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NRC Regulation of Spent Nuclear Fuel Storage and Transportation

Presentation to the SONGS Community Engagement Panel

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Overview

- Spent Fuel Storage and Transportation Regulations
- Spent Fuel Storage System Design Review
- Transportation
- High Burnup Fuel

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Regulations

- 10 CFR Part 71: *Packaging and Transportation of Radioactive Material*
  - Transportation of all radioactive material, including spent nuclear fuel
- 10 CFR Part 72 – *Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste*

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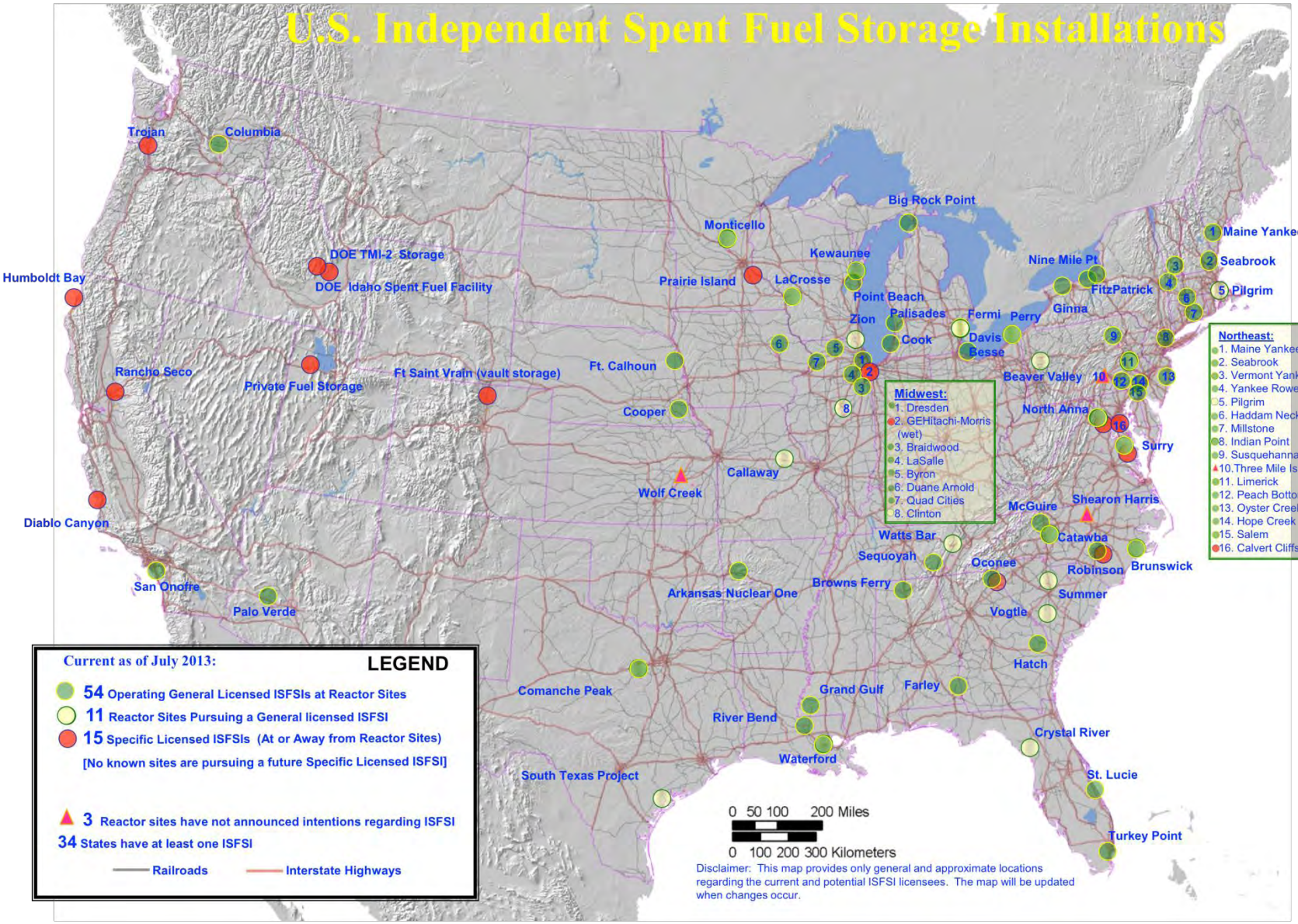
U.S. Independent Spent Fuel Storage Installations



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Part 72 Regulations

- General Design Criteria
  - Off-site radiation dose
  - Subcriticality
  - Confinement
- Quality Assurance
- Siting
- Physical Protection
- Training and Certification of Personnel
- Reporting

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Technical Review Disciplines

- Structural
- Materials
- Thermal
- Confinement
- Criticality
- Shielding and Radiation Protection
- Quality Assurance

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Storage System Design Review

- Normal Conditions
- Off-Normal Conditions
- Accident Conditions and Natural Phenomena
  - Tornado winds and tornado missiles
  - Earthquakes
  - Floods and tsunamis
  - Fires and explosions
- Structural review demonstrates that confinement is maintained under all conditions

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Storage System Design Review, cont'd

- Criticality review - fuel is subcritical under all conditions
- Shielding review:
  - System meets off-site radiation dose rate requirements
  - Radiation dose rates are "As Low As Reasonably Achievable"
- Thermal review - cladding is protected under normal conditions
- Materials review:
  - Materials properties assumed in other evaluations are appropriate
  - Materials integrity is maintained throughout expected storage period

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Transportation

- Same set of technical discipline reviews as for storage
  - Ensure that package meets external dose rate limits
  - Ensure fuel remains subcritical
  - Ensure containment is maintained

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Transportation, cont'd

- Normal and accident conditions differ from storage:
  - Normal transport
    - Vibration
    - Small drops and impacts
    - Heat and cold
  - Accidents
    - 30-ft. drop onto unyielding surface
    - Puncture
    - Fire
    - Water immersion

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High Burnup Fuel

- High Burnup Fuel is safe in storage and transportation
  - Research activities that NRC has conducted
  - Research activities at other institutions
- Continuing confirmatory research
  - Material properties testing
  - DOE high burnup fuel demonstration

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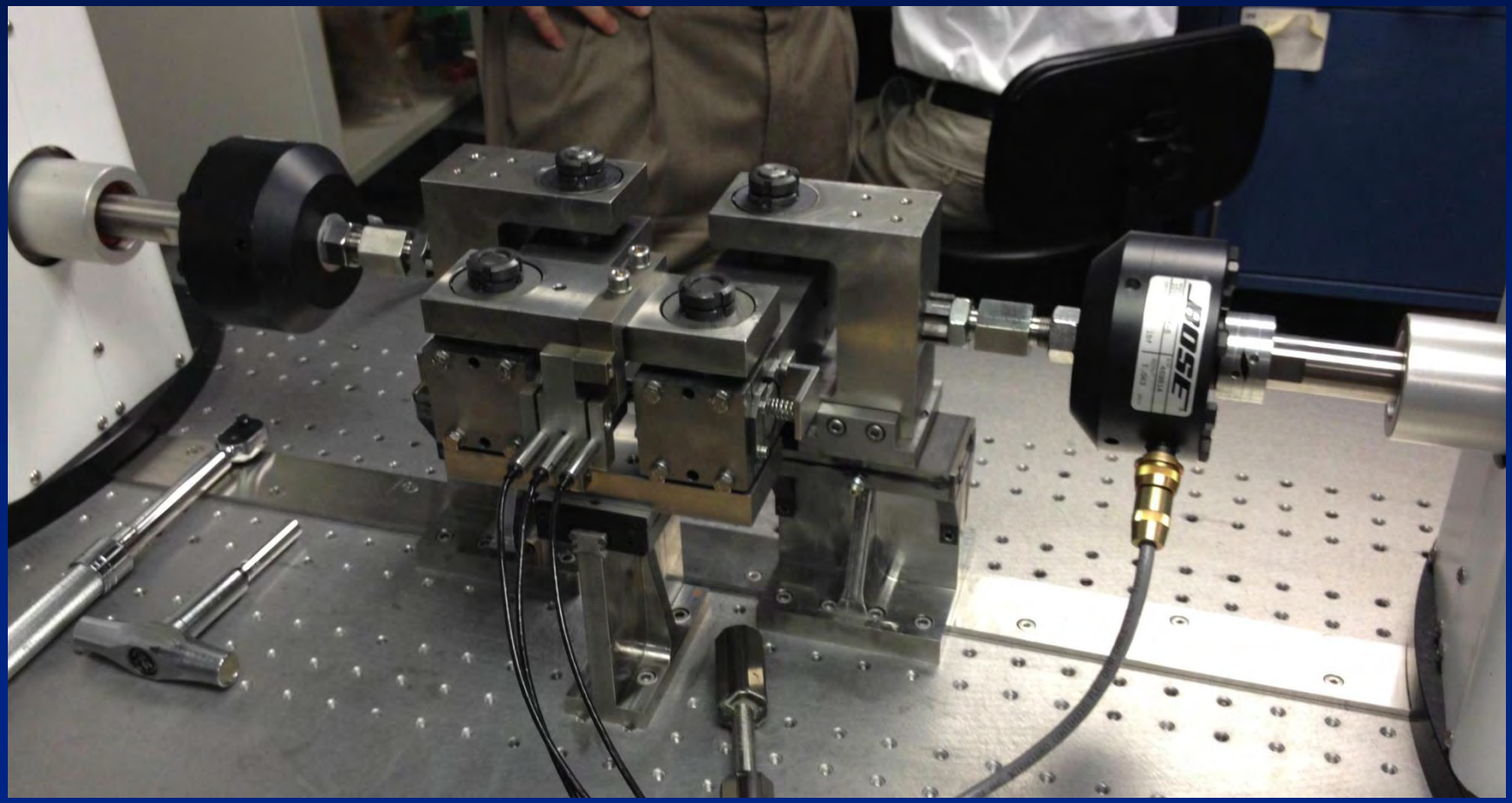
High Burnup Fuel



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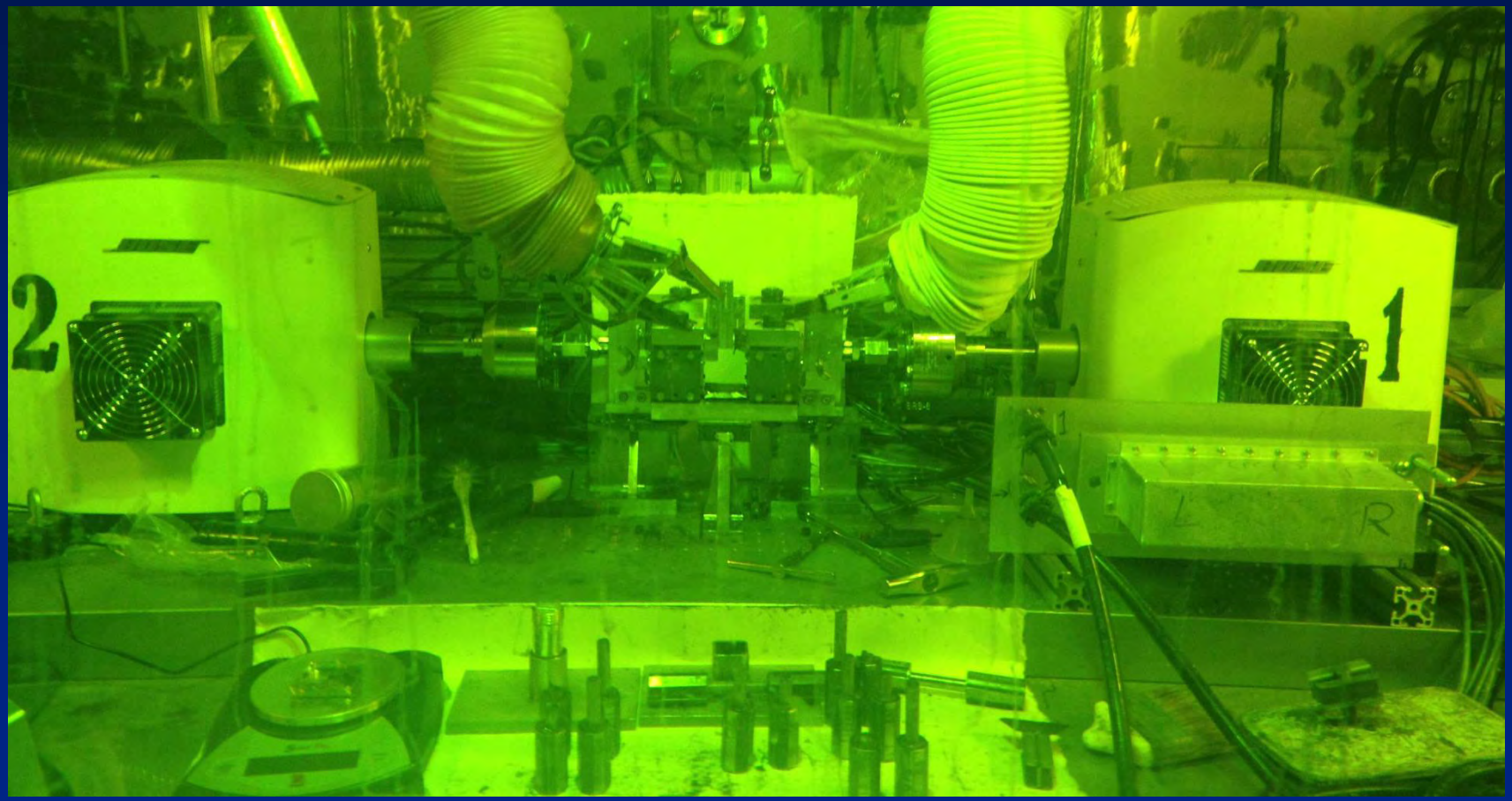
High Burnup Fuel



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Summary

- Regulations in 10 CFR Parts 71 and 72 assure safety for storing and transporting both low and high burnup spent nuclear fuel
  - Multi-disciplinary technical review
  - Confinement maintained under wide range of routine and accident conditions