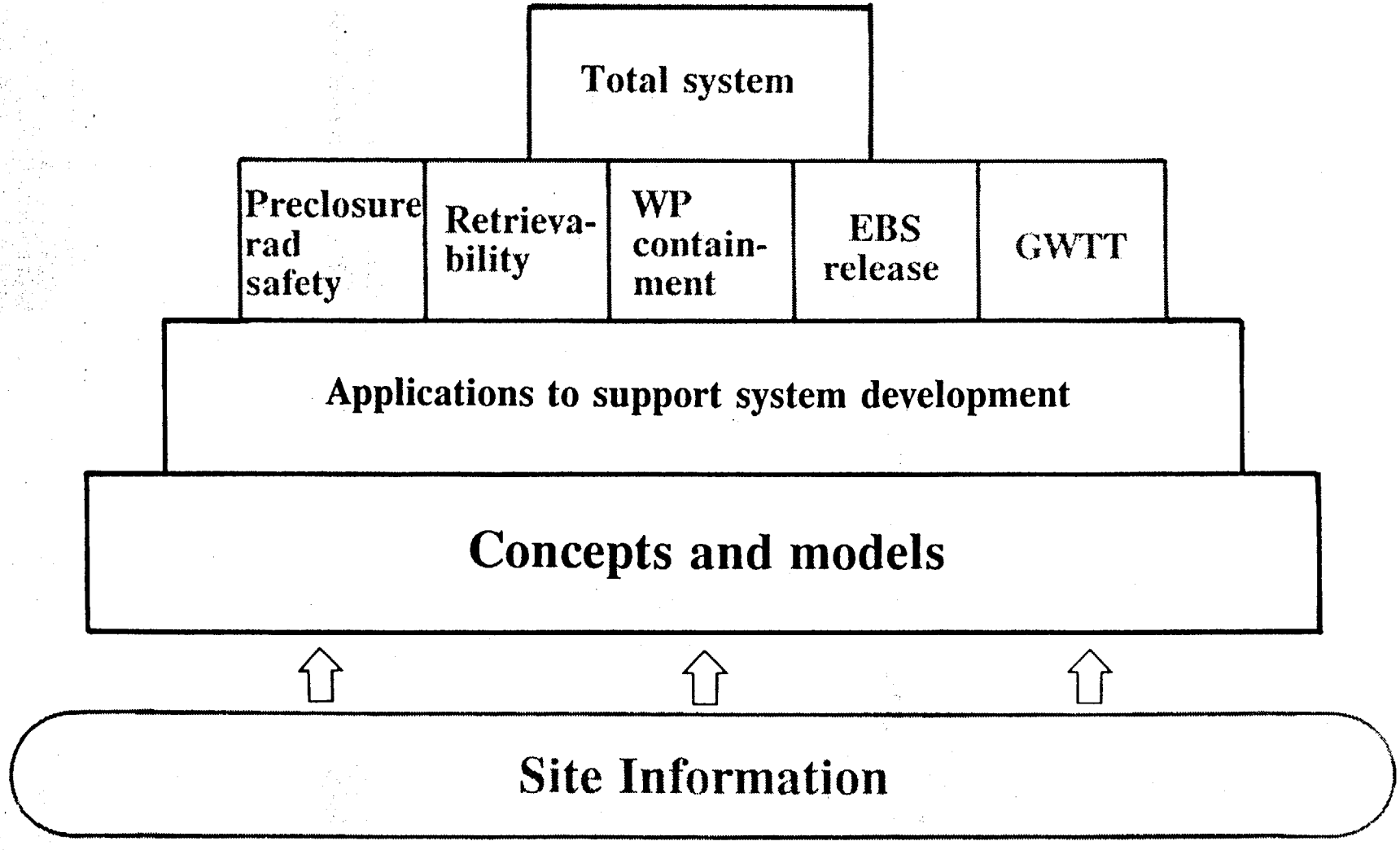
CURRENT EMPHASIS IS ON APPLICATIONS AND CONCEPTS AND MODELS



CURRENT EMPHASIS

Applications

- **Support for site characterization and design**
- **Related activities**

Concepts and models

- **Performance-assessment development**
- **Basic concepts and models**

APPLICATIONS
Support for site characterization and design

Support for ESF alternatives study Support to Calico Hills study Support to surface-based test program	Decision studies
Support to testing Support to ESF design Design development	Implementation support

OBJECTIVE III -

MINIMIZE ADVERSE IMPACTS ON SOCIETY

PRECLOSURE HEALTH, ENVIRONMENT, AND SOCIAL COSTS

1. WORKER HEALTH AND SAFETY
2. ENVIRONMENT/AESTHETICS
3. ENVIRONMENT/HISTORICAL PROPERTIES
4. ENVIRONMENT/BIOLOGICAL IMPACTS
5. SOCIOECONOMIC IMPACTS

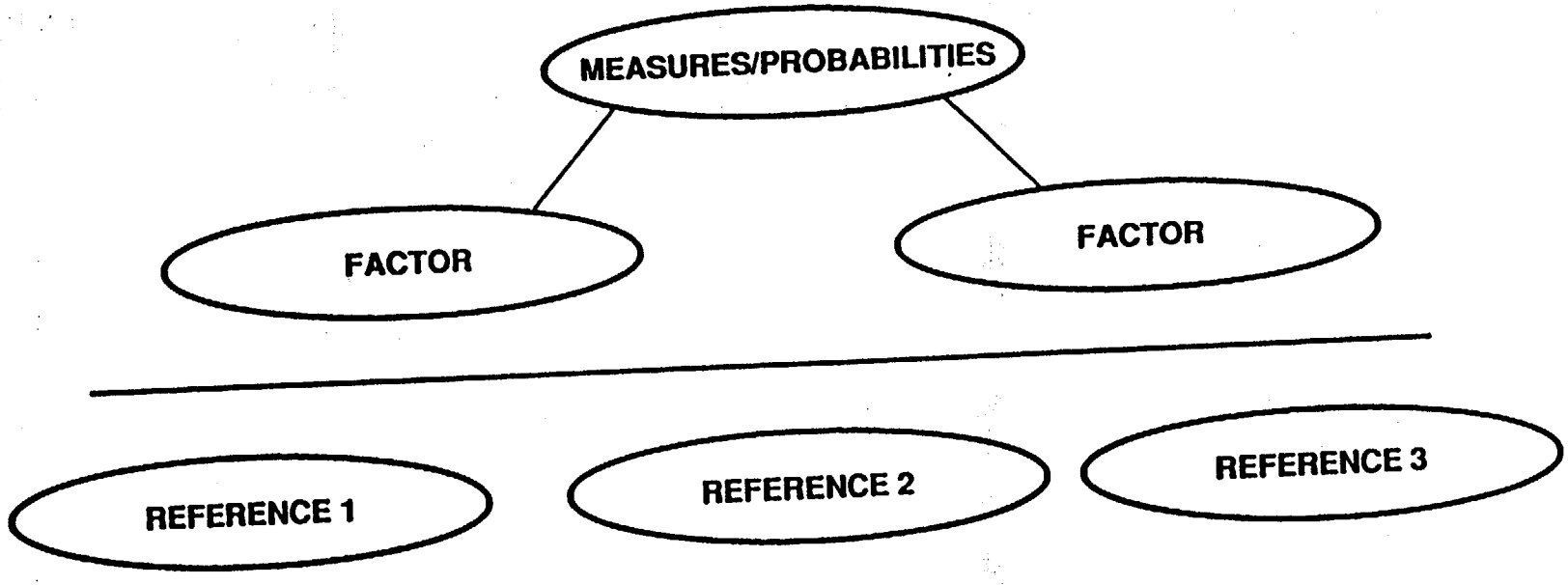
PRECLOSURE ECONOMIC COSTS

6. SCHEDULE
7. DIRECT COSTS

POSTCLOSURE COSTS

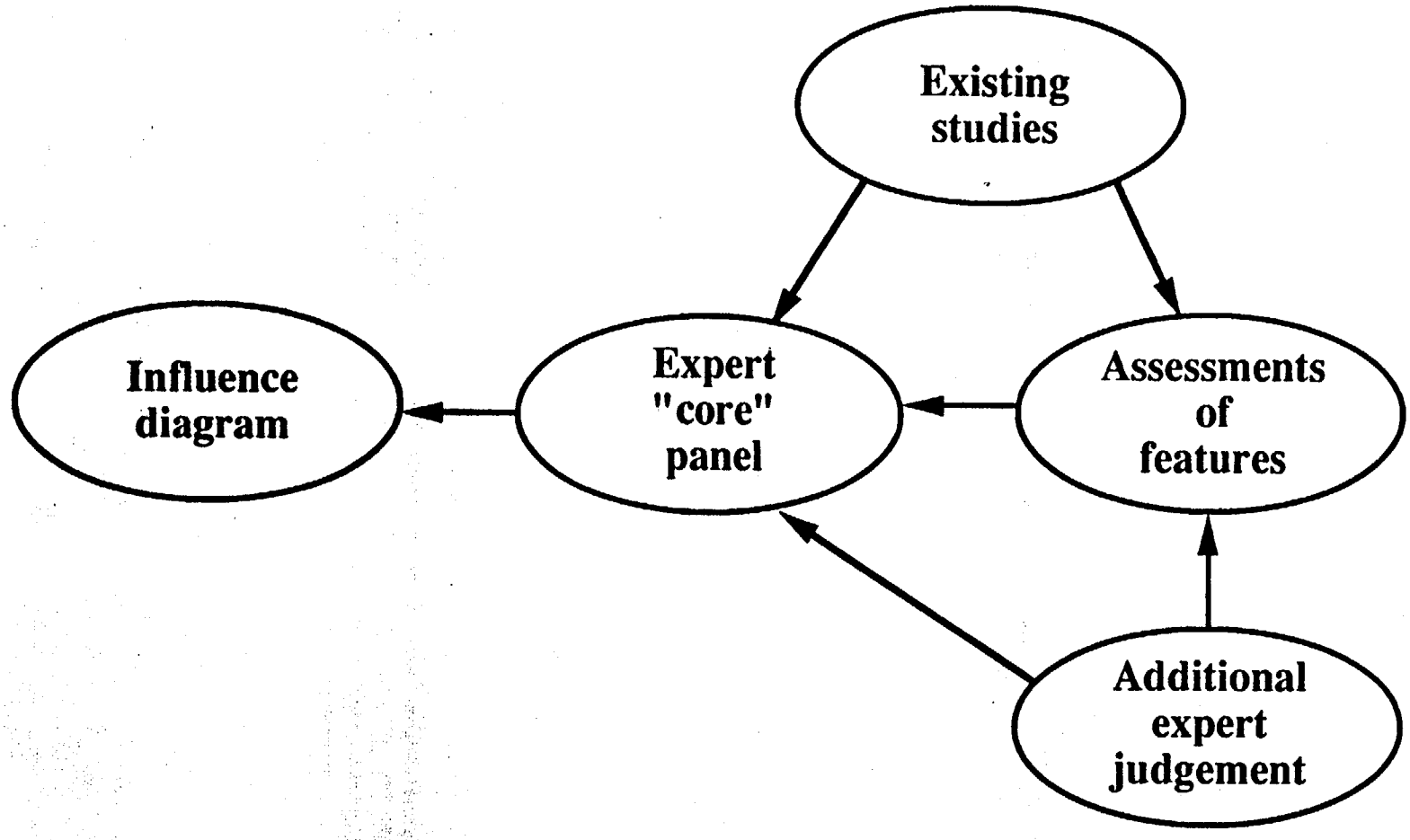
8. RADIONUCLIDE RELEASES

PERFORMANCE MEASURES AND PROBABILITIES USED IN DECISION METHODOLOGY ARE SUPPORTED BY REFERENCE INFORMATION

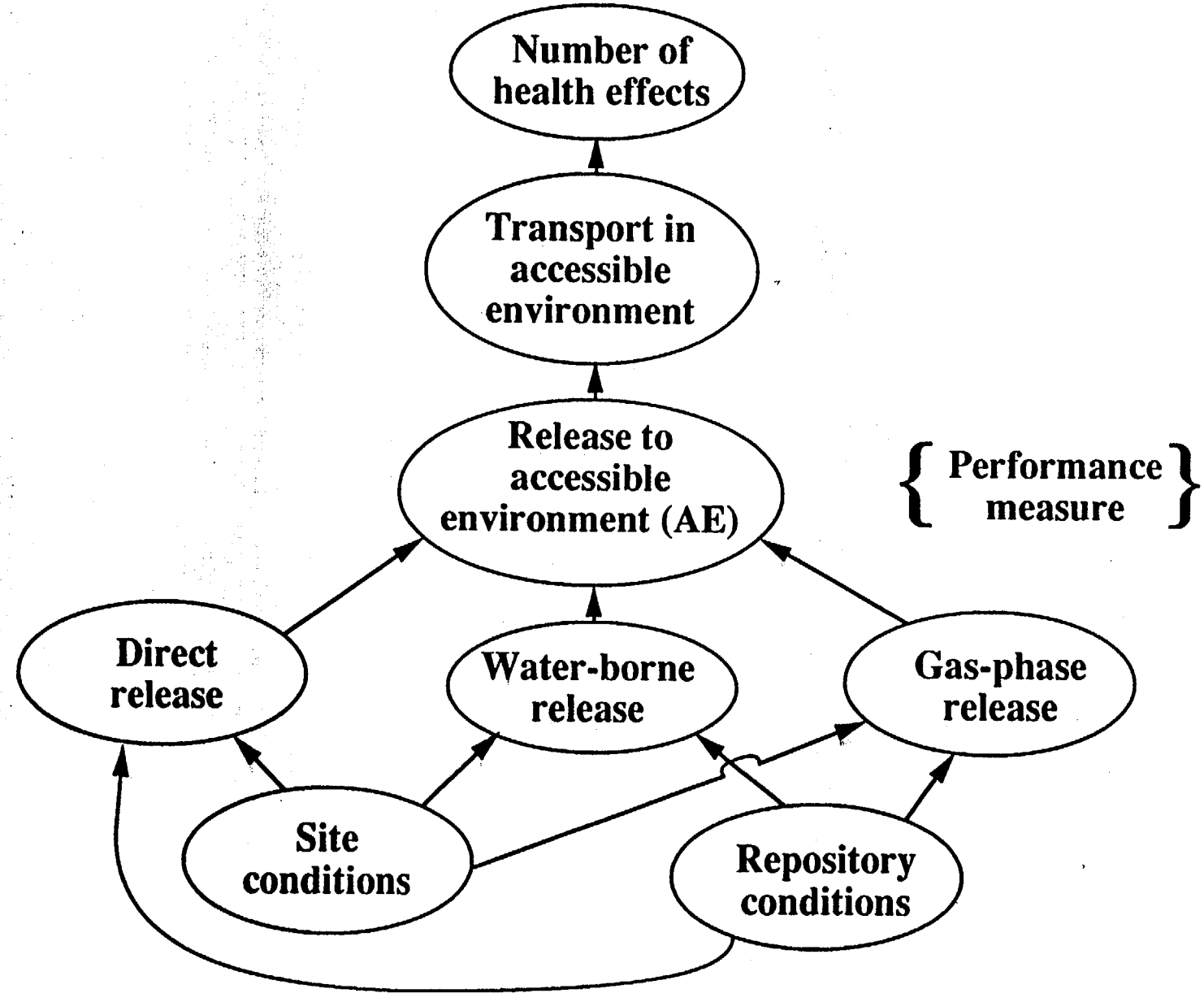


- ASSESSMENT OF OPTIONS
  - COST / SCHEDULE ESTIMATES
  - TEST COMPATIBILITY
  - OPERATIONAL EVALUATIONS
- PERFORMANCE EVALUATIONS OF FEATURES
- CORRELATION OF REQUIREMENTS

MECHANISM FOR PA SUPPORT OF ESF ALTERNATIVES



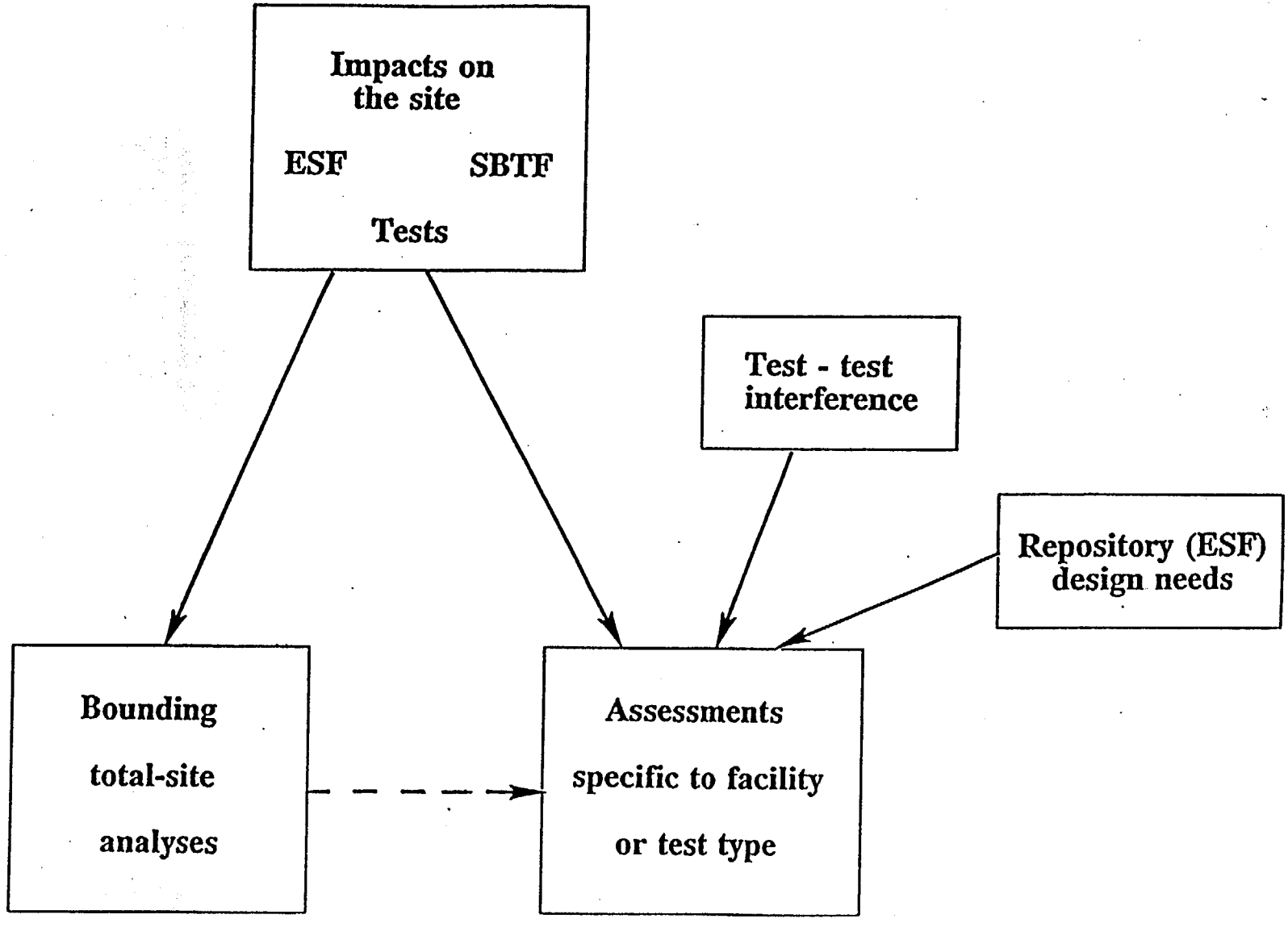
GENERAL FORM OF INFLUENCE DIAGRAM



PERFORMANCE-ASSESSMENT SUPPORT TO DESIGN REQUIREMENTS AND TEST CONTROL

- ESF Requirements Document
- Surface-Based Test Facility Requirements Document
- Control of Testing (T&EP and T&EPB)

SUPPORT TO REQUIREMENTS AND TESTING



DESIGN DEVELOPMENT

Repository design analyses

- **Allowable thermal loading**
- **Estimation of repository area requirements**
- **Effects of selected modeling assumptions (e.g., boiling) on thermal analyses**
- **Containment enhancement**
- **Location of boiling isotherm**

Preclosure safety, retrieval, and sealing analyses

Waste-package-development analyses (LLNL)

APPLICATIONS
Related Activities

Software quality assurance

Interactions with NRC, NWTRB, NAS, and other groups

Responses to NRC site-characterization analysis

Analyses in support of quality-assurance determinations

CONCEPTS AND MODELS
Performance-assessment development

Strategy and coordination

Scenario development

Total-system studies

Ground-water travel time: compliance, models

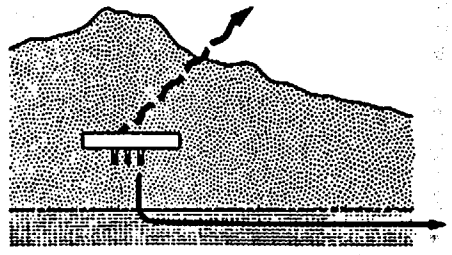
Validation of models

Development of codes

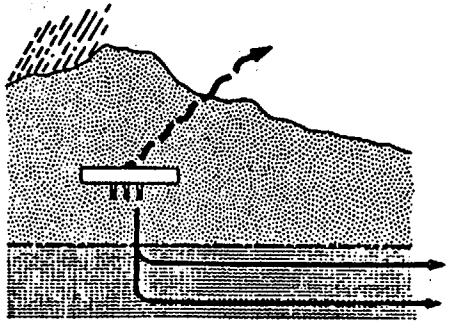
PACE

ASSESSING COMPLIANCE WITH THE EPA STANDARD

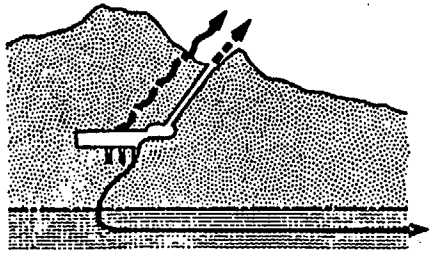
Scenario 1:



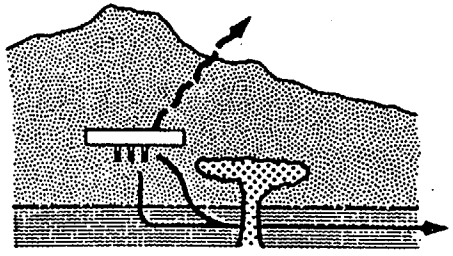
Scenario 2:



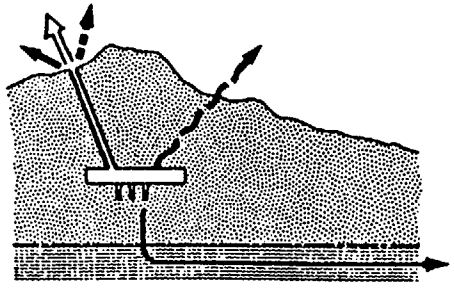
Scenario 3:



Scenario 4:



Scenario 5:



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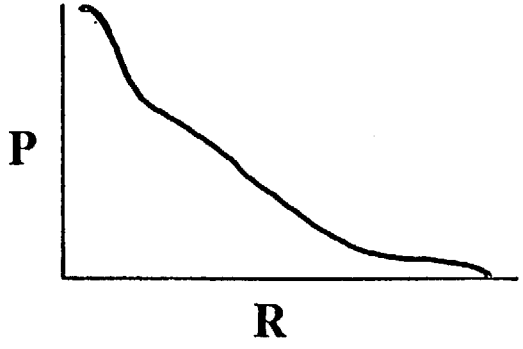
Scenario N

Complementary cumulative distribution function:



R = normalized value of radionuclide release over 10,000 years

P = probability that release exceeds R

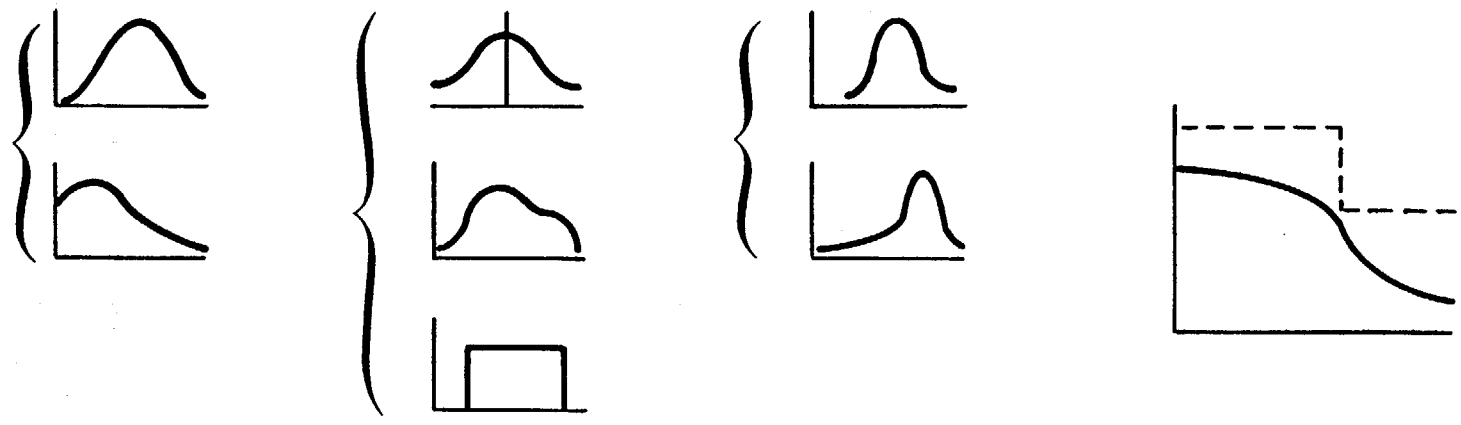
CURRENT SCENARIO DEVELOPMENT INCLUDES

- Nominal Flow System
- Human Intrusion
- Basaltic Volcanism
- Tectonism
- Climate Change
- Gas Release
- Other Human Activities
- Closure

TOTAL-SYSTEM STUDIES

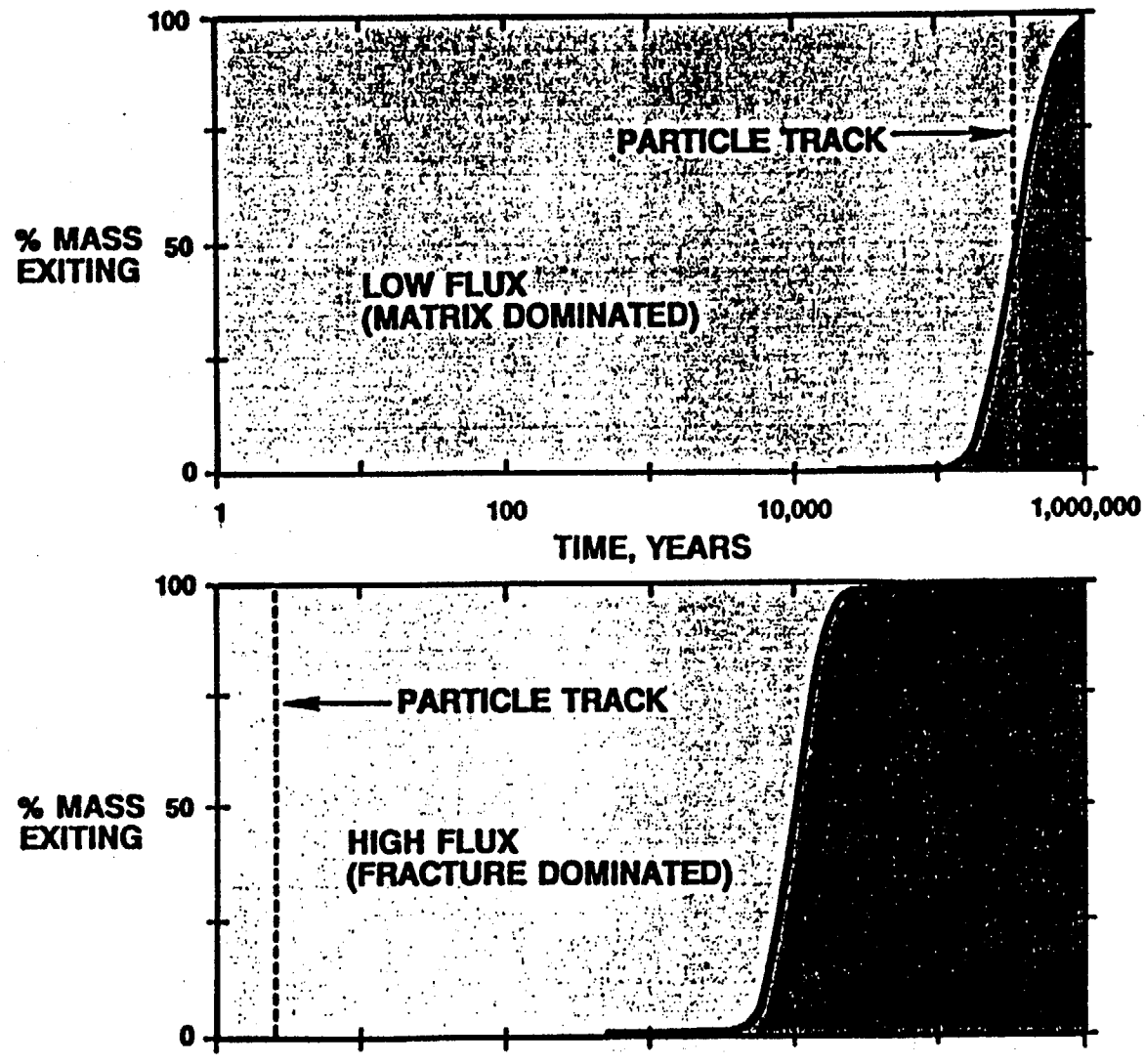
Models: Source + Flow + Transport ⇨ Releases

Parameters:



- Preliminary, simplified models
- Extension of earlier studies

INTERPRETATION OF GROUNDWATER TRAVEL TIME



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VALIDATION OF MODELS

Flow and transport

- **Laboratory**
- **Field**
- **Validation strategy**

Waste-package models

- **Experiments**

CODE DEVELOPMENT

Algorithms for flow and transport processes

Improving code efficiency

Software engineering

Code verification

- COVE-2A
- COVE-2B
- PACE-90
  - nominal
  - disturbed

PACE PARTICIPANTS

WG-1 (TOTAL-SYSTEMS)

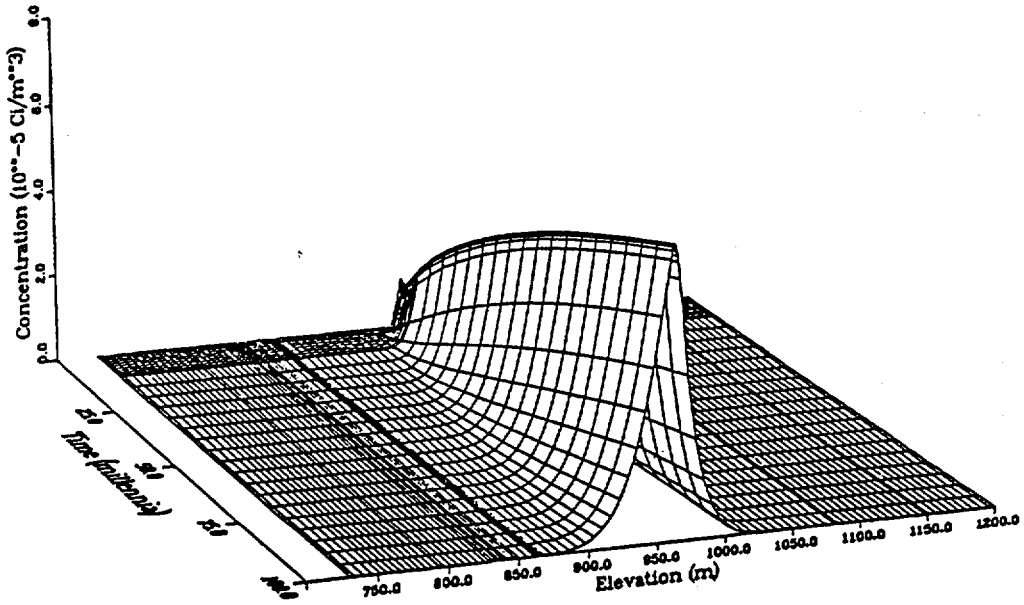
Participant	Hydrology Code	Transport Code	Dimensionality
PNL	SUMO	SUMO	2-D
LANL	TRACRN	TRACRN	1-D
SNL	TOSPAC	TOSPAC	1-D
SNL	DCM-3D	NEFTRAN	1-D
SNL	LLUVIA	LLUVA-S	1-D

WG-2 (SOURCE TERM)

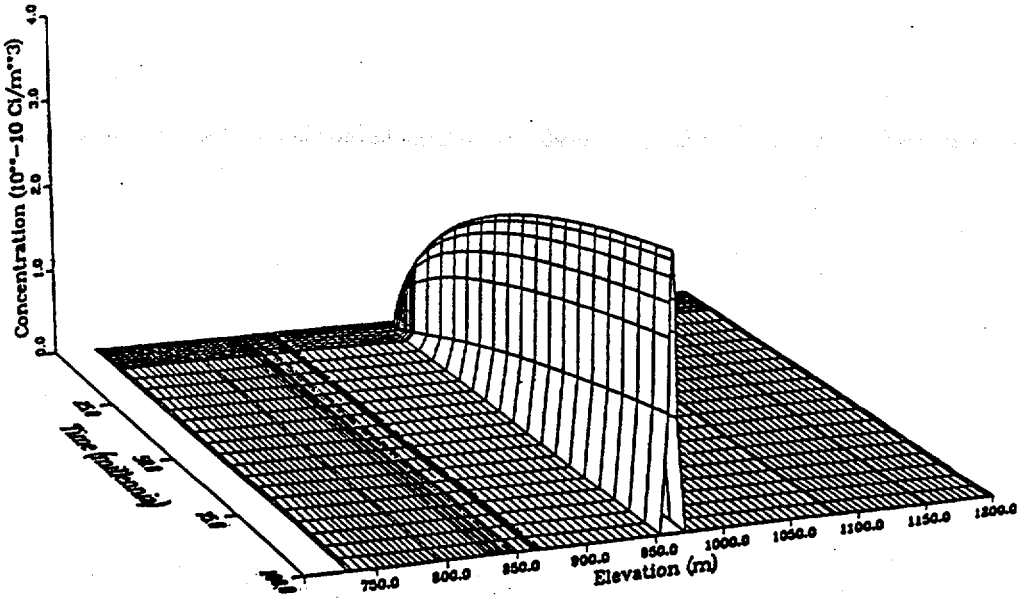
LLNL, PNL, UCB, LBL

EXAMPLE RESULTS FROM PACE 90

USW–G4 Stratigraphy; 0.01 mm/yr Flux
Moist–Continuous Source (Case 1)
I–129 Concentration in the Matrix Water



USW–G4 Stratigraphy; 0.01 mm/yr Flux
Moist–Continuous Source (Case 1)
Np–237 Concentration in the Matrix Water



CONCEPTS AND MODELS
Development of basic models

Models: Flow and transport

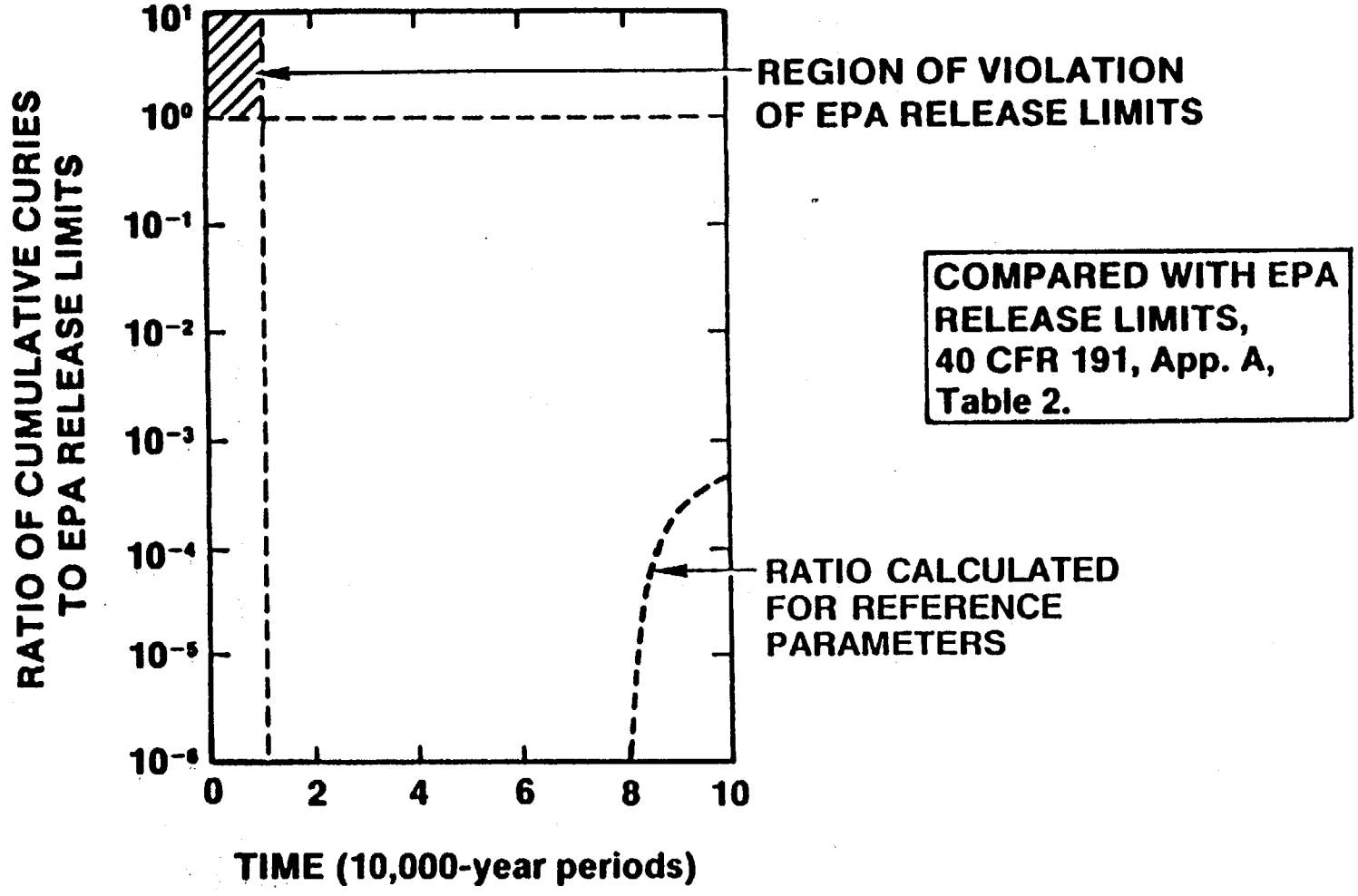
Geochemistry

Waste-package environment ("near field")

Waste-package behavior

Developers: LANL
LBL
LLNL
PNL
SNL
USGS

PRELIMINARY ESTIMATE OF CURIE DISCHARGE TO ACCESSIBLE ENVIRONMENT



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SUMMARY

The framework for performance assessment links ultimate regulatory compliance with system development, basing them on concepts and models derived from site information.

Descriptions of the current program are in the SCP, PASP, PAMP, and PAIP. But the description of the interactions among technical components needs to be strengthened.

The current effort emphasizes applications to support system development and the development of concepts and models.

Emphasis is now being given to stronger coordination and coupling of technical activities. The basic framework is being extended into a comprehensive road map.

TPO PRESENTATION

STATUS OF ESF ALTERNATIVES STUDY

PRESENTED BY

TED PETRIE

AUGUST 3, 1990

STATUS OF ESF ALTERNATIVE STUDY

- 17 OPTIONS HAVE BEEN IDENTIFIED FOR EVALUATION. GENERAL ARRANGEMENT DRAWINGS AND DATA SHEETS HAVE BEEN PREPARED.
- ALL REQUIREMENTS HAVE BEEN IDENTIFIED FOR USE IN EVALUATION OF OPTIONS.
- ALL INFLUENCE DIAGRAMS HAVE BEEN DEVELOPED BY EXPERT PANELS FOR USE IN EVALUATION OF OPTIONS.
- REQUIREMENTS HAVE BEEN CROSS-CORRELATED WITH THE INFLUENCE DIAGRAMS

(CONTINUED)

STATUS OF ESF ALTERNATIVES STUDY

- INPUT FROM THE CALICO HILLS STUDY WAS RECEIVED JUNE 30, 1990.
- GENERAL ARRANGEMENT DRAWINGS HAVE BEEN MODIFIED TO INCORPORATE CALICO HILLS RECOMMENDATION.
- DATA SHEETS ARE BEING UPDATED TO INCORPORATE CALICO HILLS RECOMMENDATION.
- INFLUENCE DIAGRAMS IMPACTED BY THE CALICO HILLS RECOMMENDATION ARE BEING RE-EVALUATED.

(CONTINUED)

STATUS OF ESF ALTERNATIVES STUDY

- SCORING OF OPTIONS HAS COMMENCED. SCORING OF KEY FACTORS WAS DELAYED PENDING INPUT FROM CALICO HILLS STUDY.
- FINAL SCORING WILL RECOMMENCE ON AUGUST 16, 1990.
- COMBINED OPTIONS WILL BE ANALIZED AND RANK ORDERED, AND A PREFERRED OPTION SELECTED.
- EVALUATION OF OPTIONS WILL CONSIDER OBTAINING EARLY ACCESS TO THE CALICO HILLS UNIT.

ESF ALTERNATIVES STUDY
INTERIM AND MAJOR MILESTONES

ACTIVITY NAME	ACTIVITY DESCRIPTION	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
YKO1M	ISSUE GUIDANCE		10/30																
YKO2M	COMPLETE IMPLEMENTATION PLAN				1/16														
YK0201	SNL COMPLETES DEF OF ESF/REP/TEST REQUIREMENTS					3/9													
YKO3M	MANAGEMENT REVIEW OF MAJOR OPTIONS IDENTIFIED						3/30												
YKO401	SNL COMPLETES FINAL SET OF ESF OPTIONS							4/30											
YKO402	SCORE OPTIONS 50% COMPLETE									6/11		E. 8/17							
YKO4M	DRAFT REVISION OF ESF REQUIREMENTS									6/29									
YKO501	SNL COMPLETES SENSITIVITY ANALYSIS										7/26		E. 11/12						
YKO502	SNL COMPLETES DRAFT REPORT ON ESF ALTERNATIVES												9/14		E. 12/7				
YKO503	SNL SUBMITS RECOMMENDATION TO DOE													10/12		E. 12/14			
YKO5M	RECOMMENDATION TO RW-1 ON SELECTION OF ESF CONFIG.														11/16		E. 1/15		
YKO6M	COMPLETE PRELIMINARY ALTERNATIVES REPORT														12/14		E. 1/31		
R6101	START FINAL ESF DESIGN																		3/30

△ DOE MILESTONE Ⓐ SECRETARY MILESTONE

ID	MILESTONE DESCRIPTION	REFERENCE DATE	FORECAST DATE	ACTUAL DATE
YKO1M	ISSUE GUIDANCE	30 OCT 89		30 OCT 89
YKO2M	COMPLETE IMPLEMENTATION PLAN	16 JAN 90		05 DEC 89
YKO3M	MANAGEMENT REVIEW OF MAJOR OPTIONS IDENTIFIED	30 MAR 90		30 MAR 90
YKO4M	DRAFT REVISION OF ESF REQUIREMENTS	29 JUN 90		14 JUN 90
YKO5M	RECOMMENDATION TO RW-1 ON SELECTION OF ESF CONFIGURATION	16 NOV 90	15 JAN 91	
YKO6M	COMPLETE PRELIMINARY ALTERNATIVES REPORT	14 DEC 90	31 JAN 91	
R6101	START FINAL ESF DESIGN	30 MAR 91	30 MAR 91	

TPO PRESENTATION

PROTOTYPE DRILLING

PRESENTED BY

UEL S. CLANTION

AUGUST 3, 1990

LM-300 ACCEPTANCE TEST

CRITERIA	CONTRACT SPECIFICATION	TEST
PULL BACK	238,500 lbs.	260,022 lbs.
PULL DOWN	30,000 lbs.	31,075 lbs.
TORQUE	250,000 in-lbs. ±21,000	262,262 in-lbs. 22,000 [illegible]

PIPE HANDLING SYSTEM STATUS

- RFP TO LANG EXPLORATORY DRILLING — JULY 1990
- TECHNICAL RESPONSE EXPECTED — 15 AUGUST 1990
- COST RESPONSE EXPECTED — 31 AUGUST 1990

3.2 mil Const.

PIPE HANDLING SYSTEM / LM-300 TEST

- 1000 TO 1500 FT HAMMER HOLE IN THE SLC AREA
  - 10 TO 15 DAYS
  - TEST OF THE RIG DRILLING
  - TEST OF THE PIPE HANDLING SYSTEM
- 2000 ft ± PROTOTYPE BOREHOLE AT APACHE LEAP
  - 12 1/4 in. BIT WITH 9 5/8 in. DRILL STRING
  - CORE WITH CHD 101 SYSTEM
  - CORE FULL DEPTH
  - FULL SUITE OF GEOPHYSICAL LOGS DRY, REPEAT WET

U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

Presentation to
Technical Project Officers

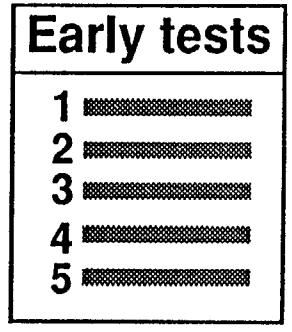
Prioritization of Surface-based Testing

August 3, 1990

The task force has three primary goals

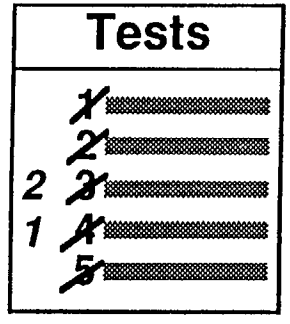
1. **Develop an explicit decision analysis method to prioritize surface-based testing in the inital phase of site investigation**

   Ensure early investigation of potentially adverse conditions and EEI, NRC, and State of Nevada concerns



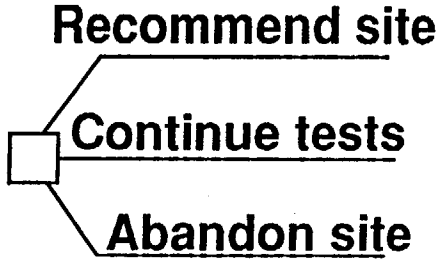
2. **Recommend methods to re-prioritize testing at any point during site characterization**

   Include a method for deciding when to stop testing



3. **Recommend a draft method to assess site suitability at any point during site characterization**

   The method should be consistent with Goals 1&2



Our task force includes broad representation from project participants

Core Team

Dr. Steven Mattson (SAIC, team lead)
Dr. Bruce Judd (Decision Analysis Co.)
Dr. William Wilson (USGS)
Martha Pendleton (SAIC)
Dr. Scott Sinnock (SNL)
Dr. Robert Gamble (Weston)
August Matthusen (SAIC)

DOE Oversight and Management

Dr. J. Russell Dyer (YMP)
Dr. Jeffrey Kimball (HQ)
Dr. Jeremy Boak (YMP)
Scott Van Camp (HQ)

Technical and Regulatory Experts Available through Organizations

LANL, LLNL, ORNL, PNL, USGS , LBL, UCB, consultants

Over 60 individuals have participated to date

We will produce reports, recommendations, and products consistent with our implementation plan

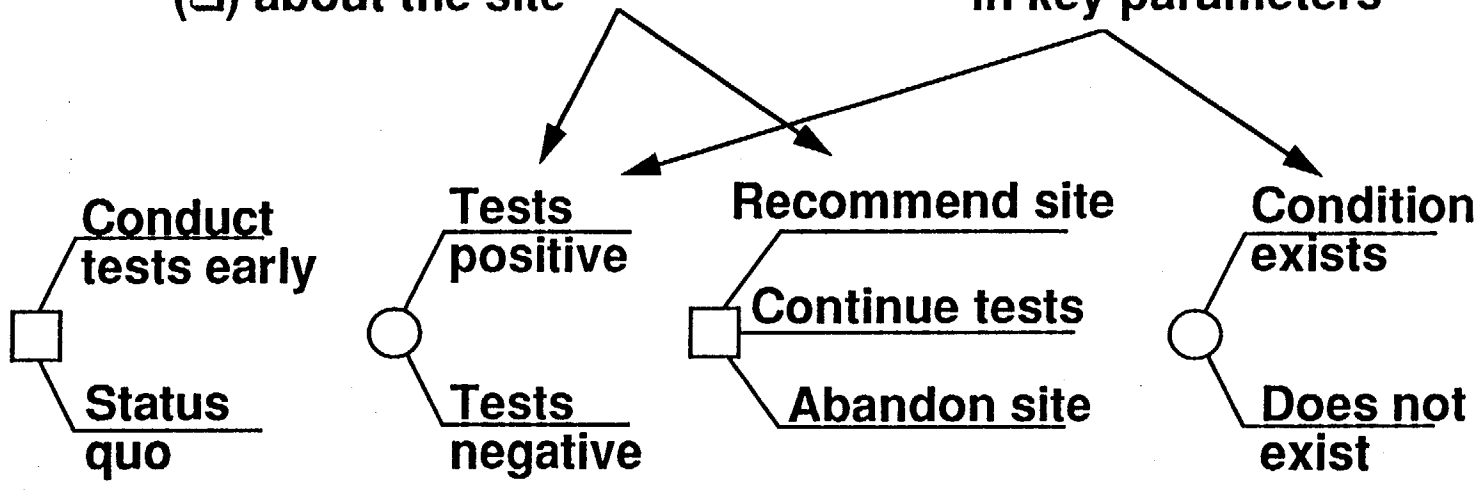
Report	Date(s)
Intermediate status briefings	May 10, Aug 3, Oct 19
Letter reports	May 14, Jun 9
Final recommendations and report	Sep 28
Approval by RW-1	Nov 9

Approximately two months behind schedule

We have developed a systematic, analytic method to assess the priority of surface-based tests

Features of the Method:

- Gives priority to tests that can *improve* DOE decisions (❑) about the site
- Gives priority to tests that can *reduce* uncertainty (○) in key parameters



❑ Decision ○ Uncertainty

Our evaluation of possible site-suitability methods comprises three primary tasks

Project Tasks

1) Identify possible suitability-assessment methods to be evaluated
   - Suitability criteria (requires management input)
   - Timing options
   - Analysis techniques

2) Evaluate the feasibility and defensibility of the methods

3) Recommend promising methods to DOE management

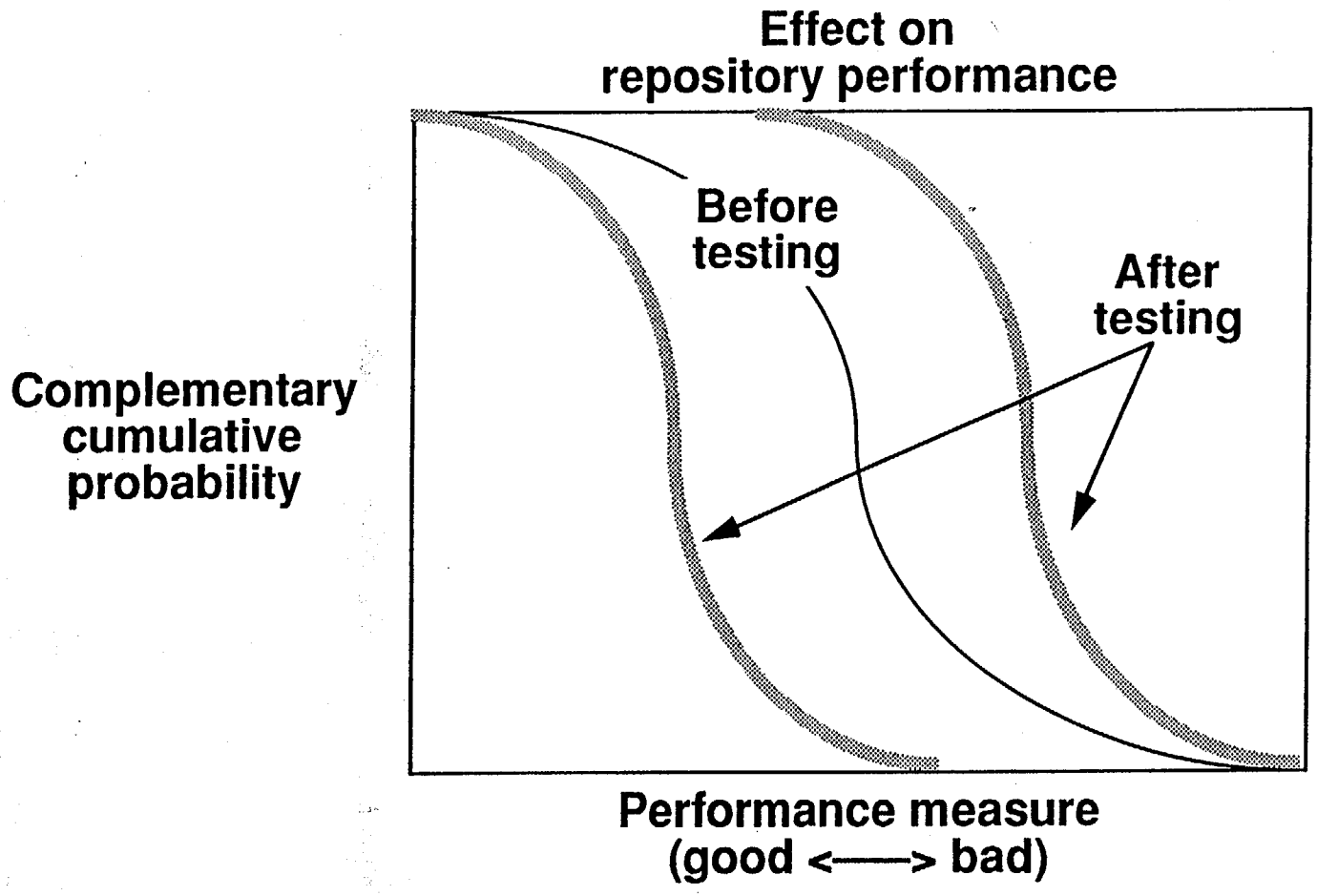
We have begun Task 1 of this effort

Various performance measures and related suitability criteria could be considered

- Postclosure performance
  - Total system releases
  - EBS release rate
  - Waste package containment
  - Ground-water travel time
- Feasibility
  - Siting and construction
  - Operation and closure
  - Retrievability
- Cost
- Other
- Preclosure radiological safety
  - Public exposure
  - Off-site releases
  - Worker exposures
- Other preclosure impacts
  - Environment
    - Protection
    - Mitigation
  - Socioeconomic
    - Mitigation
    - Compensation
  - Transportation
    - Public risks
    - Feasible routes

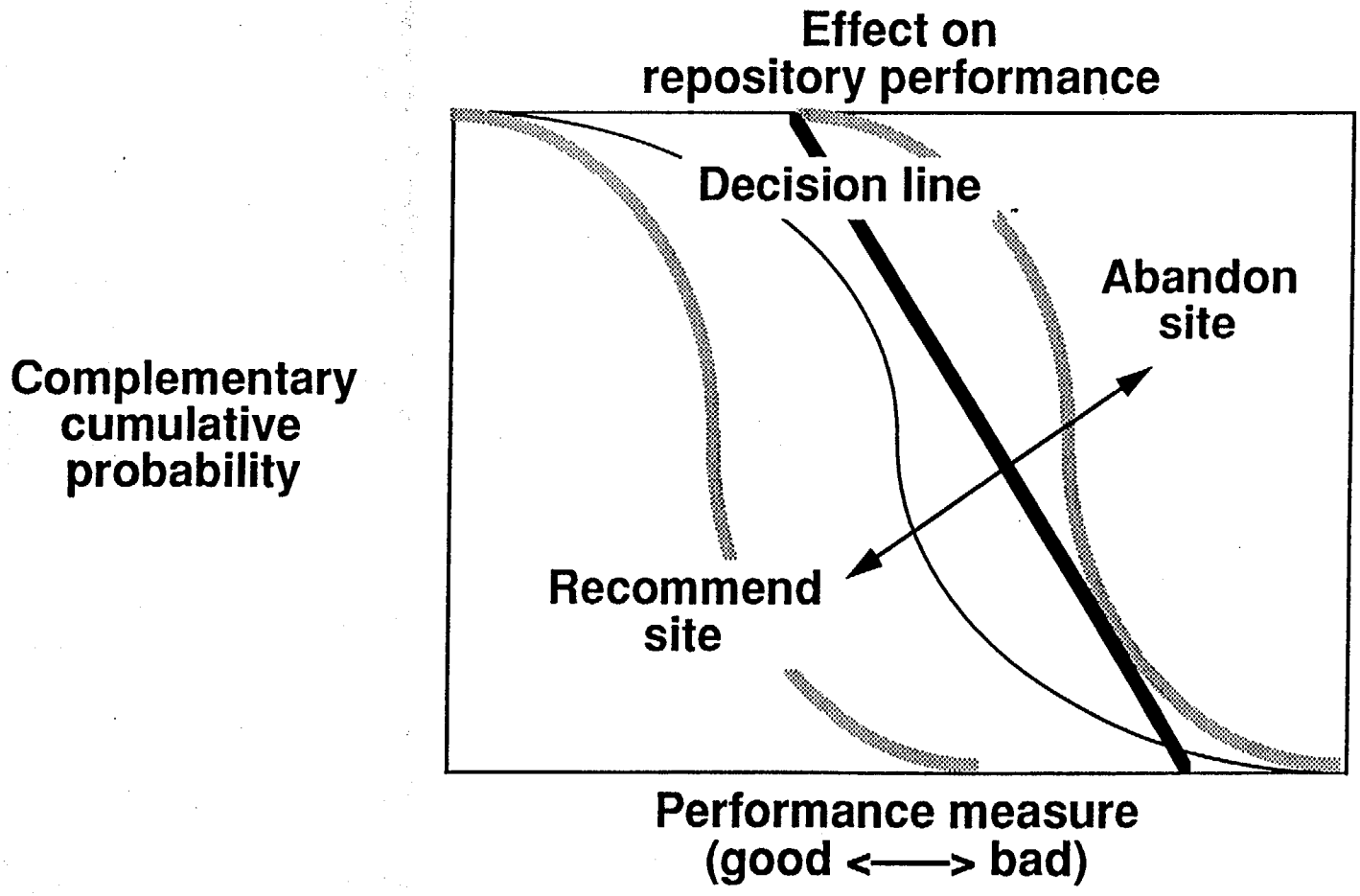
Selection of the measures and criteria depends on DOE management's definition of site suitability

We evaluate test benefits based on potential effects on repository "total system" performance



After testing, performance is less uncertain but is either better or worse than before testing

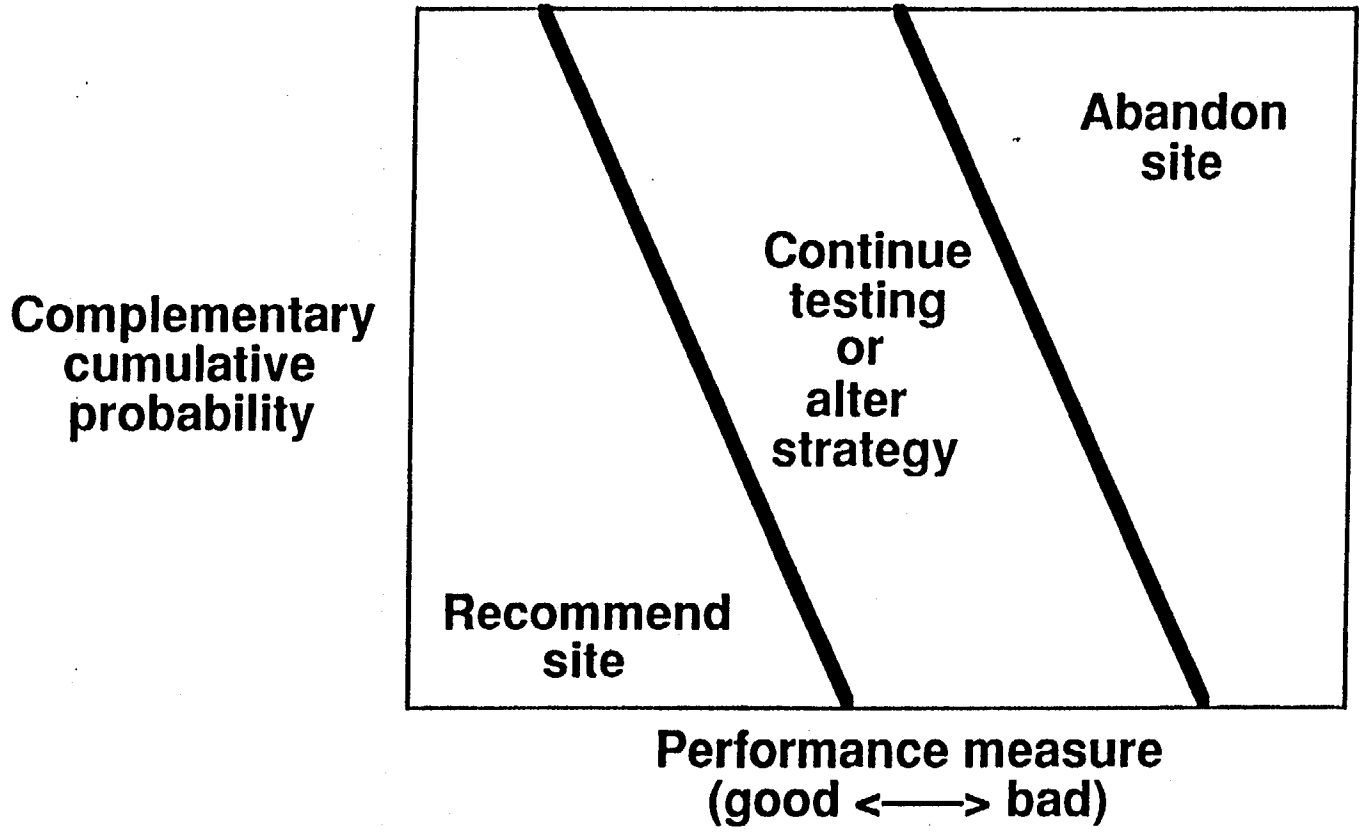
We then consider the effects of testing on repository decision making



Testing costs and schedules are considered after analyzing decision impacts

One analytic approach is to expand the test-prioritization method to address broader alternatives and criteria

Illustrative site-suitability policy diagram



This is useful when testing activities affect probabilistic suitability criteria such as postclosure system performance