

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

NORMAL OPERATION

ABNORMAL

EXTREME
 ENVIRONMENTAL

OTHER EXTREME

Construction loads Test loads

Dead & live loads Thermal

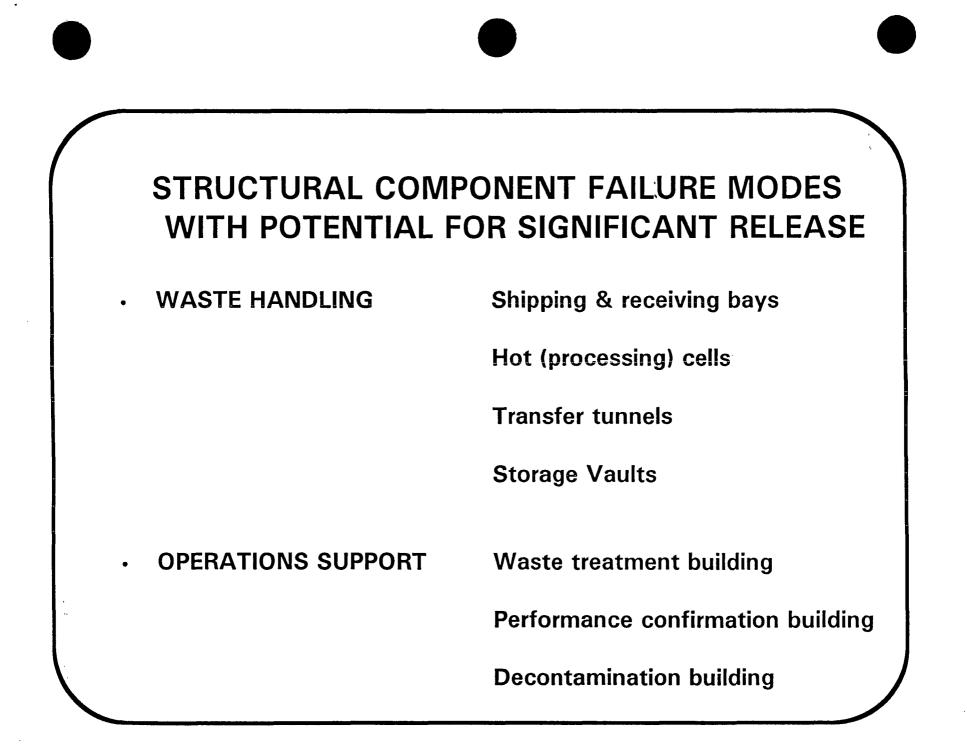
Crane load drop Loss of cooling

Seismic Wind & tornado Flood

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



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

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