To: Robert E. Browning/John Linehan
MS 623 SS

101

PDR-1
LPDR-WM-10(2)

WM DOCKET CONTROL CENTER

'87 JUN 24 A9:45

PERFORMANCE ASSESSMENT DEPARTMENT

77200

Manager, J. A. Thies (7)
6-2908 CDC #1
Secretary - S. L. Conley

- J. D. Coddington - Basalt Business Rep (matrix)
- C. E. Daugherty (BCSR)
- E. Sagar - Principal Scientist
- J. C. Steward - Administrative Assistant
- R. T. Winward - Project Assurance Engineer
- Scheduler (PR 01067)

SYSTEM PERFORMANCE ASSESSMENT GROUP 77210

Manager, J. C. Sonnichsen (16)
6-8298 CDC #1
Clerk - P. J. Dauenhauer

- T. J. Bander (BCSR)
- M. S. Bensky - Staff Engineer
- R. J. Bridwell - Staff Scientist
- M. P. Connelly - Senior Scientist
- E. E. Craft - Technician
- P. W. Eslinger - (BCSR)
- N. J. Fix (BCSR)
- D. D. Haley (BCSR)
- K. T. Key (BCSR)
- R. D. Kiser (BCSR)
- N. W. Kline (BCSR)
- R. J. VanVleet - Senior Engineer
- J. C. Walton - Senior Engineer
- O. A. Wilson (BCSR)
- Summer Technician (PR 01056) (K. L. Baker)

PRE-CLOSURE SAFETY GROUP 77220

Acting Manager, J. S. Dukelow (8)
6-4007 CDC #1
Clerk - D. A. Corbin

- C. N. Cawley - Staff Scientist
- D. G. Harrison - Engineer
- B. J. Hobbs (matrix)
- J. V. Livingston - Senior Engineer
- A. C. Metz - Staff Engineer
- J. P. Paneszko - Summer Technician
- L. F. Wojdac - Staff Engineer
- Senior Scientist (PR 01028)
- Staff Scientist (PR 01058)

SITE ANALYSIS GROUP 77230

Manager, R. C. Arnett (11)
6-8181 PBS/4
Clerk - R. M. Moore

- K. M. Berrett (BCSR)
- P. M. Clifton - Staff Engineer
- S. F. Harris - Advanced Scientist
- S. B. Hunt - Advanced Scientist
- R. Khaleel - Staff Engineer
- T. Legore (BCSR)
- A. H. Lu - Staff Scientist
- R. R. McMullen (BCSR)
- M. E. Mease - Scientist
- Summer Technician (PR 02796) Baker

WASTE PACKAGE, REPOSITORY, AND SEAL ANALYSIS GROUP 77240

Acting Manager, W. K. Terry (20)
6-6992 450 Hills St.
Clerk - D. Snow

Geomechanics Team
H. J. Dahlke - Team Leader

- R. R. Ames - Staff Engineer
- D. R. Bonin - Engineer
- W. W. Chen - Staff Engineer
- L. B. Collard - Senior Engineer
- J. I. Dearing - Senior Engineer
- I. J. Dompeter - Advanced Engineer

Waste Package/Seals Team
S. C. Yung - Team Leader

- C. Bromley (BCSR)
- Y. M. Chien - Staff Scientist
- C. H. Huang - Staff Engineer
- M. E. Jones - Technician
- M. Kummerer - Advanced Engineer
- D. W. Langford (BCSR)
- R. R. Seitz - Engineer
- J. L. Spurgeon (BCSR)
- R. T. Toyooka - Analyst (matrix)
- G. L. Underberg - Senior Engineer
- Summer Engineer (PR 01824)

6/5/87
Total = 63

WM Record File 101
WM Project 10
Docket No.
PDR ✓
LPDR ✓ (B)

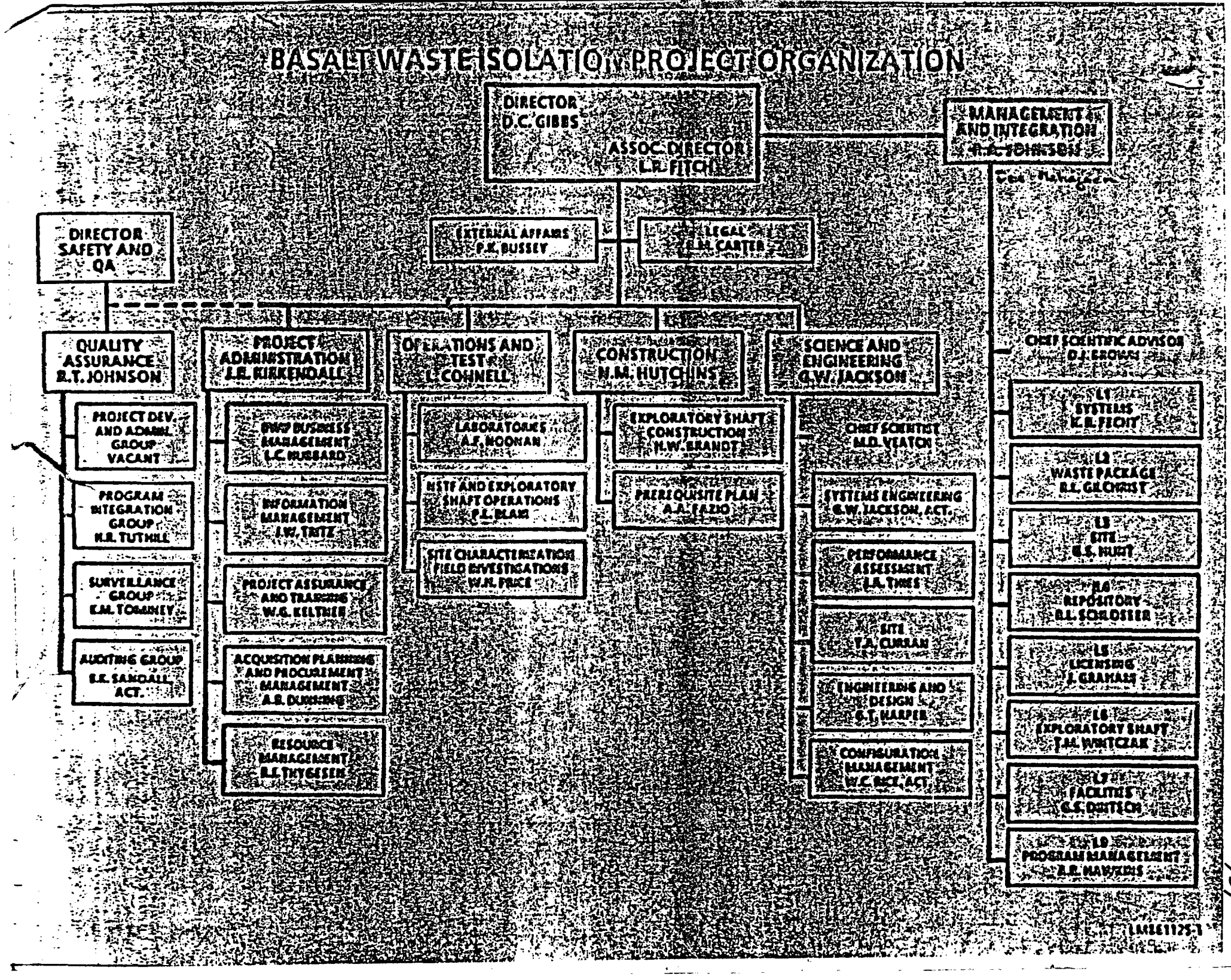
Distribution:
REB
Linehan

(Return to WM, 623-SS)
From: Cook, NRC

See pocket for enclosures

3792

BASALT WASTE ISOLATION PROJECT ORGANIZATION



SEE COVER SHEET TO REVISED MR. CLARK, DATED 8/19/81

Waste Management eighty eight

Department of Nuclear and Energy Engineering
College of Engineering and Mines
University of Arizona
Tucson, Arizona 85721 U.S.A.
401936

Waste Management

eighty eight

"CALL FOR PAPERS"

Waste Management '88
February 28-March 3, 1988
Tucson, Arizona

Waste Management '88, the fourteenth annual WM symposium, will be held February 28-March 3, at the Tucson Community Center, Tucson, Arizona. The conference is sponsored by the University of Arizona, the American Nuclear Society, the Electric Power Research Institute, the Radwaste Systems Committee of the American Society of Mechanical Engineers and numerous commercial institutions. The topics selected for WM '88 will have invited and contributed papers involving research, development and operational experience in both high and low level nuclear waste management and decommissioning. Papers concerning national and international agreements and regulations governing these topics as well as the impact of these activities on the environment are also solicited. Interested contributers to the meeting are invited to submit extended summaries (in triplicate) of their contributions to the Technical Program Chairman, M.E. Wacks (602) 621-6160, Department of Nuclear and Energy Engineering, University of Arizona, Tucson, Arizona, 85721, by September 18, 1987.

The summaries will undergo critical technical review by the Program Advisory Committee to determine if they meet the criteria of originality, technical content, significance and subject. The summary should be long enough to convey to the committee the substance of your proposed paper and its meeting of the stated criteria. Summaries with insufficient information will be rejected. Summaries submitted after due date may not be considered.

Authors will be notified of paper acceptance by November 16, 1987. Completed papers are required by February 1, 1988. The approved papers will be assigned to either oral or poster sessions depending on the subject matters applicability in the selected session objectives and author's preference. In either case the processing and publications of the papers will be identical.

General Chairman	Roy G. Post
Technical Program Chairman	Morton E. Wacks
Executive Director	James G. McCray
Exhibits/Sponsor Coordinator and Assistant General Chair	Mary G. White
European Coordinator	Reiner Papp
Secretary	Angie Register
Technical Editor	Roy G. Post
Publications Coordinators	Donna McComb & Paul Messer
Local Arrangements	Barry Ganapol
Guest Program	Becky Post

PLEASE ATTACH THIS FORM TO SUBMITTED SUMMARY

TITLE OF PAPER _____

_____

AUTHORS _____

Contributed Simulated Paper ( ) Invited Paper ( ) Who Invited? _____

TOPIC NUMBER (From TOPIC list) _____ Check Paper Classification ( ) HLW ( ) LLW ( ) Both HLW/LLW

CORRESPONDING AUTHOR _____ Phone (_____) _____

Organization _____

Address _____

I understand that acceptance of this paper for presentation requires an author-provided manuscript (in prescribed format) by February 1, 1988.

Signature _____ Date _____

TOPICS FOR PAPERS

1. *Status of International Nuclear Waste Geologic Research Facilities and Activities*
2. *Public Attitudes and Policy Issues in Nuclear Waste Management*
3. *Social and Economic Issues in Nuclear Waste Management*
4. *Legal Liability and Institutional Issues in Nuclear Waste Management*
5. *Quality Assurance and Quality Control in Nuclear Waste Management*
6. *Performance Assessment for Nuclear Waste Disposal*
7. *Environmental Surveillance and Impacts in Nuclear Waste Disposal*
8. *Federal/State/Indian Tribe Issues on Nuclear Waste Storage and Disposal*
9. *Transportation of Nuclear Waste (Technical and Non-Technical Issues)*
10. *Industry Concerns in Nuclear Waste Management*
11. *Implementation of the Low-Level Radioactive Waste Policy Act of 1980 (PL96-573) and the Low-Level Radioactive Waste Policy Act Amendments of 1985 (PL99-240)*
12. *Regulation and Licensing of LLW*
13. *Mixed Chemical/Radioactive Waste Management*
14. *Remedial Action Progress*
15. *Monitored Retrievable Storage - Status and Technical Issues*
16. *Defense HLW and TRU Storage and Disposal (including WIPP)*
17. *Implementation Status of the NWPA of 1982 (PL97-425)*
18. *High-Level Waste Disposal Technology*
19. *Modeling and Risk Assessment in HLW Storage and Disposal*
20. *Beneficial Uses of Radioactive Waste*
21. *General*

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Terry Conway, NUS
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Peter Gray, SRL, Federal Waste Programs*
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Russell Jim, Yakima Ind. Nation
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Neil Norman, Bechtel
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Alex Perge, Consultant, International Programs*
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Mike Raudenbush, S.M. Stoller
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John Stucker, Carter-Goble, Public Policy and Interfaces*
Ganesan Subbaraman, Rockwell
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Robert Williams, EPRI
Donald Wood, RHO
H. Richard Yoshimura, SNL, Transportation*

*Subgroup chairs

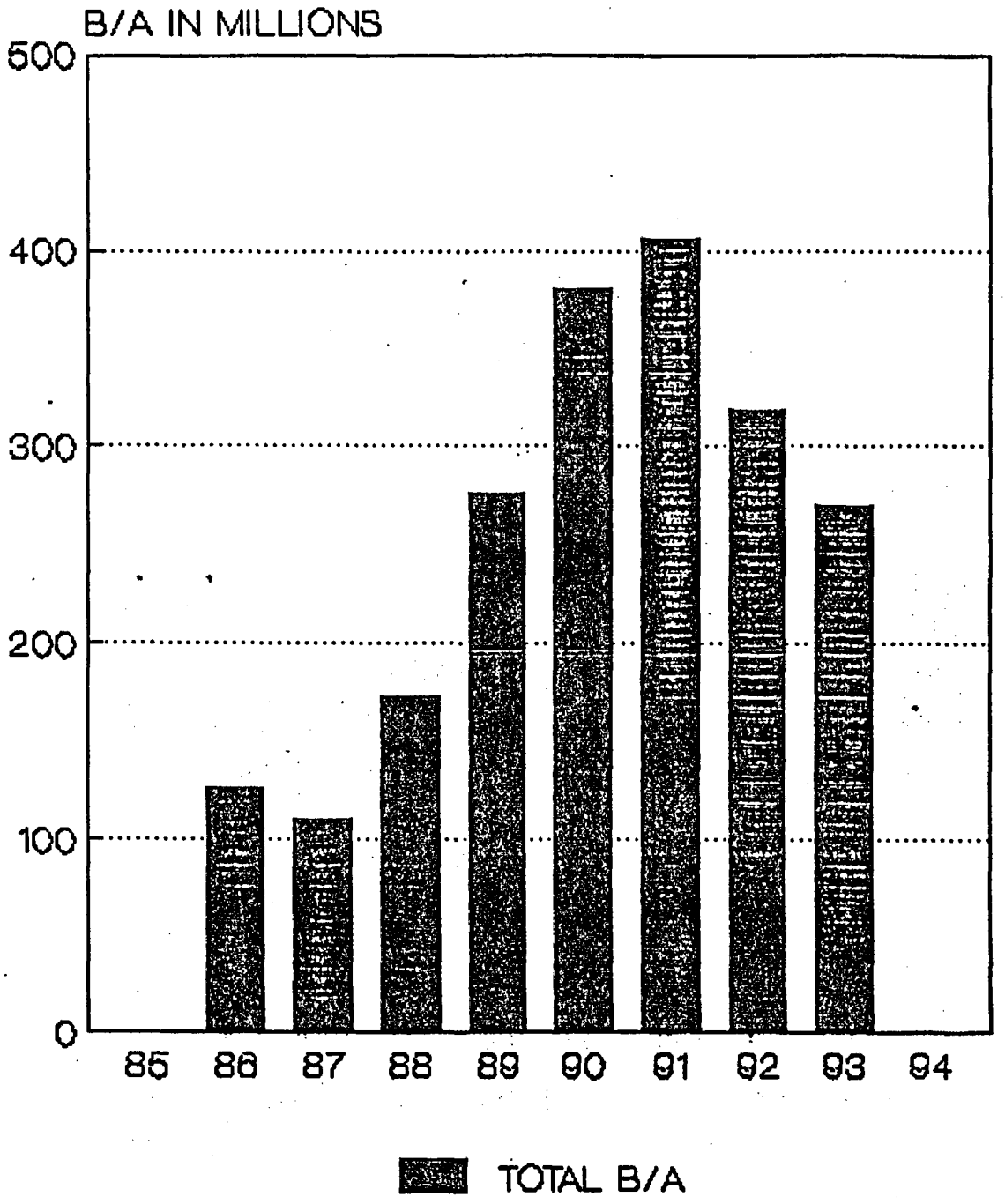
To: Robert E. Browning / John Linehan
MS 62355

PERFORMANCE ASSESSMENT BUDGET SUMMARY

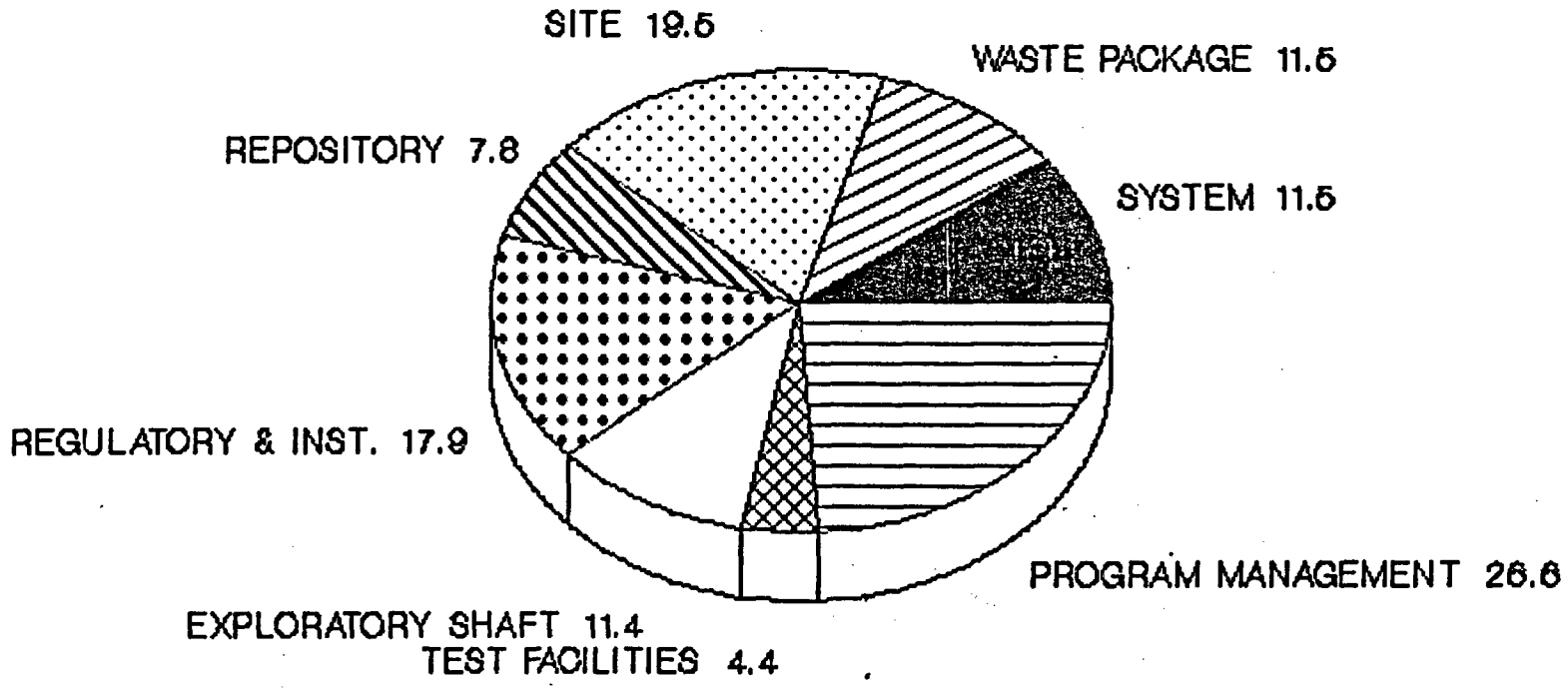
1987 BUDGET SUBMITTED

June 18, 1987

BWIP 1989 BUDGET
BUDGET AUTHORIZED

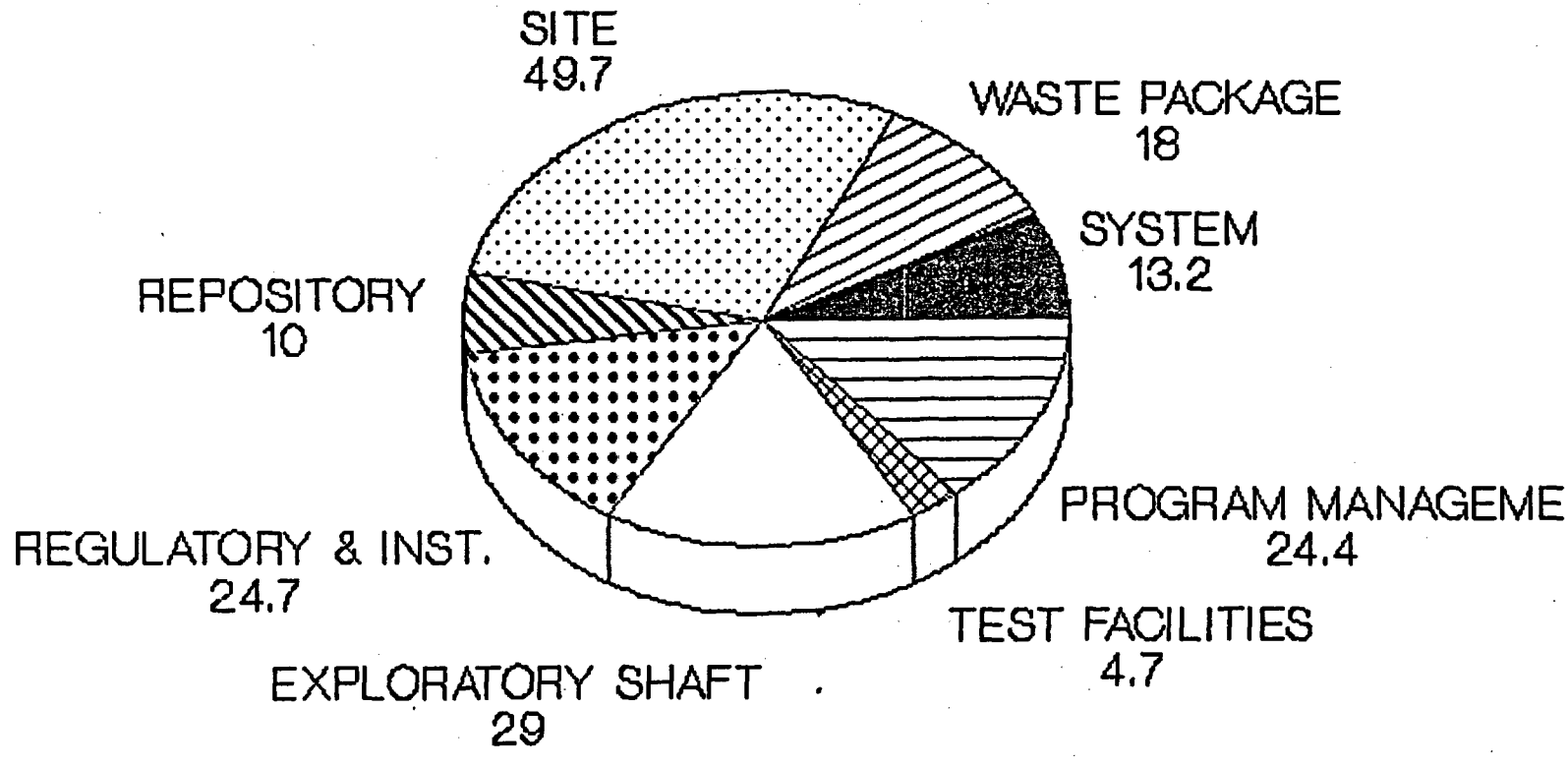


BWIP 1987 BUDGET
B/A IN MILLIONS



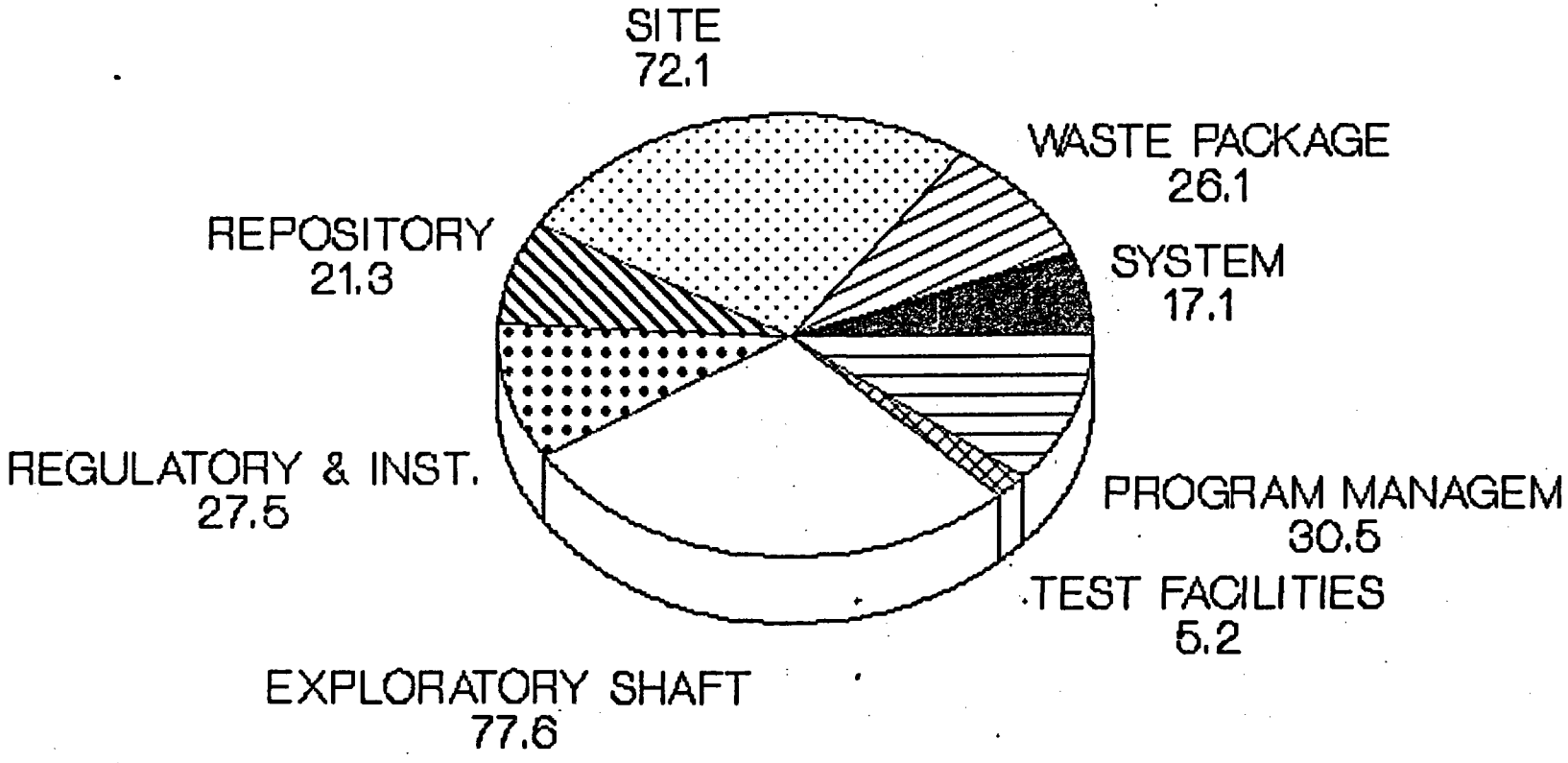
B/A TOTAL= 110.6 $MIL

BWIP 1988 BUDGET
B/A IN MILLIONS



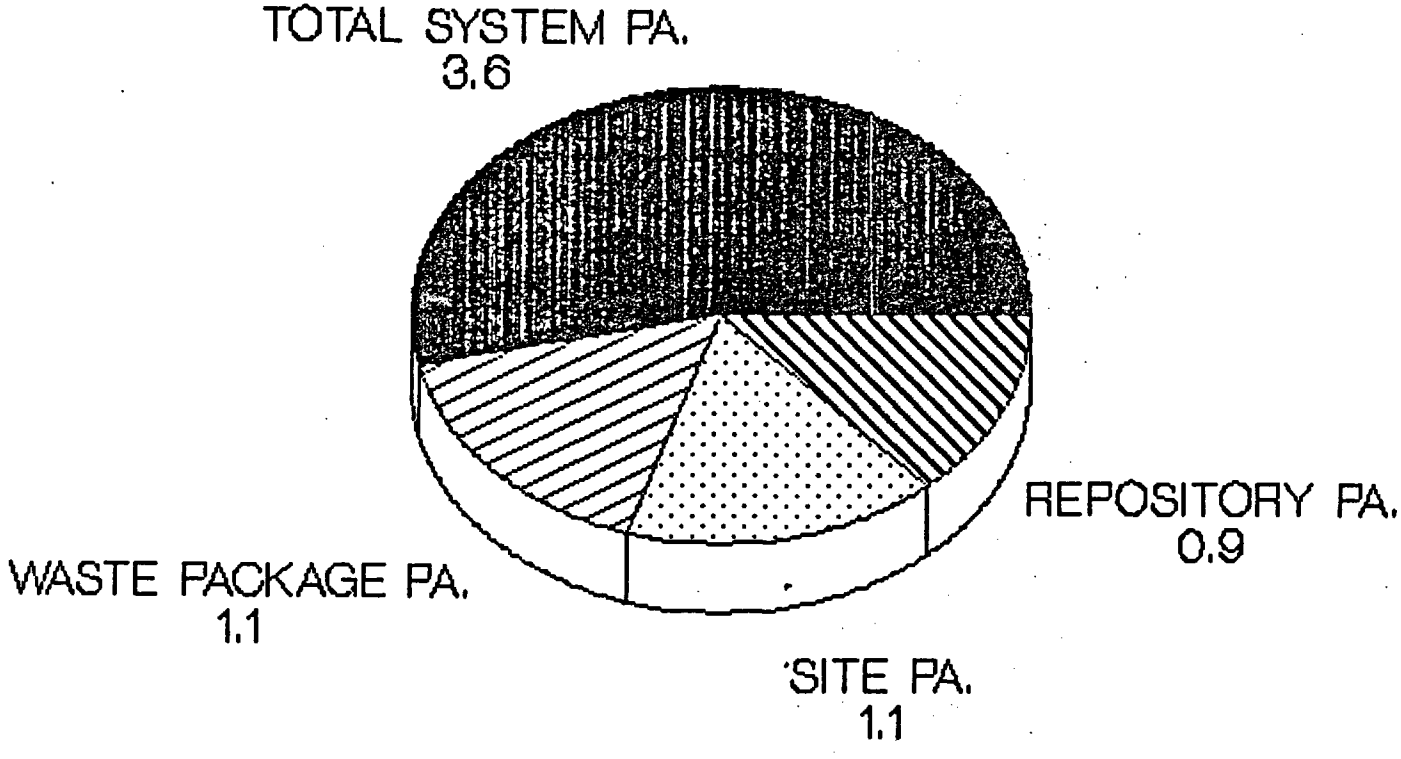
B/A TOTAL= 173.8 $MIL

BWIP 1989 BUDGET
B/A IN MILLIONS



B/A TOTAL= 277.5 $MIL

KEY BWIP BUDGET OUTLAYS
SUMMARY FOR 88



N/A IN MILLIONS

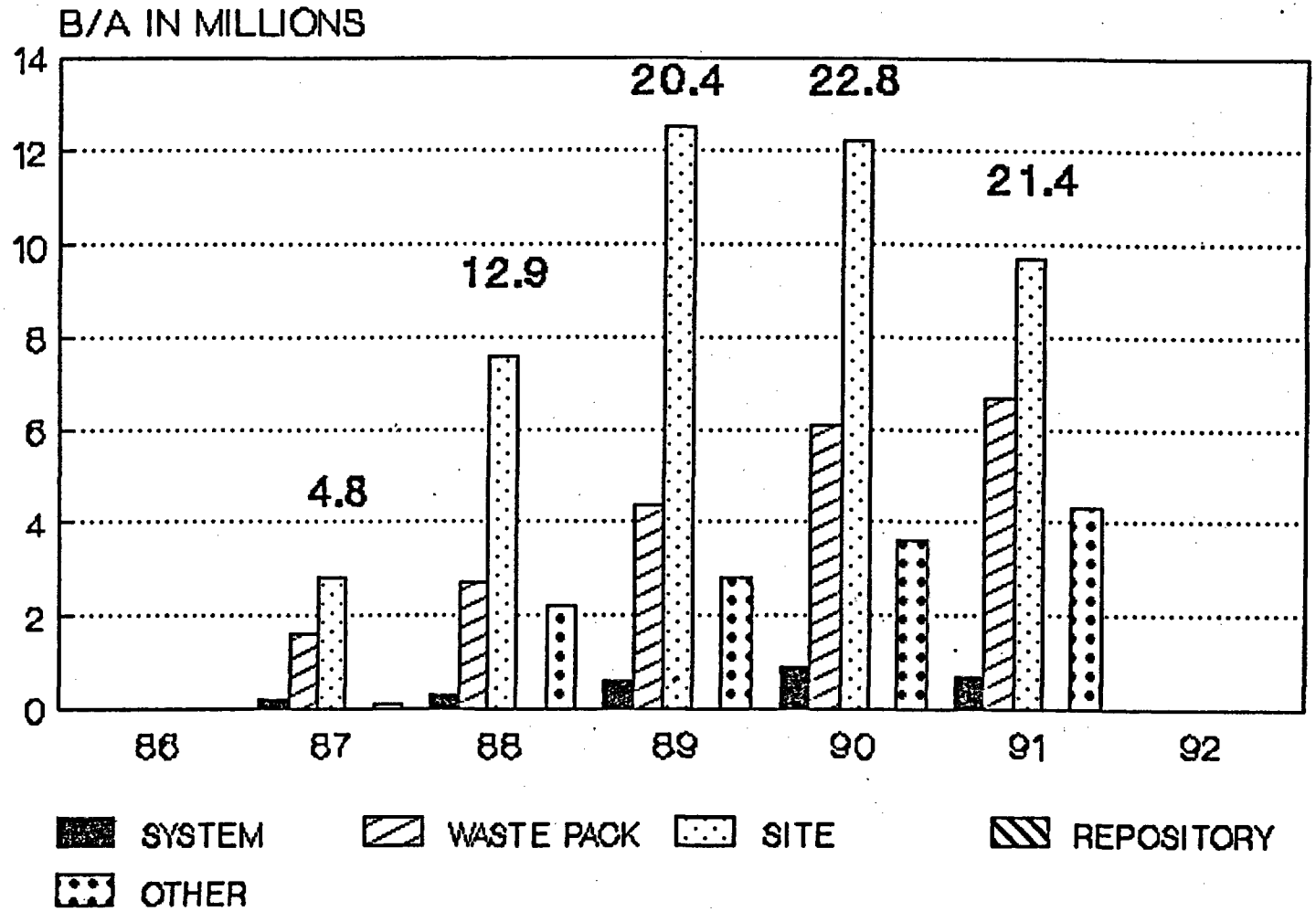
BWIP 1989 BUDGET SUBMITTAL
Budget Outlay Explanation

SYSTEMS

	BUDGET OUTLAYS ($M)			
	FY 1988	FY 1989	FY 1990	FY 1991
Total System Performance Assessment	3.6	6.3	8.3	8.5
System P.A.	0.8	1.5	2.0	2.0
Q.A. Software Documentation	1.0	1.6	2.0	1.9
Data Modeling	0.5	1.0	1.4	1.2
Pre-Closure Safety Analysis	1.2	2.1	3.0	3.4
WASTE PACKAGE				
Waste Package Performance Assessment	1.1	1.6	1.7	1.9
SITE				
Site P.A	1.1	1.2	1.6	1.4
Site P.A.	0.3	0.3	0.5	0.4
P.A. Model Development	0.8	0.9	1.1	0.9
REPOSITORY				
Repository P.A.	0.9	1.5	2.4	3.0
Geomechanics	0.7	1.1	1.1	2.2
Seal	0.2	0.3	0.6	0.6
Pre-Closure Safety	.04	0.1	0.1	0.1
TOTALS	6.7	10.6	14	14.8
GRAND TOTAL	46.1			

BWIP 1989 BUDGET

PNL OPERATING BUDGET



To: Robert E. Browning / John Linehan
MS 62355

PERFORMANCE ASSESSMENTMENT BRIEFING FOR NORM EISENBERG

JUNE 17 & 18, 1987

AGENDA

JUNE 17, 1987

INTRODUCTIONS	T. KNEPP	DOE-RL	1:00 - 1:10
PAST ACTIVITIES AND KEY RESULTS	B. SAGAR	RHO-BWIP	1:10 - 2:00
MAJOR ASSUMPTIONS			
PROJECT CONTROL	J. THIES	RHO-BWIP	2:00 - 2:15
SITE RELATED	R. ARNETT	RHO-BWIP	2:15 - 2:30
WASTE PACKAGE/REPOSITORY RELATED	W. TERRY	RHO-BWIP	
SYSTEM RELATED	J. SONNICHSEN	RHO-BWIP	
SAFETY RELATED	J. DUKELOW	RHO-BWIP	
			BREAK 2:30 - 2:45
KEY DRIVERS			
ISSUE RESOLUTION STRATEGIES	J. THIES	RHO-BWIP	2:45 - 3:00
CODE QUALITY ASSURANCE PROCEDURES	J. THIES	RHO-BWIP	3:00 - 3:30
PROJECT MILESTONES & PA LOGIC	J. THIES	RHO-BWIP	3:30 - 4:00

AGENDA

JUNE 18, 1987

CURRENT WORK

SCP SECTIONS 8.2 & 8.3	THIES	RHO-BWIP	1:00 - 1:10
PA PLAN PRODUCTION & CONTENT	SONNICHSEN	RHO-BWIP	1:10 - 1:20
PROJECT BASELINE DEVELOPMENT	THIES	RHO-BWIP	1:20 - 1:30
CODE DOCUMENTATION & QUALITY CONTROL	THIES/KLINE	RHO-BWIP	1:30 - 1:40
PREPARATION OF PERFORMANCE ANALYSIS PLANS			1:40 - 1:50
SYSTEMS	SONNICHSEN	RHO-BWIP	1:50 - 1:55
SITE	ARNETT	RHO-BWIP	1:55 - 2:00
WASTE PACKAGE REPOSITORY	TERRY	RHO-BWIP	2:00 - 2:05
SAFETY IMPLEMENTATION PLAN PREPARATION	DUKELOW	RHO-BWIP	2:05 - 2:15
SAFETY ANALYSIS PLANNING	DUKELOW	RHO-BWIP	2:15 - 2:25
Q-LIST DEVELOPMENT & CONTROL	DUKELOW	RHO-BWIP	2:25 - 2:30

BREAK 2:50 - 3:300

FUTURE WORK

SITE	ARNETT	RHO-BWIP
WASTE PACKAGE REPOSITORY	TERRY	RHO-BWIP
SYSTEMS	SONNICHSEN	RHO-BWIP
PRECLOSURE SAFETY	DUKELOW	RHO-BWIP

BUDGET REVIEW

FY 88 ACTIVITIES	KNEPP	DOE-RL	3:00 - 3:15
5 YEAR FORECAST			3:15 - 3:30

PAST ACTIVITIES

- MODEL AND CODE DEVELOPMENT
- CODE DOCUMENTATION AND BENCHMARKING
- METHODOLOGY FOR SUBJECTIVE INFORMATION
- ANALYSIS

MODEL AND CODE DEVELOPMENT

- MODELS AND CODES DEVELOPED AT BWIP

  *- MAGNUM
  *- CHAINT
  *- PORFLO
  - EPASTAT
  - REPREL
  - ... ETC.
  - PRE- AND POST- PROCESSORS

- MODELS AND CODES ACQUIRED BY BWIP

  - GEOTHER
  - ABAQUS
  - ANSYS
  - ADINA
  - ... ETC.
  - PRE- AND POST- PROCESSORS

* VALIDATION EXPERIMENTS

METHODOLOGY FOR SUBJECTIVE INFORMATION

- USE OF DELPHI TECHNIQUE
  - IDENTIFICATION OF DISRUPTIVE SCENARIOS
- USE OF PROBABILITY ENCODING METHOD
  - PROBABILITY DISTRIBUTIONS OF POROSITY AND ANISOTROPY RATIO

CODE DOCUMENTATION AND BENCHMARKING

- TECHNICAL REPORTS
  - PORFLO
  - MAGNUM-3D
  - EPASTAT
  - REPREL
- USERS' MANUALS
  - PORFLO
  - CHAINT
  - MAGNUM-2D
  - MAGNUM-3D
  - EPASTAT
  - REPREL
- VERIFICATION AND BENCHMARKING
  - PORFLO
  - CHAINT
  - MAGNUM-2D
  - MAGNUM-3D

ANALYSIS

- ANALYSIS FOR EA
  - CONTAINER LIFE
  - RELEASE RATE FROM ENGINEERED BARRIERS
  - PRE-EMPLACEMENT TRAVEL TIME
  - CUMULATIVE RELEASE AT ACCESSIBLE ENVIRONMENT

- POST EA CODE DEVELOPMENT AND ANALYSIS ACTIVITIES
  - WASTE PACKAGE SENSITIVITY
  - REPOSITORY SEALS SENSITIVITY
  - PARTIAL DEVELOPMENT OF SYSTEM PERFROMANCE ASSESSMENT MODEL (SPAM)
  - PARTIAL DEVELOPMENT OF CONTAINER CORROSION MODEL (PACLIFE)
  - ENHANCEMENT OF GEOTHER MODEL
  - BAYESIAN ANALYSIS OF SUBJECTIVE DATA
  - BUCKLING ANALYSIS OF SHAFT LINER
  - ANALYSIS OF ESF EFFECTS
  - DEVELOPMENT OF A 2-D ADJOINT SENSITIVITY CODE
  - INVESTIGATION OF EQUIVALENT POROUS MEDIUM APPROACH
  - POSITION PAPER ON DISRUPTIVE SCENARIO ANALYSIS

MAJOR ASSUMPTIONS

- PROJECT CONTROL
  - NQA - 1
  - NUREG 0856
  - RHO-BW-MA-17: VOL. 1. 2. 3

TECHNICAL ASSUMPTIONS SITE SUBSYSTEM

- HIGH DEGREE OF HETEROGENEITY - PROBABILISTIC APPROACH
- EQUIVALENT POROUS MEDIUM

TECHNICAL ASSUMPTIONS FOR REPOSITORY SEALS PA

- NEED TO CONSIDER COUPLED GROUNDWATER FLOW, HEAT TRANSFER AND RADIONUCLIDE TRANSPORT
- CARBON-14 AND IODINE-129 ARE RADIONUCLIDES OF GREATEST CONCERN. SELENIUM-79 WILL ALSO BE CONSIDERED
- CURRENT MODELS REPRESENT THE REPOSITORY DOMAIN AS A POROUS CONTINUUM; IF SITE CHARACTERIZATION DATA INDICATE THAT LARGE FRACTURE ZONES EXIST, THEN SUCH ZONES WILL BE INCLUDED IN FUTURE MODELS
- CURRENT MODELS ARE BASED ON TWO-DIMENSIONAL REPRESENTATIONS OF THE REPOSITORY SEALS; FUTURE MODELS WILL CONSIDER THREE-DIMENSIONAL REPRESENTATIONS
- BOREHOLE AND SHAFT/DRIFT PATHWAYS WILL BE MODELED INDEPENDENTLY PRIOR TO ASSESSMENT OF THE ADVANCED CONCEPTUAL DESIGN

TECHNICAL ASSUMPTIONS FOR WASTE PACKAGE

- REDUCING CHEMICAL ENVIRONMENT
- UNIFORM CORROSION
- PACKING SWELLS WHEN WET TO FILL VOIDS
- DIFFUSION - DOMINATED TRANSPORT ON SCALE OF WASTE PACKAGE

REPOSITORY-RELATED TECHNICAL ASSUMPTIONS

- LINEAR-ELASTIC CONTINUOUS MEDIUM
- TEMPERATURE INDEPENDENT MATERIAL PROPERTIES
- 2-DIMENSIONAL PLANE STRAIN ANALYSES
- ISOTROPY

SYSTEM RELATED TECHNICAL ASSUMPTIONS

- DEFINE APPROACH TO SYSTEM MODEL VALIDATION
  - PARTIAL VALIDATION OF COMPONENT MODELS
  - PEER REVIEW OF OVERALL MODEL HIERARCHY
- REEVALUATE THE INTERACTION OF COMPONENT MODELS
  - NEED TO INCLUDE MECHANISTIC INTERACTION
  - APPLICATION OF CONDITIONAL PROBABILITY
- INVESTIGATE USE OF SENSITIVITY ANALYSIS TO SCREEN DISRUPTIVE SCENARIOS
  - FOCUS DISRUPTIVE SCENARIO CHARACTERIZATION ACTIVITIES
  - USE OF SYSTEM MODEL TO EVALUATE IMPACTS ASSOCIATED WITH DISRUPTIVE SCENARIOS
- DEVELOP AN APPROACH FOR USING BAYESIAN STATISTICS

SAFETY RELATED TECHNICAL ASSUMPTIONS

AIRBORNE RELEASES

- GROUND LEVEL RELEASE FOR SOURCE TERM FROM REPOSITORY
- 60m STACK RELEASE FOR WASTE MANAGEMENT BUILDINGS 1 AND 2
- UNDER ACCIDENT CONDITIONS, DESIGN AND ADMINISTRATIVE CONTROLS WILL LIMIT DOSE TO THE MAXIMALLY EXPOSED MEMBER OF THE PUBLIC TO ≤ 500 mrem/yr (10 CFR 60.2).
- UNDER NORMAL OPERATING CONDITIONS, THE ANNUAL DOSE TO THE MAXIMALLY EXPOSED MEMBER OF THE PUBLIC WILL BE A FRACTION OF THE 25 mrem (WHOLE BODY) OR 75 mrem (ANY ORGAN) (40 CFR 61, SUBPART H).

SAFETY RELATED TECHNICAL ASSUMPTIONS

AIRBORNE RELEASES

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SAFETY RELATED TECHNICAL ASSUMPTIONS

- PROBABILISTIC RISK ASSESSMENT METHODOLOGY
- DOSE CALCULATIONS USING ICRP 26 AND 30
- FEDERAL AND STATE REGULATIONS IMPLEMENTING
  - ◊ RESOURCE CONSERVATION AND RECOVERY ACT
  - ◊ COMPREHENSIVE ENVIRONMENTAL RESPONSE AND COMPENSATION ACT
  - ◊ MINE SAFETY AND HEALTH ACT
  - ◊ TOXIC SUBSTANCE CONTROL ACT
  - ◊ CLEAN WATER ACT
  - ◊ CLEAN AIR ACT
- TO LIMIT EXPOSURES, ALARA APPLIES

KEY DRIVERS

OVERVIEW

- CONCEPT OF ADDRESSING EACH ISSUE
- ALLOCATION - JUDGEMENT FOR ESTIMATING THE AMOUNT OF TESTS

BWIP SITE CHARACTERIZATION

- PERFORMANCE BASED
- ISSUES DRIVEN

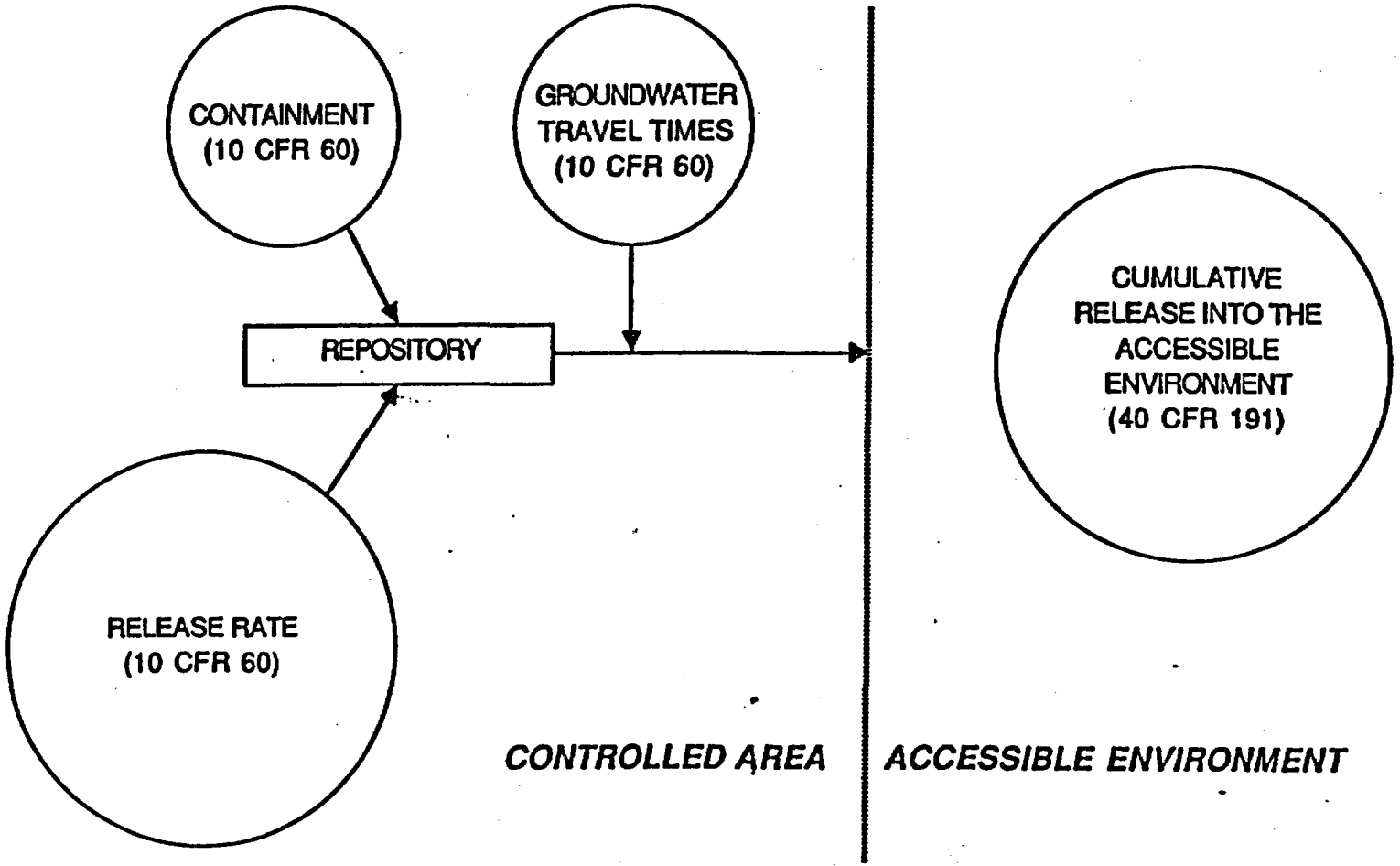
ASSESS PERFORMANCE

PERFORMANCE ASSESSMENT IS THE PROCESS OF QUANTITATIVELY EVALUATING COMPONENT, SUBSYSTEM AND SYSTEM BEHAVIOR, RELATING TO CONTAINMENT AND ISOLATION OF RADIOACTIVE WASTES, TO DETERMINE COMPLIANCE WITH THE NUMERICAL CRITERIA ASSOCIATED WITH 10 CFR PART 60.

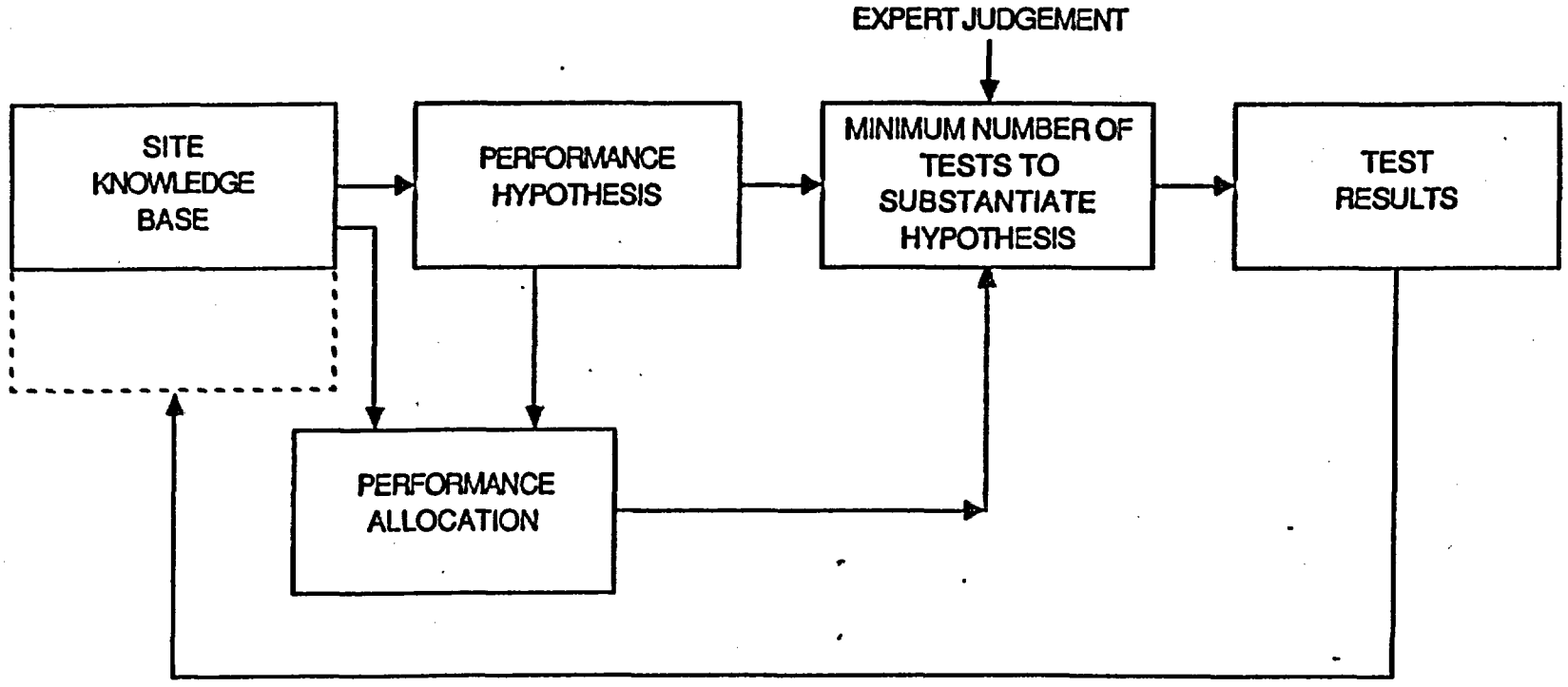
LICENSING STRATEGY

- SELECT & IDENTIFY BARRIERS TO BE RELIED UPON
- ESTABLISH CRITERIA FOR ISSUE CLOSURE
- OUTLINE TECHNICAL STRATEGIES
- IDENTIFIES CRITICAL ASSUMPTIONS
- IDENTIFY INFORMATION NEEDS

REPOSITORY PERFORMANCE CRITERIA



PERFORMANCE ALLOCATION - EXPERT JUDGEMENT - NUMBER OF TESTS



ISSUE CLOSURE

- HOW WILL IT HAPPEN?
- WHEN WILL IT HAPPEN?
- DYNAMIC FEEDBACK DURING TESTING

PA DEPARTMENT
SOFTWARE MANAGEMENT

- 103 POSTCLOSURE CODES INCLUDING PRE AND POST-PROCESSORS IDENTIFIED AND INVENTORIED
- 10 POTENTIAL* PRECLOSURE CODES IDENTIFIED
- CODES CONSOLIDATED INTO 61 WORKING PACKAGES WITH NEED DATES ASSIGNED
- 24 CODE CONTROL PROCEDURES IDENTIFIED; 14 COMPLETE (3/6/87)
- 4 DEPARTMENT DESK INSTRUCTIONS IDENTIFIED; 4 COMPLETE
- MASTER NETWORK AND GANT CHART UP ON PROJECT II
- DEPARTMENT ASSIGNMENT MATRIX IMPLEMENTED

---

* DOE-HQ PRAM WILL IDENTIFY MOST PRECLOSURE CODES

CODE BASELINE REQUIREMENTS SUMMARY

I. INVENTORY

II. CHECKLIST (PMPM 14-103)

III. UPGRADE DOCUMENTATION

- TASK NOTEBOOK (PMPM 14-111)
- REQUIREMENTS DOCUMENT (PMPM 14-115)
- TECHNICAL MODEL DESCRIPTION (PMPM 14-101)
- USER'S MANUAL (PMPM 14-101)

IV. APPROVE DOCUMENTATION BY FINAL INTERNAL DEVELOPMENT REVIEW (PMPM 14-108)

V. SUBMIT SOFTWARE TO IRM FOR CONFIGURATION CONTROL (PMPM 14-114)

PROCESS TO BRING EXISTING PERFORMANCE ASSESSMENT (PA) CODES UNDER INFORMATION MANAGEMENT (IRM) CHANGE CONTROL

I. INVENTORY

ALL PA HARDWARE AND SOFTWARE HAS BEEN INVENTORIED

II. CHECKLIST CODES (PMPM 14-103)

- PREPARE WRITTEN IDENTIFICATION OF DISCREPANCIES
- OBTAIN QUALITY ASSURANCE (QA) AGREEMENT ON RESOLUTION OF DISCREPANCIES

PROCESS TO BRING EXISTING PERFORMANCE ASSESSMENT (PA) CODES UNDER INFORMATION MANAGEMENT (IRM) CHANGE CONTROL (CONTINUED)

III. UPGRADE CODE DOCUMENTATION

MINIMAL DOCUMENTATION REQUIREMENTS FOR BRINGING EXISTING SOFTWARE UNDER CHANGE CONTROL

EACH VERSION OF A SOFTWARE PROGRAM WILL BE REQUIRED TO HAVE CERTAIN DOCUMENTATION DEPENDING ON THE USE OF THE OUTPUT, I.E., QUALITY LEVEL.

1) TASK NOTEBOOK (PROJECT WORKBOOK PMPM 14-111)
2) REQUIREMENTS DOCUMENT (PMPM 14-115)
3) TECHNICAL MODEL DESCRIPTION (PMPM 14-123/PMPM 14-101)
4) USER'S MANUAL (PMPM 14-123/PMPM 14-101)
   - PROGRAMMER'S REFERENCE SECTION
   - PROGRAM OPERATION SECTION

PROCESS TO BRING EXISTING PERFORMANCE ASSESSMENT (PA) CODES UNDER INFORMATION MANAGEMENT (IRM) CHANGE CONTROL (CONTINUED)

III. UPGRADE CODE DOCUMENTATION (CONTINUED)

1) AS A MINIMUM, THE TASK NOTEBOOK SHALL CONTAIN THE FOLLOWING:

- SOFTWARE SUMMARY (PER NUREG-0856)
- PROGRAM HISTORY INCLUDING OLD DOCUMENTATION AND ANY EXISTING DESIGN NOTES
- STATEMENT OF WORK
- CORRESPONDENCE
  - TECHNICAL
  - MANAGERIAL
- PROGRAM MANAGEMENT
  - ANY AVAILABLE HISTORICAL PLANS
  - ANY AVAILABLE HISTORICAL SCHEDULES
  - ANY AVAILABLE HISTORICAL WORK ORDERS
  - PLAN FOR BRINGING PROGRAM INTO IRM COMPLIANCE
  - CURRENT PLANS
  - CURRENT SCHEDULES
  - CURRENT WORK ORDERS
- TEST CASES
- TESTING STATUS AND RESULTS

PROCESS TO BRING EXISTING PERFORMANCE ASSESSMENT (PA) CODES UNDER INFORMATION MANAGEMENT (IRM) CHANGE CONTROL (CONTINUED)

III. UPGRADE CODE DOCUMENTATION (CONTINUED)

2) AS A MINIMUM THE REQUIREMENTS DOCUMENT SHALL SPECIFICALLY ADDRESS THE FOLLOWING:

- THEORETICAL BASIS
  - NARRATIVE OF PROGRAM HISTORY
  - REFERENCE LIST
- TRAINING REQUIREMENTS
- SECURITY REQUIREMENTS
- QUALITY REQUIREMENTS
  - CRITERIA FOR VALIDATION, VERIFICATION AND BENCHMARKING

3) THE TECHNICAL MODEL DESCRIPTION SHALL BE IN ACCORDANCE WITH SECTION B, NUREG-0856

PROCESS TO BRING EXISTING PERFORMANCE ASSESSMENT (PA) CODES UNDER INFORMATION MANAGEMENT (IRM) CHANGE CONTROL (CONTINUED)

III. UPGRADE CODE DOCUMENTATION (CONTINUED)

4) THE USER'S MANUAL SHALL BE COMPOSED OF TWO PARTS, A PROGRAMMER'S REFERENCE SECTION AND A PROGRAM OPERATIONS SECTION

THE PROGRAMMER'S REFERENCE SECTION SHALL CONTAIN THE FOLLOWING:

- GLOSSARY OF TERMS
- HARDWARE DEPENDENCIES/CURRENT OPERATING ENVIRONMENT
- MODULE DESCRIPTION FOR EACH MODULE
- TREE STRUCTURE OF MODULE RELATIONSHIPS
- SYSTEM FLOW DIAGRAMS (INCLUDING ALL PRO AND POST PROCESSORS)
- LISTING OF ALL MODULES (MODULES MUST BE DOCUMENTED)
- DISCUSSION OF DATA HANDLING BY PROGRAM
- DATA FILE DOCUMENTATION
- PROGRAM IMPLEMENTATION INSTRUCTIONS

PROCESS TO BRING EXISTING PERFORMANCE ASSESSMENT (PA) CODES UNDER INFORMATION MANAGEMENT (IRM) CHANGE CONTROL (CONTINUED)

III. UPGRADE CODE DOCUMENTATION (CONTINUED)

4) THE USER'S MANUAL SHALL BE COMPOSED OF TWO PARTS, A PROGRAMMER'S REFERENCE SECTION AND A PROGRAM OPERATIONS SECTION

THE PROGRAM OPERATIONS SECTION SHALL CONTAIN THE FOLLOWING:

- GENERAL PROGRAM DESCRIPTION
- SPECIFIC FUNCTION DESCRIPTIONS
- ERROR HANDLING
- DATA FILES
- INPUT DATA
- SYSTEM INTERFACES
  - COMMAND LANGUAGE
  - DEPENDENCIES (PRE AND POST PROCESSORS)
- OUTPUT
- EXAMPLES WHICH SHOW THE RUNSTREAMS, INPUT DATA AND OUTPUT FROM THE RUNS WITH IDENTIFYING AND DEFINING COMMENTS

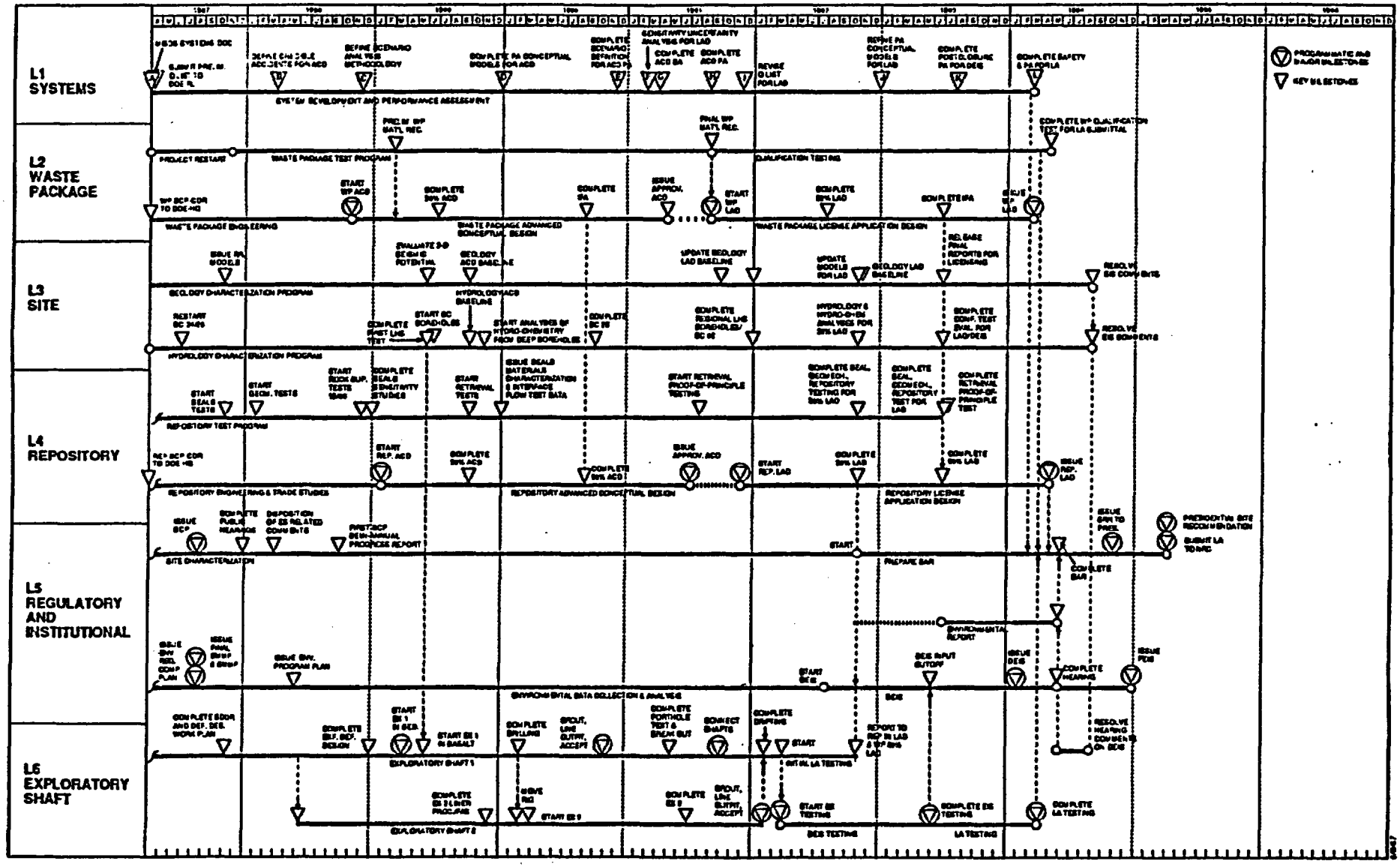
PROCESS TO BRING EXISTING PERFORMANCE ASSESSMENT (PA)
CODES UNDER INFORMATION MANAGEMENT (IRM)
CHANGE CONTROL (CONTINUED)

IV. REVIEW AND APPROVE MODEL DOCUMENTATION FINAL INTERNAL DEVELOPMENT REVIEW (PMPM 14-108)

PROCESS TO BRING EXISTING PERFORMANCE ASSESSMENT (PA) CODES UNDER INFORMATION MANAGEMENT (IRM) CHANGE CONTROL (CONTINUED)

V. SUBMIT SOFTWARE TO IRM FOR CONFIGURATION CONTROL (PMPM 14-114)

BWIP MASTER PROJECT SCHEDULE
Revision 0 - 2/12/87



AGENDA

JUNE 18, 1987

CURRENT WORK

SCP SECTIONS 8.2 & 8.3	THIES	RHO-BWIP	1:00 - 1:10
PA PLAN PRODUCTION & CONTENT	SONNICHSEN	RHO-BWIP	1:10 - 1:20
PROJECT BASELINE DEVELOPMENT	THIES	RHO-BWIP	1:20 - 1:30
CODE DOCUMENTATION & QUALITY CONTROL	THIES/KLINE	RHO-BWIP	1:30 - 1:40
PREPARATION OF PERFORMANCE ANALYSIS PLANS			1:40 - 1:50
SYSTEMS	SONNICHSEN	RHO-BWIP	1:50 - 1:55
SITE	ARNETT	RHO-BWIP	1:55 - 2:00
WASTE PACKAGE REPOSITORY	TERRY	RHO-BWIP	2:00 - 2:05
SAFETY IMPLEMENTATION PLAN PREPARATION	DUKELOW	RHO-BWIP	2:05 - 2:15
SAFETY ANALYSIS PLANNING	DUKELOW	RHO-BWIP	2:15 - 2:25
Q-LIST DEVELOPMENT & CONTROL	DUKELOW	RHO-BWIP	2:25 - 2:30

FUTURE WORK

BREAK 2:50 - 3:300

SITE	ARNETT	RHO-BWIP
WASTE PACKAGE REPOSITORY	TERRY	RHO-BWIP
SYSTEMS	SONNICHSEN	RHO-BWIP
PRECLOSURE SAFETY	DUKELOW	RHO-BWIP

BUDGET REVIEW

FY 88 ACTIVITIES	KNEPP	DOE-RL	3:00 - 3:15
5 YEAR FORECAST			3:15 - 3:30

CURRENT WORK

SCP SECTIONS

8.2.2.1.1

8.2.2.1.2

8.2.2.1.3

8.2.2.1.6

8.2.2.2.1

8.2.2.2.2

8.2.2.2.3

8.2.2.2.5

8.3.2.5

8.3.3 (SUPPORT)

8.3.4 (SUPPORT)

8.3.5

PERFORMANCE ASSESSMENT PLAN

PERFORMANCE ASSESSMENT PLAN

PURPOSE:

- A MORE DETAILED PLANNING DOCUMENT THAT COMPLEMENTS THE SCP SECTION 8.3.5.
- OUTLINES A MULTI-YEAR (5 YEAR) PLAN FOR THE BWIP PERFORMANCE ASSESSMENT DEPARTMENT

FORMAT:

- EXTENSIVE USE OF TABLES
- IDENTIFY MILESTONES AND DELIVERABLES
- MINIMIZE TEXT

OUTLINE OF PERFORMANCE ASSESSMENT PLAN

SECTION	RESPONSIBILITY
1.0 Introduction	
1.1 General Discussion - Purpose of PAP - Role of PAP in BWIP document hierarchy	J. C. Sonnichsen
1.2 Responsibilities - Scope of PA activities - Responsibilities of PA Department and organizations - Major PA milestones (limit to 8/group)	J. C. Sonnichsen J. A. Thies
2.0 Resolution of Performance Issues (Issue by Issue breakdown limit discussion of each Issue to 1 page) - Statement of Issue - Approach to Issue Resolution (summary of of IRS) - Analytical methodology - Data needs	J. C. Sonnichsen 1.1, 1.2, 1.3, 1.8, 1.9 J. S. Dukelow 2.1, 2.2, 2.3, 1.7, 2.4, 2.5, 4.1 R. C. Arnett 1.6 W. K. Terry 1.4, 1.5
3.0 Special Topics (planned studies and position papers) * Organized and prepared by each group	Group Managers
4.0 Summary of Planned Activities Present in tabular form activities, timetable, resources, WBS derived from logics * Organized and prepared by each group	Group Managers
Appendices:	
A) Activity Network - summary of logics	Group Managers
B) Software QA - IRM procedures - Plan for computer code documentation - Verification, benchmarking	J. C. Sonnichsen
C) Code and Model Description	Group Managers
D) Approach to Model Validation	J. C. Sonnichsen

SCHEDULE

	ACTIVITY	DUE DATE
1.	PREPARE OUTLINE	JUNE 10, 1987
2.	PREPARE EXPANDED LOGICS	JUNE 17, 1987
3.	COMPLETE DRAFT INPUT	JULY 3, 1987
4.	COMPLETE REVISED DRAFT	JULY 20, 1987
5.	COMPLETE FINAL DRAFT	AUGUST 5, 1987
6.	COMPLETE TEXT PREPARATION	AUGUST 21, 1987
7.	SUBMIT DRAFT TO DOE-RL	AUGUST 28, 1987

PROJECT BASELINE DEVELOPMENT

6.2. DISPOSAL SYSTEM VERIFICATION

6.2.1. PRE-CLOSURE SAFETY ANALYSIS

6.2.1.1. SAFETY ANALYSIS FOR LICENSED ACTIVITIES

6.2.1.2. SAFETY ANALYSIS FOR UNLICENSED ACTIVITIES

6.2.2. POST-CLOSURE PERFORMANCE ASSESSMENT

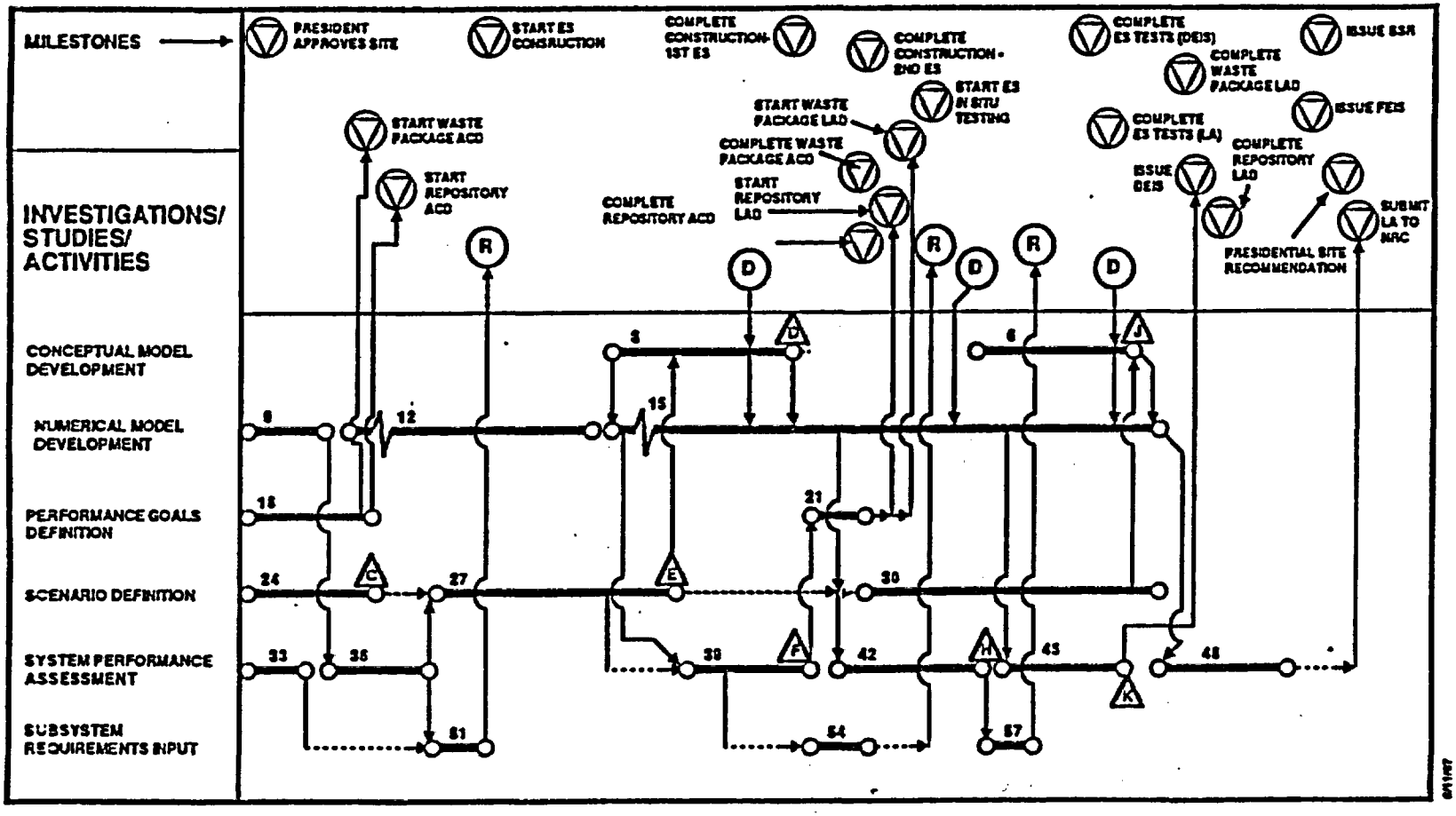
6.2.2.1. SITE SUBSYSTEM PERFORMANCE ASSESSMENT

6.2.2.2. ENGINEERED BARRIER SUBSYSTEM PERFORMANCE ASSESSMENT

6.2.2.3. SEALS SUBSYSTEM PERFORMANCE ASSESSMENT

6.2.2.4. GEOLOGIC REPOSITORY SYSTEM PERFORMANCE ASSESSMENT

SCP POSTCLOSURE PERFORMANCE ASSESSMENT - GEOLOGIC REPOSITORY SYSTEM



3 DEFINE CONCEPTUAL MODELS FOR ACD PPA

6 DEFINE CONCEPTUAL MODELS FOR LA PPA

9 ISSUE DATA BASE FOR S/U ANALYSIS

12 ISSUE COMPUTER CODE DOCUMENTATION

15 COMPLETE CODE V/B, MODEL VALIDATION

18 DEFINE ALLOCATION METHODOLOGY AND ALLOCATIONS FOR ACD

21 DEFINE ALLOCATIONS FOR LAD

24 DEFINE SCENARIO ANALYSIS METHODOLOGY

27 DEFINE SCENARIOS FOR ACD PPA

30 DEFINE SCENARIOS FOR LA PPA

33 CONDUCT PPA FOR SCP DESIGN

36 CONDUCT S/U ANALYSIS FOR SCENARIO SELECTION

39 CONDUCT S/U ANALYSIS FOR LAD ALLOCATION AND ISSUE RESOLUTION STRATEGY UPDATE

42 CONDUCT PPA FOR ACD AND ISSUE RESOLUTION STRATEGY UPDATE

45 CONDUCT PPA FOR DEIS

48 CONDUCT PPA FOR LA AND ISSUE CLOSURE

51 DEFINE SITE INFORMATION REQUIREMENTS FOR SCENARIO DEFINITIONS

54 DEFINE INFORMATION REQUIREMENTS FOR DATA BASE UPGRADE

57 DEFINE INFORMATION AND REDESIGN REQUIREMENTS BASED ON ACD PPA

A METHODOLOGY FOR ANALYSIS OF OFF NORMAL SCENARIOS

D CONCEPTUAL MODELS FOR ACD

E SCENARIO DEFINITION

F SENSITIVITY ANALYSIS FOR LAD

J CONCEPTUAL MODELS FOR LA

H ACD - PA

K DEIS - PA

ABBREVIATIONS:

ACD = ADVANCED CONCEPTUAL DESIGN
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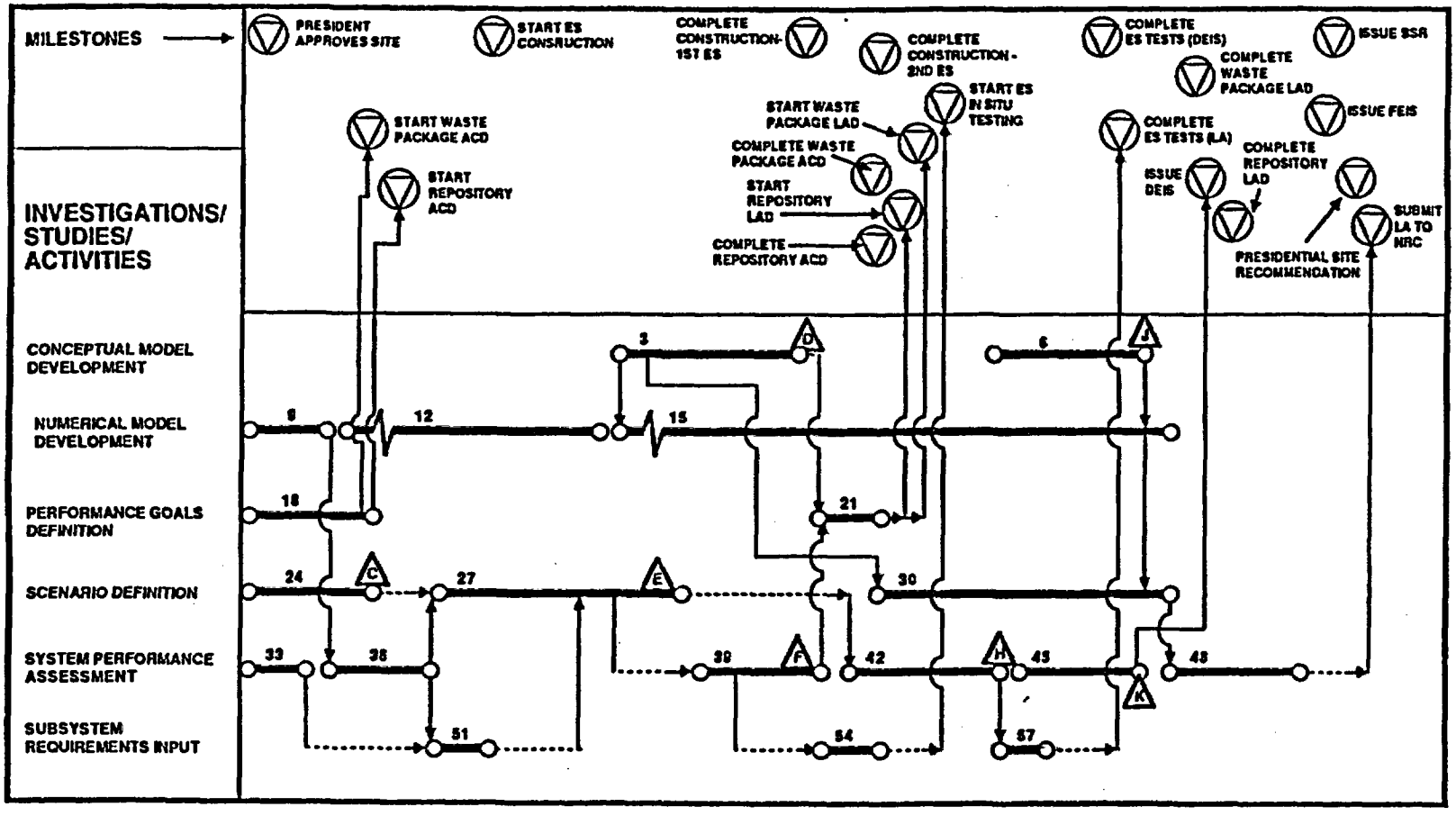
ES = EXPLORATORY SHAFT
FEIS = FINAL ENVIRONMENTAL IMPACT STATEMENT
LA = LICENSE APPLICATION
LAD = LICENSE APPLICATION DESIGN
PPA = POSTCLOSURE PERFORMANCE ASSESSMENT
SCP = SITE CHARACTERIZATION PLAN
S/U = SENSITIVITY/UNCERTAINTY
V/B = VERIFICATION/BENCHMARKING

R REQUIREMENTS FOR RESEARCH AND DESIGN INFORMATION

D DATA FROM RESEARCH AND DESIGN ACTIVITIES

SCP POSTCLOSURE PERFORMANCE ASSESSMENT - ENGINEERED BARRIERS SUBSYSTEM



3	DEFINE CONCEPTUAL MODELS FOR ACD PPA	24	DEFINE SCENARIO ANALYSIS METHODOLOGY	45	CONDUCT PPA FOR DEIS	C	METHODOLOGY FOR ANALYSIS OF OFF NORMAL SCENARIOS
6	DEFINE CONCEPTUAL MODELS FOR LA PPA	27	DEFINE SCENARIOS FOR ACD PPA	48	CONDUCT PPA FOR LA	D	CONCEPTUAL MODELS FOR ACD
9	ISSUE DATA BASE FOR S/U ANALYSIS	30	DEFINE SCENARIOS FOR LA PPA	51	DEFINE SITE INFORMATION REQUIREMENTS FOR SCENARIO DEFINITIONS	E	SCENARIO DEFINITION
12	ISSUE COMPUTER CODE DOCUMENTATION	33	CONDUCT PPA FOR SCP DESIGN	54	DEFINE INFORMATION REQUIREMENTS FOR DATA BASE UPGRADE	F	SENSITIVITY ANALYSIS FOR LAD
15	COMPLETE CODE V / B, MODEL VALIDATION	36	CONDUCT S / U ANALYSIS FOR SCENARIO SELECTION	57	DEFINE INFORMATION AND REDESIGN REQUIREMENTS BASED ON ACD PPA	J	CONCEPTUAL MODELS FOR LA
18	DEFINE ALLOCATION METHODOLOGY AND ALLOCATIONS FOR ACD	39	CONDUCT S / U ANALYSIS FOR LAD ALLOCATION			H	ACD - PA
21	DEFINE ALLOCATIONS FOR LAD	42	CONDUCT PPA FOR ACD			K	DEIS - PA

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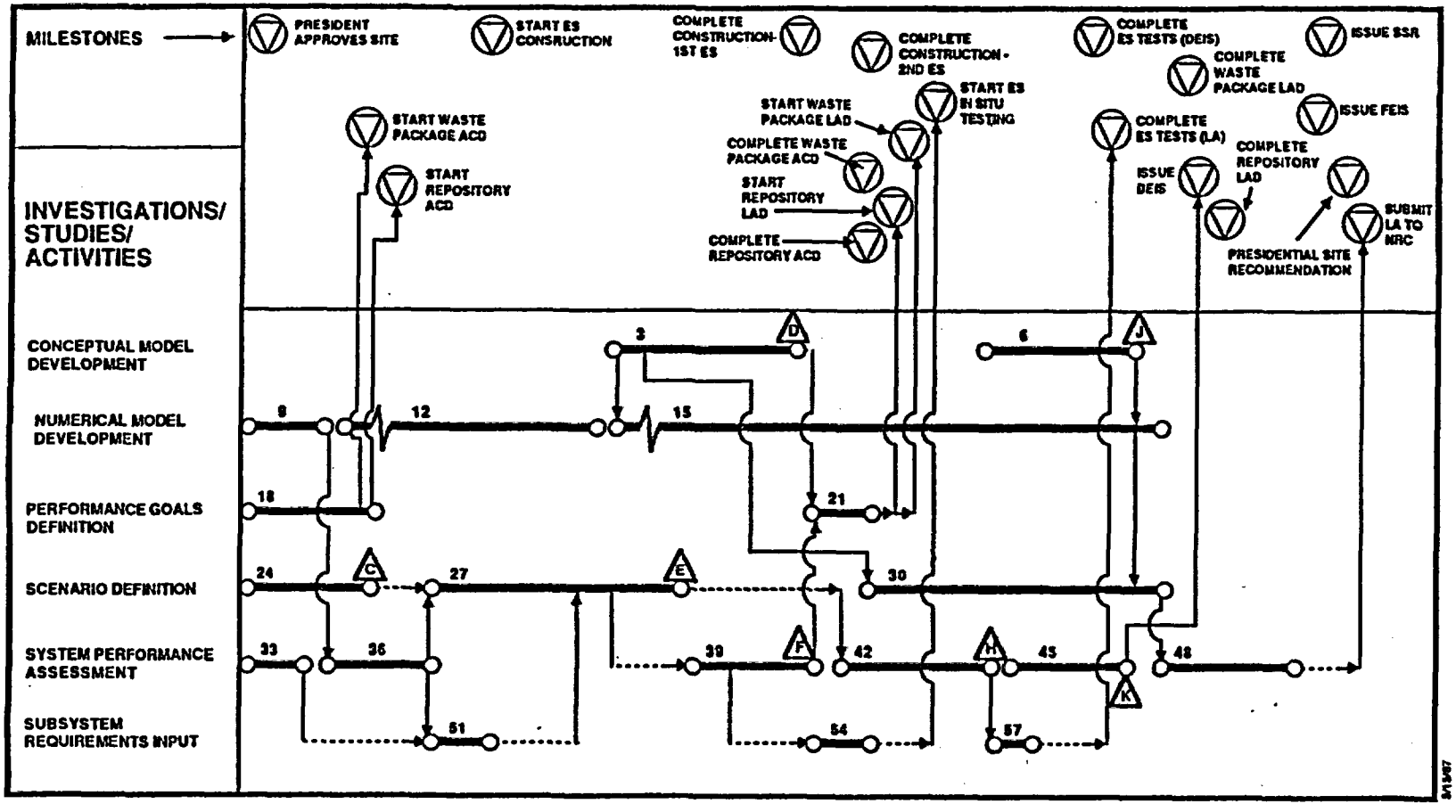
SCP POSTCLOSURE PERFORMANCE ASSESSMENT - SEALS SUBSYSTEM



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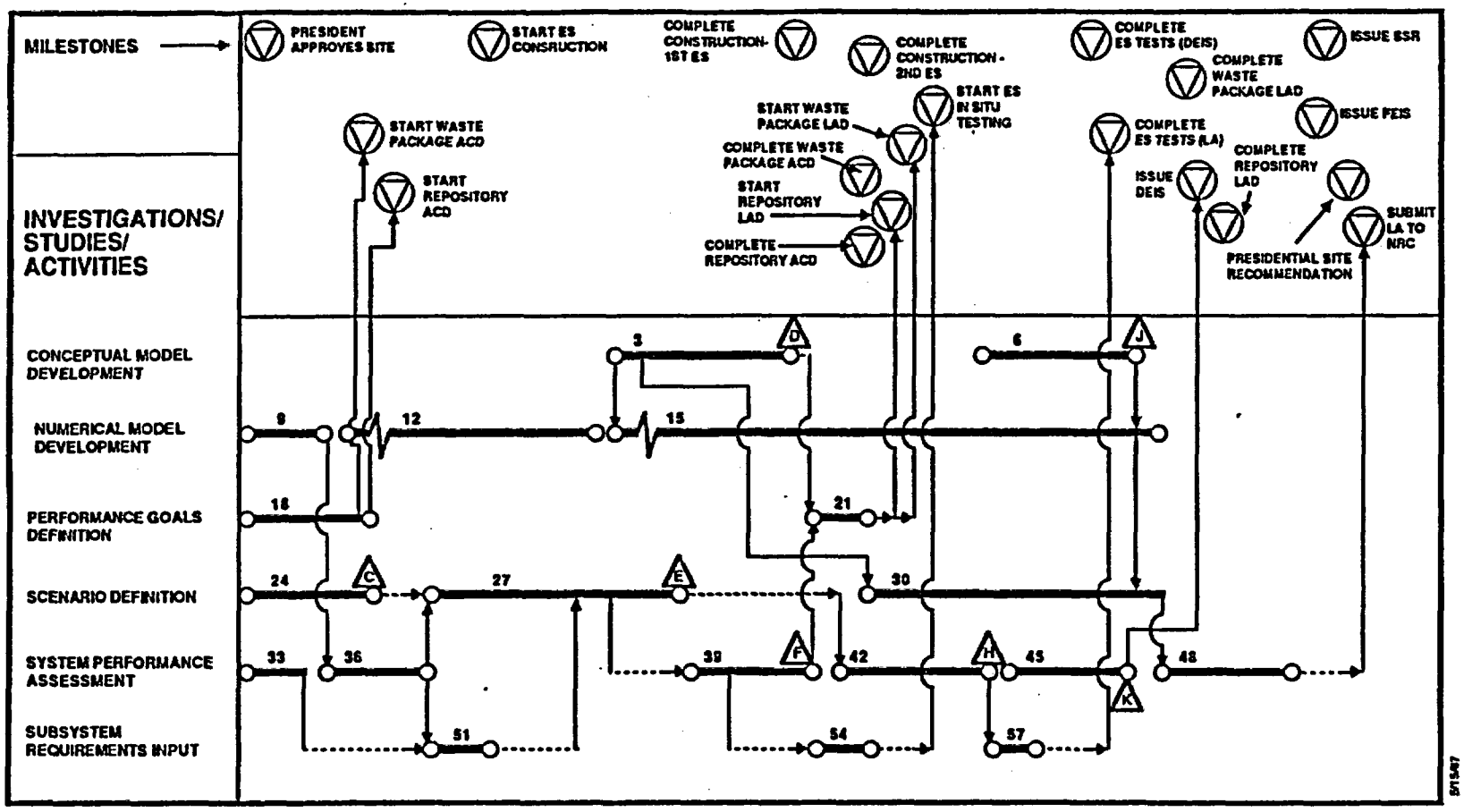
SCP POSTCLOSURE PERFORMANCE ASSESSMENT - SITE SUBSYSTEM



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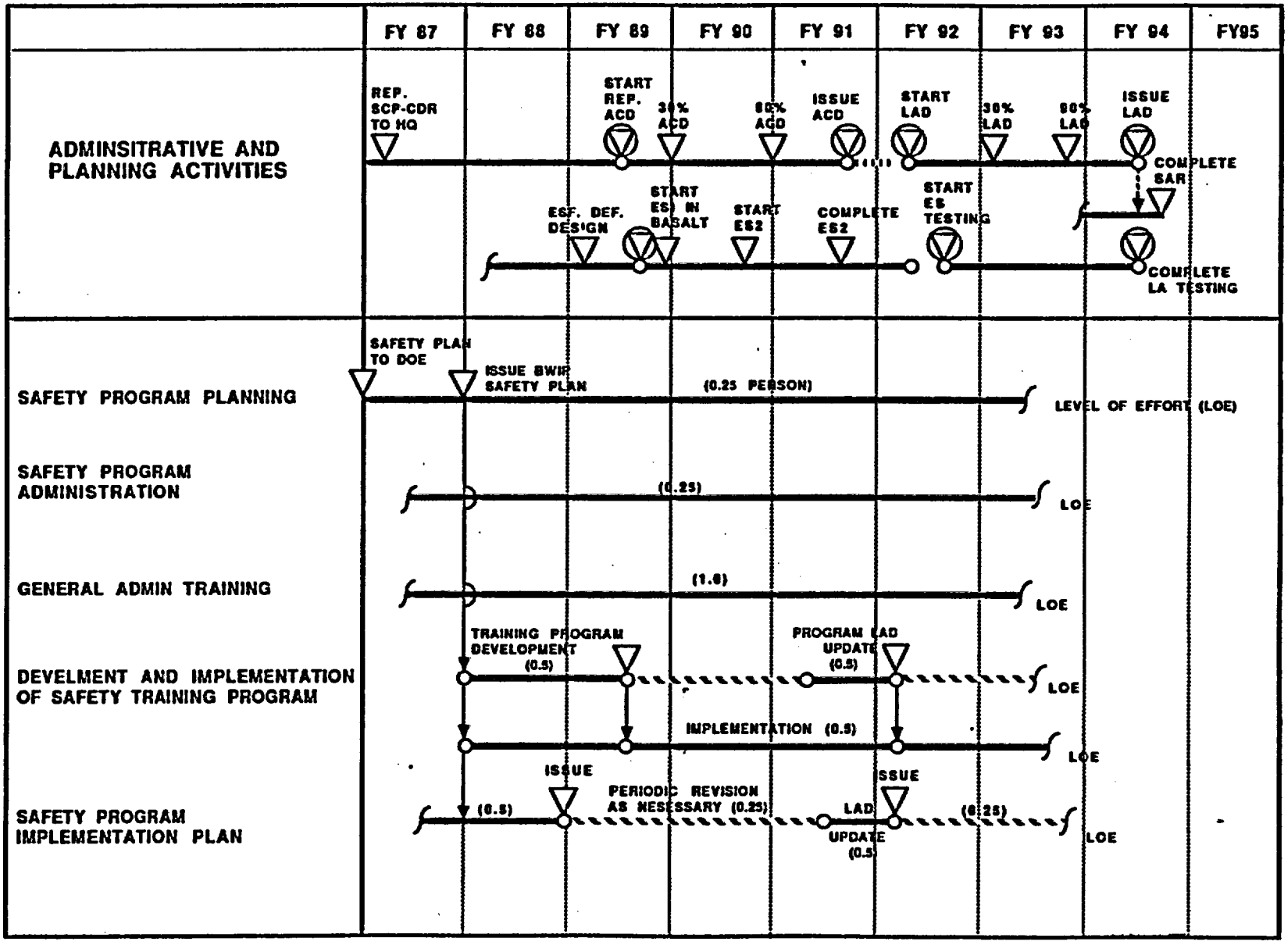
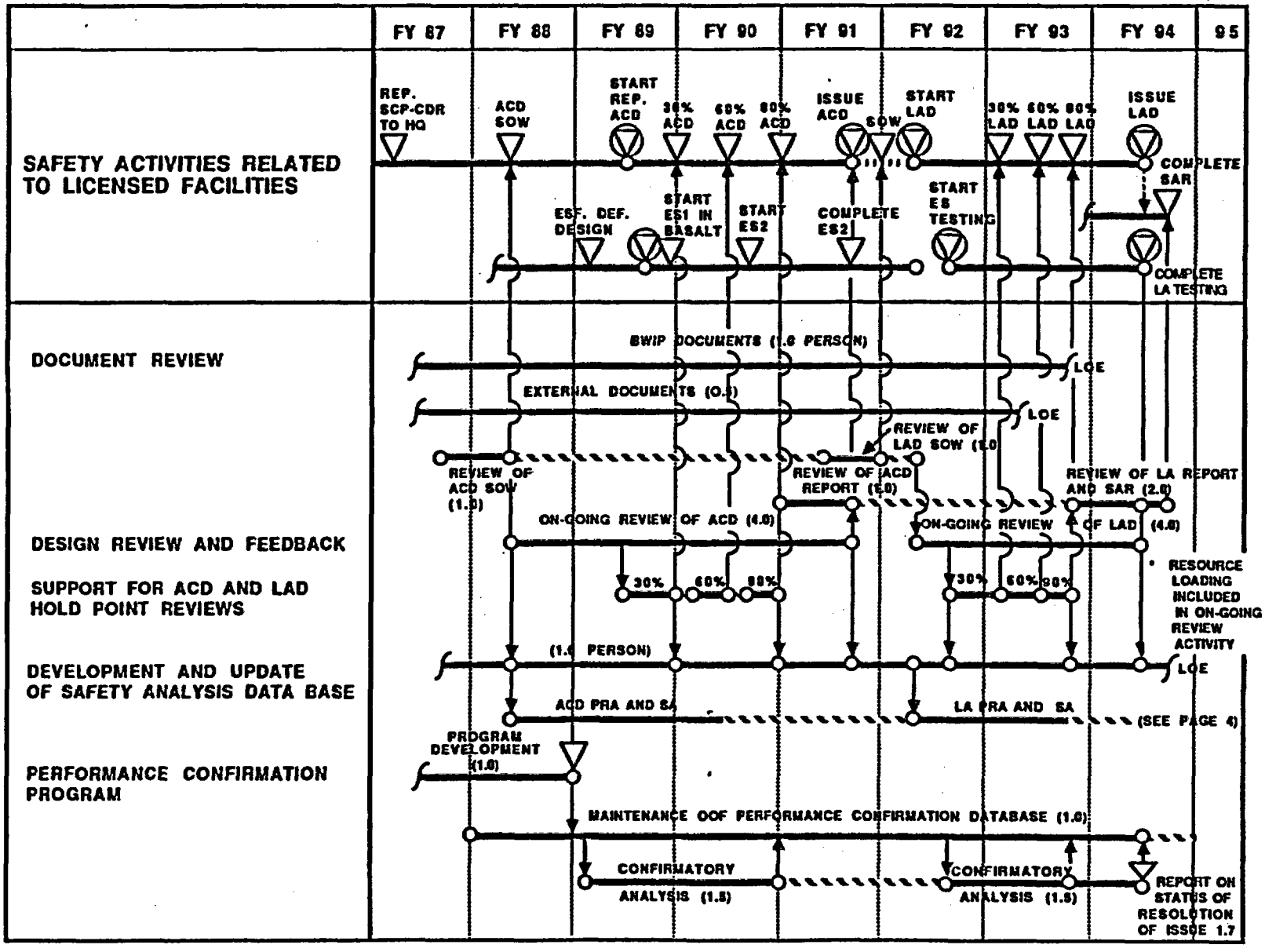
SCHEDULE 1

SCP PRECLOSURE SAFETY SCHEDULE



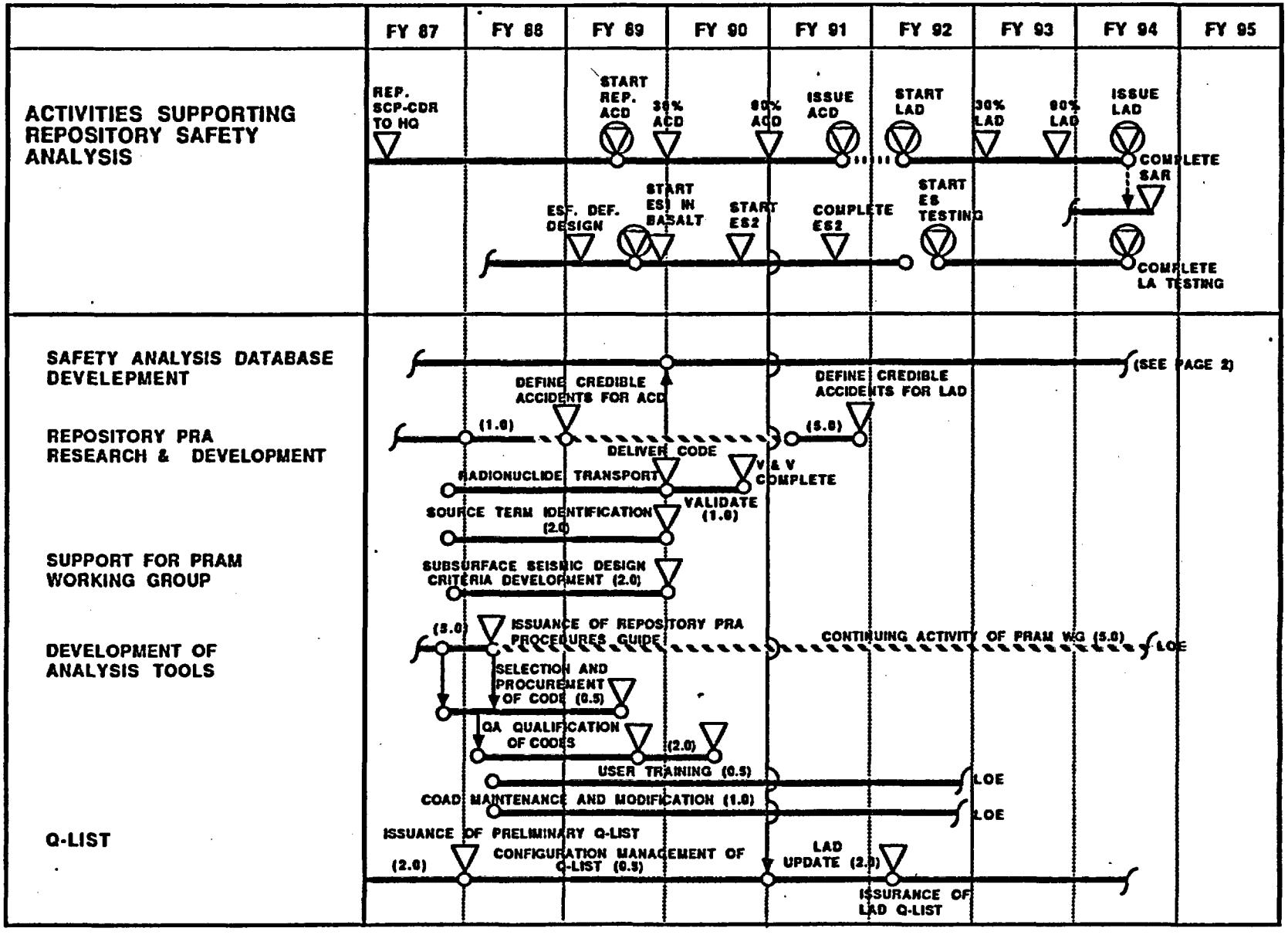
SCHEDULE 2

SCP PRECLOSURE SAFETY SCHEDULE



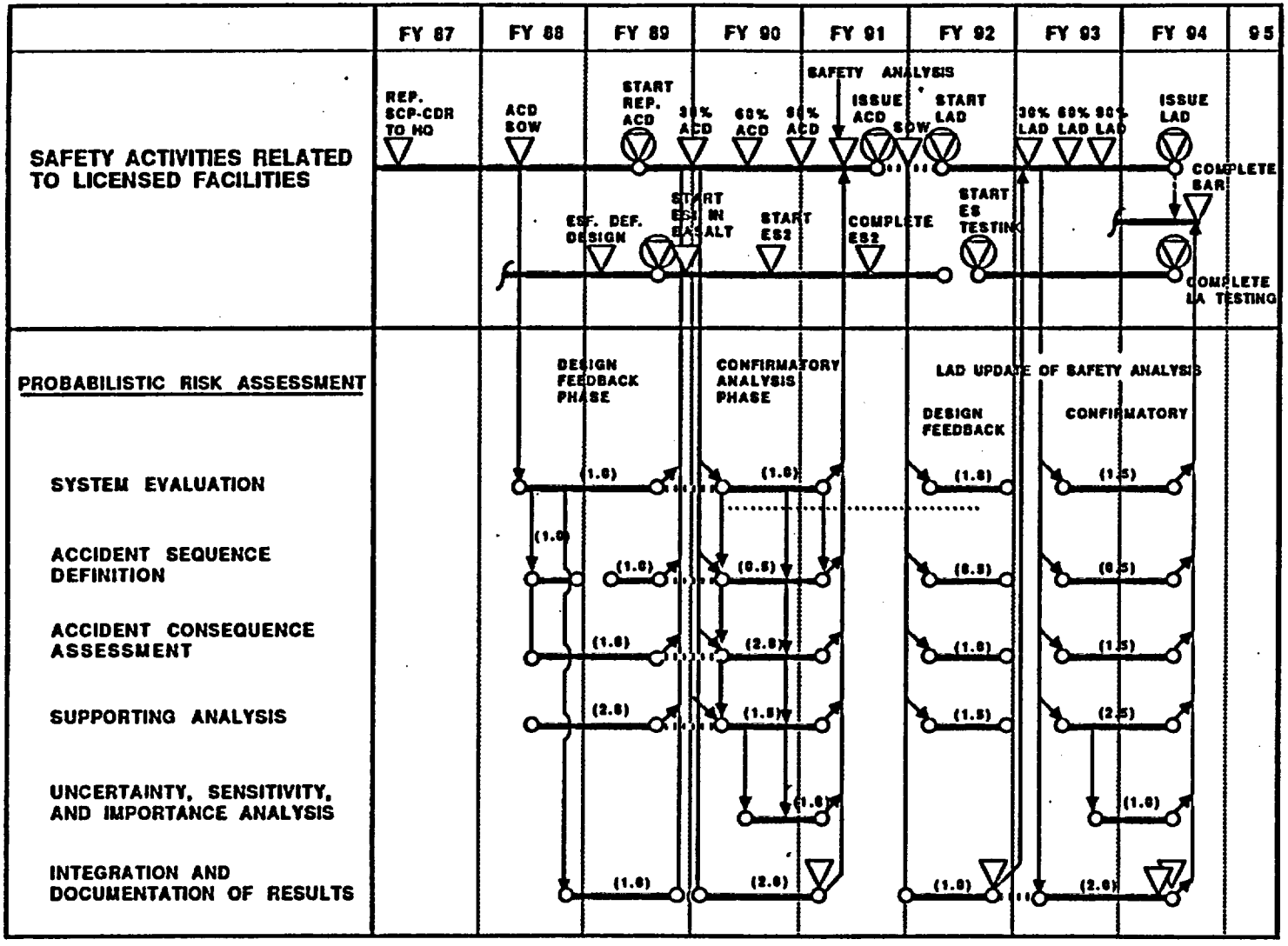
SCHEDULE 3

SCP PRECLOSURE SAFETY SCHEDULE



SCHEDULE 4

SCP PRECLOSURE SAFETY SCHEDULE



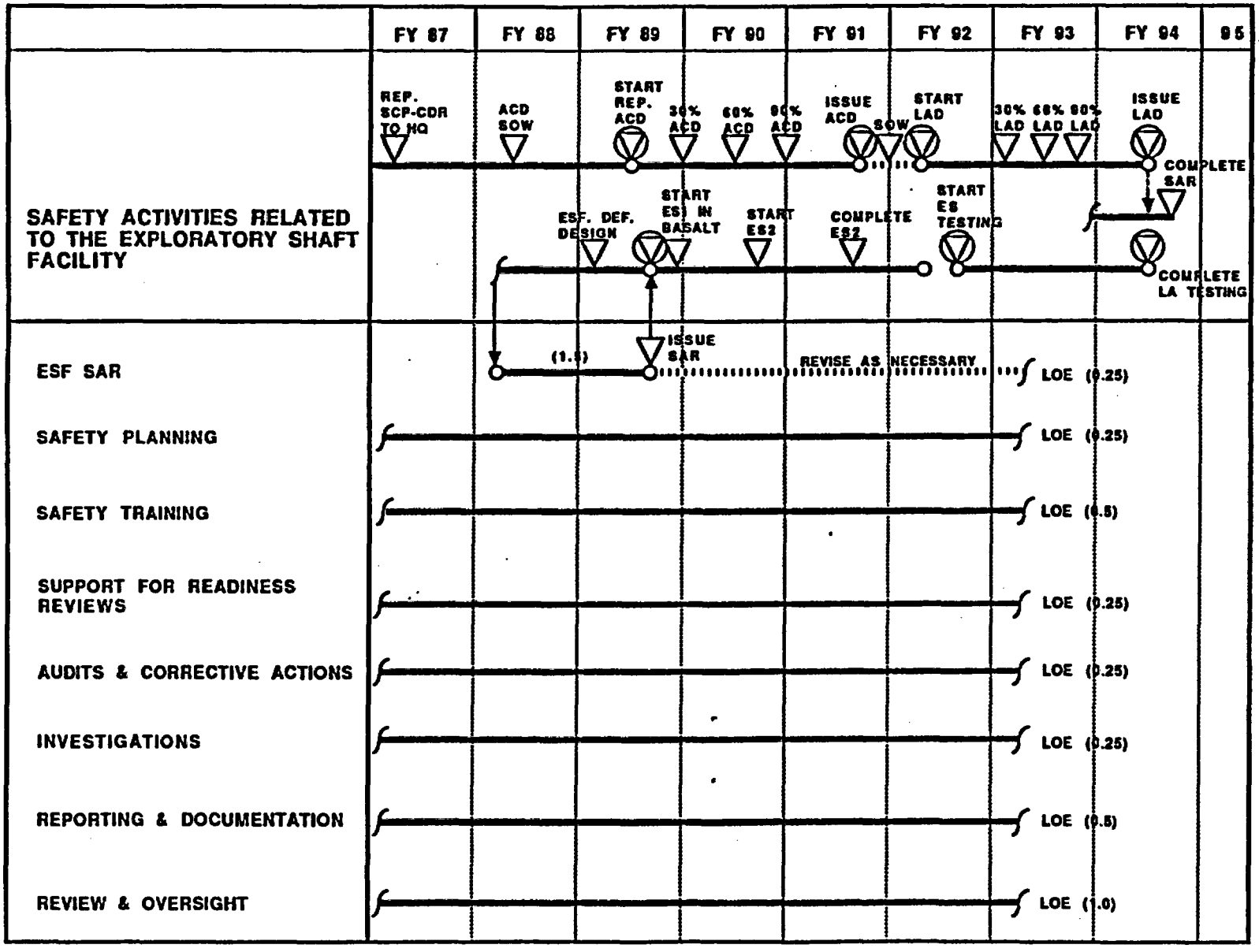
SUPPORTING ANALYSES

- SEISMIC
- CONFINEMENT & VENTILATION
- WASTE HANDLING
- CONTROL SYSTEMS & ROBOTICS
- FIRE & EXPLOSION
- REPOSITORY BACKOUT
- MISCELLANEOUS ANALYSES

6/12/87

SCHEDULE 5

SCP PRECLOSURE SAFETY SCHEDULE



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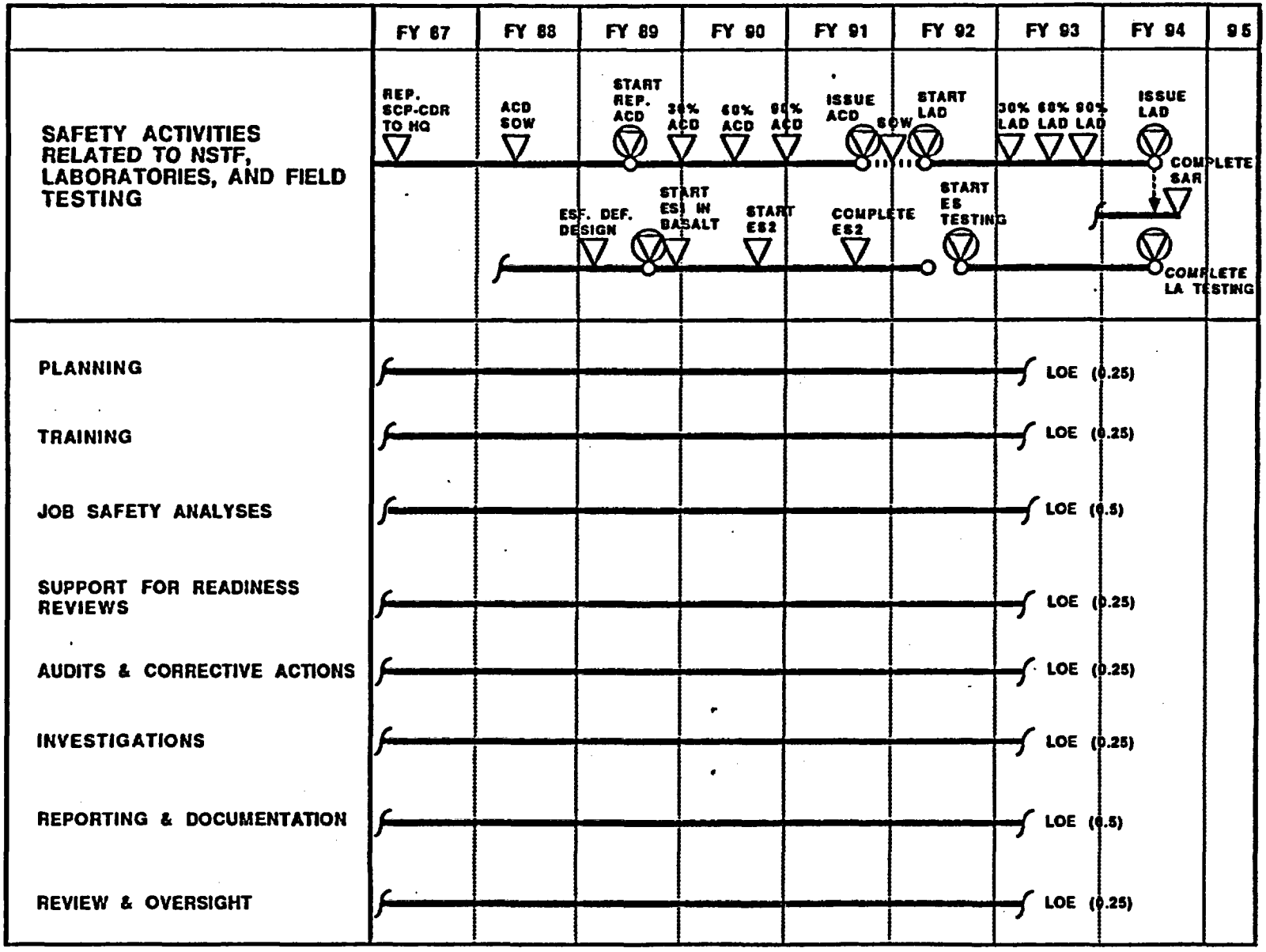
SCHEDULE 6

SCP PRECLOSURE SAFETY SCHEDULE



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CODE DOCUMENTATION

AND

QUALITY CONTROL

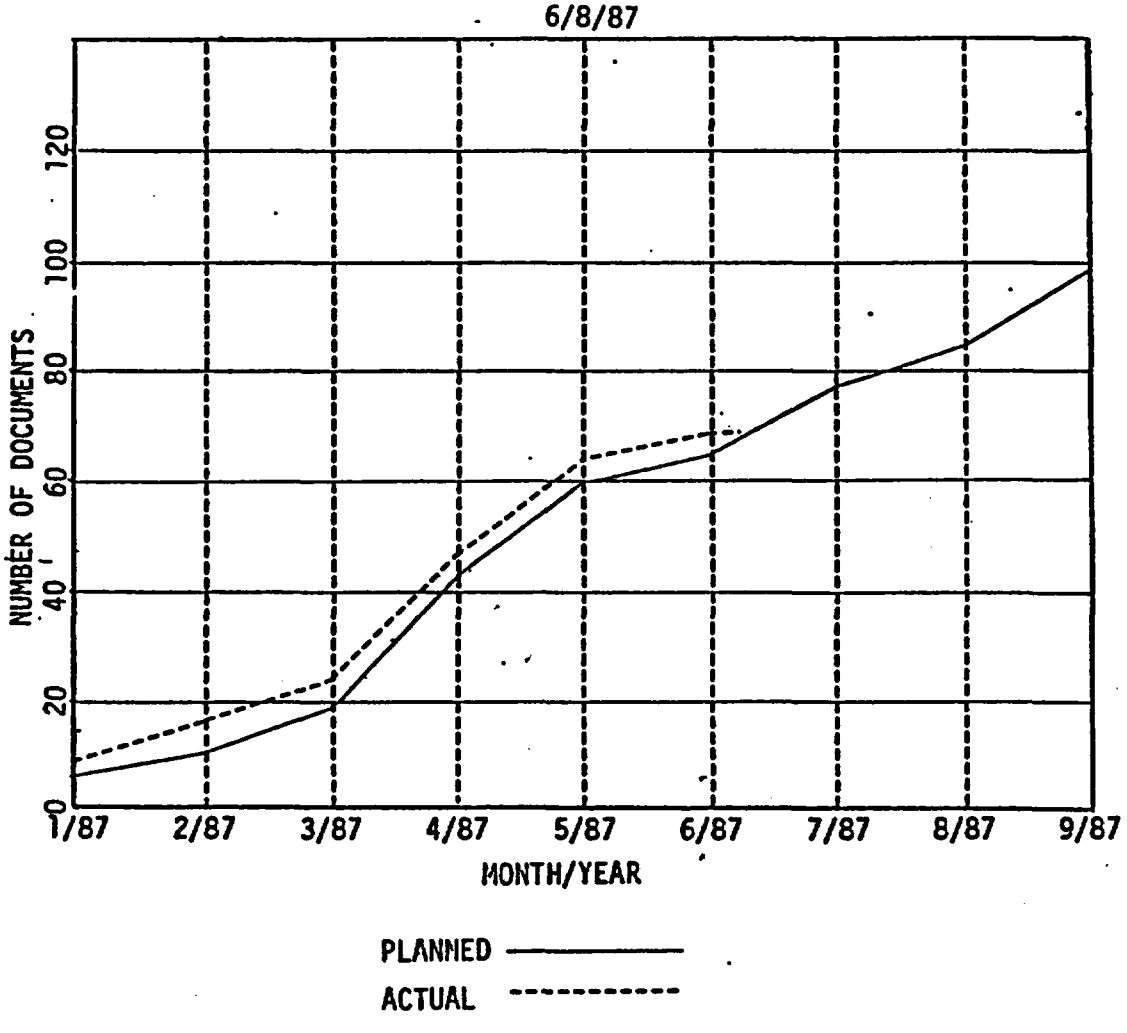
PERFORMANCE ASSESSMENT DEPARTMENT
FINAL INTERNAL DEVELOPMENT REVIEW SCHEDULE

SOFTWARE CODE PACKAGE	QUALITY LEVEL	CHECKLIST COMPLETED	TASK NOTEBOOK COMPLETED	REQUIRED DOCUMENTS COMPLETED	TECHNICAL REPORT COMPLETED	USERS GUIDE COMPLETED	TECHNICAL DESCRIPTION COMPLETED	FINAL INTERNAL DEVELOPMENT REVIEW DATE
AE.AQUS	1	COMPLETE	--TBD--	--N/A--	--N/A--	--N/A--	--N/A--	/ /
AC INA	1	COMPLETE	--TBD--	--N/A--	--N/A--	--N/A--	--N/A--	/ /
AN SYS	1	--TBD--	--TBD--	--TBD--	--N/A--	--TBD--	--TBD--	/ /
CH.AINT	1	COMPLETE	COMPLETE	TECH PUB	--N/A--	COMPLETE*	08/01/87	/ /
CH.AINT.MC	1	COMPLETE	08/01/87	--N/A--	01/08/88	--N/A--	--N/A--	/ /
CH.AINT.MCI	3	COMPLETE	08/01/87	--N/A--	01/08/88	--N/A--	--N/A--	/ /
CH TFLX	1	COMPLETE	COMPLETE	--N/A--	TECH PUB	--N/A--	--N/A--	/ /
CC MCYL	3	ARCHIVED	ARCHIVED	--N/A--	--N/A--	ARCHIVED	--N/A--	/ /
EF ASTAT	1	COMPLETE	COMPLETE	08/14/87	--N/A--	09/30/87	07/17/87	/ /
FC3INV	3	COMPLETE	06/01/87	--N/A--	--N/A--	--N/A--	--N/A--	/ /
FE.2INV	1	COMPLETE	08/01/87	08/01/87	--N/A--	11/01/87	08/01/87	/ /
FE.2SEN	3	COMPLETE	06/01/87	--N/A--	--N/A--	--N/A--	--N/A--	/ /
FE3INV	3	08/03/87	03/01/88	--N/A--	--N/A--	--N/A--	--N/A--	/ /
FE3SEN	3	06/15/87	03/01/88	--N/A--	--N/A--	--N/A--	--N/A--	/ /
FE DTRA-3D	3	06/15/87	07/15/87	--N/A--	--N/A--	--N/A--	--N/A--	/ /
FF.ACSAM	3	COMPLETE	--TBD--	--N/A--	--N/A--	--N/A--	--N/A--	/ /
FF.AC_CALL	3	COMPLETE	--TBD--	--N/A--	--N/A--	--N/A--	--N/A--	/ /
GE DTHER	1	COMPLETE	09/01/87	06/30/87	--N/A--	09/01/88	09/01/88	/ /
HE.ATING5	3	COMPLETE	COMPLETE	--N/A--	--N/A--	--N/A--	--N/A--	/ /
HE ATING6	3	04/01/88	04/01/88	--N/A--	--N/A--	--N/A--	--N/A--	/ /
HE XGEN (PREPROCESSOR)	3	COMPLETE	COMPLETE	--N/A--	--N/A--	--N/A--	--N/A--	/ /
KE NUC	1	--TBD--	--TBD--	TECH PUB	--N/A--	--TBD--	--TBD--	/ /
LH.3	3	COMPLETE	--TBD--	--N/A--	--N/A--	--N/A--	--N/A--	/ /
MAGNUM-2D	1	COMPLETE	01/15/88	01/15/88	--N/A--	COMPLETE*	05/01/88	/ /
MAGNUM-2D (POSTPROCESSORS)	3	09/15/87	03/15/88	--N/A--	--N/A--	--N/A--	--N/A--	/ /
MAGNUM-2D (PREPROCESSORS)	3	08/31/87	03/15/88	--N/A--	03/15/88	--N/A--	--N/A--	/ /
MAGNUM-3D	1	COMPLETE	COMPLETE	COMPLETE	--N/A--	COMPLETE*	06/01/87	/ /
MAGNUM-3D (POSTPROCESSORS)	3	COMPLETE	COMPLETE	--N/A--	--N/A--	--N/A--	--N/A--	/ /
MAGNUM-3D (PREPROCESSORS)	3	COMPLETE	COMPLETE	--N/A--	--N/A--	--N/A--	--N/A--	/ /
MH DE	3	COMPLETE	06/05/87	--N/A--	COMPLETE*	--N/A--	--N/A--	/ /
NE TWORK	3	COMPLETE	COMPLETE	--N/A--	--TBD--	--N/A--	--N/A--	/ /
ONEDANT	3	ARCHIVED	ARCHIVED	--N/A--	--N/A--	--N/A--	--N/A--	/ /
OF_GEN2	1	--TBD--	--TBD--	--TBD--	--N/A--	--TBD--	--TBD--	/ /
PACLIFE	3	COMPLETE	COMPLETE	--N/A--	--N/A--	--N/A--	--N/A--	/ /

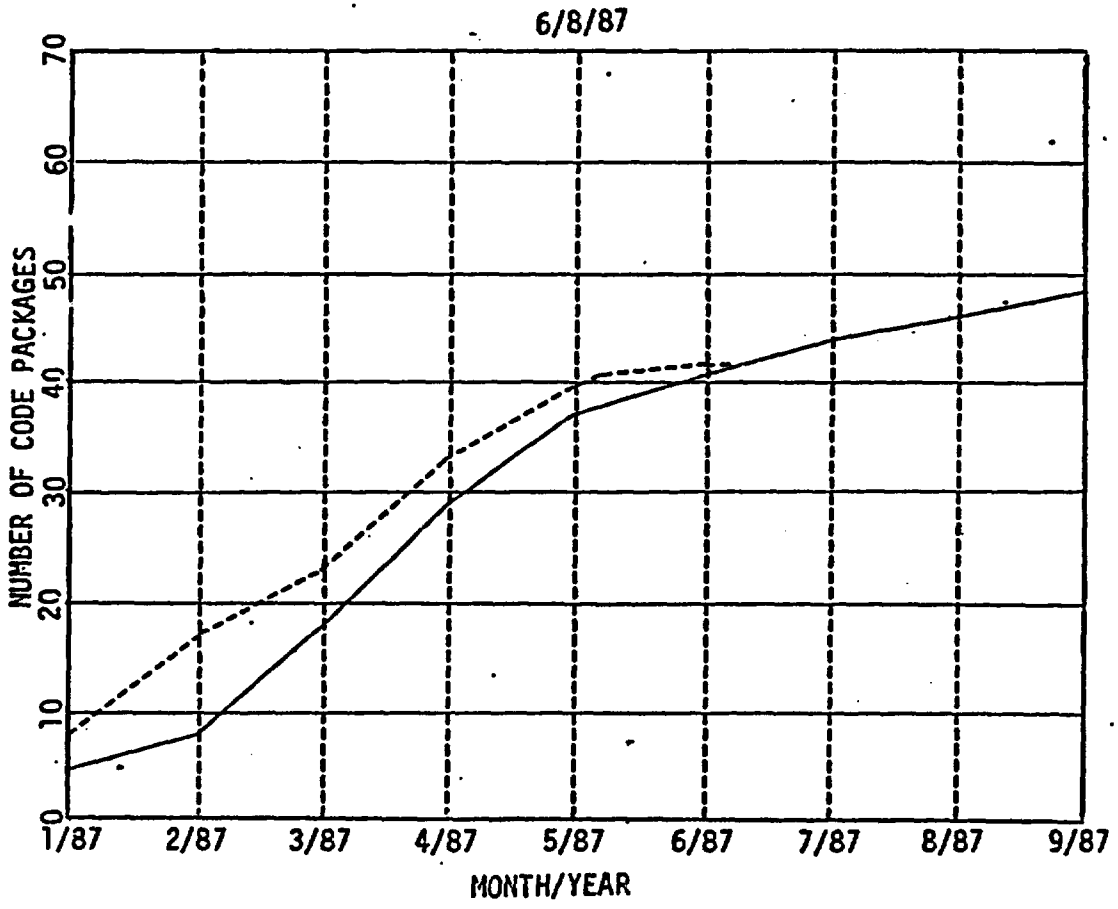
PERFORMANCE ASSESSMENT DEPARTMENT
FINAL INTERNAL DEVELOPMENT REVIEW SCHEDULE

SOFTWARE CODE PACKAGE	QUALITY LEVEL	CHECKLIST COMPLETED	TASK NOTEBOOK COMPLETED	REQUIRED DOCUMENTS COMPLETED	TECHNICAL REPORT COMPLETED	USERS GUIDE COMPLETED	TECHNICAL DESCRIPTION COMPLETED	FINAL INTERNAL DEVELOPMENT REVIEW DATE
PACSTAT	1	COMPLETE	07/01/87	--N/A--	09/15/87	--N/A--	--N/A--	/ /
PATH-2D	1	COMPLETE	05/15/88	--N/A--	05/15/88	--N/A--	--N/A--	/ /
PATH-3D	3	COMPLETE	COMPLETE	--N/A--	TECH PUB	--N/A--	--N/A--	/ /
PATRAN	3	COMPLETE	--TBD--	--N/A--	--N/A--	--N/A--	--N/A--	/ /
PCM.STAT	1	05/29/87	09/01/87	09/01/88	--N/A--	09/01/88	09/01/88	/ /
PDRAW	3	COMPLETE	06/01/87	--N/A--	--N/A--	--N/A--	--N/A--	/ /
PORFLO	1	COMPLETE	COMPLETE	09/01/87	--N/A--	COMPLETE*	COMPLETE*	/ /
PORFLO-3D	1	COMPLETE	COMPLETE	10/01/87	--N/A--	--TBD--	--TBD--	/ /
PORMC-SF	1	COMPLETE	09/30/87	09/30/87	--N/A--	09/30/88	09/30/88	/ /
PORMC-SF (POSTPROCESSORS)	3	COMPLETE	09/30/87	--N/A--	--N/A--	--N/A--	--N/A--	/ /
PORMC-SF (PREPROCESSORS)	3	COMPLETE	09/30/88	--N/A--	--TBD--	--N/A--	--N/A--	/ /
PORMC-SF-3D	1	03/31/88	12/31/88	12/31/88	--N/A--	12/31/88	12/31/88	/ /
PORMC-SF-3D (AUXILLIARY CODES)	3	07/20/88	12/31/88	--N/A--	--N/A--	--N/A--	--N/A--	/ /
QFLUX	3	COMPLETE	COMPLETE	--N/A--	--N/A--	--N/A--	--N/A--	/ /
REPREL	1	COMPLETE	COMPLETE	TECH PUB	--N/A--	TECH PUB	TECH PUB	/ /
REPREL (PRE/POSTPROCESSORS)	3	COMPLETE	COMPLETE	--N/A--	--N/A--	--N/A--	--N/A--	/ /
SANGPL	3	06/30/88	--TBD--	--N/A--	--N/A--	--N/A--	--N/A--	/ /
SANGRE	3	12/31/87	--TBD--	--N/A--	--N/A--	--N/A--	--N/A--	/ /
SENSPLT	3	COMPLETE	06/05/87	--N/A--	--N/A--	--N/A--	--N/A--	/ /
SENSPLT/PORFLO (PRE/POSTPROC.)	3	COMPLETE	07/31/87	--N/A--	--N/A--	--N/A--	--N/A--	/ /
SINDA	1	COMPLETE	05/15/87	06/30/87	--N/A--	09/01/87	09/01/87	/ /
SPAM	1	06/08/88	06/08/88	06/08/88	--N/A--	06/08/88	06/08/88	/ /
TRACKER/TRAVEL	1	COMPLETE	07/01/87	--N/A--	--TBD--	--N/A--	--N/A--	/ /
TSAP	1	COMPLETE	COMPLETE	12/31/87	--N/A--	12/31/87	12/31/87	/ /
TWODANT	3	ARCHIVED	ARCHIVED	--N/A--	--N/A--	--N/A--	--N/A--	/ /
UCLA3D	3	COMPLETE	12/31/87	--N/A--	--N/A--	--N/A--	--N/A--	/ /

PERFORMANCE ASSESSMENT
CUMULATIVE SOFTWARE
DOCUMENTATION CURVE



PERFORMANCE ASSESSMENT
CUMULATIVE SOFTWARE
DOCUMENTATION CURVE



(PLANNED AND ACTUAL DATES FOR CHECKLISTING PA CODE PACKAGES)

PLANNED ————————

ACTUAL ----------

PERFORMANCE ANALYSIS PLANS

SYSTEMS PERFORMANCE ANALYSIS PLANS

- HYDROLOGIC IMPACTS OF EXPLORATORY SHAFT CONSTRUCTION
- DISRUPTIVE SCENARIO SENSITIVITY ANALYSIS
- BARRIER SENSITIVITY STUDY

PERFORMANCE ANALYSIS PLAN

(HYDROLOGIC IMPACTS OF EXPLORATORY SHAFT CONSTRUCTION)

OBJECTIVES

- ANALYZE CHANGE IN HEAD ASSOCIATED WITH DRILLING EXPLORATORY SHAFTS
- ANALYZE IMPACTS ASSOCIATED WITH CONSTRUCTING A DRIFT CONNECTING THE TWO SHAFTS

APPROACH

- APPLICATION OF MAGNUM-2D AND MAGNUM-3D COMPUTER CODES TO SIMULATE CONSTRUCTION
- PUBLISHED SOURCES OF DATA WILL BE USED TO EXTENT POSSIBLE

SCHEDULE

- PHASE 1 WILL BE COMPLETED 5 MONTHS AFTER APPROVAL OF WORK PACKAGE
- PHASE 2 WILL BE COMPLETED 5 MONTHS AFTER THE COMPLETION OF PHASE 1

PERFORMANCE ANALYSIS PLAN
(DISRUPTIVE SCENARIO SENSITIVITY ANALYSIS)

OBJECTIVES

- ASSESS THE PERFORMANCE OF THE SYSTEM UNDER UNANTICIPATED EVENTS AND PROCESSES. IDENTIFY PERFORMANCE THRESHOLDS
- INTERPRET RESULTS AND PROVIDE INPUT TO SITE DEPARTMENT FOR CHARACTERIZATION OF DISRUPTIVE SCENARIOS

APPROACH

- IDENTIFY CANDIDATE PARAMETERS THAT CAN BE USED TO ASSESS DISRUPTIVE EVENTS AND PROCESSES
- CONDUCT SYSTEM SENSITIVITY ANALYSIS TO ASSESS RELATIVE IMPORTANCE OF PARAMETERS AND ACCEPTABLE RANGES OF PARAMETERS
- RELATE PARAMETER RANGE TO INITIATING EVENTS AND PROCESSES

SCHEDULE

- COMPLETE PRELIMINARY ANALYSIS 6 MONTHS AFTER APPROVAL OF WORK PACKAGE
- DEFINE PHASE 2 ANALYSIS WITHIN 3 MONTHS AFTER PRELIMINARY ANALYSIS

PERFORMANCE ANALYSIS PLAN
(BARRIER SENSITIVITY STUDY)

OBJECTIVES

- EVALUATE ISSUE RESOLUTION STRATEGY ASSUMPTIONS
- EVALUATE WHAT COMBINATIONS OF PARAMETERS COMPROMISE SYSTEM BEHAVIOR
- EVALUATE RELATIVE IMPORTANCE OF PARAMETERS AND IDENTIFY DATA COLLECTION PRIORITIES
- ATTEMPT TO IDENTIFY WHAT ADDITIONAL MODEL DEVELOPMENT SHOULD BE CONSIDERED

APPROACH

- LUMPED PARAMETER APPROACH USING SIMPLIFIED ANALYTICAL EXPRESSIONS (PHASE 1)
- COMPARISON OF RESULTS USING EXISTING SYSTEM NUMERICAL MODELS (REPREL, EPASTAT) (PHASE 2)

SCHEDULE

- COMPLETE PHASE 1 — SEPTEMBER 30, 1987
- COMPLETE PHASE 2 — JUNE 30, 1988

SITE PERFORMANCE ANALYSIS PLANS

- LHS PRE-TEST ANALYSIS
- GROUNDWATER FLOW SENSITIVITY TO CHANGES IN VERTICAL HYDRAULIC CONDUCTIVITY
- GROUNDWATER FLOW SENSITIVITY TO HYPOTHETICAL TECTONIC FEATURES
- ALTERNATE GROUNDWATER FLOW CONCEPT
- EVALUATE FRACTURE FLOW VS. EQUIVALENT POROUS MEDIUM
- PASCO BASIN SCALE GROUNDWATER MODEL
- HYDROCHEMICAL MIXING MODEL
- POSSIBLE INTERFERENCE BETWEEN CONCURRENT TESTING AND DRILLING ES THROUGH SEDIMENTS

LHS PRE-TEST ANALYSIS

OBJECTIVES:

- Predict a range of test conditions for RRL-2 LHS tests
- Demonstrate numerical model capability for interpreting LHS tests
- Estimate the limits of the LHS tests to define a heterogeneous basalt system
- Preliminary evaluation of ES and ESF on LHS test interpretation

APPROACH:

- 3D groundwater flow model of the central Cold Creek Syncline area
- Upper Grande Ronde basalt sequence
- MAGNUM-3D finite element code
- Provision for
  - high stress near the pumping well (RRL-2B)
  - exploratory shaft,
  - approximation of the exploratory shaft facility
- Two phases are planned.
  - phase 1 provides for model set up and preliminary results
  - phase 2 will provide input for LHS test design.

SCHEDULE:

Phase 1 is scheduled for completion over a period of 5-6 months (September). Phase 2 has a planned 3-4 month completion schedule.

GROUNDWATER FLOW SENSITIVITY TO VERTICAL HYDRAULIC CONDUCTIVITY

OBJECTIVE:

Determine the sensitivity of groundwater flow to vertical hydraulic conductivity of the basalt dense interiors

APPROACH:

- 3D groundwater flow model of the central Cold Creek Syncline
- MAGNUM-3D computer code
- Vary vertical hydraulic conductivity
- Determine sensitivity of predicted hydraulic heads

SCHEDULE:

6 Months

GROUNDWATER FLOW SENSITIVITY TO HYPOTHETICAL TECTONIC FEATURES

OBJECTIVE:

Determine the sensitivity of groundwater flow (and ultimately performance) to tectonic faults or fractures

APPROACH:

- 2D X-sectional model of the basalt sequence
- MAGNUM-2D code - discrete line elements
- Simulate groundwater flow with cross-cutting tectontic faults or fractures
- Tectonic fault/fracture zone characteristics to be varied:
  - fracture zone thickness
  - fracture zone hydraulic properties
  - strike and dip
  - vertical and horizontal extent

SCHEDULE:

6 Months

ALTERNATE GROUNDWATER FLOW CONCEPTS

OBJECTIVES:

- Simulate 3-5 alternative groundwater flow concepts or conceptual models
- Develop preliminary rank in terms of consistency with hydrologic and geologic information
- Develop preliminary rank in terms of relative site performance.

APPROACH:

- Numerical model of each alternative groundwater flow conceptual model
- Simulate each alternative conceptual model
- Compare results and rank models according to
  - consistency with available data
  - expected performance
- Emphasis on effects of:
  - boundary conditions (direction of flow)
  - anticlinal structures

SCHEDULE:

7-8 Months

EQUIVALENT POROUS MEDIUM VS. FRACTURE FLOW

OBJECTIVES

- Examine the applicability of using an equivalent porous medium (EPM) approximation in modeling fluid flow through basalt dense interiors
- Examine the applicability of using an EPM approximation in modeling radionuclide transport through basalt dense interiors.

APPROACH

- For fluid flow, porous medium equivalence is established in terms of Darcian fluxes.
- For solute transport, equivalence is established in terms of solute travel time or residence time.
- A discrete model of network of conduits formed by intersecting column-defining fracture patterns of dense interiors is used.
- MAGNUM-2D is used to simulate flow through discrete fractures.
- A particle-tracking procedure is used for advective transport along discrete fractures.
- Both filled and unfilled fractures are considered.
- Both continuous and discontinuous network models are considered for flow through dense interiors.

SCHEDULE

Scheduled for completion over a period of 6 months (October 31, 1987)

PASCO BASIN SCALE GROUNDWATER FLOW MODEL

OBJECTIVE:

Plan and construct model of the regional groundwater flow regime

APPROACH:

1) Review previous studies, determine specific objectives, prepare plan

2) Incorporate available geologic and geohydrologic information per the regional groundwater study plan. Calibrate model and perform preliminary check-out simulations

3) Simulation and sensitivity runs

4) Update model with new data and prepare final model report

SCHEDULE:

1) Complete item 1 during FY 1987.

2) Complete item 2 in FY 1988

3) Complete item 3 & 4 in FY 1989

HYDROCHEMICAL MIXING MODEL

OBJECTIVES:

1) Construct preliminary model of conservative chemical species

2) Calibrate site groundwater flow model parameters and dispersivity to chemical measurements

3) Assist in definition of hydrochemical characterization requirements

APPROACH:

1) Use Cold Creek Syncline Model to simulate hydraulic heads

2) Input head field to 3D transport model

3) Transport model computes groundwater velocity field

4) Select conservative chemical species (no sorption or decay)

5) Attempt to match chemistry distribution with reasonable range of dispersivity

6) Adjust groundwater flow model parameters as needed to obtain match with chemistry as well as head.

SCHEDULE:

1) Construct preliminary transport model 5 months

2) Complete model using current data - 6-8 months

IMPACTS OF ES STARTER HOLES

OBJECTIVE:

Estimate the potential interference with testing in the Grande Ronde basalts and concurrent drilling of the exploratory shaft starter holes through the suprabasalt sediments.

APPROACH:

- Supports the DOE/HQ Hydrology Task Group.
- 2-D axisymetric model to simulate the effects of suprabasalt drilling 2 ES on basalt interbeds and interflows.
- Range of properties and conditions
- Calibrate model against available data such as the responses to U-Pond decomissioning.
- 3D modeling if needed to supplement the axisymetric modeling.

SCHEDULE:

4-6 months depending on requirements of the Hydrology Task Group

WASTE PACKAGE PERFORMANCE ANALYSIS PLANS

- CODE DEVELOPMENT AND VERIFICATION
  - FOR CODES USED IN WASTE PACKAGE PERFORMANCE ASSESSMENT
- WASTE PACKAGE ACD SENSITIVITY INVESTIGATION
- BENCH-SCALE PRETEST ANALYSIS

WASTE PACKAGE
CODE DEVELOPMENT AND VERIFICATION

OBJECTIVE:

- TO PROVIDE STATE-OF-THE-ART CODES TO ASSESS THE PERFORMANCE, RELIABILITY, AND SAFETY OF THE WASTE PACKAGE SUBSYSTEM AND ITS ENVIRONMENT.
- TO IMPLEMENT THE BWIP SOFTWARE QUALITY ASSURANCE PROGRAM TO THE CODES FOR WASTE PACKAGE ANALYSIS.

APPROACH:

- DEVELOP A SET OF COMPUTER CODES IN A CONSISTENT AND COHESIVE MANNER INSTEAD OF ONE SYSTEM CODE (SUCH AS WAPPA) TO ANALYZE THE WASTE PACKAGE. THIS APPROACH IS DUE TO THE VERY INTRICATE PHYSICAL AND CHEMICAL PHENOMENA AFFECTING THE WASTE PACKAGE DURING ITS LONG-TERM BURIAL.
- BWIP's SOFTWARE QA REQUIREMENTS WILL BE RIGOROUSLY IMPLEMENTED.

SCHEDULE:

- DOCUMENTATION OF CODES IS UNDER WAY.
- COMPLETION OF DOCUMENTATION AND VERIFICATION FOR ALL CODES IS DUE BEFORE USE TO SUPPORT LICENSE APPLICATION.

WASTE PACKAGE ACD SENSITIVITY INVESTIGATION

OBJECTIVE: TO FIND VARIATIONS IN WASTE PACKAGE PERFORMANCE MEASURES IN RESPONSE TO VARIATIONS IN MATERIAL PROPERTIES AND DESIGN PARAMETERS, FOR USE IN ACD DESIGN PROGRAM AND RELATED TESTING.

APPROACH: COUPLED COMPUTER ANALYSES OF PROCESSES GOVERNING WASTE PACKAGE BEHAVIOR.

SCHEDULE: START UPON REMOVAL OF STOP WORK ORDER. COMPLETE BEFORE BEGINNING OF ACD DESIGN PROGRAM.

BENCH-SCALE PRE-TEST ANALYSIS

OBJECTIVE: TO PREDICT RESULTS OF HALF-SCALE QUALIFICATION TESTS TO GUIDE TEST DESIGN.

APPROACH: APPLY COMPUTATIONAL MODELS OF ALL PHENOMENA TO BE MEASURED IN HALF-SCALE QUALIFICATION TESTS.

SCHEDULE: BEGIN WHEN STOP WORK ORDER IS LIFTED. COMPLETE BEFORE 30% ACD.

REPOSITORY/SEALS PERFORMANCE ANALYSIS PLANS

- GEOMECHANICS MODELS OF REPOSITORY OPENINGS
- VERIFICATION AND BENCHMARKING OF GEOMECHANICS CODES
- REVISED DRIFT SEALS SENSITIVITY STUDIES
- NONLINEAR THERMOMECHANICAL PARAMETRIC SENSITIVITY STUDIES

GEOMECHANICS MODELS OF REPOSITORY OPENINGS: NONLINEAR THERMOMECHANICAL PARAMETRIC SENSITIVITY STUDIES

OBJECTIVE: TO DETERMINE SENSITIVITY OF STRUCTURAL PERFORMANCE MEASURES TO VARIATIONS IN BASALT PROPERTIES AND REPOSITORY GEOMETRY.

APPROACH: USE ABAQUS FINITE-ELEMENT CODE. VARY ONE PROPERTY OR DIMENSION AT A TIME OVER RANGE OF INTEREST, WHILE HOLDING OTHERS CONSTANT. OBTAIN SENSITIVITY COEFFICIENTS.

SCHEDULE: COMPLETION 12 MONTHS AFTER RESTART. SUBMIT QUARTERLY STATUS REPORTS.

VERIFICATION AND BENCHMARKING OF GEOMECHANICS CODES

OBJECTIVE: TO QUALIFY ABAQUS AND ADINA FOR USE IN QA-1 ANALYSES

APPROACH: FOR EACH CODE,

- PREPARE USER REQUIREMENTS DOCUMENT
- PERFORM ACCEPTANCE TESTING OF ALGORITHMS IN CODE
- PERFORM VALIDATION TESTING OF SPECIFIC MODELS

SCHEDULE: COMPLETION 14 MONTHS AFTER RESTART

REVISED DRIFT SEALS SENSITIVITY STUDY

OBJECTIVE

EVALUATE SENSITIVITY OF REPOSITORY SEALS PERFORMANCE TO VARIATIONS IN UNCERTAIN AND/OR DESIGN-CONTROLLABLE PARAMETERS

APPROACH

TWO-DIMENSIONAL PHENOMENOLOGICAL MODEL CONSIDERING COUPLED GROUNDWATER FLOW, HEAT TRANSFER AND RADIONUCLIDE TRANSPORT

SCHEDULE

- START ANALYSIS ON AUGUST 1, 1987
- SUBMIT SUPPORTING DOCUMENT FOR REVIEW BY MARCH 31, 1988

SAFETY

IMPLEMENTATION

PLAN

SAFETY IMPLEMENTATION PLAN

PURPOSE

PROVIDE BASALT WASTE ISOLATION PROJECT (BWIP) PLANNING, DOCUMENTATION, AND EVALUATION AS REQUIRED BY ANNEX IIIb (SAFETY PLAN) OF DOE ORDER 4700 "PROJECT MANAGEMENT PLAN"

THE IMPLEMENTATION PLAN:

- ESTABLISHES RESPONSIBILITIES FOR ACTIONS REQUIRED BY THE ORDER
- DETERMINES ORGANIZATIONAL RESPONSIBILITY FOR IDENTIFIED ACTIONS
- PROVIDES A SCHEDULE & MILESTONES FOR COMPLETION OF REQUIRED ACTIONS

SAFETY IMPLEMENTATION PLAN

STATUS

- DRAFT SAFETY PLAN ISSUED OCTOBER 1986
- REVISION AND UPDATE SCHEDULED TO BE COMPLETED JULY 1987
- IMPLEMENTATION SEPTEMBER 1987

SAFETY ANALYSIS

PLANS

SAFETY ANALYSIS PLAN

STATUS

- PRELIMINARY Q-LIST PREPARED BASED UPON "GUIDANCE FOR DEVELOPING THE SCP - CONCEPTUAL DESIGN REPORT AND SCP Q-LISTS". DOCUMENT PREPARED BY WESTON.
- GUIDANCE PROCEDURES ARE BEING PREPARED BY PRECLOSURE RISK ASSESSMENT METHODOLOGY (PRAM) TO DEVELOP A COMMON METHODOLOGY FOR PRECLOSURE ANALYSES AT THE THREE CANDIDATE SITES.
- SCP SECTIONS FOR PRECLOSURE RADIOLOGICAL SAFETY ARE BEING DEVELOPED.
- PERFORMANCE CONFIRMATION AND MONITORING PROGRAM IS BEING INTEGRATED.

SAFETY ANALYSIS PLAN

OBJECTIVE

- CONDUCT ANALYSES THAT PROVIDE DESIGN RECOMMENDATIONS THAT WILL REDUCE THE PROBABILITY AND CONSEQUENCES OF OFF-NORMAL EVENTS AND UNUSUAL OCCURENCES

- PROVIDE SAFETY ANALYSIS DATA FOR THE ADVANCED CONCEPTUAL DESIGN (ACD) AND LICENSING APPLICATION DESIGN (LAD) THAT WILL DEMONSTRATE COMPLIANCE WITH

  A) 10 CFR 60.21 (c), 40 CFR 191 AND 10 CFR 960

  B) PART II - SAFETY ANALYSIS REPORT OF THE OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT (OCRWM) DOCUMENT - "STANDARD FORMAT AND CONTENT GUIDE FOR LICENSE APPLICATION FOR GEOLOGICAL REPOSITORIES"

  C) DOE ORDER 5481.1a "SAFETY REVIEW & ANALYSIS SYSTEM"

Q-LIST

DEVELOPMENT

Q-LIST DEVELOPMENT CONSTRAINTS

IMPORTANT TO SAFETY

THOSE ENGINEERED STRUCTURES, SYSTEMS, AND COMPONENTS ESSENTIAL TO THE PREVENTION OR MITIGATION OF ACCIDENTS AS DEFINED IN 10 CFR 60.2.

IMPORTANT TO WASTE ISOLATION

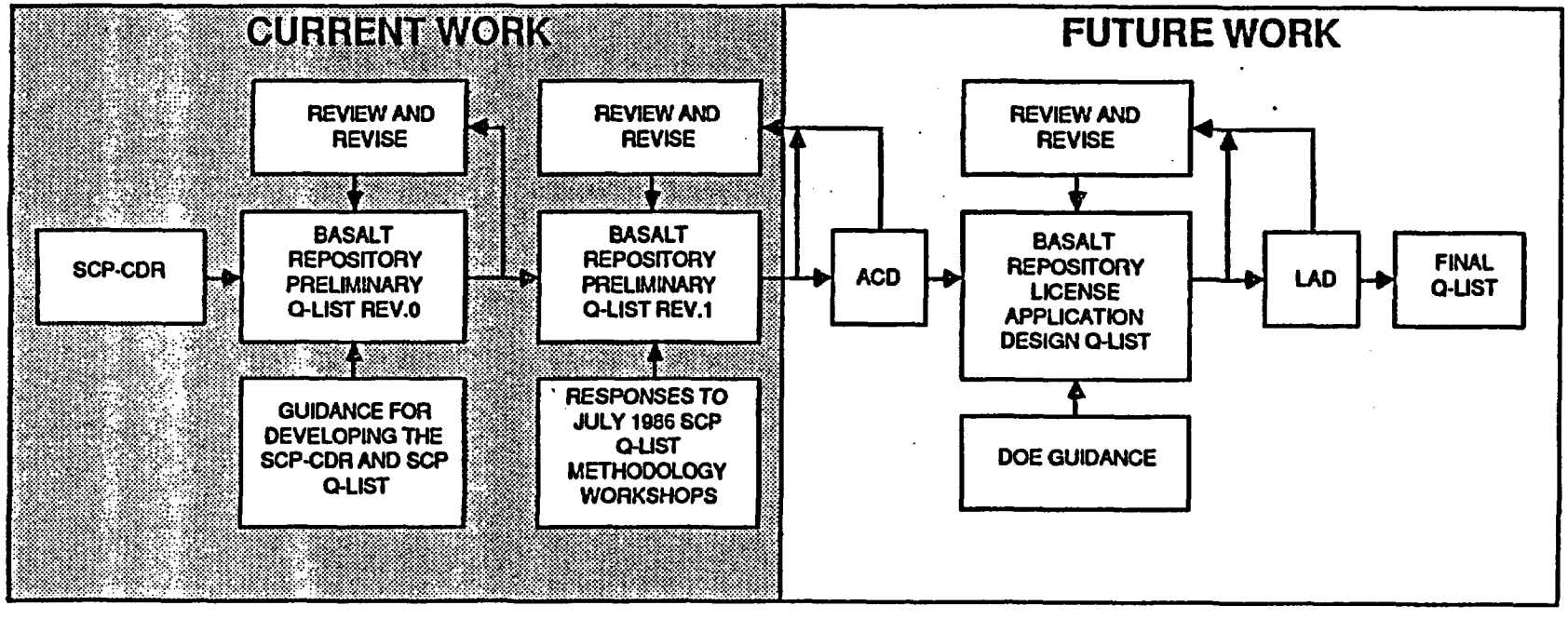
THE HARDWARE PORTIONS OF THOSE ENGINEERED AND NATURAL BARRIERS ALLOCATED PERFORMANCE TO MEET THE 10 CFR 60, SUBPART E POSTCLOSURE PERFORMANCE OBJECTIVES.*

*ACTIVITIES PERFORMED ON THE NATURAL BARRIERS IMPORTANT TO WASTE ISOLATION WILL BE PLACED ON A "QUALITY ACTIVITIES LIST".

Q-LIST DEVELOPMENT CONTROLS

- CURRENT Q-LIST DEVELOPMENT CONTROLLED BY THE PROJECT DIRECTIVE
- FUTURE Q-LIST DEVELOPMENT CONTROLLED BY PROCEDURE (TO BE DEVELOPED)
- TECHNICAL REVIEWS CONTROLLED BY PROCEDURE
- REVISIONS CONTROLLED BY PROCEDURE (TO BE DEVELOPED)

Q-LIST DEVELOPMENT LOGIC



FUTURE WORK

SITE

FUTURE WORK

- COMPLETE CURRENT WORK
- EVALUATION OF FRACTURE FLOW VS. EQUIVALENT POROUS MEDIUM
- PASCO BASIN SCALE MODEL
- HYDROCHEMICAL MIXING MODEL ANALYSIS
- MODELING TO SUPPORT TESTING CRITERIA
- HYDRAULIC STRESS TEST INTERPRETATION

HYDROCHEMICAL MIXING MODEL

- DEVELOP MODEL TO SIMULATE CONSERVATIVE CHEMICAL SPECIES (CHLORIDE)
- DETERMINE WHETHER GROUNDWATER FLOW MODEL PREDICTS A FLOW FIELD CONSISTENT WITH CHEMISTRY
- IF NOT, ADJUST FLOW MODEL PARAMETERS

HYDRAULIC STRESS TEST INTERPRETATION

- SUPPORT SITE DEPARTMENT IN LHS AND SMALL SCALE TEST INTERPRETATION
- USES PRE-TEST MODEL TO INTERPRET TESTS
- USE INVERSE/SENSITIVITY MODEL TO ESTIMATE LARGE SCALE UNCERTAINTY OF LHS TESTS

SITE CHARACTERIZATION CRITERIA DEVELOPMENT

- OPTION D OF OPTIONS PAPER
- GROUNDWATER TRAVEL TIME (ISSUE 1.6)
- CREATING HIERARCHY OF CRITERIA

  PERFORMANCE (GROUNDWATER TRAVEL TIME)

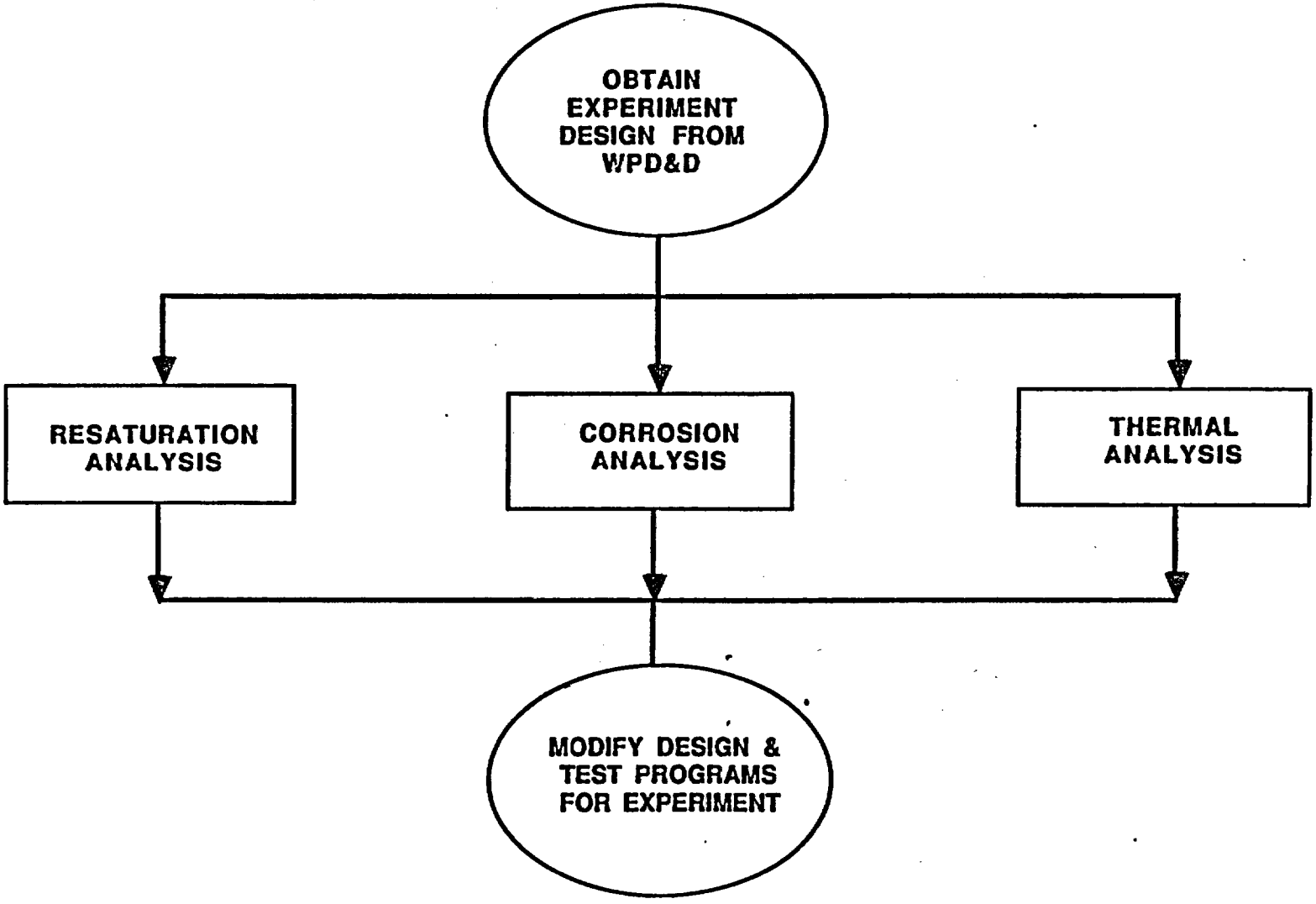
  CHARACTERIZATION

  TESTING

  MEASUREMENT

WASTE PACKAGE/REPOSITORY

LABORATORY HALF-SCALE WASTE PACKAGE PRE-TEST ANALYSIS



NONLINEAR THERMOMECHANICAL PARAMETRIC SENSITIVITY STUDIES PLAN

PURPOSE: TO DETERMINE PARAMETRIC SENSITIVITY COEFFICIENTS FOR THE MATERIAL PROPERTIES OF BASALT, AS WELL AS FOR CERTAIN GEOMETRIC PARAMETERS ASSOCIATED WITH THE REPOSITORY DESIGN.

SCOPE: MATERIAL PROPERTIES CONSIDERED:

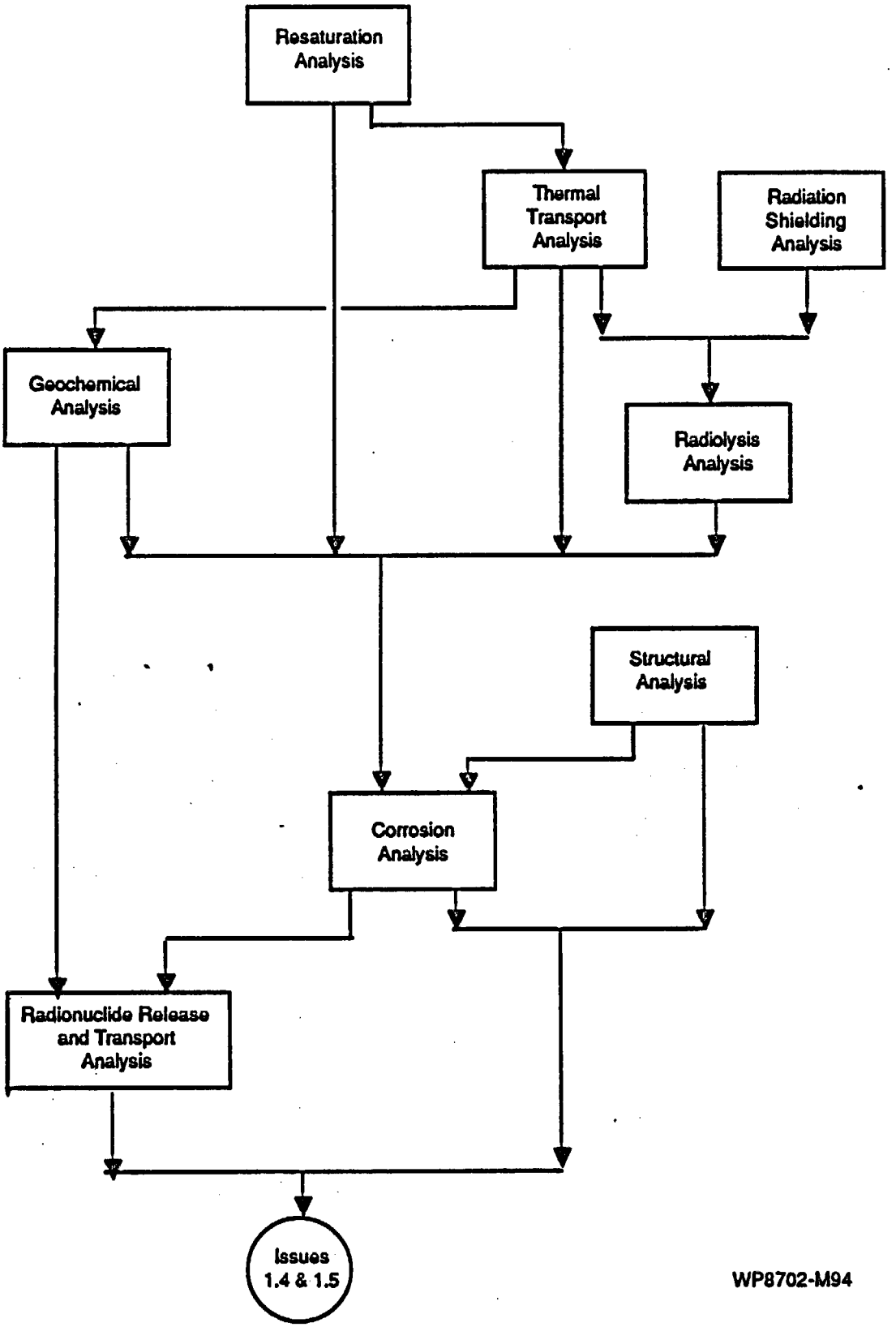
1. DENSITY
2. HEAT CAPACITY
3. THERMAL CONDUCTIVITY
4. MODULUS OF ELASTICITY
5. POISSON'S RATIO
6. COEFFICIENT OF THERMAL EXPANSION

GEOMETRIC PARAMETERS CONSIDERED:

1. SPACING BETWEEN EMPLACEMENT BOREHOLES
2. EXTENT OF THE DISTURBED ROCK ZONE SURROUNDING BOREHOLES.

METHOD OF ANALYSIS: FINITE ELEMENT ANALYSIS USING THE ABAQUS CODE.

RELATIONSHIPS AMONG ANALYSES IN THE PERFORMANCE SENSITIVITY INVESTIGATION



WP8702-M94

FUTURE REPOSITORY SEALS PERFORMANCE ASSESSMENT

REVISED DRIFT SEALS SENSITIVITY ANALYSIS

OBJECTIVES:

- ASSESS REPOSITORY SEALS PERFORMANCE FOR SCP CONCEPTUAL DESIGN
- ASSESS THE NEED FOR SEALS IN THE SHAFTS
- ASSESS THE IMPACT OF CHANGES IN THE FOLLOWING PARAMETER VALUES ON SEALS PERFORMANCE
  - DISTANCE BETWEEN SHAFTS AND EMPLACED WASTE
  - HYDRAULIC CONDUCTIVITY OF THE HOST ROCK
  - RADIAL EXTENT OF THE DAMAGED ROCK ZONE
  - COEFFICIENT OF MOLECULAR DIFFUSION
  - ENGINEERED BARRIERS RELEASE RATE

GEOMECHANICS CODE VERIFICATION AND BENCHMARKING PLAN:

PURPOSE: TO SATISFY THE REQUIREMENTS OF THE SOFTWARE CONFIGURATION CONTROL PROCEDURES IN ORDER TO PLACE THE GEOMECHANICS CODES INTO THE INFORMATION MANAGEMENT PRODUCTION LIBRARY.

SCOPE: THE TWO CODES BEING VERIFIED UNDER THIS PLAN ARE ABAQUS AND ADINA, BOTH GENERAL PURPOSE FINITE ELEMENT CODES TO BE USED FOR A WIDE RANGE OF THERMAL AND THERMOMECHANICAL REPOSITORY ANALYSES AS DICTATED BY FUTURE ANALYSIS PLANS.

WASTE PACKAGE CODE VERIFICATION

CODE	PURPOSE	VERIFICATION STATUS
ABAQUS	MECHANICAL AND THERMOMECHANICAL	PLANNED
ADINA	MECHANICAL AND THERMOMECHANICAL	PLANNED
CHAINT	RADIONUCLIDE DIFFUSION	UNDER WAY - PNL CONTRACT
CHAINT-MC	MONTE-CARLO VERSION OF CHAINT	UNDER WAY - PNL CONTRACT
PCM. STAT	CONTAINER CORROSION	PLANNED
PACSTAT	CONTAINER CORROSION	CODE STILL BEING DEVELOPED
PORFLO	GROUNDWATER FLOW IN POROUS MEDIUM	PARTIALLY COMPLETE-ESTIMATED COMPLETION JUNE 1, 1988
PORFLO - 3D	3-D VERSION OF PORFLO	CODE STILL BEING DEVELOPED
GEOTHER	2-PHASE GROUNDWATER FLOW	CODE STILL BEING DEVELOPED
SINDA	THERMAL CONDUCTION	COMPLETE EXCEPT REPORT
TSAP	THERMAL CONDUCTION	UNDER WAY-JANUARY 1, 1988 COMPLETION GOAL
NETWORK	FINITE-ELEMENT MESH GENERATOR FOR TSAP & SINDA	UNDER WAY-JANUARY 1, 1988 COMPLETION GOAL
ONEDANT/ TWODANT	RADIATION TRANSPORT	PLANNED

SYSTEMS

ACQUISITION OF SANGRE FROM LANL

- 2-D COUPLED POROUS DERFORMABLE MEDIA FINITE ELEMENT CODE
- STUDY COUPLED TECTONIC DEFORMATION AND HYDROLOGIC FLOW IN BASALT REPOSITORIES
- ESTIMATE COULOMB FAILURE OF BASALTS FROM ENHANCED PORE PRESSURE
- PUBLIC DOMAIN, JULY 1, 1987

MATRIX DIFFUSION

- 2- AND 3-D FRACTURE FLOW AND MASS TRANSPORT MODEL
- EFFECT OF MATRIX DIFFUSION ON MASS TRANSPORT

VALIDATION

- IMPLEMENT VALIDATION STRATEGY OUTLINED IN SECTION 8.3.5 OF SCP
- PREPARE A PLAN FOR VALIDATION OF SPECIFIC MODELS
  - VALIDATION OF MAGNUM-2D
  - VALIDATION OF PORFLO
  - ETC.
- USE OF CONTROLLED EXPERIMENTS AND/OR FIELD STUDY TO VALIDATE FEATURES OF A MODEL (EXPERIMENT SATISFIES SEVERAL NEEDS)

USE OF SUBJECTIVE INFORMATION

- USE OF BAYESIAN ANALYSIS

SPAM

(SYSTEM PERFORMANCE ASSESSMENT MODEL)

- ADVANCE ON EPASTAT
  - NUMERICAL SOLUTIONS TO MASS TRANSPORT
  - TRANSPORT OF MULTICOMPONENT DECAY CHAINS
  - BIO-SPHERE MODULE
- MODULAR STRUCTURE
  - NEW MODULES REQUIRED
  - COMPARABLE TO SYVAC
- DEVELOP IN FY 88

MECHANISTIC CORROSION MODELING

GOALS

- BOUND RATES OF GENERAL AND NON-UNIFORM CORROSION
- PREDICT CORROSION INDUCED CHANGES IN GEOCHEMICAL ENVIRONMENT

COPPER CONTAINER

- GENERAL CORROSION RATES BOUNDED BY TRANSPORT LIMITATIONS
- SPECIES OF IMPORTANCE ARE: O_2, HS^-, $SO_4^=$, Cl^-, RADIOLYSIS
- PREDICTIONS DEPENDENT ON END EFFORT AND SULFUR ASSUMPTIONS

STEEL CONTAINER

- CORROSION DOMINATED THE REDOX CHEMISTRY IN THE WASTE PACKAGE
- HIGH HYDROGEN FUGACITY PREDICTED
- VERY LOW CORROSION POTENTIALS PROTECT AGAINST PITTING AND CREVICE CORROSION

CODE

- 2-D FINITE DIFFERENCE FOR GENERAL CORROSION
- NON-UNIFORM MODELS UNDER DEVELOPMENT

MAJOR PRECLOSURE SAFETY ACTIVITIES

* Document Review
* Design Review and Feedback
* Safety Analysis Database Development
* Performance Confirmation Program
* Repository Preclosure Risk Assessment Research and Development
* QA Qualification of Codes and other Analytical Tools
* Q-List Development and Maintenance
* Repository Probabilistic Risk Assessment
* Deterministic Safety Analyses

DESIGN REVIEW AND FEEDBACK

* Qualitative Review
* Review of Design Requirements and Design Media
* Participation in Readiness Review and Design Hold-Point Reviews
* Goal is to provide early Safety Feedback into the Design Process

REPOSITORY PRECLOSURE RISK ASSESSMENT RESEARCH & DEVELOPMENT

* Determination of Source Terms for Repository Accidents
* Transport of Radionuclides from Subsurface Accidents to Surface Release Points
* Development of Seismic Design Criteria for Subsurface Facilities

QA QUALIFICATION OF CODES

* Preclosure Safety Assessment will require twenty to thirty computer codes

* Estimate that current procedures imply six person year effort to qualify codes

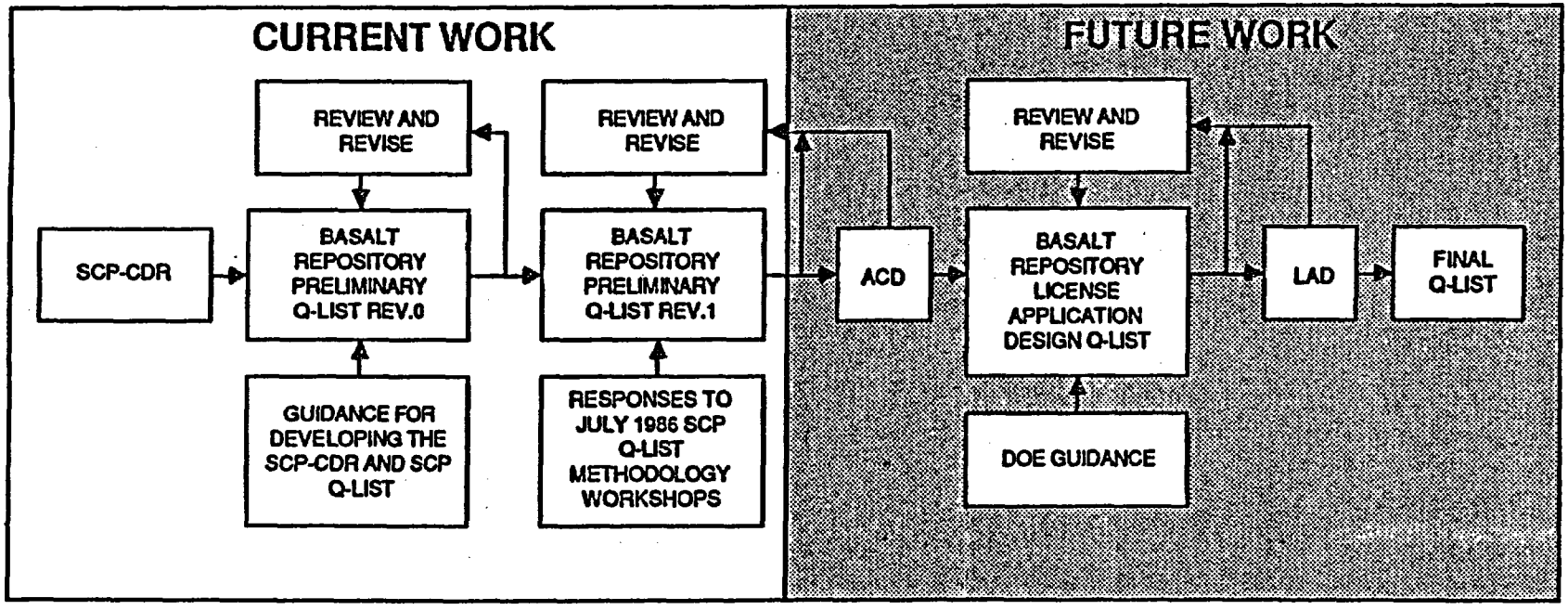
REPOSITORY PROBABILISTIC RISK ASSESSMENT

* Similar to Reactor PRAs
* Specific Methodology being determined by PRAM Program
* Specific Activities:
  + System Evaluation (FTA)
  + Accident Sequence Definition
  + Accident Consequence Assessment
  + Supporting Analyses
  + Uncertainty Analysis
  + Integration of Results
  + Documentation of Results
* Two-phase analysis planned for both the ACD and LAD
  + Preliminary PRA providing design feedback at 30% design review
  + Subsequent refinement of the PRA to confirm compliance of design with all requirements

SUPPORTING ANALYSES

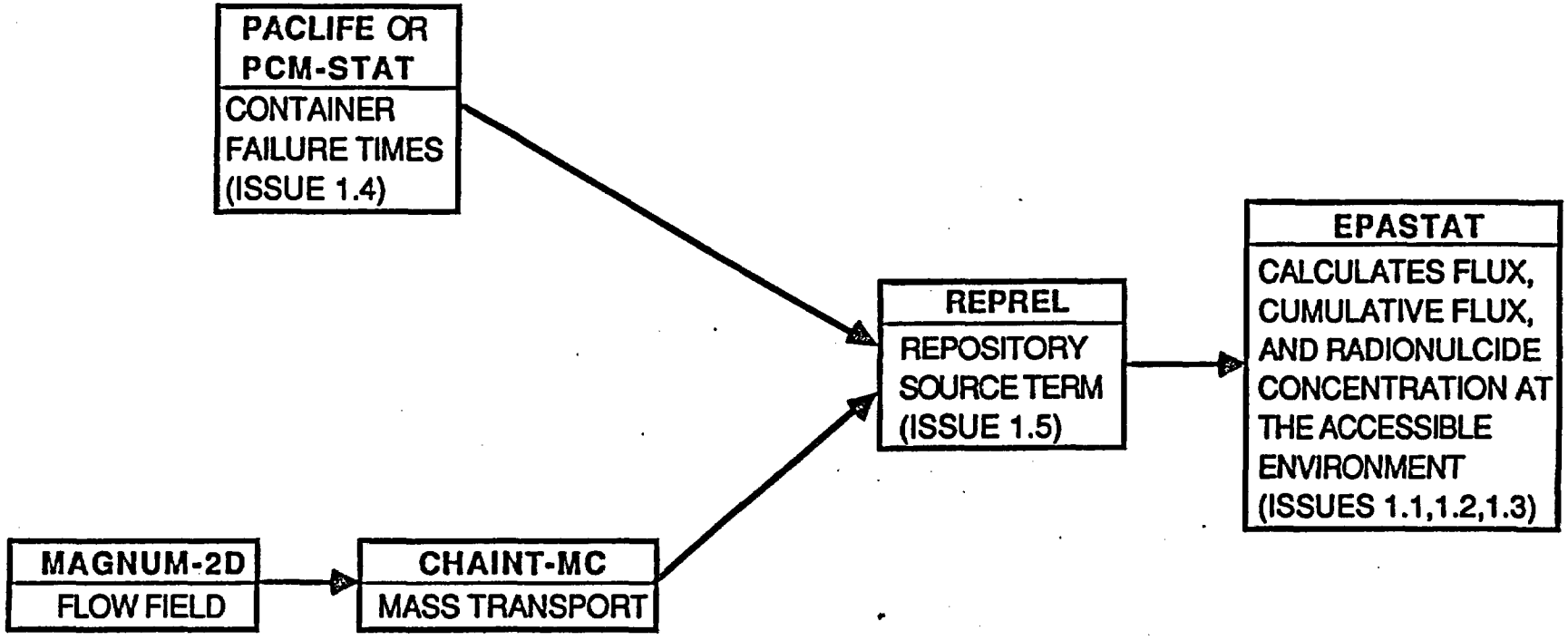
* Seismic Analysis
* Confinement & Ventilation
* Waste Handling
  + Waste Container Integrity
  + Criticality Analysis
  + Waste Hoist Reliability
  + Waste Process Flow
* Control Systems & Robotics
* Fire & Explosion
* Loss of Electric Power
* Groundwater Intrusion
* Tornado, Windstorm, and Ashfall

Q-LIST DEVELOPMENT LOGIC

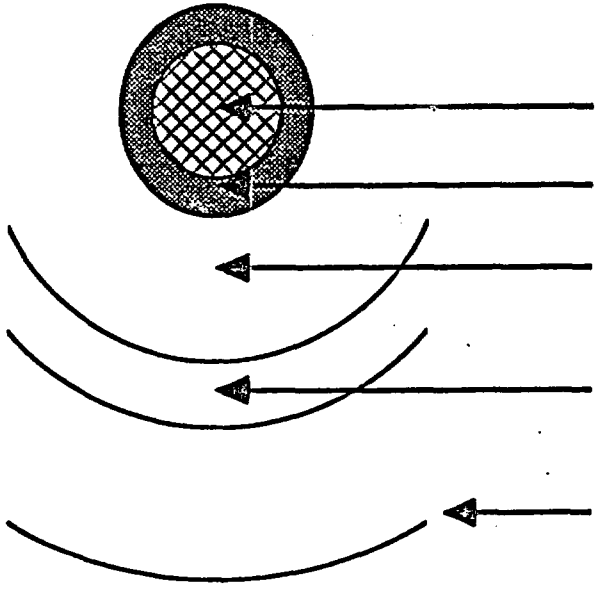


TOTAL SYSTEM PERFORMANCE ASSESSMENT (FUTURE WORK)

ASSESSMENT OF TOTAL SYSTEM PERFORMANCE



SYSTEM PERFORMANCE ASSESSMENT MODEL (SPAM)



SYSTEM ELEMENTS	PERFORMANCE MEASURE
WASTE FORM	
ENGINEERED BARRIERS	NRC RELEASE RATE CRITERION (RADIONUCLIDE FLUX) ISSUE 1.5
HOST ROCK (FLOW INTERIOR)	
FLOW TOP	
ACCESSIBLE ENVIRONMENT	EPA RELEASE RATE CRITERION (CUMULATIVE FLUX) EPA GROUNDWATER AND INDIVIDUAL PROTECTION CRITERIA (DOSE AND CONCENTRATIONS) ISSUES 1.1, 1.2, 1.3

SYSTEM PERFORMANCE ASSESSMENT MODEL (SPAM)

SALIENT FEATURES:

- SATURATED POROUS MEDIUM
- MULTIPLE REGIONS
- 2-D MASS TRANSPORT
- CHAIN DECAY
- TRANSPORT FROM THE WASTE PACKAGE TO THE ACCESSIBLE ENVIRONMENT
- COUPLED PARAMETERS ARE CORRECTLY LINKED
- PROBABILISTIC CODE

PERFORMANCE MEASURES:

- FLUX AT ENGINEERED BARRIERS
- CUMULATIVE FLUX AT THE ACCESSIBLE ENVIRONMENT
- DOSE TO MAN AT THE ACCESSIBLE ENVIRONMENT