

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

**NUCLEAR WASTE TECHNICAL REVIEW BOARD**

**SUBJECT: PROJECT IMPLEMENTATION  
PROCESS: ENGINEERING  
DESIGN**

**PRESENTER: PAUL HARRINGTON**

**PRESENTER'S TITLE  
AND ORGANIZATION: TEAM LEADER FOR ENGINEERING AND FIELD OPERATIONS  
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT OFFICE  
LAS VEGAS, NEVADA**

**TELEPHONE NUMBER: (702) 794-5415**

**AUSTIN, TEXAS  
APRIL 30 - MAY 1, 1996**

# Overview

- **Shift to Production Mode**
- **Identification and Prioritization of Engineering Products**
- **Development of Design Basis**
- **Bin Information**
- **Schedule Information**

# Production Mode

- **Complete discrete design products/design only one time**
- **Obtain responses to design data needs analyses**
- **Resolve To Be Verified (TBV) and To Be Determined (TBD)**

# Identification and Prioritization of Engineering Products

- **Identify engineering products to be produced**
  - Scoping estimate of approximately 14,000 drawings, 1100 specifications, and 2900 analyses
- **Perform binning of Structures, Systems, and Components to determine priorities**
  - Higher regulatory risk
  - Longer lead time
- **Incorporate schedule interfaces into engineering product schedules**
  - Some Bin 1 activities will be done early to support Viability Assessment, License Application, and other disciplines
- **Level 3 schedules nearing completion**
  - Develop engineering Level 4 schedules for production

# Development of Engineering Design Basis

- **Define design basis**
  - Includes drawings, specifications, and analyses
- **Parts of design basis are included in Level 2 baseline**
- **Conforms with 10 CFR Part 50 design control process**
- **Configuration management refinement**
  - Configuration management process
  - Numbering system for drawings, and specifications
  - Numbering system for Structures, Systems, and Components

## Design Document Development at License Application

BIN 1	BIN 2	BIN 3
<p>No radiological safety significance</p>	<p>Has or affects radiological safety significance but Has regulatory precedent</p>	<p>Has or affects radiological safety significance and Has no regulatory precedent or Affects waste containment or isolation</p>
<p style="text-align: center;"><b>Design Products</b></p> <p><u>Conceptual Design Documents</u> General Arrangements P&amp;ID Electrical one lines System Description</p> <p><u>Estimating Basis for Completion 20%</u> Partially dimensioned Not at Rev. A level</p>	<p style="text-align: center;"><b>Design Products</b></p> <p><u>Conceptual Design Documents</u> General Arrangements P&amp;ID Electrical one lines Logics Handling Drawings Equipment Outlines System Description</p> <p><u>Physical Design Documents</u> Analyses Calculations Specifications Drawings</p> <p><u>Estimating Basis for Completion 60%</u> Largely dimensioned at Rev. A level</p>	<p style="text-align: center;"><b>Design Products</b></p> <p><u>Infrastructure Tools</u> Commodity Design Guides System Design Guides</p> <p><u>Conceptual Design Documents</u> General Arrangements P&amp;ID Electrical one lines Logics Handling Drawings Equipment Outlines System Description Tech Specs Test Plans</p> <p><u>Physical Design Documents</u> Analyses Calculations Specifications Drawings</p> <p><u>Estimating Basis for Completion 90%</u> Fully dimensioned, TBV's limited at Rev 0 level</p>

**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY - SURFACE  
WASTE HANDLING FACILITIES  
WASTE HANDLING BUILDING  
STRUCTURE**

Bin	System Design Guides	Commodity Design Guides	General Design Guides	P&ID	Electrical One Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analysis	Calculations	Specifications	Drawings
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- Stack
  - Seismic Structure (varying requirements)
- Operating & Administration
  - Seismic Structure
  - Shielding
  - Loading
- Foundation - Slab
- Shielding strategy & source terms
- Wall penetration commodity guide
  - Master/Slave
  - Pass through sleeves
  - Windows
  - Electrical/Mechanical
  - Electrical
  - Instrumentation & Control
  - Personnel Hatches
  - Shield Doors
  - Seals
- Canister Restraints
- Cranes - (Design Guide?)
  - 125 ton cranes
  - Gantry (remote)
  - Small bridge
  - Remote operation
- Ventilation - 4 zones
  - Cold System
  - Radiological control (3 systems)
  - Zones 1 - 3 w/filters
  - Redundant w/emergency back-up power
- Chilled water system (distribution)
- Recycled water distribution
- Fire water distribution
- Secondary waste collection
  - Pump & Batch to Rad waste system
- Communications (telephone, video) (Portions)
- Data collection
- Facility Monitoring
- Facility Control (general computer)
- Radiological Monitoring
- Fire detection & protection

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Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		
SP3330A3	Prepare Drift Scale Test Status Rpt #1	125	3	ST27E	02FEB98*	29JUL98									
SP3640A3	Conduct Confirmatory Testing NFE & Prep Rpt:	184	3	ST27E	11FEB98*	02NOV98									
<b>Tectonics</b>															
<b>POSTLA</b>															
SP3880A3	Prepare Drift Scale Test Status Report #2	277	3	POSTLA	01AUG00*	06SEP01									
<b>Testing</b>															
<b>Waste Form Testing</b>															
<b>WP0035 - Prepare WFCR Rev 1</b>															
WP0035	Prepare WFCR Rev 1	259	2	WP0035	01MAR96	26FEB97									
EIWP0035I	Assemble Data fm Long and Short Term WF Testing	249	3	WP0035	01MAR96*	26FEB97									
EIWP0035A	Prepare & Review WFCR Rev 1	249	3	WP0035	01MAR96*	26FEB97									
<b>WP085 - Short Term Waste Form Testing-2</b>															
WP085	Short Term Waste Form Testing-2	527	2	WP085	01OCT96	07OCT98									
EIWP0860	Procure Approved Test Materials	273	3	WP085	03OCT96*	04NOV97									
EIWP0851	Develop Process Models for the Degradation Modes	507	3	WP085	03OCT96*	09OCT98									
EIWP0852	Measure Oxidation Using TGA Techniques	507	3	WP085	03OCT96*	09OCT98									
EIWP0853	Measure Dissolution in Flow-Through Tests	507	3	WP085	03OCT96*	09OCT98									
EIWP0854	Measure HLWG Degradation Process Model Parameter	507	3	WP085	03OCT96*	09OCT98									
EIWP0855	Measure Releases from SNF Hardware	384	3	WP085	01APR97*	07OCT98									
<b>WP110 - Prepare WFCR Rev 2</b>															
WP110	Prepare WFCR Rev 2	194	2	WP110	09JAN98	07OCT98									
EIWP1101	Assemble Data and Process Models	190	3	WP110	09JAN98*	07OCT98									
EIWP110A	Prepare & Review the WFCR Rev. 2	190	3	WP110	09JAN98*	07OCT98									
<b>WP120 - Short-Term Waste Form Testing-1</b>															
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		



# Conclusion

- **Must continue development of a detailed schedule to capture License Application scope and interface needs**
- **Must continue to communicate the details of our approach to develop a License Application design basis**

**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY - SURFACE  
WASTE HANDLING FACILITIES  
WASTE HANDLING BUILDING  
STRUCTURE (Con't)**

- Security system
- Office administration system
- Decontamination System
- Industrial air systems
- Power distribution
- Water distribution
- Burn-up credit monitoring system (See Waste Package?)
- Inspection system (See Waste Package?)
- Change Room & Laundry Room
  - Water Sampling
  - Cleaning Equipment
  - Waste collection system

**CASK RECEIPT & PREP SYSTEM - NEUTRAL ZONE**

- Shipping Bay (Seismic)
- 125 Ton Bridge Crane
- Cart for transport (remote) structure (1)
- Air Locks into Zone 3
- Prep Areas
- Remote Manipulators
- Pneumatic Tools
- Equipment Hoist (Remote)
- Doors
- Yokes
- Shield Windows
- Vent & Purge (Radiological)
- Sampling System
- Glove Box
- Trunnions
- Gantry Crane (for Trunnions) - Remote (1)

**POSSIBLE EXTRA STEP:**

- Separate Hot Cell:
  - Cut tops from dual purpose canisters  
(Cutting equipment)

Bin	System Design Guides	Commodity Design Guides	General Arrangements	PAID	Electrical One-Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Specifications
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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY - SURFACE  
WASTE HANDLING FACILITIES  
WASTE HANDLING BUILDING  
CANISTER WASTE TRANSFER**

- Area - Zone 3
- Same Cart
- Crane Remote
- New Cart
- Cask lid removal equipment & bolt installer/remover
- Monorail Crane (125 Ton) (remote)
- Decon equipment (CO2)
- Cask Transfer port
- Motorized port plate
- Canister yoke
- Air Locks
- Doors

Bltn	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Line	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Structural Design
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**DISPOSAL CANISTER WELDING & TRANSFER SYSTEM**

- Area
- Disposal Container Cell
- Bridge Crane (125 ton) Remote
- NDE (WP design)
- Welding station (WP design)
- Buddy Crane (25 ton remote-2) retrieve main cart)
- Electro-mech manipulators
- Decon Equipment/if unique
- DC buddy cart
- Winch
- Staging area
- Horizontalizer
- Gantry crane (remote)
- Decon area
- Air locks
- DC cart loader
- EM manipulator (decon remote)
- ACGLF (automatic center of gravity lifting fixture  
- see WIPP design)

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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY - SURFACE**

**WASTE HANDLING FACILITIES**

**WASTE HANDLING BUILDING (cont)**

**UNCONFINED WASTE TRANSFER SYSTEM**

- Contamination Control Barrier (funnel)
- Yoke
- 10 ton hoist (Remote)
- Hoist Crane - Lift Assemblies
- Staging racks (lag storage) (criticality, fuel types)
- Bare SFA Transfer Cell (area)
- Electro-mech manipulator to attach grapple
- Grapple for SFAs
- Shield doors
- Rack doors
- Rack Vent system cooling & filter system
- Rack Drain System
- DC Funnel

Bin	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Line	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Structural Drawings
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**BARE SHA DISPOSAL CONTAINER PORT ROOM**

- Cart with turntable integral
- Shield Windows

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**PERFORMANCE CONFIRMATION FILLER SYSTEM**

- Filler system (filler added by gravity)
- Laser welders/cutter & controls
- Turntable
- PC filler crane (10 ton bridge)
- EMM
- Buddy crane
- Lifting for DC (to be added?)
- Decon
- EM Manip
- Decon equip

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**PERFORMANCE CONFIRMATION UNIQUE:**

- Sampling Equipment
- Manipulators
- Decon Equipment
- Remote Handling
- Cutters
- Available Area

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**DISPOSAL CONTAINER AREA**

- Turntable

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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY - SURFACE  
WASTE HANDLING FACILITIES  
CASK MAINTENANCE FACILITY**

**STRUCTURE**

- Stack
  - Seismic Structure (varying requirements)
- Operating & Administration
  - Seismic Structure
  - Shielding
  - Loading
- Foundation - Slab
- Shielding strategy & source terms
- Wall penetration commodity guide
  - Electrical/Mechanical
  - Electrical
  - Instrumentation & Control
  - Personnel Hatches
  - Shield Doors
  - Seals
- Pool
  - Basket Restraints
- Cranes - Design Guide
  - 125 ton cranes
  - Gantry
  - Small Bridge
  - Jib Cranes (No remote operations)
- Ventilation System - 4 Zones
  - Cold System
  - Radiological Control (3 Systems)
  - Zones 1 - 3 w/filters
  - Redundant w/emergency back-up power
- Chilled water system (distribution)
- Recycled water distribution
- Fire water distribution
- Secondary waste collection
  - Pump & Batch to Rad waste system
- Communications (telephone, video) (portions)
- Data collection
- Facility Monitoring
- Facility Control (general computer)

Bin	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analysis	Calculations	Specifications
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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY SURFACE  
WASTE HANDLING FACILITIES  
CASK MAINTENANCE FACILITY**

**STRUCTURE (Cont)**

- Radiological Monitoring
- Fire detection & protection
- Security system
- Office administration system
- Decontamination systems
- Industrial air systems
- Power distribution
- Water distribution

Bin	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Specifications
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**CASK PREPARATION SYSTEM - SECONDARY ZONE**

- Decontamination Pit (seismic)
- Decontamination equipment
- Cask shroud/bottom protector
- Sampling system
- Ventilation & purge system
- 125 ton crane
- Lid removal tools
- Cask closure adapter
- Yokes
- Movable personnel platform
- Shielding of personnel

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**POOL CONFIGURATION & REGENERATION SYSTEM**

- Bridge Crane
- Cask vacuum system (cask cleaning may be unique)
- Leak detection system
- Pool purification system
- CCTV/Lighting
- Basket Racks
- Lifting fixtures
- Cleaning equipment

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**DECONTAMINATION SYSTEM**

- Design Guide

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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

Bln	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Line	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Specifications
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**REPOSITORY - SURFACE  
WASTE HANDLING FACILITIES  
CASK MAINTENANCE FACILITY  
CASK COMPONENT & REPAIR & CLOSURE SYSTEM**

- Equipment
- Camera System
- Leak test equipment
  - Gas System
  - Sniffers?

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**EXTERNAL REPAIR SYSTEM**

- Cask carrier (cart)
- Criteria for inspection
  - Inspection equipment
  - Welding equipment
  - Rail interface (design guide)
  - Airlock/doors

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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**RADWASTE FACILITY  
STRUCTURE**

	Blm	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analysis	Calculations	Specifications	Designs
Seismic Structure (varying requirements)														
Operating & Administration														
- Seismic Structure	2													
- Shielding	2													
- Loading	2													
Foundation - Slab	2													
Shielding strategy & source terms	2													
Enclosure Penetrations	2													
- Instrumentation & Control	1													
- Seals	1													
Ventilation Systems - 4 zones														
- Cold System	1													
- Radiological control (3 systems)	2													
- Zones 1 - 3 w/filters														
- Redundant w/emergency back-up power														
Chilled water system (distribution)	1													
Recycled water distribution	1													
Fire water distribution	1													
Secondary waste collection	2													
- Pump & Batch to Rad waste system														
Communications (telephone, video) (Portions)	2													
Data collection	2													
Facility Monitoring	1													
Facility Control (general computer)	2													
Radiological Monitoring	2													
Fire detection & protection	2													
Security system	1													
Office administration system	1													
Decontamination System	2													
Industrial air systems	1													
Power distribution	1													
Water distribution	1													
Forklifts	1													
Drum lifters	1													
HEPA filtration equipment	2													



**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**RADWASTE FACILITY (Cont)  
LOW LEVEL LIQUID WASTE SYSTEMS**

Bin	System Design Guides	Commodity Design Guides	General Arrangements	R&ID	Electrical One-Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Special Drawings
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- Materials of construction
- QA program
- Recycled Waste - Water System
  - Interior collection tanks
  - Feed pumps
  - Filters
  - Evaporator feed tank
  - Evaporator
  - Condensor
  - Condensate collection tank
  - Ion exchange unit
  - valves
  - Recycled water storage tank
  - Recycled water distribution system
- Chemical Waste System
  - Interior collection tanks
  - Feed pumps
  - Ph adjustment tank (non-hazardous)
  - Waste transfer pump
  - Holding tank
  - Cement mixing station
  - Cement storage silo
  - Pumps, mixers
  - Waste piping system

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**SOLID LOW LEVEL WASTE SYSTEM**

- In-drum compactor
- Super compactor
- Jib crane
- Shredder
- Misc equipment

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**MIXED WASTE AREA**

- Holding area

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**OTHER ISSUES**

- Special studies: Integrated nuclear facilities
- Remotely controlled issues
- Recovery from events
- Transport system design guide
  - Carts
  - On-Site rail system


**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

	Bin	System Design Guides	Commodity Design Guides	General Arrangements	PAID	Electrical One Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analysis	Calculations	Specifications	Drawings
<b>OTHER ISSUES (Cont)</b>														
<b>SPECIAL ITEMS:</b>														
Cask Throughput Rate														
Cask design to be developed (may be new to NRC from multiple facilities)														
<b>CONTINGENCY EVENTS (TBD)</b>														
Borated Water System for Cask Maintenance Facility ?														
<b>OTHER DESIGN BASIS EVENTS</b>														
Natural Phenomena														

# COMPONENT LEVEL OF DESIGN DETAIL BY DESIGN PRODUCTS

## WASTE PACKAGE

### DIFFUSION BARRIERS

NOTE: (EBS Study underway now)

Unknown Material

- Over Package
- Under Package

TSPA Need - Performance Requirement

Design - Test - Material Interaction

- Thermal Conductivity
- Porosity

Pre-Employment (under WP)

Post-Placement (overlay)

NOTE: (Ground support design for 100 years for backfill installation)

- Mechanical
- Constructability - Repository
- Feasibility

Does installation affect performance?

Thermal conductivity testing timing (Thermal Management)

Drip shield - Study program

- Ceramic
- Metal
- Determine TSPA need

Drip shield emplacement

### OUTER BARRIER - corrosion allowance

Material Selection

- Long term performance - model development  
corrosion:

- General
- Pitting
- MIC
- Galvanic
- Et al

- Fabricability (Is it?)

- Availability

- Chemical Interactions

- Cost Evaluations

Thickness Determination

Closure Mechanism

Inspection Requirement (NDE)

Shielding

	Blm	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Line	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Structural	Designs
Unknown Material														
- Over Package														
- Under Package														
TSPA Need - Performance Requirement	3													
Design - Test - Material Interaction														
- Thermal Conductivity														
- Porosity														
Pre-Employment (under WP)	2													
Post-Placement (overlay)	3													
NOTE: (Ground support design for 100 years for backfill installation)														
- Mechanical														
- Constructability - Repository														
- Feasibility														
Does installation affect performance?	3													
Thermal conductivity testing timing (Thermal Management)														
Drip shield - Study program	3													
- Ceramic														
- Metal														
- Determine TSPA need														
Drip shield emplacement	2													
OUTER BARRIER - corrosion allowance														
Material Selection														
- Long term performance - model development corrosion:	3													
- General														
- Pitting														
- MIC														
- Galvanic														
- Et al														
- Fabricability (Is it?)	1													
- Availability	1													
- Chemical Interactions														
- Cost Evaluations	1													
Thickness Determination	3													
Closure Mechanism	2													
Inspection Requirement (NDE)	3													
Shielding	2													

**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**WASTE PACKAGE (Cont)**

**INNER BARRIER-**

Corrosion Resistant

**Material Selection**

- Long term performance - model development corrosion:

- Fabricability
- Availability
- Chemical Interaction
- Cost Evaluations

**Thickness Determination**

**Closure Mechanism**

**Inspection Requirement (NDE)**

**Shielding**

**Interaction with Fuel**

**Interaction with Outer Barrier**

**Cathodic Protection**

**BASKET**

**Material Selection**

- Long term performance - model development corrosion:

- Fabricability
- Availability
- Chemical Interaction
- Cost Evaluations

**Thickness Determination**

**Attachment to Inner Barrier**

**Inspection Requirement**

**Shielding**

**Interaction with Fuel**

**Interaction with Inner Barrier**

**Cathodic Protection**

**Structural**

**Criticality control**

**Thermal**

**Neutronic Issues**

**DHLW BASKET**

**Material consideration**

Bin	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Specifications
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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY - SUBSURFACE  
UNDERGROUND CLOSURE  
SEALS**

Strategy is that ramp is not a preferential pathway  
/Human Barriers

Dry Site - not critical item

- Preclosure - See linings
- Postclosure
  - Location - Criteria
  - Excavate
  - Material
  - Method of Construction -  
(sealing equipment)
  - Test procedures
  - Peripheral Sealing

Seals may require a test, study, & analysis program to  
support design

Closure Backfill (human intrusion & subsidence  
prevention) (Everything but emplacement  
drifts; no PA purpose)

- Material
- Select for Compatability w/seals
- Test
- Availability
- Argument NOT to backfill study
- Dist Systems Material Handling
- Emplacement & Handling/Distribution System

**RAMES**

**PORTALS (NORTH)**

Layout

- Structure
- Ground Control (Structural Support)
- Access Doors (Machinery, Personnel)
- Utility Interface (Conveyer, water, power, air,  
communications, emergency systems)
- Security Monitor (separate system)
- Ventilation Interface
- Airlocks
  - Personnel
  - Material

Bin	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One Lines	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Specifications
2												
1												
3												
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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY - SUBSURFACE  
UNDERGROUND CLOSURE (Cont)  
PORTALS (SOUTH)**

Layout

- Structure
- Ground Control (Structural Support)
- Access Doors (Machinery, Personnel)
- Utility Interface (Conveyor, water, power, air, communications, emergency systems)
- Security Monitor (separate system)
- Ventilation Interface
- Airlocks
  - Personnel
  - Material

Bin	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Line	Logics	Handing Drawings	Equipment Outlines	System Description	Analyses	Calculations	Specifications
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2												
3												
1												
1												
2												
1												

**PORTALS (NORTH)**

Ramp Interior

- Ground control
- Invert (non-emplacment)
- Utilities
- Ventilation (structure)
- Personnel Access
- Rail System
- Water Control System
- Conveyor System
- Fire Detection System
- Fire Suppression System
- Waste Access (OP analyze)
- Intersections

3												
3												
1												
1												
1												
2												
2												
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2												
2												
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2												

**PORTALS (SOUTH)**

Ramp Interior

- Ground control
- Invert (non-emplacment)
- Utilities
- Ventilation (structure)
- Personnel Access
- Rail System
- Water Control System
- Conveyor System
- Fire Detection System
- Fire Suppression System
- Waste Access (OP analyze)
- Intersections

3												
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1												
1												
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2												
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2												

**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**REPOSITORY-SUBSURFACE  
UNDERGROUND CLOSURE  
SHAFTS**

**DEVELOPMENT EXHAUST SHAFT**

- Foreshaft
- Layout
- Collar
- Ground Control (Structural Support)
- Access doors
- Utility Interface (Conveyer water, power, air communications, emergency power)
- Security Monitor
- Ventilation Interface
- Location
- Excavation Method
- Liner/Embedments (ground support)
- Shaft Stations
- Guides/Structures
- Personnel Access (emergency)
- Water Control
- Vent Subduct
- Hoist System
- (Rad Mon F/U)(DBE, decon)
- Seals Interface

Bin	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Line	Logics	Handling Drawings	Equipment Outlines	System Description	Analyses	Calculations	Specifications
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2												
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**REPLACEMENT EXHAUST SHAFT**

- Foreshaft
- Layout
- Collar
- Ground Control (Structural Support)
- Access doors
- Utility Interface (Conveyer water, power, air communications, emergency power)
- Security Monitor
- Ventilation Interface
- Location
- Excavation Method
- Liner/Embedments (ground support)
- Shaft Stations
- Guides/Structures
- Personnel Access (emergency)
- Water Control
- Vent Subduct
- Hoist System
- (Rad Mon F/U)(DBE, decon)
- Seals Interface

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**COMPONENT LEVEL OF DESIGN DETAIL  
BY DESIGN PRODUCTS**

**RUNNING LIST OF DESIGN GUIDES**

- Ground Support & Embedments
- Seismic Structure
- Instrumentation
- Electrical Distribution
- Piping Distribution
- Penetration commodity guide
- Remote Operation & Control Guide
- Fire Protection
- Computer Design Guide (data collection & control)
- Decontamination System Design Guide
- Cranes & Lifting Devices
- Surface Transportation
  - Carts
  - Rail System

Bin	System Design Guides	Commodity Design Guides	General Arrangements	P&ID	Electrical One-Line	Logics	Handling Drawings	Equipment Outlines	System Description	Analysis	Calculations	Specifications

**OTHER DESIGN PRODUCTS, STUDIES, SUPPORT REQUIREMENTS**

- Licensing Compliance
- Technical Specifications
- Quality Program/Procedures Improved
- Rail vs rubber wheel
- Ramps vs shafts - usage study/report
- Criticality control in surface facilities (fire suppression - water system)
- Security Topical
- Fuel Inspection Criteria
- Argument not to backfill non-emplacement drifts; no backfill for human intrusion or subsidence


Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish							
							FY96	FY97	FY98	FY99	FY00	FY01	FY02
WP120	Short-Term Waste Form Testing-1	261	2	WP120	02OCT95	30SEP96							
EIWP1201	Develop Preliminary Process Models for Degradati	256	3	WP120	02OCT95*	07OCT96							
EIWP1202	Measure Oxidation Using TGA Techniques	256	3	WP120	02OCT95*	07OCT96							
EIWP1203	Measure Dissolution in Flow-Through Tests	256	3	WP120	02OCT95*	07OCT96							
EIWP1204	Measure HLWG Degradation Process Model Parameter	256	3	WP120	02OCT95*	07OCT96							
<b>Materials Testing</b>													
<b>WP0020 - Prepare EMCR Rev 2</b>													
WP0020	Prepare EMCR Rev 2	194	2	WP0020	09JAN98	07OCT98							
EIWP0011	Support Systems Studies	1,608	3	WP0020	02OCT95	01MAR02							
EIWP00202	Assemble Data & Process Models	190	3	WP0020	09JAN98*	07OCT98							
EIWP0020A	Prepare & Review EMCR Rev 02	190	3	WP0020	09JAN98*	07OCT98							
<b>WP0021 - Short Duration Materials Testing - 1</b>													
WP0021	Short Duration Materials Testing - 1	261	2	WP0021	02OCT95	30SEP96							
EIWP00211	Develop Preliminary Process Models for Degradati	251	3	WP0021	02OCT95	30SEP96							
EIWP00212	Measure Critical Pitting Potential	251	3	WP0021	02OCT95	30SEP96							
EIWP00213	Measure Critical Crevice Potential	251	3	WP0021	02OCT95	30SEP96							
EIWP00214	Measure air/steam oxidation	251	3	WP0021	02OCT95	30SEP96							
EIWP00215	Measure Environmentally Assist. Cracking	251	3	WP0021	02OCT95	30SEP96							
EIWP00216	Measure MIC	251	3	WP0021	02OCT95	30SEP96							
EIWP00217	Test Other EB Segment Materials	251	3	WP0021	02OCT95	30SEP96							
EIWP00218	Perform Degradn Mode Surveys	251	3	WP0021	02OCT95	30SEP96							
EIWP00219	Perf Basket Materials Scoping Tests	251	3	WP0021	02OCT95	30SEP96							
							FY96	FY97	FY98	FY99	FY00	FY01	FY02

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		
<b>WP0026 - Short Duration Materials Testing - 2</b>															
WP0026	Short Duration Materials Testing - 2	527	2	WP0026	01OCT96	07OCT98									
EIWP00269	Determine Materl Thermal Stability	502	3	WP0026	01OCT96*	30SEP98									
EIWP00272	Test Basket Material	502	3	WP0026	01OCT96*	30SEP98									
EIWP00271	Develop Container Materls Models	501	3	WP0026	02OCT96*	30SEP98									
EIWP00261	Develop EB Segment Material Models	502	3	WP0026	03OCT96*	02OCT98									
EIWP00262	Test candidate metal barrier material	502	3	WP0026	03OCT96*	02OCT98									
EIWP00263	Measure Critical Pitting Potential	502	3	WP0026	03OCT96*	02OCT98									
EIWP00264	Measure Critical Crevice Potential	502	3	WP0026	03OCT96*	02OCT98									
EIWP00265	Measure air/steam oxidation	502	3	WP0026	03OCT96*	02OCT98									
EIWP00266	Measure Environmentally Assist. Cracking	502	3	WP0026	03OCT96*	02OCT98									
EIWP00267	Measure MIC	502	3	WP0026	03OCT96*	02OCT98									
EIWP00268	Test Other EB Segment Materials	502	3	WP0026	03OCT96*	02OCT98									
EIWP00270	Develop Advanced Techniques	400	3	WP0026	03MAR97*	30SEP98									
<b>WP015 - Prepare EMCR Rev 1</b>															
WP015	Prepare EMCR Rev 1	259	2	WP015	01MAR96	26FEB97									
EIWP015A	Prepare & Review EMCR Rev 1	249	3	WP015	01MAR96*	26FEB97									
EIWP0152	Assemble Data & Process Models	247	3	WP015	05MAR96*	26FEB97									
<b>Thermal Effects</b>															
<b>ST135 - Single Heater Test: Installation</b>															
ST135	Single Heater Test: Installation	76	2	ST135	14MAY96	27AUG96									
<b>ST140 - Drift Scale Heater Test: Installation</b>															
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish	FY96	FY97	FY98	FY99	FY00	FY01	FY02
SSNE540	NEPA Biolog. Resources. Prelim. Impacts Assessme	113	4	NE1250	01OCT97	17MAR98							
NE5001 - Prepare PDEIS													
NF5001	Prepare PDEIS	120	2	NE5001	02SEP98	16FEB99							
SSNE5001	Prepare PDEIS	112	3	NE5001	01SEP98	12FEB99							
NE5003 - DOE HQ Review													
NE5003	DOE HQ Review	22	2	NE5003	17FEB99	18MAR99							
SSNE5003	DOE HQ Review	22	3	NE5003	14JAN99	12FEB99							
NE5024 - PISA/PDEIS Variance Analysis													
NF5024	PISA/PDEIS Variance Analysis	44	2	NE5024	02SEP98	02NOV98							
SSNE5024	PISA/PDEIS Variance Analysis	42	3	NE5024	01SEP98	30OCT98							
R5171M0 - Publish FEIS Record of Decision													
SSNE560	NEPA Compliance Support Activities	1,004	3	R5171M0	01OCT96*	29SEP00							
MGDS													
General													
MG010 - Write Design/Operations PISA CH. 3,4,5,6													
MG010	Write Design/Operations PISA CH. 3,4,5,6,9,11	195	2	MG010	30SEP97	29JUN98							
EIMG010401	Write Surface Design Operations PISA-RSD Ph I	186	3	MG010	02OCT95	27JUN96							
EIWP0701	Provide WPM/WPD Input to Progress Reports	1,443	3	MG010	02OCT95	02JUL01							
EIMG01402A	Write PISA	437	3	MG010	01OCT96*	29JUN98							
EIWP050A9M	Prepare WPD Input to PISA Chap 5&6	391	3	MG010	08OCT96*	30APR98							
EIWP0702	Issue WPM Input to PISA Chapter 5 & 6	391	3	MG010	08OCT96*	30APR98							
SSNE648	Prepare Input for PISA Section 9.1	187	3	MG010	02SEP97*	01JUN98							
SSNE654	Prepare Input for PISA Section 9.4	187	3	MG010	02SEP97	01JUN98							
							FY96	FY97	FY98	FY99	FY00	FY01	FY02

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish	FY96	FY97	FY98	FY99	FY00	FY01	FY02
SSNE624	Prepare Input for PISA Sec. 2.1 (Geog. & Demog.)	123	3	MG010	05DEC97*	01JUN98							
SSNE630	Prepare Input for PISA Section 2.2	125	3	MG010	05DEC97	03JUN98							
<b>MG050 - MGDS Design Phase I Review</b>													
MG050	MGDS Design Phase I Review	61	2	MG050	07JUL97	29SEP97							
EIRPMG05	MGDS Design Phase I Review - Repository	60	3	MG050	07JUL97*	29SEP97							
EIWPMG05	MGDS Dsgn Phase I Review - Waste Package	60	3	MG050	07JUL97*	29SEP97							
<b>MG060 - MGDS Design Phase II Review</b>													
MG060	MGDS Design Phase II Review	66	2	MG060	30APR99	30JUL99							
EIRPMG06	MGDS Design Phase II Review - Repository	64	3	MG060	30APR99*	30JUL99							
EIWPMG06	MGDS Design Phase II Review - Waste Package	107	3	MG060	30APR99*	30SEP99							
<b>MG070 - MGDS Design Phase III Review</b>													
MG070	MGDS Design Phase III Review	66	2	MG070	27NOV01	01MAR02							
EIRPMG07	MGDS Design Phase III Review Repository	66	3	MG070	27NOV01*	01MAR02							
EIWPMG07	MGDS Design Review Phase III - Waste Package	66	3	MG070	27NOV01*	01MAR02							
<b>XMG0018 - Finalize ConOps/Funct Flow</b>													
XMG0018	Finalize ConOps/Funct Flow	123	2	XMG0018	01OCT96*	31MAR97							
<b>XMG0070 - Develop TSLCC Input for VA</b>													
XMG0070	Develop TSLCC Input for VA	336	2	XMG0070	01APR96*	30JUL97							
<b>XMG0080 - Develop Final TSLCC Input</b>													
XMG0080	Develop Final TSLCC Input	246	2	XMG0080	04AUG97*	27JUL98							
<b>Engineered Barrier System</b>													
<b>WP050 - EBS Design - Phase II</b>													
WP050	EBS Design - Phase II	475	2	WP050	06OCT97	30JUL99							
EIW050A6	Develop Probabilistic Design Methods - Ph-I	257	3	WP050	02OCT95	08OCT96*							

FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02

FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		
EIWP0509N	Analyse EBS Performance - Ph II	459	3	WP050	02OCT95	30JUL97									
EIWP0509P	Perform Probabilistic Eval. of EBS Designs	459	3	WP050	02OCT95	30JUL97									
EIWP0509P1	Probabilistic Eval. Anal. of EBS Designs	732	3	WP050	02OCT95	31AUG98									
EIWP0509P2	Final Prob. Eval. Anal. for Licensing Process	940	3	WP050	02OCT95	30JUN99									
EIWP0705	Review TSPA Results	459	3	WP050	01OCT97	30JUL99									
EIWP0712	Management & Integration Support	459	3	WP050	01OCT97	30JUL99									
EIWP0504A	Comp Devel/EBS Backfill, Drip Shield & Add Barr.	456	3	WP050	06OCT97*	30JUL99									
EIWP0504B	Comp DOE High Level Waste Evaluation	456	3	WP050	06OCT97*	30JUL99									
EIWP0509E	Integrate Systems Studies	456	3	WP050	06OCT97*	30JUL99									
EIWP0509F	Integrate Requirements	456	3	WP050	06OCT97*	30JUL99									
EIWP0509G	Integrate DBEs & DBAs	456	3	WP050	06OCT97*	30JUL99									
EIWP0509H	Integrate Environ Assessment Performance	456	3	WP050	06OCT97*	30JUL99									
EIWP0509I	Integrate Performance Assessment TSPA-LA	456	3	WP050	06OCT97*	30JUL99									
EIWP0509J	Develop EBS System Design Description	456	3	WP050	06OCT97*	30JUL99									
EIWP0509K	Integrate Dev of Licensing & Reg Documents	456	3	WP050	06OCT97*	30JUL99									
EIWP0509L	Integrate Development of NEPA Documents	456	3	WP050	06OCT97*	30JUL99									
EIWP0501	Complete Dev of CF Disposal Container Design	456	3	WP050	30OCT97*	24AUG99									
EIWP0502	Complete Dev of UCF Disposal Container Design	456	3	WP050	30OCT97*	24AUG99									
EIWP0503	Complete Dev of HLW Disposal Container Design	456	3	WP050	30OCT97*	24AUG99									
EIWP0504	Complete Dev of EBS Invert	456	3	WP050	30OCT97*	24AUG99									

FY96	FY97	FY98	FY99	FY00	FY01	FY02

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish								
							FY96	FY97	FY98	FY99	FY00	FY01	FY02	
EIWP0505	Develop EB Segment Parts List, Dwgs & Specs	456	3	WP050	30OCT97*	24AUG99								
EIWP0507	Complete EB Segment Materials Selection	456	3	WP050	30OCT97*	24AUG99								
EIWP0508	Review and Document EB Segment Mats Selection	456	3	WP050	30OCT97*	24AUG99								
EIWP0509	Develop Disposal Container Fabrication	456	3	WP050	30OCT97*	24AUG99								
EIWP0509A	Develop Disposal Container Closure Method	456	3	WP050	30OCT97*	24AUG99								
EIWP0509B	Develop Non-destructive Examination Methods	456	3	WP050	30OCT97*	24AUG99								
EIWP0509C	Prepare EB Segment Cost Estimates	456	3	WP050	30OCT97*	24AUG99								
EIWP07051	Review TSPA Results	459	3	WP050	01OCT98	31JUL00								
WP050A - EBS Design - Phase I														
WP050A	EBS Design - Phase I	521	2	WP050A	02OCT95	29SEP97								
EIWP050A9H	Integrate Systems Studies	501	3	WP050A	02OCT95	29SEP97								
EIWP050A9I	Integrate Funct Analyses & Reqts	501	3	WP050A	02OCT95	29SEP97								
EIWP050A9J	Define EBS - DBEs & DBAs	501	3	WP050A	02OCT95	29SEP97								
EIWP050A9K	Integrate Environ Assessment Performance	501	3	WP050A	02OCT95	29SEP97								
EIWP050A9N	Integrate Dev of Licensing & Reg Documents	501	3	WP050A	02OCT95	29SEP97								
EIWP050A9O	Develop EBS System Design Desc. - Ph I	501	3	WP050A	02OCT95	29SEP97								
EIWP050A4A	Comp Ph-I Dsgn/Backfill, Drip Shields/Add Barr.	502	3	WP050A	02OCT95	30SEP97								
EIWP050A4B	Comp Ph-I DOE High Level Waste Evaluation	502	3	WP050A	02OCT95	30SEP97								
EIWP050A9Q	Analyze EBS Performance - Phase I	502	3	WP050A	02OCT95	30SEP97								
EIWP050A9R	Perform Probabilistic Eval. of WP Designs	502	3	WP050A	02OCT95	30SEP97								
EIWP050A9L	Integrate Performance Assessment TSPA-VA	504	3	WP050A	02OCT95	02OCT97								
							FY96	FY97	FY98	FY99	FY00	FY01	FY02	

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish							
							FY96	FY97	FY98	FY99	FY00	FY01	FY02
EIWP050A1	Complete Phase I of the CF Disposal Container De	522	3	WP050A	02OCT95	29OCT97							
EIWP050A2	Complete Phase I of the of UCF Disposal Containe	522	3	WP050A	02OCT95	29OCT97							
EIWP050A3	Complete Phase I of the HLW Disposal Container D	522	3	WP050A	02OCT95	29OCT97							
EIWP050A4	Complete Phase I Design of EBS Invert	522	3	WP050A	02OCT95	29OCT97							
EIWP050A5	Complete Phase I-EB Segment Parts List Dwgs Spec	522	3	WP050A	02OCT95	29OCT97							
EIWP050A7	Complete Phase I of the EB Segment Materials Set	522	3	WP050A	02OCT95	29OCT97							
EIWP050A8	Review & Document Phase I EBS Material Selection	522	3	WP050A	02OCT95	29OCT97							
EIWP050A9	Complete Phase I Disposal Container Fabrication	522	3	WP050A	02OCT95	29OCT97							
EIWP050A9A	Complete Phase I Disposal Container Closure Meth	522	3	WP050A	02OCT95	29OCT97							
EIWP050A9B	Complete Phase I development of Non-destructive	522	3	WP050A	02OCT95	29OCT97							
EIWP050A9C	Complete Phase I EB Segment Cost Estimates	522	3	WP050A	02OCT95	29OCT97							
EIWP0703	Support PA Working Groups	251	3	WP050A	01OCT96*	30SEP97							
EIWP0711	Management & Integration Support	251	3	WP050A	01OCT96*	30SEP97							
EIWP07031	Support PA Working Groups	502	3	WP050A	01OCT96*	30SEP98							
WP080 - Criticality Analysis Technical Report													
WP080	Criticality Analysis Technical Report	261	2	WP080	02OCT95	30SEP96							
EIWP080A	Complete Final Disp. Criticality Anal. Technic Rpt	251	3	WP080	02OCT95	30SEP96							
EIWP080B	Develop Initial Disp. Crit. Anal. Consequence Mdl	251	3	WP080	02OCT95	30SEP96							
WP100 - Update Disposal Criticality Topical Repo													
WP100	Update Disposal Criticality Topical Report	198	2	WP100	22APR96	22JAN99							
EIWP100C	Update Disposal Criticality Topical Rpt.	480	3	WP100	02OCT95	28AUG97							
							FY96	FY97	FY98	FY99	FY00	FY01	FY02



Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish	FY96	FY97	FY98	FY99	FY00	FY01	FY02
SI.WP100A	Coord Final Criticality Control Top. Rpt. Devlp.	189	3	WP100	08OCT97	10JUL98							
EIWP100A	Devel.Final Disposal Criticality Topical Report	231	3	WP100	08OCT97*	09SEP98							
EIWP0510	Develop Probabilistic Design Methods - Ph II	231	3	WP100	22APR98*	24MAR99							
EIWP100B	Comp. Disp.Crit.Anal.Consequence Mdl.	231	3	WP100	22APR98*	24MAR99							
WP150 - Develop Criticality Control Topical Repo													
WP150	Develop Criticality Control Topical Report	267	2	WP150	01OCT96	08OCT97							
EIWP080A6	Develop Probabilistic Design Methods	230	3	WP150	02OCT95	29AUG96							
EIWP150A	Develop Draft Disposal Criticality Topical Rpt	230	3	WP150	01OCT96*	29AUG97							
EIWP150B	Develop Disp Crit Anal Consequence Mdl	230	3	WP150	01OCT96	29AUG97							
SI.WP150A	Coord Criticality Control Top Rpt Draft Devlp	257	3	WP150	01OCT96	08OCT97							
WP275 - EBS Design Phase III													
WP275	EBS Design Phase III	642*	2	WP275	09AUG99	01MAR02							
EIWP2768	Finalize EBS System Design Description	441	3	WP275	27JUL99*	27APR01							
EIWP2763	Apply & Update Disposal Crit Anal Methodology	125	3	WP275	30JUL99	31JAN00*							
EIWP2764	Update EBS Technical Spec's	125	3	WP275	30JUL99*	31JAN00							
EIWP2751	Support Development of LA	648	3	WP275	30JUL99*	01MAR02							
EIWP2760	Document Dev. of EBS Invert	648	3	WP275	30JUL99*	01MAR02							
EIWP2762	Doc.Dev. of EBS Backfill,Drip Shield,& Add Barr.	648	3	WP275	30JUL99*	01MAR02							
EIWP0713	Management & Integration Support	604	3	WP275	02AUG99	28DEC01							
EIWP2766	Perform Probabilistic Eval. for Licensing Proc.	647	3	WP275	02AUG99*	01MAR02							
EIWP2752	Document Development of CF Disposal Container De	648	3	WP275	25AUG99	27MAR02							
							FY96	FY97	FY98	FY99	FY00	FY01	FY02



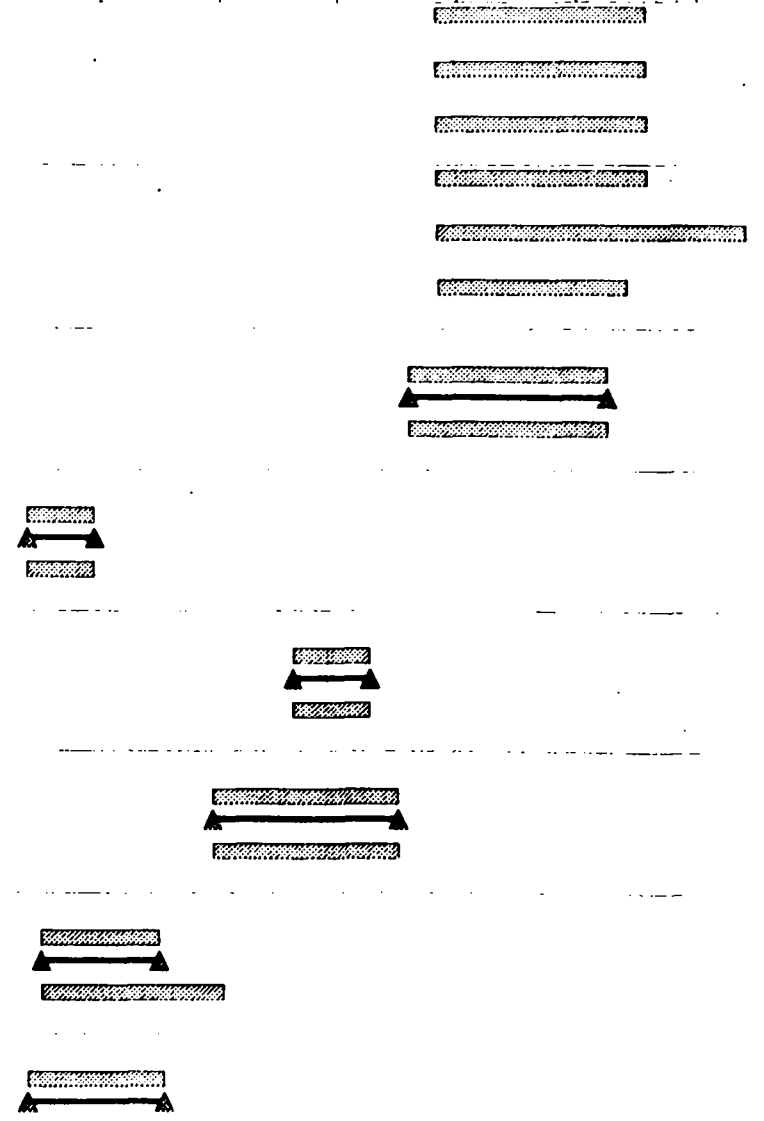
Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		
EIWP2753	Doc. Devel'mt of UCF Disposal Container Design	648	3	WP275	25AUG99	27MAR02									
EIWP2754	Document Development of HLW Disposal Container D	648	3	WP275	25AUG99	27MAR02									
EIWP2756	Complete EB Segment Parts List, Dwgs & Specs	648	3	WP275	25AUG99	27MAR02									
EIWP2758	Complete EB Segment Materials Selection	648	3	WP275	25AUG99	27MAR02									
EIWP2759A	Comp. Devel'mt of Disposal Container Fabrication	648	3	WP275	25AUG99	27MAR02									
EIWP2759B	Develop Non-destructive Examination Methods	648	3	WP275	25AUG99	27MAR02									
EIWP2759C	Update EB Segment Cost Estimates	648	3	WP275	25AUG99	27MAR02									
XWP3015 - Develop Tech Specs															
XWP3015	Develop Tech Specs	272	2	XWP3015	03SEP96*	01OCT97									
EIWP1015A	Develop EBS Tech Specs for Safety Systems	272	3	XWP3015	01JUL98*	30JUL99									
XWP508 - Develop Galvanic Corrosion Protection															
XWP508	Develop Galvanic Corrosion Protection	123	2	XWP508	10JUN96*	05DEC96									
EIWP508A	Substantiate WP Galvanic Corrosion Protection	123	3	XWP508	02JAN96*	24JUN96									
XWP511 - Determine Near field Environment Impact															
XWP511	Determine Near field Environment Impacts	200	2	XWP511	10JUN96*	27MAR97									
EIWP511A	Determine Near Field Environment Impacts	200	3	XWP511	01OCT96*	18JUL97									
Repository Subsurface															
RP120 - Subsurface Design - Phase I															
RP120	Subsurface Design - Phase I	521	2	RP120	02OCT95	29SEP97									
EIRPI2002	FY96 Activities	251	3	RP120	02OCT95	30SEP98									
EIRPI2105	Waste Emplacement Strategy	102	3	RP120	01OCT96*	28FEB97									
EIRPI2020	Underground HVAC System	112	3	RP120	01OCT96*	14MAR97									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish										
							FY96	FY97	FY98	FY99	FY00	FY01	FY02			
EIRP12065	Prelim Design of Undrgrnd Fac Portion of EB Seg	122	3	RP120	01OCT96*	28MAR97										
EIRP12040	Performance Confirmation Design	124	3	RP120	01OCT96*	01APR97										
EIRP12003	Support SRA - Phase I	250	3	RP120	01OCT96	29SEP97										
EIRP12035	Radiological Safety	251	3	RP120	01OCT96*	30SEP97										
EIRP12037	Support DBA/Q-List Development	251	3	RP120	01OCT96*	30SEP97										
EIRP12090	Design Guide Development - Phase I	251	3	RP120	01OCT96*	30SEP97										
EIRP12097	M & I - SubSurface	251	3	RP120	01OCT96*	30SEP97										
EIRP12101	SDD Development	251	3	RP120	01OCT96*	30SEP97										
EIRP12070	Cost Update	190	3	RP120	08OCT96*	11JUL97										
EIRP12015	Update/Refine Concept of Operations	242	3	RP120	15OCT96*	30SEP97										
EIRP12005	Develop Subsurface Layout	187	3	RP120	01NOV96*	31JUL97										
EIRP12010	Preliminary Utilities Description	187	3	RP120	01NOV96*	31JUL97										
EIRP12085	NEPA Support	218	3	RP120	15NOV96*	26SEP97										
EIRP12045	Interface Activities	211	3	RP120	02DEC96*	30SEP97										
EIRP12030	Preliminary Sealing/Closure Design	141	3	RP120	11FEB97*	29AUG97										
RP170A - Subsurface Design - Phase II																
RPI70A	Subsurface Design - Phase II	475	2	RP170A	06OCT97	30JUL99										
FIRP17205	Seals/Decommissioning	272	3	RP170A	30SEP97*	29OCT98										
FIRP17005	Update Subsurface Layout	123	3	RP170A	01OCT97*	31MAR98										
FIRP17040	Refine Subsurface Waste Handling System Design	156	3	RP170A	01OCT97	15MAY98										
FIRP17055	Update Utilities Systems Design	251	3	RP170A	01OCT97*	30SEP98										
							FY96	FY97	FY98	FY99	FY00	FY01	FY02			

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish								
							FY96	FY97	FY98	FY99	FY00	FY01	FY02	
EIRPI7010	Refine Ground Support Systems	374	3	RP170A	01OCT97*	31MAR99								
EIRPI7003	Interface Activities	397	3	RP170A	01OCT97	03MAY99								
EIRPI7020	Radiological Safety	438	3	RP170A	01OCT97*	30JUN99								
EIRPI7000	Support SRA - Phase II	455	3	RP170A	01OCT97	26JUL99								
EIRPI7001	Refine Concept of operations	455	3	RP170A	01OCT97	26JUL99								
EIRPI7017	Design Guide Development - Phase II	455	3	RP170A	01OCT97	26JUL99								
EIRPI7022	Support DBA/Q-List Development	455	3	RP170A	01OCT97	26JUL99								
EIRPI7065	Cost Update	455	3	RP170A	01OCT97	26JUL99								
EIRPI7070	SDD Development - Phase II	455	3	RP170A	01OCT97	26JUL99								
EIRPI7075	Develop Tech. Spec's - Phase II	455	3	RP170A	01OCT97*	26JUL99								
EIRPI7098	M & I - SubSurface	455	3	RP170A	01OCT97	26JUL99								
EIRPI7099	Refine Underground Facility Portion of EB Seg.	455	3	RP170A	01OCT97	26JUL99								
EIRPI7015	Refine Retrieval System and Strategy	190	3	RP170A	02JAN98*	30SEP98								
EIRPI7025	Finalize HVAC System Configurations	190	3	RP170A	02JAN98*	30SEP98								
EIRPI7035	Refine Emergency Systems Designs	146	3	RP170A	30JUN98*	29JAN99								
EIRPI7045	Update Materials Identification and Characterist	111	3	RP170A	01OCT98*	15MAR99								
RP180 - Subsurface Design Phase III														
RP180	Subsurface Design Phase III	642	2	RP180	09AUG99	01MAR02								
EIRPI8050	Conduct of Operations	129	3	RP180	27JUL99*	01FEB00								
EIRPI8010	Support SRA - Phase III	441	3	RP180	27JUL99	27APR01								
EIRPI8025	Support DBA/Q-List Development	441	3	RP180	27JUL99	27APR01								
							FY96	FY97	FY98	FY99	FY00	FY01	FY02	

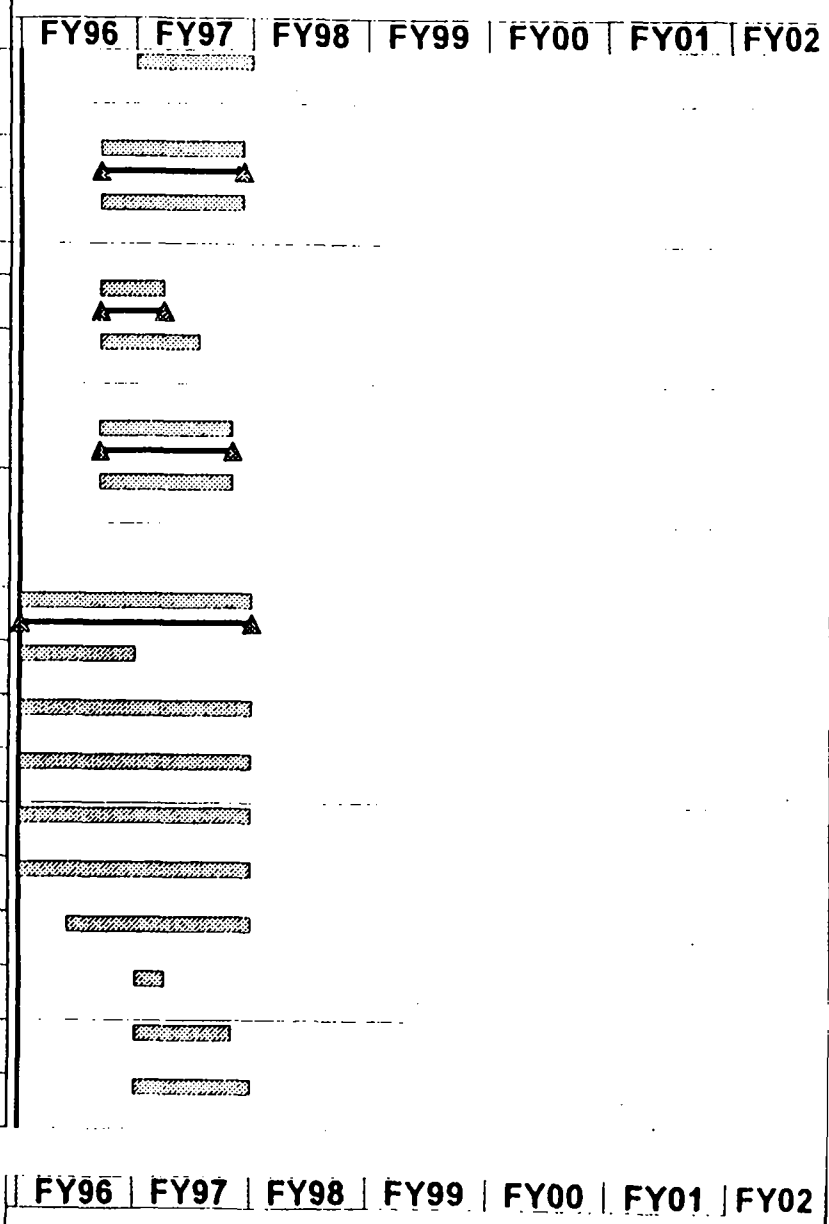
Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish
EIRP18045	SDD Development - Phase III	441	3	RP180	27JUL99	27APR01
EIRP18055	License Application Development	441	3	RP180	27JUL99*	27APR01
EIRP18060	Complete LA Design	441	3	RP180	27JUL99*	27APR01
EIRP18005	Interface Activities	443	3	RP180	27JUL99*	01MAY01
EIRP18065	M & I - SubSurface	651	3	RP180	27JUL99	01MAR02
EIRP18007	Cost Update	396	3	RP180	02AUG99*	01MAR01
XRP2025 - Prepare Tech Specs						
XRP2025	Prepare Tech Specs	417	2	XRP2025	30APR99*	28DEC00
EIRP17050	Prepare Technical Specifications	417	3	XRP2025	30APR99*	28DEC00
XRP2035 - Develop Subsurface Layout						
XRP2035	Develop Subsurface Layout	149	2	XRP2035	01FEB96*	30AUG96
EIRP12110	Develop Subsurface Layout	149	3	XRP2035	01FEB96*	30AUG96
XRP2055 - Update Sub Surface Fac/Arrangements						
XRP2055	Update Sub Surface Fac/Arrangements	168	2	XRP2055	30APR98*	31DEC98
EIRP17010	Prep. Subsurface Supt. Facility Gen. Arrangement	168	3	XRP2055	30APR98*	31DEC98
XRP2215 - Prepare Thermal Mgmt Technical Report						
XRP2215	Prepare Thermal Mgmt Technical Report	395	2	XRP2215	02SEP97*	31MAR99
EIRP17200	Prepare Thermal Mgmt Technical Report	395	3	XRP2215	02SEP97*	31MAR99
XRP500 - Identify Emplacement Drift Materials						
XRP500	Identify Emplacement Drift Materials	253	2	XRP500	13MAR96*	14MAR97
EIRP12060	Identify Materials of Construction	392	3	XRP500	13MAR96*	30SEP97
XRP502 - Develop WP Handling Concept						
XRP502	Develop WP Handling Concept	292	2	XRP502	01FEB96*	31MAR97

FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02



FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02

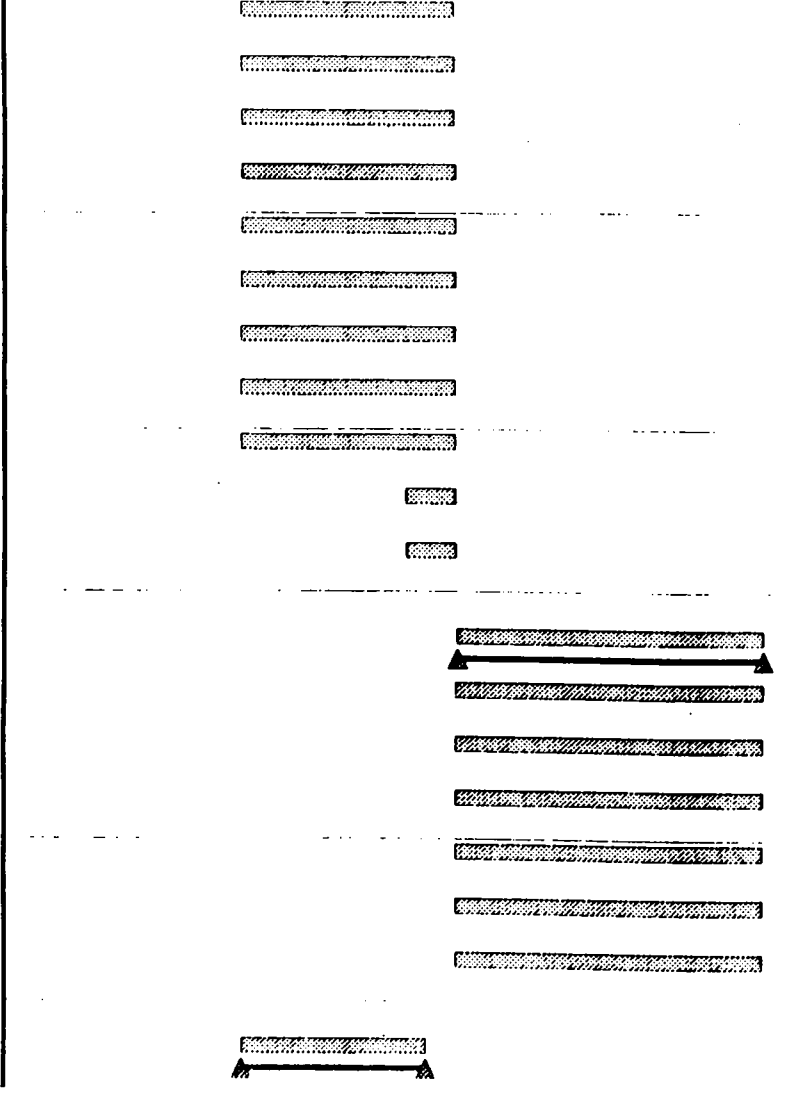
Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		
EIRP12025	Subsurface Waste Package Handling Design	251	3	XRP502	01OCT96*	30SEP97									
XRP504 - Develop Retrieval Strategy															
XRP504	Develop Retrieval Strategy	309	2	XRP504	10JUN96*	29AUG97									
EIRP12050	Develop Retrieval Design	309	3	XRP504	10JUN96*	29AUG97									
XRP506 - Develop drift stability approach															
XRP506	Develop drift stability approach	136	2	XRP506	10JUN96*	24DEC96									
EIRP12001	Develop Drift Stability Approach	213	3	XRP506	10JUN96*	15APR97									
XRP510 - Determine Near field Environment Impact															
XRP510	Determine Near field Environment Impacts	287	2	XRP510	10JUN96*	30JUL97									
EIRP12055	Develop Near-Field Environment	288	3	XRP510	10JUN96*	31JUL97									
Repository Surface															
RP020 - Surface Design - Phase I															
RP020	Surface Design - Phase I	521	2	RP020	02OCT95	29SEP97									
EIRP2402B	Uncanistered Fuel Recpt/Handling Anal. RSD Ph.I	251	3	RP020	02OCT95	30SEP96									
EIRP2401	Management and Integration-RSD Ph.I	502	3	RP020	02OCT95	30SEP97									
EIRP2404	Cost Estimating - RSD Ph.I	502	3	RP020	02OCT95	30SEP97									
EIRP2405A	Support SRA-RSD Ph.I	502	3	RP020	02OCT95	30SEP97									
EIRP2405B	Support Systems Studies RSD Ph.I	502	3	RP020	02OCT95	30SEP97									
EIRP2406	Interface Activities -RSD Ph.I	400	3	RP020	01MAR96*	30SEP97									
EIRP2402C	Operations/Staffing Analysis-RSD Ph.I	82	3	RP020	01OCT96*	02JAN97									
EIRP2403G	Site-Utilities System Design-RSD Ph.I	208	3	RP020	01OCT96*	30JUL97									
EIRP2402A	Radiological Safety - RSD Ph.I	251	3	RP020	01OCT96*	30SEP97									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		



Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		
EIRP2402D	Prepare Design Guides-RSD Ph.I	251	3	RP020	01OCT96*	30SEP97									
EIRP2403A	Updt/Intgrt Nuclear Facil Design-RSD Ph.I	251	3	RP020	01OCT96*	30SEP97									
EIRP2405C	Support DBA/Q-List Development-RSD Ph I	251	3	RP020	01OCT96*	30SEP97									
EIRP2407	Develop Alternatives Data for NEPA-RSD Ph.I	190	3	RP020	02JAN97*	30SEP97									
EIRP2403B	Non-Nuclear Structures Design -RSD Ph.I	147	3	RP020	03JAN97*	31JUL97									
EIRP2403C	Site Preparation - RSD Ph.I	147	3	RP020	03JAN97*	31JUL97									
EIRP2403H	Site-Monitoring,Control & Comm Sys Dsgn-RSD Ph.I	147	3	RP020	03JAN97*	31JUL97									
EIRP2403I	Site-Physical Security Design -RSD Ph I	147	3	RP020	03JAN97*	31JUL97									
EIRP2408	Nevada Transportation - RSSD Ph-I	167	3	RP020	31JAN97*	26SEP97									
RP070A - Surface Design - Phase II															
RP070A	Surface Design - Phase II	475	2	RP070A	06OCT97	30JUL99									
FIRP7407	Support NEPA Process-RSD Ph II	211	3	RP070A	01OCT97*	04AUG98									
FIRP7403E	Nevada Transportation - RSD Ph II	455	3	RP070A	01OCT97*	26JUL99									
FIRP7403F	Prepare Design Guides - RSD - Ph II	455	3	RP070A	01OCT97	26JUL99									
FIRP8409	Prepare Technical Rpts-RSD Ph II	455	3	RP070A	01OCT97*	26JUL99									
FIRP7401	Management and Integration-RSD Ph II	458	3	RP070A	01OCT97	29JUL99									
FIRP7402A	NOB-Waste Handling Sys Dsgn-RSD Ph.II.	458	3	RP070A	01OCT97	29JUL99									
FIRP7402B	NOB-Cask Maint. Sys Dsgn-RSD Ph.II	458	3	RP070A	01OCT97	29JUL99									
FIRP7402C	NOB-Waste Treatment Sys Dsgn-RSD Ph.II	458	3	RP070A	01OCT97	29JUL99									
FIRP7402D	NOB-HVAC Systems Design-RSD Ph.II	458	3	RP070A	01OCT97	29JUL99									
FIRP7402E	NOB-Utility Systems Design-RSD Ph II	458	3	RP070A	01OCT97	29JUL99									
							FY96	FY97	FY98	FY99	FY00	FY01	FY02		

Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish
EIRP7402F	NOB-Monitoring, Cntrl & Comm Sys Dsgn-RSD Ph.II	458	3	RP070A	01OCT97	29JUL99
EIRP7402G	NOB-Structure/Piping Design _RSD Ph II	458	3	RP070A	01OCT97	29JUL99
EIRP7403A	Carrier Staging Shed Design-RSD Ph.II	458	3	RP070A	01OCT97	29JUL99
EIRP7403D	Radiological Safety - RSD Ph.II	459	3	RP070A	01OCT97*	30JUL99
EIRP7404	Cost Estimating - Ph.II	459	3	RP070A	01OCT97	30JUL99
EIRP7405A	Support SRA - RSD Ph II	459	3	RP070A	01OCT97	30JUL99
EIRP7405B	Support Systems Studies - RSD Ph II	459	3	RP070A	01OCT97*	30JUL99
EIRP7405C	Support DBA/Q-List Development	459	3	RP070A	01OCT97	30JUL99
EIRP7406	Interface Activities -RSD Ph II	459	3	RP070A	01OCT97	30JUL99
EIRP7407B	Update Staffing Analysis-RSD Ph II	108	3	RP070A	01MAR99*	30JUL99
EIRP7403C	Update Non-nuclear Designs-RSD Ph II	108	3	RP070A	01MAR99*	30JUL99
RP080 - Surface Design Phase III						
RP080	Surface Design Phase III	642	2	RP080	09AUG99	01MAR02
EIRP8401	Management and Integration-RSD Ph III	647	3	RP080	02AUG99*	01MAR02
EIRP8402	Begin FP&C Surface Design-RSD Ph III	647	3	RP080	02AUG99*	01MAR02
EIRP8404	Cost Estimating -RSD Ph.III	647	3	RP080	02AUG99	01MAR02
EIRP8405A	Support SRA - RSD Ph III	647	3	RP080	02AUG99*	01MAR02
EIRP8405B	Support DBA/Q-List Development-RSD Ph III	647	3	RP080	02AUG99	01MAR02
EIRP8406	Interface Activities - RSD Ph III	647	3	RP080	02AUG99*	01MAR02
XRP1025 - Develop Tech Specs						
XRP1025	Develop Tech Specs	395	2	XRP1025	02OCT97*	30APR99

FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02



FY96 | FY97 | FY98 | FY99 | FY00 | FY01 | FY02



Activity ID	Activity description	OD	Sched. Level	PSS	Early start	Early finish	FY96	FY97	FY98	FY99	FY00	FY01	FY02	
EIRP1025	Technical Specifications-RSD Ph. II	398	3	XRP1025	01OCT97*	04MAY99								
XRP1050 - Develop Facility Arrangements														
XRP1050	Develop Facility Arrangements	146	2	XRP1050	31MAY96*	31DEC96								
FIRP1050	Develop Surface Facility GA's - RSD - Ph I	208	3	XRP1050	03JAN97*	28OCT97								
<b>ESF/TBM Operations</b>														
<b>General</b>														
ES080 - TBM Ops to GDF 2 Access (sta 39+40 - 49+														
ES080	TBM Ops to GDF 2 Access (sta 39+40 - 49+90)	72	2	ES080	22JAN96*	30APR96								
ES085 - TBM Ops to South Ramp Turn (sta 49+90 -														
ES085	TBM Ops to South Ramp Turn (sta 49+90 - 59+01)	61	2	ES085	01MAY96	24JUL96								
ES088 - Prepare for Long Term ESF Operations														
ES088	Prepare for Long Term ESF Operations	2,063*	2	ES088	05FEB96	31DEC03								
EISE800	Support ESF Operations	399	3	ES088	04MAR96*	30SEP97								
EISE804	Maintain ESFDR	399	3	ES088	04MAR96*	30SEP97								
EISE810	Develop/Maintain ESF/MGDS Transition Plan	250	3	ES088	01OCT96*	29SEP97								
EISE820	DIE FY97	251	3	ES088	01OCT96*	30SEP97								
SCES088C1	Complete Underground Construction	251	3	ES088	01OCT96	30SEP97								
SCES088E1	Complete Existing Surface Facilities	251	3	ES088	01OCT96	30SEP97								
SCES088N01	Provide New Surface Construction	251	3	ES088	01OCT96	30SEP97								
EISE822	DIE FY98	251	3	ES088	01OCT97*	30SEP98								
EISE810A	Develop/Maintain ESF/MGDS Transition Plan	455	3	ES088	01OCT97*	26JUL99								
EISE800A	Support ESF Operations	855	3	ES088	01OCT97*	01MAR01								
EISE806	Update ESF Con-Ops	251	3	ES088	02FEB98*	01FEB99								
							FY96	FY97	FY98	FY99	FY00	FY01	FY02	