

APRIL 25 MEETING

MAY 12 1989

- 1 -

Mr. Ralph Stein, Associate Director
Office of Systems Integration & Regulations
Office of Civilian Radioactive Waste
Management
U. S. Department of Energy, RW 24
Washington, D. C. 20545

Dear Mr. Stein:

SUBJECT: MINUTES FROM APRIL 25, 1989 MEETING

The purpose of this letter is to provide you with a copy of the minutes from the April 25, 1989 meeting among the staff of the U. S. Nuclear Regulatory Commission (NRC) and the Center for Nuclear Waste Regulatory Analysis (CNWRA) and representatives from the U. S. Department of Energy (DOE), the State of Nevada, and Lincoln County, Nevada. The purpose of the meeting was to introduce the CNWRA staff and ongoing technical work to DOE and the State of Nevada; to have the State of Nevada present an overview of its program; and to discuss the need for timely access to data and the need for increased technical exchanges.

As a result of the meeting, both DOE and the State of Nevada stated that they had gained a better understanding of the CNWRA and its work. In addition, the presentations by the State of Nevada were helpful in having the NRC and CNWRA staffs and DOE gain insight into the Nevada work. With respect to the need to gain timely access to data and the need for increased technical exchanges, the NRC staff believes that the discussions held during the meeting were encouraging. All of the participants present agreed that the issue concerning data and technical exchanges needs to be addressed further. This will be discussed at the upcoming meeting on interactions that will be scheduled for early June. A detailed summary of the meeting is contained in the enclosure.

If you require any additional assistance, please feel free to contact Mr. Joe Holonich of my staff at (301) 492-3403 or FTS 492-3403.

Sincerely,

ORIGINAL SIGNED BY

John J. Linehan, Director
Repository Licensing and Quality
Assurance Project Directorate
Division of High-Level Waste Management

8905150115 890512
PDR WASTE
WM-11 PDC

Enclosed: As stated

in pocket

cc: C. Gertz, DOE/NV
R. Loux, State of Nevada
M. Baughman, Lincoln County
D. Bechtel, Clark County
S. Bradhurts, Nye County

DISTRIBUTION & CONCURRENCE: SEE NEXT PAGE

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B. J. Youngblood	R. E. Browning	J. Bunting
J. Linehan	R. Ballard	On-Site Reps
NMSS R/F	HLPD R/F	J. Holtonich
ACMW	PDR	

OFFICIAL RECORD COPY

OFC : HLPD	: HLPD	:	:	:	:
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Received w/Ltr Dated 5/12/89

ENCLOSURE

MINUTES FROM APRIL 25, 1989 MEETING

On April 25, 1989, staff from the U. S. Nuclear Regulatory Commission (NRC) and the Center for Nuclear Waste Regulatory Analysis (CNWRA) met with representatives from the U. S. Department of Energy (DOE) and the State of Nevada. The purpose of the meeting was to introduce the CNWRA; to present the CNWRA's program; and to have the State of Nevada present an overview of its program. Attachment 1 is a list of attendees.

The meeting began with the NRC staff providing background on the development of the CNWRA and the NRC's management of the Center. This was followed by a presentation from the CNWRA President on the general background of the Center. This included a summary of the CNWRA organization and its staffing. A copy of these presentations is contained in Attachment 2. Next, CNWRA staff gave a detailed discussion of its program. The subjects covered included: (1) the CNWRA program for systematic analysis of the regulations; (2) CNWRA technical assistance work; and (3) ongoing CNWRA research. Attachment 3 is a copy of the slides used during the presentation.

Following the CNWRA's presentation, the State of Nevada discussed the activities presently being undertaken in its program. The State's presentation included information on: (1) the State of Nevada's role; (2) Nevada's technical concerns; and (3) the type of technical activities and studies being undertaken. The details of this presentation are in Attachment 4.

The final topic discussed at the meeting was the need for increased technical exchanges among the participants and the need for NRC staff to have timely access to data. This discussion began with the staff giving a background presentation on the need for technical exchanges. Attachment 5 is a copy of the NRC staff's presentation. During the discussion, the State of Nevada and DOE agreed with the NRC staff that there was a need for technical exchanges between the staff and other program participants. It was also stated that the NRC staff, DOE, and the State of Nevada have begun to put in place the mechanism for scheduling such interactions. Based on the discussions at the meeting, all parties agreed that a meeting scheduled for early June 1989 to discuss the character and groundrules for such exchanges and to identify an initial set of such interactions would be beneficial.

With respect to the need for NRC staff to access DOE's data bases, DOE stated that there were several types of data bases that were in different formats. For example, there was the Reference Information Data Base, which was in hard copy, the Site and Engineering Properties Data Base, which was in electronic

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format, and the local records centers, which each participant has and which contain different data in various formats. DOE further stated that it was exploring the NRC staff's request for access to the data bases. The participants agreed that this subject would be further discussed in the meeting being scheduled for early June.

Joseph J. Holonich May 5 1989
Joseph J. Holonich, Section Leader
Repository Licensing and Quality
Assurance Project Directorate
Division of High-Level Waste Management
U. S. Nuclear Regulatory Commission

Gordon Appel 5/10/89
Gordon Appel, Chief
Licensing Branch
Office of Civilian Radioactive
Waste Management
U. S. Department of Energy

ATTACHMENT 1

List of Attendees

NRC

J. Linehan
J. Holonich
D. Brooks
M. Delligatti
P. Prestholt
M. Silberberg

U. S. Geological Survey

L. Hayes
R. Craig

Weston/DOE

M. Lugo
S. Van Camp

Lincoln County, Nevada

R. Massey

Sandia National Laboratory

S. Sinnock

Science Application International, Corp

J. King
J. Nelson
J. Younder
C. Pflum
M. Glora

Center for Nuclear Waste Regulatory Analysis

J. Latz
J. Hageman
A. Whiting
P. Nair
J. Russel
R. Adler
W. Patrick

DOE

G. Appel
E. Wilmont
S. Brocoum
D. Dobson
J. Blaylock
M. Cloninger
L. Little
C. Brooks
E. Petrie
C. Gertz
M. Blanchard

State of Nevada

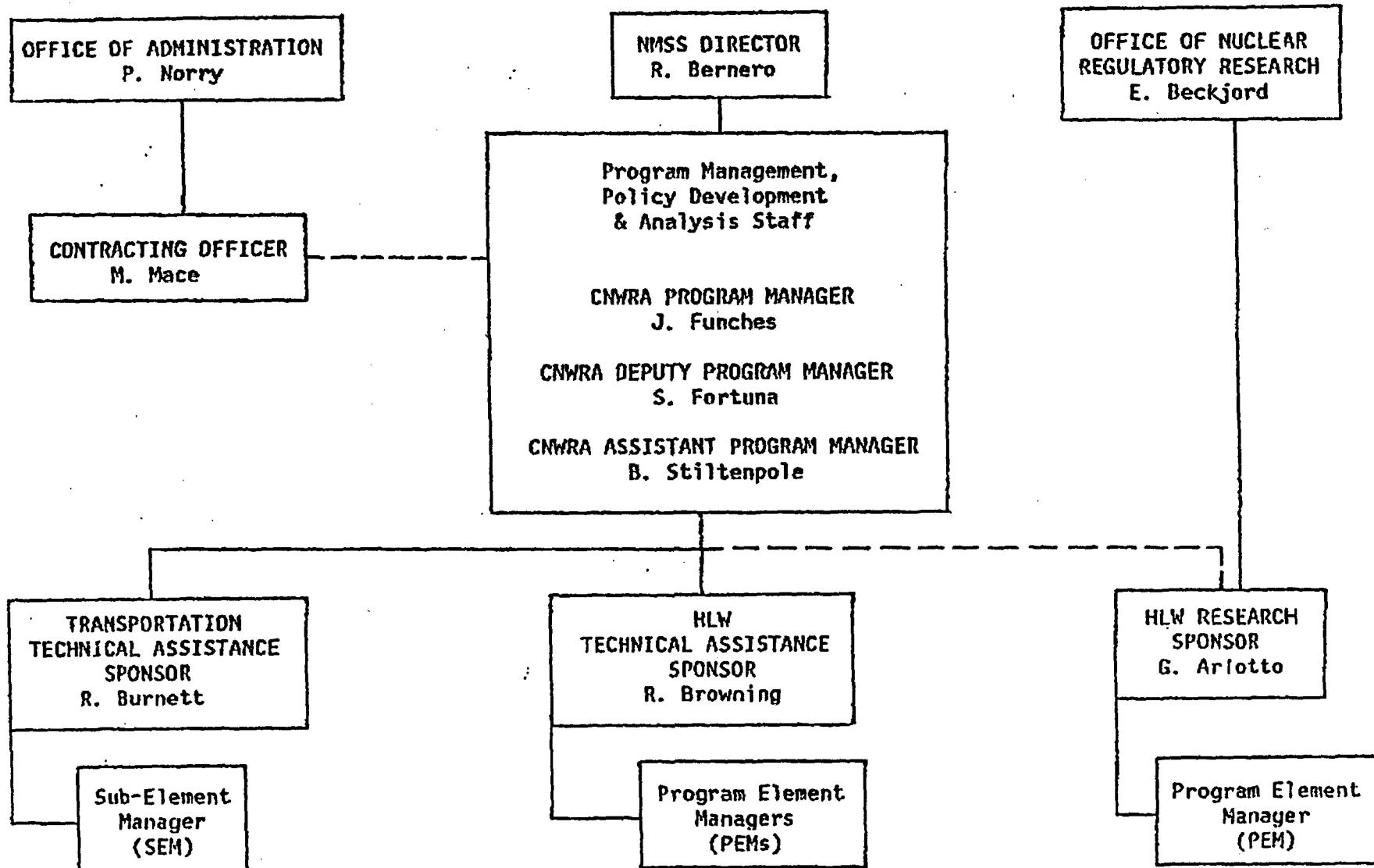
C. Johnson

Los Alamos National Laboratory

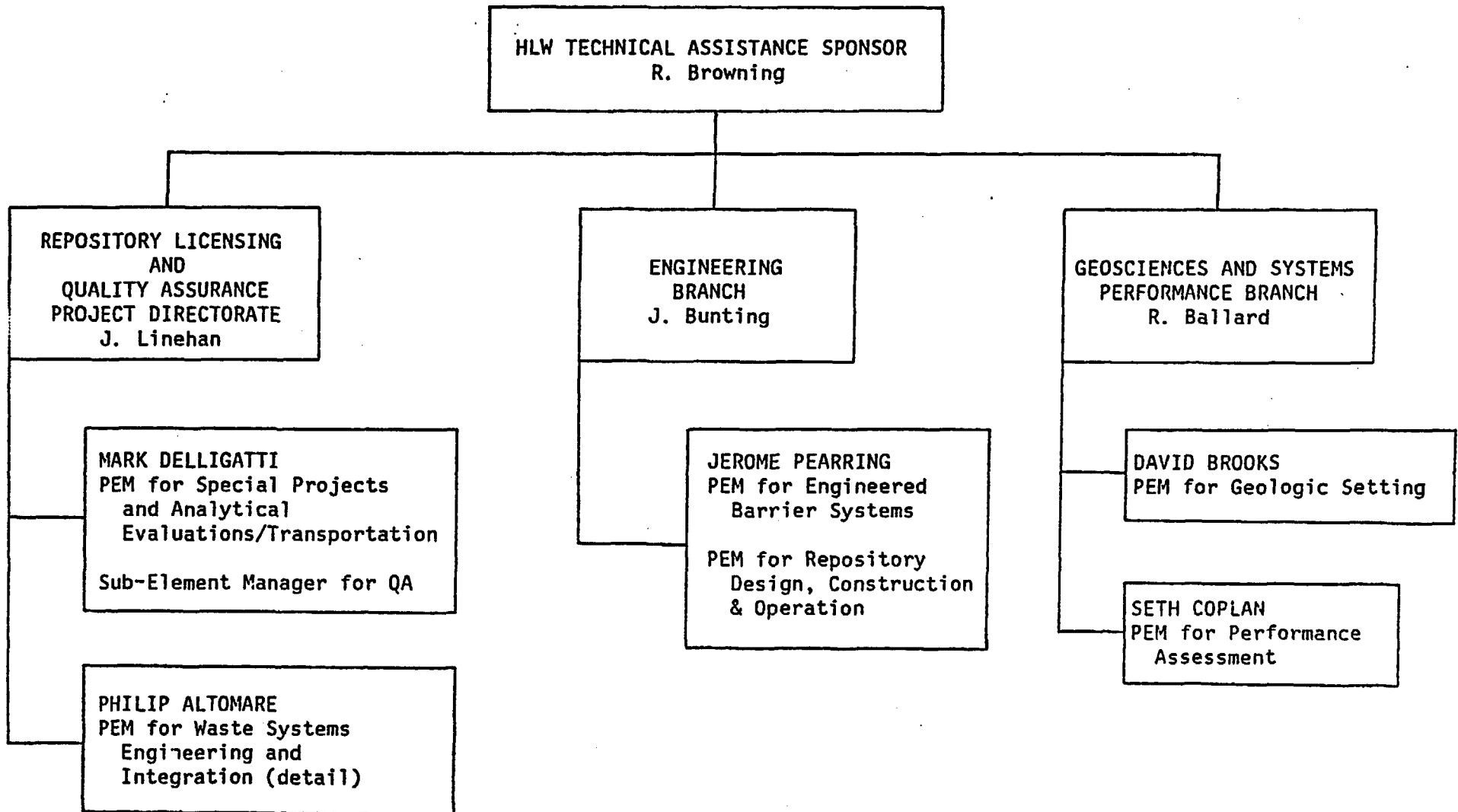
J. Canepa

ATTACHMENT 2

RESPONSIBILITIES FOR CNWRA CONTRACT MANAGEMENT



RESPONSIBILITIES FOR CNWRA CONTRACT MANAGEMENT
(Continued)



CENTER FOR NUCLEAR WASTE
REGULATORY ANALYSES

A FEDERALLY FUNDED RESEARCH
AND DEVELOPMENT CENTER

WHY AN FFRDC?

- o Establish Legal Authority to:
 - Preclude Contractor Conflict of Interest
 - Assure Long-Term Continuity of Contracted Technical Excellence

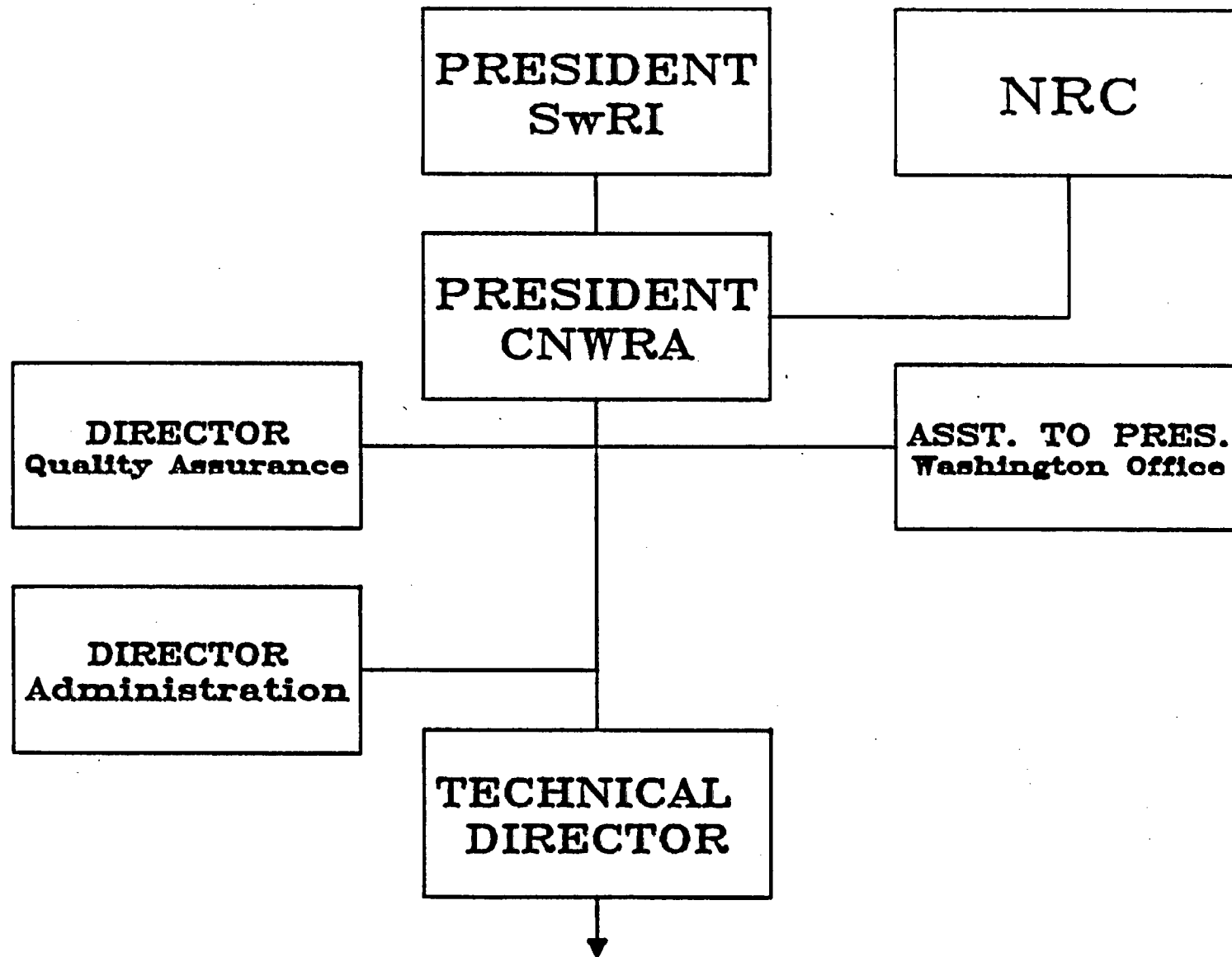
UNIQUE CHARACTERISTICS OF THE FFRDC

- o Managed as Non-Profit Autonomous Unit
- o Remain Free from Conflict of Interest
- o Long-Term Relationship by Specific Agreement
- o Charter Limited to NRC's Specific Needs

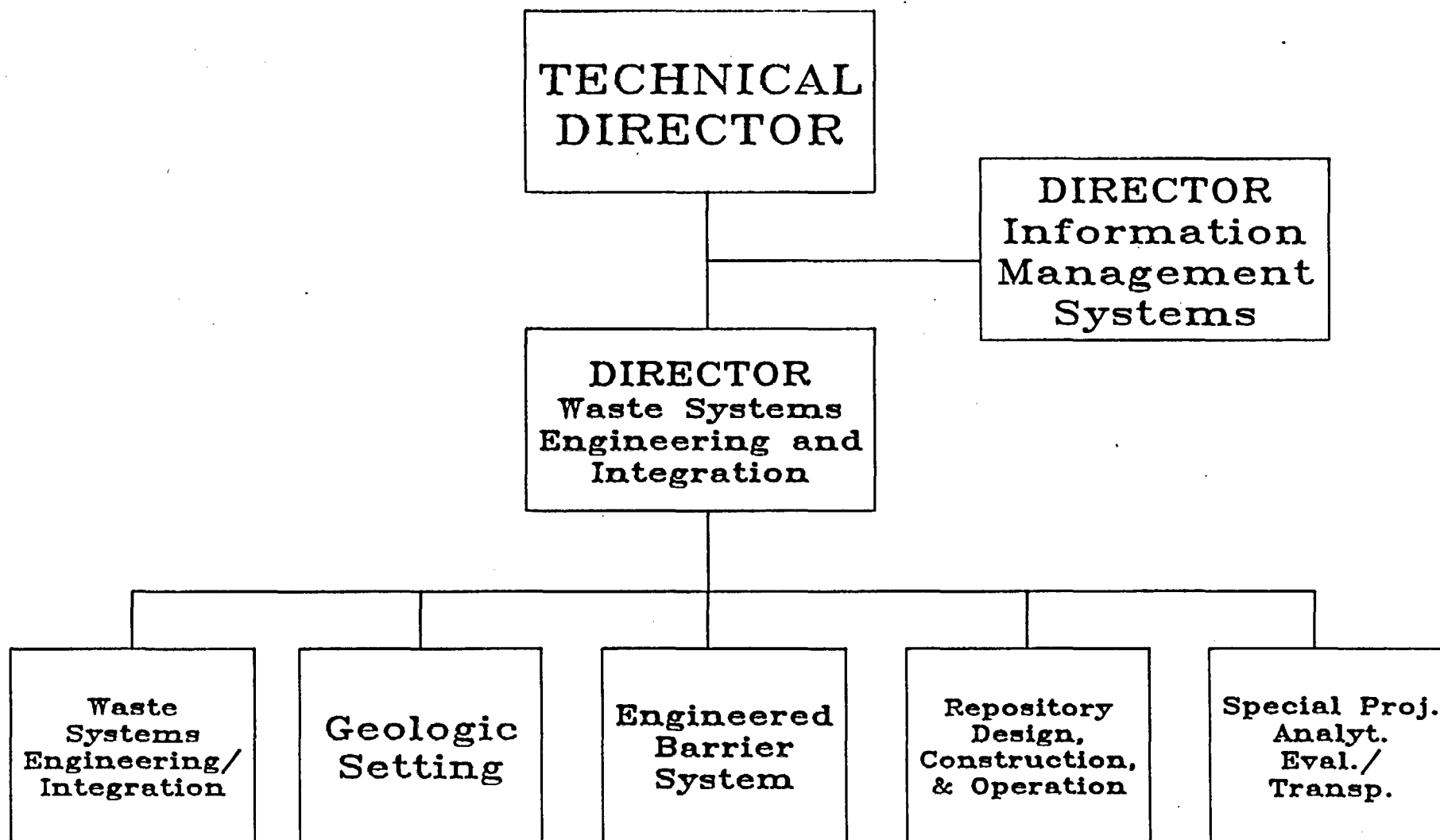
SELECTION OF SwRI

- o Independent Non-Profit Entity
Devoted to R&D (Basic and Applied
Physical Sciences and Engineering)
- o Agreed to Long-Term Commitment
free of any Conflict of Interest
- o An existing Multi-disciplinary
staff of over 2100 persons
- o State-of-the-art Laboratories,
Office Space, Support Services

CENTER MANAGEMENT STRUCTURE



CENTER PROGRAM ELEMENTS



**FIRST YEAR
CENTER REQUIREMENTS/ACCOMPLISHMENTS
(Continued)**

- o **Begin Development of Program
Architecture**
 - **Complete Preliminary Design
of Program Architecture**

- o **Begin Development of Program
Architecture Support System**
 - **Completed Preliminary Program
Architecture Support System**

**FIRST YEAR
CENTER REQUIREMENTS/ACCOMPLISHMENTS
(Continued)**

- o **Develop Technical and Analytical Capabilities**
 - **Hired 29 Core Staff**
 - **Completed Three Regulatory Analyses**
 - **Initiated Research Program**
 - **Began Technology Transfer to Center**
 - **Initiated Three-Year Transportation Risk Study**

FIRST YEAR CENTER REQUIREMENTS/ACCOMPLISHMENTS

- o Set up and Equip Offices**
 - Established Offices in San Antonio, TX & Washington DC**
- o Establish Management Structure and Controls**
 - Developed and Implemented Management and Administrative Procedures**
 - Developed Detailed Operations Plans**
 - Developed Center Quality Assurance Manual**

SECOND YEAR CENTER OBJECTIVES (Continued)

o New Objectives

- Accelerated Original 3-Year Phase-In Plan
- Recommend Reg. Requirements for Priority Attention in Review of DOE's Site Characterization Program
- Support Review of DOE's Site Characterization Plan
- Support Quality Assurance Audits
- Technical Support for Developing Technical Positions
- Develop Integrated Research Plan
- Start Three Additional Research Projects

SECOND YEAR CENTER OBJECTIVES

- o On-Going Objectives
 - Continue to Develop Technical and Analytical Capabilities
 - Increase Center Core Staff
 - Continue Development of Program Architecture
 - Continue Four Research Projects Begun in First Year
 - Continue 3-Year Transportation Risk Study

SUMMARY

Center for Nuclear Waste Regulatory Analyses

- o Center is Established
- o Center Completed First Year Requirements Successfully
- o Center is Continuing to Increase its Technical/
Analytical Capabilities

ATTACHMENT 3

**CENTER FOR NUCLEAR WASTE
REGULATORY ANALYSES**

SOUTHWEST RESEARCH INSTITUTE

Presented at the

**Joint NRC, DOE, State of Nevada and Affected Units
of Local Government Meeting on Activities
of the CNWRA**

April 25, 1989

OUTLINE OF PRESENTATIONS

- 1. Overview of the CNWRA Program and “Start-Up” Activities**
- 2. Description of Systems Approach to Regulatory Program**
- 3. Description of CNWRA Technical Assistance Program**
- 4. Overview of Current CNWRA Research Program**

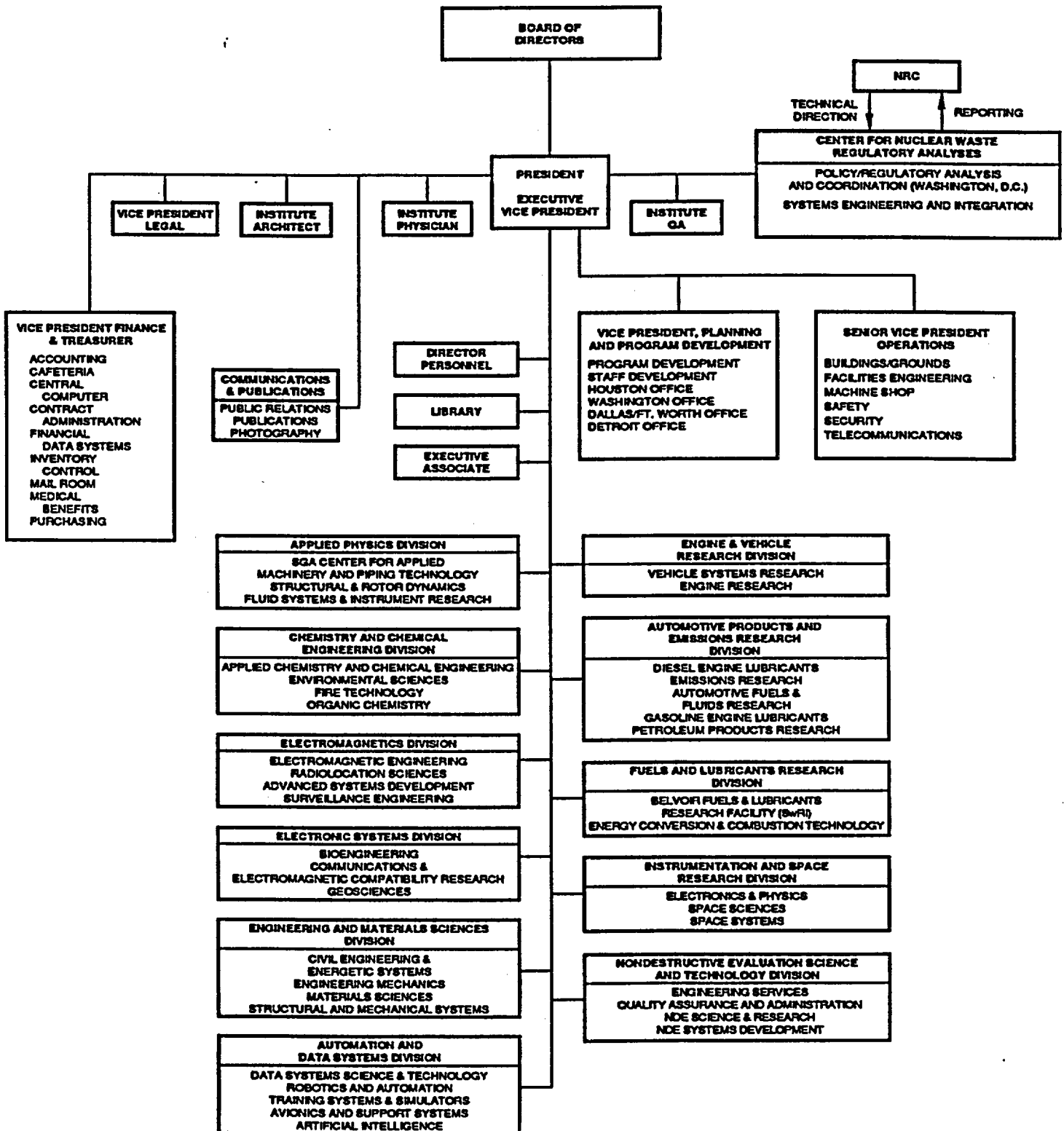
OVERVIEW OF THE CNWRA PROGRAM AND START-UP ACTIVITIES

AERIAL VIEW

ESTABLISHMENT OF A FFRDC BY THE NRC FULFILLS THREE PURPOSES

- **AVOIDS CONFLICT-OF-INTEREST SITUATIONS**
- **PROVIDES LONG-TERM CONTINUITY IN TECHNICAL ASSISTANCE AND RESEARCH**
- **PROVIDES A CENTRAL CAPABILITY FOR PERFORMING AND INTEGRATING TECHNICAL ASSISTANCE, RESEARCH, AND INDEPENDENT REVIEW ACTIVITIES RELATED TO ALL ASPECTS OF HLW LICENSING**

SOUTHWEST RESEARCH INSTITUTE ORGANIZATION CHART



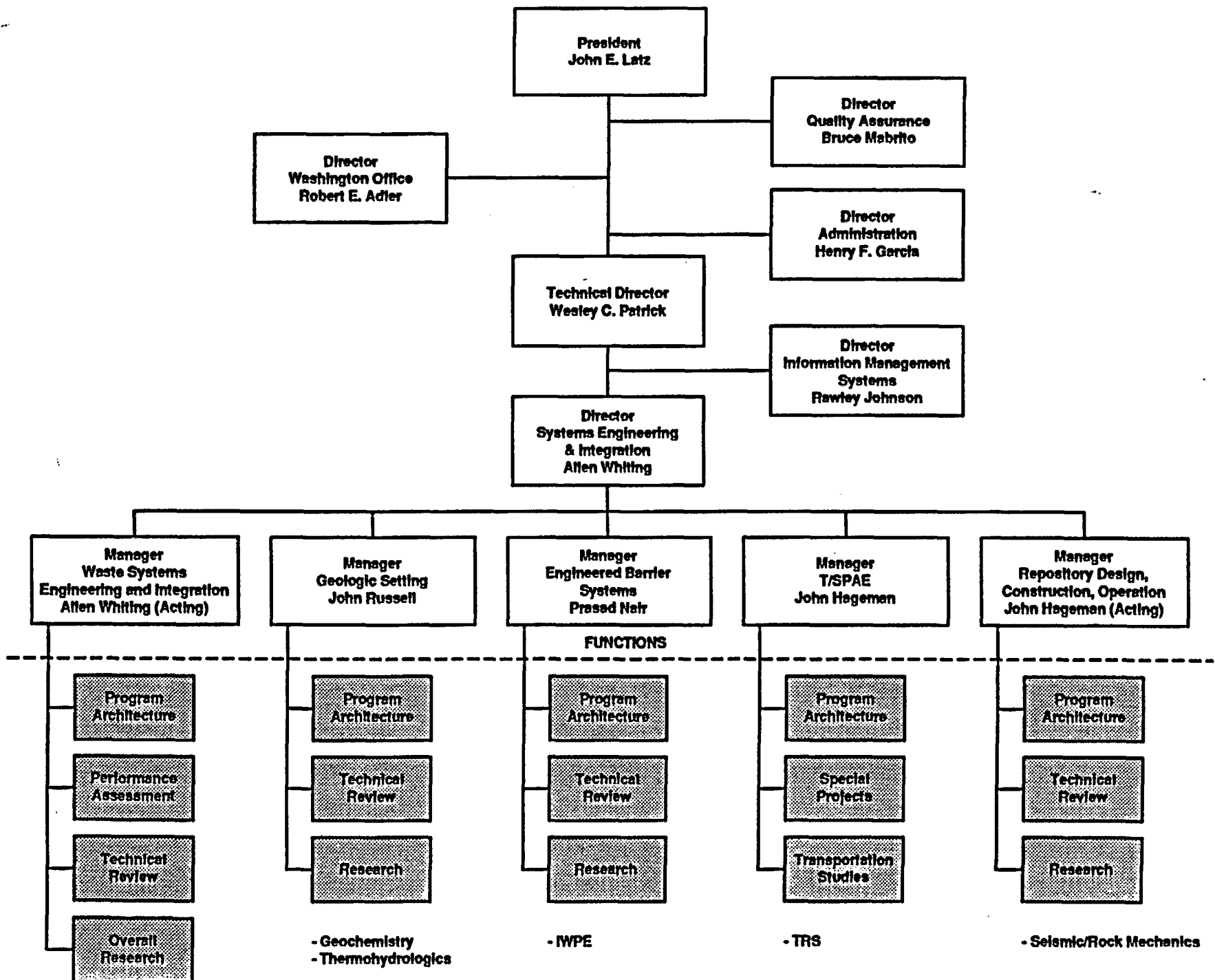
STANDING GROUPS

ADVISORY COMMITTEE FOR RESEARCH
ANIMAL RESEARCH COMMITTEE
ARCHITECTURAL COMMITTEE
COMPUTER COMMITTEE
FACILITIES REVIEW PANEL

LIBRARY COMMITTEE
MANAGEMENT ADVISORY COMMITTEE
NUCLEAR QUALITY ASSURANCE COMMITTEE
PATENT COMMITTEE
PLANNING COMMITTEE

PLANNING COUNCIL
PROPOSAL PANEL
RADIOLOGICAL HEALTH & SAFETY COMMITTEE
SAFETY COMMITTEE
SERVICES COMMITTEE

NOVEMBER 1988



SUMMARY CENTER STAFFING PLAN

APRIL 1989

	<u>PROFESSIONAL</u>	<u>SUPPORT</u>	<u>TOTAL</u>
CURRENT	23	8	31
END OF FY 1989	35	8	43
END OF FY 1990	45	10	55
END OF FY 1991	50	12	62
END OF FY 1992	52	12	64

PRESENT KEY CENTER EXPERTISE

- DATABASE MANAGEMENT AND DATA PROCESSING
- GEOCHEMISTRY
- GEOLOGY
- HEALTH PHYSICS
- INFORMATION MANAGEMENT SYSTEMS
- MATERIAL LIFE PREDICTION
- MATERIAL SCIENCES
- MECHANICAL ENGINEERING
- MINING ENGINEERING
- NDE TECHNOLOGY
- NUMERICAL MODELING
- QUALITY ASSURANCE
- RELIABILITY
- RISK ASSESSMENT/RISK ANALYSIS
- REGULATORY AND POLICY ANALYSIS
- ROCK MECHANICS
- SYSTEMS ENGINEERING
- SOIL MECHANICS
- TRANSPORTATION ENGINEERING
- WASTE LEACHING

CNWRA PRINCIPAL PROGRAMMATIC AREAS

- **SYSTEMS APPROACH TO LICENSING**
- **TECHNICAL ASSISTANCE**
- **TRANSPORTATION RISK STUDY**
- **RESEARCH**

DESCRIPTION OF SYSTEMS APPROACH TO THE REGULATORY PROGRAM

NWPA ESTABLISHES THE HLW REPOSITORY LICENSING ENVIRONMENT

- **Technically Sophisticated and Complex**
- **Several Inter-Related Components – At Reactor Storage, MRS, Geologic Repository, Transportation, etc.**
- **Formal Administrative Law Process**
- **Multiple-Party Evaluation and Approval Process**
- **Institutionally Complex – Negotiator, MRS Commission, Technical Review Board**
- **Intense Public Scrutiny**
- **Rigorous Schedule – 3-Year Review of License Application**

SYSTEMS ENGINEERING IS BEING USED TO ENSURE SUCCESSFUL AND TIMELY FULFILLMENT OF THE NRC-HLW MISSION

- **MISSION ORIENTED**
 - Develops One-to-One Relation Between NWPAA Requirements and NRC-HLW Program Elements
- **REQUIREMENTS-BASED**
 - Analyzes All Regulations and Statutes (NRC, DOE, DOT, EPA, DOL, etc.) Affecting HLW Program
- **PROACTIVE**
 - Identifies Institutional, Regulatory, and Technical Uncertainties and Implements Actions to Resolve Them
- **BASIS FOR INTEGRATION**
 - Ensures that All Essential Work Elements are Included but that Non-Essential and Unfocused Elements are Excluded
- **DYNAMIC**
 - Incorporates Changes in All Aspects of the Licensing Environment
 - Institutional, Regulatory, and Technical

THIS "TOP DOWN" APPROACH ENCOMPASSES ALL KEY SUBSYSTEMS OF HLW MANAGEMENT

- **Repository (Geologic Disposal)**
- **Monitored Retrievable Storage**
- **At-Reactor Storage**
- **Transportation Interfaces**
- **DHLW and West Valley Wastes**
- **Alternative Programs (e.g. SUBSEABED)**

IT ALSO SPANS THE COMPLETE TIME FRAME OF INTEREST

- **CONSTRUCTION AUTHORIZATION**
- **LICENSE TO OPERATE**
- **OPERATIONAL MONITORING**
- **DECISION TO CLOSE AND DECOMMISSION**
- **POST-CLOSURE MONITORING**
- **TERMINATION OF THE LICENSE**

PRACTICAL ROLE OF SYSTEM ENGINEERING

- **Defines The Overall System**
- **Allocates Functions/Responsibilities Among The Subsystems**
- **Coordinates Subsystem Activities**
- **Monitors Performance/Progress Of Interrelated Activities**
- **Assesses Impacts Of Actual And Potential Actions (Delays, Accelerations, Legislation, Etc.)**
- **Integrates Subsystem Results**
- **Evaluates And Documents Closure Of Issues And Reduction Of Programmatic, Regulatory, And Technical Uncertainties**

THREE IMPORTANT PRACTICAL RESULTS ARE BEING ACHIEVED

- **SCHEDULE RISK IS REDUCED**
- **RESOURCES ARE CONSERVED**
- **PUBLIC CONFIDENCE IS INCREASED**

SCHEDULE RISK IS REDUCED THROUGH:

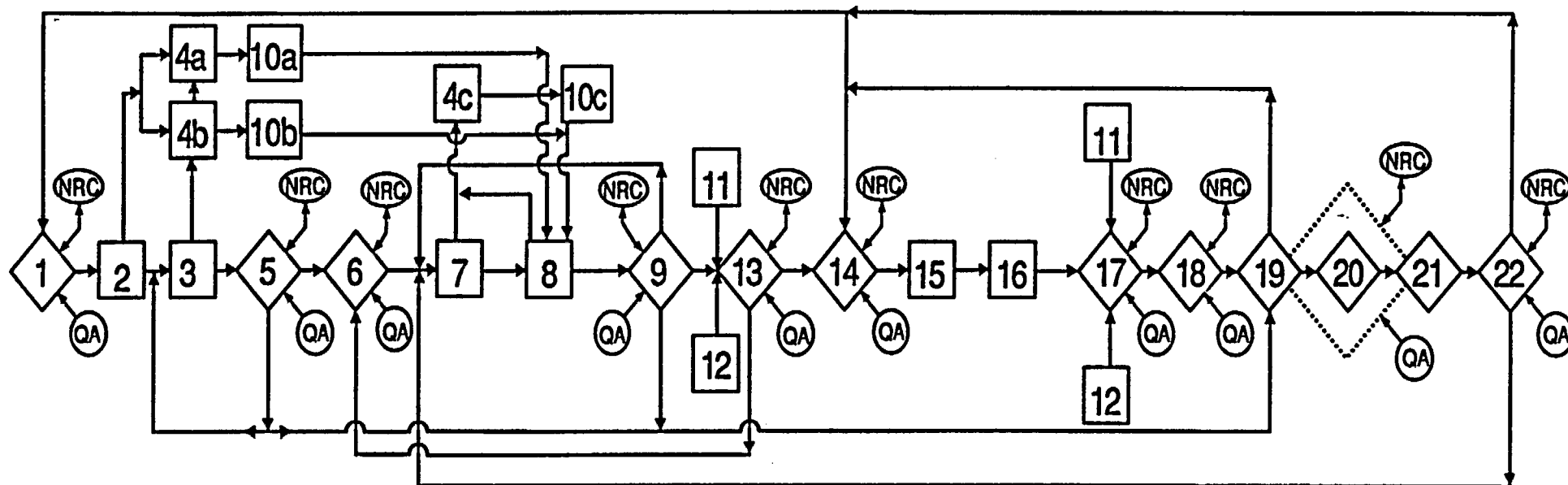
- **COMPREHENSIVE EVALUATION OF PROGRAMMATIC REQUIREMENTS AND UNCERTAINTIES**
- **EARLY IDENTIFICATION OF PROBLEM AREAS**
- **PROACTIVE RESOLUTION OF CONCERNS**
- **PRIORITIZATION OF ACTIONS**
- **STREAMLINING THE LICENSING PROCESS**
 - **TIMELY GUIDANCE AVAILABLE TO DOE**
 - **STAFF PREPARED TO REVIEW THE LICENSE APPLICATION**
 - **APPROPRIATE PROCEDURAL ENHANCEMENTS**

RESOURCES ARE CONSERVED THROUGH:

- **FOCUS ON THE NRC-HLW MISSION**
- **PRIORITIZATION OF ACTIONS**
- **INCLUSION OF ONLY ESSENTIAL PROGRAM ELEMENTS**
- **THOROUGH INTEGRATION BOTH PROGRAMMATICALLY AND ORGANIZATIONALLY**

PUBLIC CONFIDENCE IS INCREASED THROUGH:

- **OBJECTIVE EVIDENCE THAT A DOE LICENSE APPLICATION CAN BE PROCESSED IN A HIGH-QUALITY, TIMELY, COST-EFFECTIVE MANNER**
- **A COMPREHENSIVE BASIS FOR LICENSE REVIEW THAT INCLUDES ALL REGULATORY REQUIREMENTS**
- **AN ESTABLISHED, DEMONSTRABLE LICENSE APPLICATION REVIEW PROCESS**



PHASE OF THE PROCESS REQUIRING WORK AT AND INPUT FROM THE PROGRAM ELEMENTS



PHASE OF THE PROCESS REQUIRING INTEGRATION



REVIEW AND APPROVAL BY NUCLEAR REGULATORY COMMISSION



REVIEW AND APPROVAL BY QUALITY ASSURANCE

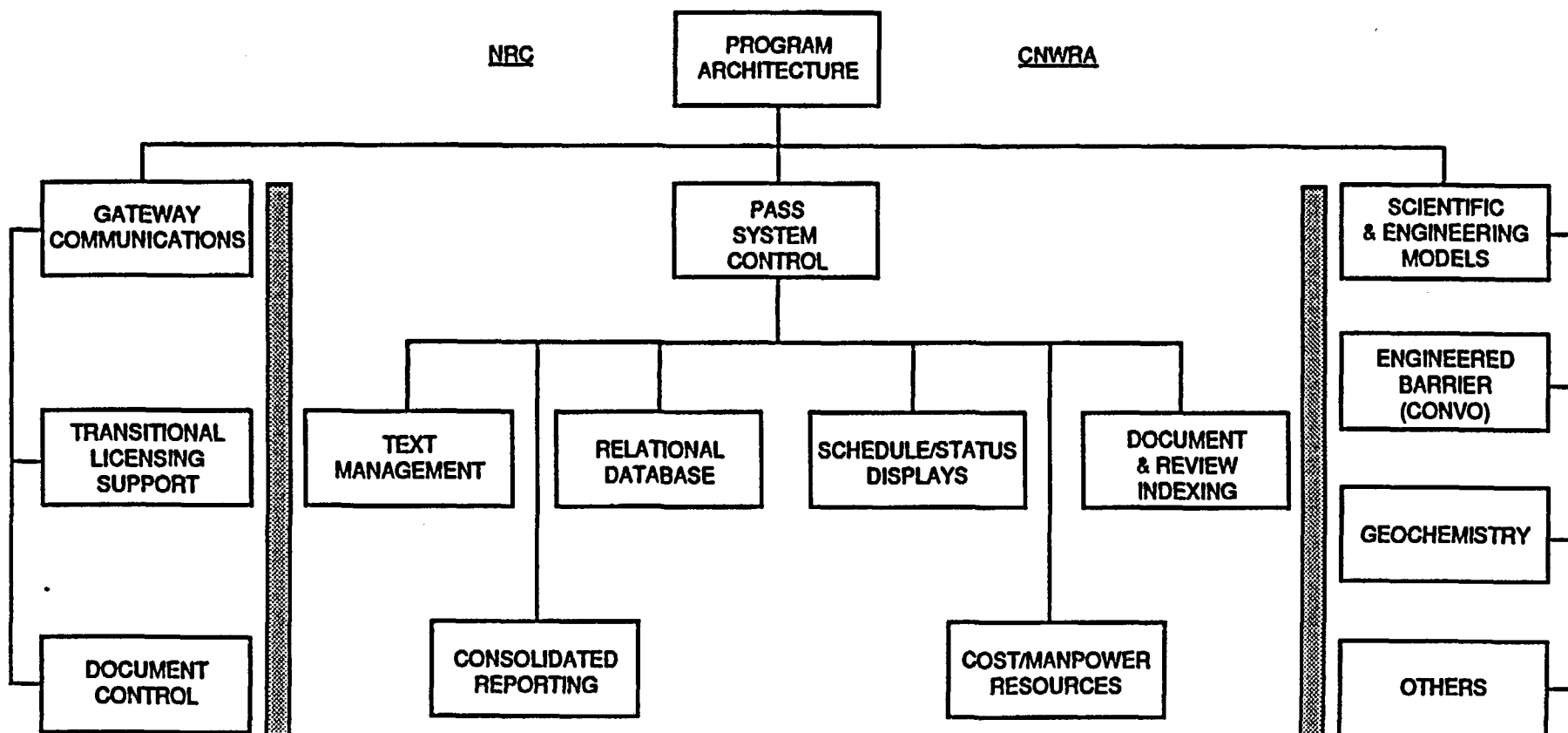
1. IDENTIFY POTENTIALLY APPLICABLE REGULATIONS
2. ANALYZE REGULATORY REQUIREMENTS
3. IDENTIFY AND LIST ELEMENTS OF PROOF
- 4a. IDENTIFY AND DESCRIBE INSTITUTIONAL UNCERTAINTIES
- 4b. IDENTIFY AND DESCRIBE REGULATORY UNCERTAINTIES
- 4c. IDENTIFY AND DESCRIBE TECHNICAL UNCERTAINTIES
5. INTEGRATE AND REVIEW REGULATORY REQUIREMENTS; AND INTEGRATE, REVIEW, AND REVISE ELEMENTS OF PROOF
6. SELECT SUBSET OF REGULATIONS FOR FURTHER ANALYSIS BASED ON TIME-CRITICAL NATURE
7. IDENTIFY BASIC APPROACH FOR COMPLIANCE DETERMINATION METHODS (REVISE AT SUBSEQUENT ITERATIONS)
8. INTEGRATE/IDENTIFY INFORMATION REQUIREMENTS
9. INTEGRATE, REVIEW, AND REVISE COMPLIANCE DETERMINATION METHODS, ELEMENTS OF PROOF, AND INFORMATION REQUIREMENTS

- 10a. IDENTIFY INSTITUTIONAL UNCERTAINTY QUESTIONS
- 10b. IDENTIFY REGULATORY UNCERTAINTY QUESTIONS
- 10c. IDENTIFY TECHNICAL UNCERTAINTY QUESTIONS
11. OBTAIN DOE "ISSUES", INFORMATION NEEDS AND UNCERTAINTIES
12. OBTAIN STATE, TRIBE, AND OTHER AFFECTED PARTIES "ISSUES", INFORMATION NEEDS AND UNCERTAINTIES
13. INTEGRATE, CONSOLIDATE, AND RANK UNCERTAINTIES AND UNCERTAINTY QUESTIONS (INCLUDING DOE AND STATE ITEMS)
14. IF UNCERTAINTY, UNCERTAINTY QUESTION, OR INFORMATION REQUIREMENT IS UNRESOLVED, FLAG AS OPEN ITEM; SELECT ITEMS FOR NRC ACTION; IDENTIFY OTHER ACTION PARTIES

15. IDENTIFY UNCERTAINTY REDUCTION METHODS AND RELATED INFORMATION REQUIREMENTS; SPECIFY ALTERNATE NRC PROGRAMS FOR UNCERTAINTY REDUCTION
16. DEVELOP COSTS, SCHEDULES, AND LEAD TIMES FOR NRC PROGRAMS
17. ANALYZE ALTERNATIVES AND NRC PROGRAM TRADEOFFS
18. RECOMMEND NRC PROGRAM INCLUDING OVERALL RESEARCH PROGRAM PLAN
19. DEVELOP AND DISPLAY NETWORK AND CRITICAL PATH FOR EACH REGULATORY REQUIREMENT
20. DEVELOP AND DISPLAY NETWORK FOR TOTAL PROGRAM
21. CONTROL AND DOCUMENT PROGRAM STRUCTURE AND CHANGES
22. CONDUCT NRC PROGRAM

PROCESS DIAGRAM FOR DEVELOPING AND MAINTAINING THE PROGRAM ARCHITECTURE

HLW PROGRAM ARCHITECTURE FUNCTIONAL ALLOCATION



SYSTEMS ENGINEERING: STATUS AND ACCOMPLISHMENTS

- **COMPLETED PROOF-OF-CONCEPT**
- **COMPLETED PROOF-OF-SYSTEM**
- **ANALYZED INSTITUTIONAL AND REGULATORY UNCERTAINTIES PERTAINING TO SITING**
- **IDENTIFIED REGULATORY UNCERTAINTIES RELATED TO THE SCP AND ESF**
- **RECOMMENDED, PRIORITIZED, AND PROVIDED RATIONALE FOR CANDIDATES FOR REGULATORY ACTION**

DESCRIPTION OF THE CNWRA TECHNICAL ASSISTANCE PROGRAM

TECHNICAL ASSISTANCE: APPROACH

- **PROVIDE TECHNICAL SUPPORT TO REGULATORY GUIDANCE DOCUMENTS**
- **ASSIST IN EVALUATION OF DOE PRE-LICENSING AND LICENSING SUBMITTALS**
- **PROVIDE TECHNICAL SUPPORT TO DEVELOPMENT OF COMPLIANCE DETERMINATION METHODS**
- **PARTICIPATE IN DEVELOPMENT OF NRC PERFORMANCE ASSESSMENT CAPABILITY**

PERFORMANCE ASSESSMENT WILL PLAY A PIVOTAL ROLE

- **Early Identification of Key Parameters and Features**
- **Evaluation of Relative Importance of Parameters and Features by Means of Sensitivity Analyses**
- **Identify Targets for Confirmatory and Exploratory Research**
- **Provide Basis for Technical Integration Across the Program**
- **Provide for Determination of Compliance with Subsystem Regulatory Requirements**
- **Ensure Consistency of Subsystem Evaluation Methodologies with the Overall System Performance Assessment Methodology**
- **Assess Performance of Overall System in Context of 10CFR60 and 40CFR191**

TECHNICAL ASSISTANCE: STATUS AND ACCOMPLISHMENTS

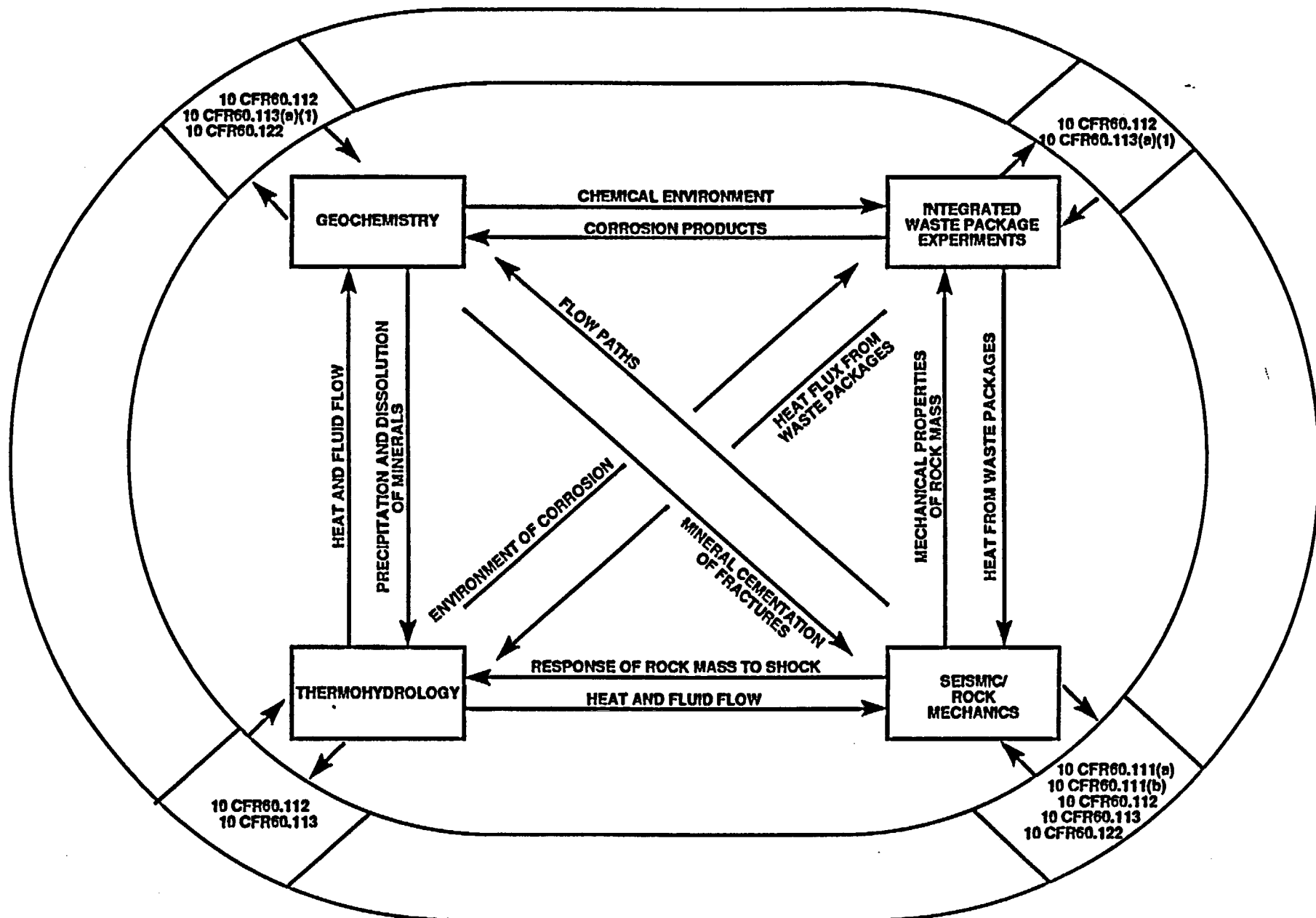
- **"CONVO" EVALUATION AND ENHANCEMENT PLAN (EBS COMPLIANCE DETERMINATION CODE)**
- **FAST PROBABILISTIC PERFORMANCE ASSESSMENT (FPPA) METHODOLOGY EVALUATION**
- **REVIEW SITE CHARACTERIZATION PLAN**
- **REVIEW OF THE EXPLORATORY SHAFT DESIGN ACCEPTANCE ANALYSIS**
- **INITIATE PERFORMANCE ASSESSMENT ACTIVITIES**

OVERVIEW OF CURRENT CNWRA RESEARCH PROGRAM

PURPOSES OF RESEARCH PROJECTS

- **DEVELOP AND/OR ENHANCE TECHNICAL BASIS OF REGULATIONS**
- **PROVIDE CONFIRMATORY DATA AND CALCULATIONS FOR USE IN LICENSE REVIEW**
- **EXPLORE PHENOMENA, PROCESSES, AND CONDITIONS**
- **DEVELOP NRC AND CNWRA STAFF CAPABILITIES FOR TIMELY HIGH-QUALITY REVIEW OF LICENSING MATERIALS**

INTEGRATION AMONG RESEARCH PROJECTS



RESEARCH PROJECTS: STATUS AND ACCOMPLISHMENTS

- **GEOCHEMISTRY**

- **MODIFIED EQ3/6 FOR NONISOTHERMAL KINETICS AND RAYLEIGH GAS FRACTIONATION**
- **MODELED GEOCHEMICAL CONTROLS AND EVOLUTION OF GAS, WATER, AND MINERALS**
- **DESIGNED AND ACQUIRED FACILITIES AND EQUIPMENT FOR MODELING AND EXPERIMENTS**
- **INITIATED EXPERIMENTAL PROGRAM ON THERMODYNAMIC PROPERTIES OF ZEOLITES**

- **THERMOHYDROLOGY**

- **LITERATURE REVIEW AND TECHNOLOGY TRANSFER**
- **INITIATED DESIGN FOR SEPARATE EFFECTS EXPERIMENTS**

RESEARCH PROJECTS: STATUS AND ACCOMPLISHMENTS (CONT'D)

- **SEISMIC ROCK MECHANICS**
 - **COMPLETED LITERATURE REVIEW**
 - **INITIATED EQUIPMENT DESIGN AND FABRICATION**
- **INTEGRATED WASTE PACKAGE EXPERIMENTS**
 - **PREPARED SPECIMEN FABRICATION PROCEDURES AND INITIATED SPECIMEN FABRICATION**
 - **PERFORMED MODELING FOR GEOCHEMISTRY AND WASTE PACKAGE EXPERIMENTAL DESIGN**
 - **PREPARED AND RELEASED PROCEDURES FOR PREPARATION OF WATERS**
 - **INITIATED LABORATORY CORROSION TESTING**
 - **INITIATED HYDROGEN EFFECTS STUDIES**

GEOCHEMISTRY RESEARCH PROJECT

**CENTER FOR NUCLEAR WASTE
REGULATORY ANALYSES**

**SOUTHWEST RESEARCH INSTITUTE
San Antonio, Texas**

Project Manager: John L. Russell

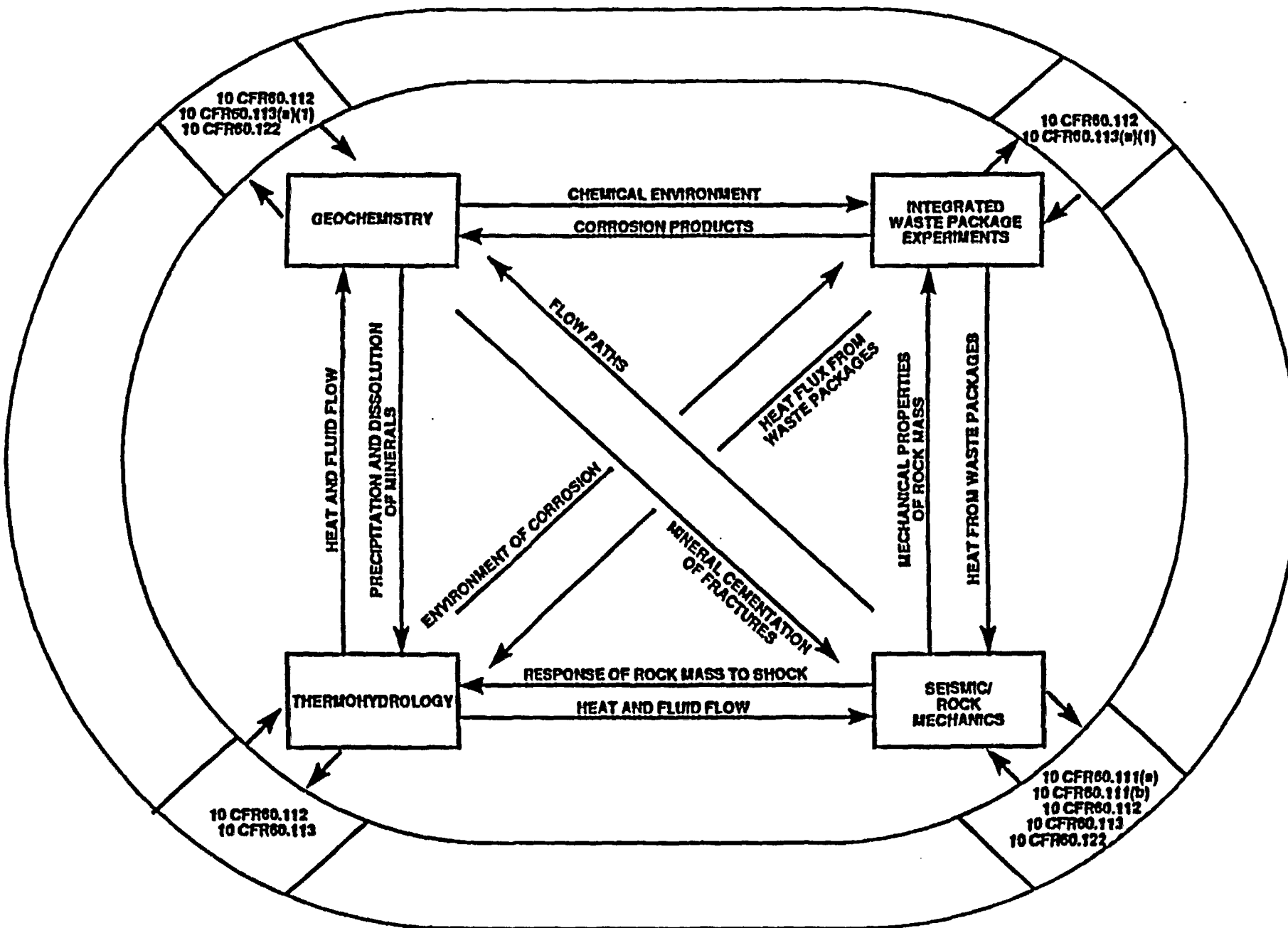
**Principal Investigators:
William M. Murphy and Roberto T. Pabalan**

**April 25, 1989 Presentation
at Las Vegas, NV**

GEOCHEMISTRY RESEARCH PROJECT GENERAL OBJECTIVES

- **To Understand the Ambient Geochemical Conditions and Processes at the Proposed HLW Repository Site**
- **To Understand the Geochemical Conditions and Processes Affecting the Transport of Radionuclides and Releases to the Accessible Environment**
- **To Understand the Geochemical Conditions and Processes Which will Affect Performance of the Waste Packages and EBS**
- **To Recognize and Evaluate Issues and Uncertainties in Predictive Geochemical Models Used in Performance Assessment in Regard to Isolation of the Waste**

INTEGRATION AMONG RESEARCH PROJECTS



GEOCHEMISTRY RESEARCH PROJECT

- **REGULATORY BASES IN 10 CFR PART 60**

60.21(c) Safety Analysis Report

**60.112 Overall System Performance Objective for the
Geologic Repository after Permanent Closure**

**60.113 Performance of Particular Barriers after
Permanent Closure**

60.122(b)(3),(4) Siting Criteria – Favorable Conditions

**60.122(c)(7),(8) Siting Criteria – Potentially Adverse Conditions
(9),(20),(24)**

GEOCHEMISTRY RESEARCH PROJECT REGULATORY PRODUCTS AFFECTED

- **REVIEW OF SCP/PREPARATION OF SCA**
- **DEVELOPMENT OF TECHNICAL POSITIONS**
 - **Environment of EBS Package**
 - **Radionuclide Transport**
 - **Rock/Water Chemical Interactions**
- **ISSUED TECHNICAL POSITIONS**
 - **Determination of Radionuclide Solubility in Groundwater for Assessment of High-Level Radionuclide Waste Isolation**
 - **Determination of Radionuclide Sorption of HLW Repositories**
 - **Guidance for Determination of Anticipated Processes and Events (Draft)**
 - **Interpretation and Identification of the Disturbed Zone (Draft)**

GEOCHEMISTRY RESEARCH PROJECT REGULATORY PRODUCTS AFFECTED (CONT'D)

- **POTENTIAL RULEMAKINGS**
 - Further Amplification of the Meaning of the Phrase the “Disturbed Zone” used in 10 CFR Part 60
 - Further Amplification of the Meaning of the Phrase “Anticipated Processes and Events and Unanticipated Processes and Events” used in 10 CFR Part 60
- **PRE-LICENSING GUIDANCE**
- **LICENSE APPLICATION EVALUATION**
- **CONFIRMATORY AND EXPLORATORY EXPERIMENTS**

**GEOCHEMISTRY RESEARCH PROJECT
REGULATORY PRODUCTS AFFECTED (CONT'D)**

- **PERFORMANCE ASSESSMENT**
- **DESIGN CRITERIA**

GEOCHEMICAL PARAMETERS

- **GROUNDWATER CHEMISTRY**
- **MINERALOGY, PETROLOGY, AND ROCK CHEMISTRY**
- **STABILITY OF MINERALS AND GLASS**
- **RADIONUCLIDE TRANSPORT AND RETARDATION MECHANISMS
(E.G., COMPLEXES, COLLOIDS, SORPTION, PRECIPITATION)**

GEOCHEMISTRY RESEARCH PROJECT BASIC APPROACH

- **GEOCHEMICAL MODELING**

- Allows Integration of Results from Various Types of Studies
- Enables Prediction of the Performance of Geochemical Systems Under Physical and Chemical Conditions not Studied Experimentally
- Permits Predictions of the Performance of Geochemical Systems on Scales of Time and Space that Exceed those Accessible by Laboratory Study
- Enables Design and Interpretation of Experiments

- **EXPERIMENTAL STUDIES**

- Required to Provide Accurate Parameters for the Geochemical Model
- Necessary to Validate Geochemical Modeling
- Needed to Independently Judge the Geochemical Work by DOE on HLW Isolation

ACCOMPLISHMENTS

- **Modified EQ3/6 to perform nonisothermal kinetic and Rayleigh gas fractionation computations**
- **Performed modeling using EQ3/6 to support experimental design for geochemistry and waste package programs**
- **Performed modeling to identify geochemical controls and to interpret the evolution of gas, water, and minerals at Yucca Mountain**
- **Conducting an experimental program to study the standard state and solid solution thermodynamic properties of zeolites relevant to Yucca Mountain**
- **Reviewed in detail chapters 4 and 8.3.1.3 of the CDSCP and the SCP (Geochemistry).**

SHORT TERM ANTICIPATED PRODUCTS

- **Report Describing Modeling of the Time Evolution of the Nonisothermal Gas-Water-Rock System at Yucca Mountain.**
- **Report Giving New Thermodynamic Data for Clinoptilolite End Members and Solid Solutions.**
- **Modeling Support for Waste Package and Thermohydrology Studies.**

THERMOHYDROLOGY RESEARCH PROJECT

**CENTER FOR NUCLEAR WASTE
REGULATORY ANALYSES**

**SOUTHWEST RESEARCH INSTITUTE
San Antonio, Texas**

Project Manager: John L. Russell

**Principal Investigators:
Frank Masch, Frank Dodge, and Chris Freitas**

**April 25, 1989 Presentation
at Las Vegas, NV**

THERMOHYDROLOGY RESEARCH PROJECT GENERAL OBJECTIVE

- **To Use Laboratory Experiments and Analytical Methods to Provide NRC with an Understanding of Thermohydrologic Phenomena in Unsaturated Media on Both the Repository and Waste-Package Scales.**

THERMOHYDROLOGY RESEARCH PROJECT

- **REGULATORY BASES IN 10 CFR PART 60**

60.21(c) Safety Analysis Report

**60.112 Overall System Performance Objective for the
Geologic Repository after Permanent Closure**

**60.113 Performance of Particular Barriers after Permanent
Closure**

60.122(b)(4),(7) Siting Criteria – Favorable Conditions

60.122(c)(23),(24) Siting Criteria – Potentially Adverse Conditions

THERMOHYDROLOGY RESEARCH PROJECT REGULATORY PRODUCTS AFFECTED

- **DEVELOPMENT OF TECHNICAL POSITIONS**
 - Environment of EBS Package
 - Radionuclide Transport
- **ISSUED TECHNICAL POSITIONS**
 - Guidance for Determination of Anticipated Processes and Events (Draft)
 - Interpretation and Identification of the Disturbed Zone (Draft)
 - Groundwater Travel Time (Draft)
- **POTENTIAL RULEMAKINGS**
 - Further Amplification of the Meaning of the Phrases “Disturbed Zone” and “Pre-waste Emplacement Groundwater Travel Time” used in 10 CFR Part 60
 - Further Amplification of the Meaning of the Phrase “Anticipated Processes and Events” used in 10 CFR Part 60

THERMOHYDROLOGY RESEARCH PROJECT REGULATORY PRODUCTS AFFECTED (CONT'D)

- **PRE-LICENSING GUIDANCE**
- **LICENSE APPLICATION EVALUATION**
- **CONFIRMATORY AND EXPLORATORY EXPERIMENTS**
- **PERFORMANCE ASSESSMENT**
- **DESIGN CRITERIA**

THERMOHYDROLOGY RESEARCH PROJECT OBJECTIVES

- **TO IMPROVE UNDERSTANDING OF THERMOHYDROLOGIC PHENOMENA IN UNSATURATED MEDIA TO SUPPORT EVALUATIONS OF:**
 - **Containment of Radionuclides in Waste Packages**
 - **Release of Radionuclides from the Engineered Barrier System**
 - **Extent of Disturbed Zone (Required to Determine Ground Water Travel Time)**
 - **Effects on Transport of Radionuclides to the Accessible Environment**
- **TO DETERMINE THE LIMITS TO WHICH LABORATORY SIMULATIONS CAN BE USED TO VALIDATE COMPUTATIONAL ALGORITHMS**
- **TO ASSESS THE PREDICTIVE CAPABILITIES OF COMPUTATIONAL ALGORITHMS USED MODEL THERMOHYDROLOGIC PHENOMENA**
- **TO PROVIDE NECESSARY INPUT FROM THE THERMOHYDROLOGIC RESEARCH PROJECT TO OTHER CENTER PROGRAMS**

THERMOHYDROLOGY RESEARCH PROJECT TASKS

- 1. TECHNOLOGY TRANSFER FROM OTHER NRC PROJECTS AND ASSESSMENTS OF OTHER RESEARCH**
- 2. DESIGN AND EXECUTION OF PRELIMINARY SEPARATE EFFECTS EXPERIMENTS**
- 3. DESIGN OF UNSATURATED-ZONE THERMOHYDROLOGICAL EXPERIMENTS**
- 4. THERMOHYDROLOGICAL PHENOMENA INDUCED BY THE AGGREGATE OF EMPLACED HLW IN UNSATURATED GEOLOGIC MEDIA**
- 5. UNSATURATED-ZONE THERMOHYDROLOGICAL PHENOMENA INDUCED BY A FEW PACKAGES OF HLW**

THERMOHYDROLOGY RESEARCH PROJECT

TASK 2: DESIGN AND EXECUTION OF PRELIMINARY SEPARATE EFFECTS EXPERIMENTS

PURPOSE: TO STUDY PHENOMENA THAT AFFECT THERMO-HYDROLOGICAL FLOW AT VARIOUS AMOUNTS OF SATURATION

- Surface Tension Effects**
- Fracture vs Matrix Flow**
- Natural Convection**
- Media Effects**
- Forced vs Natural Convection**
- Transient Heat Effects**
- Flux of Fluids**

BASIC TYPES OF SEPARATE EFFECTS EXPERIMENTS

- Flow Visualization**
- Flow Measurement**
- Combinations of Visualization and Measurements**

SEISMIC/ROCK MECHANICS RESEARCH PROJECT PURPOSE, GOALS, AND GENERAL OBJECTIVES

- (1) To obtain an understanding of the important parameters associated with the response of the shaft liners and the underground repository structures in tuff due to seismic motion. This objective supports the requirements in 10CFR60 for repository design, safe operations, waste retrievability and integrity of the engineered barriers.**
- (2) To obtain an understanding of joint dynamic responses and important parameters associated with the responses due to seismic motion. This objective supports the postclosure performance requirements in 10CFR60 under seismic loading.**
- (3) To develop methodologies to evaluate, validate, and reduce uncertainties in the prediction models used in seismic assessment of tuff media. This objective is directed toward decreasing the uncertainties in repository design input conditions.**

SEISMIC/ROCK MECHANICS PROJECT REGULATORY BASIS

- | | |
|--------------------------------------|---|
| (1) 10 CFR60.111(b)(1) | Retrievability of Waste |
| (2) 10 CFR60.112 | Overall System Performance Objective
for the Geologic Repository After
Permanent Closure |
| (3) 10 CFR60.113(a)(1)(ii)(A) | Containment of HLW Within the Waste
Packages for a Period Between 300 and
1000 Years After Permanent Closure |
| (4) 10 CFR60.131(b)(1) | Protection Against Natural Phenomena
and Environmental Conditions |
| (5) 10 CFR60.133(c) | Retrieval of Waste |
| (6) 10 CFR60.133(e)* | Underground Openings |

SIGNIFICANT PROJECT SUMMARY

Findings

A. Current Knowledge

- **Body waves affect subsurface excavations.**
- **Joint slip is the dominant mode of rock mass deformation.**
- **Joint slip accumulation may fail excavations at relatively lower peak acceleration values**
- **DOE Seismic Design Basis.**
- **Peak ground motion under a “controlling seismic event”**
- **Design value 0.3 g.**

SIGNIFICANT PROJECT SUMMARY (CONT'D)

B. Deficiency in Technology

- **No validated joint models available for analyzing the response of joints under dynamic loadings**
- **No laboratory data available for joint model validation**

SIGNIFICANT PROJECT SUMMARY (CONT'D)

Research Needs (Exploratory/Confirmatory)

- **Design and development of a focused laboratory program for dynamic testing of jointed tuff material**
- **Validation of joint models**
- **Performance analysis for reduction of uncertainty at Yucca Mountain**

EXPECTED RESULTS

(Issues Addressed/Closed)

- **Validation of joint models and associated computer codes for use to reduce uncertainty in analysis of joints**
- **Reduction of uncertainty at the proposed repository site**
 - **Sensitivity analysis**
 - **Canister scale**
 - **Drift scale**
 - **Repository scale**
 - **Performance analysis**
- **Development of technical documents to support the repository licensing function of the NRC**

MAJOR PRODUCTS AND MILESTONES COMPLETED/PROJECTED FY 89-90

- **Draft Integrated Report on the Focused Literature**
 - **Critical Assessment of Seismic and Geomechanics Literature
Related to a High-Level Nuclear Waste Underground Repository**
- **Draft Analytical Model/Computer Code Selection Report**

INTEGRATED WASTE PACKAGE EXPERIMENTS PURPOSE

- **OBTAIN AN UNDERSTANDING OF IMPORTANT PARAMETERS THAT AFFECT LONG-TERM PERFORMANCE OF WASTE PACKAGE MATERIALS IN TUFF ENVIRONMENTS.**
- **ASSESS METHODOLOGIES USED IN PREDICTING LONG-TERM MATERIAL DEGRADATION WHERE THERE ARE LIMITED DATA AND INFORMATION.**

INTEGRATED WASTE PACKAGE EXPERIMENTS SPECIFIC OBJECTIVES

- **ASSESS STATE-OF-KNOWLEDGE**
 - **EVALUATE TECHNOLOGY WITH RESPECT TO YMP WASTE PACKAGE PROGRAMS**
- **WASTE PACKAGE EXPERIMENTAL PROGRAMS**
 - **CORROSION TESTING**
 - **DEVELOPMENT OF PREDICTIVE MODELS**
 - **EVALUATION OF METALLURGICAL STABILITY OF MATERIALS**
 - **STUDY OF HYDROGEN EFFECTS**
 - **STUDY OF WELDING EFFECTS**
- **FACILITATE CONTINUOUS TECHNICAL INTEGRATION SUPPORT TO NRC AND CNWRA IN AREA OF WASTE PACKAGE PERFORMANCE.**

REGULATORY BASIS OF IWPE

- **SUBSTANTIALLY COMPLETE CONTAINMENT FOR 300-1000 YRS.
[10CFR60.113(a)(ii)]**
- **COMPARISON OF ALTERNATIVES THAT PROVIDE LONGER
RADIONUCLIDE CONTAINMENT [10CFR60.21(c)(1)(ii)(D)]**

STEPWISE TESTING STRATEGY

- **LITERATURE ASSESSMENT**
 - **OTHER NRC/DOE PROGRAMS**
- **SCOPING TESTS**
 - **SELECT TESTS**
- **SHORT-TERM TESTS**
 - **UNCERTAINTY REDUCTION NEED BASED**
 - **STATISTICALLY VALID TESTS**
- **LONG-TERM TESTS**
 - **PERFORMANCE CONFIRMATORY TESTS**

STATUS OF THE PROGRAM

- **PREPARED SPECIMEN DRAWINGS, FABRICATION PROCEDURES, AND INITIATED SPECIMEN FABRICATION**
- **RECEIVED CHEMICALS, MATERIALS, AND EQUIPMENT NECESSARY FOR CORROSION TESTING**
- **PREPARED AND RELEASED DRAFT PROCEDURE FOR PREPARATION OF SYNTHETIC J-13 AND EQ3/EQ6 CALCULATED WATERS**
- **INITIATED TESTING IN FEBRUARY**

ATTACHMENT 4

**OVERVIEW OF NEVADA'S
HIGH-LEVEL NUCLEAR WASTE REPOSITORY
PROGRAM**

*** * * * ***

by

CARL JOHNSON

NEVADA AGENCY FOR NUCLEAR PROJECTS

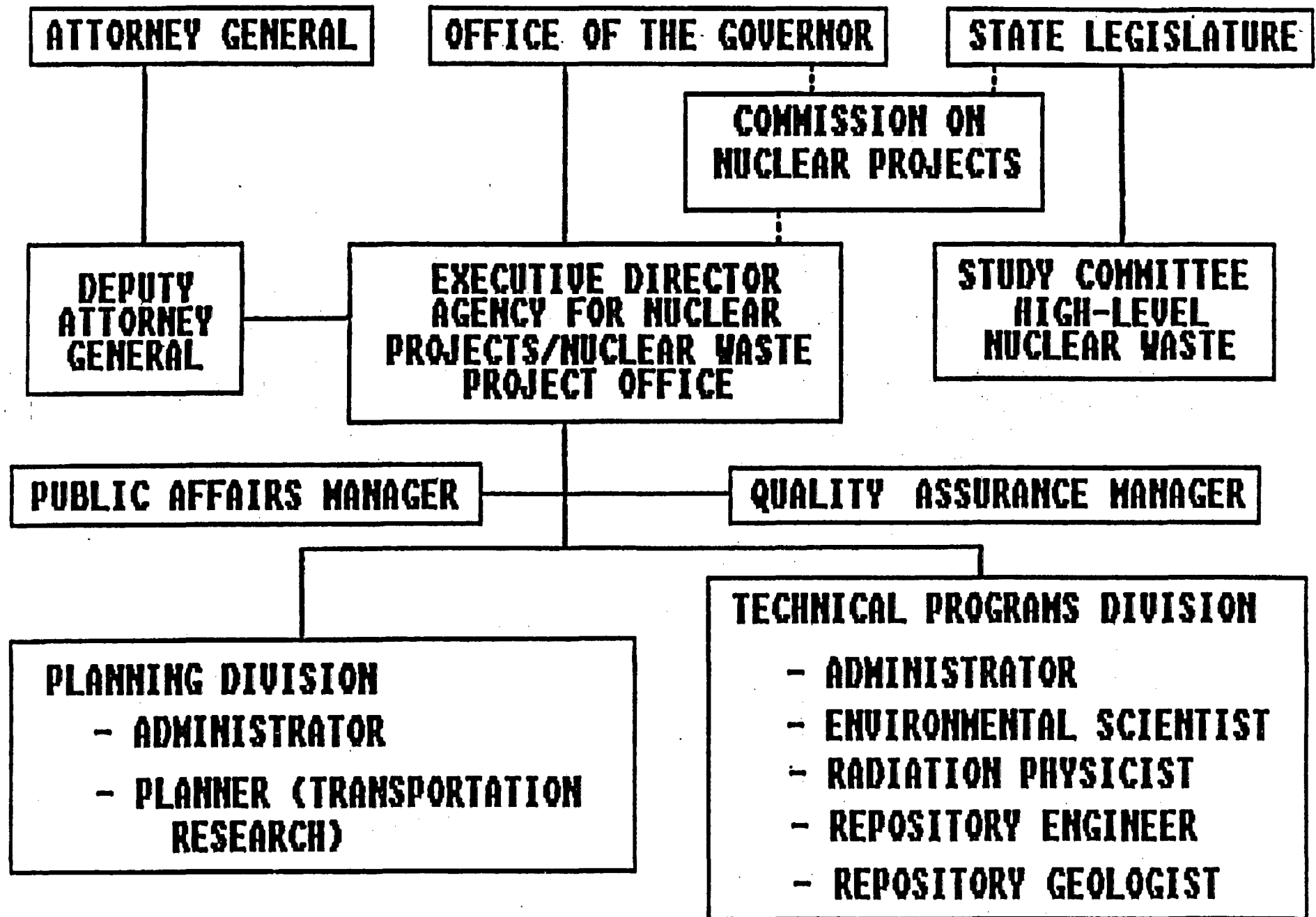
AGENDA

- o ORGANIZATION**
- o TECHNICAL CONCERNS**
- o TECHNICAL PROGRAMS**

STATE ROLE IN HLW PROGRAM

- o 1982 NWPA ESTABLISHED STATE PARTICIPATION**
- o STATE OVERSIGHT ROLE**
 - o REVIEW**
 - o MONITORING**
 - o TESTING**
- o 1985 LEGISLATURE ESTABLISHED**
NEVADA AGENCY FOR NUCLEAR PROJECTS

**STATE OF NEVADA AGENCY FOR NUCLEAR PROJECTS
ORGANIZATIONAL CHART**



TECHNICAL CONTRACTORS
TO
AGENCY FOR NUCLEAR PROJECTS

DESERT RESEARCH INSTITUTE

**CENTER FOR NEOTECTONIC STUDIES
UNIVERSITY OF NEVADA-RENO**

**DEPARTMENT OF GEOSCIENCE
UNIVERSITY OF NEVADA-LAS VEGAS**

HIFFLIN & ASSOCIATES

**ENVIRONMENTAL RESEARCH CENTER
UNIVERSITY OF NEVADA-LAS VEGAS**

H. PLATT THOMPSON ENGINEERS

L. LEHMAN & ASSOCIATES

**THOMAS DEVINE
UNIVERSITY OF CALIFORNIA**

DAVID TILLSON

- HYDROLOGY**
- GEOLOGY, SEISMOLOGY**
- VOLCANISM**
- GEOCHEMISTRY, PALEOCLIMATE**
- GEOTHERMAL RESOURCES**
- REPOSITORY ENGINEERING**
- HYDROLOGY MODELING**
- MATERIAL SCIENCE**
- LICENSING**

STATE PROGRAM GOALS

- **TO INSURE THAT PUBLIC HEALTH AND SAFETY AND THE ENVIRONMENT ARE ADEQUATELY PROTECTED THROUGH ALL PHASES OF REPOSITORY SITING, CONSTRUCTION, OPERATIONS, CLOSURE, AND DECOMMISSIONING.**
- **TO ASSESS SOCIAL AND ECONOMIC IMPACTS THAT THE STATE OF NEVADA COULD EXPERIENCE AS A RESULT OF REPOSITORY SITING AND DEVELOPMENT WITH APPROPRIATE MITIGATION STRATEGY.**
- **TO PROVIDE FOR LOCAL GOVERNMENT COORDINATION AND FOR PUBLIC PARTICIPATION IN THE PROJECT.**
- **TO PROVIDE FOR EFFECTIVE POLICY GUIDANCE TO THE GOVERNOR AND OTHER STATE LEADERS.**
- **TO PROVIDE FOR SOUND AND EFFICIENT ADMINISTRATION AND MANAGEMENT OF THE STATE EVALUATION PROGRAM.**

HEALTH AND SAFETY OBJECTIVES

- **DETERMINE TECHNICAL ISSUES CRITICAL TO THE HEALTH AND SAFETY OF NEVADANS AND THEIR ENVIRONMENT.**
- **REVIEW RELEVANT U.S. DEPARTMENT OF ENERGY (DOE) PROGRAM PLANS, TECHNICAL STUDIES, AND OTHER DOCUMENTS TO ASSURE INTEGRATION OF NEVADA CONCERNS, ONGOING AWARENESS OF FEDERAL ACTIVITIES, INPUT INTO PROGRAM DESIGNS AND COORDINATION OF THE SCHEDULE OF ACTIVITIES.**
- **PROVIDE FOR STATE INITIATED, INDEPENDENT STUDY OF TECHNICAL ISSUES THAT HAVE BEEN IDENTIFIED AS CRITICAL AND THAT (A) ARE NOT BEING ADDRESSED BY D.O.E. AND THEIR CONTRACTORS, OR (B) THAT THE METHODS OR RESULTS USED BY D.O.E. AND THEIR CONTRACTORS ARE IN QUESTION BY THE STATE OF NEVADA, OR (C) THE AREAS OF STUDY ARE SO CRITICAL THAT DUPLICATIVE STUDIES ARE WARRANTED.**
- **PROVIDE ON-SITE MONITORING OF ALL FEDERAL TECHNICAL FIELD AND LABORATORY ACTIVITIES WITH REGARD TO SITE SCREENING AND CHARACTERIZATION IN ORDER TO MAKE COMMENTS AND RECOMMENDATIONS AND TO UNDERSTAND HOW THESE TECHNIQUES AND METHODS AFFECT THE OVERALL STUDY.**

**ISSUES CRITICAL TO
HEALTH, SAFETY AND THE ENVIRONMENT**

SITE SUITABILITY ISSUES

- 1) CHARACTERISTICS OF MOISTURE MOVEMENT THROUGH THE UNSATURATED ZONE.**
- 2) RELATIONSHIP OF YUCCA MOUNTAIN GROUNDWATER REGIME TO THE REGIONAL AQUIFER SYSTEM.**
- 3) EFFECT OF FUTURE CLIMATIC VARIATIONS AND RESULTING CHANGES IN THE HYDROGEOLOGIC REGIME ON THE INTEGRITY OF THE SITE.**
- 4) EFFECTS OF FUTURE FAULTING OR OTHER TECTONIC EVENTS ON THE INTEGRITY OF THE SITE.**
- 5) EFFECTS OF FUTURE VOLCANISM ON THE INTEGRITY OF THE SITE.**
- 6) HUMAN INTERFERENCE OF THE SITE DUE TO PERCEIVED PRESENCE OF EXTRACTABLE NATURAL RESOURCES.**

NEVADA'S
TECHNICAL PROGRAM

REVIEW

- o ATTENDENCE AT TECHNICAL MEETINGS**
- o PARTICIPATION IN FIELD REVIEWS**
- o DOCUMENT REVIEWS**
 - o ENVIRONMENTAL ASSESSMENTS**
 - o MISSION PLAN**
 - o GENERAL TECHNICAL POSITIONS**
 - o RULE MAKINGS**
 - o 10 CFR 60, 40 CFR 191, 10 CFR 960**
 - o CD - SITE CHARACTERIZATION PLAN**
 - o CONCEPTUAL REPOSITORY DESIGN**
 - o TECHNICAL PLANS AND REPORTS**
 - o SITE CHARACTERIZATION PLAN**
 - o DESIGN ACCEPTABILITY ANALYSIS**

MONITORING

- o FIELD ACTIVITIES**
- o TECHNOLOGY ADVANCEMENTS**
- o PROGRAM SCHEDULES AND MILESTONES**

TECHNICAL STUDIES

UNSATURATED ZONE HYDROLOGY

o UNSATURATED ZONE MOISTURE INVESTIGATION

DRI and MIFFLIN

o FRACTALS IN FLOW AND TRANSPORT

DRI

o INTERACTION OF FRACRURE/MATRIX FLOW

DRI

o AIR/VAPOR MOVEMENT IN UNSATURATED ZONE

DRI

o INFILTRATION AND RECHARGE AT YUCCA MT.

DRI

SATURATED ZONE HYDROLOGY
AND
REGIONAL GROUNDWATER FLOW SYSTEM

- o ENVIRONMENTAL ISOTOPE - CALIBRATED
GROUNDWATER FLOW MODELS**

DRI

- o RADIONUCLIDE INVENTORY OF SATURATED ZONE**

DRI

- o THERMAL EFFECTS ON GROUNDWATER FLOW**

DRI

- o RELATIONSHIP OF SATURATED ZONE TO
REGIONAL FLOW SYSTEM**

DRI

- o TRENDS IN WATER LEVELS**

LEHMAN

GEOCHEMISTRY

- o SORPTION CAPABILITIES OF AUTHIGENIC MINERALS**

MIFFLIN

- o DIAGENESIS OF BEDDED GLASSSES**

MIFFLIN

- o MINERALOGY OF TUFFS**

UNR and MIFFLIN

- o CLAY STABILITY IN FRACTURES AND PORES**

MIFFLIN

- o CARBONATE/SILICATE DEPOSITION IN FAULTS**

DRI and MIFFLIN

- o GEOCHEMICAL AND THERMAL EFFECTS OF SEALING MATERIALS**

UNR

FUTURE CLIMATE CHANGE

- o PALEOHYDROLOGIC RECONSTRUCTION OF
GROUNDWATER DISCHARGE AREAS**

MIFFLIN

- o REGIONAL PACKRAT HIDDEN STUDIES**

MIFFLIN and DRI

- o SHORT - TERM CLIMATE CYCLES
AND TRENDS**

DRI

GEOLOGY AND SEISMOLOGY

o ACTIVE FAULTING AND QUATERNARY GEOLOGY

UNR

o REGIONAL TECTONICS

UNR

o EARTHQUAKE ASSESSMENT

UNR

o NUCLEAR TESTING GROUND MOTION ASSESSMENT

UNR

o CHARACTERISTICS OF NORMAL FAULTING GROUND MOTION

UNR

VOLCANISM

**o ASSESSMENT OF REGIONAL VOLCANISM
ONLY**

NATURAL RESOURCES

o MINERAL RESOURCE POTENTIAL

UNR

o HYDROCARBON POTENTIAL

UNR

o GEOTHERMAL RESOURCE POTENTIAL

UNLV

ROCK MECHANICS

o ROCK MASS ASSESSMENT

UNR

ENVIRONMENTAL PROGRAM

- **ENVIRONMENTAL SURVEY**
 - **ARCHAEOLOGY**
 - **AIR QUALITY**
 - **WATER QUALITY**
 - **SOILS**
 - **BIOLOGY**
 - **TERRESTRIAL ECOLOGY**
 - **AESTHETICS**
 - **NOISE**
- **ASSESSMENT OF POTENTIAL IMPACTS**
- **DEFINE MITIGATION MEASURES**
- **ENVIRONMENTAL MONITORING**

ATTACHMENT 5

Access to Data

Joe Holonich

U.S. Nuclear Regulatory Commission

Office of Nuclear Material Safety and Safeguards

Division of High-Level Waste Management

History of Correspondence

- **August 11, 1988 NRC Letter**
- **October 13, 1988 DOE Response**
- **January 19, 1989 NRC Clarification**
- **March 13, 1989 DOE Response**
- **April 21, 1989 NRC Confirmation**

Summary of Issue

- **NRC staff needs timely access to data**
 - **DOE**
 - **State of Nevada**
- **Data from NRC research activities will be made available**
- **Mechanisms for communication among researchers**

Basic Framework

- **Procedural Agreement (Morgan-Davis)**
- **Site-Specific Agreement**
- **NRC Staff Guidance**
 - **WM Policy Memorandum 43**
 - **WM Policy Memorandum 44**
 - **WM Policy Memorandum 45**

Proposed Solutions

- **Established approach for parties to have access to data base**
- **Mechanisms for communications**
 - **Information gathering activities**
 - **Agency positions on particular matters**
 - **Periodic information exchange meetings**
- **Controlled process**
- **Additional discussion today**