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

NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING

SUBJECT: INTEGRATED SITE PROGRAM

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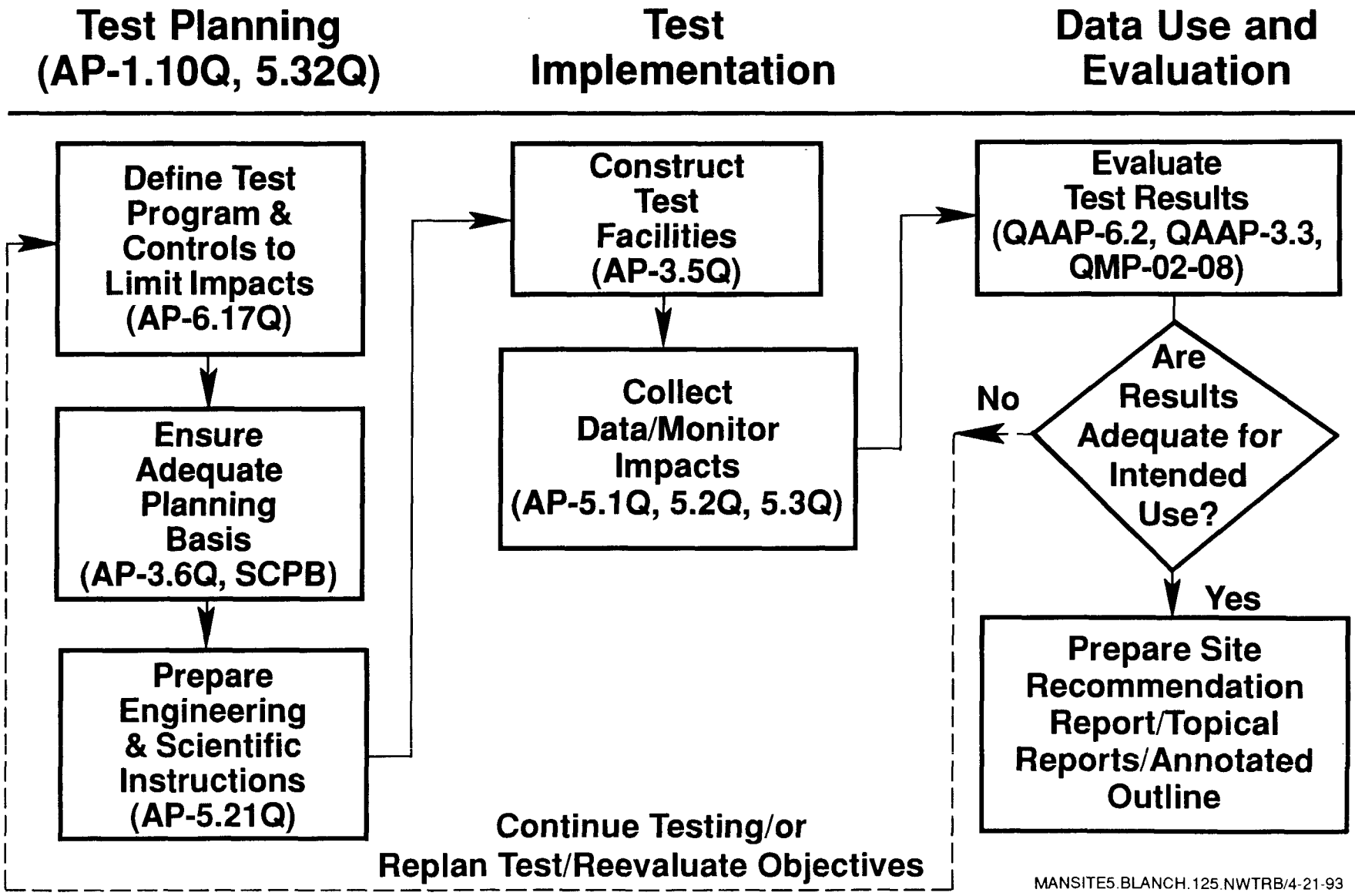
RENO, NEVADA
APRIL 21-22, 1993

Overview

- Framework of integrated site program
- Planning process
- Site investigations
- Interaction with other elements

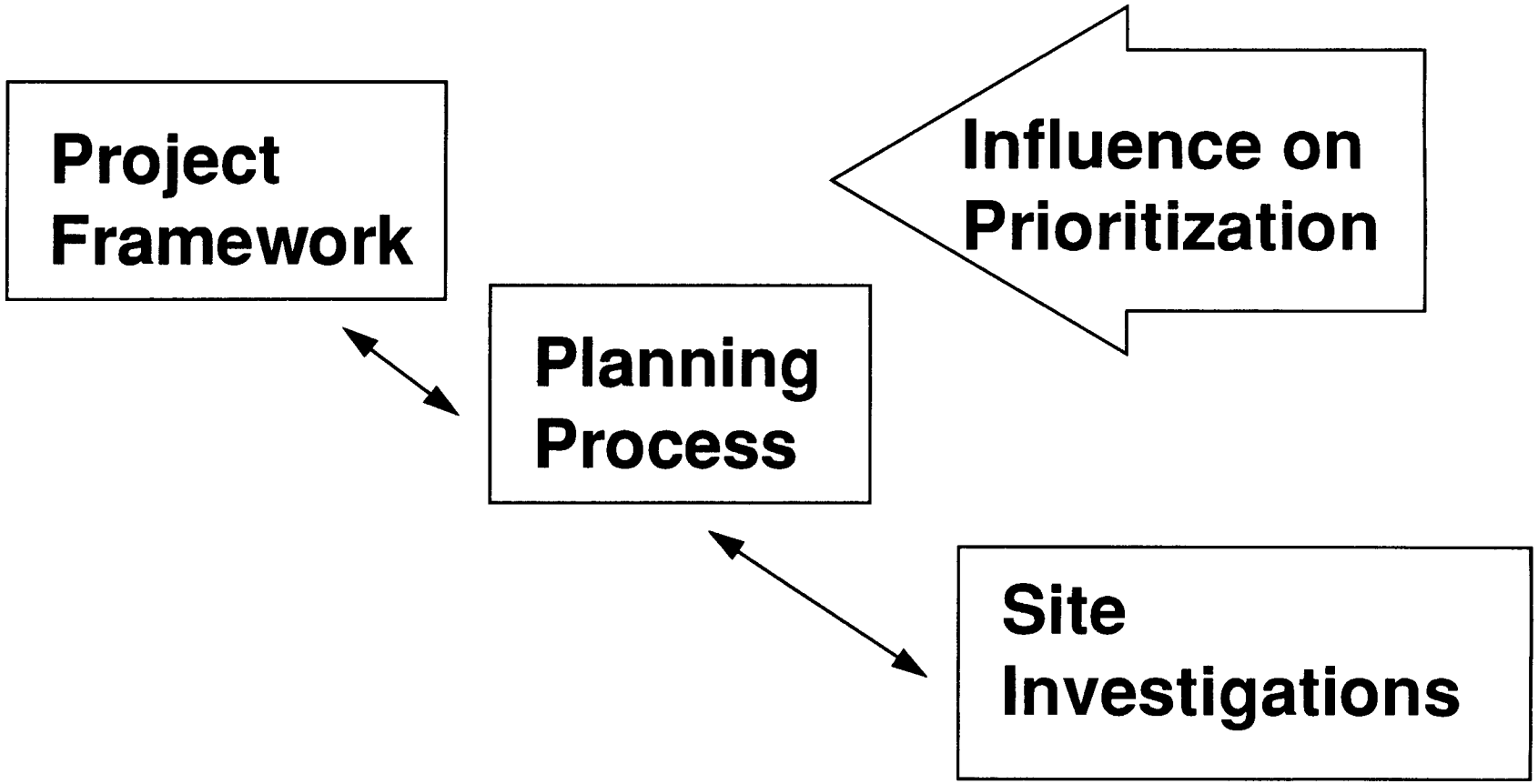
What Process is Being used to Plan, Implement, and Evaluate Testing?



Challenges

- The framework is for planning and integration
- Planning and integration is an ongoing process
  - Planning and integration can never be defined as a final products
  - Emphasis is on the process
- Detail is constantly changing
  - A process of a moving level of definition
  - Flow to greater detail to define and resolve
  - Flow to less detail or consolidation for modeling and resolution of issues

Interaction of Major Elements



Elements of the Integrated Program Framework

- **Program Milestones**
  - Environmental Impact Statement, site suitability decision, license application
- **Regulatory**
  - Annotated Outline cycle
  - Issue Resolution
- **Performance Assessment**
  - Iterative Total System Performance Assessment
  - Issue-specific analysis

Elements of the Integrated Program Framework

- **Design**
  - Exploratory Studies Facility, Advanced Conceptual Design, License Application Design
- **Construction**
  - Exploratory Studies Facility
- **Site Investigations Program**
  - Exploratory Studies Facility testing
  - Surface-based testing

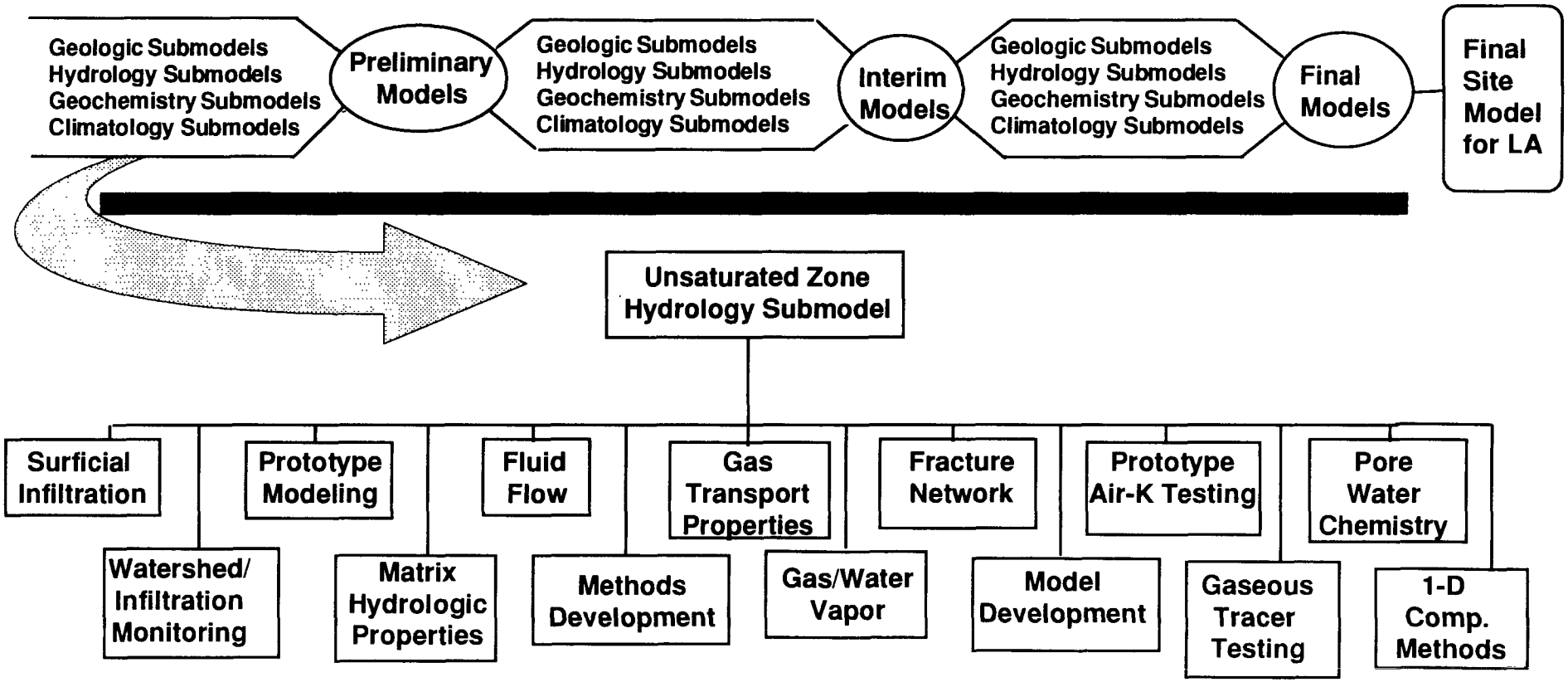
Integration at All Levels

- **High-level requirements**
  - Data users--design, performance assessment
- **Site characterization program integration**
  - Hydrology integration
  - Geochemistry integration
  - Geophysics integration
  - Drilling integration
  - Integrated core logging
- **Activity Integration**
  - Work-scope consolidation
- **Data Integration**
  - Technical product feedback to users
  - Establishment of the degree of the fulfillment of requirements

Site Characterization Program Planning

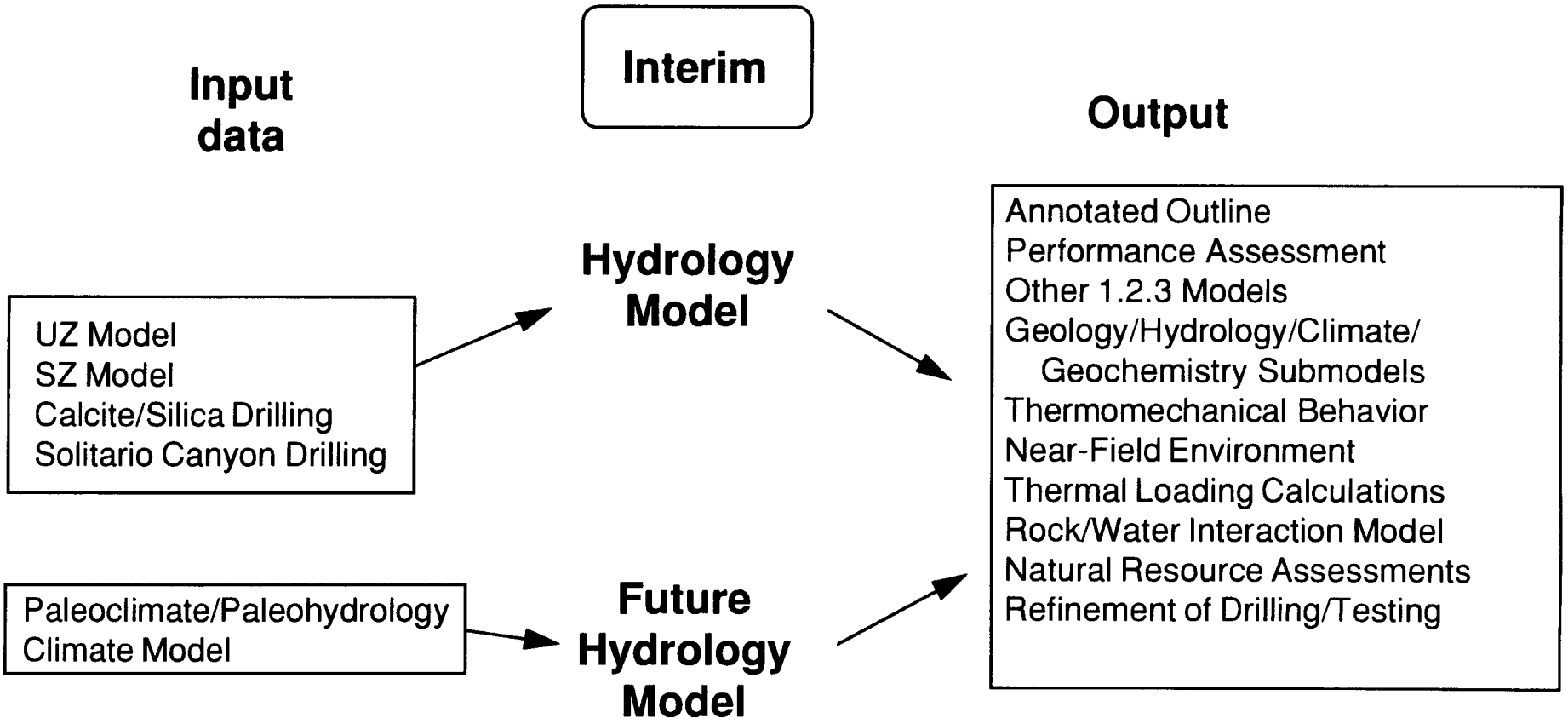
- **Site characterization program goals**
  - Level 2 project milestones
  - Integrated long-range plan
- **Prioritization**
  - How best to achieve the goals
  - Issues from performance assessment/regulatory/design
  - Mechanism--Early Site Suitability Evaluation, Integrated Test Evaluation, annual planning process
  - Other priority influences
- **Annual plan**

Site Investigations
Long-Range Planning



Submodel Components

Long-Range Plan
Input/Output Example



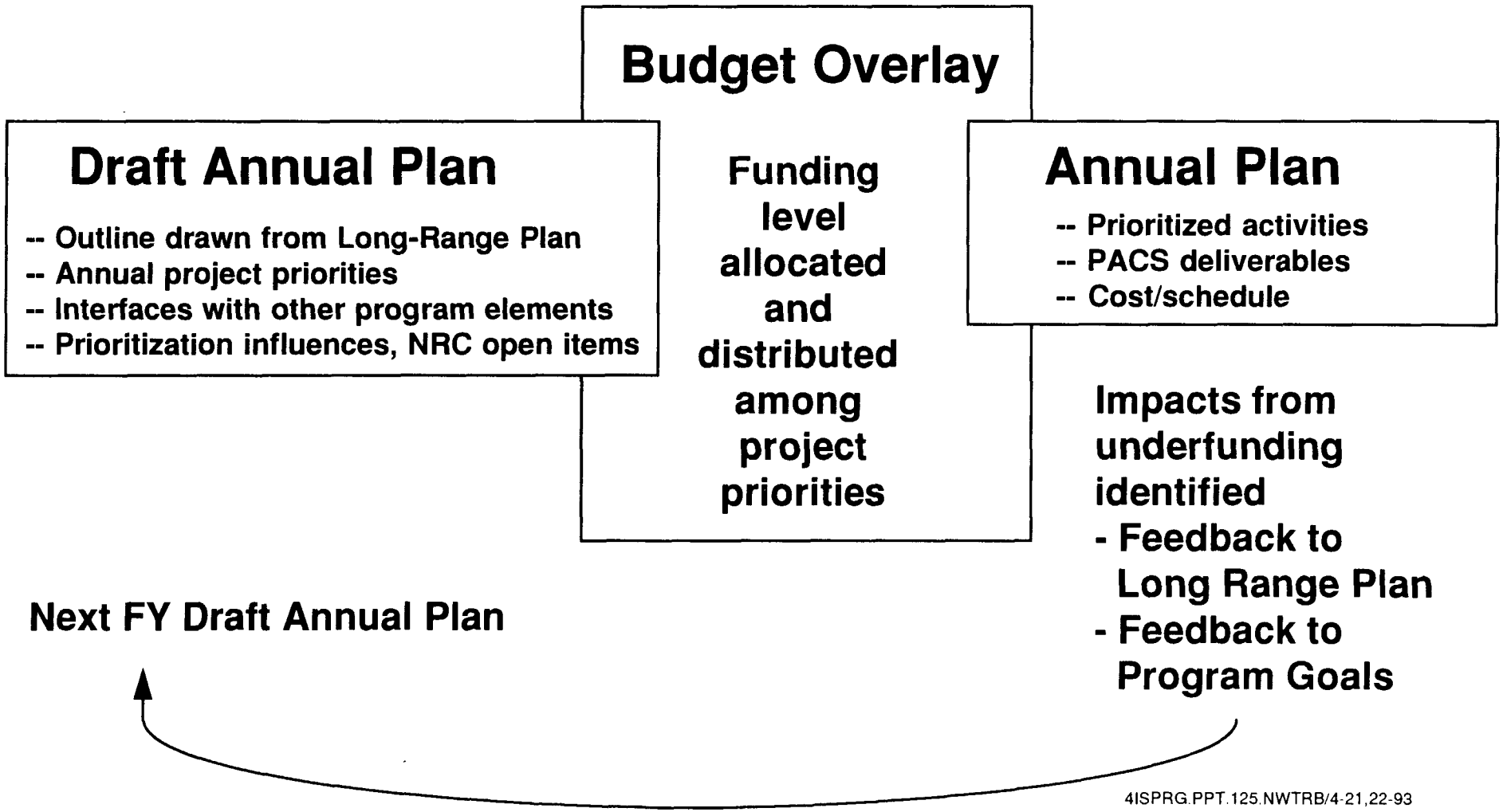
Annual Study Prioritization

- Peer review of unsaturated zone hydrology
  - Unsaturated zone
- Test prioritization task
  - Management sense of importance
- Early Site Suitability Evaluation
  - Review of state of knowledge
  - Recommendations--major categories
- Integrated Test Evaluation
- Design requirements
- Performance assessment

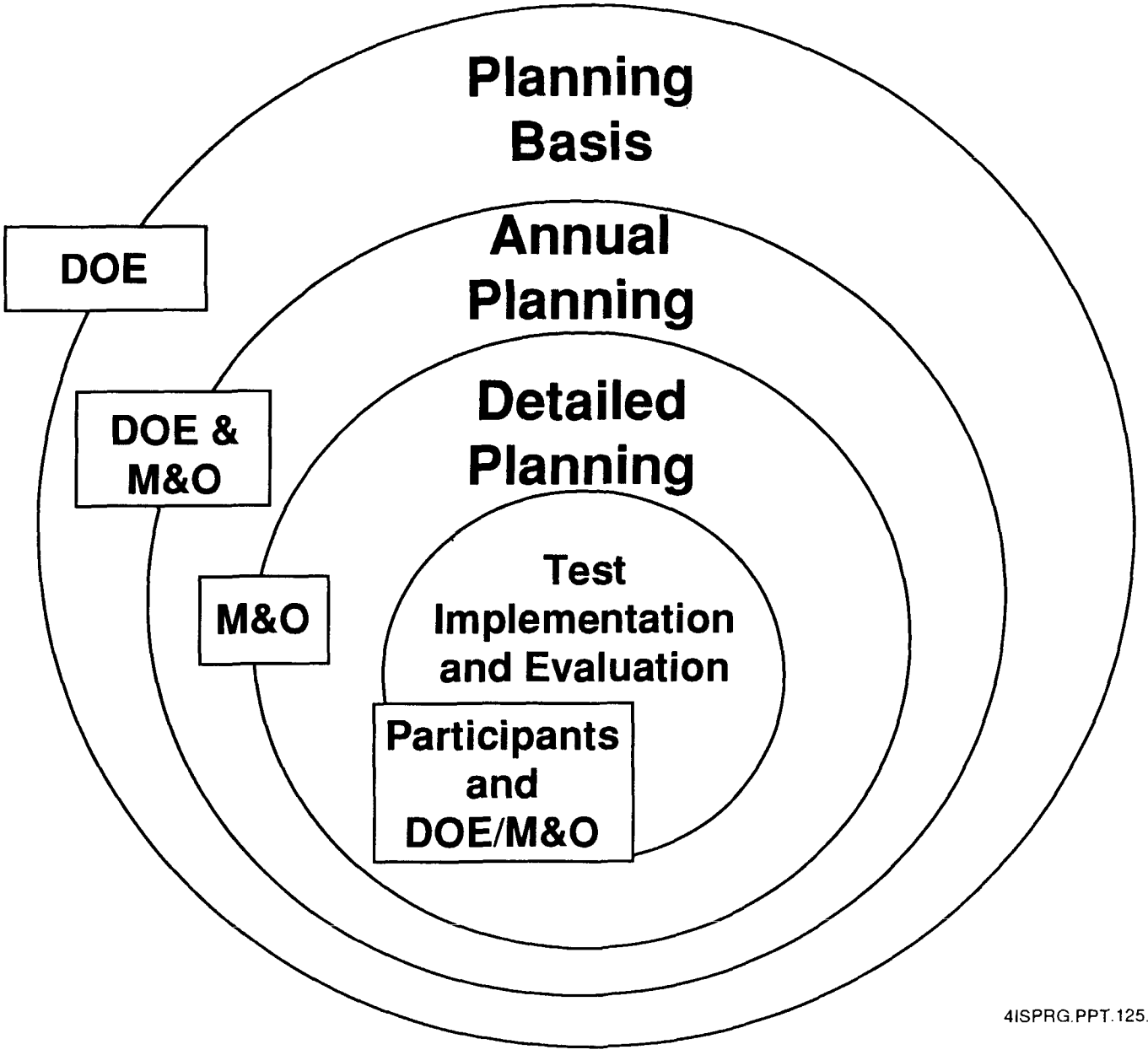
Influences on Prioritization

- **Budget constraints**
- **Review organization recommendations**
  - **State, Congress, NWTRB, ACNW, NRC interaction**
- **Physical**
  - **Findings from investigations, assessments**
  - **Needs from design program**

Annual Planning Process
Investigation Level



Integrated Planning



FY 93 Priorities

FY 1993

Priority 1	ESF Design Support
Priority 2	Irretrievable Data
Priority 3	ESF Testing
Priority 4	GWTT Disqualifier
Priority 5	Other Unsuitability Studies
Priority 6	Seismic Hazards
Priority 7	Issue Resolution Activities
Priority 8	Model Development
Priority 9	Other SCP Activities

Annual Plan

Annual Priorities

WBS SCP	Title	Priority 1: ESF Design Support	Priority 2: Irretrievable Data Collect.	Priority 3: ESF Testing
1.2.3.2.6.2 8.3.1.14.2	Soil & Rock Properties	X		
1.2.3.3.1.1.2 8.3.1.2.1.2	Runoff & Streamflow		X	
1.2.3.3.1.2.4 8.3.1.2.2.4	Percolation in UZ -ESF			X

Activities Descriptions

1.2.3.3.1.2.4 Percolation in Unsaturated Zone - ESF Study

Purpose: This activity will contribute to an understanding of the instate hydrologic characteristics of the unsaturated zone and the impact of ESF construction on the in situ hydrologic characteristics....

Description:
- Map individual fractures and fracture networks,
- Conduct radial and axial flow studies in core samples....

FY 93 Funding: $669,000 (Mission 2001: $839,000)

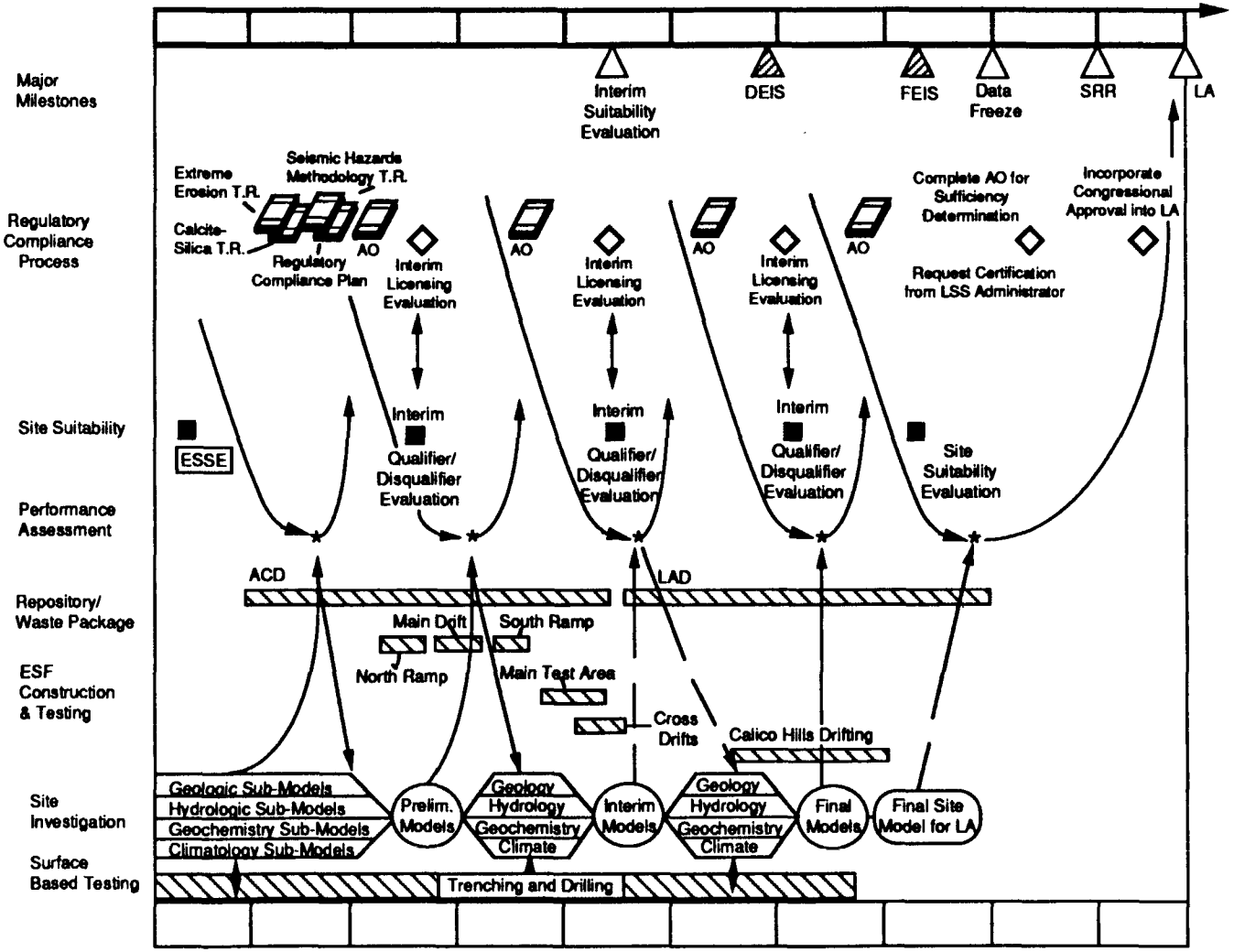
ITE Test Prioritization: High: Unsuitability, Regulatory Compliance, Scientific Confidence

Deliverable Description

(3GUS010M) Prelim. Report : Borehole Instrumentation This milestone will be satisfied by a preliminary borehole instrumentation report for the Perched-Water Test based on literature research and consultation with instrument manufacturers. (9/30/93)

(3GUS029M) Axial Intact Fracture Sampling Methods This will be satisfied with a report documenting field testing of alternative coring methds for sampling of intact fractures for ESF testing. (5/31/94)

Integrated Site Investigation Program



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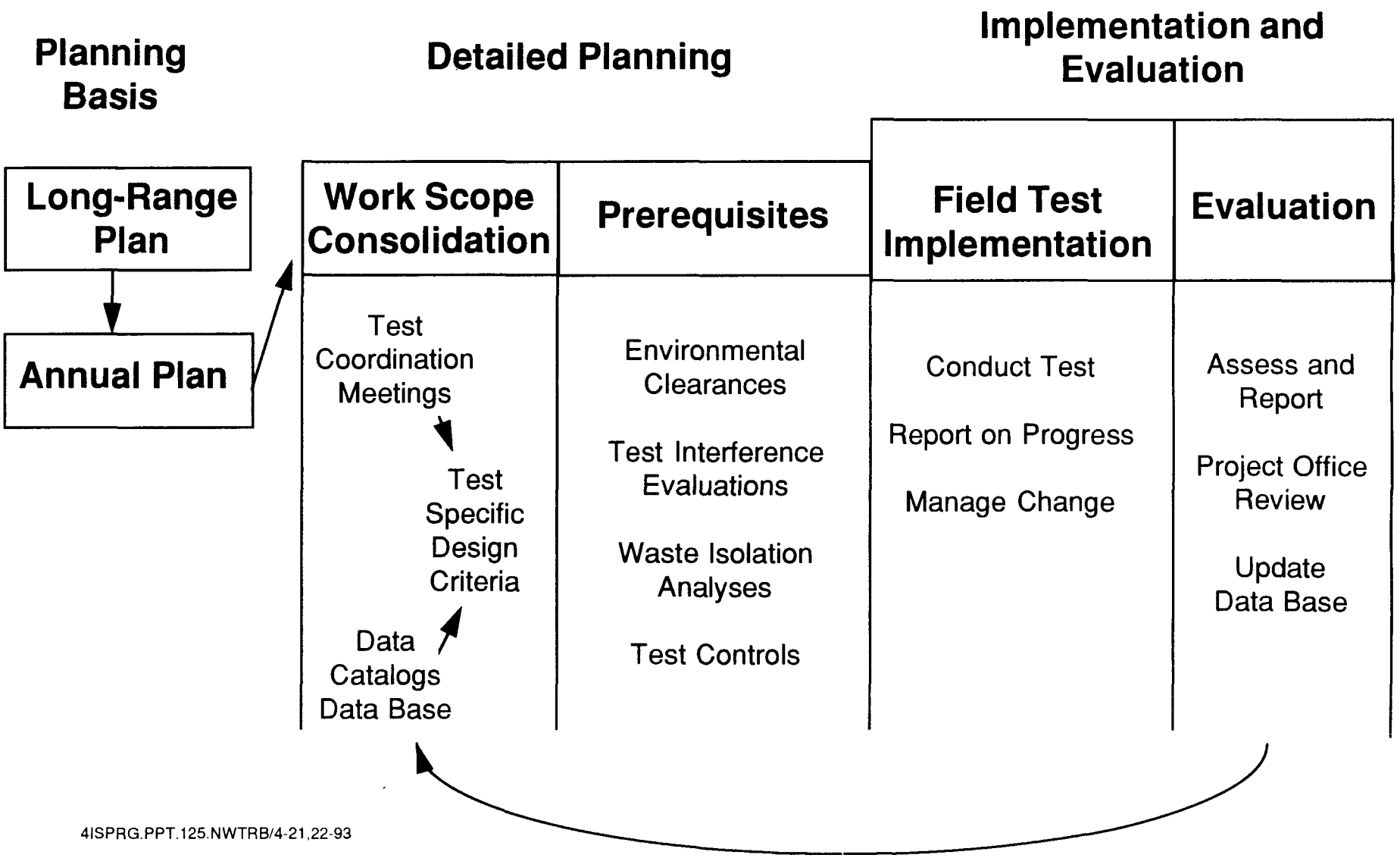
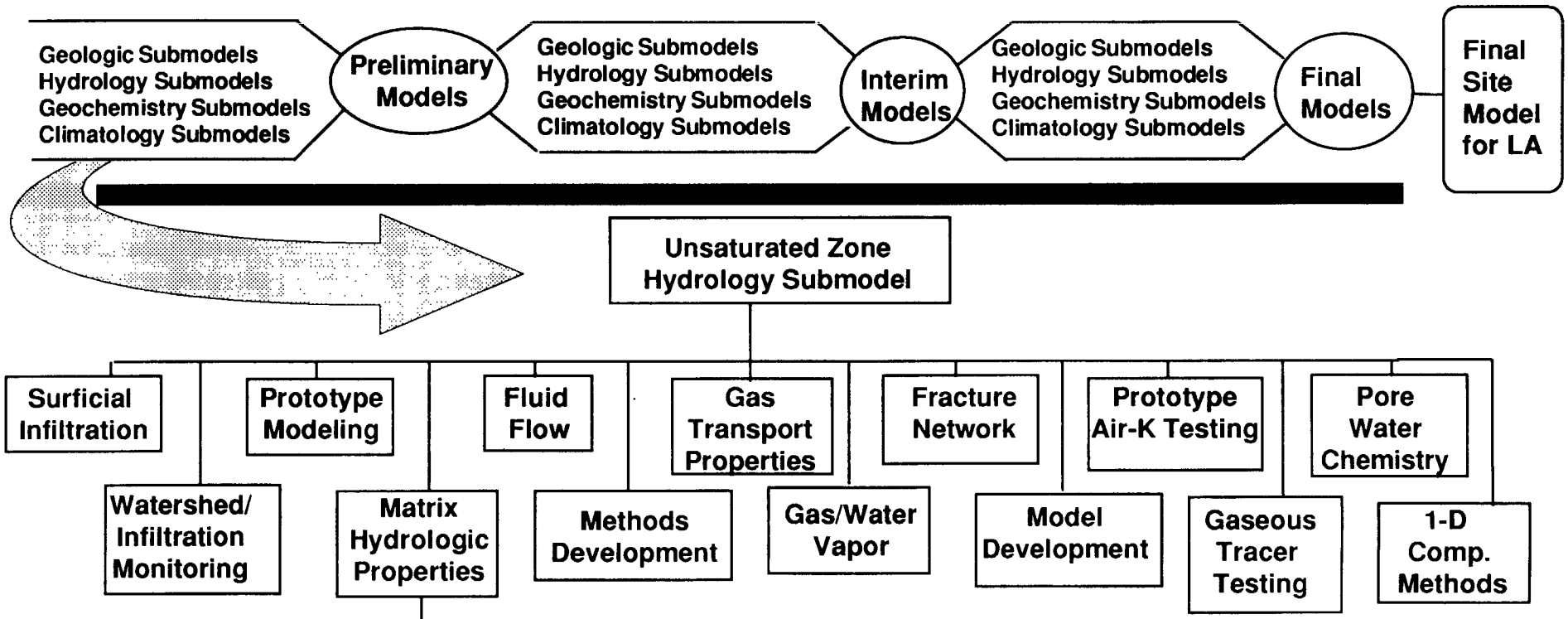
Site Investigation Process



Site Investigations Program
Integrated Long-Range Plan



(3GUP020M) Open File Report: SPOC System
This milestone is satisfied by a technical report describing the system developed to measure moisture characteristic curves using the submersible pressure outflow (SPOC) system and the concurrent collection of outflow data for unsaturated conductivity calculations. (3/31/94)

Example of Factors Influencing Test Prioritization

- **Infiltration Study**
  - Needed to understand the transfer function from precipitation to infiltration
  - Performance Assessment 1989-1990
  - Programmatic decision to accelerate the infiltration program
    - Capitalize on opportunity--exceptionally wet year
  - Implementation: findings drove modification of the tests

Unsaturated Zone Hydrology Model Components

Preliminary Model

Prerequisites	Model Components	Next Steps
Neutron Boreholes Unsaturated Zone Boreholes	Surficial Infiltration Watershed/Infiltration Properties Matrix Hydrologic Properties Fluid Flow Processes Gas Transport Properties Gas/Water Vapor Chemistry Fracture Network Air Permeability Pore Water Chemistry	Small and Large Plot Rainfall Simulation Unsaturated Zone Boreholes

Example of Work Scope Consolidation Borehole SRG-5

- **Integration of Multiple Considerations**
  - **A design borehole now is serving systematic drilling needs and unsaturated zone flow data requirements**

Example of Work Scope Consolidation Borehole SRG-5

(Continued)

- **Specifics:**

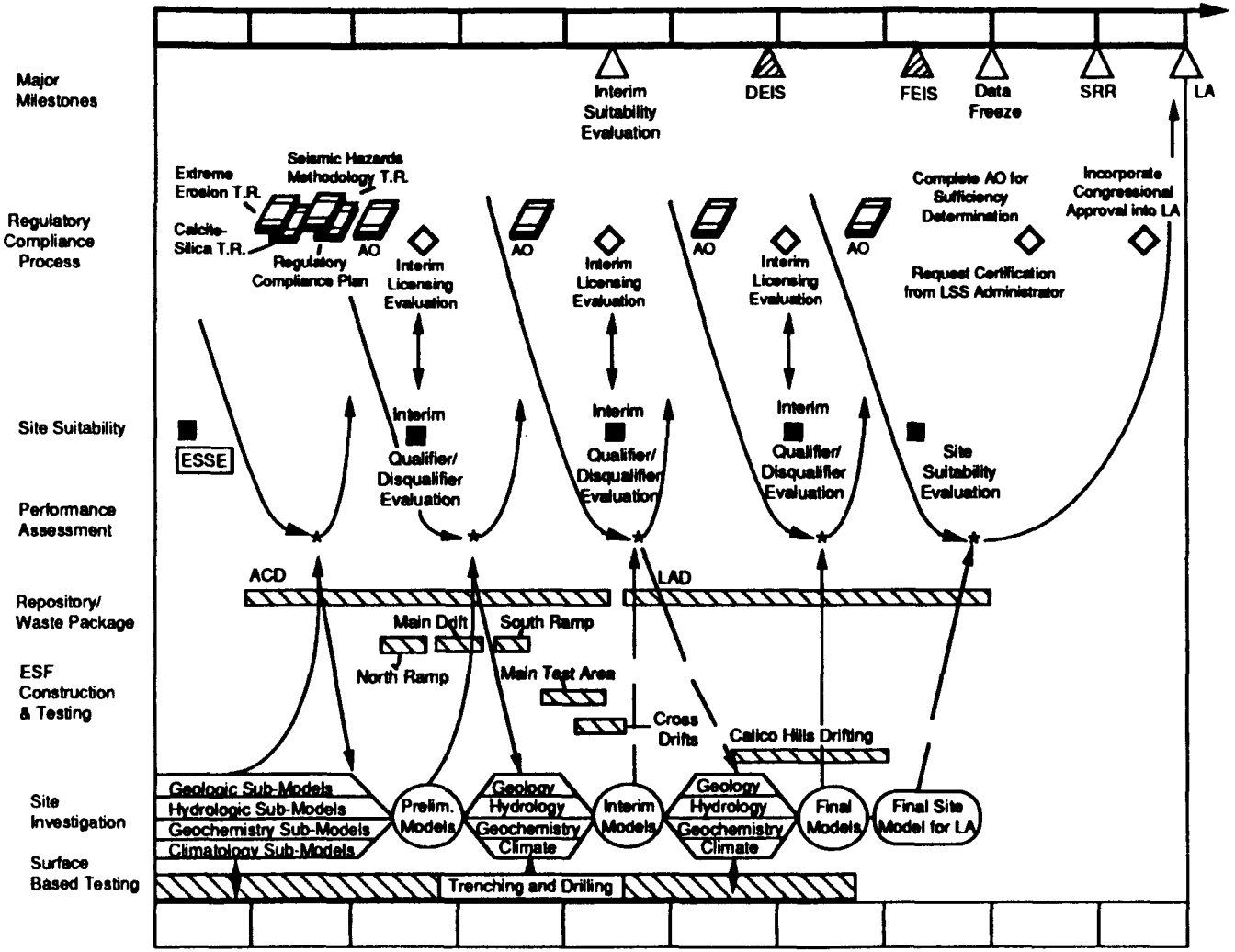
  A. Construction and coring requirements

  - ESF Design, Topopah Spring ramp and drift
  - ESF Design, Calico Hills ramp and drift
  - Systematic drilling program
  - Water/gas phase flow testing

  B. Testing, sampling, and monitoring

  - Matrix hydrologic properties testing
  - Air permeability testing
  - Hydrochemical characterization of the unsaturated zone
  - Gas monitoring and sampling
  - Site potentiometric-level evaluation
  - Saturated zone hydrochemistry
  - Site stratigraphy model study
  - Other Program studies utilizing core from systematic drilling program

Integrated Site Investigation Program



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