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

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Status of Yucca Mountain Repository Design

Presented to:
Nuclear Waste Technical Review Board

Presented by:
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Acting Director, Office of the Chief Engineer

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Las Vegas, Nevada

Outline

- Summary of design changes
- Site layout
- Waste handling process and facilities
- Waste packages and canisters
- Subsurface facilities
- Design status
- Summary

Acronyms

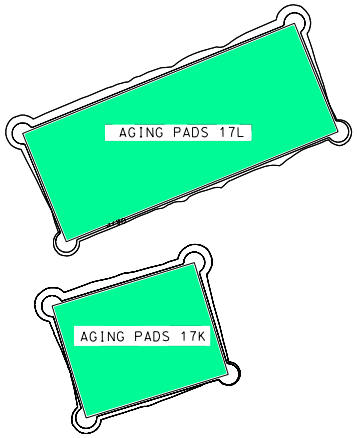
CRCF	Canister receipt and closure facility
CSNF	Commercial spent nuclear fuel
DHLW	Defense high-level (radioactive) waste
EDGF	Emergency Diesel Generator Facility
GROA	Geologic repository operations area
HEPA	High-efficiency particulate air (filter)
IHF	Initial handling facility
HLW	High-level (radioactive) waste
ITS	Important to safety
LLWF	Low Level Waste Facility
MCO	Multi-canister overpack
QARD	Quality assurance requirements and description
RF	Receipt facility
TAD	Transportation, aging, and disposal
WHF	Wet handling facility
WP	Waste package

Summary of Design Changes

- **TAD canisters utilized**
- **TAD canisters reduce handling of individual CSNF assemblies at repository**
- **Operational goal is 90% of individual CSNF assemblies loaded in TAD canisters by utilities**
- **Limited quantity of uncanistered individual CSNF assemblies to be loaded into TAD canisters at the repository**
- **Reconfigured waste handling process and facilities**
- **WP configuration suite revised for TAD canisters**
- **IHF added to accommodate naval SNF and DOE HLW receipt**

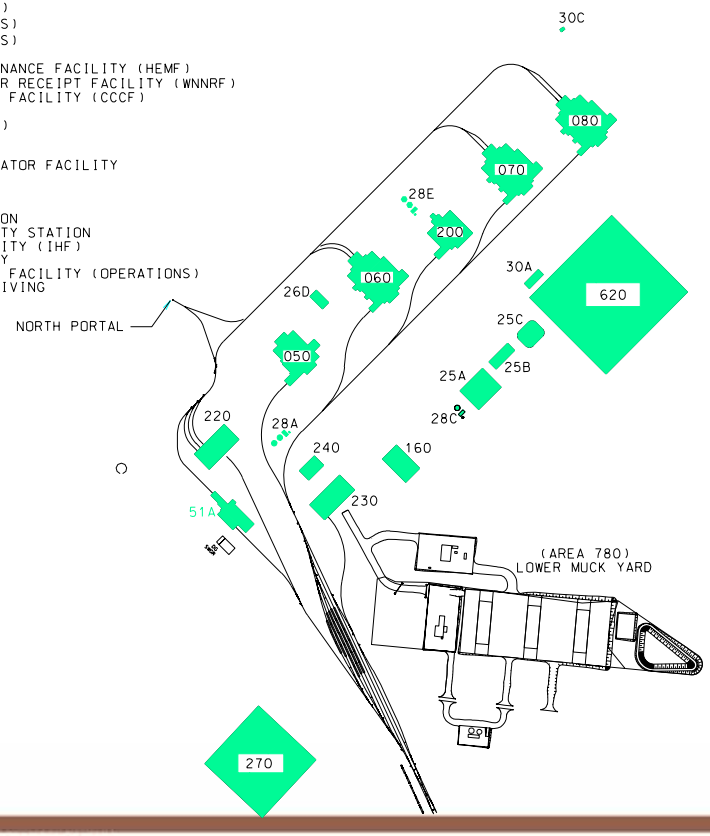
Site Layout

Site Overview

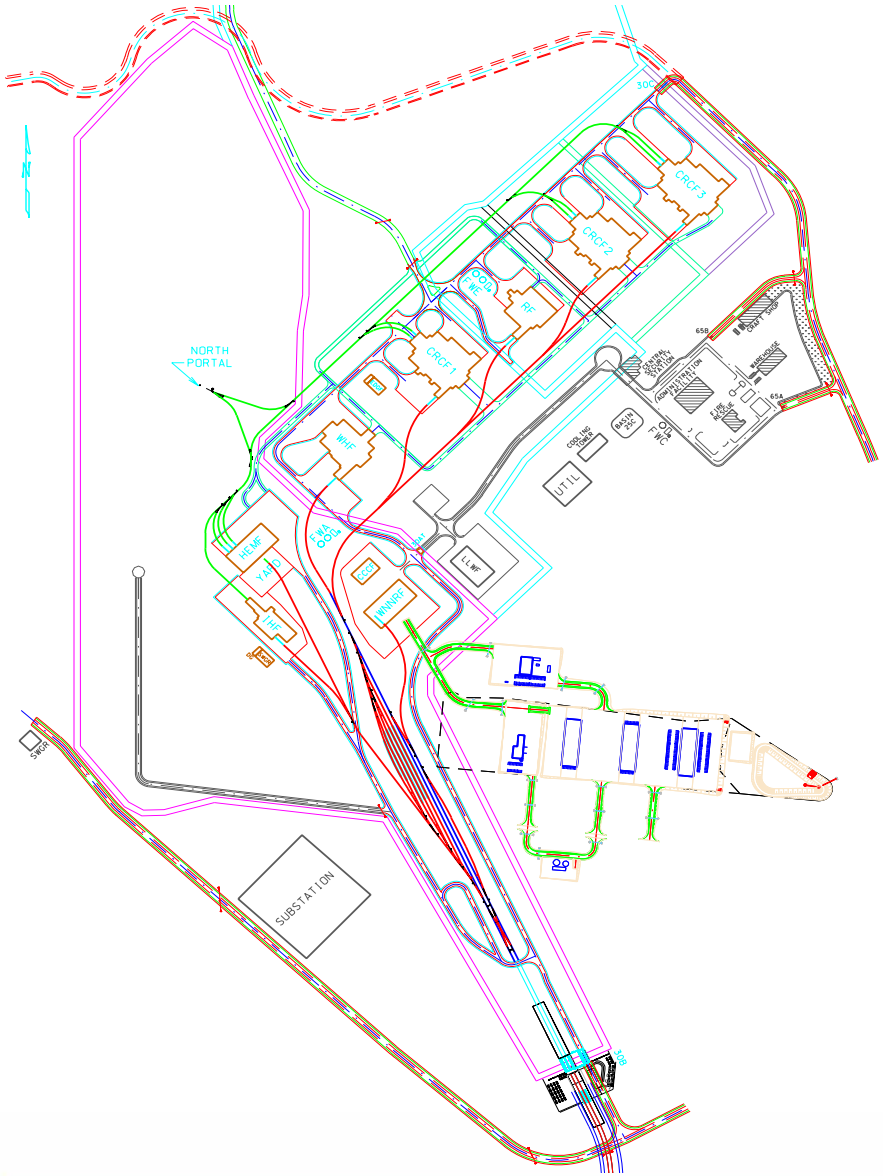


LEGEND

AREA No.	DESCRIPTION
050	WET HANDLING FACILITY (WHF)
060	CANISTER RECEIPT AND CLOSURE FACILITY 1 (CRCF 1)
070	CANISTER RECEIPT AND CLOSURE FACILITY 2 (CRCF 2)
080	CANISTER RECEIPT AND CLOSURE FACILITY 3 (CRCF 3)
160	LOW LEVEL WASTE HANDLING (LLWH)
17K	AGING PADS (500 SPACES)
17L	AGING PADS (1000 SPACES)
17M	AGING PADS (1000 SPACES)
200	RECEIPT FACILITY (RF)
220	HEAVY EQUIPMENT MAINTENANCE FACILITY (HEMF)
230	WAREHOUSE & NON-NUCLEAR RECEIPT FACILITY (WNNRF)
240	CENTRAL CONTROL CENTER FACILITY (CCCF)
270	SUBSTATION (GENERAL)
25A	UTILITIES FACILITY (UF)
25B	COOLING TOWER
25C	EVAPORATION POND
26D	EMERGENCY DIESEL GENERATOR FACILITY
28A	FIREWATER FACILITY
28C	FIREWATER FACILITY
28E	FIREWATER FACILITY
30A	CENTRAL SECURITY STATION
30C	NORTH PERIMETER SECURITY STATION
51A	INITIAL HANDLING FACILITY (IHF)
620	ADMINISTRATION FACILITY
63A	FIRE, RESCUE & MEDICAL FACILITY (OPERATIONS)
68A	WAREHOUSE/CENTRAL RECEIVING
71A	CRAFT SHOPS



Site Overview



New Facilities

IHF - Initial Handling Facility

WHF - Wet Handling Facility

CRCF 1 - Canister Receipt and Closure Facility 1

CRCF 2 - Canister Receipt and Closure Facility 2

CRCF 3 - Canister Receipt and Closure Facility 3

RF - Receipt Facility

LLWF - Low Level Waste Facility

EDGF (26D) - Emergency Diesel Generator Facility

Previous Facilities

HEMF - Heavy Equipment Maintenance Facility

CCCF - Central Control Center Facility

WNNRF - Warehouse and Non-Nuclear Receipt Facility

Utility, Security, and Administration Facilities

Site Layout Changes

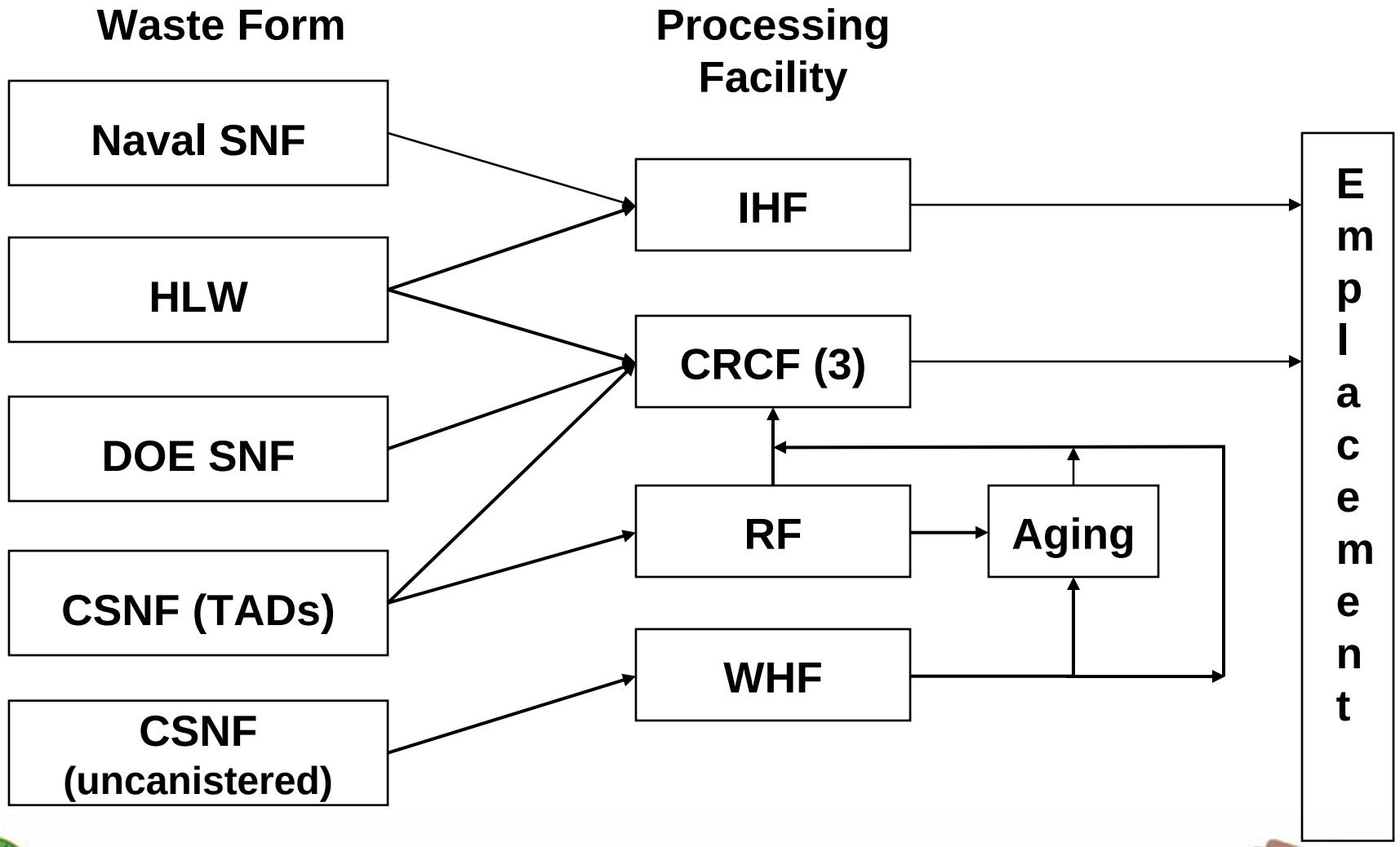
- **Waste handling, aging, and support facilities in same general location as previous layout**
- **IHF allows canisterized waste (HLW and naval SNF) receipt and emplacement with minimal impact to construction of other waste handling facilities**
- **CRCFs handle all canisterized waste except naval SNF**
- **RF removes canisters from transportation conveyance and places into aging overpack or site transfer cask**
- **WHF handles uncanisterized fuel (individual fuel assemblies)**
- **EDGF and LLWF round out new facilities**

Waste Handling Process

Waste Handling Changes

- **TAD canister eliminates majority of individual CSNF assembly handling at repository**
- **Remaining uncanistered individual CSNF assemblies handled and loaded into TAD canisters underwater in the WHF**

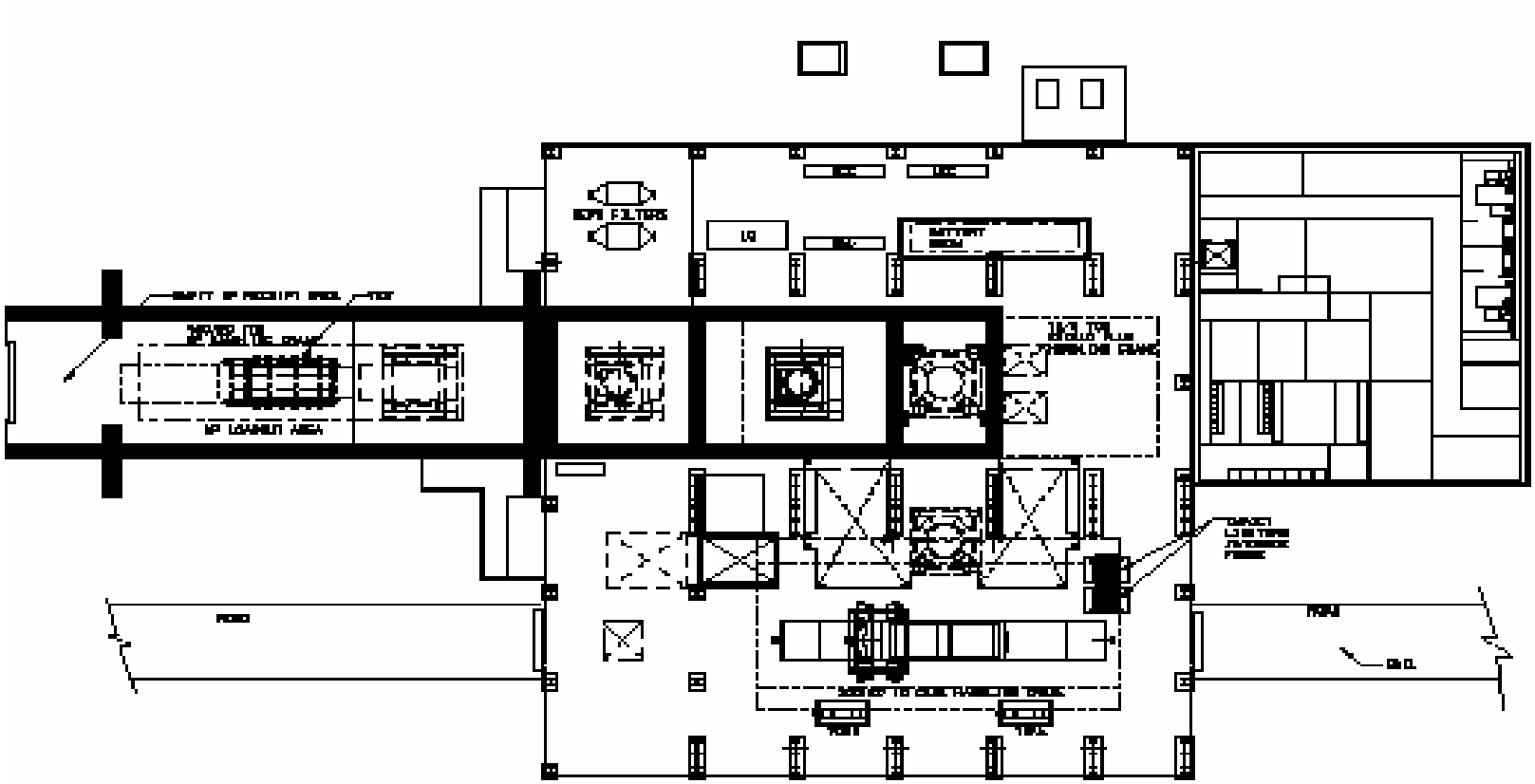
Waste Form Processing Overview



Facility Annual Capacities

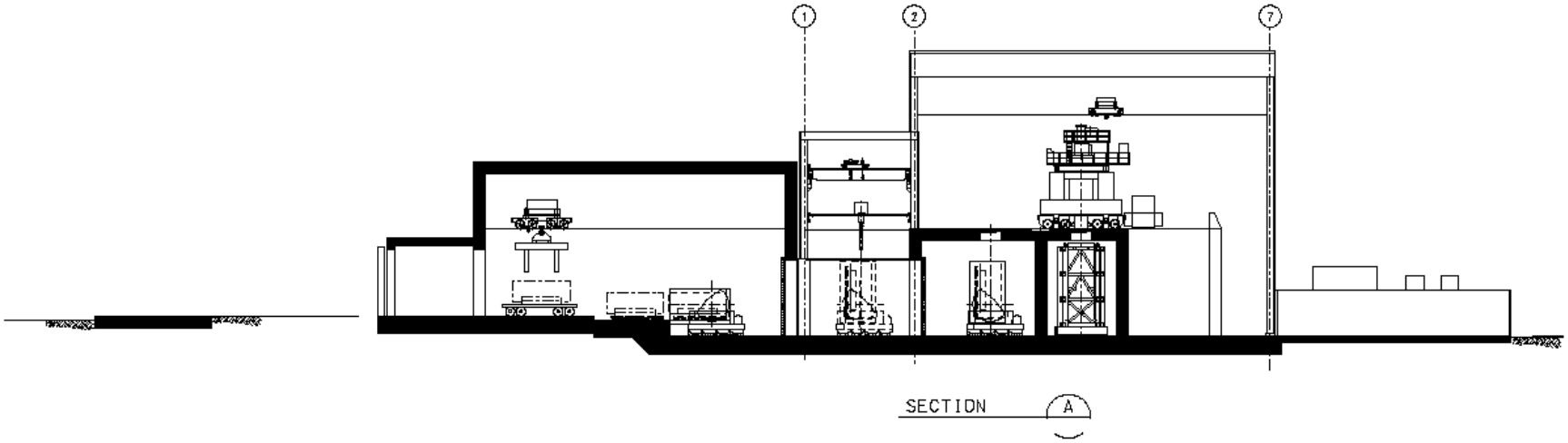
	MTHM	
Facility	Receive	Emplace
IHF	40	40
CRCF	1200	1200
WHF	340	0
RF	2300	0

Waste Handling Facilities

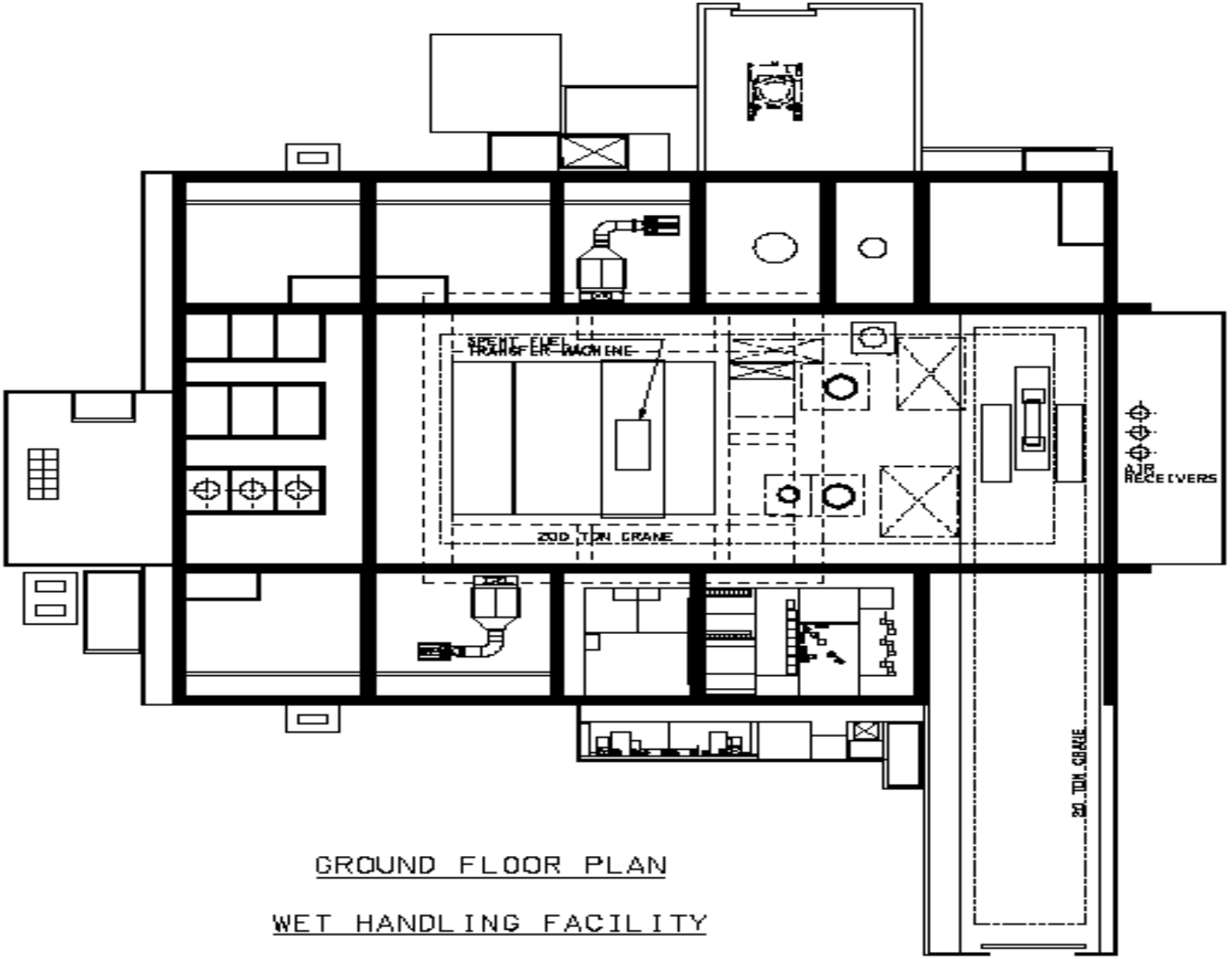


Ground Floor Plan

Initial Handling Facility

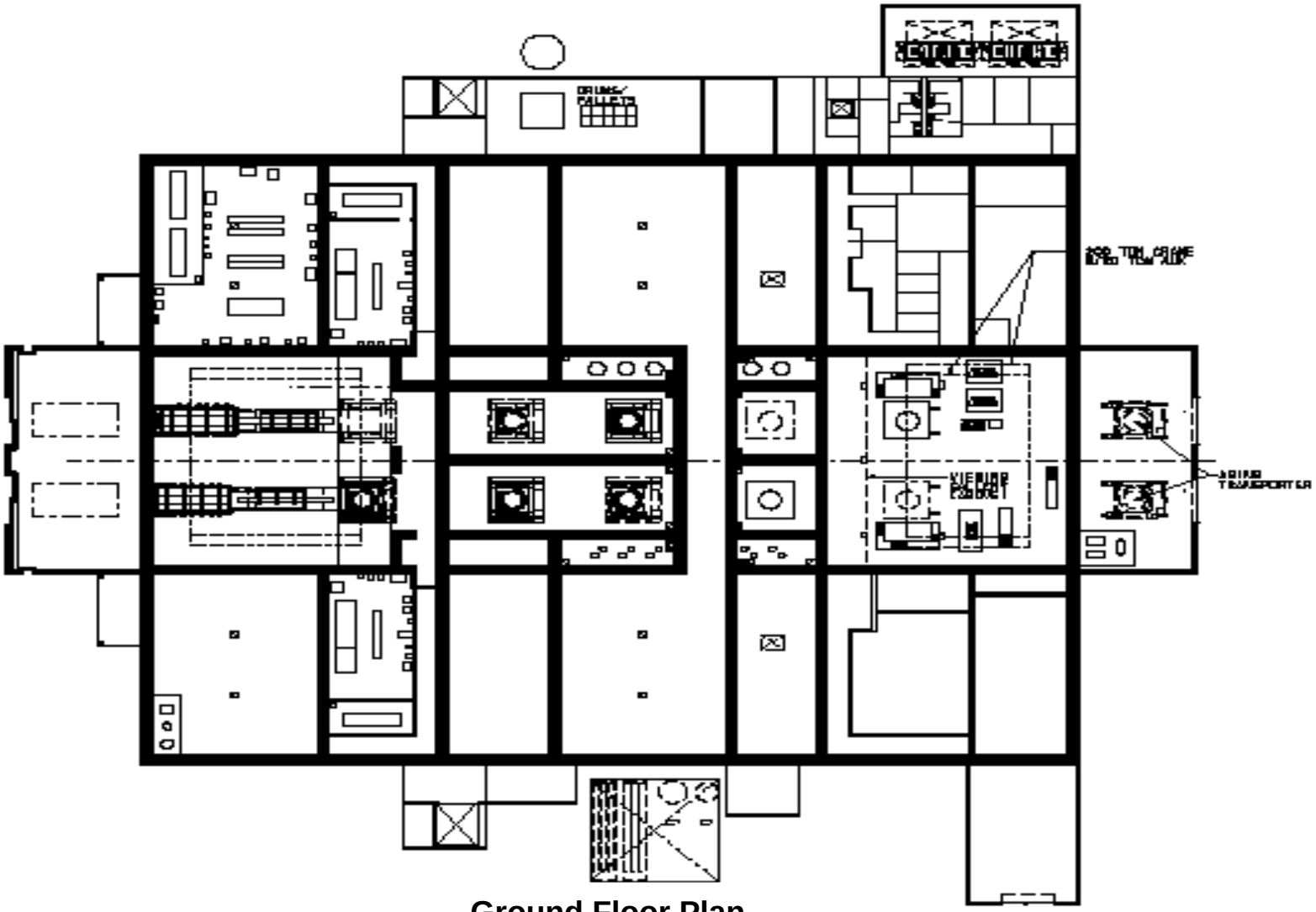


INITIAL HANDLING FACILITY

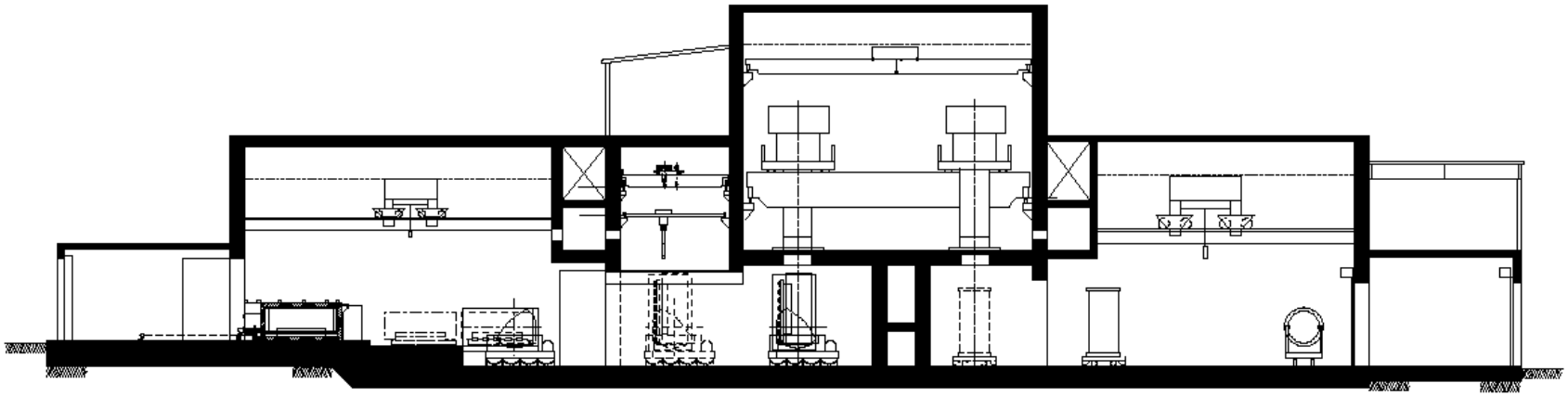


GROUND FLOOR PLAN

WET HANDLING FACILITY



Ground Floor Plan
Canister Receipt and Closure Facility



SECTION A

CRCF SECTION

GROUND FLOOR PLAN
RECEIPT FACILITY

WPs and TAD Canisters

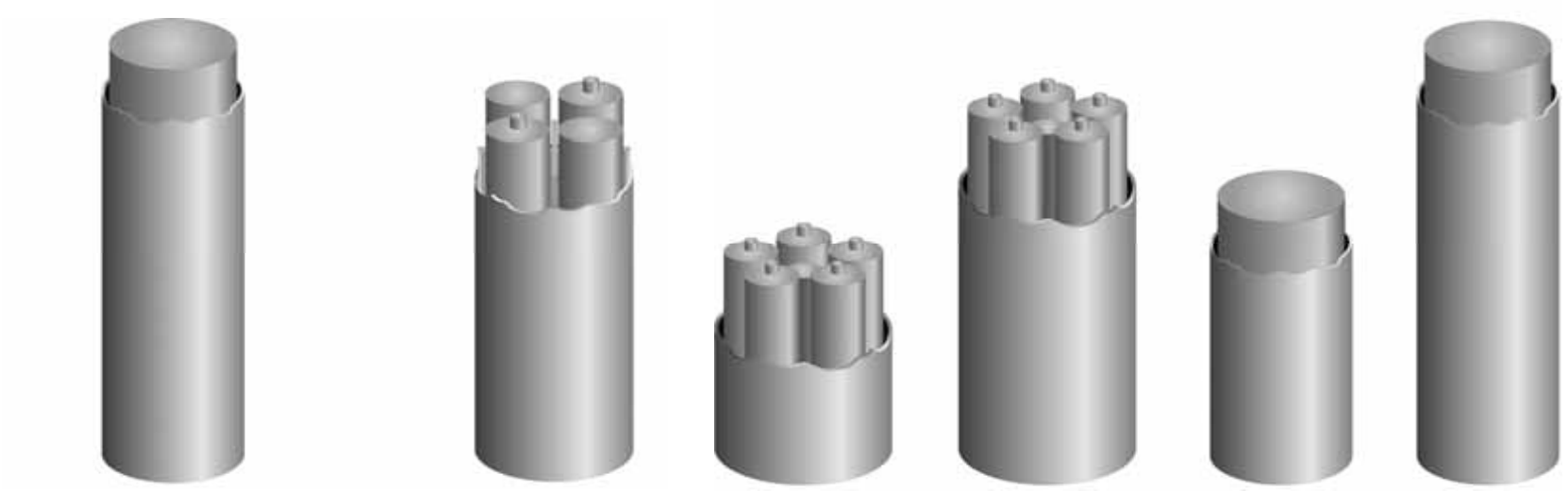
WP and TAD Canister Changes

- **Utilize TAD canisters for majority of individual CSNF assemblies**
- **TAD canisters reduce WP configuration suite from 10 to 6**
- **Shield plugs added to WPs used for HLW and DOE SNF to allow for standard closure cell configuration**

TAD Canister Key Features

- **Majority of TAD canisters loaded at utility sites**
- **Some TAD canisters loaded at repository**
- **Significantly reduces individual CSNF assembly handling at repository**
- **Simplifies repository design and operations**
- **Reduces risk at repository**
- **TAD canister includes shield plug**

Waste Package Configuration Suite



TAD
21-PWR
44-BWR

2-MCO
2-DHLW Long

5-DHLW/DOE
SNF Short

5-DHLW/DOE
SNF Long

Naval
SNF
Short

Naval
SNF
Long

Shield plugs are integral to canister design

Shield plugs added to waste package design

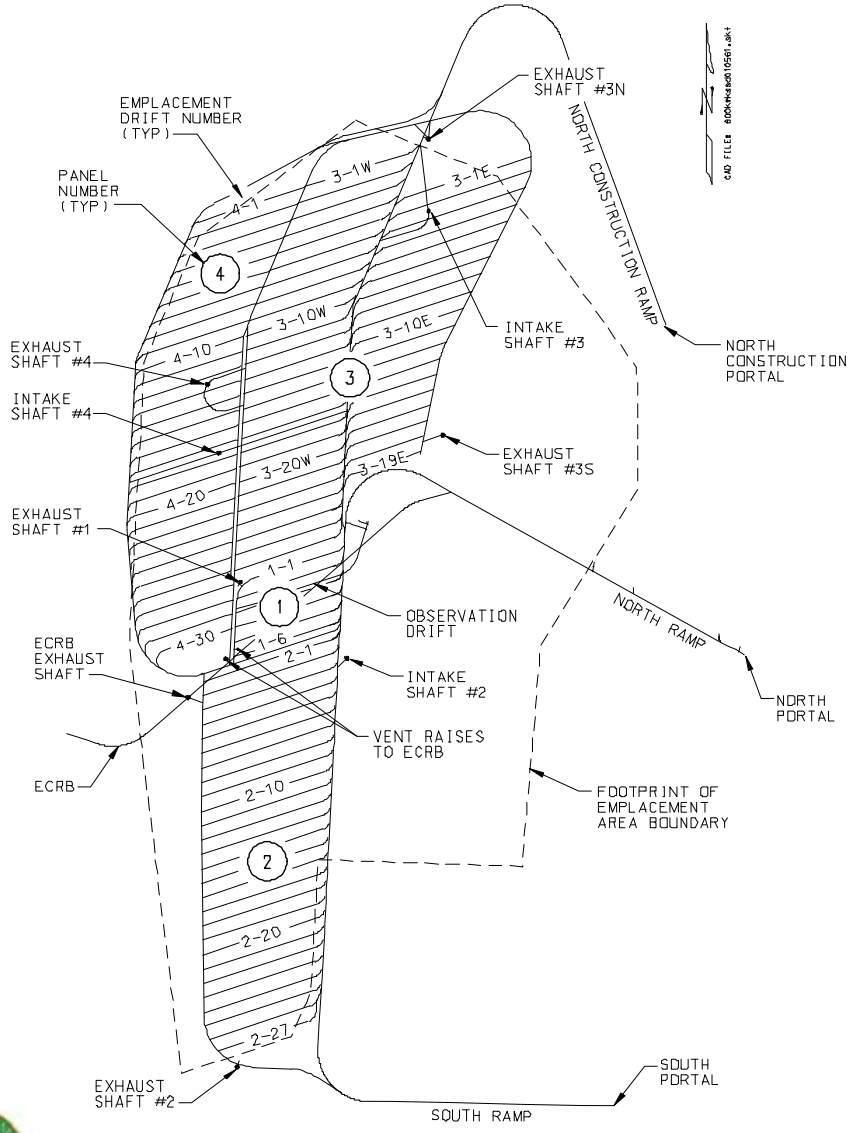
Shield plugs are integral to canister design

Subsurface

Subsurface Changes

- **No changes in overall emplacement concept**
- **Minor changes in layout**

Subsurface Layout



- **Panel numbers represent the proposed construction and emplacement sequence**
- **Sequence:**
  - **6 drifts in Panel 1**
  - **27 drifts in Panel 2**
  - **45 drifts in 3E & 3W**
  - **30 drifts in Panel 4**
- **Total emplacement length available is approximately 41 miles (66 km)**

Design Status

Design Status

- **Basic facility layouts and material flows completed**
- **Completed CRCF lumped mass structural model; others in process**
- **Structural and systems design in process**
- **Preclosure safety analysis update has begun based upon revised facility designs; will include more developed equipment reliabilities**

Summary

- **Use of TAD canisters simplifies waste handling**
- **Operational goal of 90% of individual CSNF assemblies loaded in TAD canisters by utilities**
- **Wet handling of remaining individual uncanistered CSNF assemblies**
- **WP configuration suite simplified**
- **Design for LA is progressing**