WASTE REPOSITORY
SURFACE FACILITIES

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High Level Geologic Repository
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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
OVERVIEW
REVIEW

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