

WASTE REPOSITORY SURFACE FACILITIES

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High Level Geologic Repository
Dynamic Analysis Committee
American Society of Civil Engineers**

OVERVIEW

- **Different from nuclear power plant**
- **Existing criteria & design methodology**
- **Good understanding about structural behavior**
- **Shorter design life than underground**

FACILITY SAFETY CLASSIFICATION

- IMPORTANT TO SAFETY**
 - Failure results in dose consequence beyond unrestricted area boundary**

- NOT IMPORTANT TO SAFETY**
 - Conventional design**

CURRENT DESIGN METHODOLOGY

- **State of art of surface facility design well developed**
- **Consider consequences of failure**
- **Cost/benefit from higher conservatism**

IMPORTANT CODES AND STANDARDS

- **ASCE 4-86** **Seismic analysis of safety-related nuclear structures**
- **UCRL 15910** **Design guidelines for DOE facilities**
- **NRC SRP 3.8.4** **SRP for other seismic Category I structures**
- **DOE / TIC-11603** **Standards for nonreactor nuclear facilities**
- **10CFR60** **Disposal of radioactive waste in geological repositories**
- **ACI 349** **Nuclear safety related concrete**

CRITICAL LOADS

- **PRE-OPERATION**
Construction loads
Test loads
- **NORMAL OPERATION**
Dead & live loads
Thermal
- **ABNORMAL**
Crane load drop
Loss of cooling
- **EXTREME ENVIRONMENTAL**
Seismic
Wind & tornado
Flood
- **OTHER EXTREME**
Aircraft impact
Underground explosions

FAILURE MODES

- **Cracks**
- **Spalling**
- **Exposure of rebar**
- **Formation of holes**
- **Sagging of roof slab**
- **Tilting of walls**
- **Collapse of walls**
- **Collapse of roof**

STRUCTURAL COMPONENT FAILURE MODES WITH POTENTIAL FOR SIGNIFICANT RELEASE

- **WASTE HANDLING**

Shipping & receiving bays

Hot (processing) cells

Transfer tunnels

Storage Vaults

- **OPERATIONS SUPPORT**

Waste treatment building

Performance confirmation building

Decontamination building

MECHANICAL COMPONENT FAILURE MODES WITH POTENTIAL FOR SIGNIFICANT RELEASE

- **Overhead bridge crane**
- **Jib cranes**
- **Canister storage racks**
- **Canister transfer carts**
- **Welding equipment**
- **Decontamination equipment**
- **HEPA filter unit**
- **Fuel consolidation equipment**

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