



U.S. Department of Energy
Office of Civilian Radioactive Waste Management



Repository Design Status

Presented to:

**Nuclear Waste Technical Review Board Panel on the
Engineered System**

Presented by:

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**Office of Repository Development
U. S. Department of Energy**

**January 20, 2004
Las Vegas, Nevada**

Introduction

- **Presentation on design solutions with preliminary preclosure safety analysis results**
- **Design details to be added for License Application**
- **Preliminary preclosure safety analysis based upon April 2003 design**
- **Surface facilities changes implement Cogema expertise**
- **Subsurface facility layout and ground support changes**
- **Waste package design detail changes**

Preclosure Safety Analysis Approach

- **Internal and external hazards analyses identify hazards**
- **Categorization analyses estimate frequency of event sequences**
- **Consequence analyses estimate doses to public and workers from event sequences**
- **Classification analyses identify structures, systems, and components that are important to safety**
- **Nuclear safety design basis document captures design requirements**

Preclosure Safety Analysis Event Sequences

- **Category 1 - expected to occur one or more times before permanent closure**
- **Category 2 - at least one chance in 10,000 of occurring before permanent closure**

Preclosure Safety Analysis Status

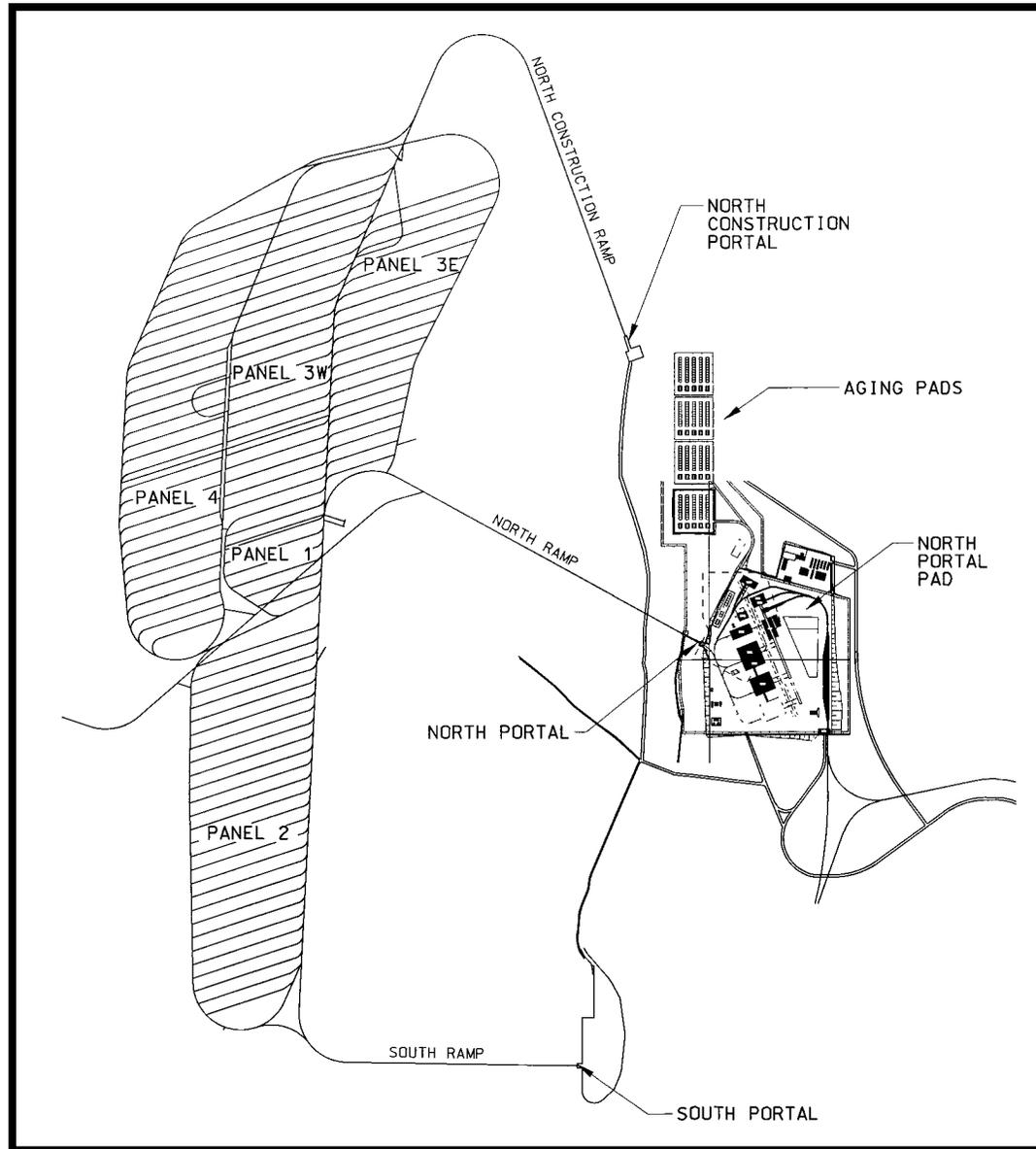
- **Preliminary preclosure safety analysis of design as of April 2003 is complete**
- **Results of preliminary preclosure safety analysis will influence License Application design**
- **Preclosure safety analysis process will be repeated for License Application design**
- **Identified event sequences and dose consequences are expected to be substantially similar for License Application design**

Surface Facilities

Surface Facilities

- **Design input from Cogema using extensive process experience from La Hague facility**
- **Design adapted for Yucca Mountain requirements**
- **Recent design changes**
 - **Transportation Cask Receipt Facility with buffer area**
 - **Canister Handling Facility**
 - **Integrated Dry Transfer Facility with remediation capability**
 - **Second Dry Transfer Facility to be built later**
 - **Processing is primarily dry with small pool for remediation**
 - **Rail-based transportation system**

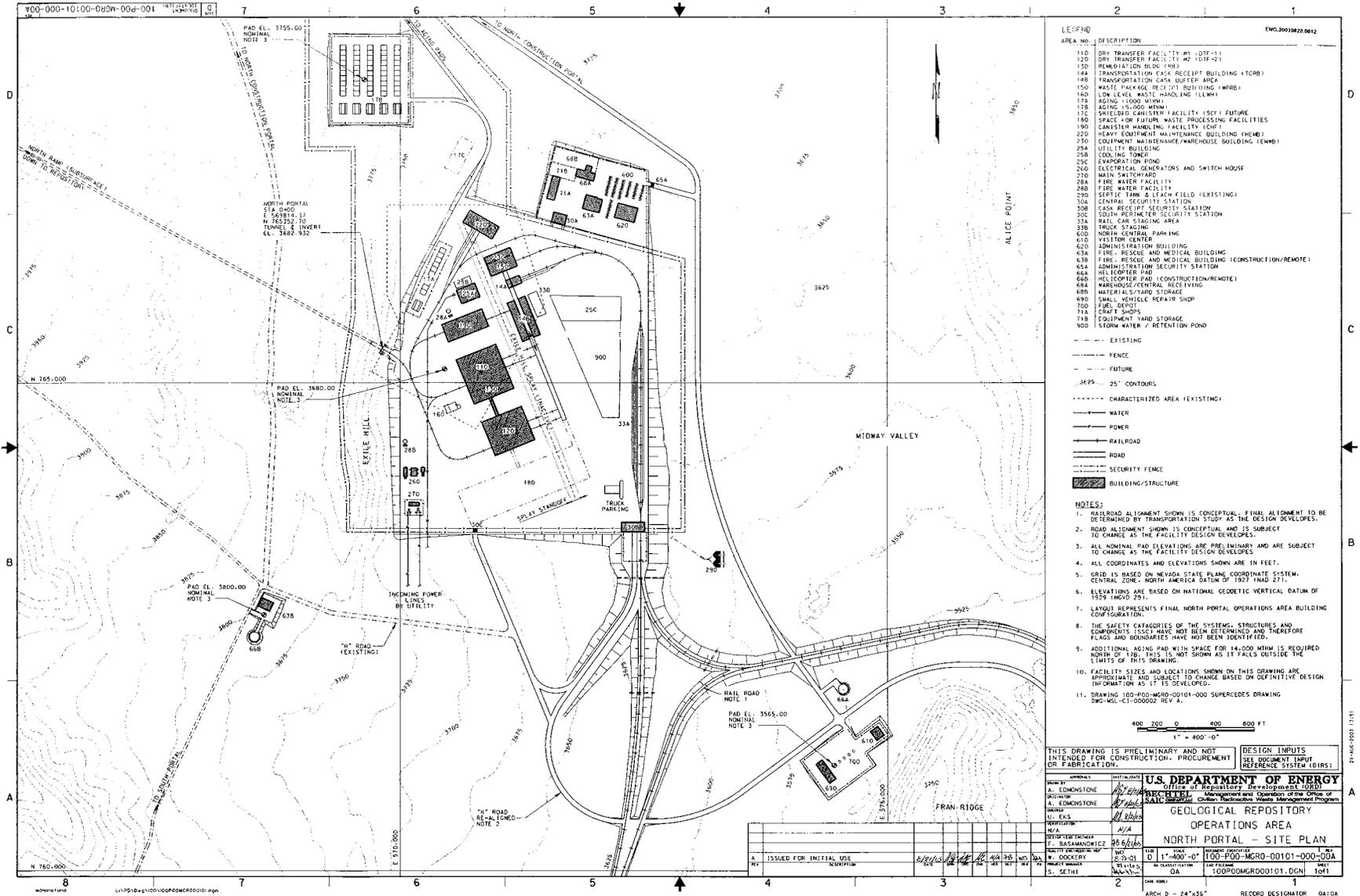
Site Plan



This drawing is preliminary and not intended for construction, procurement, or fabrication.



Surface Facilities



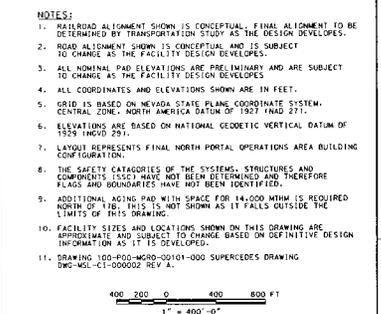
LEGEND

AREA NO. DESCRIPTION

ENG:3003020.002

110	DRY TRANSFER FACILITY #1 (DTF-1)
120	DRY TRANSFER FACILITY #2 (DTF-2)
130	DEMOCRATIZATION BLDG (DMB)
140	TRANSPORTATION CASK RECEIPT BUILDING (TCRB)
148	TRANSPORTATION CASK BUFFER AREA
150	WASTE PACKAGE RECEIPT BUILDING (WPRB)
160	LOW LEVEL WASTE HANDLING (LLWH)
170	AGING (15000 MWH)
178	AGING (15000 MWH)
180	SPACE FOR FUTURE WASTE PROCESSING FACILITIES
190	CARBON HANDLING FACILITY (CHF)
210	HEAVY EQUIPMENT MAINTENANCE BUILDING (HEMB)
220	EQUIPMENT MAINTENANCE/WAREHOUSE BUILDING (EMWB)
230	UTILITY BUILDING
240	COOKING TOWER
250	EVAPORATION POND
260	ELECTRICAL GENERATORS AND SWITCH HOUSE
270	MAIN SWITCHBOARD
280	FIRE WATER FACILITY
290	FIRE WATER FACILITY
300	SEPTIC TANK & LEACH FIELD (EXISTING)
310	CENTRAL SECURITY STATION
320	CASH RECEIPT SECURITY STATION
330	SOUTH PERIMETER SECURITY STATION
33A	RAIL CAR STAGING AREA
33B	TRUCK STAGING
600	NORTH CENTRAL PARKING
610	VISITOR CENTER
620	ADMINISTRATION BUILDING
630	FIRE, RESCUE AND MEDICAL BUILDING
63A	FIRE, RESCUE AND MEDICAL BUILDING (CONSTRUCTION/REMOTE)
63B	FIRE, RESCUE AND MEDICAL BUILDING (CONSTRUCTION/REMOTE)
650	ADMINISTRATION SECURITY STATION
660	HELICOPTER PAD
66A	HELICOPTER PAD (CONSTRUCTION/REMOTE)
680	WAREHOUSE/CENTRAL RECEIVING
690	MATERIALS/YARD STORAGE
690	SMALL VEHICLE REPAIR SHOP
700	FUEL DEPOT
710	CHUMP SHOPS
71B	EQUIPMENT YARD STORAGE
800	STORM WATER / RETENTION POND

- NOTES:
- RAILROAD ALIGNMENT SHOWN IS CONCEPTUAL. FINAL ALIGNMENT TO BE DETERMINED BY TRANSPORTATION STUDY AS THE DESIGN DEVELOPES.
 - ROAD ALIGNMENT SHOWN IS CONCEPTUAL AND IS SUBJECT TO CHANGE AS THE FACILITY DESIGN DEVELOPES.
 - ALL NOMINAL PAD ELEVATIONS ARE PRELIMINARY AND ARE SUBJECT TO CHANGE AS THE FACILITY DESIGN DEVELOPES.
 - ALL COORDINATES AND ELEVATIONS SHOWN ARE IN FEET.
 - GRID IS BASED ON NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICA DATUM OF 1927 (NAD 27).
 - ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929 (MVD 29).
 - LAYOUT REPRESENTS FINAL NORTH PORTAL OPERATIONS AREA BUILDING CONFIGURATION.
 - THE SAFETY CATEGORIES OF THE SYSTEMS, STRUCTURES AND COMPONENTS (SCT) HAVE NOT BEEN DETERMINED AND THEREFORE PLANS AND BOUNDARIES HAVE NOT BEEN IDENTIFIED.
 - ADDITIONAL AGING PAD WITH SPACE FOR 14,000 MWH IS REQUIRED NORTH OF 71B. THIS IS NOT SHOWN AS IT FALLS OUTSIDE THE LIMITS OF THIS DRAWING.
 - FACILITY SIZES AND LOCATIONS SHOWN ON THIS DRAWING ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON DEFINITIVE DESIGN INFORMATION AS IT IS DEVELOPED.
 - DRAWING 100-POO-MCR0-00101-000 SUPERCEDES DRAWING 100-MO-CI-000002 REV. A.



THIS DRAWING IS PRELIMINARY AND NOT INTENDED FOR CONSTRUCTION, PROCUREMENT OR FABRICATION.

DESIGN INPUTS
SEE DOCUMENT INPUT REFERENCE SYSTEM (OIRS)

BY: A. EDMONSTONE
CHECKED: M. DOCKERY
DATE: 2-29-01

US DEPARTMENT OF ENERGY
NORTH PORTAL - SITE PLAN
GEOLOGICAL REPOSITORY OPERATIONS AREA

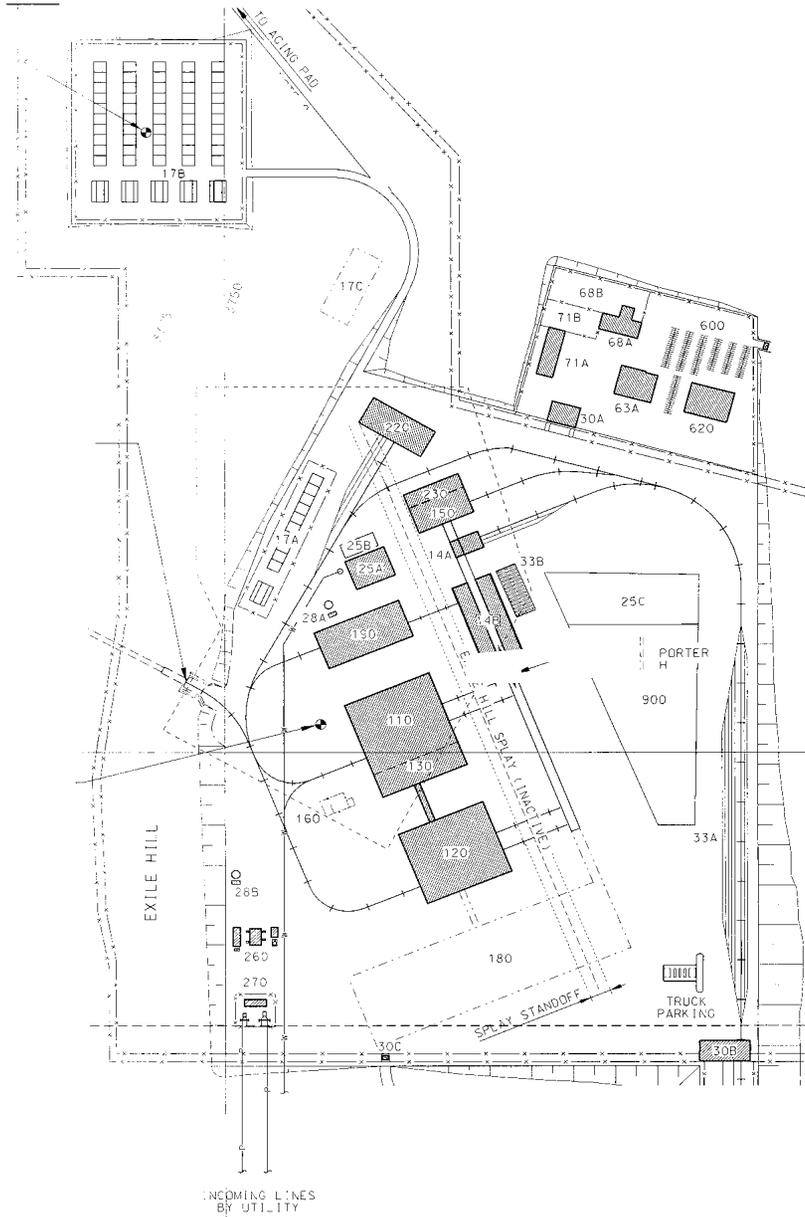
ISSUED FOR INITIAL USE

DATE	BY	APP'D	REV	DESCRIPTION
2/29/01	M. DOCKERY		1	ISSUED FOR INITIAL USE
3/1/01	S. SETHI		2	REVISED
3/1/01	S. SETHI		3	REVISED
3/1/01	S. SETHI		4	REVISED
3/1/01	S. SETHI		5	REVISED
3/1/01	S. SETHI		6	REVISED
3/1/01	S. SETHI		7	REVISED
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DATE: 2-29-01
SCALE: D 1"=400'-0"
PROJECT: 100-POO-MCR0-00101-000-00A
DRAWING: 100-POO-MCR00101.DGN
SHEET: 1011

ARCH D - 24"x36"
RECORD DESIGNATOR: 0A10A

North Portal Plan



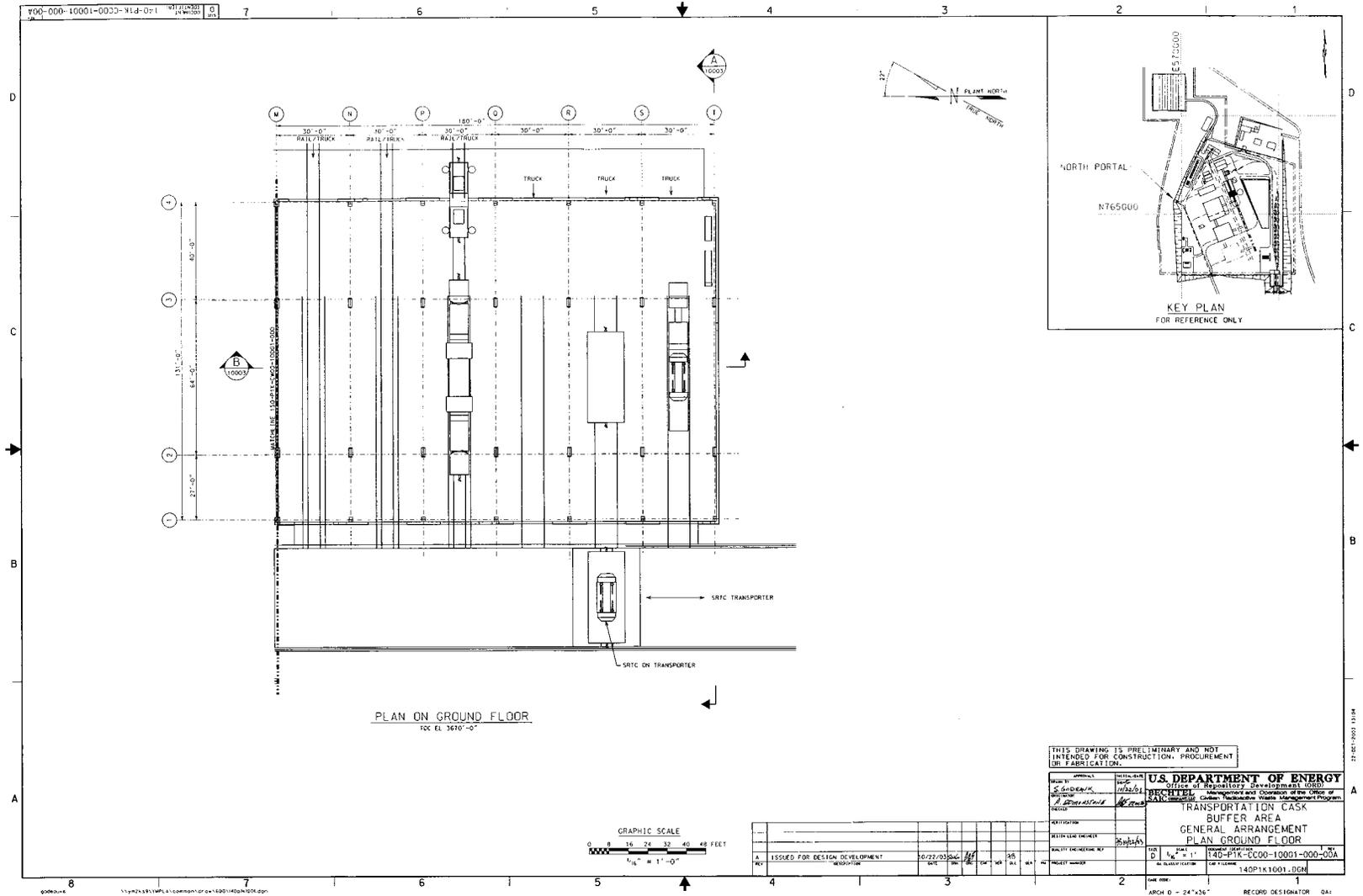
AREA No.	DESCRIPTION
110	DRY TRANSFER FACILITY #1 (DTF-1)
120	DRY TRANSFER FACILITY #2 (DTF-2)
130	REMEDIATION BLDG (RB)
14A	TRANSPORTATION CASK RECEIPT BUILDING (TCRB)
14B	TRANSPORTATION CASK BUFFER AREA
150	WASTE PACKAGE RECEIPT BUILDING (WPRB)
160	LOW LEVEL WASTE HANDLING (LLWH)
17A	AGING (1000 MTHM)
17B	AGING (5,000 MTHM)
17C	SHIELDED CANISTER FACILITY (SCF) FUTURE
180	SPACE FOR FUTURE WASTE PROCESSING FACILITIES
190	CANISTER HANDLING FACILITY (CHF)
220	HEAVY EQUIPMENT MAINTENANCE BUILDING (HEMB)
230	EQUIPMENT MAINTENANCE/WAREHOUSE BUILDING (EMWB)
25A	UTILITY BUILDING
25B	COOLING TOWER
25C	EVAPORATION POND
260	ELECTRICAL GENERATORS AND SWITCH HOUSE
270	MAIN SWITCHYARD
28A	FIRE WATER FACILITY
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30A	CENTRAL SECURITY STATION
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68A	WAREHOUSE/CENTRAL RECEIVING
68B	MATERIALS/YARD STORAGE
690	SMALL VEHICLE REPAIR SHOP
700	FUEL DEPOT
71A	CRAFT SHOPS
71B	EQUIPMENT YARD STORAGE
900	STORM WATER / RETENTION POND

---	EXISTING
- - - -	FENCE
---	FUTURE
.....	25' CONTOURS
- - - -	CHARACTERIZED AREA (EXISTING)
---	WATER
---	POWER
+	RAILROAD
---	ROAD
- - - -	SECURITY FENCE
█	BUILDING/STRUCTURE

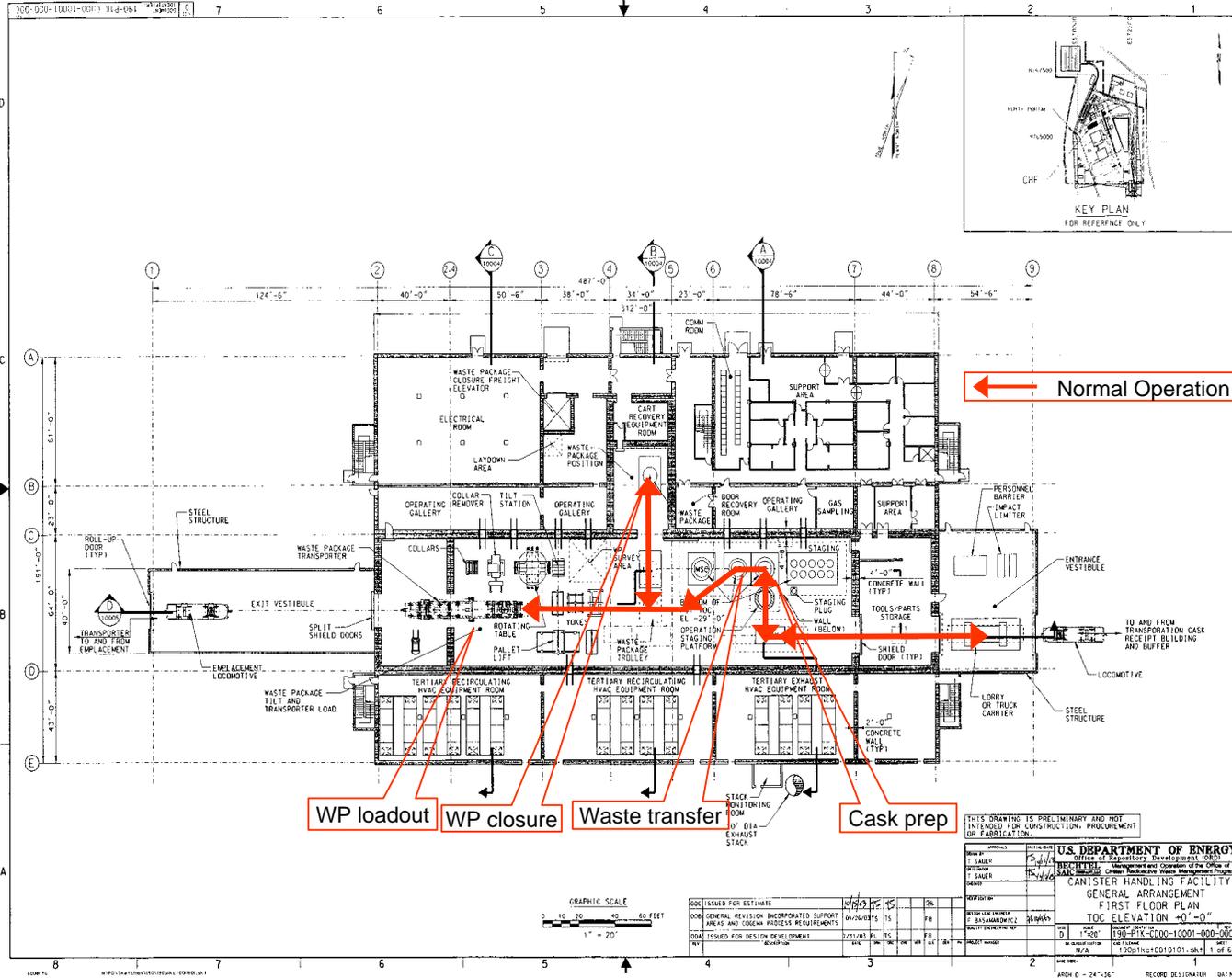
This drawing is preliminary and not intended for construction, procurement, or fabrication.



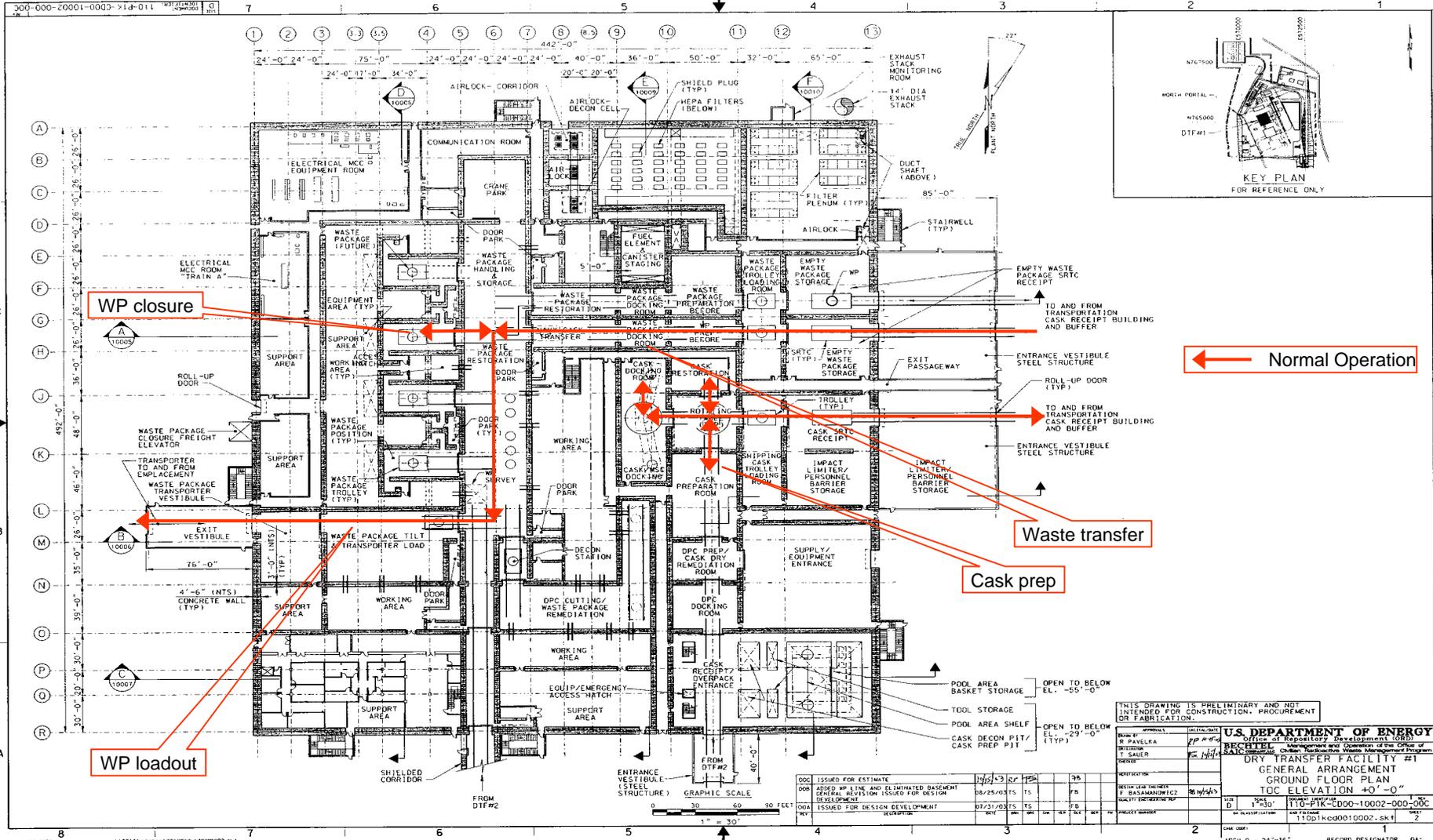
Transportation Cask Receipt Facility



Canister Handling Facility

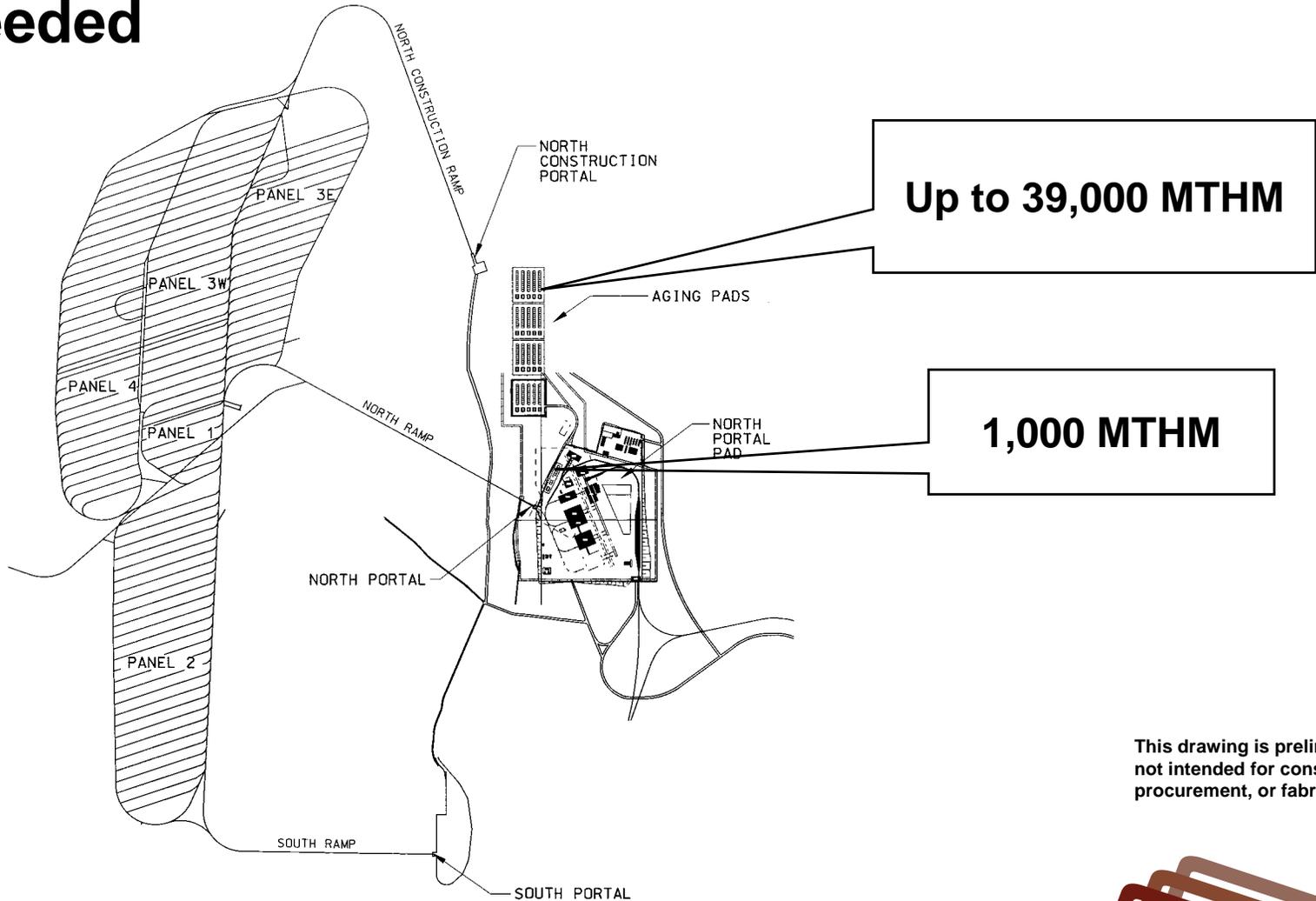


Dry Transfer Facility 1/ Remediation



Site Aging

Up to 40,000 metric tons of heavy metal capacity, built as needed

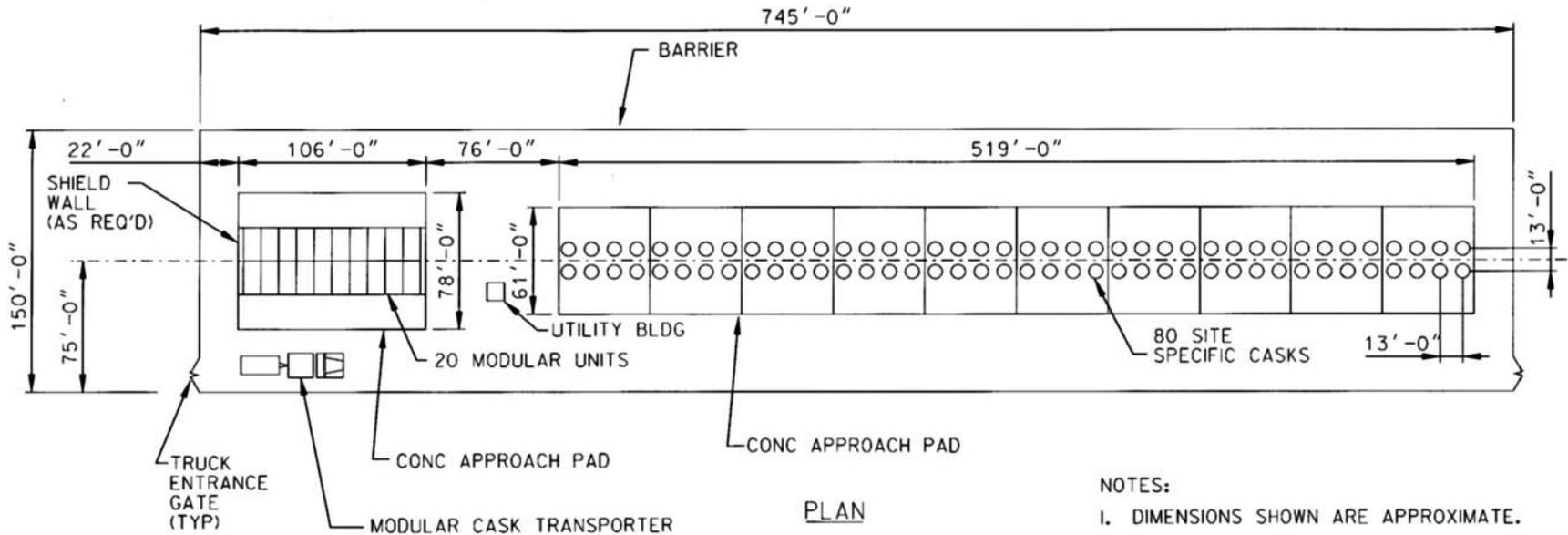


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North Portal Aging Facility

1000 metric tons of heavy metal capacity



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Surface Facilities Phased Implementation

- **Allows for the implementation of a small initial disposal capability**
 - **Increases confidence to meet 2010 initial operation**
 - **Remediation integral with fuel handling facility for more efficient processing and movement inside a single facility**
 - **Adopt lessons learned approach**
- **Provides maximum flexibility to adjust to future changes in:**
 - **Funding**
 - **Schedule**
 - **Incoming waste stream**

Surface Facilities Construction Sequence

- **Phase 1**

- **Transportation Cask Receipt Facility**
- **Canister Handling Facility**
- **Dry Transfer Facility 1**
- **Aging - 6,000 metric tons of heavy metal, initial**
- **Balance of Plant Facilities, partial**

- **Phase 2**

- **Dry Transfer Facility 2**
- **Aging - up to 40,000 metric tons of heavy metal, total**
- **Balance of Plant, complete**

Surface Facilities Preliminary Preclosure Safety Analysis Results

- **No Category 1 or 2 external event sequences**
- **Two Category 1 internal event sequences involving drop or collision of commercial spent nuclear fuel assemblies in a Dry Transfer Facility**
- **31 Category 2 internal event sequences for cask, canister, and assembly handling (drops or collisions) in the surface facilities**
- **No Category 1 or 2 event sequences for 1,000 metric tons of heavy metal Waste Aging Facility**
- **Canister Handling Facility and up to 40,000 metric tons of heavy metal aging not addressed**

Surface Facilities Dose Consequences

- **Sum of offsite doses from normal operations and frequency-weighted Category 1 event sequence doses are below regulatory limits**
- **Sum of worker doses from normal operations and Category 1 event sequences are below regulatory limits**
- **Category 2 offsite doses are below regulatory limits**

Classification Analyses

- **Structures, systems, and components that are credited for prevention or mitigation of Category 1 or Category 2 event sequences are important to safety and are classified as Safety Category**
- **Natural or engineered barriers that are important to meeting 10 CFR 63.113 performance objectives are important to waste isolation and are classified as Safety Category**
- **Structures, systems, and components that are not important to safety or waste isolation are classified as Non-Safety Category**

Surface Facilities Structures, Systems, and Components Classification Results

- **Structures in which spent fuel assemblies, canisters, or casks without impact limiters are handled are important to safety**
- **Important to safety subsystems in the Cask Receipt and Return System include cask receipt, cask preparation, and the cask buffer subsystems**
- **Important to safety systems in the Dry Transfer Facilities include cask preparation, waste package, DOE canister, and spent nuclear fuel/high-level radioactive waste transfer systems**
- **Other important to safety systems include the transportation cask, waste packages, remediation system, emplacement and retrieval system, and the aging system**

Aircraft Hazard Evaluation

- **Hazards**

- **Military flights within the Nevada Test and Training Range and Nevada Test Site**
- **Commercial, general aviation, and military flights 8 miles or more away in the Beatty corridor**

- **Approach: Screen out hazard due to low probability**

- **Methods similar to NUREG-0800**
- **Flight counts from Federal Aviation Administration**
- **Flight counts from Nevada Test and Training Range instrumentation**
- **Crash rates from historical data by type of aircraft**

Aircraft Hazard Evaluation

(Continued)

- **Initial study screened out hazard for 100-year operation and 1,000 metric tons of heavy metal aging pad**
- **Planned changes in use of the Nevada Test Site airspace by the Air Force require reevaluating the aircraft crash hazard**

Surface Facilities As Low As Is Reasonably Achievable and Worker Safety

- **As low as is reasonably achievable design goals - 500 mrem/yr for rad worker**
- **As low as is reasonably achievable design guide**
 - Minimize manual operations in radiation and contaminated areas
 - Increase the reliability of processes and equipment used
 - Increase the distance from the radiation source term and/or shield the radiation source
 - Engineer effective contamination controls into the design
 - Decrease exposure times
- **Examples of as low as is reasonably achievable implementation**
 - Remote operations for high radiation activities
 - Shield walls and limited personnel access during operations

Subsurface Facilities

Subsurface Facility

- **Thermal goals**
 - Limit cladding temperature to 350°C
 - Limit preclosure drift wall temperature to 96°C
 - Limit postclosure drift wall temperature to 200°C
 - Allow for pillar drainage (a portion of the drift pillar temperature will remain below the boiling point of water)
 - The ventilation system must provide 15 m³/s per emplacement drift for a period of 50 years after final emplacement to meet the thermal goals
- **Waste packages emplaced 0.1 m end to end**

Subsurface Design Changes

- **Recent design changes**

- **Revised panel layouts and ventilation system**
- **Revised ground support**
- **Returned to rail system for waste package transporter**
- **Increased radius of emplacement drift turnouts**
- **Moved ventilation control doors to outer end of turnouts**

Subsurface Configuration

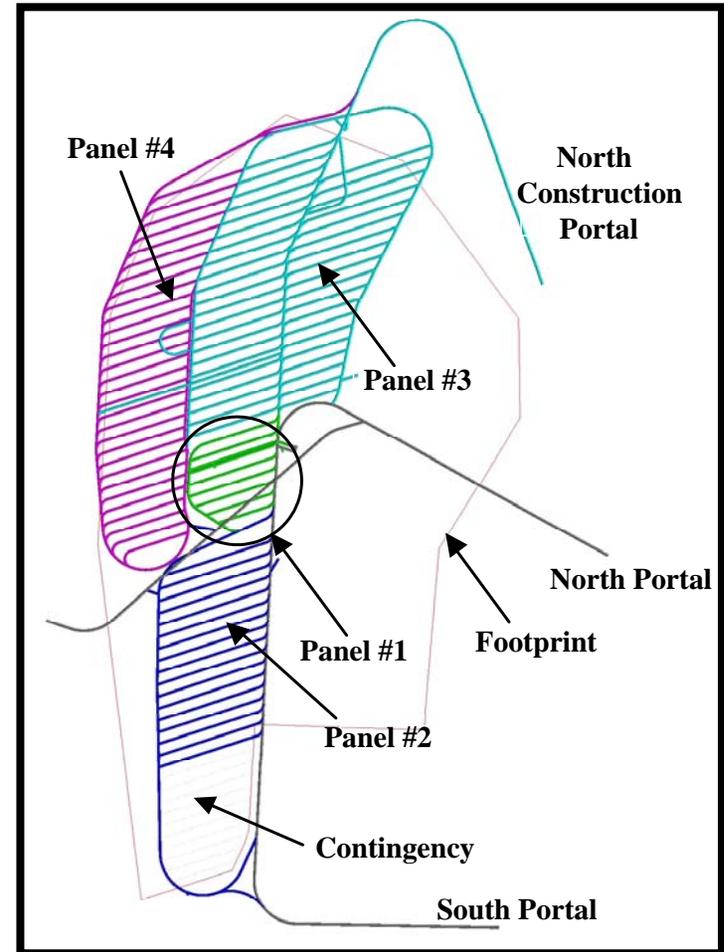
- Panel numbers represent the proposed emplacement sequence

- **Sequence:**

- Panel 1, Phase 1 for 2010
 - ◆ Develop at least 3 emplacement drifts
- Panel 1, Phase 2
 - ◆ Complete Panel 1 drifts (8 total)
- Panel 2
 - ◆ 17 drifts total (excludes contingency)

- Total emplacement length available is approximately 41 miles (65 km)

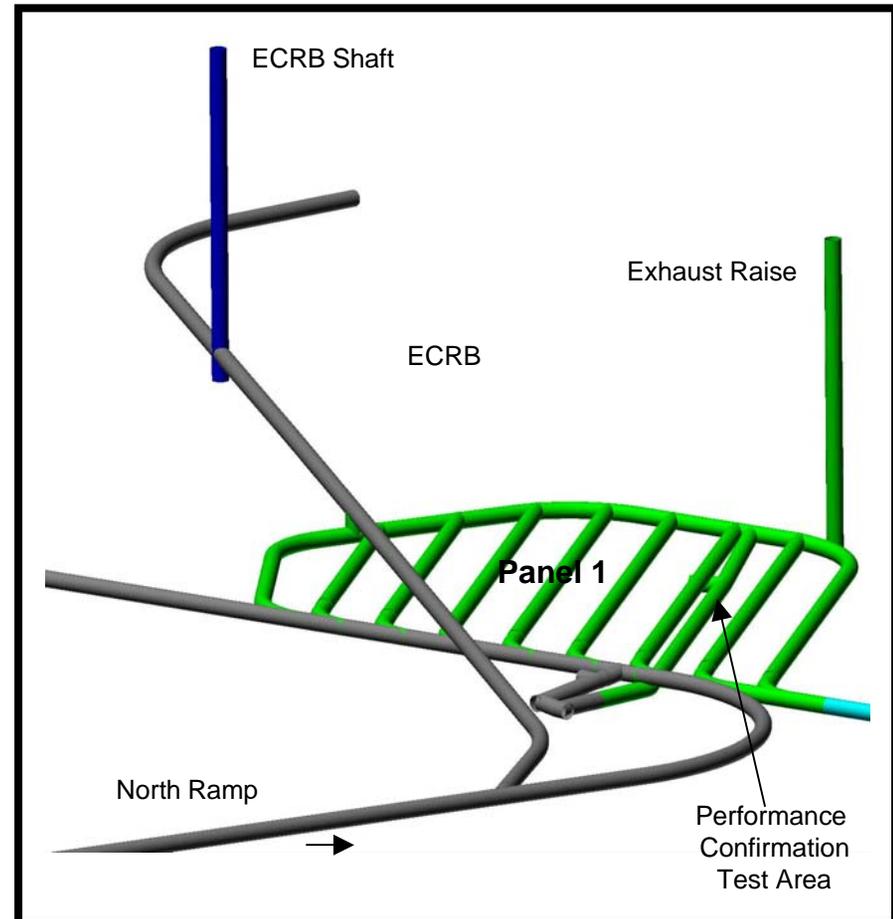
- Available contingency of 11 - 13.5 percent for the 70,000 metric tons of heavy metal case



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Panel 1

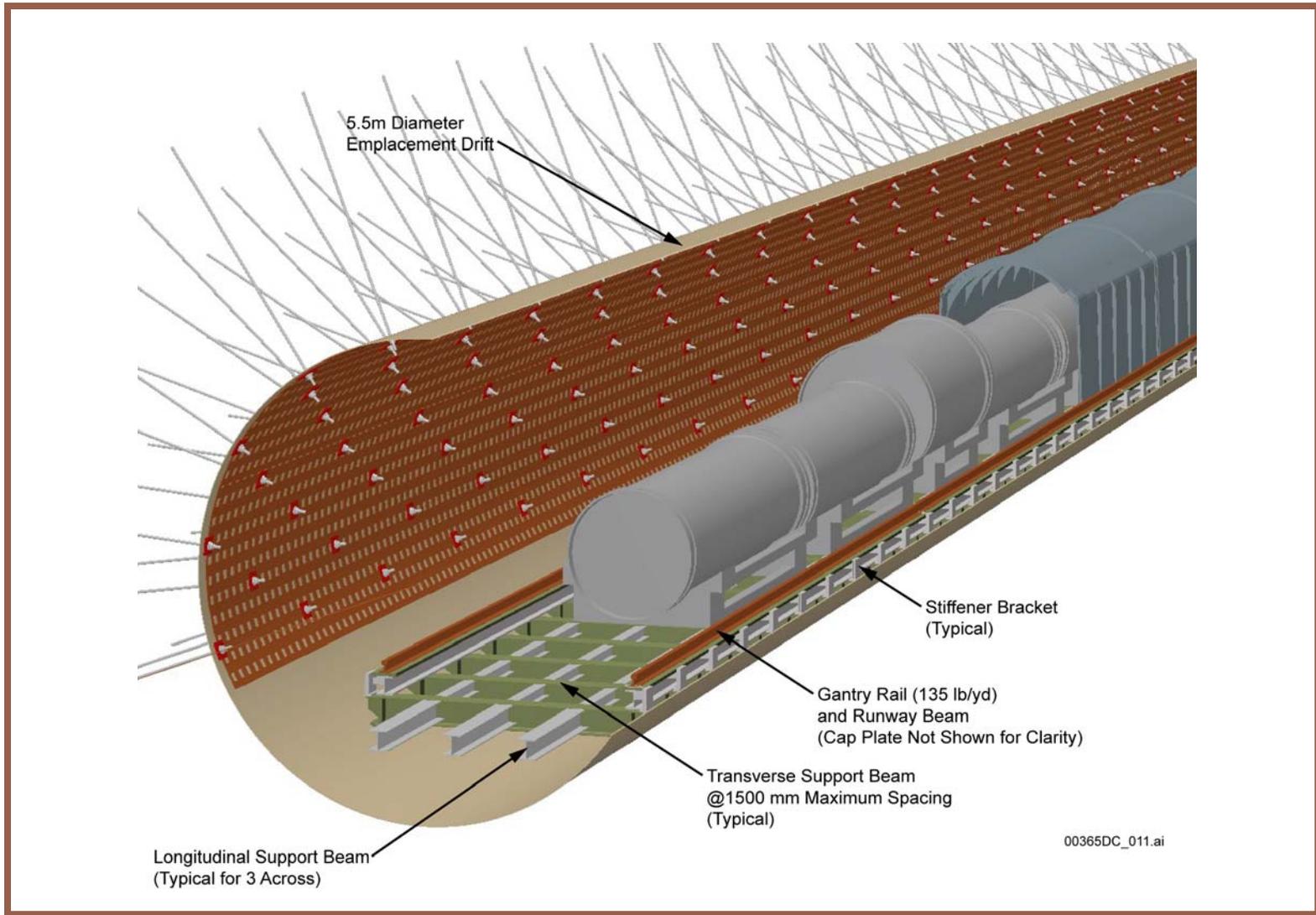
- Panel 1 consists of eight emplacement drifts
- Approximately 4,100 m (13,000 ft) of useable emplacement drift
- Panel 1 is located approximately half in the lower lithophysal and half in the middle non-lithophysal
- Panel 1 will be ventilated using the North Ramp and the exhaust raise
- A portion of Panel 1 will be used as a test area for performance confirmation



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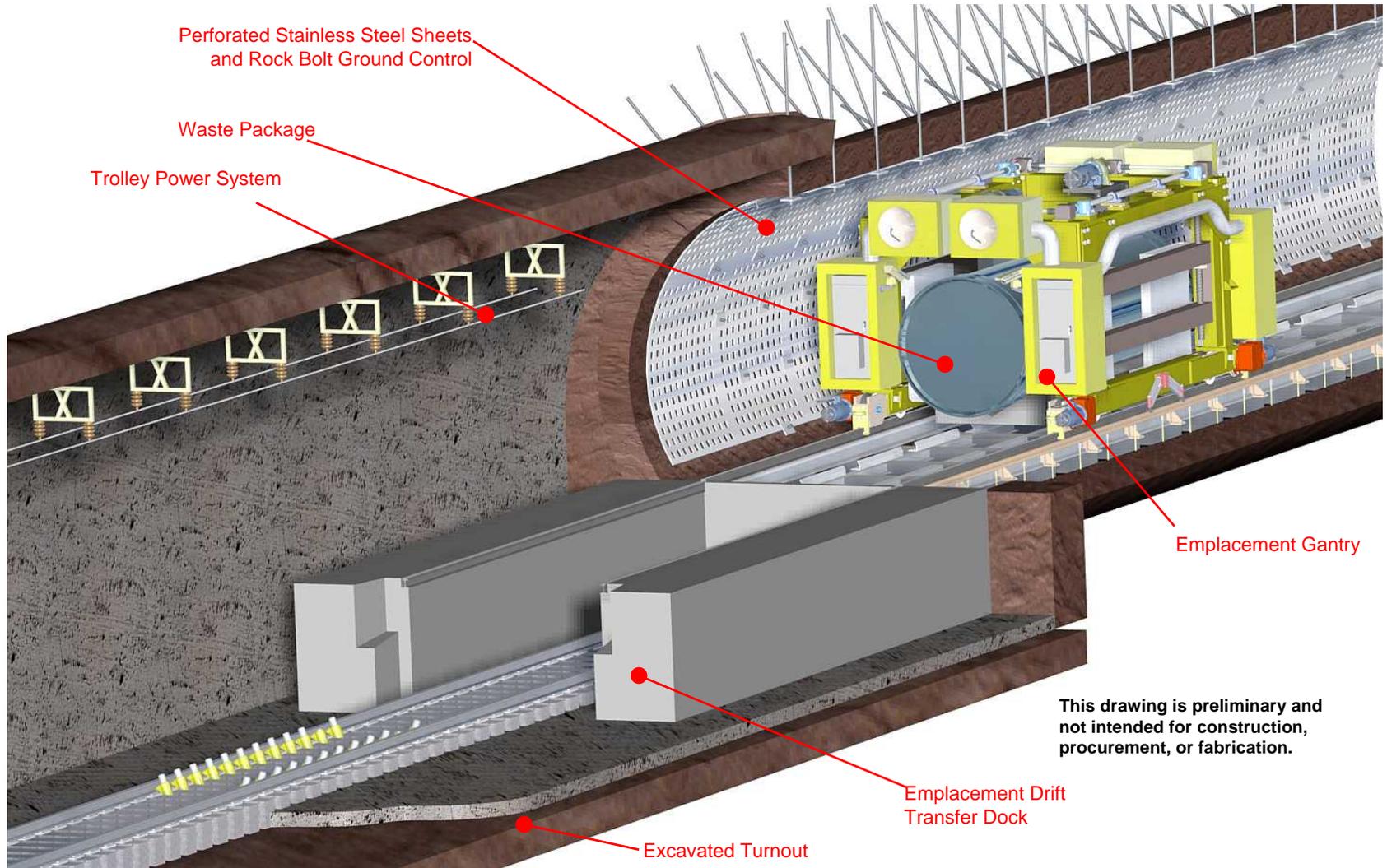


Emplacement Drift Isometric

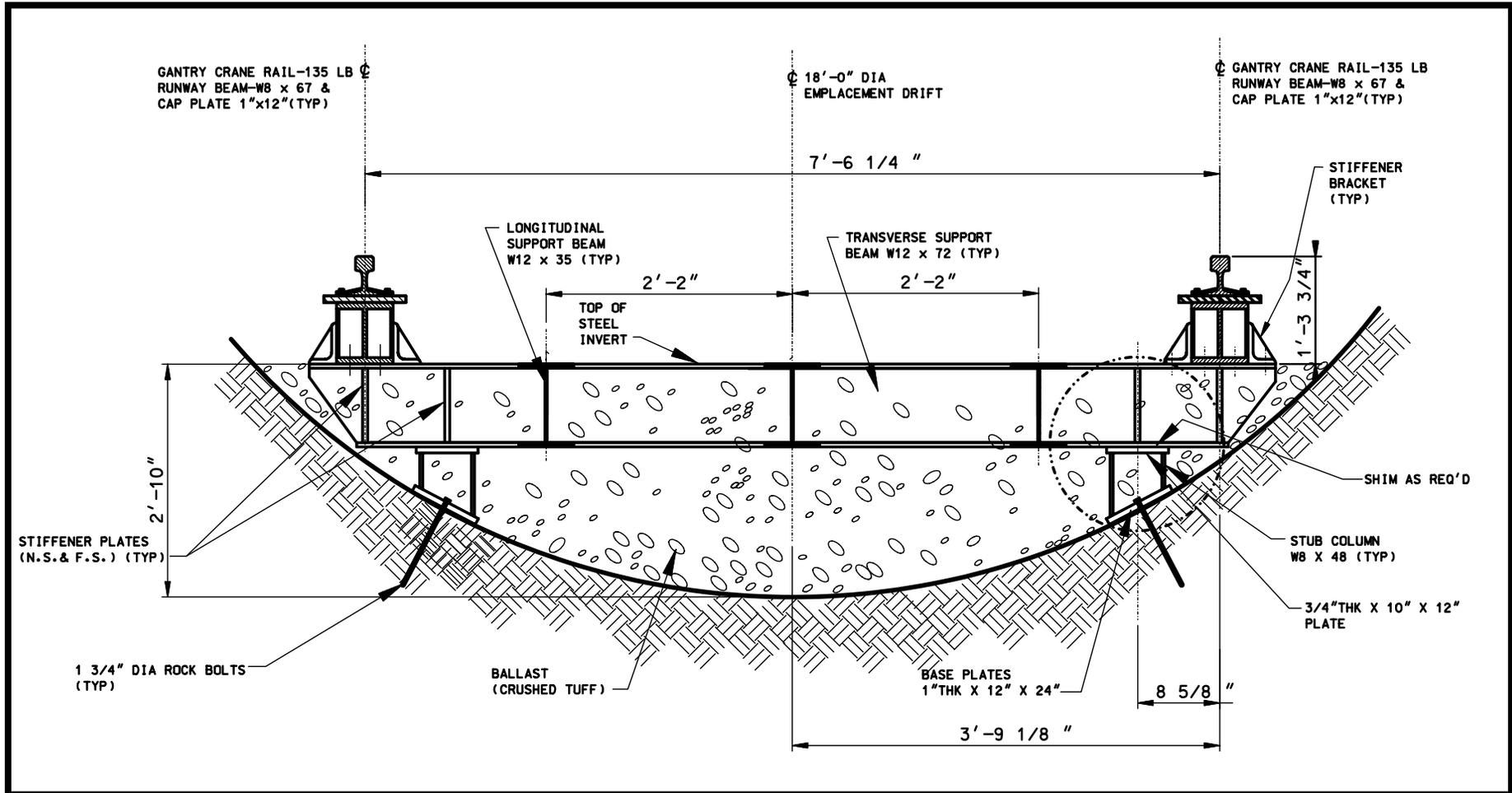


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Emplacement Drift Entrance



Emplacement Drift Invert



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Emplacement Drift Invert

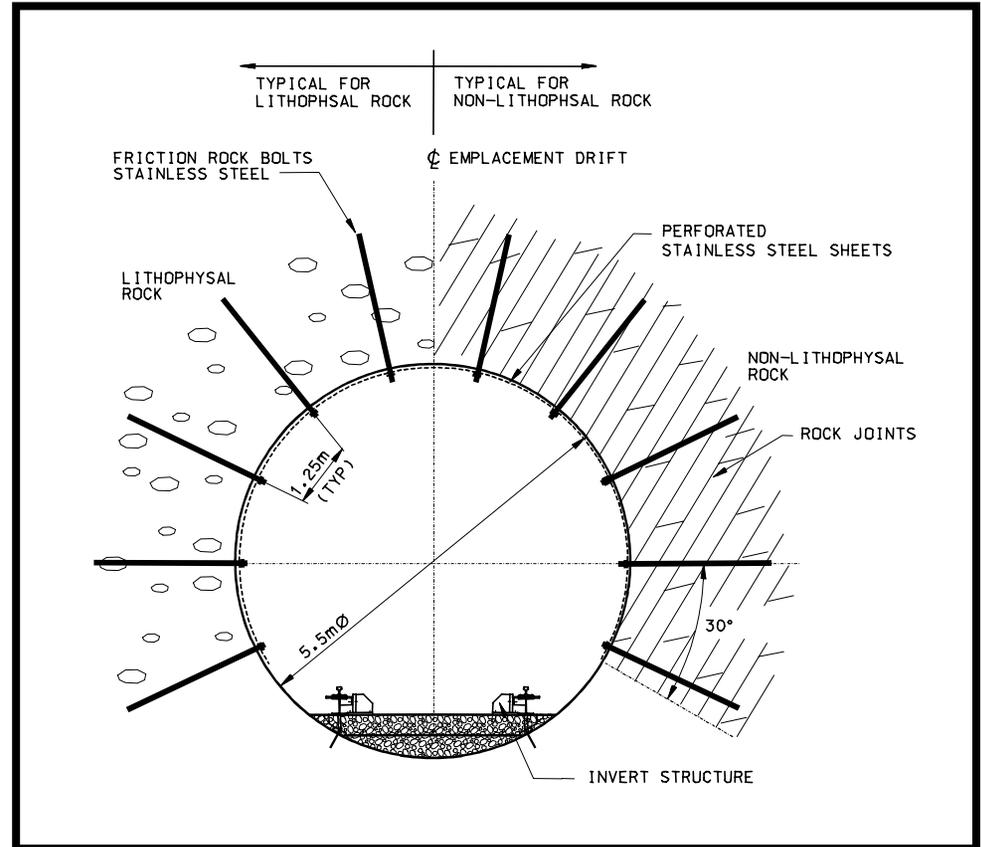
(Continued)

- **Emplacement drift invert includes steel structure and ballast material**
- **Carbon steel invert structure**
 - Supports emplacement gantry rail system
 - Supports waste packages and drip shields during the preclosure period
- **Ballast material**
 - Crushed tuff, well graded from 2 inch minus to no more than 5 percent fines, compacted to 95 percent of its maximum dry density
 - Provides an engineered barrier to diffuse the potential radionuclide flow from the waste packages
 - Supports waste packages and drip shields during the postclosure period



Ground Support for Emplacement Drifts

- Friction rock bolts 3 m long, spaced at 1.25 m
- Thin (3 mm thick) perforated sheets, installed in a 240° arc around the drift periphery along entire drift length
- Bolts and sheets made of stainless steel to ensure their longevity
- Suitable for various ground conditions
- Capable of preventing rock fall



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Ground Support for Non-Emplacement Openings

- **Access and exhaust mains; ramps**

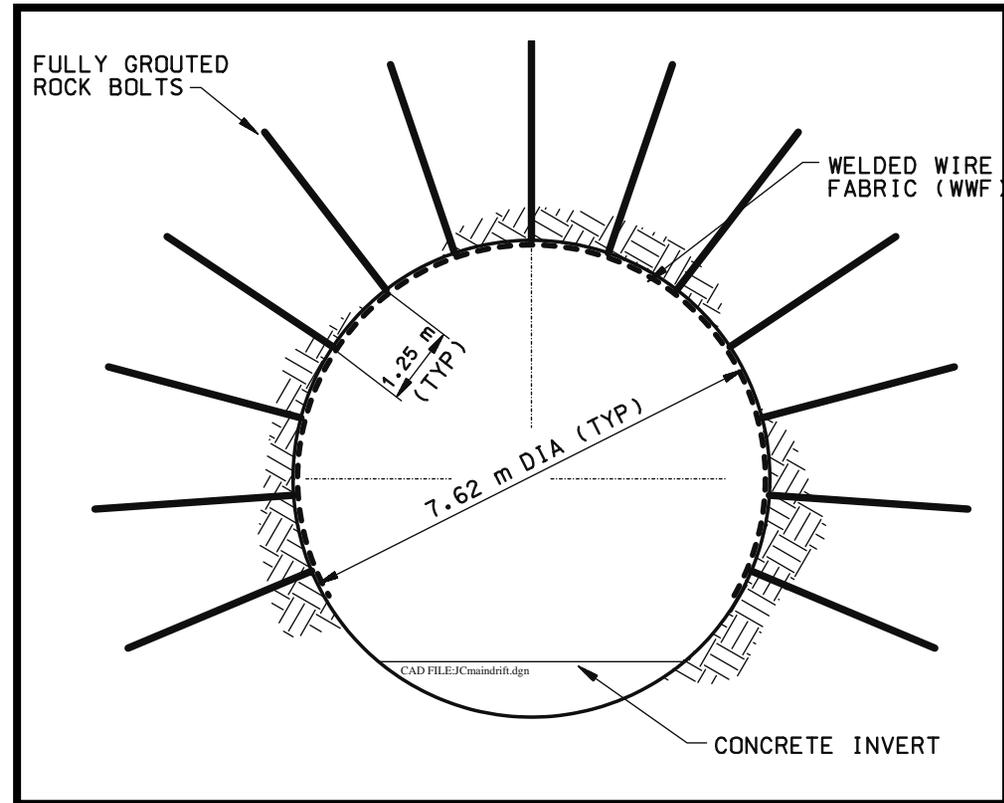
- Fully grouted rock bolts, typically spaced at 1.25 m
- Welded wire fabric installed from springline to springline or below springline for raveling control
- Materials made of carbon steel

- **Turnouts and intersections**

- Fully grouted rock bolts
- Wire mesh
- Shotcrete (100 mm thick)
- Lattice girders if required in wide spans

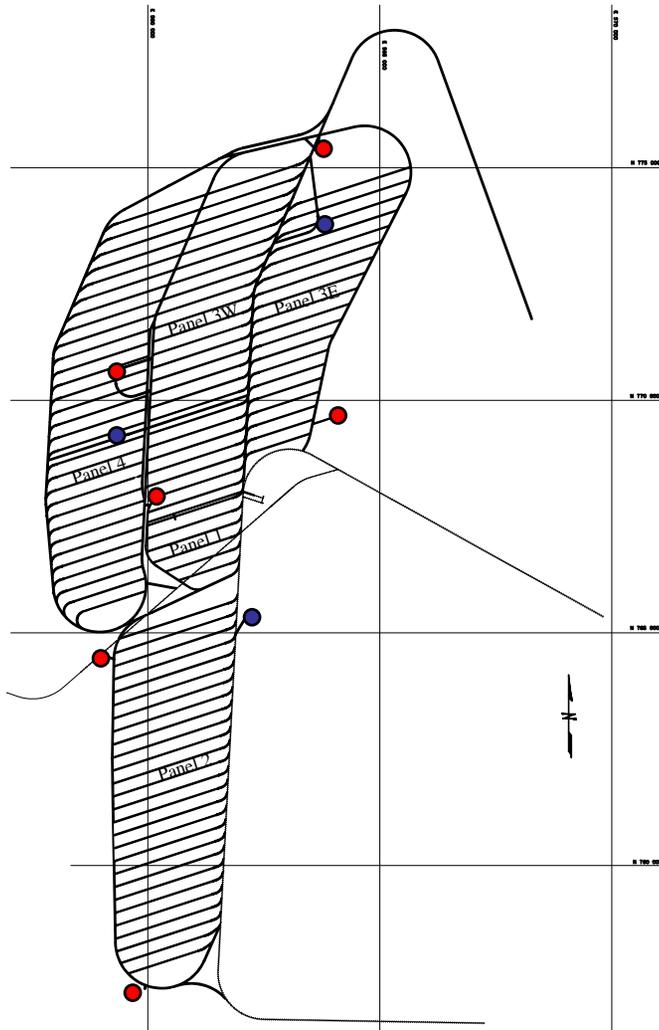
- **Shafts**

- Rock bolts
- Shotcrete or concrete (100 mm thick)



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Forced Ventilation



- **Main Intakes:**
 - 3 shafts and 3 ramps
 - Total intake airflow rate: 1,700 m³/s at 15 m³/s per emplacement drift (includes leakage)
- **Main Exhausts:**
 - 6 shafts or raises
 - Total exhaust airflow rate: 1,900 m³/s at 17 m³/s per emplacement drift (includes leakage)
- — Intake shaft
- — Exhaust shaft or raise

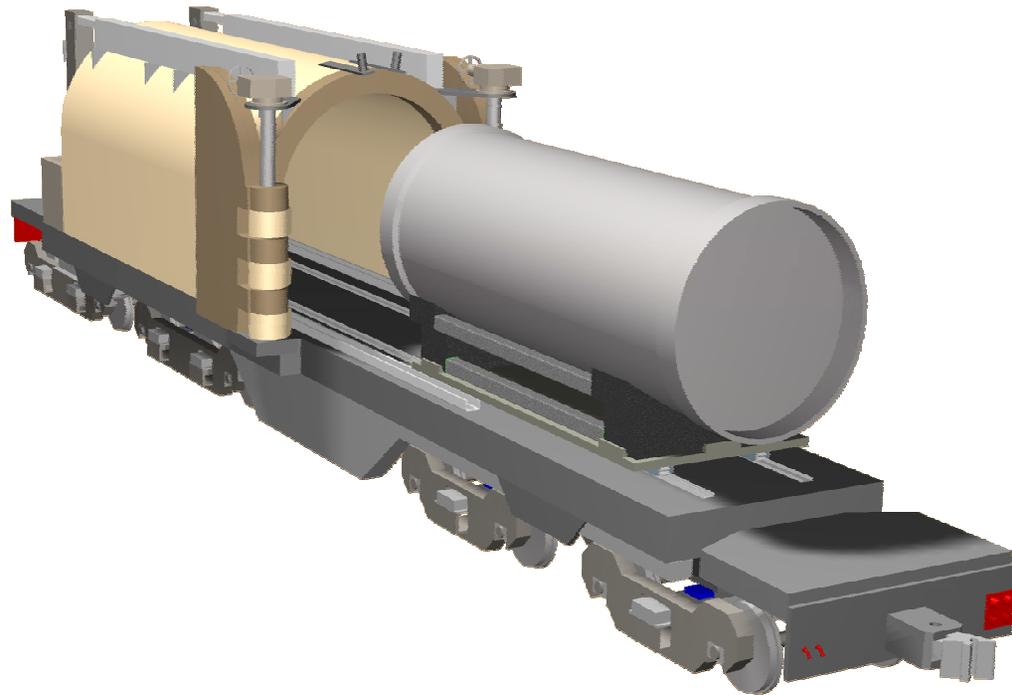
Notes: Exhaust airflow greater than intake airflow to account for thermal expansion of air.

Estimated airflow rates are for emplacement drifts only.

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Waste Package Transporter

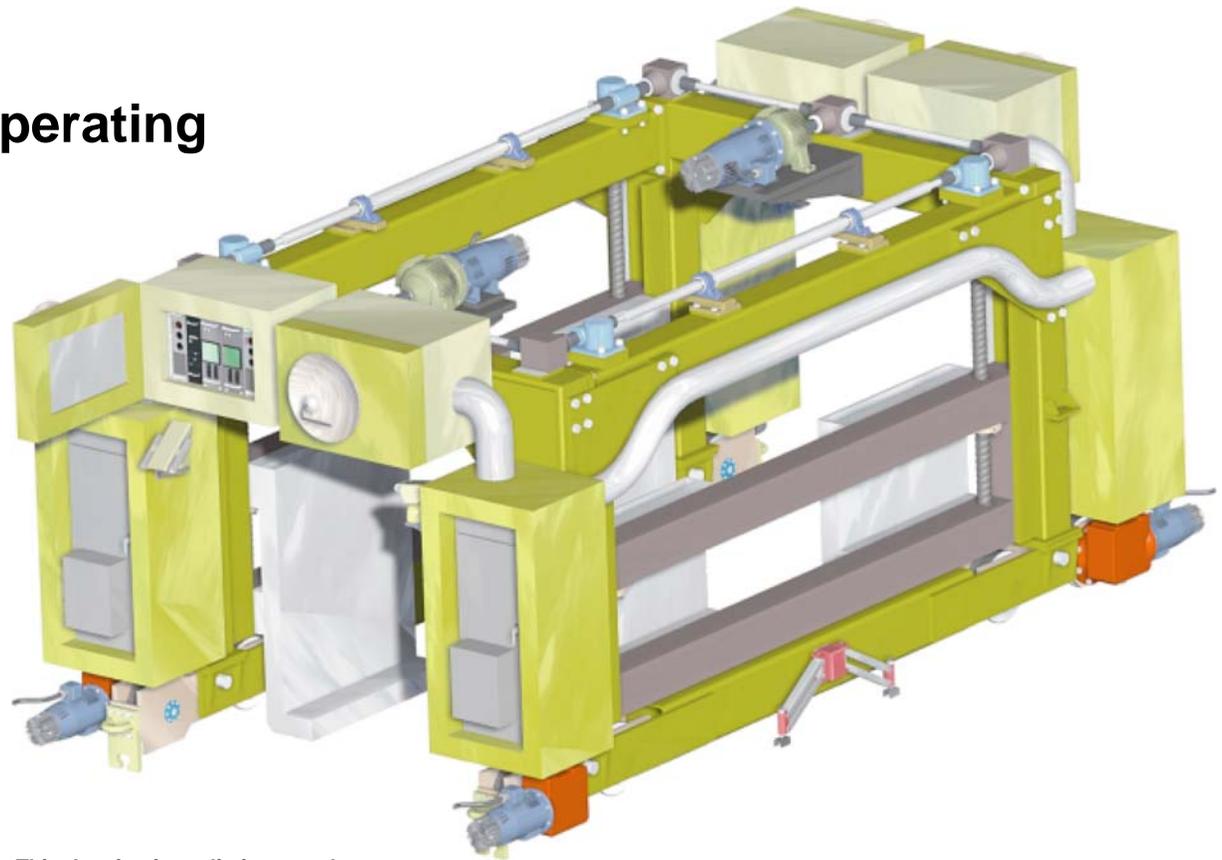
- **Transports individual waste package on pallets from the surface facilities to the emplacement drifts**
- **Weight:**
 - 350 tons loaded
 - 265 tons unloaded
- **5.0 mph maximum operating speed**
- **Two locomotives move transporter underground, one backs transporter into drift**
- **All manual and remote control operations are through the transport locomotives**



This drawing is preliminary and not intended for construction, procurement, or fabrication.

Emplacement Gantry

- Moves and emplaces waste packages on pallets within emplacement drift
- 40-60 tons weight
- 1.7 mph maximum operating speed
- Remote controlled



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Subsurface Facility Preliminary Preclosure Safety Analysis and Classification Results

- **There are no Category 1 or Category 2 event sequences in the subsurface facilities**
- **Structures, systems, and components that prevent Category 1 or Category 2 event sequences are important to safety**
- **The following structures, systems, and components are important to safety because they are credited with prevention:**
 - **Waste package**
 - **Waste package transporter**
 - **Emplacement gantry**

Subsurface Facilities Preliminary Classification Results

- **The following features are important to waste isolation because they are important to meeting 10 CFR 63.113 performance objectives**
 - **Subsurface facility**
 - **Drift inverts**
 - **Drip shields**
 - **Saturated zone (between repository and accessible environment)**
 - **Unsaturated zone (above and below the repository)**
 - **Waste packages**
 - **Commercial and naval spent nuclear fuel cladding**
 - **Waste form**

Subsurface Facilities As Low As Is Reasonably Achievable and Worker Safety

- **Unshielded waste packages are transported in a shielded transporter**
- **Drift turnouts are designed to reduce the dose rates in the access mains**
- **Emplacement drift ventilation control doors also provide personnel access control**
- **Differential pressure between emplacement and development areas**

Waste Package

Waste Package Design Process

- **Design for preclosure**

- **Waste package is designed such that breach is beyond Category 2 for postulated event sequences to support the Preclosure Safety Analysis**
- **The following postulated event sequences will be evaluated:**
 - ◆ **Object falls onto the waste package**
 - ◆ **Waste package drops, dynamic events, swingdowns, tipovers, etc.**
 - ◆ **Vibratory ground motions**
 - ◆ **Parametric fires**
 - ◆ **Preclosure design-basis rock fall**

Waste Package Design Process

(Continued)

- **Analyze for postclosure**

- **Analyze postulated events (drip shield installed) and provide information to support model abstractions for total system performance assessment, including assessment of corrosion potential**
 - ◆ **Damage from rock fall**
 - ◆ **Damage from vibratory ground motion**
 - ◆ **Weld flaw distribution**
 - ◆ **Waste package and weld area stress state**

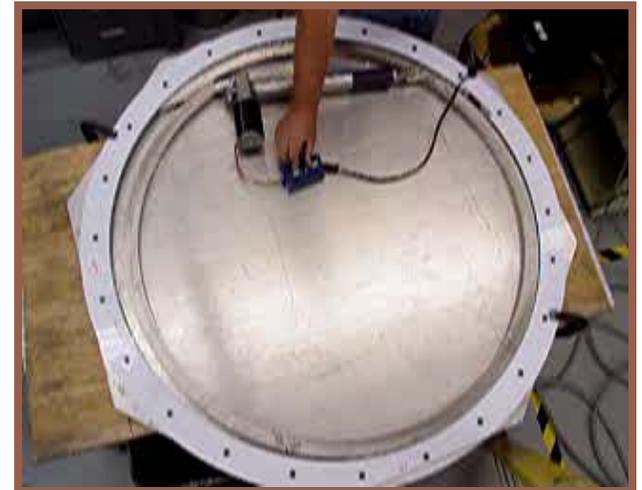
Waste Package Design Changes

- **Recent design detail changes**

- Replaced the extended outer lid with a flat lid
- Replaced induction annealing with either laser peening or low-plasticity burnishing as the outer lid closure weld stress mitigation technique
- Changed the middle lid weld configuration from a full penetration weld to a fillet weld and deleted the stress mitigation step
- Reduced the stainless steel inner lid thickness from 3 to 4 inches to 2 inches and changed the closure method from a full penetration weld to a spread ring with seal welds
- Replaced the split trunnion collar design with a one-piece twist-on design
- Changed the gap between the inner vessel and outer corrosion barrier to accommodate differential thermal expansion

Waste Package Mockups

- **FY 2000 waste package mock-up (based on site recommendation design)**
 - Fabricated a quarter-length test mock-up to investigate the feasibility of fabrication
 - Performed residual stress measurements before and after mock-up welding
 - Demonstrate machine welding and non-destructive evaluation techniques
 - Used in several development studies
- **Spread ring mock-up**
 - Mock-up of the single spread ring design and engagement tool was constructed
 - Operated successfully



Waste Package Development Studies

- **Development studies serve several purposes:**
 - Provide information and rationale for design and fabrication issues
 - Support analyses and model reports that are developed for total system performance assessment
- **The following studies have been completed:**
 - Weld Flaw Distribution
 - Induction Annealing
 - Laser Peening - Depth of Compressive Stress
 - Controlled Plasticity Burnishing - Depth of Compressive Stress
 - Residual Stress Measurement Analyses
 - Neutron Diffraction Analyses

Waste Package Development Studies

(Continued)

- **The following studies are planned or continue in FY 04**

- **Weld Material and Base Material Variability Study**
- **Laser Peening and Controlled Plasticity Burnishing Corrosion Study**
- **Fracture Toughness Study**
- **Welding Interpass Temperature Study**

Waste Package Prototype Program

- **Prototyping is an integral part of design**
- **Prototyping will demonstrate the fabrication processes before manufacture of the production units**
 - Ensures that waste packages can be manufactured as designed
- **Prototypes will be used to:**
 - Verify the closure processes and systems
 - Demonstrate waste package handling processes
 - Train operators for start-up and operations

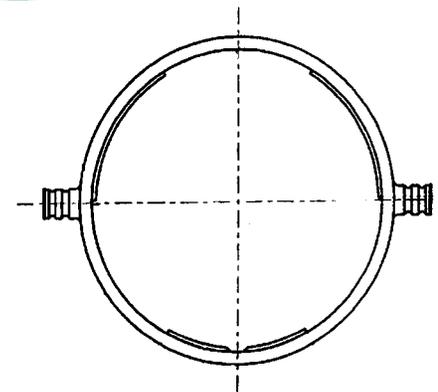
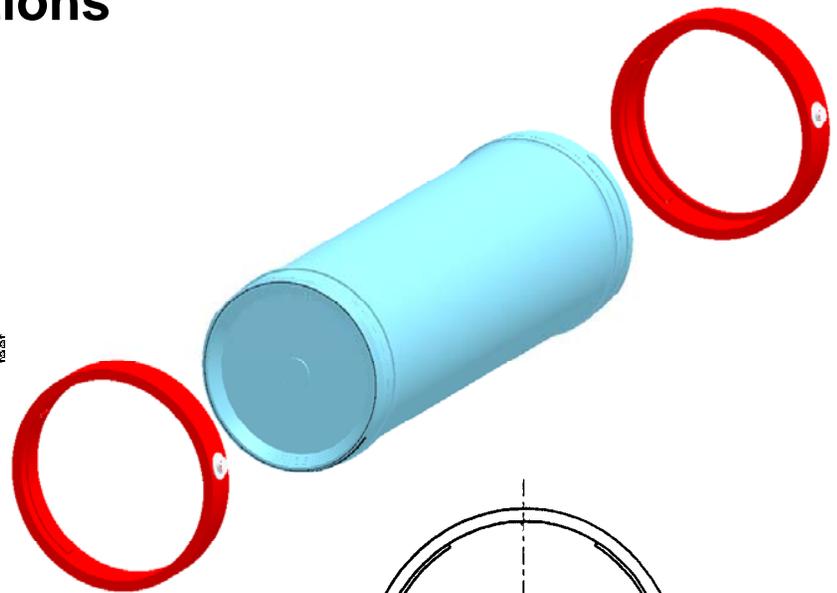
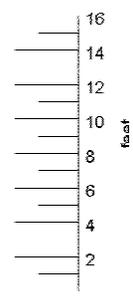
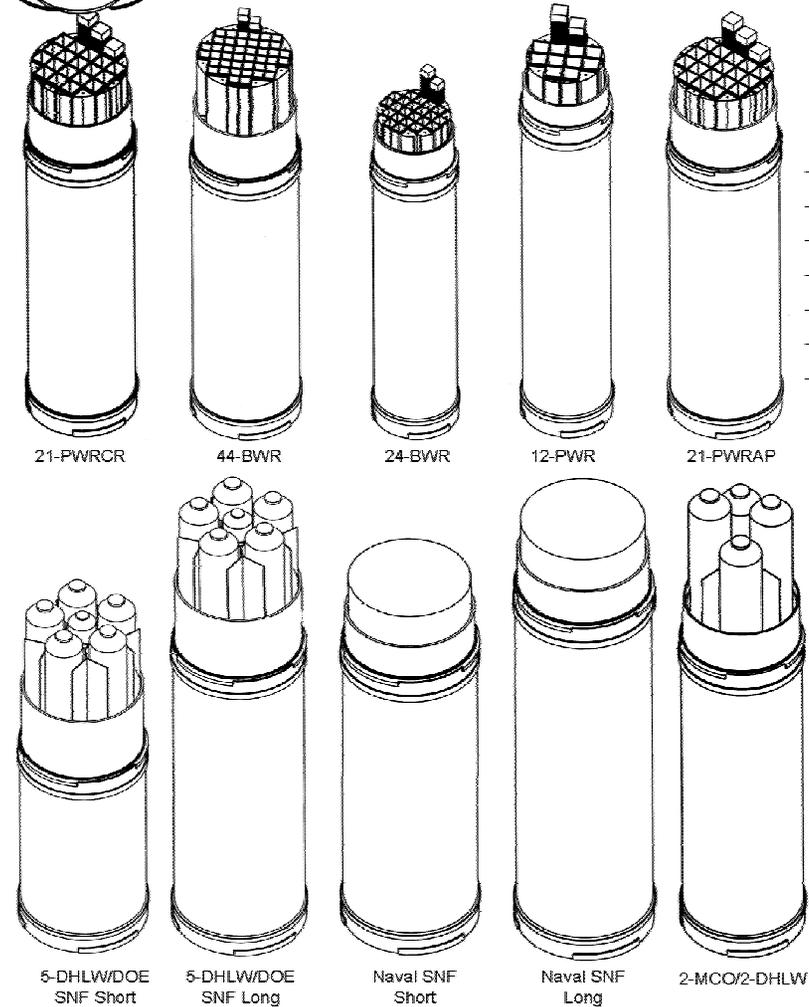
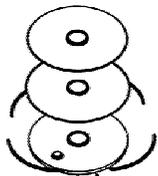
Waste Package Prototype Program

(Continued)

- **15 waste package prototypes have been planned, scheduled, and budgeted**
- **Prototypes will be produced over a six-year period from calendar year 2003 through 2008**
- **Request for proposal for the first waste package prototype procurement issued in July 2003**
 - **21 element pressurized water reactor waste package with absorber plates, full scale, includes all internals**
 - **Manufactured in strict compliance with all current design requirements including application of the American Society of Mechanical Engineers Section III Code N-Stamp**
- **Award of fixed-price contract is in process**

Waste Package Configurations

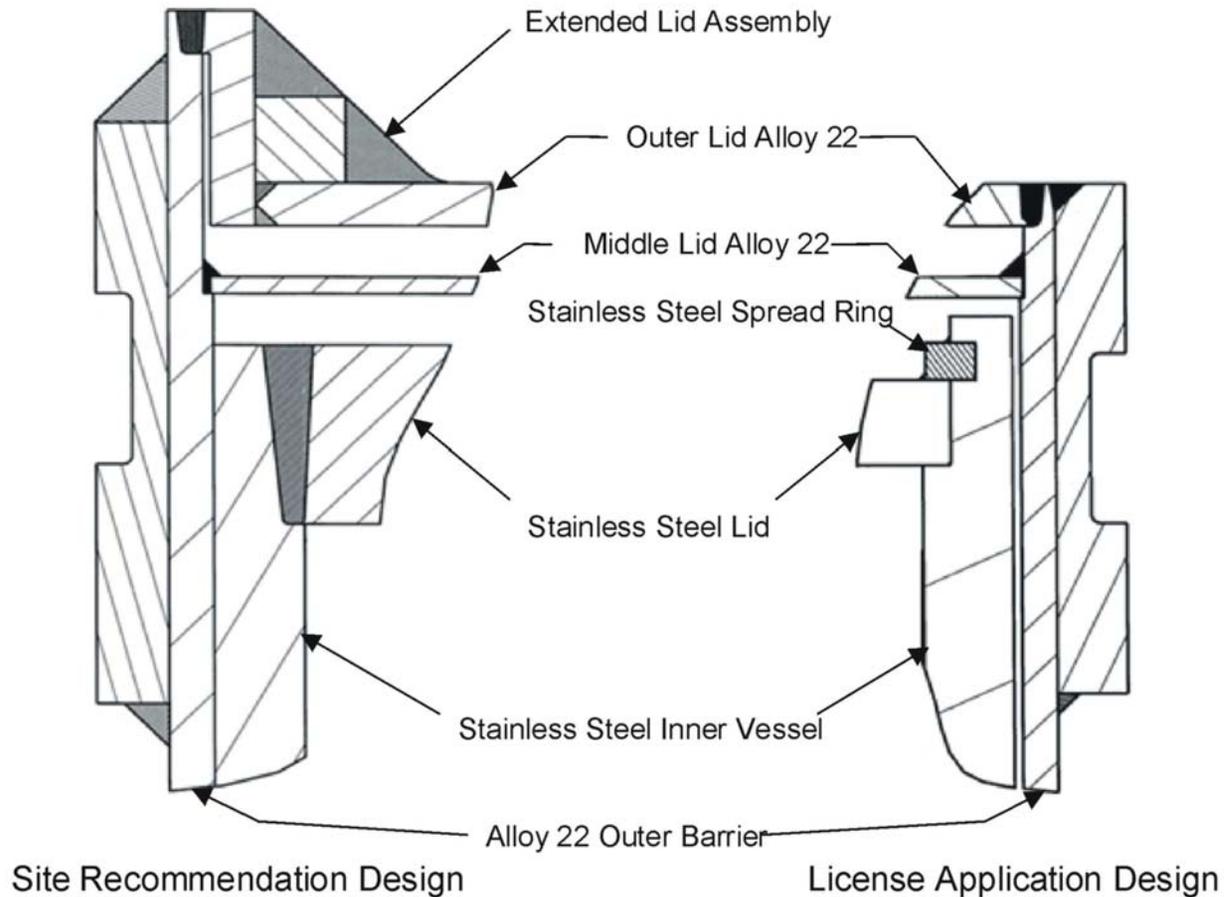
10 waste package configurations



This drawing is preliminary and not intended for construction, procurement, or fabrication.



Waste Package Closure Details



This drawing is preliminary and not intended for construction, procurement, or fabrication.

Drip Shield Design Process

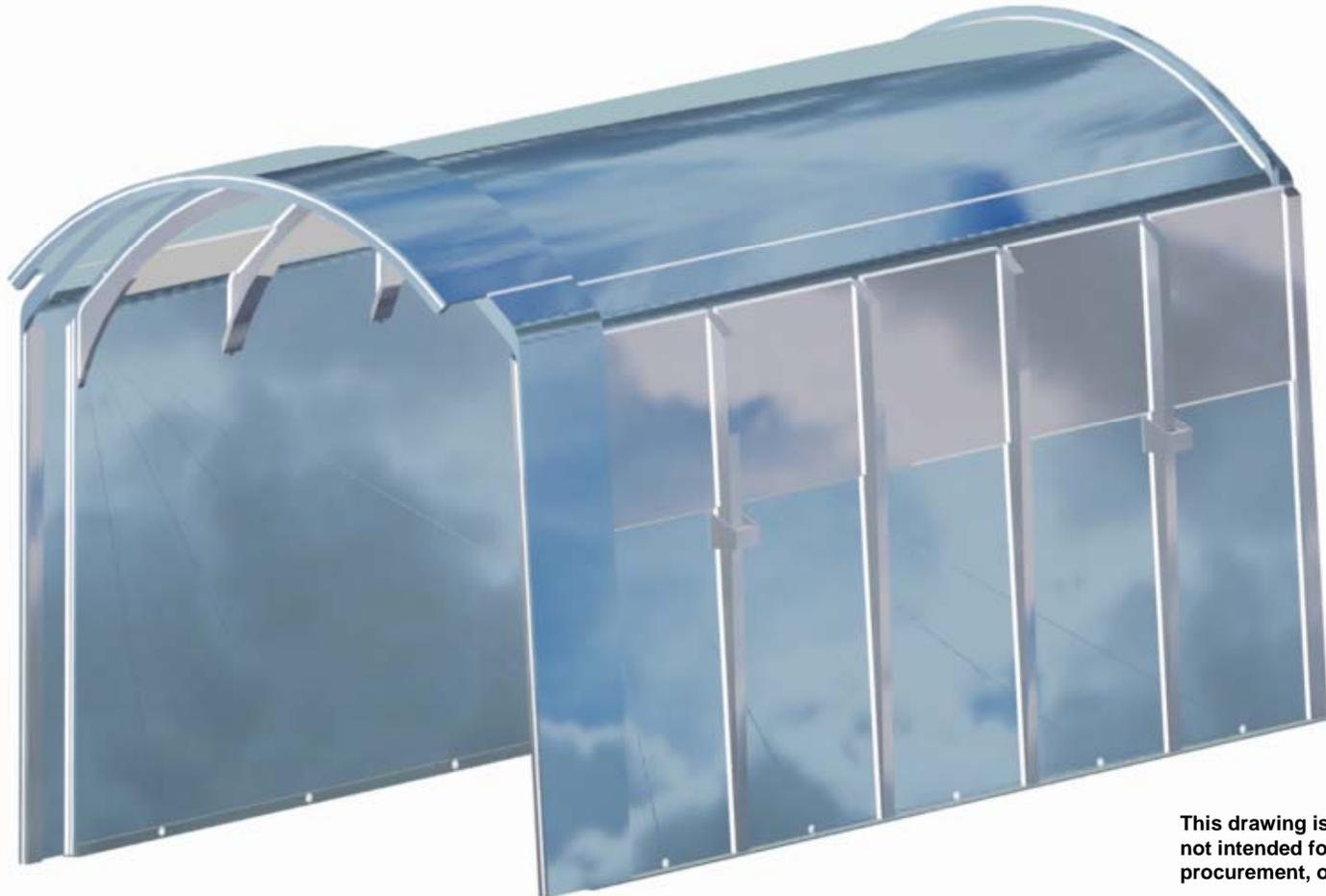
- **Analyze for postclosure**

- **Analyze postulated events and provide information to support model abstractions for total system performance assessment**
- **Postulated events include:**
 - ◆ **Rock fall**
 - ◆ **Vibratory ground motion**

Drip Shield Design Changes

- **Potential drip shield design detail changes not yet adopted**
 - Increased distance from drip shield to waste package to prevent drip shield contact with the waste package in the event of rock fall
 - Increased stiffness for bending loads and stresses along the bulkheads
 - Added longitudinal stiffener beams between the bulkheads along the axial direction, to provide additional strength for bending loads along axial length
 - Simplified handling and interlocking features
- **Material selection remains unchanged**

Drip Shield Illustration



This drawing is preliminary and not intended for construction, procurement, or fabrication.

Waste Package Preliminary Preclosure Safety Analysis Results

- **Preclosure safety considerations**
 - **The waste package design considers both Category 1 and Category 2 event sequences as defined by preclosure safety analysis**
 - **Waste package breach is therefore beyond Category 2**

Waste Package Preliminary Classification Results

- **The following structure, system, and component is important to safety:**
 - Waste package
- **The following features are important to waste isolation:**
 - Waste package
 - Drip shield

Summary

- **Preliminary preclosure safety analysis indicated April 2003 design would be able to meet regulatory performance objectives**
- **Structures, systems, and components which are important to safety have been identified**
- **Engineered features which are important to waste isolation have been identified**
- **Complete design development to support License Application**
- **Preclosure safety analysis to be updated based upon final License Application design**
- **No new event sequences are anticipated, so ability of License Application design to meet regulatory performance objectives is expected**

