

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

**PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD**

**SUBJECT: EXPLORATORY STUDIES FACILITY
(ESF) DESIGN STATUS**

PRESENTER: EDGAR H. PETRIE

**PRESENTER'S TITLE
AND ORGANIZATION: ACTING DIRECTOR,
ENGINEERING & DEVELOPMENT DIVISION
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
U.S. DEPARTMENT OF ENERGY
LAS VEGAS, NEVADA**

**PRESENTER'S
TELEPHONE NUMBER: (702) 794-7989**

JULY 15-17, 1991

ESF DESIGN CHRONOLOGY

JANUARY 1991

- **ESF ALTERNATIVES STUDY "FINDINGS REPORT" COMPLETED JANUARY 1990**
- **OGD PRESENTED FINDINGS TO DR. J. BARTLETT (RW1) JANUARY 14, 1991**
- **DR. BARTLETT DIRECTED OGD TO INITIATE A DESIGN STUDY FOCUSING ON THE FAVORABLE FEATURES OF THE HIGHEST RANKED OPTIONS IDENTIFIED IN THE FINDINGS REPORT FEB. 12, 1991**

DOE/HQ DIRECTION ON ESF ALTERNATIVES

**DR. BARTLETT PROVIDED GUIDANCE LETTER TO YMPO
FOR ESF DESIGN DEVELOPMENT GUIDANCE AND
NEAR-TERM ACTIVITIES TO INCLUDE:**

- **ACCEPTANCE OF PRELIMINARY FINDING REPORT**
- **DIRECTION TO PROCEED WITH DESIGN STUDY FOCUSING ON FAVORABLE FEATURES OF THE HIGHEST RANKED ESF ALTERNATIVES**
- **DIRECTION TO PROCEED WITH A DESIGN STUDY BASED ON POST-1988 DATA, ESF ALTERNATIVES STUDY, AND CALICO HILLS STUDY, PROVIDING THE FLEXIBILITY TO PENETRATE THE CALICO HILLS UNIT IN THE FIRST PHASE AS AN AID TO THE EARLY EVALUATION OF SITE SUITABILITY**
- **PREPARE PLANS FOR A PHASED APPROACH TO DESIGN DEVELOPMENT AND ESF IMPLEMENTATION PRESERVING FLEXIBILITY; ALSO TAKE ADVANTAGE OF FINDINGS AS DATA ACQUISITION PROCEEDS**

BACKGROUND

**WHERE WE HAVE BEEN,
WHERE WE ARE,
AND WHERE WE INTEND TO GO**

ESF BASELINE

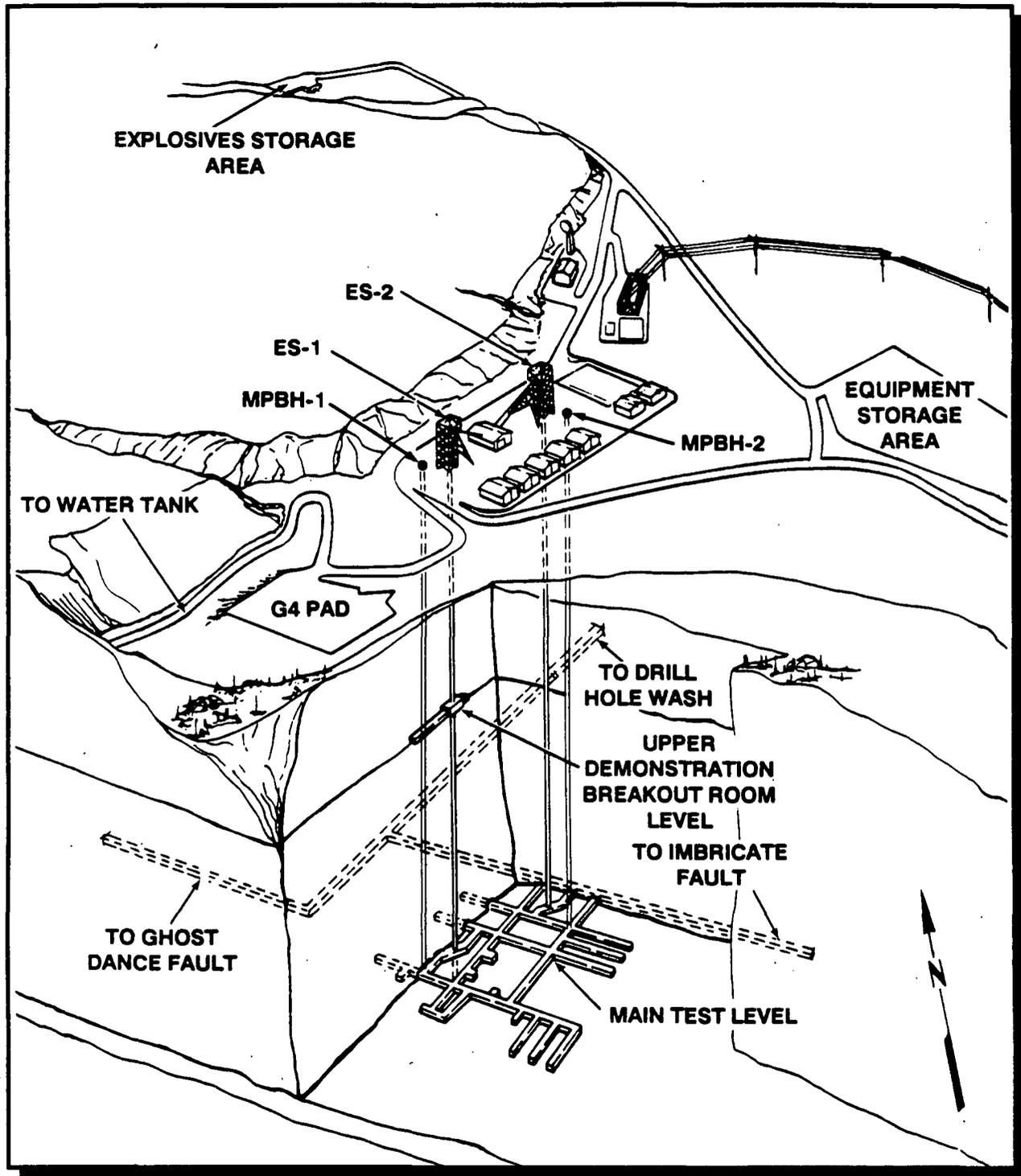
THE ESF BASELINE CONFIGURATION CONSISTS OF 2 - 12' SHAFTS; BOTH EXCAVATED TO THE TOPOPAH SPRING LEVEL

- **ESF ACCESS #1**

- **SURFACE TO TOPOPAH SPRING LEVEL
12 FT DIAMETER APPROXIMATELY 1055 FT**

- **ESF ACCESS #2**

- **SURFACE TO TOPOPAH SPRING LEVEL
12 FT DIAMETER APPROXIMATELY 1055 FT**



EXPLORATORY SHAFT FACILITY BASELINE

EXPLORATORY SHAFT FACILITY BASELINE

- **EXPLORATORY DRIFTS (i.e., DRILL HOLE WASH,
GHOST DANCE FAULT, AND IMBRICATE FAULT
ZONE**
 - **TOPOPAH SPRING LEVEL
APPROXIMATELY 5000 FT.**
 - **MAIN TEST AREA (TOPOPAH SPRING LEVEL)
APPROXIMATELY 4000 FT. OF DRIFTS**

EXPLORATORY STUDIES FACILITY REFERENCE DESIGN CONCEPT

- **CURRENT CONFIGURATION**

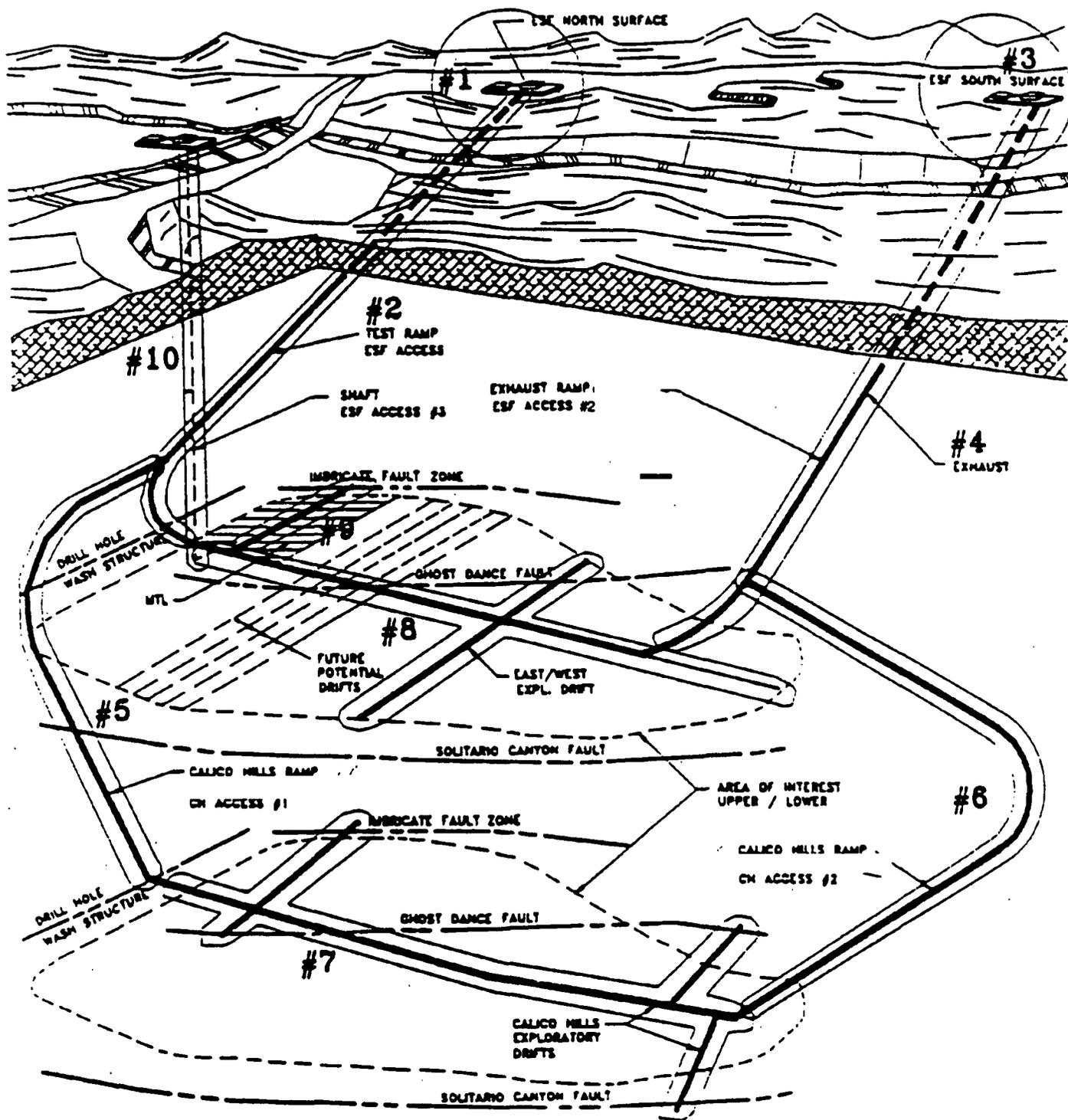
 - 2 - 25 FT. DIAMETER RAMPS (SURFACE ACCESS)

 - 2 - 16 FT. DIAMETER RAMPS

 - 1 - 16 FT. DIAMETER SHAFT (OPTIONAL)

- **EXPANDED ACREAGE FOR TESTING FACILITIES**

- **EXPANDED ACREAGE FOR SURFACE FACILITIES
BECAUSE OF THE GREATER DISTANCE
BETWEEN PORTALS**



NOTE: THIS IS PICTORIAL ONLY AND NOT DRAWN TO SCALE

NOTE: DESIGN, CONSTRUCTION, AND TESTING PHASES SHOWN - - -

#2

REFERENCE DESIGN CONCEPT

PHASED APPROACH TO ESF DESIGN CONSTRUCTION AND TESTING

● PROPOSED DESIGN/TEST PHASES, REFERENCE DESIGN CONCEPT

- 1. SITE PREPARATION AND PORTAL OF NORTH RAMP**
- 2. NORTH RAMP FROM PORTAL TO TOPOPAH SPRING (TS) LEVEL**
- 3. SITE PREPARATION AND PORTAL OF SOUTH RAMP**
- 4. SOUTH RAMP FROM PORTAL TO TS LEVEL**
- 5. NORTH RAMP FROM CALICO HILLS (CH) TURNOUT TO CH LEVEL**
- 6. SOUTH RAMP FROM CH TURNOUT TO CH LEVEL**
- 7. FULL LENGTH DRIFT AT THE CH LEVEL**
- 8. FULL LENGTH DRIFT AT THE TS LEVEL**
- 9. MAIN TEST LEVEL CORE AREA AT THE TS LEVEL**
- 10. OPTIONAL SHAFT AT NORTH END: SURFACE TO TS LEVEL**

DESIGN STUDY CONFIGURATION ADVANTAGES

- **ACCESS TO CALICO HILLS PROVIDED**
- **VISUAL ACCESS TO THREE FAULTS AT
TOPOPAH SPRINGS AND CALICO HILLS
PROVIDED**
- **TBM's PROVIDE SCHEDULE ADVANTAGE
OF 3 YEARS**
- **RAMP ACCESSES ARE COORDINATED WITH
PHYSICAL ACCESS REQUIREMENTS OF
THE CONCEPTUAL REPOSITORY DESIGN**

MAJOR DIFFERENCES

	<u>BASELINE</u>	<u>DESIGN STUDY</u>
PRIMARY CONSTRUCTION TECHNIQUE	DRILL & BLAST	TUNNEL BORING MACHINE
DRIFT/RAMP/SHAFT LENGTH	2 MILES	13 MILES
MUCK REMOVED	130,000 CU. YDS.	900,000 CU.YDS.
SURFACE FACILITIES AREA	20 ACRES	70 ACRES
TEST DRIFT AREA	27 ACRES	92 ACRES

**REVIEW OF ESF DESIGN STUDY
AND GENERAL
ARRANGEMENT DRAWINGS**

PURPOSE OF DESIGN STUDIES

- **A PRELIMINARY DESIGN ACTIVITY LEADING TO REVISIONS OF THE DESIGN SUMMARY REPORT**
- **PROVIDES SUFFICIENT TECHNICAL DETAIL SUCH THAT CONCERNS WITH FEASIBILITY OF THE ESF ARE ADEQUATELY BOUNDED**

SCOPE

- **ESF DESIGN STUDIES AND GENERAL ARRANGEMENT DRAWINGS WHICH PROVIDE THE TECHNICAL BASIS FOR REVISIONS TO THE DESIGN SUMMARY REPORT**
- **DRAFT PORTIONS OF THE DESIGN SUMMARY INFORMATION**
- **ALL OF THE ABOVE FOR THE ESF NORTH AREA (PHASES 1, 2, AND 5)**

PURPOSE OF REVIEW

- **DETERMINE IF DESIGN STUDIES CONTAIN INFORMATION REQUIRED TO UPDATE THE TITLE I DESIGN SUMMARY REPORT**
 - **IDENTIFY MAJOR TECHNICAL CONCERNS**
 - **INCORPORATION OF REVISED DESIGN CRITERIA**
 - * **RECOGNIZE THAT MSIS ACTIVITY WILL PROVIDE THE REQUIREMENTS BASELINE**

- **PROVIDE FORUM FOR DIFFERING VIEWPOINTS REGARDING DESIGN SOLUTION & ANALYTICAL TECHNIQUES**

TECHNICAL REVIEWS

MANAGEMENT REVIEW

- **ACCOMPLISHED BY REPRESENTATIVES OF AFFECTED PARTICIPANTS**
- **ASSURE DESIGN IS CONSISTENT WITH KNOWN REQUIREMENTS AS PROVIDED BY PARTICIPANTS**

INDEPENDENT REVIEW

- **ACCOMPLISHED BY INDIVIDUALS KNOWLEDGEABLE OF DESIGN TECHNICAL DISCIPLINES**
- **QUALIFICATIONS AND TRAINING DOCUMENTED AS QA RECORDS**
- **PROVIDES MANAGEMENT ASSURANCE THAT CRITERIA USED WILL YIELD A FEASIBLE PRODUCT WITH SUFFICIENT INFORMATION TO ALLOW COST & SCHEDULE DEVELOPMENT**

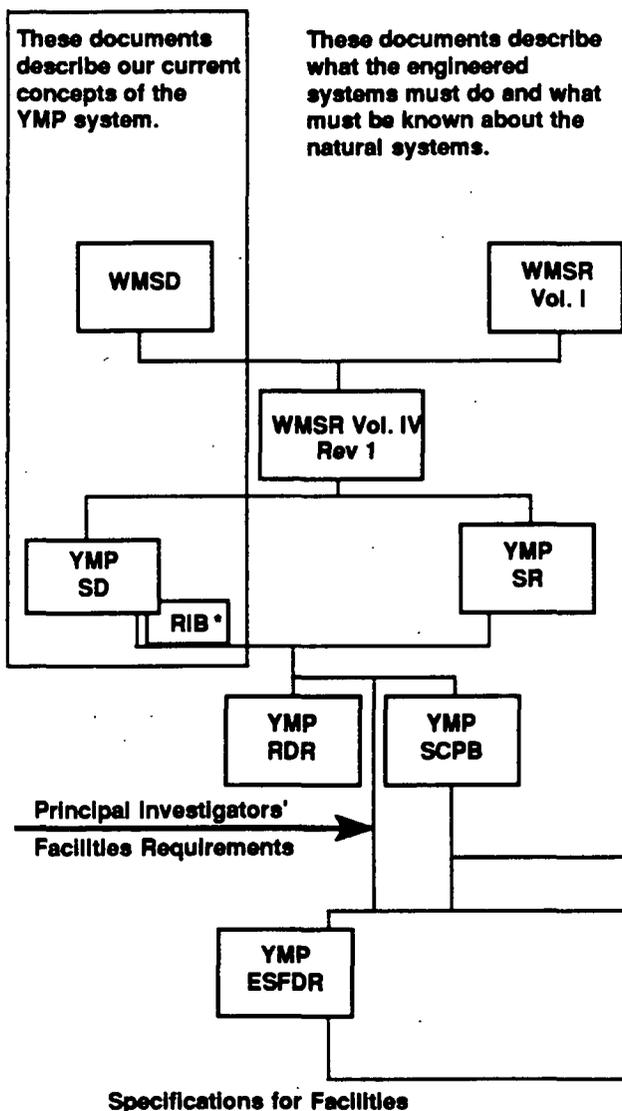
FEASIBLE PRODUCT

**PLANNED IMPLEMENTATION OF DESIGN CRITERIA
YIELDS PRODUCT THAT:**

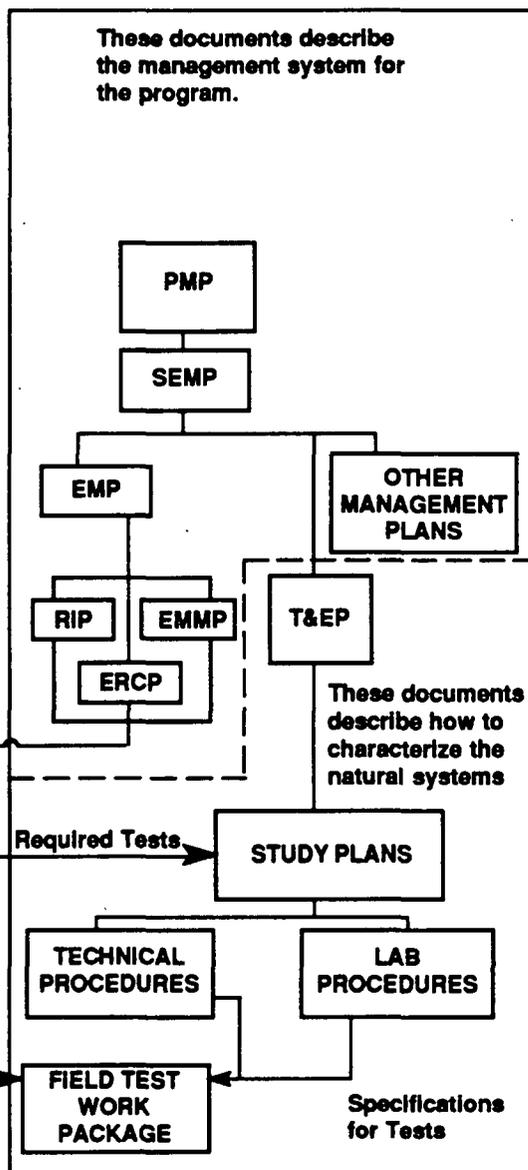
- **MEETS MISSION NEEDS**
- **COMPLIES WITH FEDERAL AND STATE REGULATIONS**
- **COMPLIES WITH DOE ORDERS**

DESIGN CRITERIA AND REQUIREMENTS SOURCES

TECHNICAL DOCUMENT HIERARCHY



MANAGEMENT DOCUMENT HIERARCHY

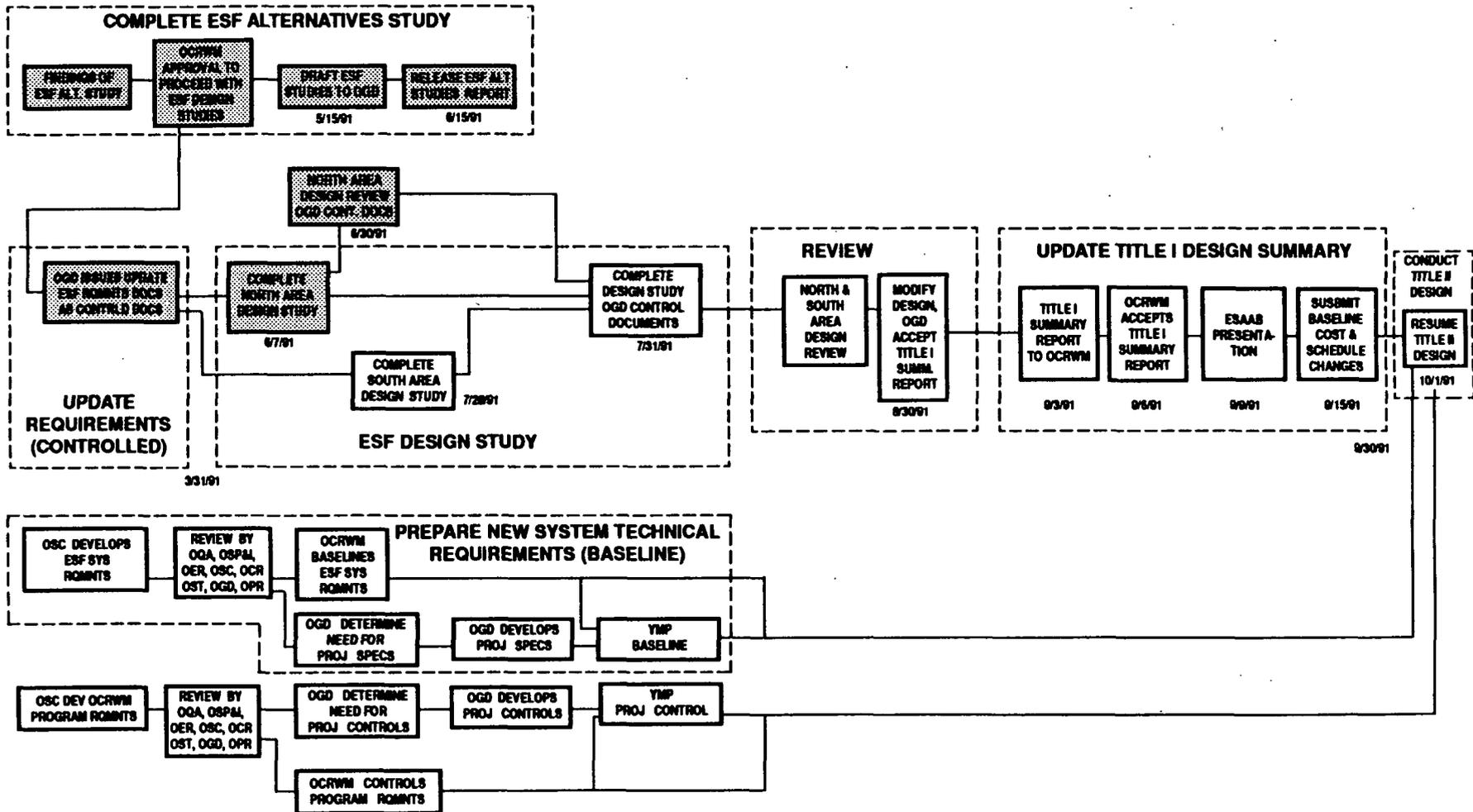


DOCUMENT DESCRIPTIONS

- WMSR 1** - PROVIDES TOP-LEVEL REQUIREMENTS FOR WASTE MANAGEMENT PROGRAM
- WMSR IV** - PROVIDES TOP-LEVEL REQUIREMENTS FOR AN MGDS
- MGDS SD** - PROVIDES A DETAILED REFERENCE DESCRIPTION FOR EACH MGDS SUBSYSTEM
- MGDS SR** - TRANSLATES TOP-LEVEL REQUIREMENTS FROM WMSR IV INTO DETAILED SITE-SPECIFIC REQUIREMENTS FOR THE MGDS AND ALOCATES REQUIREMENTS TO MGDS SUBSYSTEMS
- MGDS RDR** - PROVIDES DESIGN REQUIREMENTS FOR THE SURFACE AND UNDERGROUND FACILITIES WHICH MAKE UP THE REPOSITORY
- SCPB** - SITE CHARACTERIZATION PROGRAM BASELINE DEFINES THE FUNCTIONS THAT THE SITE NATURAL SYSTEMS ARE EXPECTED TO PERFORM AND THE INFORMATION NEEDED TO CHARACTERIZE THE SITE
- ESFDR** - EXPLORATORY STUDIES FACILITY DESIGN REQUIREMENTS DOCUMENT FOR THE SURFACE AND UNDERGROUND FACILITIES WHICH MAKE UP THE ESF

TRANSITION OF REQUIREMENTS FOR ESF DESIGN

(DRAFT)



POST-REVIEW ACTIVITIES (NORTH AND SOUTH AREAS)

- **REVISED TITLE I DESIGN SUMMARY REPORT
ACCEPTED BY PROJECT OFFICE**
- **EXPLORATORY STUDIES FACILITY CONCEPT
SELECTED/APPROVED BY DIRECTOR OCRWM**
- **ESAAB ACTS ON REQUEST TO PROCEED WITH
TITLE II AND LONG LEAD PROCUREMENT**
- **TITLE II DESIGN INITIATED**

TITLE II DESIGN PHASE

- **DETAILED ANALYSIS OF PROJECT PARTICIPANT DESIGN INPUTS**
- **VERIFICATION* OF DESIGN INPUTS ANALYSIS**
- **PREPARE DETAILED DESIGN**
- **VERIFICATION* OF DETAILED DESIGN**
- **ACCEPTANCE FOR CONSTRUCTION**

*** REQUIRED FOR SAFETY AND WASTE ISOLATION ACTIVITIES AND ITEMS**