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WM Project 16
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(Return to WM, 623-SS)

MEMORANDUM FOR: ROBERT E. BROWNING, DIRECTOR
DIVISION OF WASTE MANAGEMENT

FROM: TILAK R. VERMA, SENIOR ON-SITE
LICENSING REPRESENTATIVE
SALT REPOSITORY PROJECT (SRP)

SUBJECT: SRP SITE REPORT FOR THE MONTH OF NOVEMBER, 1985

1. Design

During the week of November 4, 1985, a Repository Coordination Group Meeting was held in Irvine, California. BWIP, NNWSI, SRP, Weston and DOE-HQ were represented at this meeting. A program-wide format for SCP-Conceptual Design Report (CDR) was the topic for discussion at this meeting.

The Repository Coordination Group Meeting was followed by a SRP Repository Coordination Meeting on November 6-8, 1985. I attended the later meeting as a NRC observer. The agenda for the meeting included several major topics related to the Salt SCP Conceptual Design Report. A listing of these topics is as follows:

a. ONWI Discussion of Design Considerations
b. Fluor Approach to CDR Design and Report Preparation
c. Basis for Design
   - Data and Assumed Values used in CDR Design
   - Assumptions used in CDR Design
d. Schedules for CDR Design and Reviews.

Fluor was directed to proceed with SCP-CDR in early October, 1985. The report is to be completed in early April, 1986 with most of the engineering being completed by January, 1986. All design data and design assumptions to be used in CDR will require SRPO approval.

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I have discussed some of these data and assumptions with Pearing of WMEG during his visit here in Columbus. Copies of the viewgraphs and summaries of data and assumptions were made available to him.

From discussions at the meeting and from my review of the material related to SCP-CDR, I have the following observations:

(i) Fluor and PB-KBB are not consistent in their criteria for the design of repository shafts and exploratory shafts.

(ii) There are numerous changes in the Basis for Design for SCP compared to the one used in Draft Final EAs.

Some of the viewgraphs used in the meeting are attached for your information.

2. Hydrology

Final EAs for the Davis Canyon, Deaf Smith and Richton Dome sites make use of a groundwater code, called "PTRACK" in calculating pre-emplacement groundwater travel time. I have asked for a copy of PTRACK documentation report. INTERA topical report on application of PTRACK to these three sites has not yet been made available to ONWI, however, I will keep Fred Ross of WMGT informed about the availability of this report.

3. Waste Package

ONWI has prepared a draft report on "Multifactor Test Design to Investigate Uniform Corrosion of Low-Carbon Steel in a Nuclear Waste Salt Repository Environment". SRPO is getting it peer reviewed at ANL. I have received a copy of the draft report. The report provides the details of a test program that will result in a data base to characterize the uniform corrosion in low-carbon steel in repository-relevant brines. I will make copy of the report available to Voglewede and Peterson as soon as it is published.

A copy of the draft report on "Common Canister Evaluation Report", prepared by the MRS and Repository Waste Package Task Force, is also available.

4. Exploratory Shaft Facility

The A/E contract for the Salt Repository Exploratory Shaft Facility has been transferred from ONWI to SRPO. The A/E contractor for ESF design, PB-KBB, has put Vince Lambardo as their Technical Representative here in Columbus.

5. Quality Assurance

QA Plan for site characterization activities by SRPO has been finalized. I have received two copies of the Plan. One copy has been provided to Hedges of WMRP for his information and comments.

SRPO has scheduled a QA Audit of ONWI for December 17-20, 1985. I have requested to Reese of SRPO (QA Manager) to have Bilhorn of WMRP as a NRC observer for this audit. Reese has told me that Bilhorn is invited to observe the QA audit of ONWI.

6. Geology

A three-day workshop between DOE and NRC was held here in Columbus on November 19-21, 1985. The topics covered in the workshop were related to structures and tectonics of the Palo Duro Basin. DOE and their contractors presented alternative interpretations of regional structure from the available data base, uncertainties in the data, lack of data and criteria used in interpreting borehole and seismic information. The meeting discussions were quite open and professional.

7. General

ONWI has reorganized again. About a year and a half ago, they had implemented Matrix Management concept, which they admit was not all that good in their line of work. A copy of their new organization is attached.

Tilak R. Verma

Tilak R. Verma
Senior On-Site
Licensing Representative
Salt Repository Project

NRC:TRV:max:0310C

Enclosure:
As Stated

cc:
M. Bell
J. Bunting
H. Miller
M. Knapp
J. Greeves
J. Linehan
R. Johnson
J. Giarratana
S. Bilhorn
R. Cook
P. Prestholt

Rec'd W/memo of 11/29/85 to Browning

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∴ CDR OUTLINE Narrative	Chapter 2	Chapter Coordinator Griffin/Russell

Section No. and Title: 2.2 Site (Data Base)	Section Author: WCC

Date Assigned	Outline Due	Approved	Draft Due	Final Due	No. of Pages
10-8-85	10-31-85		11-26-85	12-31-85	20/11

Summary (Approximately 100 Words)

This section summarizes the geologic, hydrologic and geomechanical data base for the site available at the time the SCP-CDR is prepared. Much of this data is from boreholes located miles from the site. No site-specific subsurface data are available. Base geologic information includes stratigraphic relationships from the nearest boreholes. Base hydrologic information includes hydrologic parameters from nearby boreholes and from the published hydrologic literature. Geomechanical data are summarized from rock property, laboratory test reports. Surface soil information are excerpted from Soil Conservation Service maps. Surface flood information will be taken from surface hydrology studies by SRP subcontractors. References are cited for all site data.

Opening Statement

A variety of geologic, hydrologic, and geomechanical data are available from the area surrounding the proposal Deaf Smith County repository site. This section summarizes these data that are needed for SCP-CDR design. The base data values are described, listed, or plotted as the basis from which assumed design values will be derived. Design values proposal are discussed in the following Section 2.3.

Main Body Outline

Refer to attached sheet.

Conclusion

No specific conclusion - this section will present the site data base used for the SCP-CDR.

MAIN BODY OUTLINE FOR CDR SECTION 2.2

2.2 SITE DATA BASE

2.2.1 SURFACE

2.2.1.1 Topographic/Geomorphic

2.2.1.2 Soil/Rock Stratigraphy

2.2.1.3 Engineering Geology Description/Geologic Features

2.2.1.4 Seismic

2.2.1.5 Hydrologic (groundwater and flood) / geochemical including recharge and solution fronts

2.2.1.6 Geomechanical

2.2.1.7 Archeology

2.2.2 SUBSURFACE (Above Repository Horizon)

2.2.2.1 Stratigraphy

2.2.2.2 Engineering Geology Description / Geologic Features

2.2.2.3 Hydrologic / Geochemical

2.2.2.4 Geomechanical / In Situ Stress

2.2.2.5 Thermal Properties / In Situ Temperature

2.2.3 REPOSITORY HORIZON

2.2.3.1 Stratigraphy

2.2.3.2 Engineering Geology Description / Geologic Features

2.2.3.3 Hydrologic / Geochemical

2.2.3.4 Geomechanical

2.2.3.5 Thermal Properties / In Situ Temperature

CDR OUTLINE	Chapter 2	Coordinator Griffin/Russell
FIGURES AND TABLES	Section No. and Title 2.2 Site (Data Base)	Author WCC

FIG./TABLE NO. * : (Caption)

Figure Topographic Map 1"=200'

Figure USGS Map

FIG./TABLE NO. * : (Caption)

Figure Soil Conservation Service Map of Site Area

FIG./TABLE NO. * : (Caption)

Figure(s) PMF Floodplain Drawing also
50 yr Floodplains
100 yr "
500 yr "
(total 4 figures)

FIG./TABLE NO. * : (Caption)

Table Range of Hydralogic Parameters for Deaf Smith Site

FIG./TABLE NO. * : (Caption)

Table(s) (est 3) Range, mean standard deviation of Geomechanical Properties (Rock Properties) for Shaft Strata and for Repository Horizon

FIG./TABLE NO. * : (Caption)

*The number of Figures and Tables are subject to change therefore no numbers will be assigned at this time.

CDR OUTLINE	Chapter 2	Coordinator Griffin/Russell
REFERENCES	Section No. and Title 2.2 Site (Data Base)	Author WCC

Numerous references including those from:

- o SWEC (Stone and Webster Engineering Corp.)
- o TBEG (Texas Bureau of Economic Geology, University of Texas of Austin)
- o TDWR (Texas Department of Water Resources)
- o RE/SPEC Inc - - Rock laboratory testing
- o ARA (Applied Research Associates) subcontractor to SWEC for rock laboratory testing

BOLICK

EMPLACEMENT MODE

- VERTICAL PACKAGE EMPLACEMENT (IN BOREHOLE, FLOOR OF THE STORAGE ROOM)

- HORIZONTAL PACKAGE EMPLACEMENT (IN BOREHOLE, PILLARS OF THE STORAGE ROOM)

- FLUOR POSITION PAPER, FAVORS HORIZONTAL PACKAGE EMPLACEMENT FOR THE DEAF SMITH COUNTY SITE IN TEXAS

- ONWI INDEPENDENT EVALUATION FAVORS HORIZONTAL PACKAGE EMPLACEMENT FOR THE DEAF SMITH COUNTY SITE IN TEXAS.

PREVAILING ADVANTAGES OF HORIZONTAL PACKAGE EMPLACEMENT MODE

- IT CAN BE USED IN THE LIMITED THICKNESS OF THE SALT BED
- IT PROVIDES A BETTER SELECTION OF EMPLACEMENT HORIZON FOR THE PACKAGE
- IT PROVIDES BETTER STORAGE ROOM AND PILLAR LONG-TERM STABILITY
- IT REDUCES THE STRESS ACTING ON THE PACKAGE (PRESENCE OF CLAY SEAMS)
- IT REDUCES THE POSSIBILITY OF NUCLIDE MIGRATION IN CLAY SEAMS
- IT REDUCES THE CORROSION OF THE WASTE PACKAGE IN THE PRESENCE OF CLAY SEAMS
- IT OFFERS POTENTIAL SAVINGS IN EXCAVATION COSTS
- INCREASED STORAGE CAPACITY OF WASTE PACKAGES DUE TO TWO ROWS OF PACKAGE EMPLACEMENT IN THE STORAGE ROOM PILLARS

PREVAILING DISADVANTAGES OF VERTICAL PACKAGE EMPLACEMENT MODE

- NECESSITY OF SELECTION OF A SALT BED THICKNESS ACCOMMODATING THE TALL STORAGE ROOM IN RELATIVELY CLEAN SALT

- SELECTION OF A SALT BED THICKNESS ALLOWING THE STORAGE OF WASTE PACKAGE IN RELATIVELY CLEAN SALT IN ORDER TO REDUCE CORROSION AND PREVENT NUCLIDE MIGRATION IN CLAY SEAMS

- IMPAIRED LONG-TERM STABILITY OF THE REPOSITORY ASSOCIATED WITH THE EXCAVATION OF TALL SQUARE ROOMS IN A BEDDED SALT DEPOSIT CONTAINING NUMEROUS CLAY SEAMS

- INCREASED COST OF EXCAVATION ASSOCIATED WITH TWO PASS VERTICAL MINING

- INCREASED EXCAVATION COSTS DUE TO A HIGHER TONNAGE TO BE MINED

- REDUCED PACKAGE STORAGE CAPACITY DUE TO A SINGLE ROW OF CANISTERS PLACED IN THE FLOOR OF THE STORAGE ROOM

CARR

WASTE TYPES/QUANTITIES/RATES/CHARACTERISTICS

TYPES (REFERENCE MISSION PLAN AND GR)

- SPENT FUEL { WHOLE ASSEMBLIES / REACTOR CONSOLIDATED FUEL }
- DEFENSE HIGH-LEVEL WASTE
- WEST VALLEY HIGH-LEVEL WASTE

SCP DESIGN ISSUES

- TO WHAT DEGREE IS "ENHANCED" SYSTEM (MRS WITH SRP CANISTER) OR OTHER OCRWM "SYSTEMS" ADDRESSED AS ALTERNATIVES IN SCP DESIGN?
- WHAT ONSITE GENERATED WASTES WILL BE DISPOSED OF SUBSURFACE AND WHAT DEGREE OF DESIGN SHOULD BE DONE IN SCP:
  - DISASSEMBLY HARDWARE
  - TRU CONTAMINATED WASTE
  - LLW
- HOW WILL SCP DESIGN ADDRESS "SHALL NOT PRECLUDE" PROVISIONS OF GRD?

WASTE TYPES/QUANTITIES/RATES/CHARACTERISTICS

(CONTINUED)

QUANTITIES

WEST VALLEY HIGH-LEVEL WASTE	300	CANISTERS ~650 MTU
DEFENSE HIGH-LEVEL WASTE	14,700	CANISTERS ~7,350 MTU
SPENT FUEL	900	MTU AS REACTOR DISASSEMBLIED FUEL
	61,000	MTU AS WHOLE ASSEMBLIES
	85,000	WHOLE PWR ASSEMBLIES
	1,200	PWR ASSEMBLIES AS FUEL PINS
	122,000	WHOLE BWR ASSEMBLIES
	1,250	BWR ASSEMBLIES AS FUEL PINS

ISSUES

- RECEIPT CANISTER FOR REACTOR DISASSEMBLIED FUEL BOX? OTHER?
- VOLUME OF ASSEMBLY HARDWARE FOLLOWING TREATMENT.
- QUANTITY OF TRU CONTAMINATED AND LLW WASTE GENERATED ONSITE.

WASTE TYPES/QUANTITIES/RATES/CHARACTERISTICS

(CONTINUED)

RATES

- PER TABLE 3-1 OF RSDR.

ISSUES

- IF PHASE I BUILDING HANDLES WHOLE ASSEMBLIES/REACTOR CANISTERED PINS WILL PHASE I BUILDING CONTINUE TO PACKAGE IN YEARS #4 AND #5.
  - HOW WILL SUBSURFACE HANDLE PACKAGES FROM BOTH PHASES?
  - HOW WILL PHASE I BUILDING SWITCH TO DHLW/WV WITHOUT IMPACTING OPERATIONS?

Table 3-1. Reference Waste Receipt Rates (Units/Year)

Spent Fuel

Year of Operation(4)	Intact Assemblies*	Boxes of Consolidated Rods(1)	MTU/YR	Phase
1	1,360	270	400	1
2	1,360	243	400	1
3	1,360	216	400	1
4	1360/1700	189	400/500	1/2
5	1360/5100	162	400/1,500	1/2
6	10,200	135	3,000	2
7	10,200	108	3,000	2
8	10,200	81	3,000	2
9	10,200	54	3,000	2
10	10,200	27	3,000	2
11	10,200	0	3,000	2

DHLW/WVHLW

Year of Operation(5)	Waste Canisters	MTU/YR	Phase
1	Trace(2)	Trace(2)	1
2	Trace(2)	Trace(2)	1
3	Trace(2)	Trace(2)	1
4	Trace(2)	Trace(2)	1
5	Trace(2)	Trace(2)	1
6	800(3)	400(3)	1

*Assume spent fuel inventory is 64 percent PWR assemblies and 36 percent BWR assemblies, based on MTU. PWR equals 0.46 MTU/assembly, BWR equals 0.18 MTU/assembly. (DOE, 1983, p. 32 & 42). Quantities based on GRMGDS (DOE, 1985b), page B.1-5.

(1) One box equals 2 assemblies. Quantities shown are based on GRMGDS (DOE, 1985b), page B.1-2, and represent maximum design rather than expected values.

(2) Based on GRMGDS (DOE, 1985b), page B.1-1.

(3) Based on approximately 0.5 MTU/canister for WVHLW or DHLW. Quantities based on Mission Plan (DOE, 1985a), Table 2-2. (Separate schedules for WVHLW and DHLW canisters will be established at a later time.)

(4) Receipt rates remain unchanged from year 11 through 25.

(5) Receipt rates remain unchanged from year 6 through 25.

WASTE TYPES/QUANTITIES/RATES/CHARACTERISTICS

(CONTINUED)

CHARACTERISTICS

ISSUES

- ALL SINGLE ASSEMBLY OPERATIONS SHOULD ACCOMMODATE 5 YEAR OLD FUEL WITH UP TO 55,000 MWD/MTU BURNUP.

- WASTE PACKAGE IS LIMITED TO FUEL ASSEMBLIES WHOSE COMBINED ASSEMBLY HEAT LOAD IS 6,600 WATTS.

  12 - PWR 10 YEAR OLD
  30 - BWR 10 YEAR OLD
  6 - PWR 5 YEAR OLD
  18 - BWR 5 YEAR OLD

  - PROPER HEAT LOAD CAN BE ACHIEVED BY MIXING HOT/COLD ASSEMBLIES IN A PACKAGE.
  - LIMITING NUMBER OF ASSEMBLIES IN PACKAGE.

- SHOULD SCP DESIGN SHOW ABILITY TO ACCOMMODATE ALL FUEL ASSEMBLY DESIGNS OR SHOULD "LARGEST ENVELOPE" APPROACH BE SELECTED AND UTILIZED IN THE DESIGN.

PACKAGE DESIGNS

- MAINTAIN SAME DIAMETER AND THICKNESS PHASE I AND II
- ONWI-517 OD = 84.5 CM MAY INCREASE 5-10 CM FOR LITHOSTATIC PRESSURE, CORROSION, ID INCREASE
- CONTAINER LENGTH WILL INCREASE IN PHASE I (WHOLE ASSEMBLIES)

HP&L 17x17 W IS LONGEST PWR   NOTE: DATA UNVERIFIED.
8x8 R GE IS LONGEST BWR

	517	PHASE I	PHASE II
PWR	446.5 CM	510 CM	480 CM
BWR	481.0 CM	490 CM	465 CM

SUGGEST THREE PACKAGES LENGTHS FOR BOTH PHASES.

450 CM	485 CM	510 CM
ALL PHASE II EXCEPT 8x8 R GE 17x17 WHP&L	PHASE II 8x8 R GE 17x17 WHP&L PHASE I ALL BUT 17x17 WHP&L	PHASE I 17x17 WHP&L

- 4 PWR/10 BWR ASSEMBLY/PACKAGE PHASE I (IF BOXED 8/20 ASSEMBLY/PACKAGE)
- 12 PWR/30 BWR PER PACKAGE PHASE II

ISSUES

- OPERATION YEARS 4 THROUGH 10 HAVE BOXED PINS PLUS PHASE II CANISTER. BUT PHASE I CONVERTED OVER TO DHLW AND WV.
- PACKAGE LENGTHS
- PACKING MATERIAL

COMINGLING OF WASTE

- DHLW AND WV 15,000 PACKAGES
- LOW HEAT PRODUCTION 200-450 WATTS/PACKAGE
- MAJOR CONCERN IS ABILITY TO CLOSE SPACE BOREHOLES, I.E., LESS THAN 15 FT SPACING. (EXAMPLE WITH STAGGER PITCH AND BOTH DRIFT SIDE EMPLACEMENT 75,000 FT OF DRIFT REQUIRED.)
- ISSUES ARE:
  - SEPARATE EMPLACEMENT
  - COMINGLING WITH S.F.

BOLLCH

KEY DESIGN PARAMETERS AFFECTING THE SIZE OF THE REPOSITORY

- MSHA REGULATION FOR GASSY MINES

  A. ELIMINATION OF CROSS-CUTS AT 100 FT INTERVALS

- THERMAL AREAL HEAT LOAD

  B. TEMPERATURE NOT TO EXCEED 70 C

- SHAFT PILLAR RADIUS

  C. DETERMINED BY ANALYSIS

- CANISTER WASTE EMPLACEMENT MODE

REPOSITORY LAYOUT

- NUMBER OF DRIFTS IN MAIN ENTRIES
  A. FOR WASTE EMPLACEMENT OPERATION
  B. FOR MINE DEVELOPMENT OPERATION
  C. CROSS-CUTS CONNECTING MAIN ENTRIES

- NUMBER OF DRIFTS IN A STORAGE PANEL
  A. PREFERRED SINGLE ENTRIES

- STORAGE ROOMS
  A. 350 TO 500 FT LONG

- PANEL BARRIER PILLAR
  A. DETERMINED BY ANALYSIS
  B. SURVEY OF EXISTING POTASH MINES

- EXTRACTION RATE
  A. NOT TO EXCEED 25 PERCENT

- CONFIGURATION OF STORAGE ROOMS
  A. RECTANGULAR, HORIZONTAL PLANE

- STORAGE ROOM PILLARS
  A. MINIMUM WIDTH-TO-HEIGHT RATIO 2-4
  B. RANGE OF PILLAR WIDTH 80-120 FT
  C. WIDTH OF STORAGE ROOM 20-25 FT
  D. HEIGHT OF STORAGE ROOM 8-10 FT
  E. THICKNESS OF ROOF BEAM IN STORAGE ROOM 14-16 FT
  F. THICKNESS OF FLOOR BEAM IN STORAGE ROOM 5-7 FT

CONTINUOUS MINING MACHINES

- DRUM-TYPE MACHINES PREFERRED
  - A. NARROW HEAD
  - B. WIDE HEAD
- ROADHEADERS
  - A. LOW PRODUCTIVITY
  - B. THEY ARE NOT PRODUCTION MACHINES
- SALT, POTASH AND TRONA MINES
  - A. SURVEYS
  - B. DETERMINE REALISTIC SHIFT PRODUCTION

MATERIAL TRANSPORTATION SYSTEM

- PRODUCTION FACE
  - A. SHUTTLE CARS 18-20 TONS
  - B. LOAD HAUL DUMP UNITS 5-8 CUBIC YARDS
  - C. EXTENSIBLE CONVEYORS
  - D. HAULAGE ROAD NOT TO EXCEED 300-400 FT
- IN PANEL
  - A. WIRE ROPE CONVEYORS
  - B. RAPID CONVEYOR EXTENSION
- IN MAIN ENTRIES
  - A. WIRE ROPE CONVEYORS
  - B. RAPID CONVEYOR EXTENSION

VENTILATION

- OPERATING FACES AIR VELOCITIES/QUANTITIES
  - A. BASED ON MSHA REGULATIONS AND SURVEY OF MINES
  - B. LAST OPEN CROSSCUT
- MAIN ENTRIES
  - A. ACCELERATED AIR VELOCITIES
- SHAFTS
  - A. VENTILATION - ACCELERATED AIR VELOCITIES
  - B. PERSONNEL/MATERIAL - REDUCED AIR VELOCITIES
- TOTAL AIR QUANTITIES
  - A. MINING DEVELOPMENT - REALISTIC
  - B. WASTE EMPLACEMENT - REALISTIC
  - C. RETRIEVAL - REALISTIC
  - D. TOTAL - REALISTIC
- SHAFT DIAMETERS

EXPLORATORY SHAFT FACILITIES

- REPOSITORY TEST REQUIREMENTS
  - A. PANEL STORAGE ROOMS
  - B. PANEL STORAGE ROOM PILLARS
  - C. INSTRUMENTATION
  - D. DRILLING
- ESF INTEGRATED PART OF REPOSITORY
  - A. LOCATION
  - B. CONNECTION TO REPOSITORY
  - C. USE DURING REPOSITORY CONSTRUCTION
  - D. REPOSITORY CONSTRUCTION SCHEDULE - SHAFTS
  - E. SITE VALIDATION PROGRAM

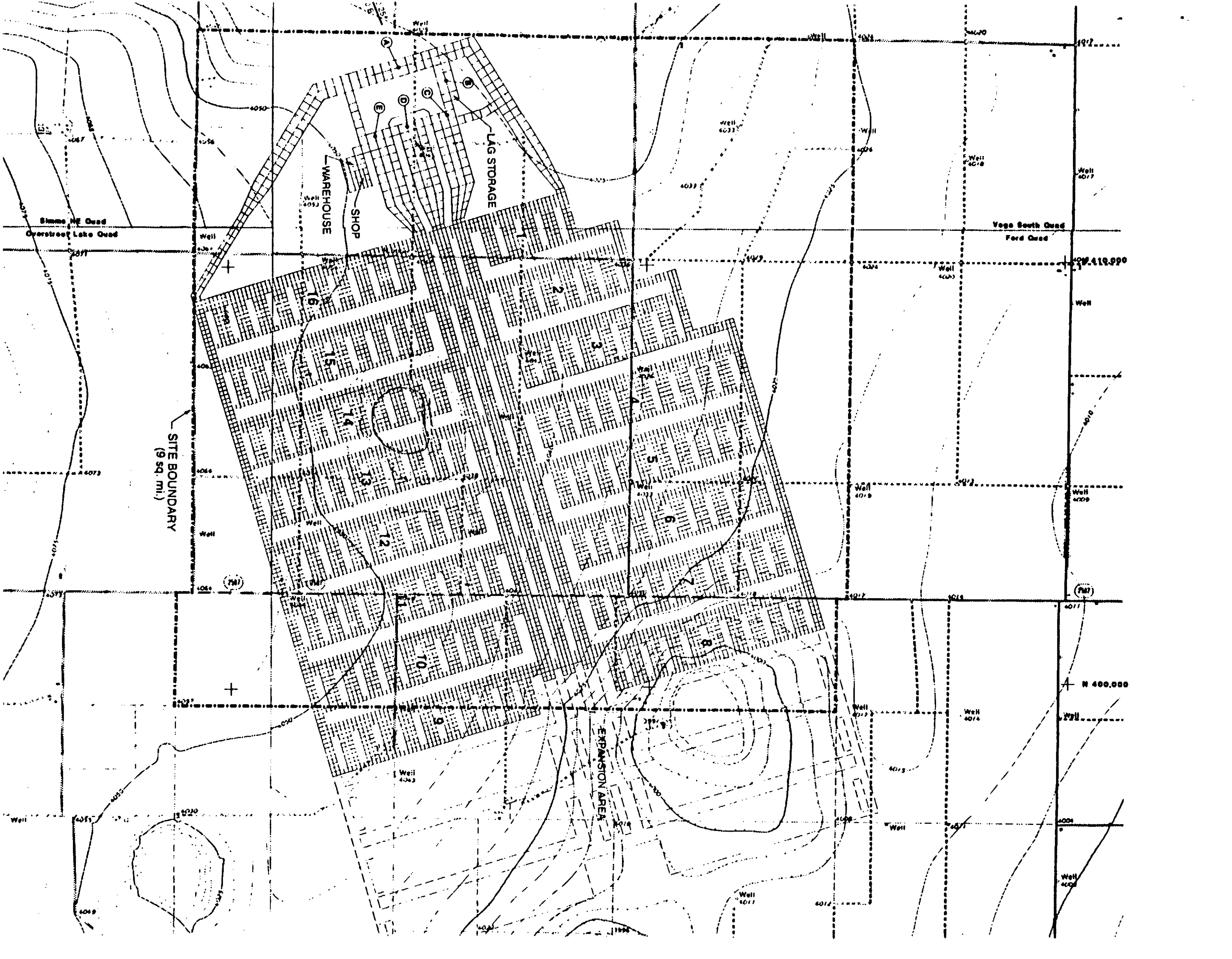
REPOSITORY DEVELOPMENT DIRECTION

- ONE DIRECTIONAL REPOSITORY DEVELOPMENT RESULTS IN THE FOLLOWING:

  A. THE YEAR-TO-YEAR COST INCREASE IN:

     - MINE OPERATING COST
     - MINE CAPITAL COST
     - WASTE EMPLACEMENT OPERATING COST
     - WASTE EMPLACEMENT CAPITAL COST
     - REPOSITORY MATERIAL HANDLING SYSTEM
     - REPOSITORY SUPPLIES
     - REPOSITORY POWER DISTRIBUTION SYSTEM
     - REPOSITORY VENTILATION COST
     - REPOSITORY COMMUNICATION SYSTEM COST
     - REPOSITORY ESCAPE ROADS

IN GENERAL THE REPOSITORY CAPITAL AND OPERATING COST REACHES THE MAXIMUM AT THE END OF THE PROJECT.


WAREHOUSE
SHOP
LAG STORAGE
SITE BOUNDARY
(9 sq. mi.)
EXPANSION AREA
Simms NE Quad
Overstreet Lake Quad
Vega South Quad
Ford Quad
N 410,000
N 400,000
Well
A
B
C
D
E
1
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16

DOWNDIP DEVELOPMENT OF THE REPOSITORY

- THE MINING MATERIAL HANDLING SYSTEM WILL HAVE TO BE DESIGNED AND OPERATED AGAINST THE NATURAL MATERIAL GRAVITY FLOW.

- REPOSITORY EGRESS AND EVACUATION ROADS ARE AGAINST THE DIP OF THE BED, REQUIRING GREATER PHYSICAL EFFORT IN EVACUATING WORKINGS DURING EMERGENCY.

- DURING MINE DISASTER, SUCH AS FLOODING, WATER FLOWS IN THE DIRECTION OF WORKINGS WITH ITS HIGH POPULATION DENSITY INCREASING THE POSSIBILITY OF PANIC AND CHAOS.

- IN BEDDED SALT DEPOSITS, OFTEN ENCOUNTERED INCLINES AND DECLINES WILL ELIMINATE THE DOWNDIP DEVELOPMENT DESIGN CRITERIA.

- NEED FOR THOROUGH EVALUATION

  A. SAFETY

  B. OVERALL COST.

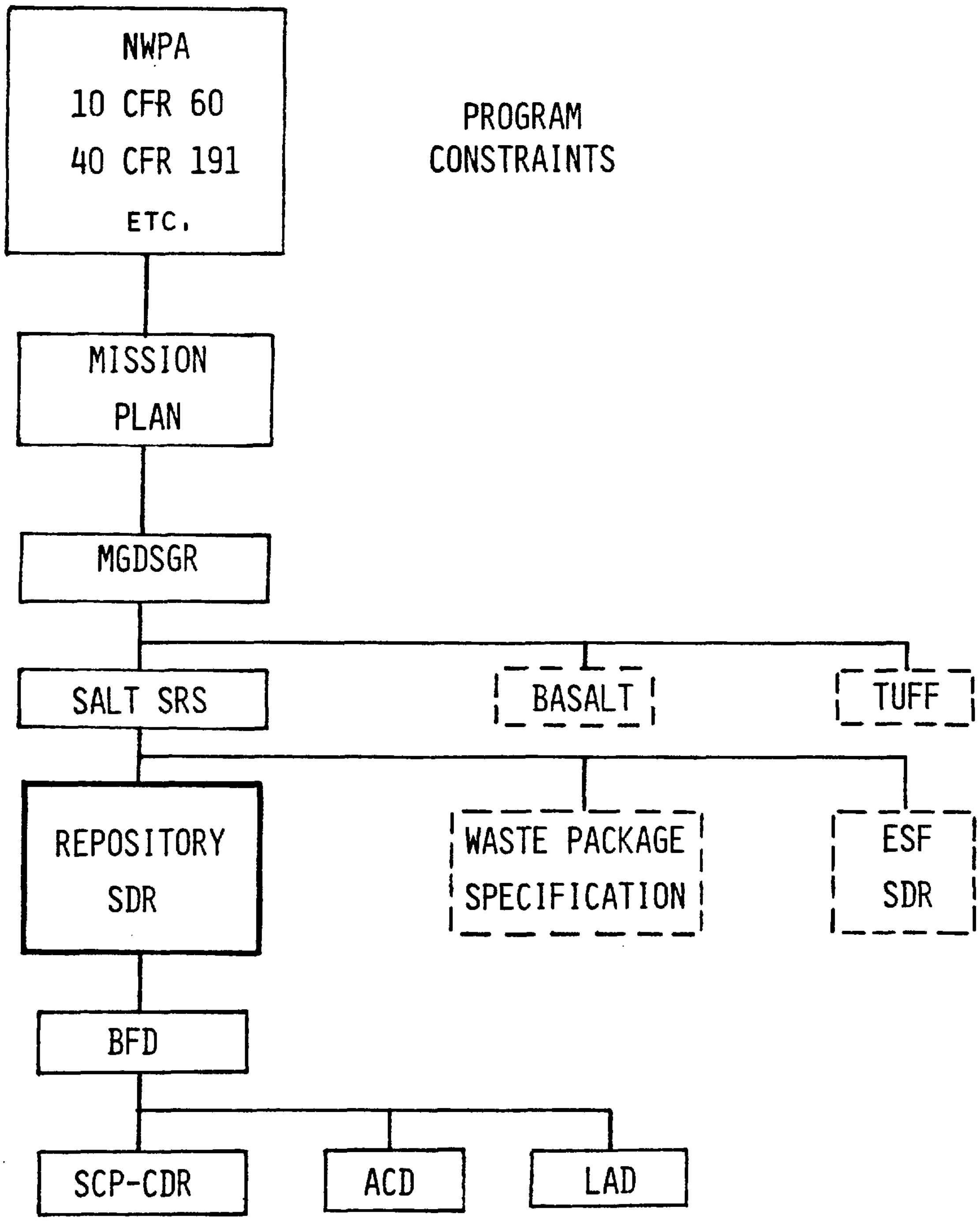
OVERALL DESIGN CRITERIA

- MAXIMUM LAND UTILIZATION
- REALISTIC CONSTRUCTION SCHEDULE
- COST-EFFECTIVE DESIGN
  - A. TONS MINED/PER LB OF WASTE EMPLACED
  - B. CUBIC FT OF AIR/PER LB OF WASTE EMPLACED
- ASSURE OVERALL LONG-TERM REPOSITORY STABILITY
- ASSURE COMPLIANCE WITH NRC AND MSHA REGULATIONS

BAUMERT

REPOSITORY SUBSYSTEM DESIGN REQUIREMENTS

- FORMERLY FUNCTIONAL DESIGN CRITERIA
- REVISION TO FDC (REV. 1, FEBRUARY 28, 1985)
- PURPOSE
  - MAKE CONSISTENT WITH MISSION PLAN, MGDSGR
  - INCORPORATE DOE, FLUOR COMMENTS
- STATUS
  - ISSUED FOR DOE APPROVAL (OCTOBER 1, 1985)
  - COPY TO FLUOR FOR SCP-CDR
  - DOE PLANS TO APPROVE FOR AC DESIGN
  - SALT SRS DRAFT FOR REVIEW (FEBRUARY 1986)
- MAJOR ADDITIONS
  - SAFETY CLASSIFICATION
  - PROPOSED DOE RETRIEVABILITY POSITION
  - TWO PHASE CONCEPT
  - GLOSSARY
  - REFERENCES
- FUTURE REVISIONS AS CRITERIA CHANGE


NWPA
10 CFR 60
40 CFR 191
ETC.
PROGRAM
CONSTRAINTS
MISSION
PLAN
MGDSGR
SALT SRS
BASALT
TUFF
REPOSITORY
SDR
WASTE PACKAGE
SPECIFICATION
ESF
SDR
BFD
SCP-CDR
ACD
LAD

November 6, 1985

SALT REPOSITORY

PERFORMANCE CONFIRMATION - NOTES

I. GENERAL ASSUMPTIONS

A. Each waste package design type will be subjected to prototype tests including:

1. Load Tests - room temp.
2. Load Tests - elevated temp.
3. Materials properties tests - full chem. & met.
4. Accelerated life cycle tests
5. Simulated operating conditions tests

B. Each production package will be subjected to:

1. Most stringent QA
2. 100% QC incl. test coupon met. check by mass spec. or EQ.
3. Possible load/press. test

II. PACKAGE TYPES TO BE SUBJECTED TO P.C.*

A. Spent fuel pkg's (Consolidated)

B. Spent fuel pkg's (Unconsolidated)

C. DHLW

D. CHLW

E. Radwaste

F. Abnormal & misc. wastes

* Packages of each type to be selected on a random sample basis for emplacement in preselected P.C. areas.

III. NO. OF PACKAGES OF EACH TYPE

A. Highest repository performance risk is probably spent fuel (Consolidated)

Assume 1% sample of $\frac{62{,}000 \text{ MTU} \times .9}{5.5 \text{ MTU/PKG.}} \cong$ 102 PKG

B. Next Highest - Spent Fuel & Abnormal

(Unconsolidated) 1% of $\frac{62{,}000 \times 0.1}{1.4} \cong$ 45 PKG

(Abnormal) 1% of ~ 1000 $\cong$ 10 PKG

C. Relatively Low Risk

DHLW 0.5% of $\frac{8000}{0.5} \cong$ 80 PKG

CHLW 0.1% of $\frac{300}{1.5?} \cong$ USE 5 PKG

RADWASTE 0.1% of ~ 15,000 $\cong$ 15 PKG

i.e. $\frac{257\sim}{50}$ = 5/YR — 257 PKG

IV. LOCATIONS/CONDITIONS

A. Three P.C. Areas (to reflect varying geology) located near the end of maintained entries.

B. Heated, insulated, partially backfilled to simulate/duplicate other repository areas.

C. Pkgs. overcored, removed, bagged/packaged, transported to surface to WHB-1 special function cell.

D. After removal & examination, fuel repackaged and reemplaced.

Kingsley

PERFORMANCE CONFIRMATION TESTING

STATUS

- OCRWM PROGRAM POSITION HAS NOT BEEN DEVELOPED. PREPARATION PLANNED AS A FUTURE RCG ACTIVITY.

- SALT SPECIFIC IMPLEMENTATION PLANS/STRATEGY HAVE NOT BEEN DEVELOPED.

PERFORMANCE CONFIRMATION TESTING

ISSUES

- WHAT IF ANYTHING DO WE SAY ABOUT PERFORMANCE CONFIRMATION TESTING IN THE SCP?
- WHAT IS THE SALT APPROACH TO DEVELOPMENT OF A BASES FOR PERFORMANCE CONFIRMATION TESTING DESIGN?

PERFORMANCE CONFIRMATION TESTING

REGULATORY REQUIREMENTS

- "PERFORMANCE CONFIRMATION MEANS THE PROGRAM OF TESTS, EXPERIMENTS, AND ANALYSES WHICH IS CONDUCTED TO EVALUATE THE ACCURACY AND ADEQUACY OF THE INFORMATION USED TO DETERMINE WITH REASONABLE ASSURANCE THAT THE PERFORMANCE OBJECTIVES FOR THE PERIOD AFTER PERMANENT CLOSURE WILL BE MET (REF. 10 CFR 60.2)."

- REQUIREMENTS DEFINED IN 10 CFR 60, SUBPART F, PERFORMANCE CONFIRMATION PROGRAM. THE PERFORMANCE CONFIRMATION PROGRAM WILL CONTAIN ELEMENTS FOR:
  - CONFIRMATION OF THE SUBSURFACE GEOTECHNICAL CONDITION WITH A COMPARISON TO DESIGN ASSUMPTIONS.
  - IN SITU DESIGN TESTING OF OPERATIONAL SEALS AND BACKFILL.
  - IN SITU DETERMINATION/MEASUREMENT OF THE THERMAL INTERACTION BETWEEN HOST ROCK AND WASTE PACKAGE.
  - MONITORING OF THE CONDITION OF REPRESENTATIVE WASTE PACKAGES INCLUDING THE INTERNAL CONDITION OF THE WASTE PACKAGE.

PERFORMANCE CONFIRMATION TESTING

BASES FOR DESIGN

REPOSITORY DESIGN FEATURES WILL PROBABLY INCLUDE:

- CONTINUATION OF IN SITU TESTING PROGRAM (IN E.S. AREAS)
- GEOTECHNICAL TESTING DURING SUBSURFACE DEVELOPMENT
- DEDICATED SUBSURFACE AREAS FOR LONG-TERM GEOTECHNICAL TESTING
- DEDICATED WASTE EMPLACEMENT AREAS FOR PERIODIC WASTE PACKAGE REMOVAL
- SURFACE FACILITIES FOR THE DESTRUCTIVE EXAMINATION OF RECOVERED WASTE PACKAGES.

PERFORMANCE CONFIRMATION TESTING

SCP REQUIREMENTS

- SCP-CDR - ANNOTATED OUTLINE, SECTION 7.4
  - DESCRIBE DOE'S PRELIMINARY PLANS INCLUDING GENERAL REQUIREMENTS, GEOTECHNICAL AND DESIGN PARAMETERS, DESIGN TESTING, AND THE MONITORING AND TESTING OF WASTE PACKAGES.
  - DISCUSS KNOWN CODES AND NEED FOR NEW CODES.
  - DISCUSS THE SURFACE AND SUBSURFACE FACILITIES REQUIRED BY THE PERFORMANCE CONFIRMATION PROGRAM. PLAN VIEW DRAWINGS WILL BE USED TO DESCRIBE THE FACILITY.

PERFORMANCE CONFIRMATION TESTING

CONCLUSION

- THERE IS A SIGNIFICANT LEVEL OF SCHEMATIC DESIGN WORK REQUIRED TO SUPPORT THE SALT SCP.
- ONWI PERFORMANCE ASSESSMENT SHOULD ESTABLISH ORDER OF MAGNITUDE FREQUENCY AND TYPES OF TESTING REQUIRED.
- SUBSURFACE DESIGNS SHOULD INDICATE DEDICATED TEST AREAS:
  - FOR GEOTECHNICAL TESTING
  - WASTE EMPLACEMENT.
- SUBSURFACE DESIGN SHOULD IDENTIFY WASTE PACKAGE EXAMINATION AREAS:
  - SHOULD REPOSITORY DESIGN INCLUDE METALOGRAPHIC EXAMINATION CAPABILITY?
- REPOSITORY SURFACE DESIGNS SHOULD INCLUDE REPACKAGING CAPABILITY.

RETRIEVABILITY

ISSUFS

- WHAT IF ANYTHING DO WE SAY ON RETRIEVAL IN THE SCP?
- WHAT IS THE SALT APPROACH TO DEVELOPMENT OF A BASES FOR RETRIEVAL SYSTEM DESIGN?

GROUND RULES

- DISCUSSION INVOLVES NRC INITIATED RETRIEVAL ONLY. RETRIEVAL FOR ECONOMIC VALUE IS NOT INCLUDED IN THIS DISCUSSION.
- WASTE REMOVAL FOR PERFORMANCE CONFIRMATION TESTING IS NOT RETRIEVAL AND IS NOT PART OF THE SUBJECT.

RETRIEVABILITY

STATUS

- SALT SPECIFIC IMPLEMENTATION PLANS HAVE NOT BEEN DEVELOPED
- FLUOR HAS PREPARED DRAFT PRELIMINARY WASTE PACKAGE RETRIEVABILITY REPORT WHICH IS CURRENTLY UNDER REVIEW
- ONWI HAS PREPARED REPORT PRELIMINARY REVIEW OF RETRIEVAL ISSUES FOR A HIGH-LEVEL WASTE REPOSITORY IN SALT WHICH IS SCHEDULED FOR ISSUE 11/15/85.

RETRIEVABILITY

REGULATIONS/CRITERIA

- "THE GEOLOGIC REPOSITORY OPERATIONS AREA SHALL BE DESIGNED TO PRESERVE THE OPTION OF WASTE RETRIEVAL, ETC." (10 CFR 60.111(b))

- "NO ACT, WHETHER BY DESIGN OR CIRCUMSTANCE, SHALL PRECLUDE THE POSSIBILITY OF, OR THE OPPORTUNITY FOR, RETRIEVAL, ETC." (PAGE 4, DOE POSITION ON RETRIEVABILITY, 6/28/85)

- "THIS DOES NOT MEAN THAT ALL EQUIPMENT, SYSTEMS, AND PROCEDURES MUST BE DESIGNED, CONSTRUCTED, AND OPERATED IN A CONSTANT STATE OF READINESS FOR THE RETRIEVAL OF THE COMPLETE INVENTORY. RATHER ALL METHODS, PLANS, AND CONTINGENCIES FOR RETRIEVAL SHALL HAVE BEEN DESIGNED, TESTED AND MADE READY, ETC." (PAGE 9, DOE POSITION ON RETRIEVABILITY)

- "....THE PRIMARY FUNCTION OF THE REPOSITORY IS TO PROVIDE CONTAINMENT AND ISOLATION FOR THE WASTE. RETRIEVABILITY AND RETRIEVAL CONSTITUTE A CONTINGENCY THAT MUST BE INCORPORATED INTO THE DESIGN. THIS CONTINGENCY SHALL NOT AFFECT OR UNNECESSARILY COMPLICATE THE DESIGN OF THE REPOSITORY TO THE EXCLUSION, COMPROMISE, OR INTERFERENCE WITH THE PRIMARY FUNCTION OF THE REPOSITORY. ALL DESIGN EFFORTS SHALL BE DIRECTED TOWARD MAKING RETRIEVABILITY AND RETRIEVAL COMPATIBLE WITH REPOSITORY OPERATIONS" (PAGE 12, DOE POSITION ON RETRIEVABILITY)

- "THE METHOD OF RETRIEVAL PLANNED FOR THE REPOSITORY SHALL ANTICIPATE AND IDENTIFY ALL CREDIBLE MALFUNCTIONS OR ACCIDENTS TO THE EMPLACEMENT SYSTEM, THE ENGINEERED BARRIERS, AND THE HOST ROCK THAT COULD AFFECT RETRIEVABILITY" (PAGE 12, DOE POSITION ON RETRIEVABILITY)

RETRIEVABILITY

BASES FOR DESIGN

A. FACTORS FOR CONSIDERATION

- NRC INITIATED RETRIEVAL OCCURS WHEN REPOSITORY LICENSE CONDITIONS HAVE BEEN EXCEEDED OR SOMETHING HAS HAPPENED TO CHANGE PREDICTED SUBSURFACE CONDITIONS (GEOLOGIC, GEOTECHNICAL, WASTE PACKAGE). REPOSITORY CONDITIONS MAY BE OUTSIDE OF PREDICTED NORMS.

- DETAILED ACCURATE PREDICTIONS OF UNFORESEEN EVENTS/ OCCURRENCES IS PROBABLY IMPOSSIBLE
  - GOAL BECOMES ESTABLISHMENT OF BOUNDING CONDITIONS.

- UNFORESEEN EVENTS/OCCURRENCES WILL OCCUR AS
  - NATURAL EVENTS
  - MAN-MADE EVENTS OR FAILURES
  - DISCOVERY OF UNKNOWN PRE-EXISTING GEOLOGIC CONDITIONS.

B. APPROACH

- DEVELOPMENT OF SCENARIOS CAUSING NRC TO REQUIRE RETRIEVAL.

- IDENTIFICATION OF CREDIBLE BOUNDING SCENARIO ESTABLISHING CREDIBLE WORST CASE CONDITIONS.

- DEVELOPMENT OF BASES FOR DESIGN USING CREDIBLE WORST CASE CONDITIONS.

- DEVELOP "A" RETRIEVAL DESIGN(S) DEMONSTRATING THAT THE OPTION TO RETRIEVE HAS BEEN PRESERVED
  - WE WILL NOT DEVELOP "THE" RETRIEVAL DESIGN WHICH WOULD BE LICENSED BY THE NRC IN THE FUTURE.
  - FUTURE LICENSED RETRIEVAL DESIGN WILL BE BASED UPON ACTUAL CONDITIONS ENCOUNTERED.

RETRIEVABILITY

SCP REQUIREMENTS

A. SCP-CDR - ANNOTATED OUTLINE, SECTION 3.2

- DISCUSS DOE'S RETRIEVAL PHILOSOPHY AND APPROACH
- DESCRIBE CURRENT CONCEPTS
- PROVIDE RETRIEVAL FLOWSHEETS
- IDENTIFY EQUIPMENT DEVELOPMENT NEEDS.

B. SCP-CDR - ANNOTATED OUTLINE, SECTION 4.5

- DESCRIBE WASTE RETRIEVAL OPERATIONS UNDER NORMAL CONDITIONS
- PROVIDE SCHEMATIC DRAWING FOR RETRIEVAL STEPS.

C. SCP-CDR - ANNOTATED OUTLINE, SECTION 6.3

- DESCRIBE REPOSITORY DESIGN CONCEPTS WHICH PRESERVE THE RETRIEVAL OPTION
- DISCUSS PREDICTED REPOSITORY ENVIRONMENT AS A FUNCTION OF TIME
- IDENTIFY WORST CASE EXTREME CONDITIONS
- DESCRIBE PRELIMINARY DEMONSTRATION PLANS
- DISCUSS FULL RETRIEVAL DESIGN APPROACH
  - CRITERIA
  - SUBSURFACE PROBLEMS
  - R&D PROGRAMS
  - DESIGN CONSTRAINTS
  - RETRIEVAL SCENARIOS.

RETRIEVABILITY

SCP REQUIREMENTS (CONTINUED)

D. SCP ANNOTATED OUTLINE, SECTION 6.3.3

- DISCUSS ANY EFFECTS OF THE BACKFILL ON RETRIEVAL PROCEDURES.

E. ONWI KEY ISSUE 4

- WASTE PACKAGE COSTS MUST BE REASONABLE WHILE ACCOMMODATING THE RETRIEVAL OPTION.

RETRIEVABILITY

CONCLUSION

- THERE IS A SIGNIFICANT LEVEL OF SCHEMATIC DESIGN WORK REQUIRED TO SUPPORT THE SALT SCP. WORK SHOULD BE SALT PROGRAM SITE-SPECIFIC.

- DESIGN APPROACH SHOULD:
  - FOCUS ON ONE OR MAXIMUM OF TWO WASTE EMPLACEMENT MODES
  - FOR NRC INITIATED RETRIEVAL, SCENARIOS SHOULD BE DEVELOPED DEFINING REFERENCE SUBSURFACE CONDITIONS
  - FOR NRC INITIATED RETRIEVAL, RETRIEVAL DESIGN BASES SHOULD BE BASED UPON ONE OR TWO WORST CASE CREDIBLE SCENARIOS
  - DESIGN BASES FOR NORMAL RETRIEVAL SHOULD BE BASED UPON PROJECTED NOMINAL GEOTECHNICAL CONDITIONS.

VERMA.

→ SOW FOR SCP-CDR. 9

Nov. 6, 1985

DRAFT

SCP-CDR DESIGN DATA AND ASSUMPTIONS

1.0 Onsite Generated Radwaste

1.1 All onsite generated radwaste will be solidified in retrievable overpacks and placed in dedicated areas of the repository. Fuel Disassembly Hardware goes underground.

1.2 Use 20.0 cubic feet of solidified onsite generated radwaste per MTU of spent fuel (reference ONWI-39) and 1.0 cubic feet per MTU of DHLW and WVHLW .

1.3 Onsite generated radwaste overpacks will be emplaced as they are produced. No interim onsite storage will be provided.

2.0 Waste Package Design

2.1 Phase I Waste Packages

2.1.1 Use Modified ONWI-517 BWR overpacks with [three] Four PWR spent fuel assemblies (or two assemblies and one box) per overpack with an average heat load of 1.89 kW and [nine] Ten BWR spent fuel assemblies (or six to eight assemblies and one to three boxes) per overpack with an average heat load of 1.85 kW. Each overpack will contain a mix of intact assemblies and reactor consolidated spent fuel boxes.

2.1.2 Use ONWI-517 PWR overpack for solidified onsite generated radwaste (47.3 cubic feet). (Not being considered now)

2.2 Phase II Waste Packages

2.2.1 Use ONWI-517 PWR and BWR overpacks with 12 consolidated PWR assemblies per overpack (6.6 kW), 30 consolidated BWR assemblies per overpack (5.4 kW), ~~3~~ 4 PWR reactor consolidated boxes per overpack (3.3 kW), or ~~8~~ 10 BWR reactor consolidated boxes per overpack (3.24 kW).

2.2.2 Use ONWI-517 DHLW overpack for each DHLW and WVHLW canister with a heat load of 0.42 kW. Adjust it upward for lithostatic pressure.

2.2.3 Use ONWI-517 PWR overpacks for compacted hardware of 18 PWR assemblies per overpack and 45 BWR assemblies per overpack.

2.3 No packing material is required around the overpack in the emplacement borehole.

3.0 Waste Package Throughput

Based on the assumptions in Section 1.0 and 2.0, the waste package throughput per waste form is as follows:

Waste Form Type	Waste Package Totals
SFA PWR	7,815
SFA BWR	4,408
DHLW/WVHLW	15,000
FA Hardware	7,268
Onsite Radwaste	26,390
Total Waste Package Throughput	60,881

4.0 Waste Receiving Transportation Modes

4.1 Design waste receiving and handling facilities for 80 percent rail with 112 trains/year, or 70 percent truck with 2,861 trucks/year. This could be 100 percent of either one. THE DHLW/WVHLW will come by train.

Arrivals are based on 12 PWR/32 BWR SFA per train cask, 2 PWR/5 BWR SFA per truck cask, one canister per cask, five casks per train, and one cask per truck.

4.2 Make allowances in design of waste receiving and handling facilities to be converted to either all rail with 139 trains/year or all truck with 4,086 trucks/year.

5.0 Repository Subsurface Layout

5.1 Layout based on waste package throughput data given in Section 3.0.

5.2 Emplacement Mode

Horizontal, in-hole, in-pillar (Fluor 1985a)

5.3 Interpretation of Gassy Mine Regulations

- o Assume a modification from maximum 100 ft crosscut limitation (DCFR-410C).
- o Ventilation systems based on a Category III mine as contained in proposed MSHA regulations 30CFR57.30000 (RSDR 1985).
- o Reversing of ventilation systems not required (DC-IOC-104)
on the emplacement side.

5.4 Subsurface Thermal Design Criteria

Acceptable areal heat loading will be based on allowable creep rates in retrieval entries consistent with maintaining an acceptable working environment for personnel and equipment during retrieval. Precooling of emplacement areas is not considered a viable concept based on evaluations to date.

Creep rates derived from SAIC semi-emperical formula using creep parameters contained in ONWI-450 (Pfeifle, et al, 1983) for Deaf Smith, Unit 4 Salt. (A/E Position with reference to Assumption No. 1 in DCFI-410C). No credible data available on creep rates.

5.5 Retrieval Scenario

The repository will be designed to provide access for retrieval and expected conditions at the points of retrieval in which retrieval can be affected. (A/E Position based on application of the SRP retrieval position)

5.6 Excavation Philosophy

Subsurface excavation will utilize continuous mining methods with single pass mining currently envisioned. (A/E Position)

5.7 Monitoring (Subsurface) Philosophy : Monitoring information needs will be identified.

Subsurface systems will include monitoring of the following types:

- o Geotechnical
- o Environmental
- o Operational
- o Critical Equipment
- o Hydrological

(A/E Position)

5.8 Backfilling Philosophy

(to minimize deformation of formation)

- NRC will allow backfilling immediately upon completion of emplacement within an entry. (A/E Position).
  - Would it require a licensing amendment.
  - Backfilling will be with crushed salt.
- Backfill will not require compacting. (A/E Position)

5.9 Site Conditions/Constraints

- Unit 4 salt meets the screening criteria for salt sites (i.e., EA, Chapter 2, natural gamma count). (A/E Position)

  No values to exceed 15

- ~~Currently defined Deaf Smith site boundaries should not be violated~~. ~~(DOE)~~

  Efforts will be made to stay within currently defined Deaf Smith site boundaries.

- It is acceptable to construct surface/shaft facilities in PMF zone modified to an elevation above the original PMF level. (A/E Position)

- J. Friemel drillhole subsurface stratigraphic column is used for ~~representative of~~ site stratigraphy. (A.E Position)

- Dip is 0.4 degrees. Dip direction is S15 degrees W. [Personal communication between T. Lamb (SWEC) and J. Moody (ONWI) on October 14, 1985]

5.10 Shaft Location Criteria

- ES locations in SCP-CDR may differ from those portrayed in the ~~ESF Impact study~~ Final EAs. (A/E Position)

- ~~Shafts~~ ESs will not be located in the NW Section. (Fluor 1985b)

- ~~Shafts~~ ES Shafts will be located up dip from emplacement areas. (A/E Position)

5.11 Subsurface Development Criteria

- Repository shafts can be constructed concurrently, if necessary, and within required schedule. (A/E Position)

- ES's ~~can~~ will be integrated into the repository to support early development and functional needs of the repository. (A/E Position)

5.12 Mined Salt Storage and Handling Approach

- Excess salt not required for decommissioning backfill will be disposed of offsite. (MBFI-529C)

- o Salt required for decommissioning backfill will be stored onsite. (MBFI-529C)

- o SCP-CDR engineering and report will not address the location of facilities that might be needed offsite for disposal of the excess salt. All onsite facilities for handling the excess salt will be addressed. (MBFI-529C)

- o For establishing onsite facilities needed to handle the excess salt destined for offsite disposal, the transportation mode will be assumed to be via rail haulage. (MBFI-529C)

5.13 Aquifer Treatment Approach

- o Watertight lining will be installed in the Ogallala and Dockum formations. Both formations contain major aquifers. Non watertight linings will be employed in the minor aquifers in the lower portions of the shafts. Either short segments of watertight lining or water rings will be used to control residual water inflows. (A/E Positions)

- o Shaft lining/seals will be required for anticipated hydrostatic and resultant lithostatic pressures. (A/E Position)

5.14 Criteria for Pillar Design

Pillars are designed for ground control and minimal creep consistent with effective utilization of the repository site. (A/E Position)

5.15 Shaft Construction Method

- o Ground freezing will be employed in the Ogallala and Dockum formations for ground and water consolidation. Grouting collection will be employed to control water inflows in minor aquifers. (A/E Position)

- o Drill and blast methods will be employed throughout the shaft depth. Road header type excavators would be suitable for excavation if sufficiently well developed and reliable at time of construction. (A/E Position)

5.16 HVAC Philosophy - Subsurface

- o In areas of normal travel or work, 80 degree F effective temperature will not be exceeded. (Hartman, 1983)

- o Emplacement and development ventilation systems will be independent and separated by substantial barriers. (RSDR 1985 and A/E Position) o Ventilation intake or development exhaust air systems will not include filtration capabilities. (A/E Position)

5.17 Offsite Utility Supply

Utility availability for electrical and natural gas is as described in Basic Repository ea Design Basis - Permian Basin - Deaf Smith County Site, November 1984.

6.0 Repository Surface Layout

6.1 Salt required for permanent closure backfill will be stored onsite.

6.2 Excess salt not required for permanent closure backfill will be disposed of offsite via rail haulage.

6.3 Offsite salt disposal is beyond the scope of the SCP-CDR.

7.0 Waste Handling Building Layout

7.1 Assume the TN-12 rail cask holds 5 HLW canisters rather than 1 HLW as referenced in RSDR.

7.2 Use Westinghouse/MRS SFA disassembly equipment for layout of disassembly cell.

7.3 Assume three months surge storage capacity (reference GRD) maximum surface surge storage capacity requirement.

Reactor consolidated spent fuel.

7.4 Assume that the RCSF boxes placed in canisters will be sealed in the same manner as intact SFA's in Phase I.

7.5 Assume that the narrow gap welding process for the ONWI-517 overpacks does not require post-weld heat treating.

8.0 Safety, Design, and Q-List Classification Systems

Attachment A summarizes the approach Fluor will assume for preliminary classifications of structures, systems, and components important to safety and barriers important to waste isolation. A design classification is proposed with a one-to-one correspondence to safety. Preliminary design requirements will be developed to support the provisions for each safety class.

CORRELATION OF: SAFETY, DESIGN, AND Q-LIST CLASSIFICATION SYSTEMS FOR THE SCP/CDR
(Listings under Columns B and C below, summarize the assumed approach to be taken for SCP/CDR)

	(A) PREVIOUS FLUOR REPOSITORY PROTECTION CATEGORIES (RPC) (2)	(B) FLUOR-PROPOSED REPOSITORY DESIGN CATEGORIES (RDC) (Assumed Approach for SCP/CDR) (6)	(C) Q-LIST CATEGORIES (3) (Assumed Approach SCP/CDR)
SAFETY CLASSIFICATIONS (1)			
SAFETY CLASS 1 (Important to Isolation)	RPC-IC	RDC-1	Q-LIST
SAFETY CLASS 2 (Important to Safety)	RPC-IA	RDC-2	Q-LIST
SAFETY CLASS 3 (Important to Public Radiation Protection)	RPC-IB (4)	RDC-3	NON-Q-LIST
SAFETY CLASS 4 (Important to Worker Radiation Protection)	RPC-IB (4)	RDC-4	NON-Q-LIST
SAFETY CLASS 5 (Non-Nuclear Safety)	RPC-II (Repository Operability) RPC-III (Standard Practice)	RDC-5 (5)	NON-Q-LIST

ATTACHMENT A

FOOTNOTES:

(1) ref. Interim Repository Subsystem Design Requirements for High-Level Nuclear Waste Repository in Salt, Sect.5, 10Sept85.

(2) ref. FIDC-328C, 30Jan85, Structures, Systems, and Components Classification System Definitions, Rev.1, PI-4.1.2.5-2

(3) ref. Methodology for Generating a Q-List for Geologic Repositories, 27Sept85, Results of Workshop between Fluor, SRPO, et al on 10-11Sept85, Columbus, OH.

(4) RPC-IB combined protection of public under normal conditions and protection of workers under normal/accident conds.

(5) For SCP/CDR insufficient info. will preclude placement of items under a "repository operability category." For the ACD, RDC-5 may be further subdivided into RDC-5A (Repository Operability) and RDC-5B (Standard Practice).

(6) A one-on-one correspondence between design and safety classes is listed for convenience. This does not presume that design requirements will be distinctly different for each safety class. Such requirements will be developed as the design progresses towards a detailed state.

The resulting preliminary Q-List will be developed based on the referenced SRPO document.

9.0 Retrieval

9.1 Timing of Backfill

Each emplacement entry will be backfilled soon after all waste packages have been emplaced (early backfilling)

9.2 Retrieval of Onsite Generated Radwaste

Retrieval of onsite generated radwaste packages will be a contact-handling operation.

9.3 Waste Package Salt Deposits

A layer of salt will be present on the outer surface of the waste packages when removed from their emplacement boreholes.

10.0 Radiation Criteria

10.1 Use 0.6 mREM per hour as the permissible level of radiation at the site boundary. Dose Rate

10.2 Exposure to workers in unrestricted areas within the site boundary will be limited to the values in 10 CFR 20.105 and 20.106.

500 MREM TOTAL
NO MORE THAN 2MR/HR, NO MORE THAN 100 MR PER DAY FOR SEVEN DAYS CONSEC.

10.3 Use 1.0 REM total for radiation plus radioactivity as the accidental release limit at the site boundary. Total Dose

10.4 Assume accidental criticality is not possible.

11.0 DBA Development

11.1 Only consider radiological sabotage by external adversary against waste handling facilities, shipping cask receipt storage area, and waste hoist equipment building.

11.2 Use maximum release of 10^{-5} of the fission product inventory of a truck shipping cask or a single fuel bundle for a sabotage event.

12.0 Current Technology/Reasonably Available Technology

Several new technologies will be required to be incorporated into the design. Regulatory and programmatic requirements indicate that these technologies must be demonstrated.

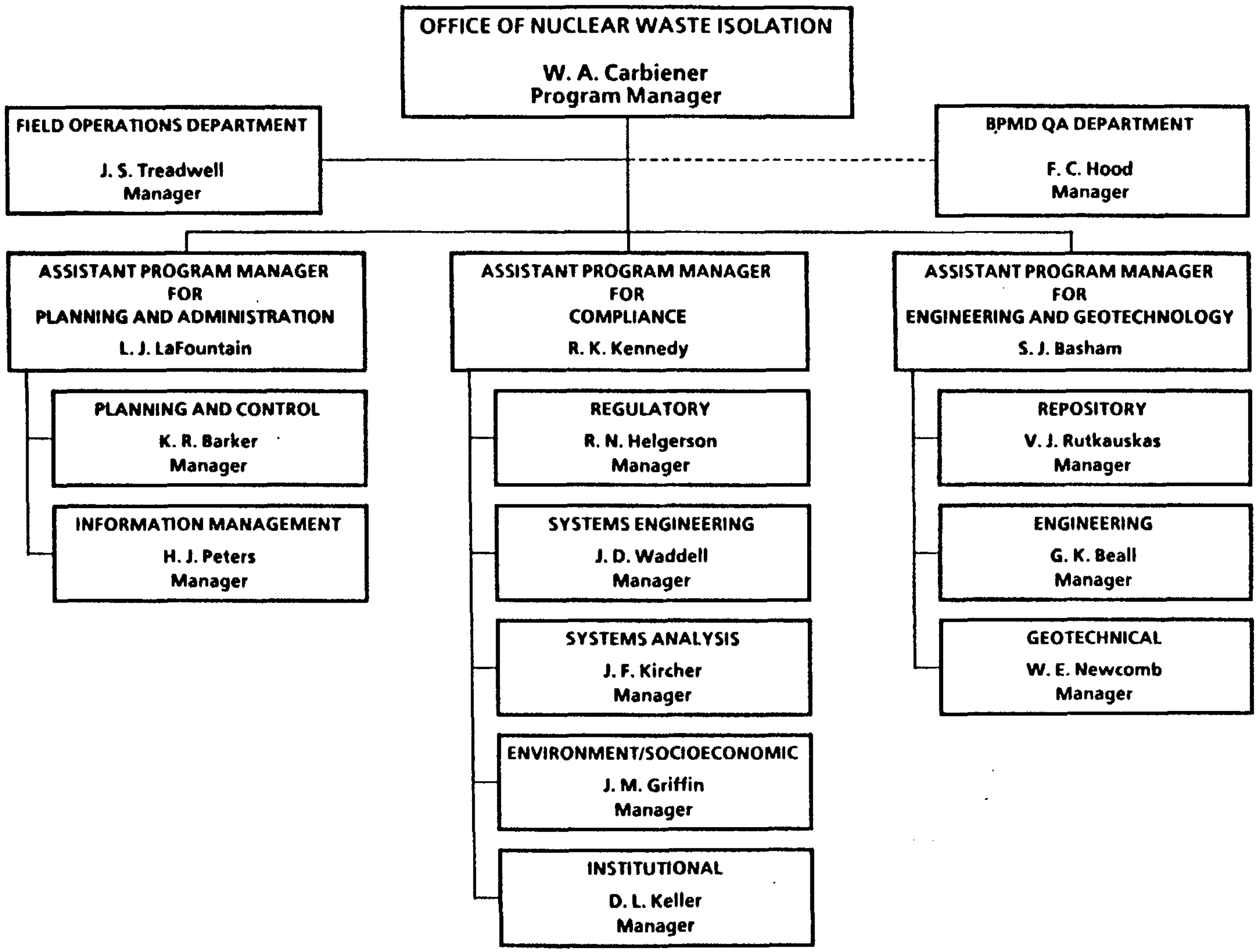
Fluor's assumptions can be summarized as follows:

- A prudent approach to satisfying 10 CFR 960 is to assume that any technology having a significance related to the media or site should be developed by the time of site selection (1990). Retrievability is an example of an issue of this type.

- A prudent approach to satisfying 10 CFR 60 is to assume that any technology having a safety significance should be developed by the time of license application (1991). Fuel consolidation is an issue of this type.

- A prudent approach to project management is to assume that all major elements of the design will have been agreed upon prior to the start of detailed design. Consequently, the viability of any new technologies must have been proven prior to the start of Title II (1990/1991).

- Performance Assessment.
- Performance Allocation.



OFFICE OF NUCLEAR WASTE ISOLATION

NOVEMBER, 1985

ONWI
Office of Nuclear Waste Isolation
Battelle

Project Number

Internal Distribution
ONWI Files
WA Carbiener/LB

Date November 8, 1985

To BPMD Staff

From Wayne A. Carbiener

Subject ONWI Organization

As we complete the site selection phase of the ONWI program and undergo a transition to the site characterization phase, I am instituting some organizational changes to consolidate several project functions which will improve our ability to carry out our responsibilities and better support SRPO. These changes will accomplish several things:

- Transfer some support functions from BPMD to ONWI to better integrate cost/schedule/funds/technical planning and information management systems (data bases, tracking systems)
- Better align administrative functions with SRPO counterparts to provide more efficient operations with clearer project direction and control
- Aggregate current Departments and Project Offices into functional groupings under an Assistant Program Manager while retaining their responsibilities to the extent feasible; thus established interfaces and working relationships are continued, including SRPO counterparts
- Assign TAC and QAC senior staff to positions more tightly coupled to the functional lines for emphasis while retaining the capability to use them to provide program-based, multi-disciplinary position papers, etc.

The organizational structure is shown in Attachment 1 along with summary responsibilities for each Department. The Project Office designation is being dropped to introduce more consistency in nomenclature. The functional groupings under an Assistant Program Manager emphasize the major activities required to execute the ONWI program, i.e., plan and administer, interpret and show compliance with the various pertinent statutes, agency orders, and regulations, and perform the requisite engineering and geotechnology studies, reviews, and analyses. The Field Operations Department is based on the expectation that a field office will be established upon recommendation and Presidential approval of a site. Thus, in the interim, it is a "field" office located in Columbus, but experience will be acquired in working the organizational interfaces. Upon relocation to the field, any additional permanently field-assigned staff will report to the Field Operations Department Manager. The QA Department Manager will continue to report to the BPMD Assistant General Manager for Quality, but will be an integral part of the ONWI management team.

Staff assignments, effective immediately, are as follows with incumbents denoted by asterisks:

Assistant Program Manager for Planning & Administration --
L. J. LaFountain
Planning and Control - K. R. Barker
Information Management - H. J. Peters

Assistant Program Manager for Compliance -- R. K. Kennedy
Senior Staff - S. C. Matthews, P. Esmailzadeh
Regulatory - R. N. Helgerson
Systems Engineering - J. D. Waddell
Systems Analysis - J. F. Kircher*
Environment/Socioeconomics - J. M. Griffin*
Institutional - D. L. Keller*

Assistant Program Manager for Engineering and Geotechnology --
S. J. Basham
Senior Staff - D. J. Lachel (Part-time)
Repository - V. J. Rutkauskas
Engineering - G. K. Beall*
Geotechnical - W. E. Newcomb*

Manager, Field Operations Department -- J. S. Treadwell*
Senior Staff - W. F. Jebb

This organization establishes two new departments within ONWI. The Planning and Control Department will include staff currently assigned to ONWI along with staff from BPMD's Management Systems and Business Operations groups. The Information Management Department will include staff currently assigned to ONWI and BPMD's Management Systems group. Initial staff assignments are shown in Attachment 2.

The functions of the former Systems Engineering Project Office are divided between the Information Management and Systems Engineering Departments in the new organization as shown in Attachment 1. The remainder of the former Project Office and Technical Department responsibilities are unchanged.

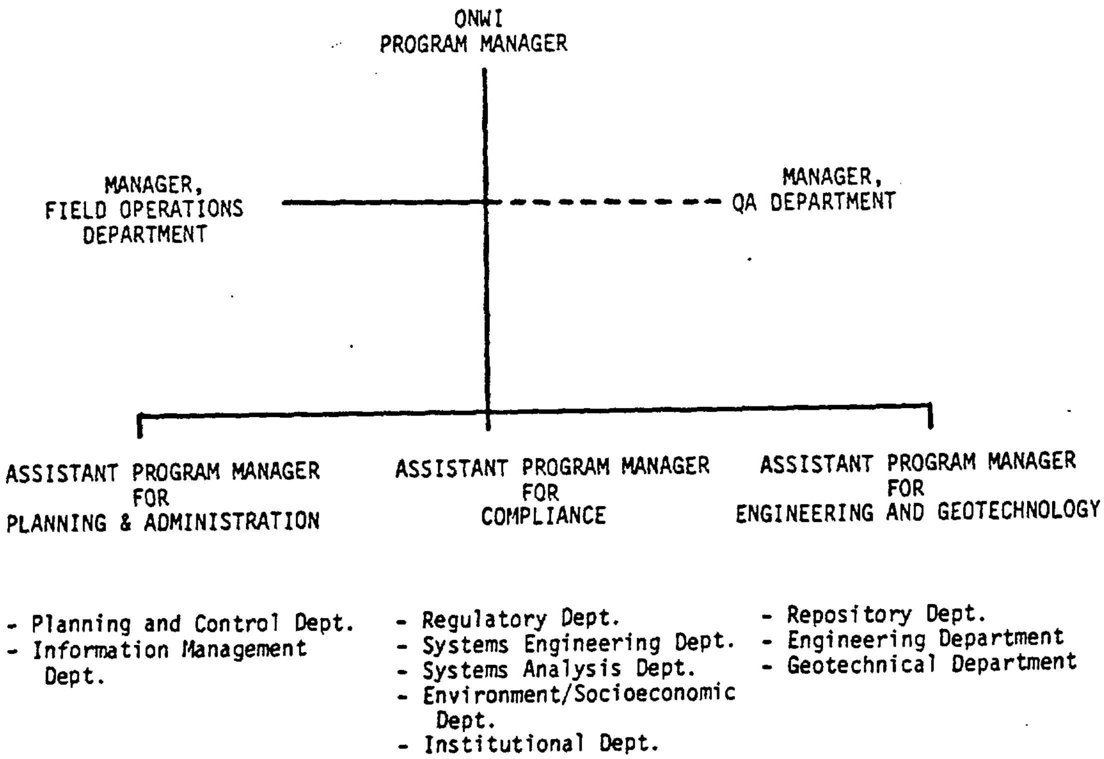
I firmly believe that this organizational structure will provide better focus and integration, and a more effective execution of the program activities. It positions us well for the characterization phase of the salt program as we go through a dramatic transition in the next 6 months or so. It should improve our ability to effectively support SRPO in the future as we undertake preparation of an SCP and detailed characterization of a site. I know I can count on your continued support and dedication as we move forward.

WAC/aa

Attach.(2)

xc: J.O.Neff, SRPO (30) Approved: W. J. Madia

ATTACHMENT 1



PLANNING & ADMINISTRATION

Planning and Control Department

- WBS 9.1.1, 9.2.
- Integrated planning; technical, cost, schedule, funds, BA/BO
- Maintenance of technical, cost, schedule, and funding baselines
- Budget and financial analysis
- C/S control
- Performance measurement
- Management information systems
- Cost, schedule, and milestone data management
- WPAS & TPP preparation
- Progress and status reporting; weekly, PSR, quarterly
- BPMD liaison; legal, contracts
- SRPO support

Information Management Department

- WBS 1.2.3, 1.3, 9.1.2
- Records management
- Configuration management and control, including drawing release
- Technical data management
- Computer support services
- BPMD liaison, records management, editing, library, and other support services
- Integration, development, and maintenance of automated data bases and tracking systems
- Provision of public access to data bases and records
- SRPO support

COMPLIANCE

Regulatory Department

- WBS 5.1-5.3
- Site Characterization Plan
- DEIS and EIS
- Construction Authorization Application
- Compliance evaluations
- Regulatory interpretation and analysis
- Licensing training
- Delineation of regulatory and statutory requirements
- BPMD liaison, legal
- Administration of subcontracts
- Support SRPO in NRC interactions

Systems Engineering Department

- WBS 1.1, 1.2.1, 1.2.2, and 1.4
- System requirements, DOE orders
- System analysis requirements
- Data needs and integration
- System optimization studies
- Technical System Description
- Transportation interfaces
- Estimates of total life cycle costs

Systems Analysis Department

- Pre-closure systems modeling
- Post-closure systems modeling
- Geochemistry
- Geostatistics
- Uncertainty analyses
- Administration of subcontracts

Environment/Socioeconomics Department

- Environmental engineering
- Ecology
- Meteorology
- Socioeconomics
- Community planning and impact mitigation
- Administration of subcontracts

Institutional Department

- WBS 5.4, 5.5
- Support SRPO in communication, outreach, and liaison activities
- Local information offices prior to site recommendation
- Preparation of informational materials
- Hearing and meeting support
- Grants

ENGINEERING AND GEOTECHNOLOGY

Repository Department

- WBS 2.0, 4.0
- Interface with repository AE
- Plans for waste package and repository
- Implement waste package and repository tasks
- Liaison with MRS and transportation programs

Engineering Department

- Materials engineering
- Facilities engineering and design (surface and subsurface)
- Construction cost estimating
- Design review
- Administration of subcontracts

Geotechnical Department

- Geophysics
- Geology
- Hydrology
- Rock Mechanics
- Soil Mechanics
- Administration of subcontracts

FIELD OPERATIONS DEPARTMENT

- WBS 3.0, 6.0, 7.0, 8.0
- Plans for site characterization
- Field transition
- Establishment and operation of field office, including records maintenance
- Field data reports
- Permits
- Monitor and review site characterization work
- Assure consistency of activities with SCP and ESCP
- In situ and offsite testing
- Interface with shaft CM and AE
- Land acquisition planning
- Support SRPO in land acquisition and protection
- Administer in situ testing subcontract

(BPMD)

QUALITY ASSURANCE DEPARTMENT

- WBS 9.3
- Establish, maintain, and implement a proper QA program
- Review planning and procurement documents for appropriate and consistent QA requirements
- Maintain designated QA records
- Perform verification and assessment of effectiveness through audits, surveillances, management reviews and similar activities
- Request corrective actions as necessary and aggressively perform corrective action follow-up
- Assure availability of adequate training for program staff

ATTACHMENT 2

PLANNING AND CONTROL DEPARTMENT

K. R. Barker, Manager
C. A. Bethel, Secretary
J. W. Niestle
C. L. Theibert

Cost and Schedule Planning Section

H. D. Kopp, Manager
E. R. Ditch
J. C. Kilgore
R. Nosal
B. H. Conley (Part-time)

Program Administration Section

G. C. Brown, Manager
S. R. Cassidy
H. C. Hess
R. F. Marshall

INFORMATION MANAGEMENT DEPARTMENT

H. J. Peters, Manager
(Vacant), Secretary

Configuration Management Section

J. J. Garvey, Manager
L. M. Green, Secretary
J. L. Easterday
G. Kilshtok
P. Vrona

Information and Data Management Section

B. A. Rawles, Manager
M. L. Kayser, Secretary
S. C. Adams
A. M. Kirk
S. F. Kowall
G. L. LaRue
R. M. Linebaugh
S. J. Richard
R. E. Wood