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OCT 13 1982

MEMORANDUM FOR: Those on Attached List
FROM: Hubert J. Miller, Chief
High-Level Waste Technical
Development Branch
Division of Waste Management
SUBJECT: NRC SITE CHARACTERIZATION ANALYSIS PLANS

WM-10
PDR
(Return to WM, 623-SS)

Attached for your information and use is the briefing package describing the high-level waste program plans for site characterization report reviews delivered in the briefing of October 12, 1982.

We welcome any questions or comments on this briefing package.

APPROVED AND SIGNED BY
Hubert J. Miller

Hubert J. Miller, Chief
High-Level Waste Technical
Development Branch
Division of Waste Management

Enclosure:
Site Characterization Briefing
Package

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NAME :	HJMILLER:1s	:	:	:	:	:	00072
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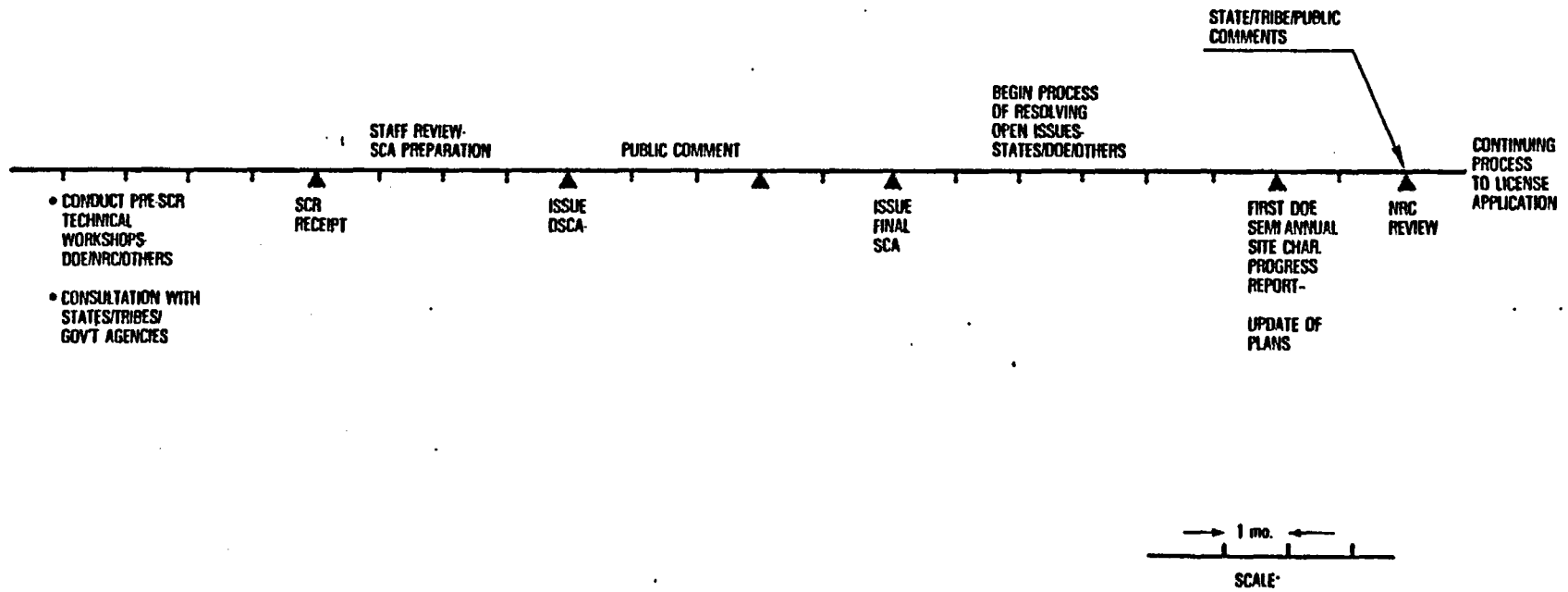
NRC HIGH LEVEL WASTE LICENSING
SITE CHARACTERIZATION REVIEW PROCESS

OCTOBER

~~SEPTEMBER~~ 1982

BRIEFING OF NRC
STAFF OCT 12, 82

SITE CHARACTERIZATION REVIEW PROCESS



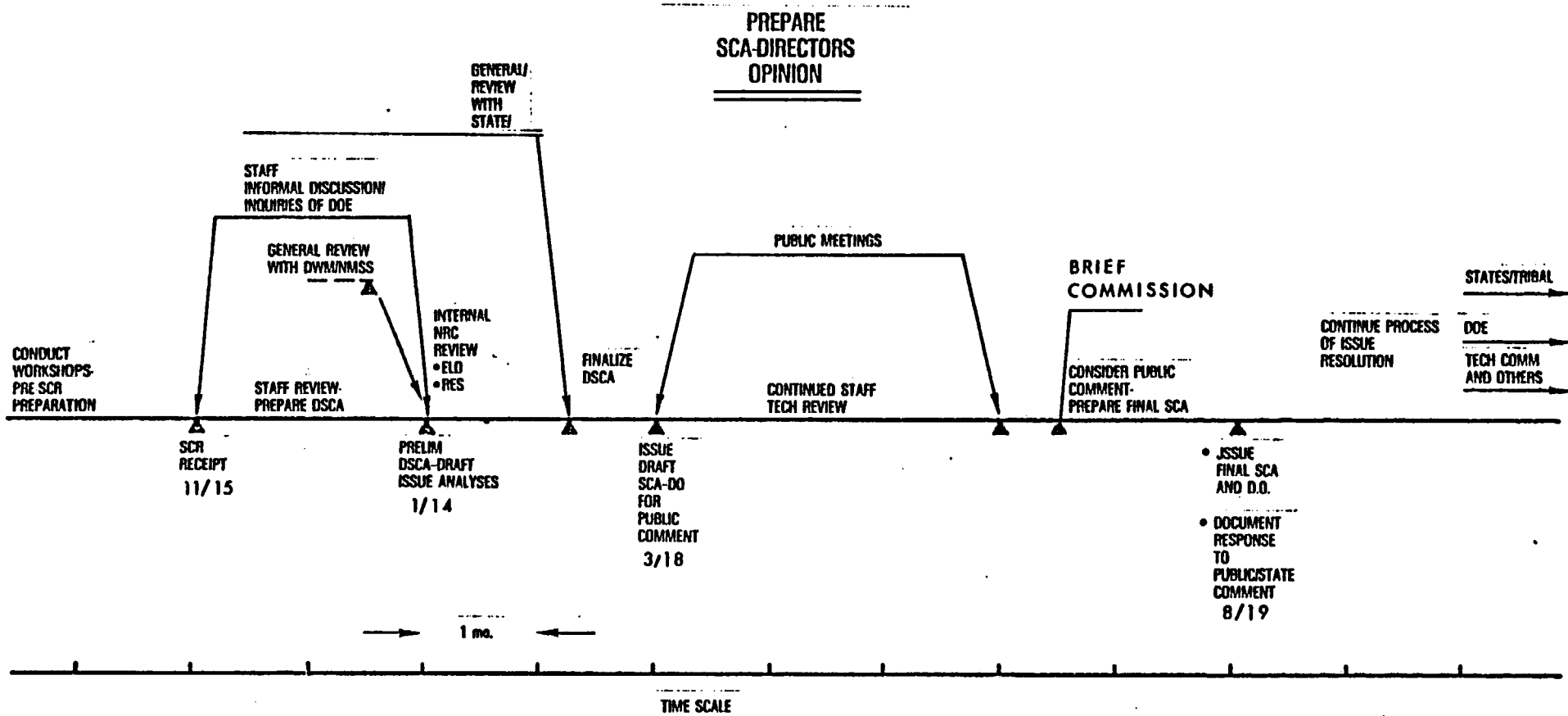
SCA PREPARATION
QUESTIONS ABOUT APPROACH

- 0 HOW TO COMPLETE REVIEW AND CRITIQUE OF 1800 PAGE SCR IN ONLY SEVERAL MONTHS

- 0 PUBLIC EXPECTATIONS -
 - UNDERSTANDING OF SCR REVIEW AS BEGINNING OF PROCESS
 - HOW TO DEMONSTRATE TO SKEPTICAL READER THOROUGHNESS OF NRC REVIEW

- 0 HOW TO HANDLE PUBLIC COMMENTS

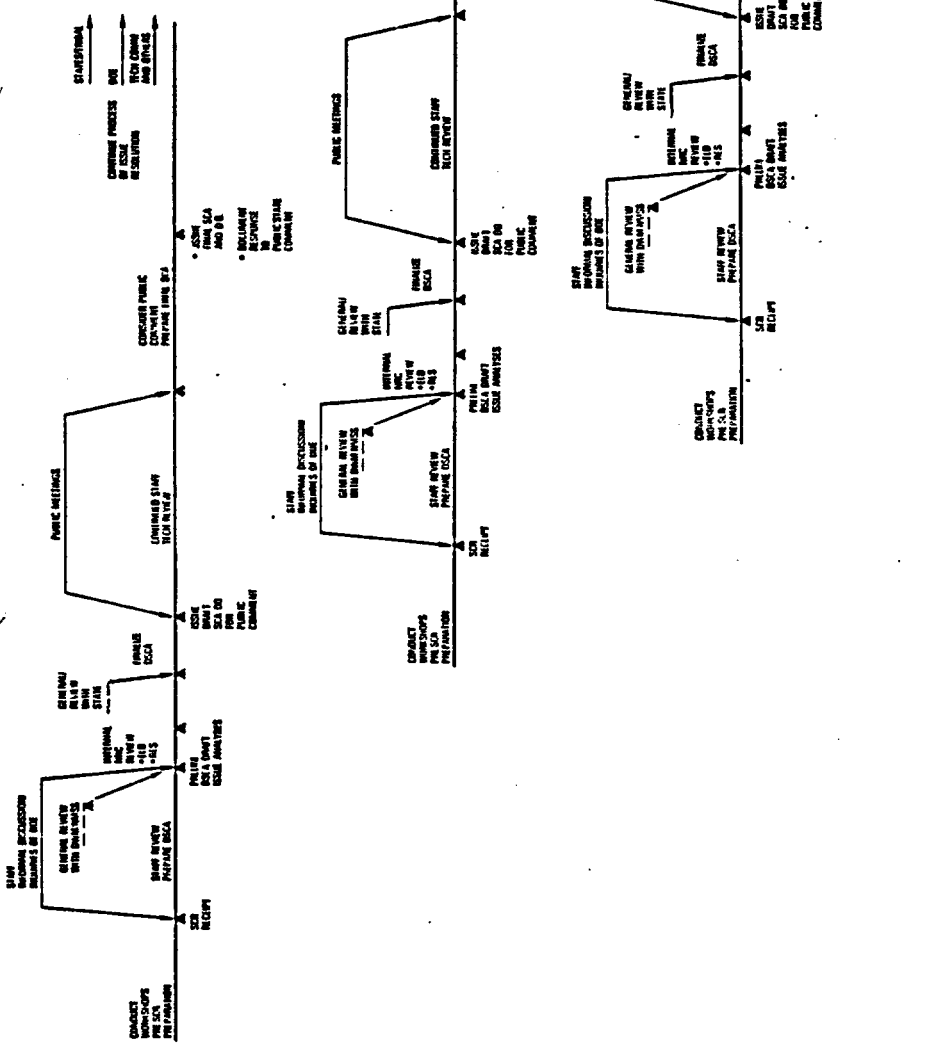
- 0 HOW TO HANDLE INSTITUTIONAL AND NEPA ISSUES?
 - 0 SITE SELECTION
 - 0 ALTERNATIVE SITES
 - 0 SCOPING OF GENERAL ENVIRONMENTAL IMPACTS



BWIP

NTS

SALT



Sept. Oct. Nov. Dec. Jan. Feb. March April May June

1982

1983

1984

7

SITE CHARACTERIZATION
ANALYSIS PRODUCTS

- 0 SITE CHARACTERIZATION ANALYSIS (SCA) AND DIRECTORS OPINION (DO)
 - o PUBLISHED AS NUREG
 - o CRITIQUE FOCUSING ON MAJOR CONCERNS/COMMENTS
 - o COMMENT ON BASIC THRUST AND STRATEGY OF DOE PROGRAM
 - o BRIEF - 50 PAGE TEXT
 - o READER MUST REFER TO SCR FOR DETAILS
 - o EXTENSIVE USE OF SUMMARY TABLES
- 0 SCA APPENDICES
 - o DETAILED TECHNICAL SUPPORT FOR SELECTED ASPECTS OF REVIEW
 - o CONTAINED IN NUREG DOCUMENT
- 0 SITE ISSUE ANALYSIS
 - o DETAILED TREATMENT OF ALL ISSUES
 - o AVAILABLE IN PUBLIC DOCUMENT ROOM
- 0 REFERENCES
 - o SELECTED KEY TECHNICAL AREAS ADDRESSED IN DETAILED TECHNICAL REPORTS
 - o EXAMPLES
 - o IN-SITU TESTING - GOLDER ASSOCIATES REPORT
 - o HYDROGEOLOGIC INVESTIGATIONS - LBL
 - o GEOCHEMISTRY INVESTIGATIONS - LBL

SOME KEY DEFINITIONS

o POTENTIAL LICENSING ISSUES

- QUESTION THAT MUST BE APPLICABLE ANSWERED OR RESOLVED TO COMPLETE LICENSING ASSESSMENTS OF SITE AND DESIGN SUITABILITY IN TERMS OF 10 CFR 60 PERFORMANCE OBJECTIVES AND REQUIREMENTS, AND TO MAKE NEPA FINDINGS.
- QUESTION ABOUT APPLICABLE PROCESSES/CONDITIONS/SITE FEATURES
- WHAT ARE MAJOR OR CRITICAL PATH ISSUES WILL CHANGE WITH TIME.
- DEFINITION IS NOT A FUNCTION OF DEGREE OF CONTROVERSY (UNLIKE RHO DEFINITION).

o DATA GATHERING AND ASSESSMENT ISSUES

- QUESTIONS OF DATA GATHERING AND ASSESSMENT METHODS AND DATA QUALITY ARE ISSUES -- NOT MIXED WITH LICENSING QUESTIONS.

o NRC CONCERN/COMMENT/OPINION

- AVOID CONFUSION BY NOT CALLING NRC COMMENTS ON DOE PROGRAM "ISSUES".

OUTLINE OF DRAFT SCA

	<u>NO. OF PAGES</u>
EXECUTIVE SUMMARY	3
DIRECTOR'S OPINION	6
1. INTRODUCTION - DESCRIPTION OF LICENSING AND SITE CHARACTERIZATION PROCESS	3
2. DESCRIPTION OF SITE AND CONCEPTUAL DESIGN	4
3. SITE SELECTION PROCESS	4
4. GROUNDWATER FLOW	6
5. GEOLOGIC STABILITY	4
6. GEOCHEMICAL RETARDATION	4
7. DESIGN OF FACILITIES	6
8. WASTE PACKAGE	4
9. INSTITUTIONAL AND ENVIRONMENTAL FACTORS	4
10. QUALITY ASSURANCE PROGRAM	3
11. SUMMARY OF NRC CONCERNS/COMMENTS/OPEN ITEMS	5
APPENDICES	100
0 DETAILED SYSTEMATIC TABULATION/EVALUATION OF SCR ISSUES	
0 SITE UNCERTAINTY AND SENSITIVITY ANALYSIS	
0 OTHER SELECTED DETAILED TEAM EVALUATIONS	
0 10 CFR 60	

SITE CHARACTERIZATION
ANALYSIS

- 0 BEGINS PROCESS -- NOT AN END POINT

- 0 MINIMUM REQUIRED:
 - 0 ASSURE MAJOR ISSUES AND ASSOCIATED LICENSING INFORMATION NEEDS IDENTIFIED
 - 0 COMMENT ON MAJOR THRUST AND STRATEGY OF DOE PLANS
 - 0 COMMENT ON DETAILED PLANS FOR ANY INVESTIGATIONS NOW ON CRITICLE PATH FOR LICENSING
 - 0 OPEN ITEMS IDENTIFIED FOR CONTINUED FOLLOW-UP DISCUSSION

- 0 LEVEL OF DETAIL IS MAJOR VARIABLE
 - 0 BROAD TEST STRATEGY
 - 0 TEST METHODS AND TECHNIQUES
 - 0 TEST AND DATE ANALYSIS PROCEDURES

- 0 REACHING OF CONSENSUS ON DETAILS OF ALL S.C. PLANS NOT REQUIRED AT THIS TIME
 - 0 INVESTIGATIONS HAVE DIFFERENT LEAD TIMES

DIRECTOR'S OPINION

0 10CFR60.11(e)

"Included in the final site characterization analysis shall be either an opinion by the Director that he has no objection to the DOE's site characterization program, if such an opinion is appropriate, or specific objections of the Director to DOE's proceeding with characterization of the named site."

0 FORMAT OF DIRECTOR'S OPINION - TWO PARTS

0 ISSUES

0 PLANS

0 ILLUSTRATIVE WORDING

"DIRECTOR HAS NO OBJECTIONS TO DOE'S PROCEEDING WITH CHARACTERIZATION OF THE HANFORD SITE SUBJECT TO THE FOLLOWING COMMENTS OF NRC STAFF":.....

0 ADEQUACY AND COMPLETENESS OF THE STATEMENT OF ISSUES

0 ADEQUACY OF DOE PLANS FOR ISSE RESOLUTION

SITE ISSUE ANALYSIS

- 0 PREPARED FOR ALL ISSUES
- 0 DEVELOPMENT BEGINS PRIOR TO SCR RECEIPT
- 0 BRIEF-2 PAGES, WITH DETAILED TECHNICAL BACKUP MATERIAL
- 0 SENT TO PUBLIC DOCUMENT ROOM
- 0 SITE-SPECIFIC CONTENTS
 - STATEMENT AND IMPORTANCE OF ISSUE
 - APPLICABLE SECTIONS OF 10 CFR 60
 - SUMMARY OF PRESENT STATE OF KNOWLEDGE, WITH ANALYSIS OF UNCERTAINTIES
 - SUMMARY OF INFORMATION NEEDED TO RESOLVE ISSUE
 - SUMMARY OF PLANS FOR INVESTIGATIONS AND TESTS TO ACQUIRE INFORMATION
 - EVALUATION OF PLANS FOR COMPLETENESS, PRACTICALITY AND LIKELIHOOD OF SUCCESS

APPENDIX C

NOTE: SEE "SUPPLEMENTARY MATERIAL" ATTACHED FOR ELABORATION ON APPENDIX SCOPE, ORGANIZATION AND APPROACH

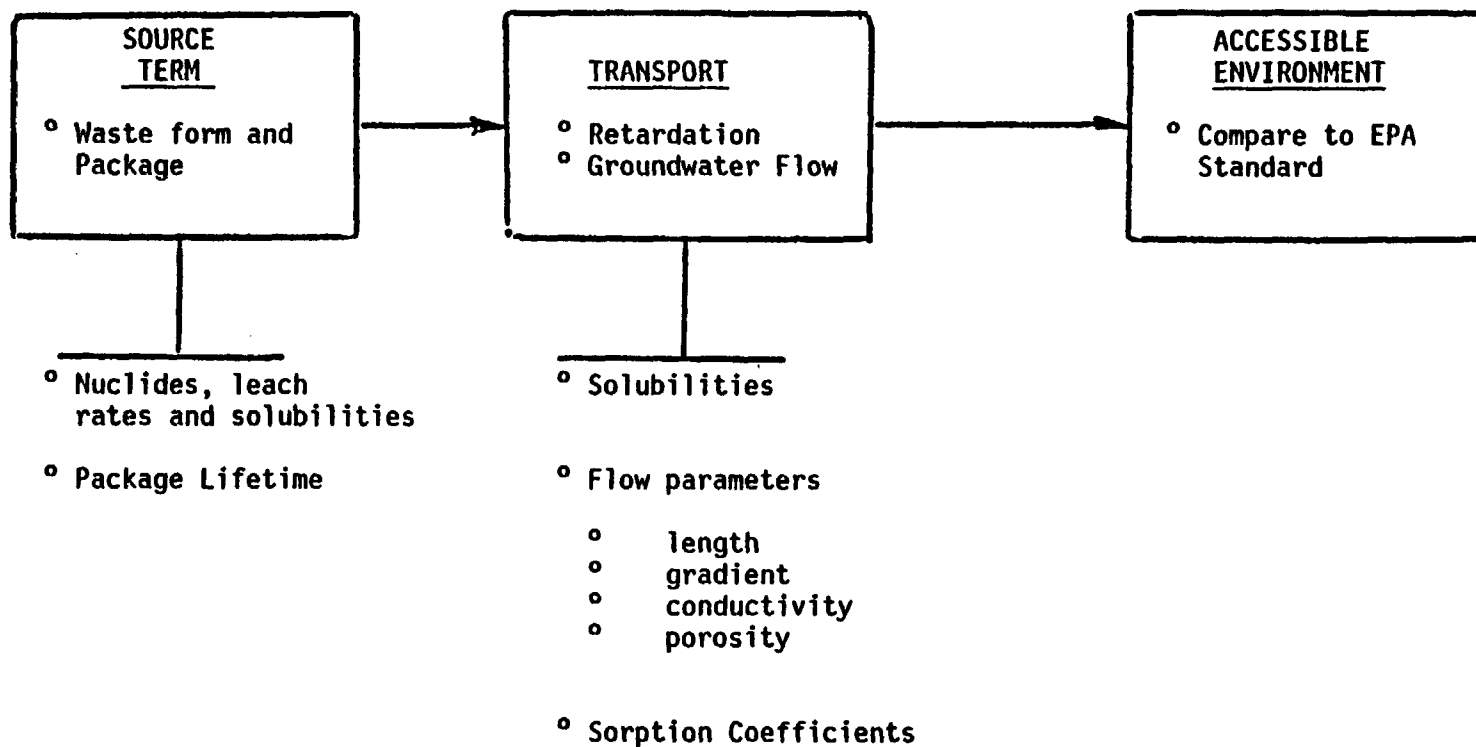
o PURPOSE

- COMPREHENSIVE AND SYSTEMATIC IDENTIFICATION OF NRC ISSUES
- COMPARISON OF NRC AND DOE/RHO ISSUES
- CROSS REFERENCING BETWEEN NRC AND DOE/RHO ISSUES

o CONTENT

- IDENTIFICATION OF NRC ISSUES
 - o GENERAL APPROACH AND PRINCIPLES
 - o LOGIC FRAMEWORK
 - o ISSUE IDENTIFICATION PROCESS
 - o COMPREHENSIVE BREAKDOWN OF NRC ISSUES
 - o NUMBERED BREAKDOWN OF ISSUES FOR SITE ISSUES ANALYSIS
- COMPARISON OF NRC AND DOE/RHO ISSUES
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 - o NUMBERED BREAKDOWN OF DOE/RHO ISSUES AND WORK ELEMENTS (CROSS REFERENCE TO NRC ISSUE NO.)
 - o ISSUE COMPARISON TABLE
 - o COMPARISON RESULTS

APPENDIX D-
SENSITIVITY STUDY



SITE CHARACTERIZATION REPORT
10CFR60 REQUIREMENTS
(SECT. 60.11)

- 0 DESCRIPTION OF SITE TO BE CHARACTERIZED
- 0 CRITERIA USED TO ARRIVE AT CANDIDATE AREA
- 0 METHOD BY WHICH SITE WAS SELECTED FOR SC
- 0 IDENTIFICATION OF ALTERNATIVE MEDIA AND SITES WHERE
DOE INTENDS TO CONDUCT SC
- 0 DECISION PROCESS BY WHICH SITE WAS SELECTED - INCLUDING
PUBLIC, INDIAN TRIBAL AND STATE VIEWS
- 0 DESCRIPTION OF SC PROGRAM
 - EXTENT OF PLANNED EXCAVATION AND PLANS FOR IN SITU TESTING
 - REPOSITORY CONCEPTUAL DESIGN
 - SAFETY CONTROL PROGRAMS
 - ALL SC PLANS (IN SOME LEVEL OF DETAIL) FOR GENERATING
INFORMATION REQUIRED FOR FULL 10CFR60 LICENSE REVIEW
- 0 DESCRIPTION OF QUALITY ASSURANCE PROGRAM
- 0 ANY OTHER ISSUES DOE WISHES NRC TO REVIEW

ALTERNATIVE SITES/SITE SELECTION
NRC SCA APPROACH

0 ALTERNATIVE MEDIA AND SITES

- 0 GENERAL REVIEW TO ASSESS THAT DOE IS DEVELOPING "SLATE OF CANDIDATE SITES THAT ARE AMONG THE BEST THAT CAN REASONABLY BE FOUND" (46 FR 13973)
- 0 GENERAL REVIEW TO SPOT ANY OBVIOUS, MAJOR PROBLEMS
- 0 DETAILED REVIEW OF ALTERNATIVE SITES TO BE COMPLETED IN REVIEW OF SCR FOR EACH SITE
- 0 NOT EVALUATING TO ASSURE "BEST SITE" IS SELECTED

0 SITE SELECTION

- 0 USING DOE SITING PLAN FRAMEWORK, REVIEW SELECTION FROM AMONG:
 - 0 OTHER FED-OWNED LANDS
 - 0 OTHER SITES WITHIN PASCO BASIN
- 0 REVIEW SELECTION OF COLD CREEK SYNCLINE
 - 0 CRITERIA
 - 0 SPECIFIC METHODS OF EVALUATION
- 0 REVIEW IN TERMS OF FOLLOWING FACTORS:
 - 0 TECHNICAL - E.G., SEISMIC AND GEOLOGIC ANOMALIES
 - 0 ENVIRONMENTAL
 - 0 INSTITUTIONAL

**OPPORTUNITY FOR
STATE PARTICIPATION
(10CFR60 - SUBPART C)**

- 0 GOVERNOR MAY MAKE FORMAL PROPOSAL ON STATE PARTICIPATION AFTER DOE HAS SELECTED A SITE FOR SITE CHARACTERIZATION**

- 0 NRC STAFF MAY BE REQUESTED TO PROVIDE CONSULTATION**
 - NRC FORMAL NOTICE OF OPPORTUNITY GIVEN AFTER RECEIPT OF SCR**

 - AVAILABLE TO STATE, TRIBAL, & LOCAL REPRESENTATIVES UPON REQUEST FROM STATE**

- 0 NRC MUST RESPOND TO WRITTEN STATE, TRIBAL, AND LOCAL GOVERNMENT COMMENTS AND QUESTIONS AS APPROPRIATE**

- 0 AFFECTED INDIAN TRIBES HAVE SAME OPPORTUNITIES AS STATES**

WMHT
◦ Hydrology
◦ Geology
◦ Facility Design

WMHL
◦ Performance assessment
◦ Waste Form and Package
◦ Special Projects

WMPI
◦ State Participation
◦ Licensing Assistance

PROJECTS
◦ BWIP
◦ NTS

TEAM 1
GROUNDWATER
FLOW

TEAM 2
WASTE FORM/
WASTE PACKAGE

TEAM 3
RETARDATION

TEAM 4
REPOSITORY
DESIGN

TEAM 5
STABILITY

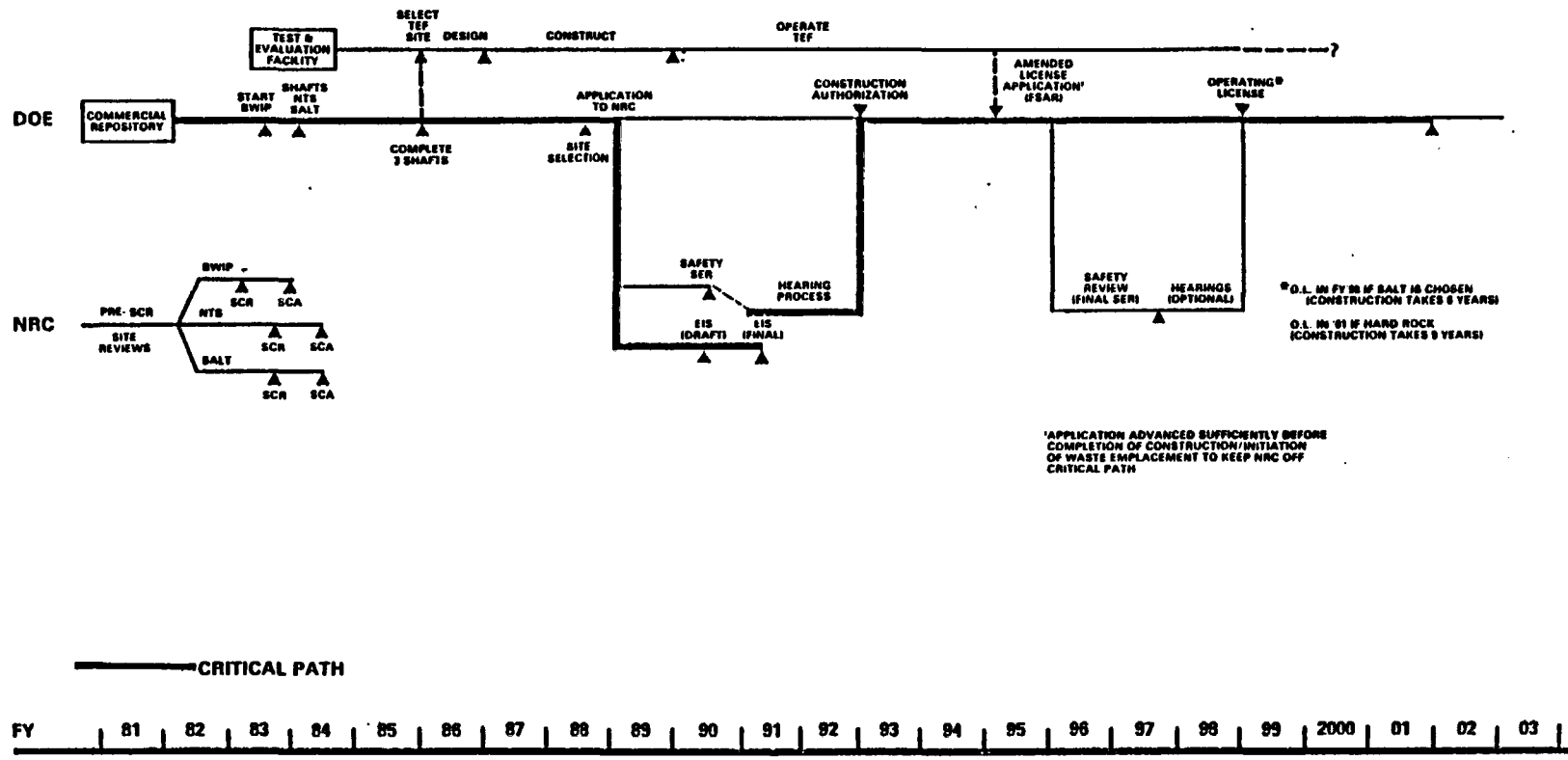
TEAM 6
INSTITUTIONAL
CONCERNS

SUPPLEMENTARY
MATERIAL

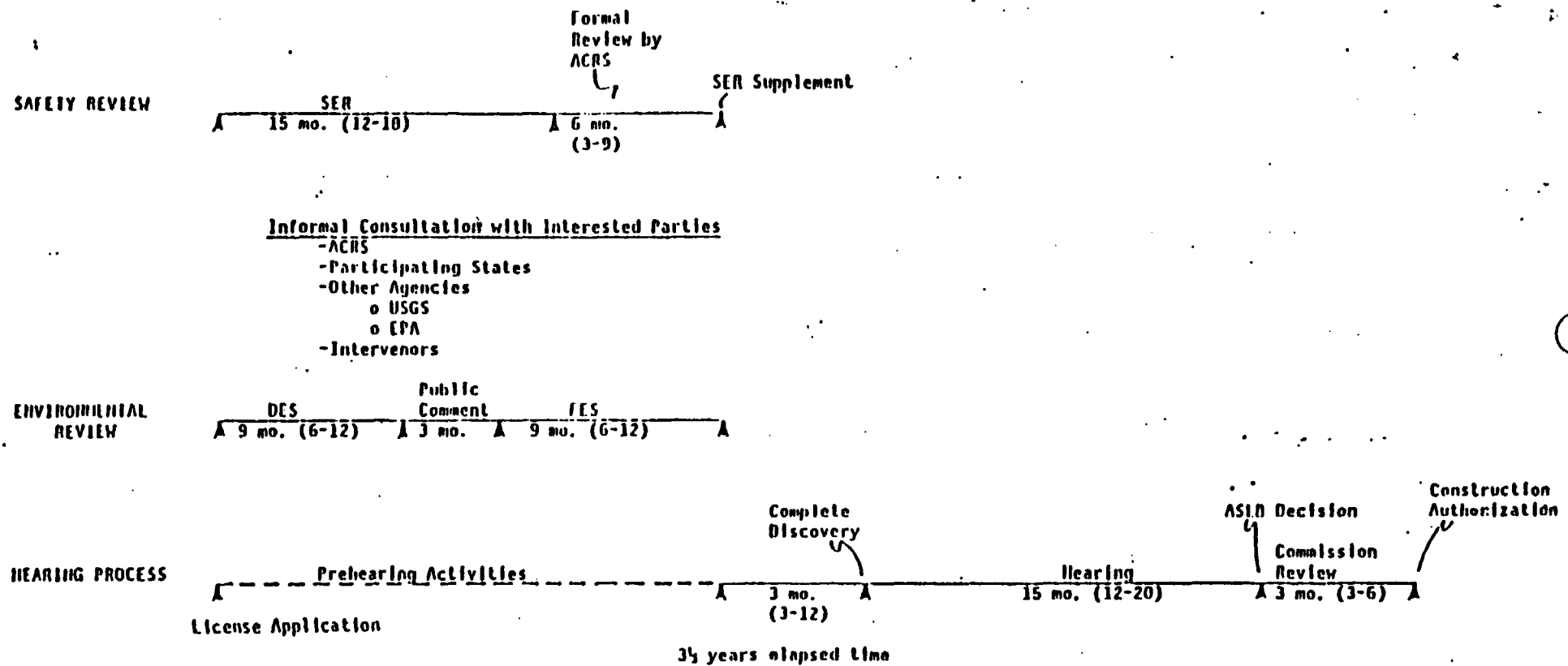
NRC HIGH-LEVEL WASTE
LICENSING APPROACH

- 0 BROAD REGULATORY REQUIREMENTS
- 0 DEALS WITH MANY NEW, UNCONVENTIONAL TECHNICAL AND INSTITUTIONAL PROBLEMS
- 0 CHARACTERIZATION OF AT LEAST THREE SITES
- 0 AT DEPTH TESTING
- 0 PROCESS FOR EARLY PUBLIC INVOLVEMENT AND IDENTIFICATION OF ISSUES
 - INFORMAL PRELICENSING INTERACTIONS WITH DOE AND OTHER ORGANIZATIONS
 - SITE CHARACTERIZATION REPORT AND CONTINUING UPDATES
- 0 SPECIAL ROLE FOR STATES, INDIAN TRIBES
- 0 FLEXIBLE TO MEET CHANGES IN DOE PLANS, SCHEDULES, OTHER CONSTRAINTS

HIGH LEVEL WASTE REPOSITORY LICENSING SCHEDULE



SCHEDULE ESTIMATES FOR HLW REPOSITORY LICENSE



FOOTNOTES

1. A high quality and complete license application is assumed. All technical work and testing needed to make the finding required in 10 CFR 60.31 are assumed complete.
2. A free and open exchange between the DOE and HRC to establish what information will be needed for the license application and that the HRC will be kept abreast of information and data as it is developed at sites being characterized is assumed.
3. Uncertainties in times are shown in parentheses. Greatest uncertainties are associated with the hearing process.

NOTE: ATTACHED
MATERIAL
EXPLAINS APP. C.

APPENDIX C

o PURPOSE

- COMPREHENSIVE AND SYSTEMATIC IDENTIFICATION OF NRC ISSUES
- COMPARISON OF NRC AND DOE/RHO ISSUES
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EXAMPLE DEVELOPMENT OF PERFORMANCE ELEMENTS

Performance Element	Primary Repository/Component Zone of Interest	Significant Controlling Processes	Significant Controlling Conditions	Significant Processes Causing Changes to Controlling Processes and Conditions	Potential Resulting Changes in Controlling Processes and Conditions
1. Water contacts backfill (volume, time)	Disturbed zone	Groundwater (A1) flow through disturbed zone (volume, velocity)	Hydraulic conductivity (A1.1) Hydraulic Gradient Effective Porosity Specific Storage	Repository Induced 1) Excavation of underground facility causes host rock fracturing. 2) Excavation dewatering 3) Waste heat generation causes thermal bouyancy force 4) Waste heat generation causes thermomechanical effects. 5) Waste heat generation causes alteration of minerals filling fractures	1) Change in hydraulic conductivity, pathways, flux and velocity 2) Change in hydraulic gradient, pathways, flux and velocity 3) same as (2) 4) same as (1) 5) same as (1)

COMPARISON OF NRC AND DOE/RHO ISSUES

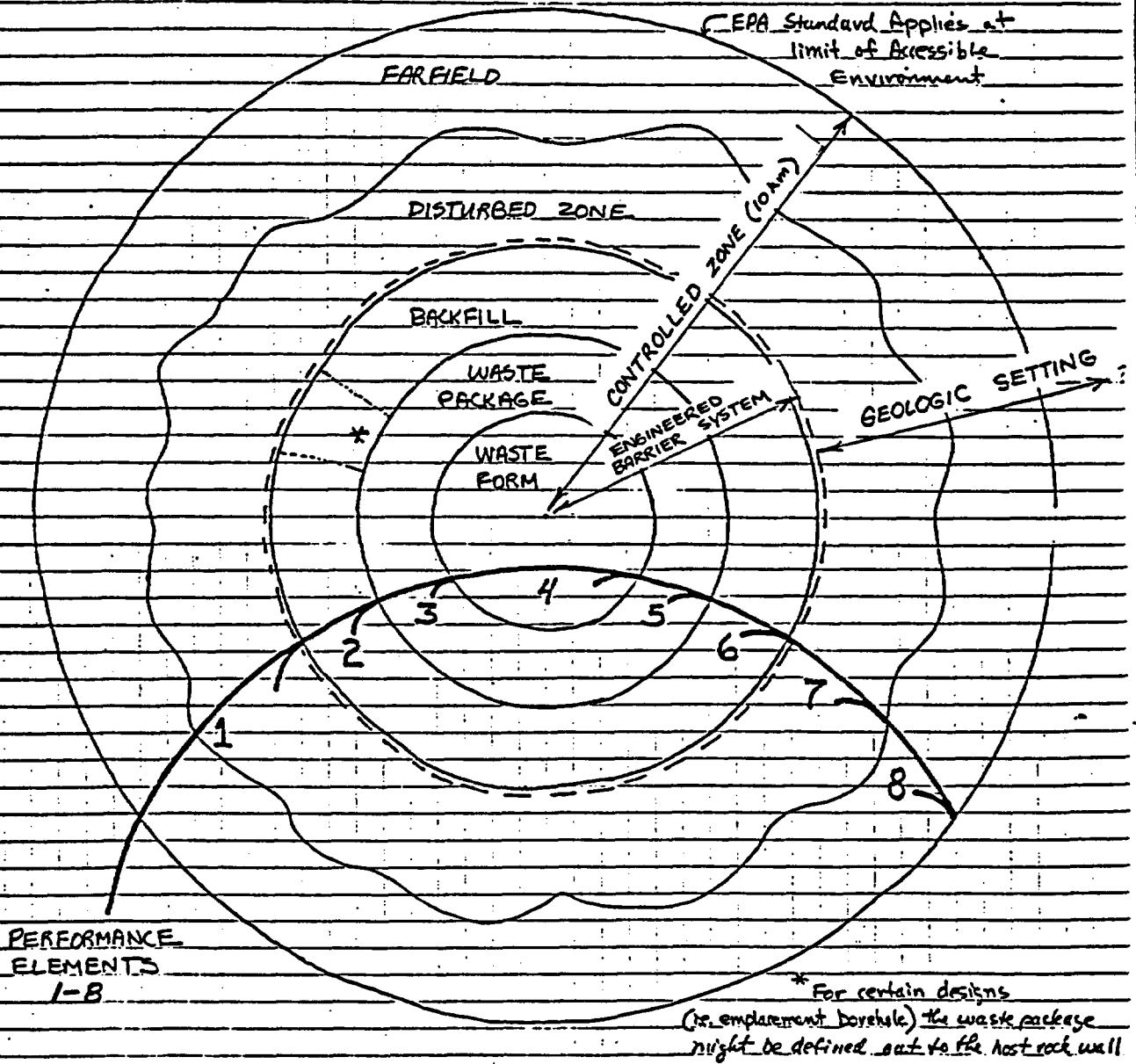
NRC ISSUES	DOE/RHO ISSUES AND WORK ELEMENTS	COMMENTS
A. GROUNDWATER		
<u>Present Conditions</u>		
A.1 What are the groundwater flow paths, discharges (flux), velocity and travel times under present conditions (disturbed zone, farfield and Pasco Basin)?	I.1	Brief statement of how RHO issues compare to NRC issue. Reference to applicable SIA's.
A.1.1 What is the three-dimensional distribution of hydrogeologic parameters (including vertical and horizontal hydraulic conductivity, effective porosity, double porosity, dispersivity, and hydraulic head) within the system (disturbed zone, farfield and Pasco Basin)?	I.1.1	
A.1.2 What are the groundwater recharge and discharge locations, mechanisms, and amounts for the Pasco Basin?	I.2	

DOE/RHO ISSUES AND WORK ELEMENTS

DOE/RHO ISSUES AND
WORK ELEMENTS

- I.1 Are the pre-waste emplacement groundwater travel times near the repository sufficient to assure compliance with NRC technical criteria (10 CFR 60)?
- I.2 What are the groundwater flow paths and travel times from the repository to the accessible environment and are they in compliance with technical criteria regarding contaminant migration?
- I.3 Are the nature and rate of past and projected hydrogeologic process such that their effects will permit isolation of waste in conformance to regulatory criteria?

ACCESSIBLE ENVIRONMENT



REPOSITORY SYSTEM COMPONENTS
AND PERFORMANCE ELEMENTS

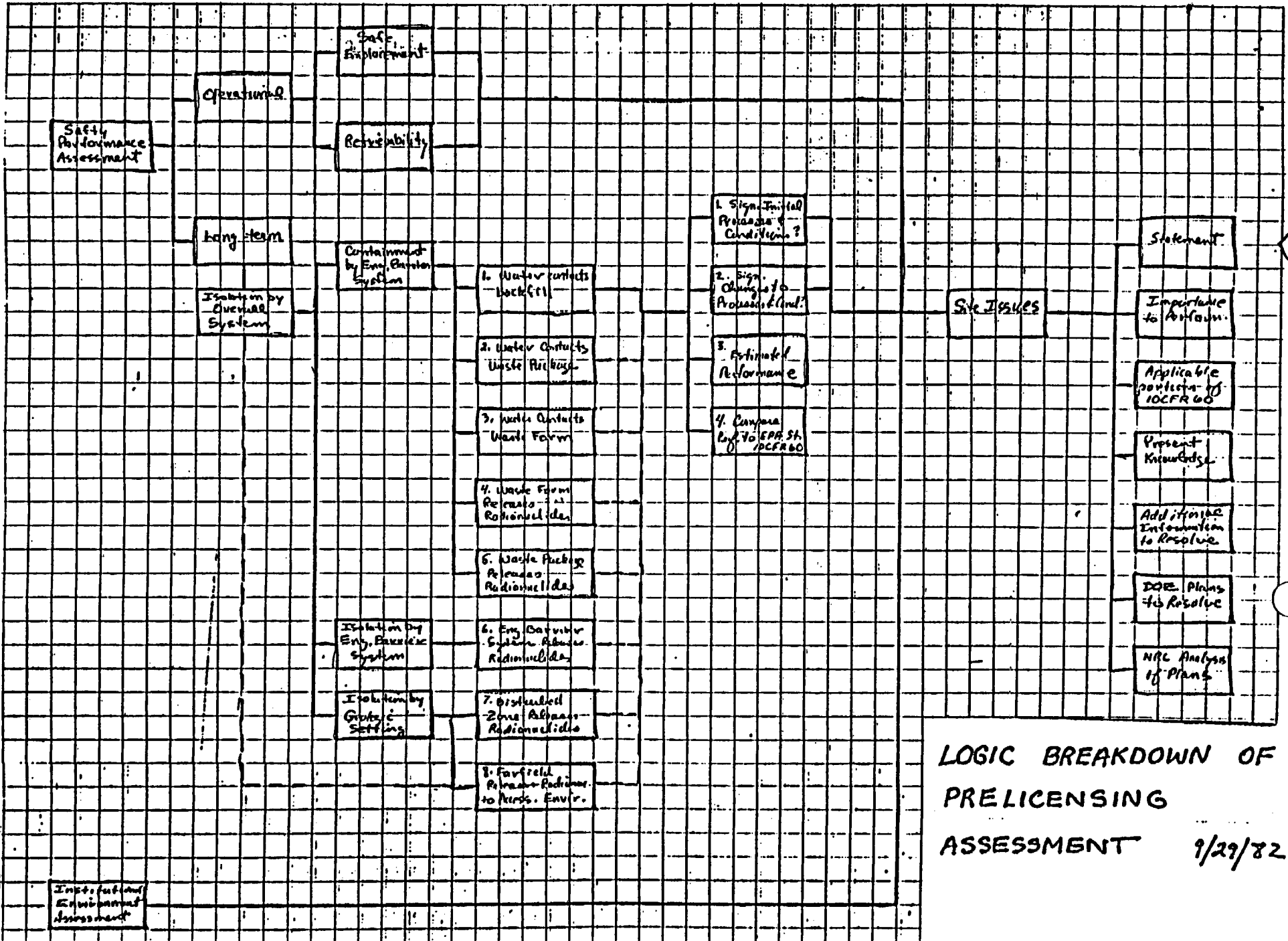
TIER 1
PERFORMANCE
OBJECTIVES

TIER 2
PERFORMANCE
ELEMENTS

TIER 3
PERF. ELE.
QUESTIONS

TIER 4
SITE ISSUES

SITE ISSUE
ANALYSIS
ITEMS



LOGIC BREAKDOWN OF
PRELICENSING
ASSESSMENT 9/29/82

LONG-TERM PERFORMANCE

Isolation by the Overall System (release controlled) 10CFR 60.112/EPA 5M	Containment by the Engineered Barrier System (release prevented) 10CFR 60.113a.1c.A	1. When and how does water contact the backfill?
		2. When and how does water contact the waste package?
		3. When and how does water contact the waste form?
		4. When and how does waste form release radionuclides?
		5. When and how are radionuclides first and subsequently released from the waste package and at what subsequent rates?
	Isolation by the Engineered Barrier System (release controlled) 10CFR 60.113a.1c.B	6. When, how and at what rate are radionuclides released from the engineered barrier system?
	Isolation by the Geologic Setting (release controlled) 10CFR 60.113a.2	7. When, how and at what rate are radionuclides released from the disturbed zone to the farfield?
		8. When, how and at what rate are radionuclides released from the farfield to the accessible environment?

TIER 1

TIER 2

PERFORMANCE OBJECTIVES

PERFORMANCE ELEMENTS

Each Performance Element 1-8

1. What are the significant controlling processes and conditions before construction and waste emplacement?

2. How do the significant controlling processes and conditions (1) change?

2a. What are the types, probabilities and nature of changes (repository induced, human induced, and natural)?

2b. What are the processes and conditions after construction and waste emplacement resulting from 2a?

3. What is the estimated performance of the element?

4. How does the estimated performance (3) compare with appropriate parts of 10CFR60 and the EPA Standard?

REVIEW

CHARACTERIZATION

SITE

REVIEW

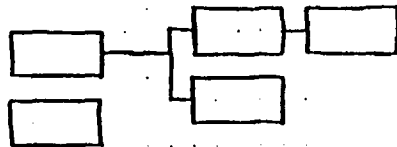
APPLICATION

LICENSE

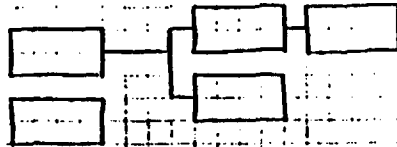
TIER 2 PERFORMANCE ELEMENTS

TIER 3 PERFORMANCE ELEMENT QUESTIONS

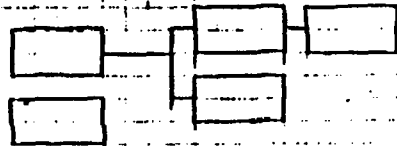
A. GROUNDWATER ISSUES



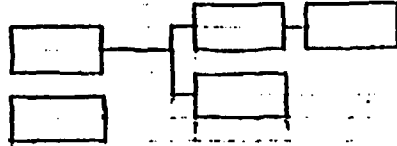
B. WASTE FORM/WASTE PACKAGE ISSUES



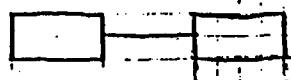
C. REMEDIATION ISSUES



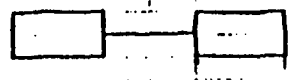
D. REPOSITORY DESIGN ISSUES



E. GEOLOGIC STABILITY ISSUES



F. INSTITUTIONAL ISSUES



TIER 4+

BREAKDOWN OF SELECTED
SITE ISSUES

Each Site Issue

1. Name of Site
2. Statement of the issue

3. Importance of the issue to repository performance

4. Portions of RCRA60 that are directly connected to the issue

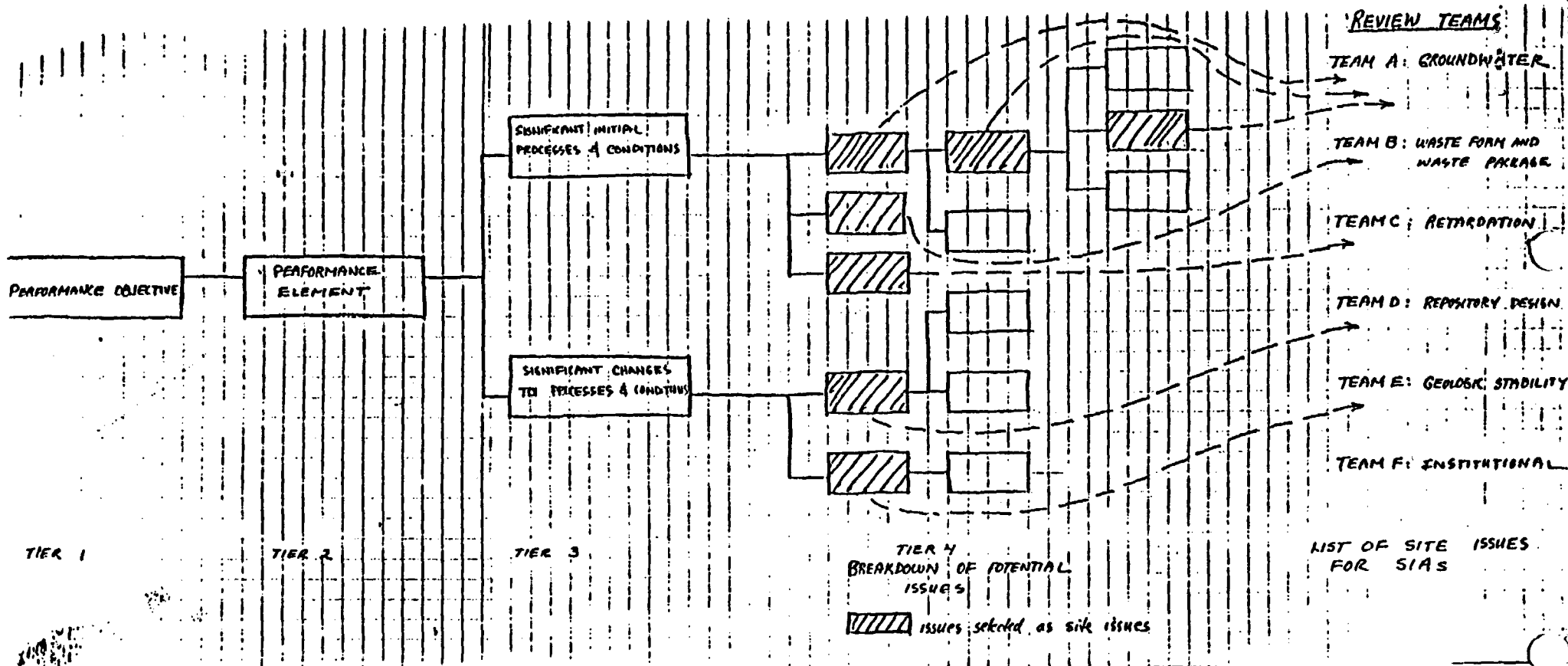
5. Summary of the present state of knowledge, with analysis of uncertainties

6. Summary of the information needed to close out the issue by the time of construction authorization application

7. Summary of the planned approach to testing, tests, test methods, and investigations to provide the information needs of (6)

8. Analysis of (7) as to completeness, practicality and likelihood of success

SITE ISSUE ANALYSIS
ITEMS



ISSUE IDENTIFICATION PROCESS