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Spent Nuclear Fuel & Plutonium Storage Risk

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Citizens Advisory Board Nuclear Materials Committee

DOE Meeting Center, Aiken, SC

Purpose

- To fulfill the Nuclear Materials Committee Work Plan topic

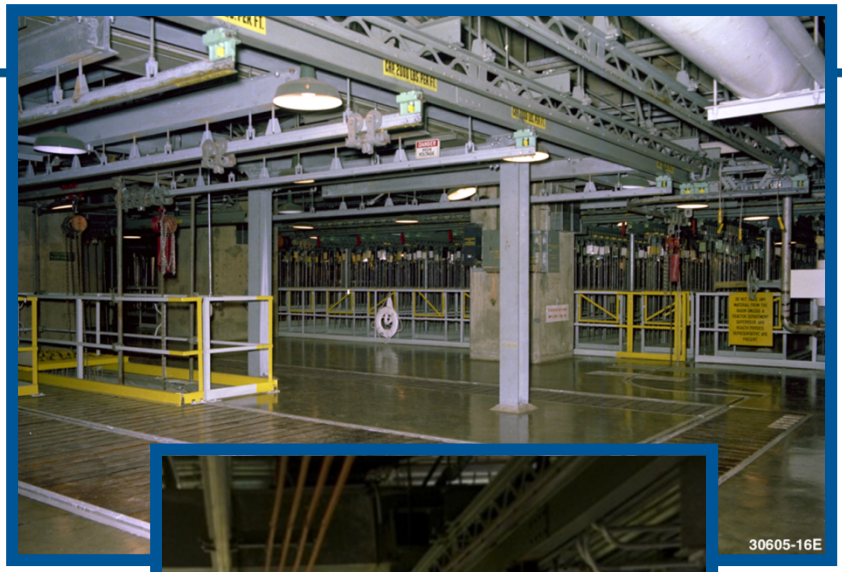
- Address a request from the Nuclear Materials Committee / CAB

Risk Analysis

- **Documented Safety Analysis (DSA)**
  - Facility Hazard Categorization
  - Hazard Analysis
    - *Scenario development / event progression*
    - *Material–at-risk / source term analysis*
    - *Prevention features*
    - *Frequency binning*
    - *Mitigation features*
    - *Consequence analysis*
  - Identification of controls to prevent occurrences and mitigate consequences
  - Defines risk and ensures within established evaluation guidelines

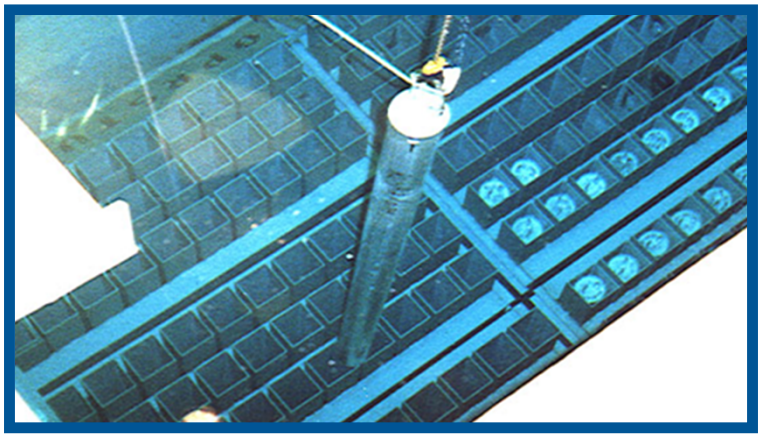
Potential Initiating Events

- Fire
- Explosion
- Loss of Containment / Confinement
- Direct Radiation Exposure
- Nuclear Criticality
- External Events
- Natural Phenomena (e.g., seismic, tornado, wind)



Accident Prevention - Examples

- **Engineered Controls**
  - Building structure
  - Storage rack and fuel bundle designs
  - Cask design
  - Fuel & cask handling equipment
- **Administrative Controls**
  - Combustible / flammable / explosive control programs
  - Hoisting & rigging program
  - Highly structured procedures
  - Personnel training & qualification



Consequence Mitigation - Examples

- **Engineered Controls**
  - Area radiation monitoring system
  - Basin water level
  - Shielding
  - Fire water supply
- **Administrative Controls**
  - Fuel receipt & shipping program
  - Emergency response
  - Fire department and manual fire fighting
  - Procedures & training

Results of Postulated Accident Scenarios – L Area

Accident	Offsite Dose (mrem)
Fire on -40' Level	6.5
Bounding Facility Fire	22.5
Fire-Induced Criticality	41
Process-Induced Criticality in Disassembly Area	8.3
Wildland or Post-Seismic Initiated Fire	22.5

Contributors to postulated fire-induced criticality accident (mrem):

- Bounding disassembly area fire 31
  - ✓ Dry fuel storage
  - ✓ Deionizers and filters
  - ✓ Radioactive waste
  - ❖ No contribution from underwater fuel
- Evaporated basin water 1.6
- Criticality 8.3

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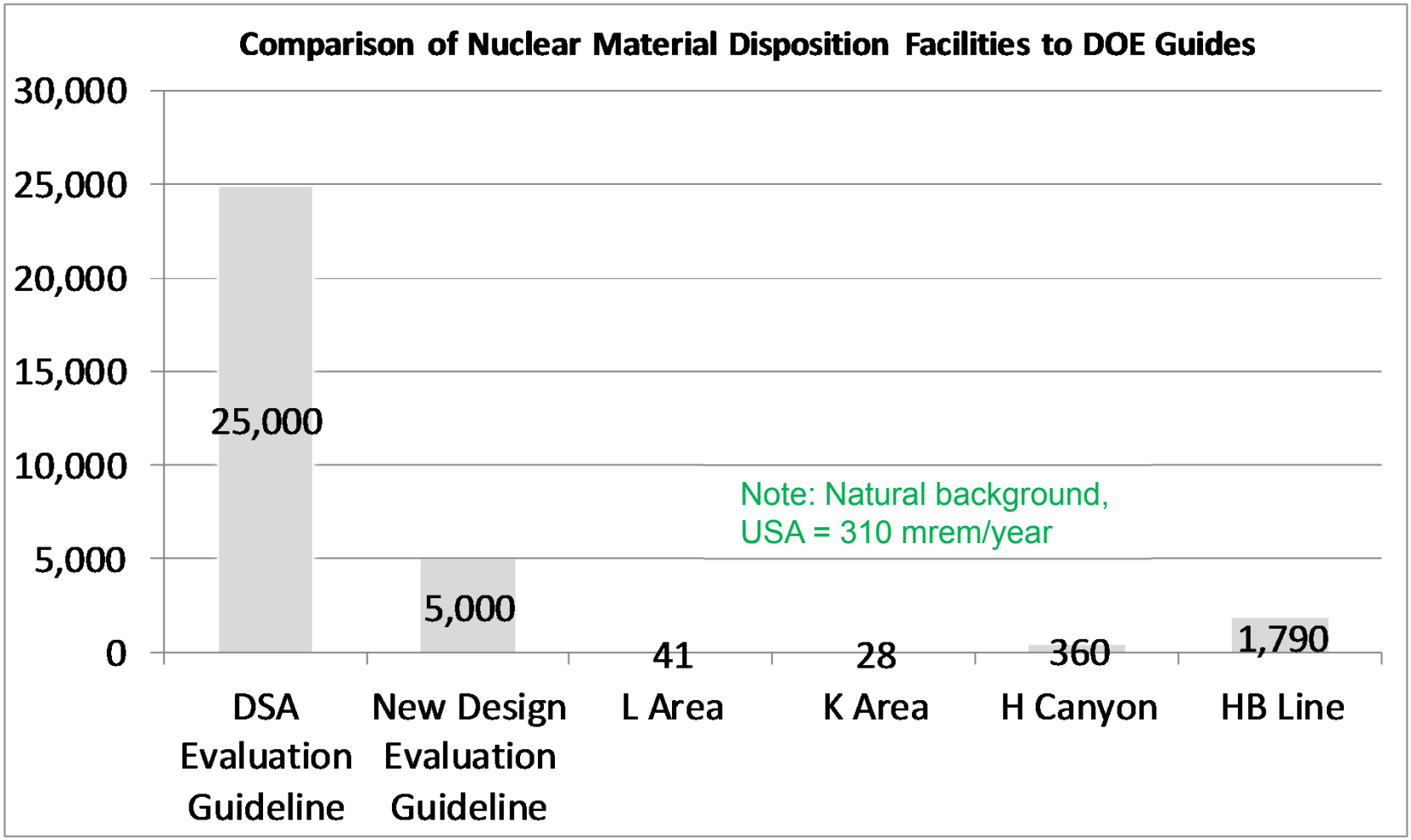
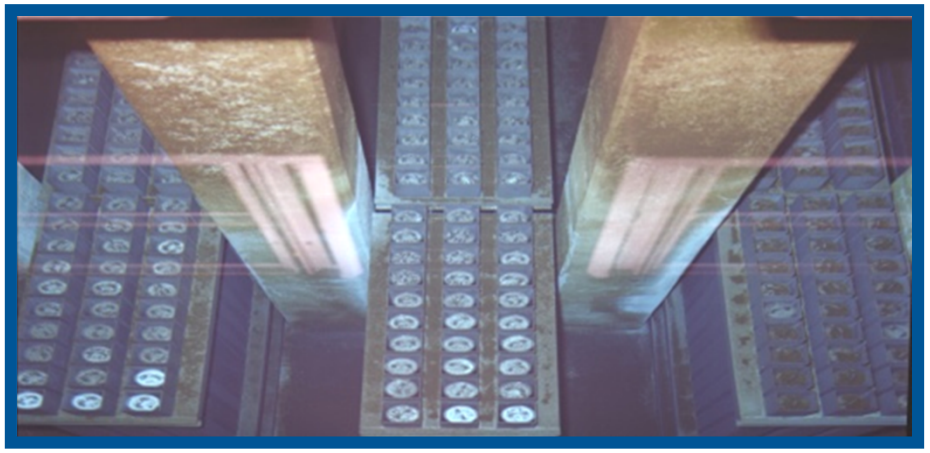
Mitigated Offsite Consequence (mrem)



Risk from Spent Nuclear Fuel & Plutonium Storage

- None of the analyzed accident scenarios result in damage to or release of radioactive material from the entire inventory of stored nuclear material, thus
- Results of consequence analyses are not affected by the total inventory of stored nuclear material
- Offsite consequences for bounding accidents are categorized as "negligible" (SCD-11) and are unaffected by quantity of stored nuclear material



Nuclear Materials Management