

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

**NUCLEAR WASTE TECHNICAL REVIEW BOARD  
FULL BOARD MEETING**

**SUBJECT: FOCUSED MGDS - ACD STATUS  
AND UPDATE ON THERMAL  
LOADING SYSTEMS STUDY**

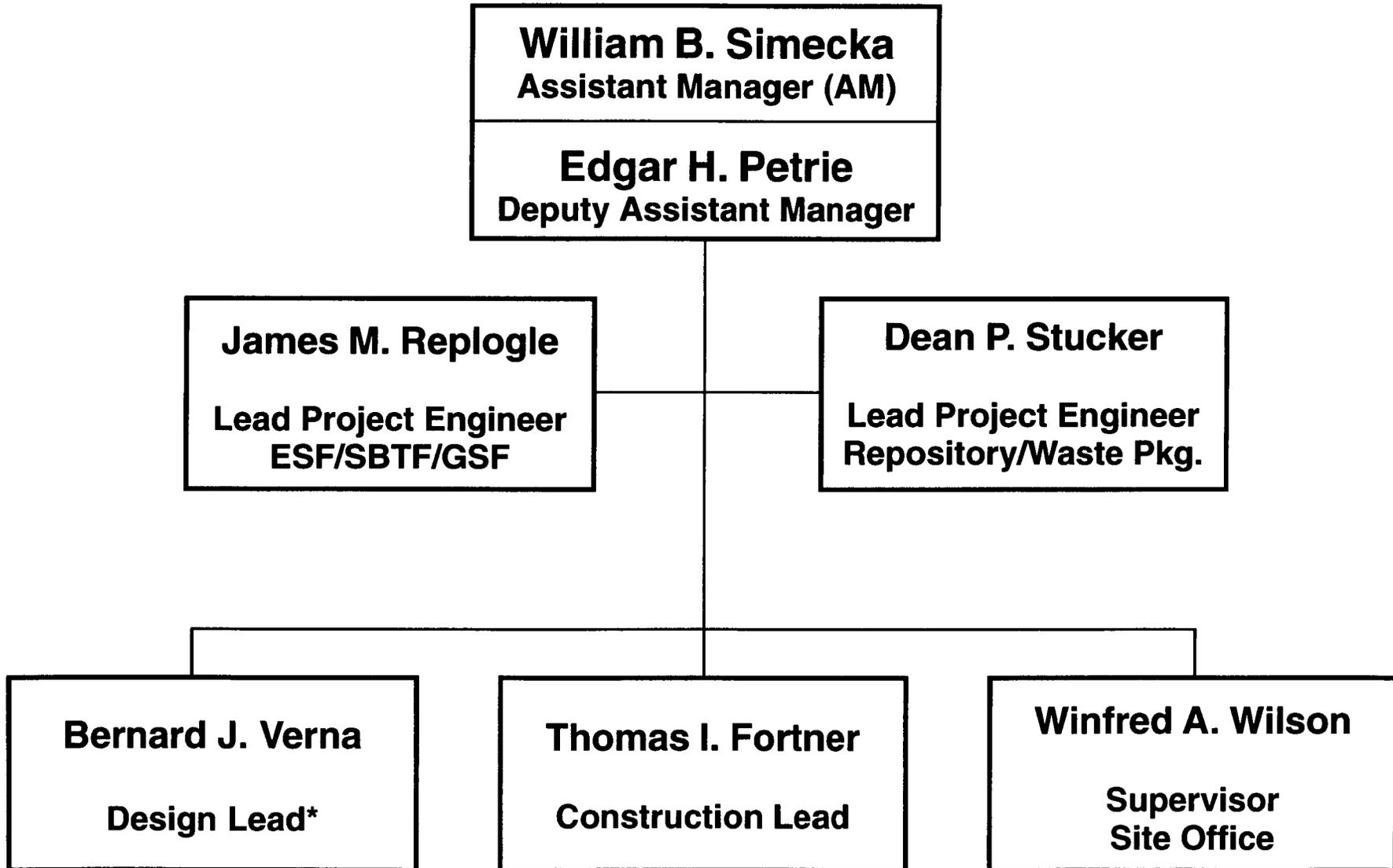
**PRESENTER: DEAN STUCKER**

**PRESENTER'S TITLE  
AND ORGANIZATION: LEAD PROJECT ENGINEER, REPOSITORY/WASTE PACKAGE  
U.S. DEPARTMENT OF ENERGY  
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT**

**PRESENTER'S  
TELEPHONE NUMBER: (702) 794-7275**

**RENO, NEVADA  
APRIL 11-12, 1994**

# Assistant Manager for Engineering and Field Operations



\*Denotes Acting

# **Is Yucca Mountain A Suitable Site for a Repository ?**

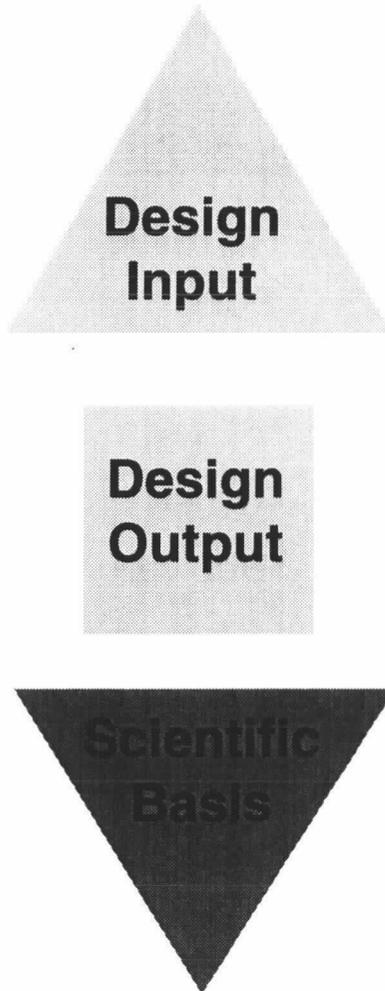
## **Repository/Waste Package Role:**

- **Assure site investigation, design and construction activities are compatible with a potential repository design**
- **Develop repository and waste package designs in order to identify impacts to existing conditions**
- **Provide basis for safety and waste isolation evaluations**

# The Mined Geologic Disposal System (MGDS)



# MGDS Design Organization



**M&O is the responsible  
MGDS Design Organization**

- TRW
- Fluor Daniel
- Morrison Knudsen
- B&W Fuel Company

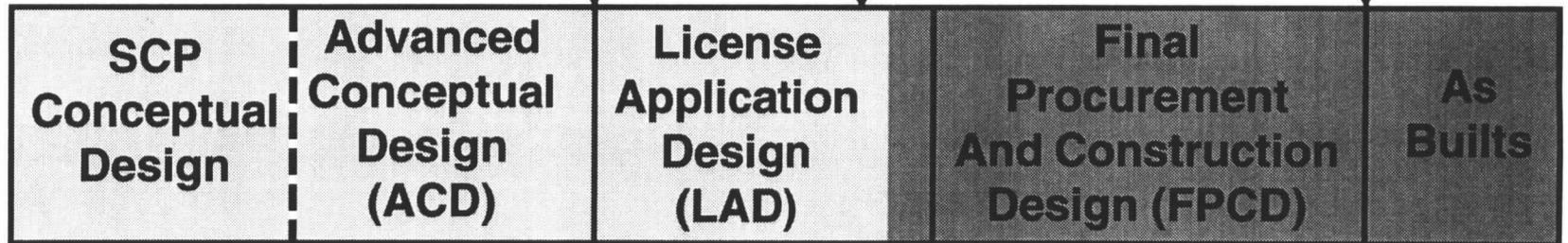
**Lawrence Livermore and Sandia National  
Laboratories are primary participants for  
scientific basis for design (substantiating  
assumptions)**

# Design Phases

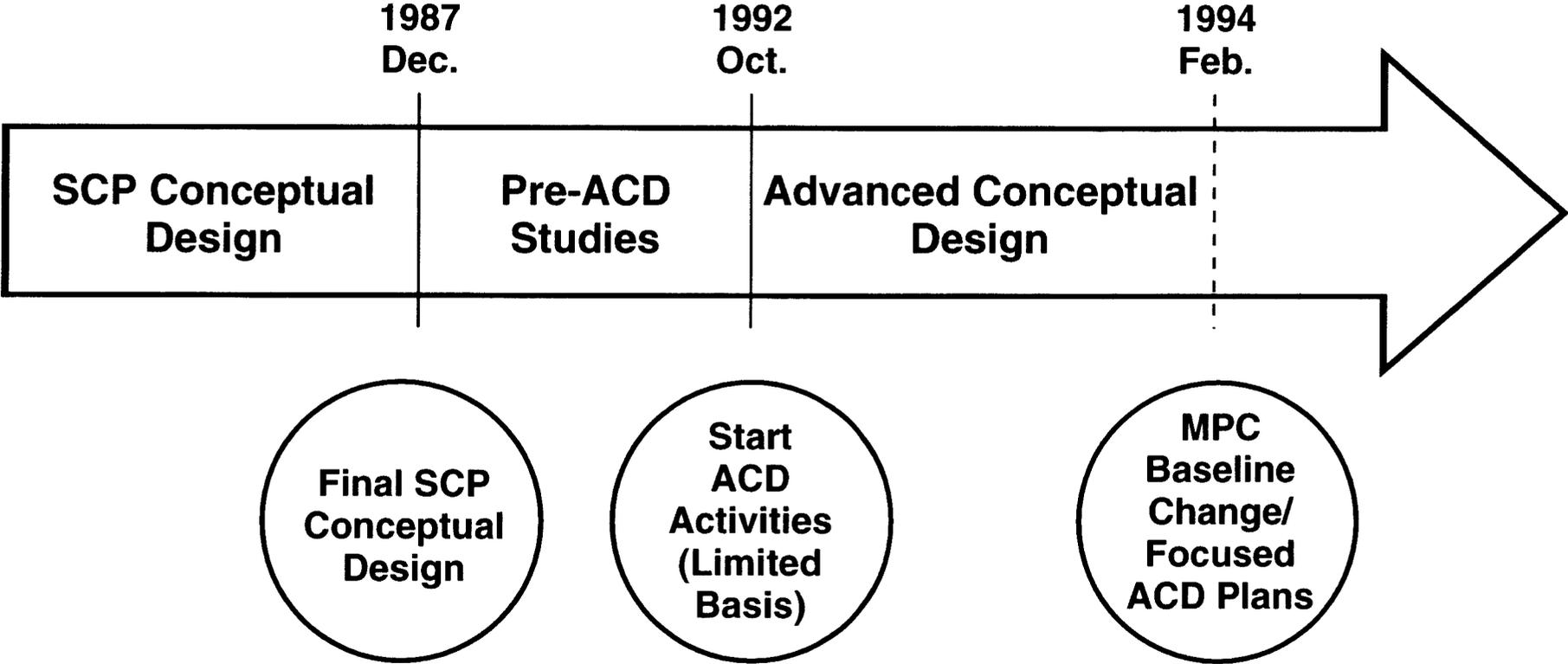
**TYPICAL  
DOE DESIGN  
PHASES**



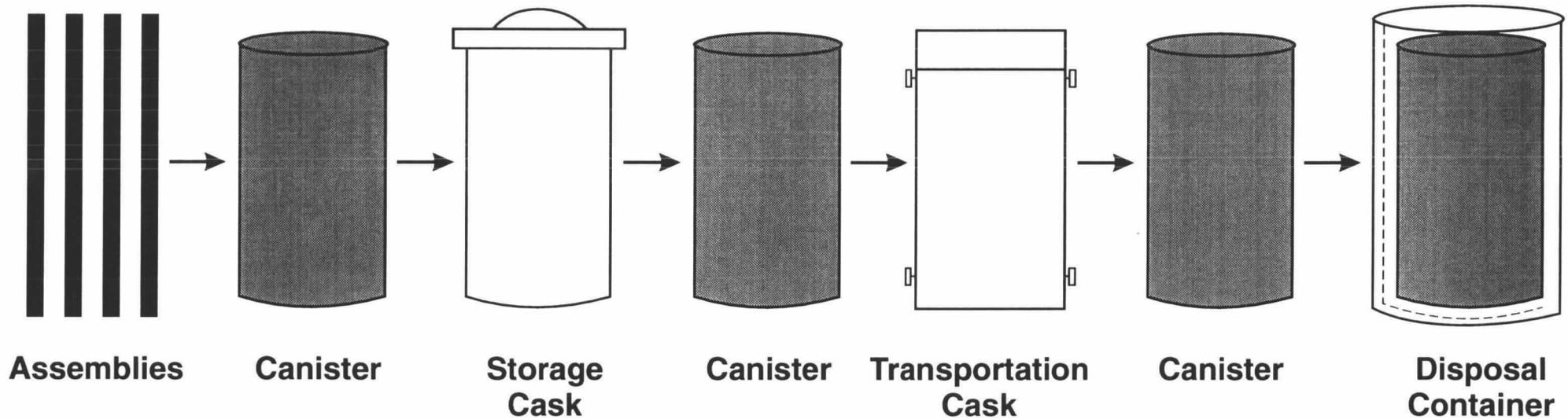
**OCRWM  
DESIGN  
PHASES**



# Current Design Schedule



# The Program Technical Baseline Changed in February 1994 with the Multi-Purpose Canister (MPC) Decision



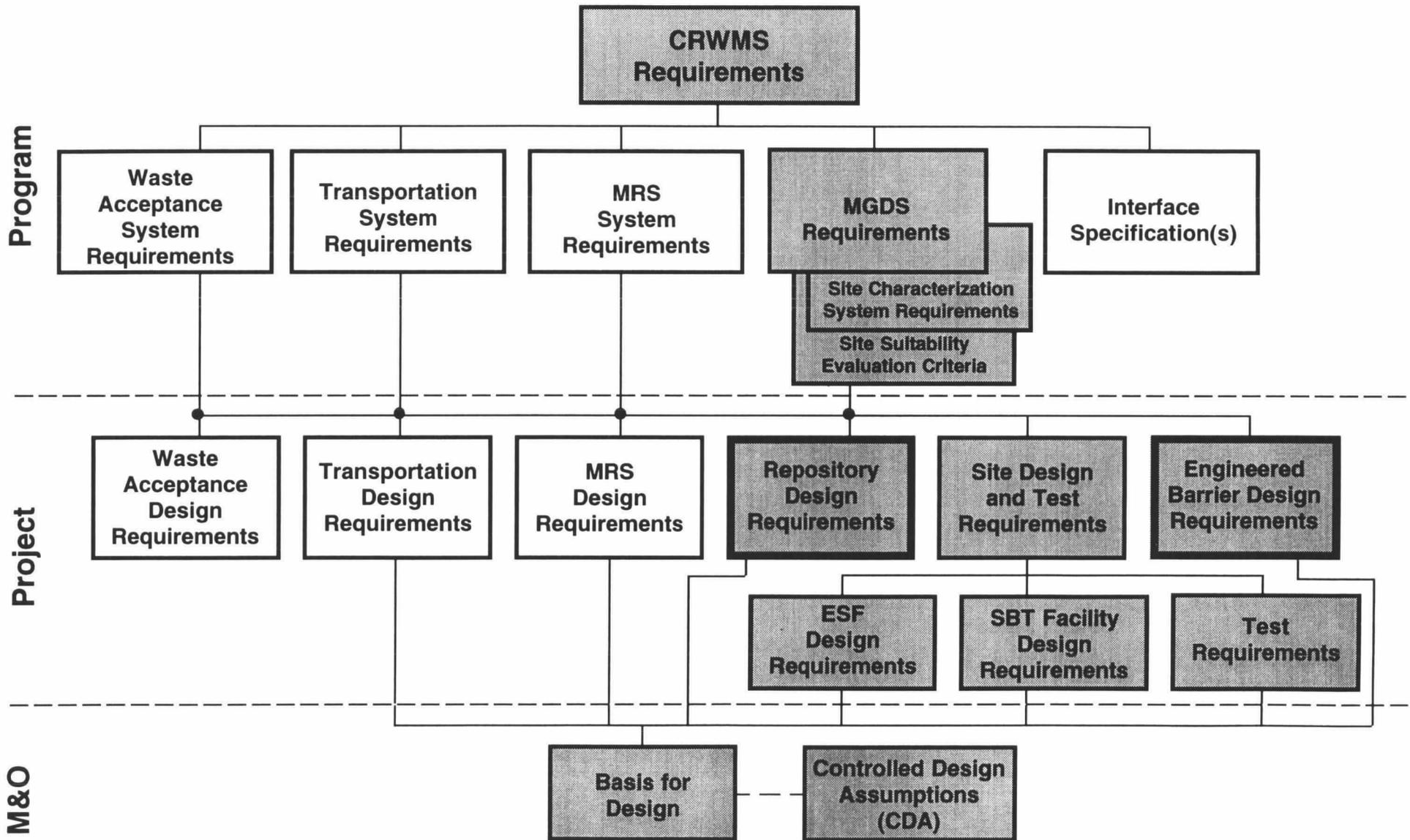
## Canister and overpacks must meet NRC regulations

- Storage, 10 CFR 72
- Transportation, 10 CFR 71
- Disposal, compatible with 10 CFR 60

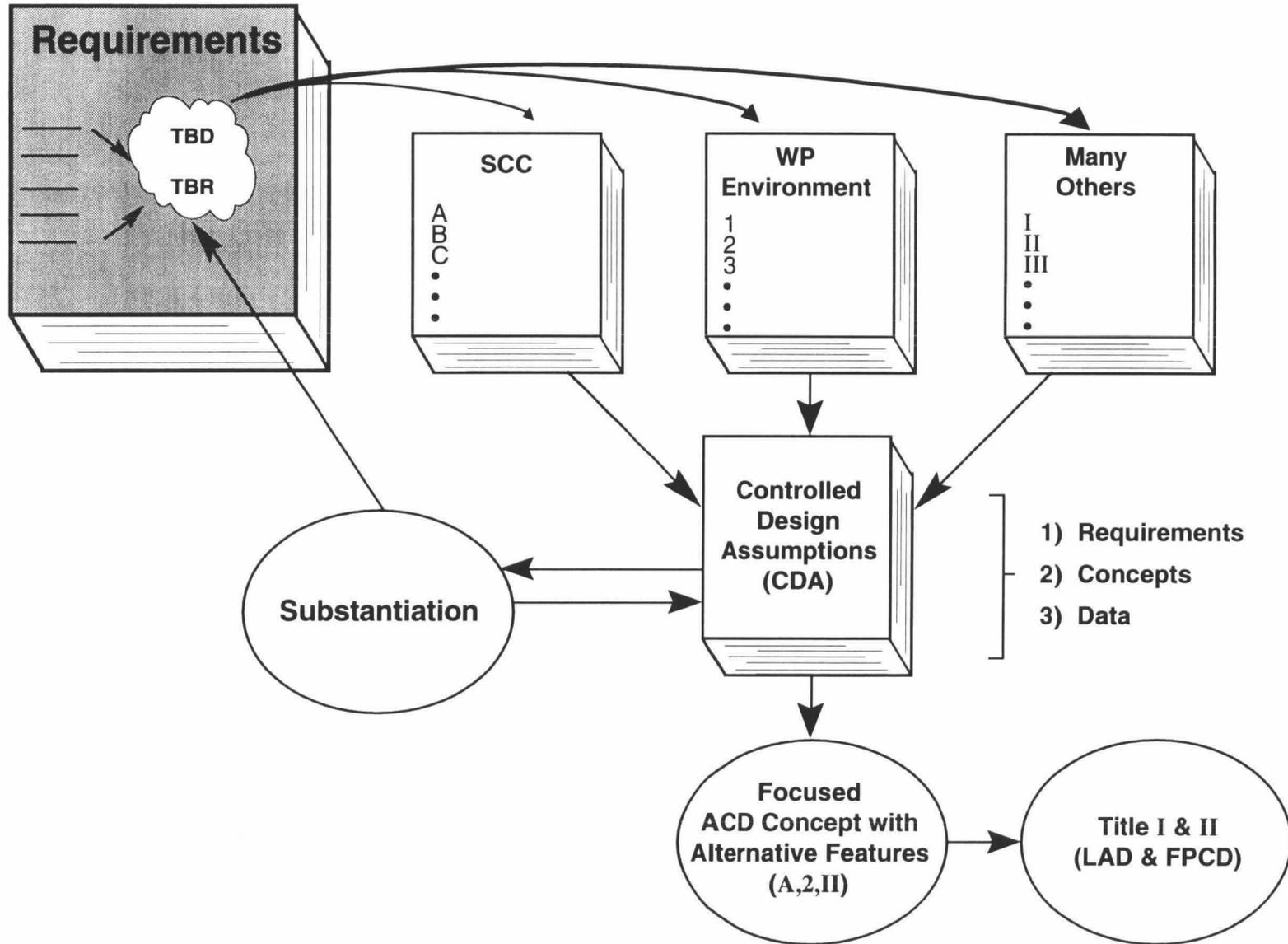
# Design Evolution

- **The MPC decision and technical baseline changes require the current SCP-CD to be replaced.**
- **The Project Design Team is now developing a Focused Advanced Conceptual Design (ACD) to replace the SCP-CD. The ACD will support**
  - **Site suitability interim evaluations**
  - **Total System Life Cycle Costs (TSLCC)**
  - **Environmental Impact Statement (EIS) Development**
  - **License Application Development**

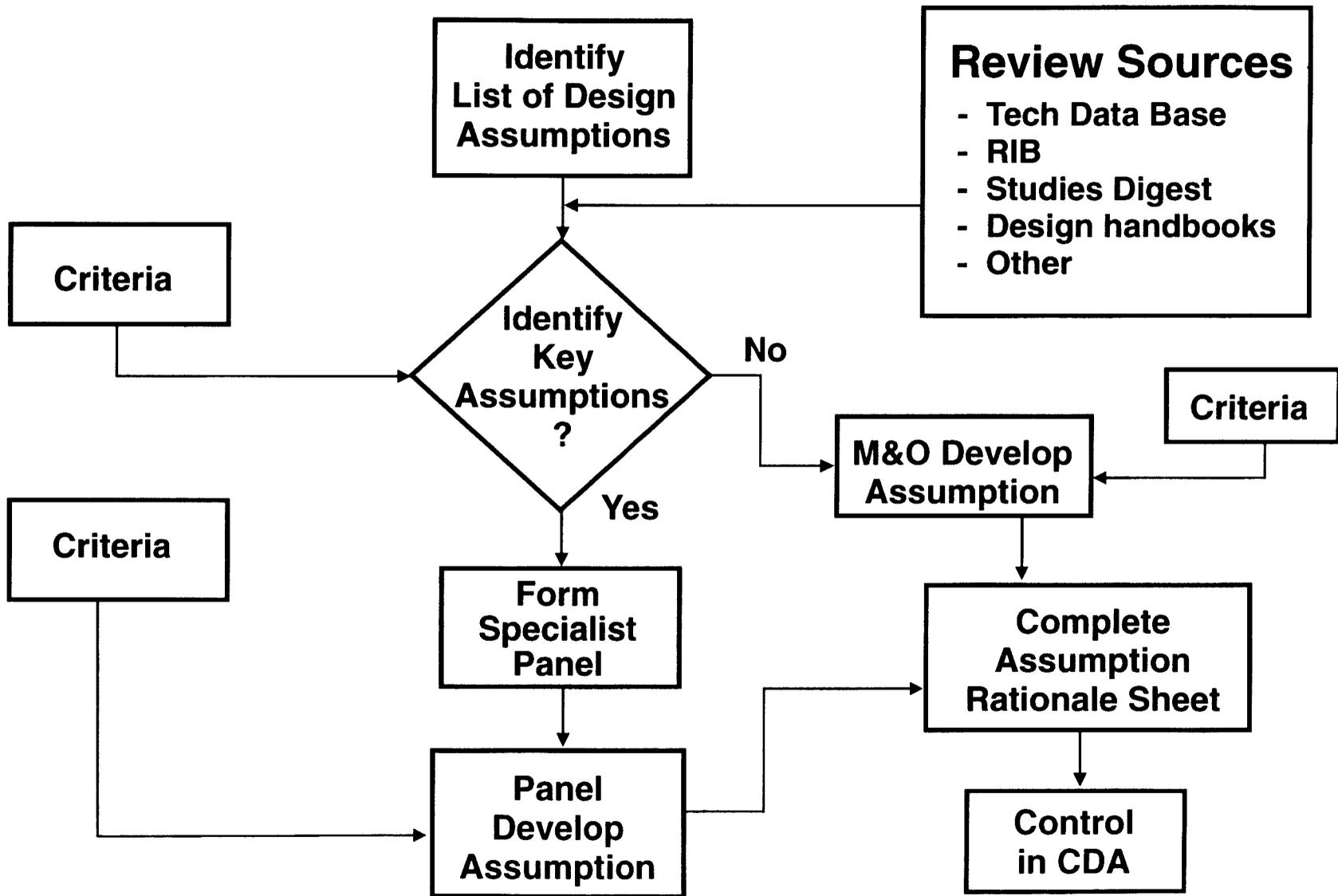
# Requirements Document Hierarchy



# Focused ACD Strategy



# Design Assumption Process



# **Controlled Design Assumption Document**

## **Outline**

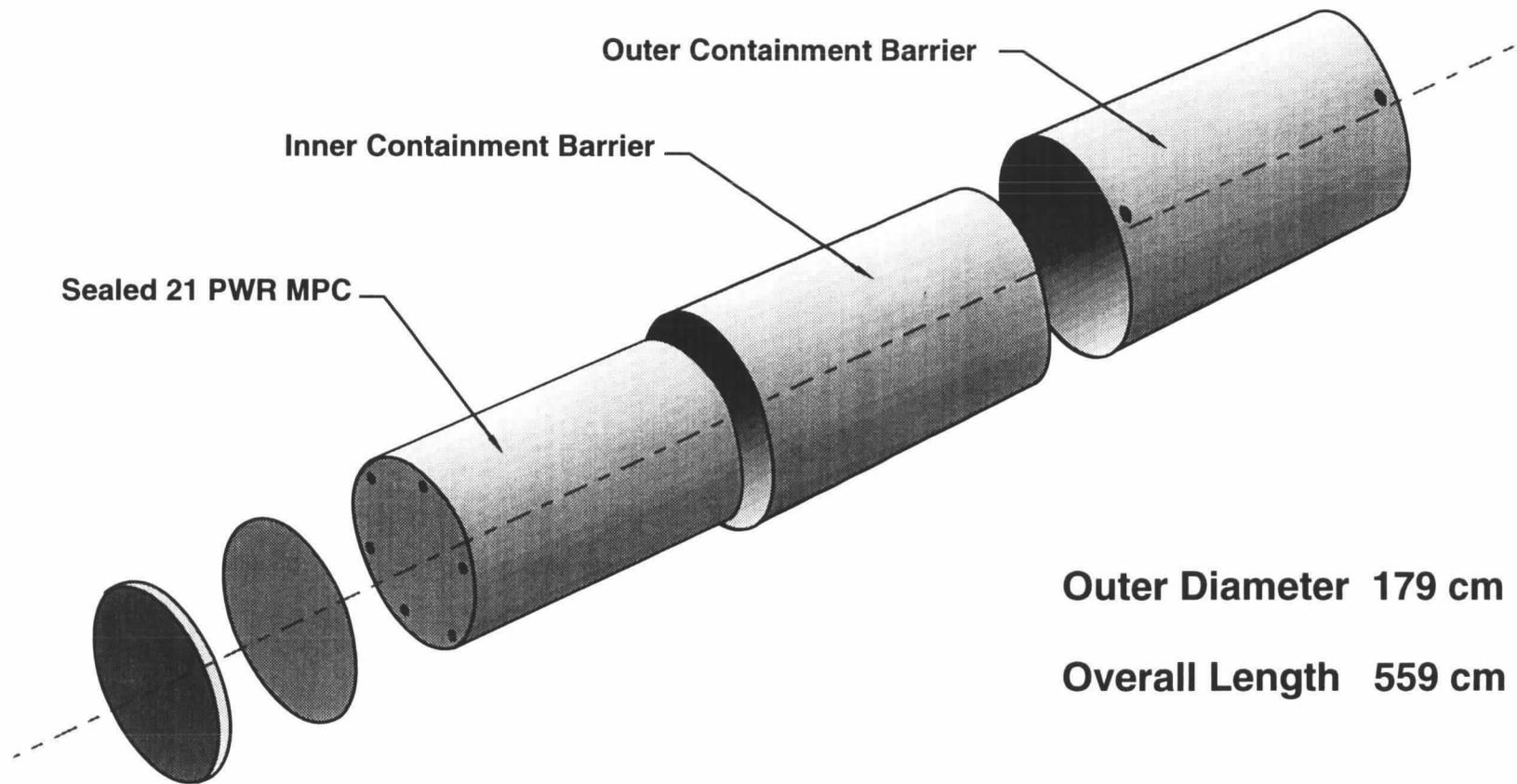
- I. Introduction**
  - II. Requirements**
    - A. EBDR**
    - B. RDR**
  - III. Concepts**
    - A. Concept of Operations**
    - B. Design Concepts**
      - 1. Waste Package**
      - 2. Repository**
        - a. Surface**
        - b. Subsurface**
  - IV. Technical Data**
- Appendix A. Rationale for Assumptions**
- Appendix B. Substantiation Tracking Sheets**
- Appendix C. Traceability Matrices**

# Focused ACD Schedule

KEY ACTIVITY	FY 1994	FY 1995	FY 1996
<b><u>DESIGN:</u></b>			
<b>MPC</b>	▽ Baseline	▽ RFP	▽ Award contracts
<b>CDA</b>		▽ Draft	▽ Rev.1
<b>ACD Summary Report</b>		▽ Rev.0	▽ Rev.2
<b>Substantiation of Assumptions</b>		▽ Initial	▽ Interim
			▽ Final
<b>ELEMENTS REQUIRING DESIGN SUPPORT:</b>			
<b>Interim Site Suitability Report</b>			▽
<b>License Application Annotated Outline</b>	▽ Rev.3	▽ Rev.4	▽ Rev.5
<b>Site Characterization Progress Reports</b>	▽ #9	▽ #10	▽ #11
		▽ #12	▽ #13
<b>Input to Total System Life Cycle Cost</b>			▽ #14

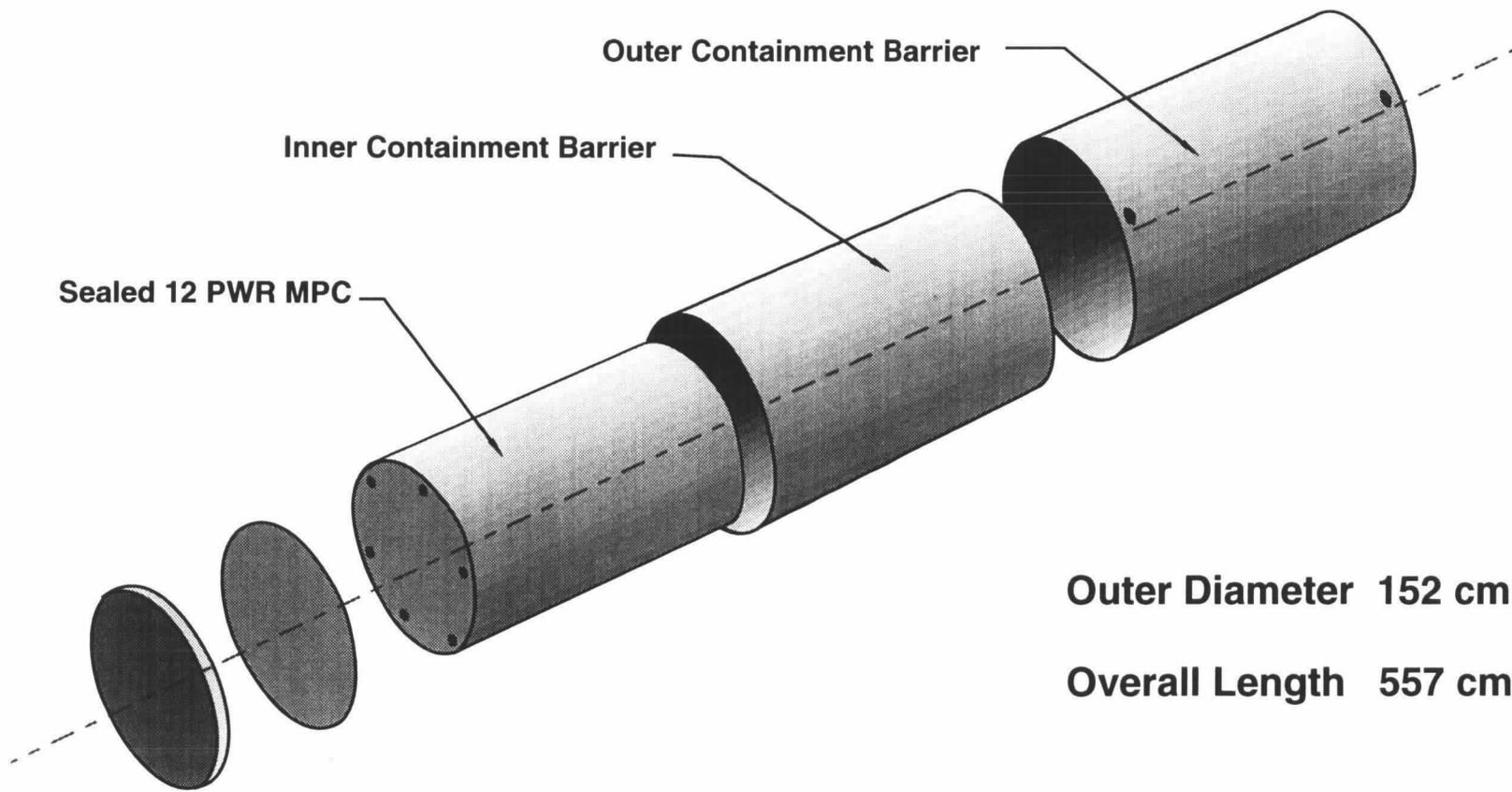
# Waste Package Design

## 21 PWR Multi-Purpose Canister



# Waste Package Design

## 12 PWR Multi-Purpose Canister

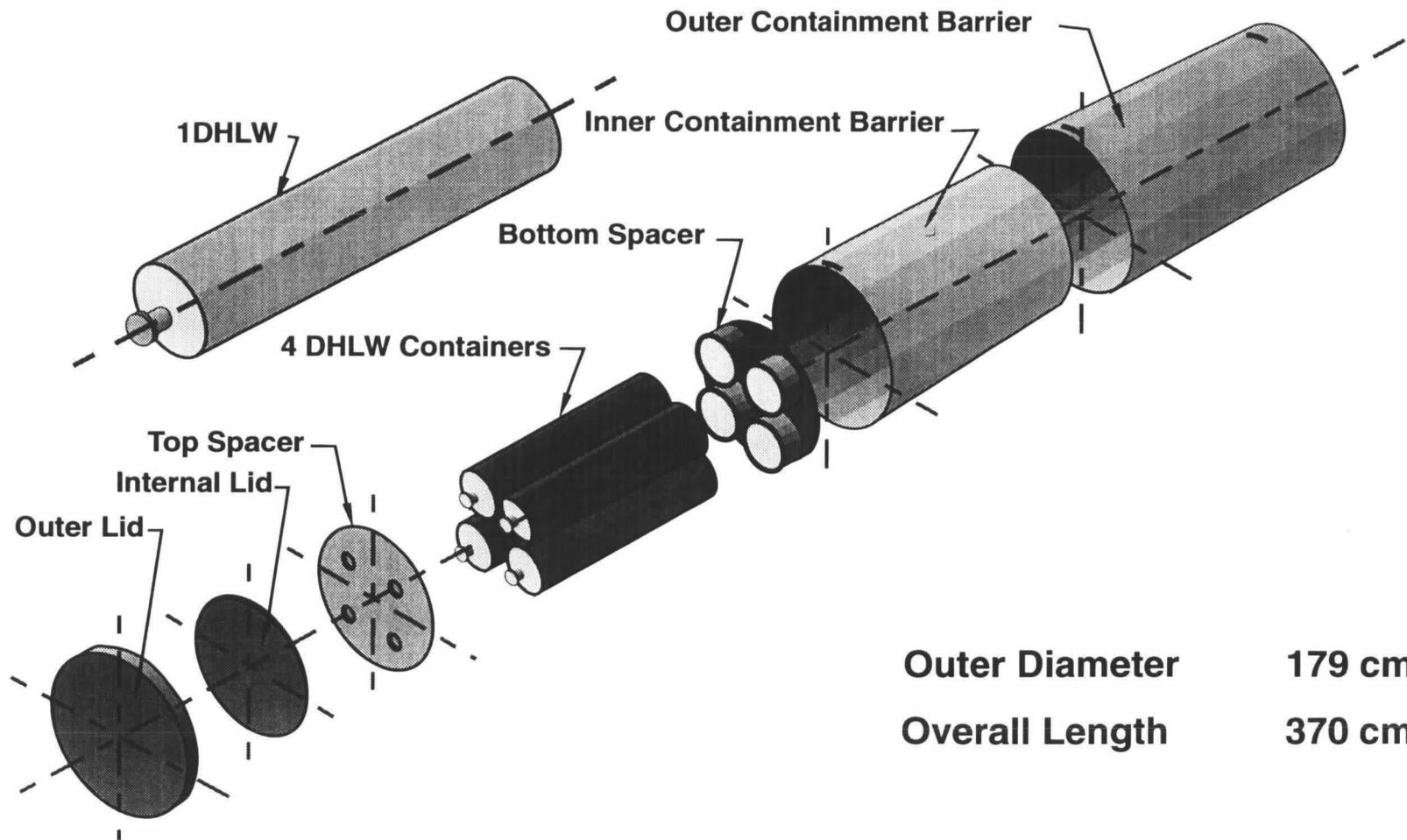


**Outer Diameter 152 cm**

**Overall Length 557 cm**

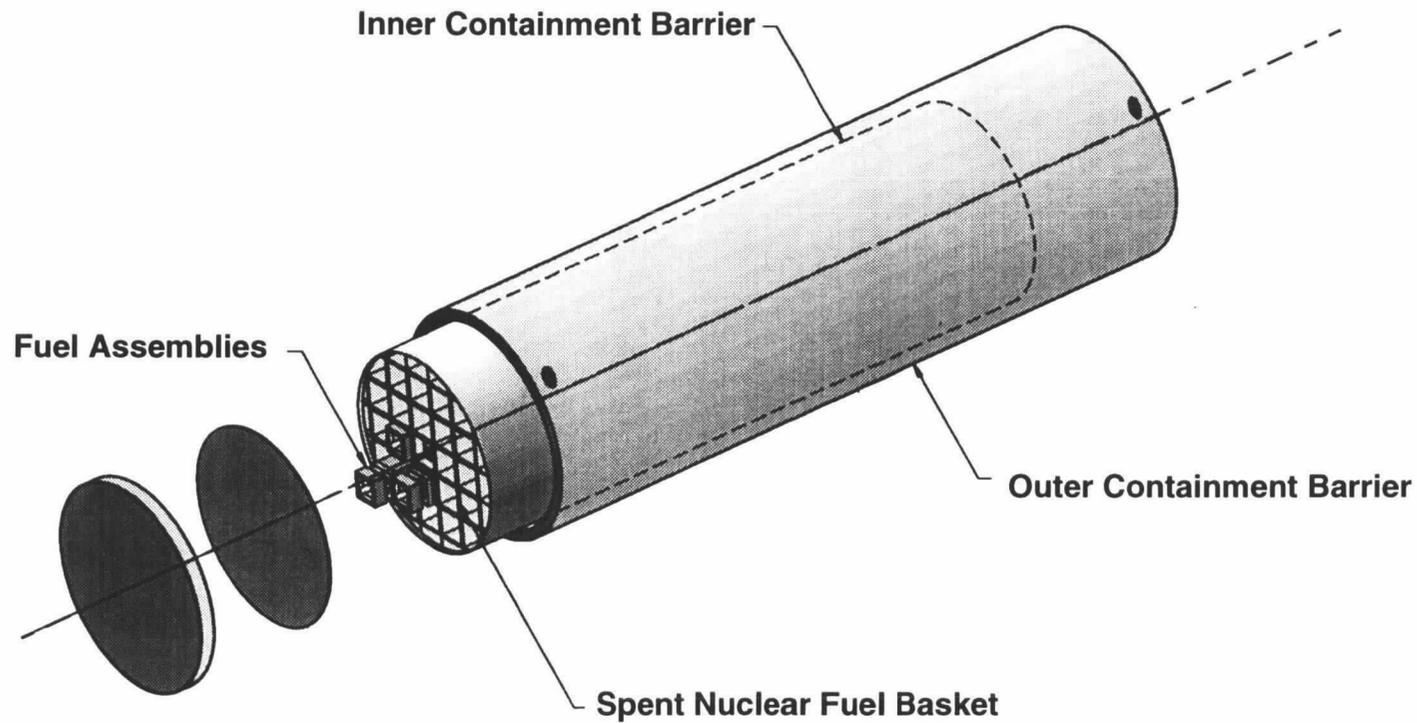
# Waste Package Design

## Defense High Level Waste



# Waste Package Design

## Uncanistered Spent Fuel



Outer Diameter 175 cm

Overall Length 529 cm

# Waste Package Design Conceptual Materials

Design Option	Inner Containment Barrier		Outer Containment Barrier		Loaded Weight
	Material	Thickness	Material	Thickness	
21 PWR MPC	Alloy 825	2 cm	A 516 Carbon Steel	10 cm	63,650 kg
12 PWR MPC	Alloy 825	2 cm	A 516 Carbon Steel	10 cm	46,010 kg
4 DHLW	Alloy 825	2 cm	70-30 Cupronickel	10 cm	35,580 kg
21 UCF WP	Alloy 825	2 cm	A 516 Carbon Steel	10 cm	52,650 kg

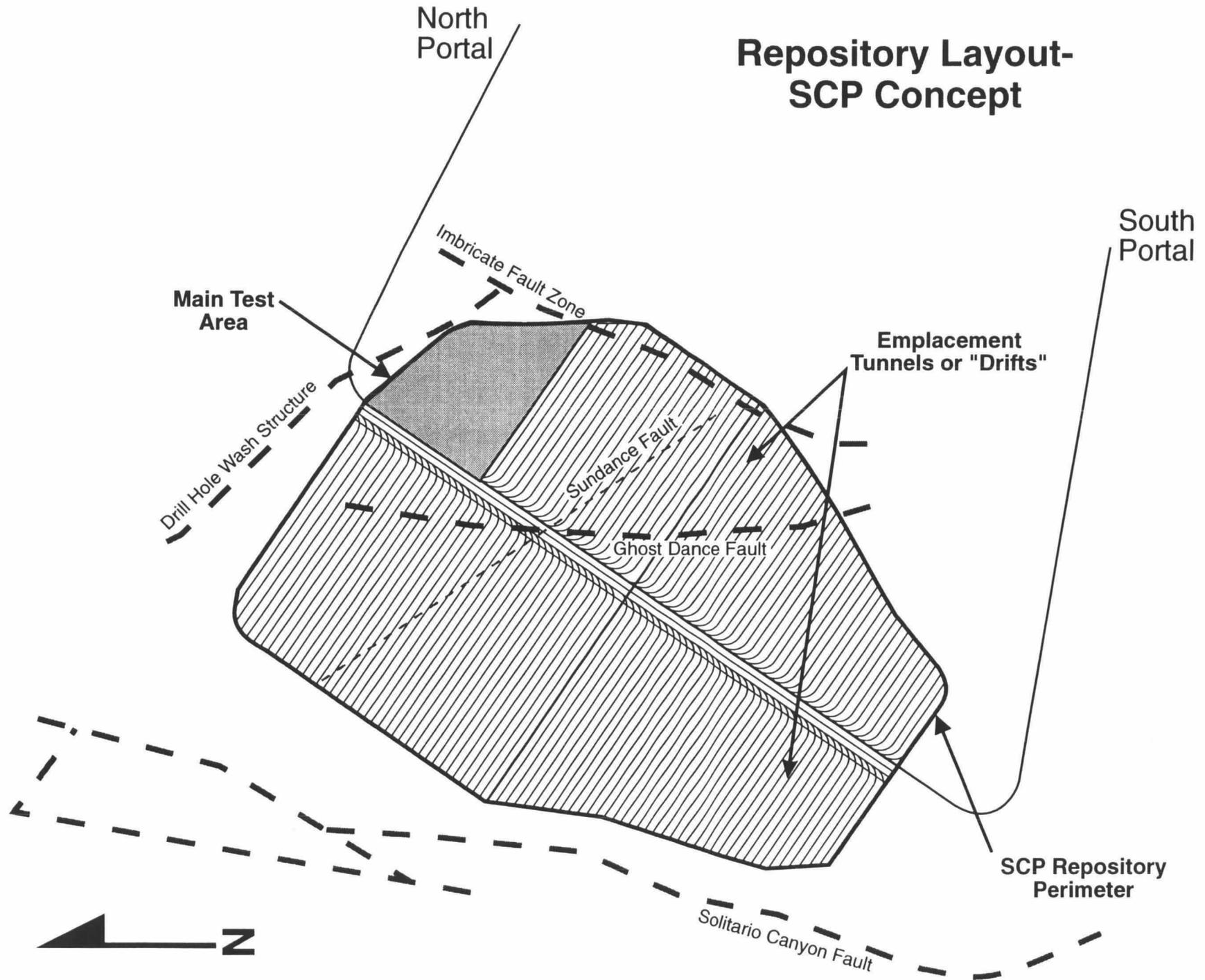
# **REPOSITORY SUBSURFACE FACILITIES**

## **ADVANCED CONCEPTUAL DESIGN STATUS**

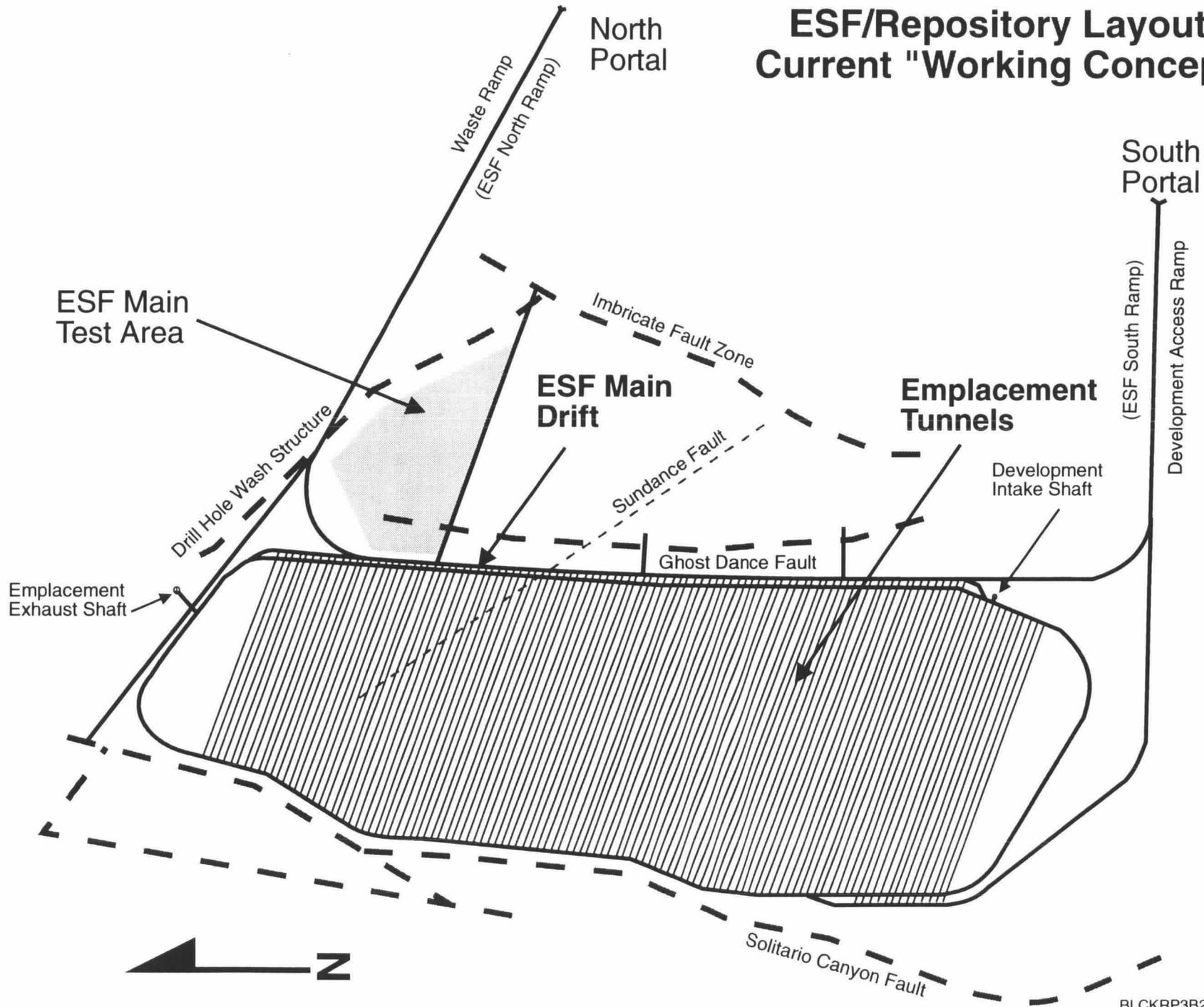
**Have developed a new "Working Concept" that:**

- **Facilitates disposal of MPC based waste packages**
- **Utilizes safer, flatter slopes and an integrated, surface/ underground rail transport system**
- **Avoids major faults**
- **Is based on up-dated geological information**

# Repository Layout- SCP Concept

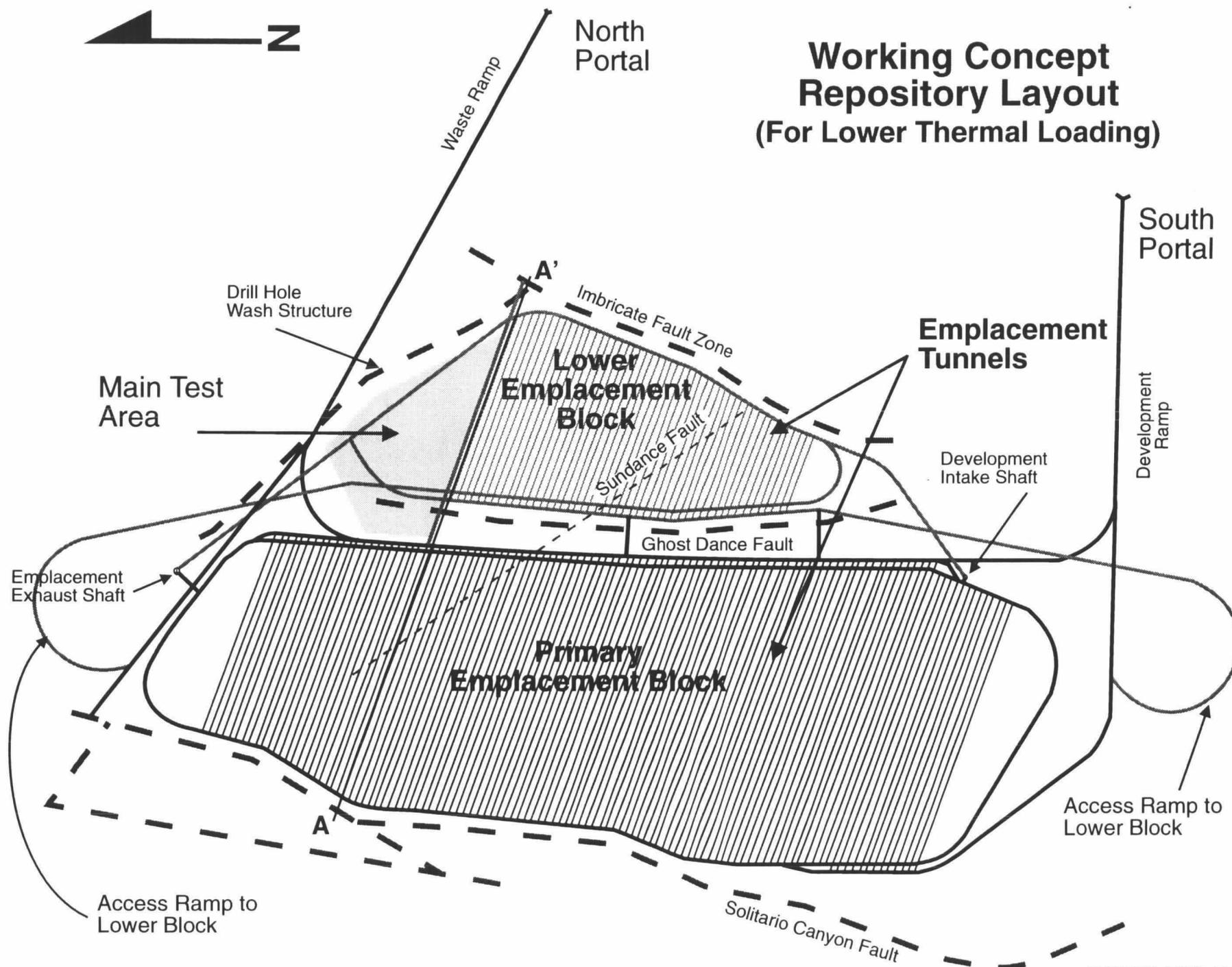


# ESF/Repository Layout- Current "Working Concept"





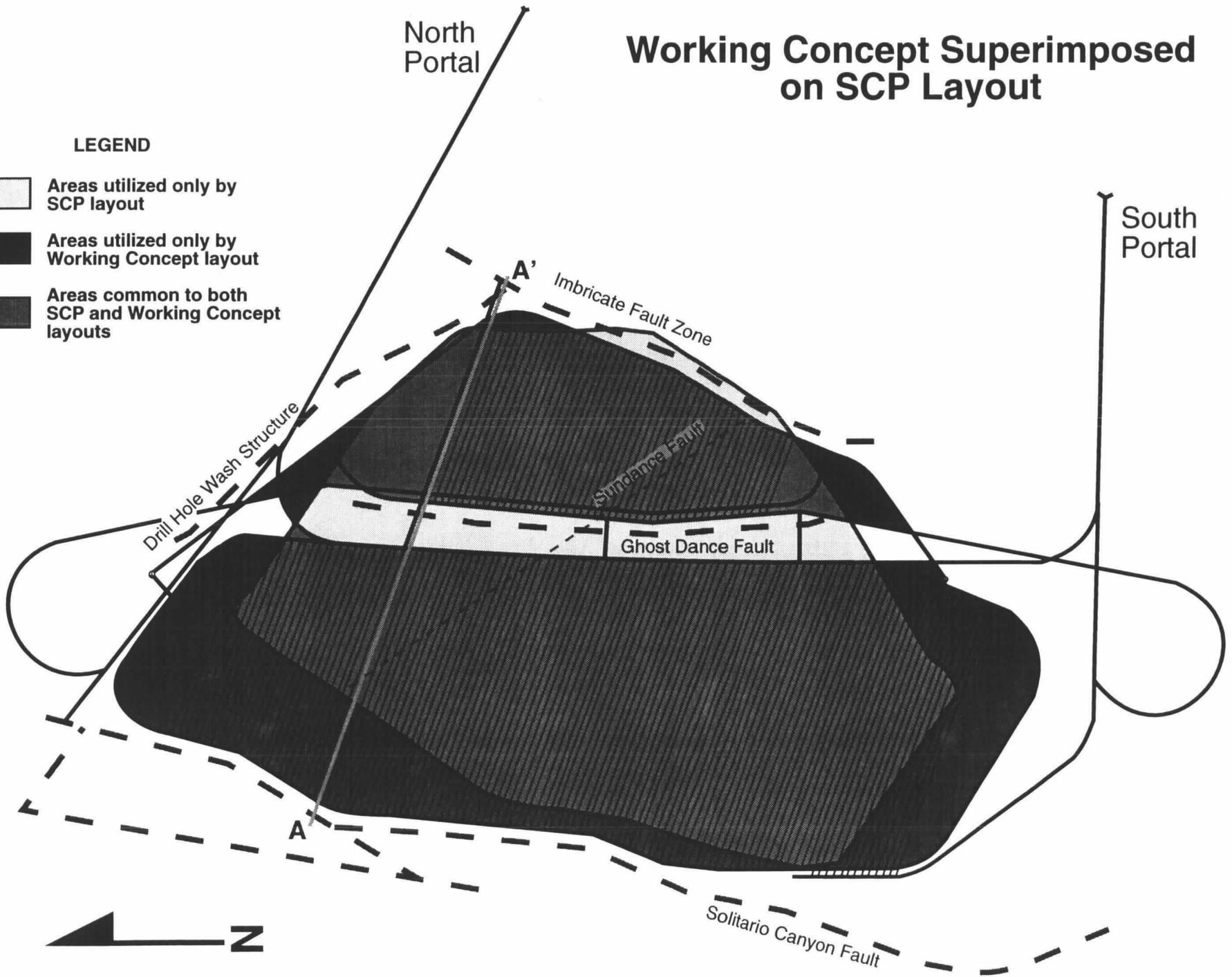
# Working Concept Repository Layout (For Lower Thermal Loading)



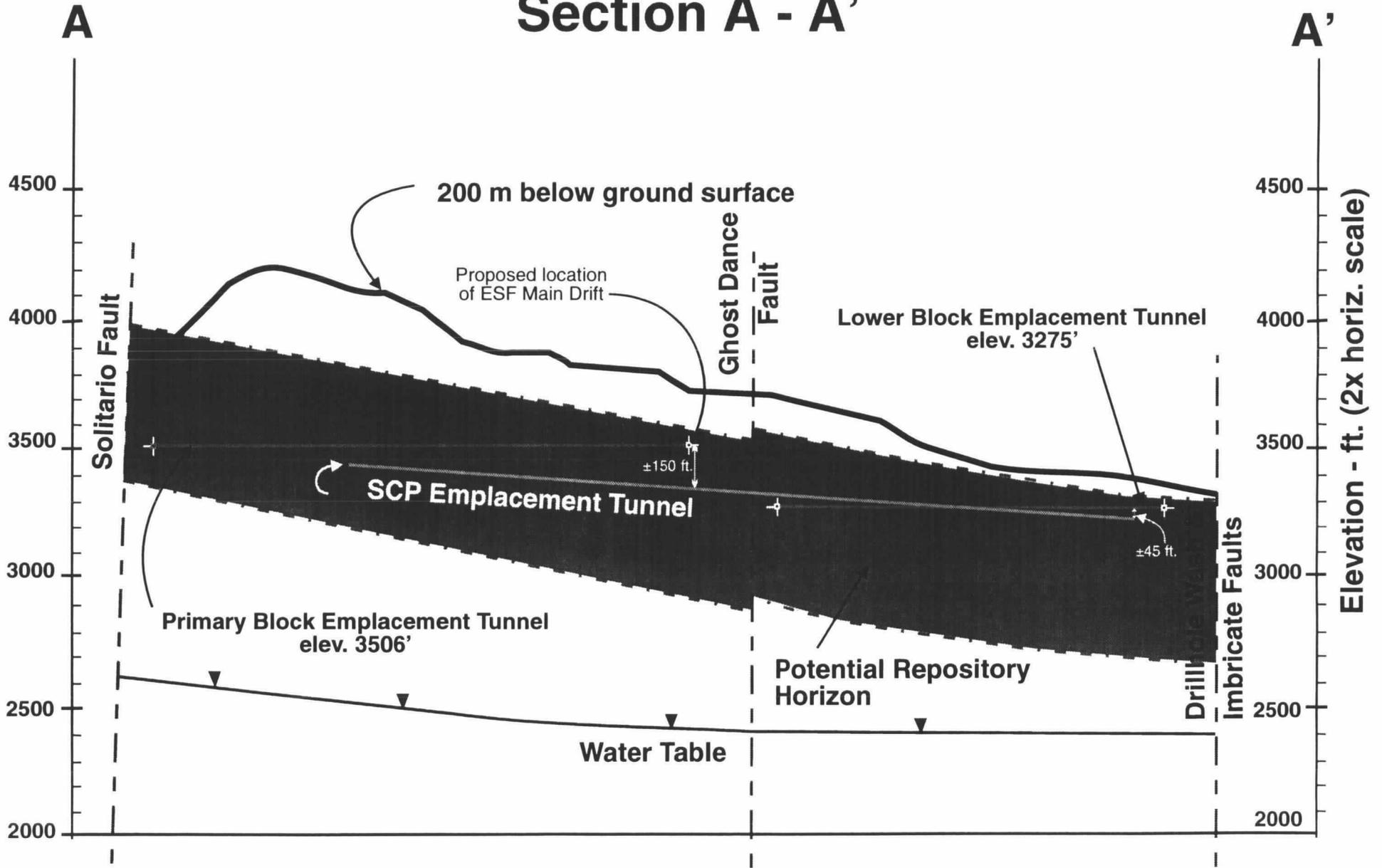
# Working Concept Superimposed on SCP Layout

## LEGEND

- Areas utilized only by SCP layout
- Areas utilized only by Working Concept layout
- Areas common to both SCP and Working Concept layouts

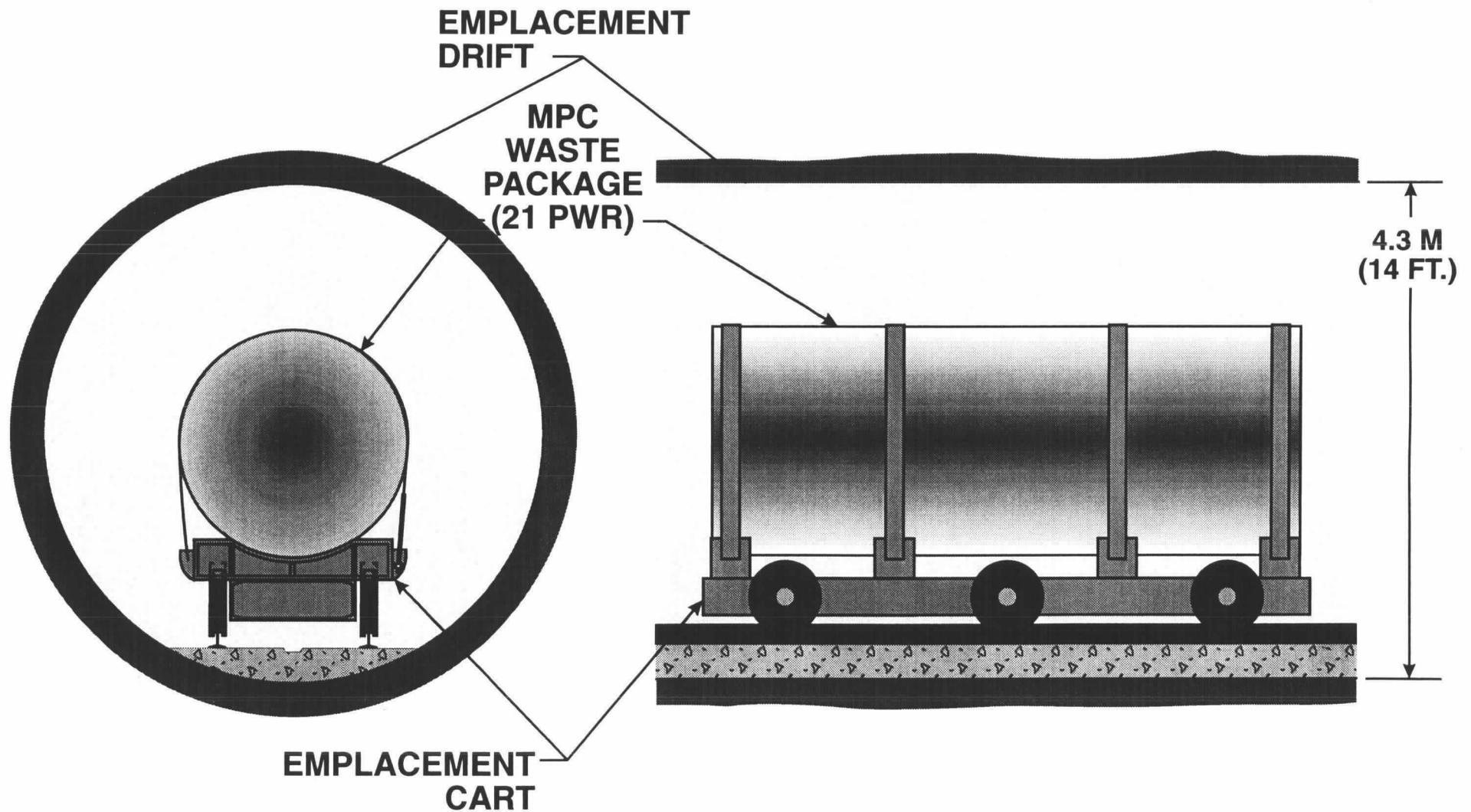


# Section A - A'

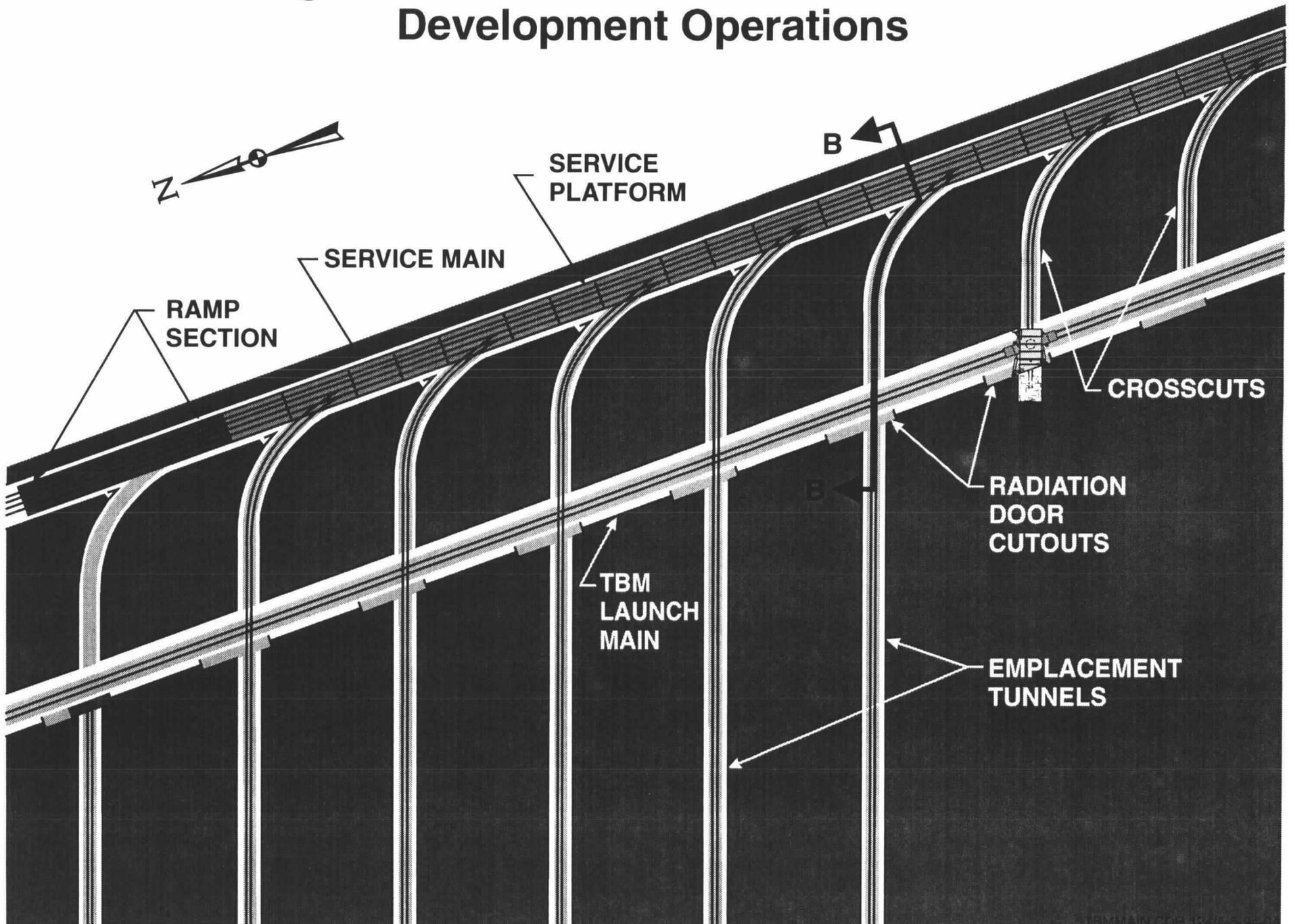


Note: Plane of section cuts through lowest emplacement drift in working concept layout.

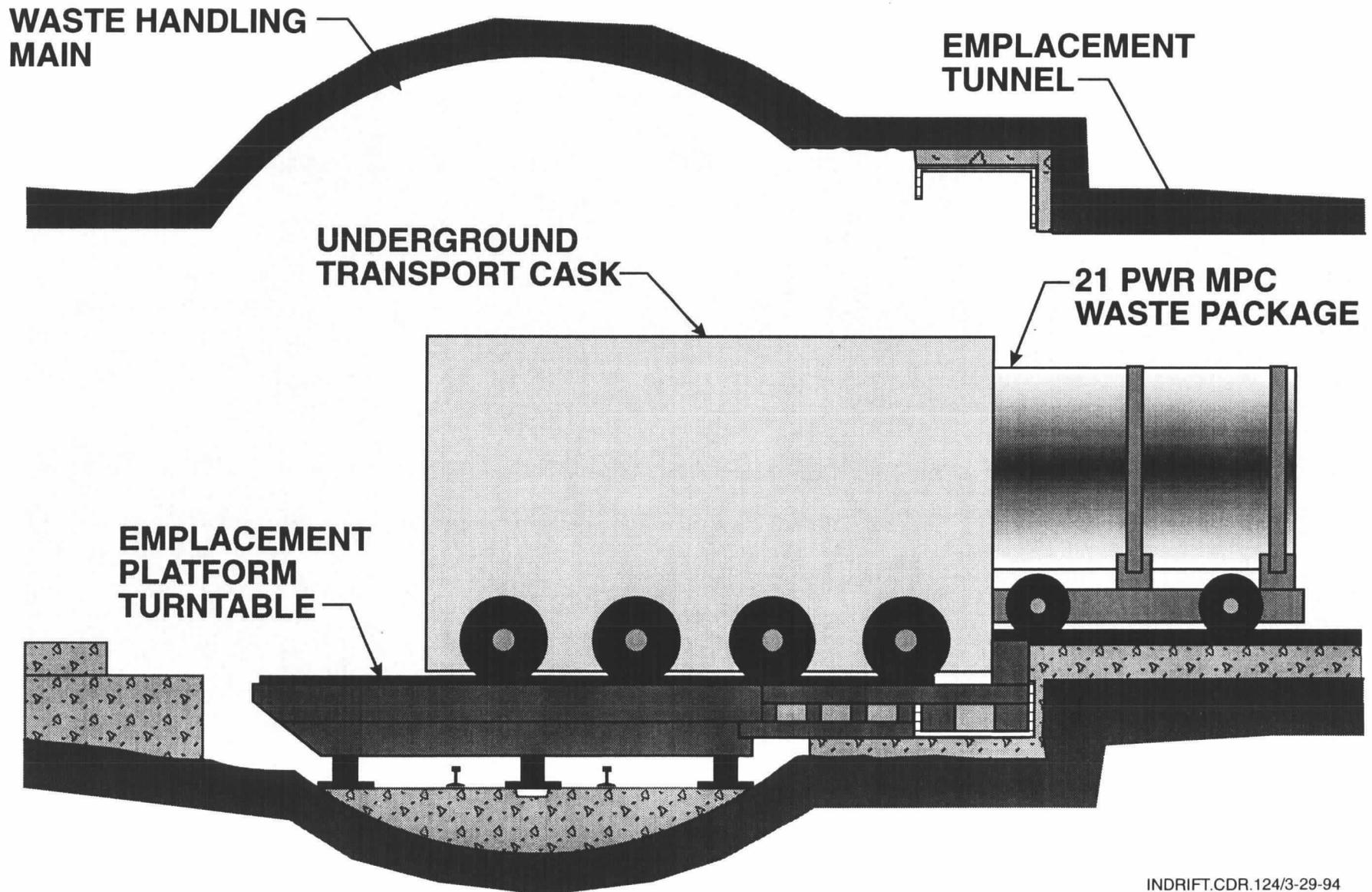
# An In-drift Emplacement Concept for MPC Based Waste Packages



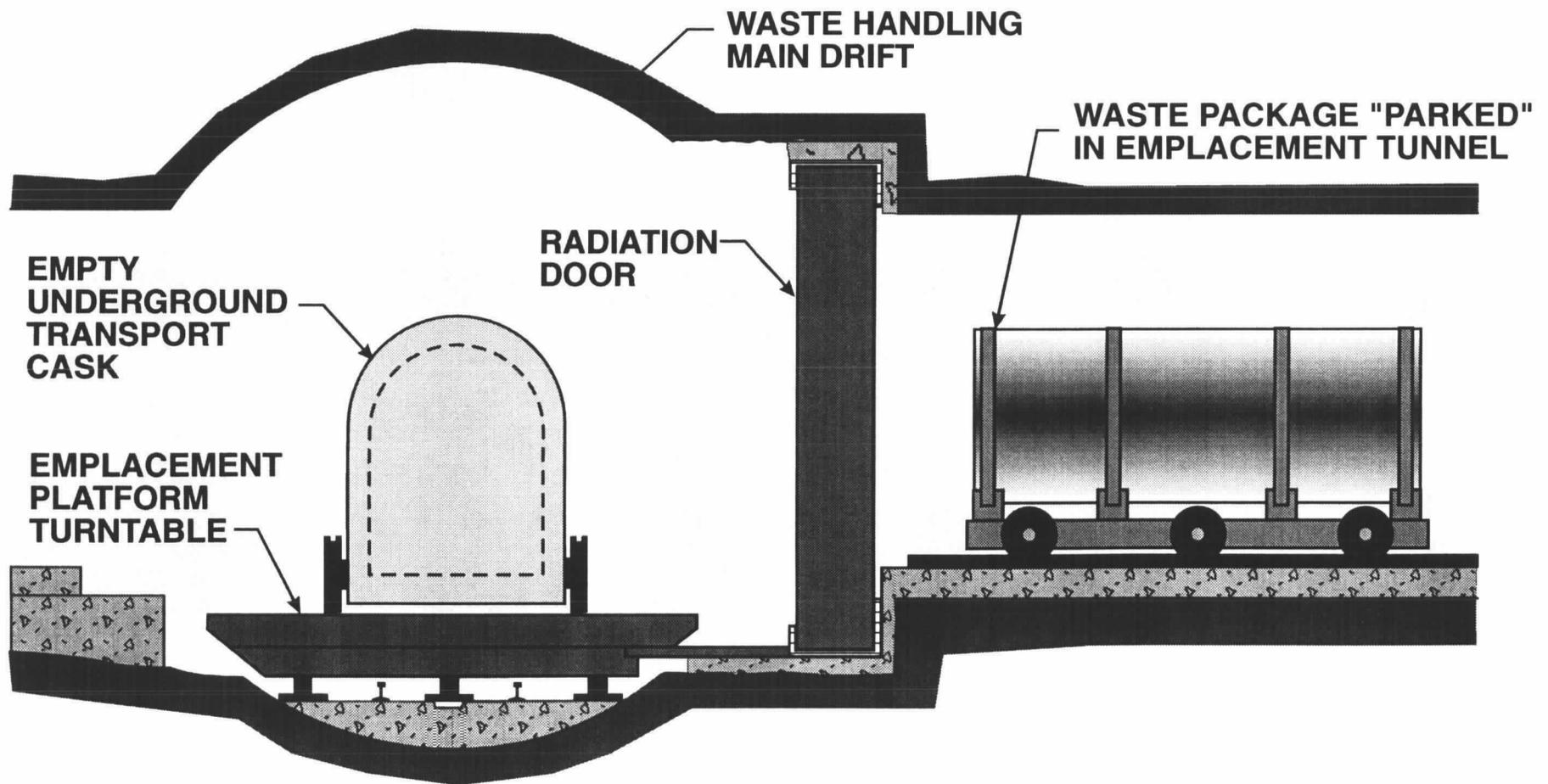
# Enlarged Plan in Service/Launch Mains Area- Development Operations



# Offloading MPC Based Waste Package Into End of Emplacement Tunnel



# Empty Cask Rotated for Return Trip to Surface



# Underground Locomotive Moving Waste Package to Emplacement Location

