DCS
WM-7

Department of Energy
Washington, D.C. 20545

JAN 21 1980

MEMORANDUM FOR: Mr. John B. Martin, Director
Division of Waste Management
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Enclosed is a copy of the minutes of our meeting with you on November 15-16, 1979 in Columbus, Ohio. Also attached is a copy of the visual aids we used in briefing your staff.

Feel free to place this material in your public document room. You need not mail a copy to Dr. Terry Lash of NRDC as we have already furnished copies to him.

Colin A. Heath, Director
Division of Waste Isolation
Office of Nuclear Waste Management

Enclosures

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MINUTES

DOE BRIEFING TO NRC

November 15 and 16, 1979

Columbus, Ohio

I. PURPOSE

The purpose of the meeting was to describe DOE-NWTS activities to the NRC staff, primarily on the subjects of in situ testing and geologic characterization.

II. ATTENDANCE

J. Malaro	NRC/WM	R. Laughon	ONWI
E. Hawkins	NRC/WM	W. Newcomb	ONWI
R. Boyle	NRC/WM	S. Basham	ONWI
G. Evans	BWIP	S. Matthews	ONWI
G. Hunt	BWIP	J. Voss	ONWI
R. Lincoln	NNWSI	M. Golis	ONWI
J. Neff	DOE/RL-C	J. Murison	ONWI
M. Barainca	DOE/RL-C	J. Buzogany	ONWI
D. Boyer	DOE/ONWM	L. Myers	ONWI
N. Carter	ONWI	R. Cudnik	ONWI
M. Glora	ONWI	D. Shipler	ONWI
W. Carbiener	ONWI	W. McIntosh	ONWI
F. Burns	ONWI	P. Patchick	ONWI
R. Hall	ONWI	W. Hewitt	ONWI
H. Burkholder	ONWI	J. Fogle	Law Eng.

III. FORMAL PRESENTATIONS

The briefing was opened with welcomes and introductory remarks by N. Carter, J. Neff, and M. Glora. These remarks set forth the purpose and format for the discussions to follow.

R. Hall made a presentation explaining the overall National Waste Terminal Storage (NWTS) organization, the interrelationships between the program participants, and ONWI's coordinating role.

H. Burkholder discussed performance assessment, including WISAP/WIPAP (AEGIS and WRIT). He noted that the far field consequence analysis models are in good shape. The near field models have not yet been integrated.

R. Laughon presented the geologic exploration program and discussed the status in each of the regions. G. Evans and R. Lincoln discussed the status of the BWIP and NNWSI program respectively.

S. Basham reviewed the in situ test program status. He noted that for the most part we are in the first phase of the program.

S. Matthews went over the repository design approach. He discussed CRRD and noted that the surface facilities for a repository are not very site sensitive. He also made the point that the underground workings are not "designed" in the usual sense, but, would be developed in a stepwise manner as the drifts advance and more information is developed. Thus modifications to the preliminary design are to be expected.

IV. INFORMAL DISCUSSIONS

A. In Situ Testing

From this point on, the briefing progressed in an informal question and answer discussion mode.

J. Malaro asked how the in situ testing requirements were formulated, were they based on the modeler's requirements and specifically, how does Climax interface? R. Lincoln responded that Climax is coordinated within LLL and is not an ONWI program. S. Basham stated that the in situ program is coordinated by The Earth Sciences Technical Plan (ESTP).

E. Hawkins questioned what information was available if the in situ program is at the phase 1 level. S. Basham responded that little or no testing is done only to develop techniques. The data that results from technique development is factored into the program.

J. Malaro noted that he would like to coordinate NRC's information needs with DOE's information development programs. He suggested that after NRC has identified their information requirements, that they meet with DOE to determine if those needs will be met by DOE programs.

J. Malaro questioned what types of information could be gotten from the various kinds of tests (i.e. lab tests, field tests, in situ

tests). S. Basham responded that this type of information will be included in the forthcoming program plan.

R. Boyle asked for a discussion on what programs were being performed at the various sites. R. Cudnik discussed the Avery Island, Stripa, and Colorado School of Mines effort. G. Evans discussed BWIP Near Surface Test Facility (NSTF) and R. Lincoln covered shale tests and Climax.

A. Geologic Exploration

E. Hawkins asked for the status of the geologic-hydrologic system review. R. Laughon responded that Request for Proposal is in process and is expected that a contract will be in place in February, 1980. The review is expected to take about 1 year to complete.

R. Boyle asked about the Environmental Survey Plans (ESP) relative to the geologic exploration program. Laughon and W. Newcomb explained the cooperative inter actions between the Regulatory Project Managers (RPM) and Geologic Project Managers (GPM) and the documentation that results. It was pointed out that the intent of the ESP's was to provide guidance to the RPM's and that little specific geologic guidance was presented. Certain of the ESP's are being revised to further limit their geologic content.

A discussion followed on the relationship of the USGS program to NWTS. The USGS program is an independent program that is semi-parallel to the ONWI program. Ultimately USGS plans to recommend regions or areas to DOE for further study. J. Neff pointed out that although USGS has independent funding, they are coordinated through the ESTP.

E. Hawkins asked about what is being done in bedded salt. W. Newcomb responded with the status in the Paradox and Permian basins and noted that Salina is currently inactive.

W. Newcomb, M. Glora, J. Buzogany, and M. Barainca described the iteractions with governments of states in which geologic exploration is proceeding.

R. Lincoln discussed NNWSI and noted repository activities must be compatible with weapons testing considerations which leaves only the southwest corner of NTS (~400 sq. mi.). He pointed out the current areas

of investigation on a vu-graph of the site.

W. Newcomb discussed the costs of geologic exploration and noted that in the last year they had increased by 40% due to the demand for petroleum exploration.

D. Shipler and W. McIntosh presented a brief overview of the PIR. E. Hawkins asked what DOE expected NRC to do with PIR. D. Shipler responded that ONWI would like to see a review similar to a real repository licensing review. J. Malaro noted that a NRC review of the PIR may be mutually beneficial, but recommended that it not be treated as a "mock licensing review". He indicated that there should be further discussions on what the NRC review of PIR could accomplish.

This concluded the briefing for November 15.

Friday, November 16, 1979

D. Geologic Exploration (continued)

W. Newcomb discussed the various stages in geologic site screening: 1) Regional-thousands of square miles and ~5% of the total informaion; 2) Area-hundreds of square miles and ~40% of the information; 3) Location-tens of square miles and ~30% of the information; and 4) Site-~25% of the information. The regional studies are designed to identify areas suitable for field investigations and are comprised of literature searches, including well logs, etc. The area studies, which take ~1 to 1-1/2 years to perform, are field investigations including almost every technique of geologic investigation. The number of boreholes to be drilled in an area is determined for each study based on the amount and quality of pre-existing information. The location studies would include the same kinds of investigations as the area studies, but would be more intense.

A discussion followed on how the NRC's proposed Site Characterization Report (SCR) would interface with the site screening process. There seemed to be a concensus that for salt domes, the SCR should be filed when the number of domes under consideration is reduced from 8 to 2. W. Hewitt described the base documents used for the salt dome selection matrix. P. Patchick discussed the geologic exploration program in the Gulf Interior Region and J. Fogle presented a proposed program for location studies at salt domes.

J. Malaro noted that he believes that NRC review of the SCR will take 6-9 months.

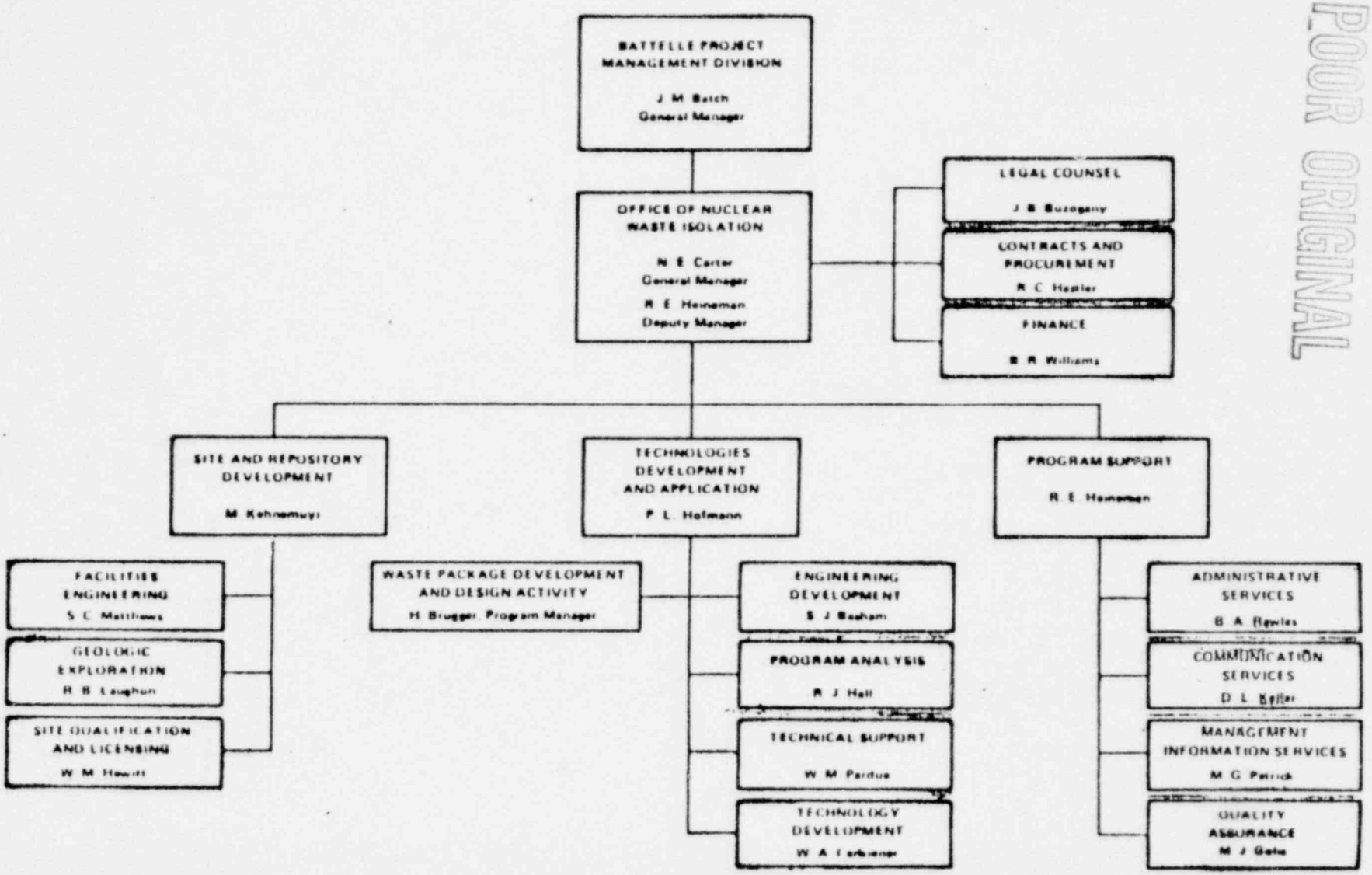
E. Quality Assurance

M. Golis gave an overview of the ONWI/NWTS QA program. He discussed plans to attempt to get ANSI standard level recognition of some of the characterization procedures.

F. Borehole Plugging

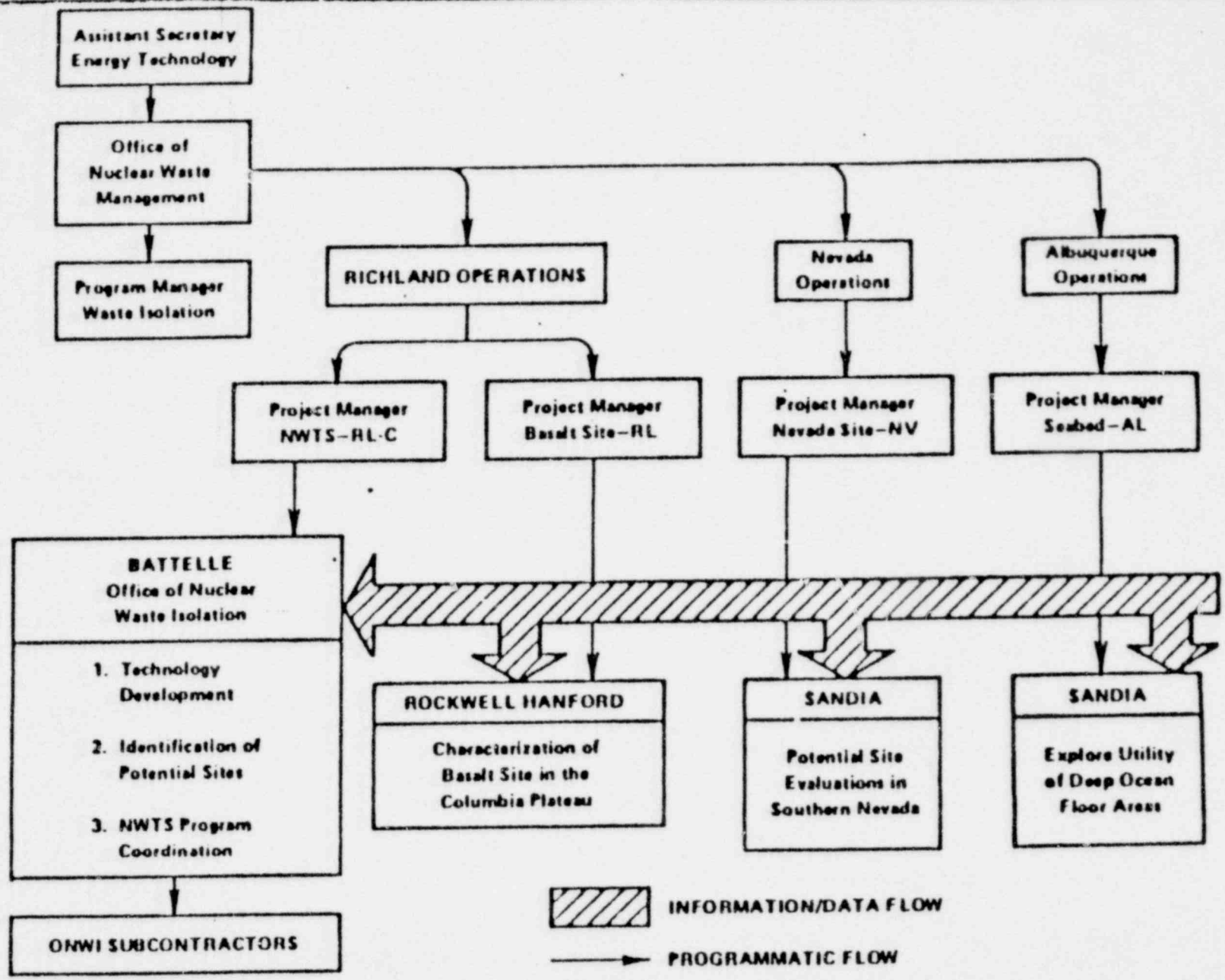
J. Burns presented the borehole plugging program and discussed the progress of the Bell Canyon test in New Mexico. He discussed the peer review process through the ESTP.

The briefing was concluded early in the afternoon on December 16.



10/1/79

ORGANIZATION OF THE OFFICE OF NUCLEAR WASTE ISOLATION (ONWI)



NWTS PROGRAM MANAGEMENT

JWV:11/15/79

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PROJECT INTERRELATION

- PROJECTS FUNCTION INDEPENDENTLY TO MEET THEIR SPECIFIC OBJECTIVES
- PROJECT ACTIVITIES ARE CARRIED OUT WITH PROGRAM-WIDE COORDINATION AND COOPERATION
- ONWI IS RESPONSIBLE FOR OVERALL COORDINATION OF NWTS EFFORTS

JHV:11/15/79

ONWI

IN SITU TESTING

DEFINITIONS

PROGRAMMATIC

(1) WASTE PACKAGE FIELD TESTS -- WASTE-ROCK INTERACTIONS, CORROSION STUDIES, BARRIER INTERACTIONS.

(2) MODEL VERIFICATION FIELD TESTS -- MOST TESTS OF INTERACTIONS OR SYNERGISTIC PHENOMENA -- THERMO-MECHANICAL, WASTE-ROCK INTERACTIONS, NUCLIDE MIGRATION, THERMAL PROPERTIES, THERMOHYDRAULIC.

(3) REPOSITORY DESIGN DATA BASE FIELD TESTS, EMPLACEMENT STUDIES (GEOMETRY AND THERMAL LOADING), RETRIEVAL, EXCAVATION TECHNIQUES (INCLUDING LOCAL PERMEABILITY EFFECTS), DEFORMATIONS AND STRUCTURAL CHANGES OF MEDIUM.

(4) SITE CONFIRMATION PROOF OF MODELS ABILITY TO PREDICT NEAR TERM (0-10 YR) NEAR FIELD (0-10 M) RESPONSE OF SPECIFIC REPOSITORY SITE BASED ON SPECIFIC MEASURED LOCAL PROPERTY DATA (TRUE IN SITU TESTS).

11/15/79:SJB

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IN SITU TESTING

DEFINITIONS

DICTIONARY

IN SITU -- "IN THE NATURAL OR ORIGINAL POSITION"

FUNCTIONAL

(1) TECHNIQUE DEVELOPMENT -- IN A REPRESENTATIVE MEDIUM, I.E., SALT, GRANITE, ETC.

(2) SYNERGISTIC EFFECTS; MODEL SUPPORT -- IN A MEDIUM CLOSELY AKIN TO THAT ANTICIPATED FOR THE REPOSITORY, I.E., MEDIUM, DEPTH, GEOCHEMICAL FACTORS, GEOPHYSICAL FACTORS, HYDROLOGY (THE CLOSER TO THE REPOSITORY ENVIRONMENT THE BETTER BUT NOT NECESSARILY IDENTICAL).

(3) SITE CONFIRMATION AND FINAL MODEL VALIDATION -- REPOSITORY SITE (TRUE IN SITU TESTS).

11/15/79:SJB

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IN SITU TEST MILESTONES

NWTS In-Situ Test Needs Workshop	Issue report	12/78
	Conduct second workshop	10/79
Conasauga Shale	Final report	7/79
Avery Island Salt	Complete brine migration tests	6/81
	Complete Thermomechanical Tests	12/81
Stripa Granite	Complete surface borehole hydrology	9/79
	Complete thermomechanical tests	12/79
	Complete ventilation tests	6/80
	Complete hydrofracture tests	9/80
Salt Test Facility	Complete experimental test definition	3/80
	Begin equipment operation	3/81
	Begin full test operation	3/82

1/16/79

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EXPERIMENTS PROPOSED FOR SALT TEST FACILITY

EXPERIMENT TYPE	DESCRIPTION
ELECTRIC HEATER (PILLAR GEOMETRY)	HEAT AND DEFORMATION IN PILLAR GEOMETRY FOR REPOSITORY DESIGN CONFIRMATION AND RETRIEVABILITY
HLW PACKAGES	
SPENT FUEL	FLOOR AND PILLAR TESTS TO EXAMINE RADIOLYSIS, BRINE MIGRATION, CORROSION, AND THERMAL DEFORMATION
WASTE FORM/HOST ROCK INTERACTION	CHEMICAL-PHYSICAL INTERACTION OF BARE AND CONTAINED WASTE FORMS IN CONTACT WITH SALT FORMATION
WASTE TRANSPORT	MIGRATION RATES OF MIXED WASTE FORMS AND SELECTED HAZARDOUS NUCLIDES
BACKFILL EFFECTS	GAS PERMEABILITY, CHEMICAL OR NUCLIDE MIGRATION RATES, CORROSION, IMPACT ON RETRIEVABILITY
ENGINEERED BARRIERS	EMPLACEMENT TECHNIQUES, IMPACT ON RETRIEVAL, NUCLIDE TRANSPORT, CHEMICAL INTERACTIONS
EQUIPMENT	DESIGN BASIS ACCIDENT EVALUATION, FLOODING, FIRE TEST, SPECIAL MAINTENANCE PROBLEMS, MONITORING INSTRUMENTATION

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1/16/79

NATIONAL WASTE TERMINAL STORAGE

IN SITU TESTING

OBJECTIVES

- INTERACTION OF MATERIALS
- RADIATION IMPACT
- VERIFICATION OF THERMAL AND MECHANICAL CHARACTERISTICS
- VERIFICATION OF WASTE FORM PERFORMANCE
- VERIFICATION OF MODELS
- VERIFICATION OF MATERIAL HANDLING, EMPLACEMENT AND RETRIEVAL METHODS
- GEOLOGIC CHARACTERISTICS AT CANDIDATE SITES

NATIONAL WASTE TERMINAL STORAGE

IN SITU TESTING

ACTIVITY	CONTRACTOR
- SALT (LOUISIANA, NEW MEXICO)	RE/SPEC, SANDIA
- GRANITE (SWEDEN, NEVADA)	LBL, LLL
- BASALT: NEAR SURFACE TEST FACILITY UNDER CONSTRUCTION	ROCKWELL HANFORD
- SHALE: TENNESSEE ELEANA	SANDIA
- SALT: SALT TEST FACILITY IN EXISTING MINE UNDER STUDY	ONWI

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2/79

OBJECTIVE OF CURRENT IN SITU TESTS

AVERY	o COMPARE DOMAL AND BEDDED SALT WITH REGARD TO HEAT EFFECTS o COMPARE PREDICTIONS FROM LABORATORY DATA WITH FIELD OBSERVATIONS o STUDY INTERACTION BETWEEN SALT AND PROTECTIVE SLEEVE
STRIPA	o ESTABLISH COUPLED INTERACTIONS OF HEAT FLOW, FLUID FLOW, AND ROCK MASS PROPERTIES BY MEANS OF HEATER TESTS, HYDROLOGIC TESTS, AND FRACTURE SYSTEM CHARACTERIZATION STUDIES IN GRANITE
CONASAUGA	o STUDY PROPERTIES OF THE FORMATION
SHALE	o EFFECTS OF HEAT ON PROPERTIES, INCLUDING HYDROLOGIC VARIATIONS o COMPARISON OF PREDICTIVE MODELS WITH NATURAL SITUATION
BWIP	o DETERMINE THE IN SITU THERMAL PROPERTIES (CONDUCTIVITY, EXPANSION, ETC.) AND BEHAVIOR (JOINTS, PERMEABILITY) OF BASALT; VALIDATE THERMOMECHANICAL MODELS USED IN REPOSITORY DESIGN
CLIMAX GRANITE	o MEASURE IN SITU THERMAL RESPONSE OF DEEP GRANITE TO A HEAT LOAD; MEASURE PERMEABILITY AS A FUNCTION OF TEMPERATURE

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FEBRUARY 13, 1979

IN SITU TEST STATUS AND INITIAL RESULTS

AVERY

- o INITIAL WATER ACCUMULATION DUE TO CONDENSATION; FLOW DECREASED WITH COLDER WEATHER
- o TEMPERATURE-DISTANCE PROFILES ESTABLISHED AS FUNCTION OF TIME
- o ISOTHERMS VS. DEPTH DRAWN

STRIPA

- o HEATER HOLE SKIN TEMPERATURES STABILIZED EARLY; SOME DECREPITATION OBSERVED
- o MEASURED TEMPERATURES FOLLOW PREDICTIONS
- o DISPLACEMENT LESS THAN EXPECTED; STICK-SLIP AND CRACK CLOSURE MAY BE INVOLVED

CONASAUGA

- o WATER RECHARGE NECESSITATED PUMPING OR AIR PRESSURIZING
- o HEAT TRANSFER MEASUREMENTS FOLLOW PREDICTIONS

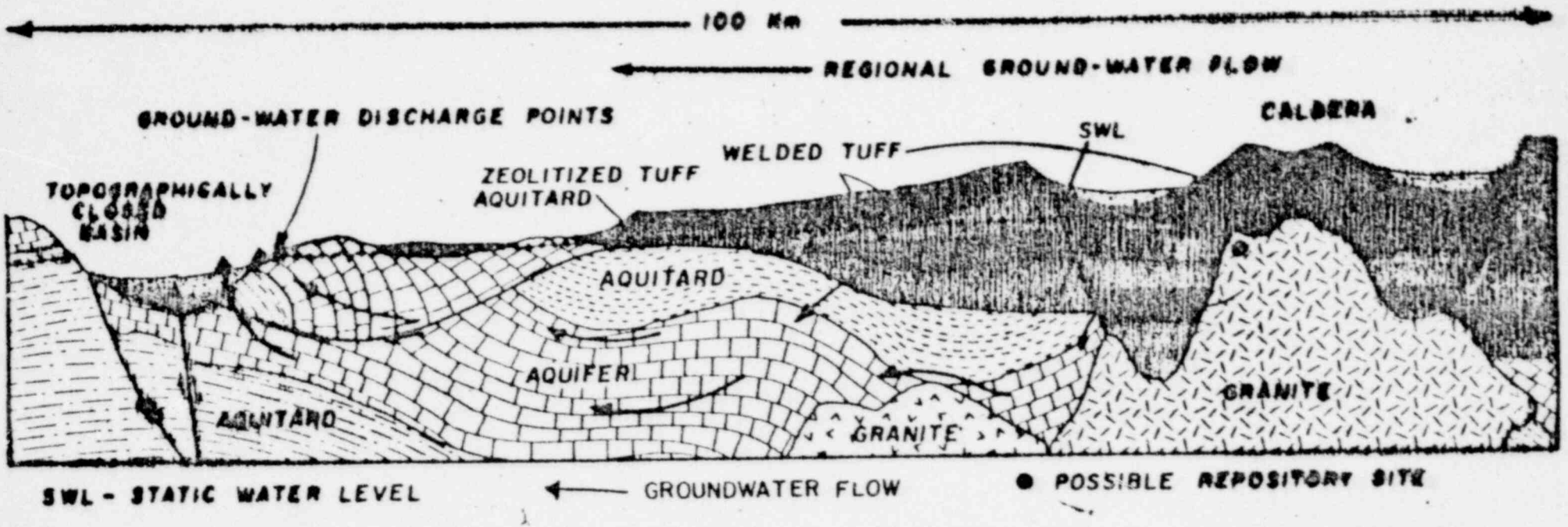
BWIP

- o HEATER AND SPENT FUEL TEST PLANS PREPARED
- o DETAILED DESIGN COMPLETED 12/78 FOR HEATER TEST; CONCEPTUAL DESIGN UNDERWAY FOR SPENT FUEL TEST
- o CONSTRUCTION (INCLUDING TUNNELS) ABOUT 35% COMPLETE
- o HEATER STARTUP-6/80; SPENT FUEL EMPLACEMENT-3/81

CLIMAX GRANITE

- o HEATER TEST INITIATED LATE CY 1977 AND COMPLETED MID CY-1978
- o LESS THAN EXPECTED VARIATION OF THERMAL CONDUCTIVITY WITH TEMPERATURE
- o DECLINE IN PERMEABILITY NOTED AS TEMPERATURE OF ROCK INCREASED
- o SPENT FUEL TEST - DETAILED DESIGN 80% COMPLETE
  - 1400 FT EMPLACEMENT HOLE AND TWO HEATER DRIFTS COMPLETE; SPENT FUEL DRIFT BEING MINED
  - SPENT FUEL EMPLACEMENT-7/80

2/13/79



MULTIPLE BARRIER MODEL

TUFF IN GREAT BASIN