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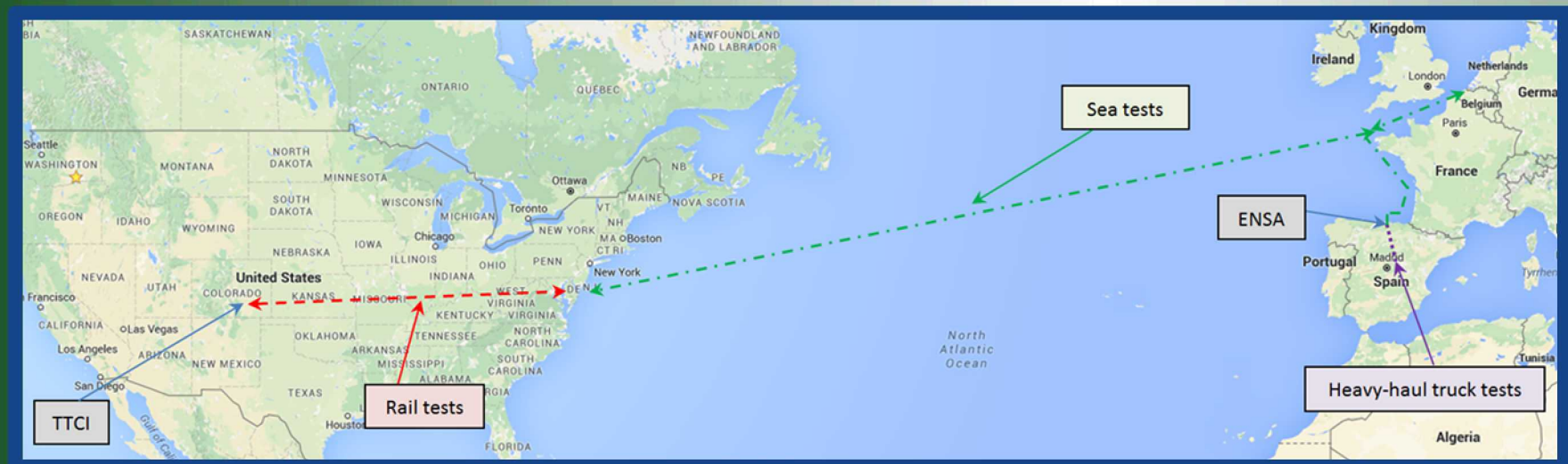
SAND2018-9149PE

DOE:NE Spent Fuel & Waste Science & Technology



NE-Sponsored Research on Spent Nuclear Fuel: Is the R&D Related and Relevant?

Sylvia Saltzstein, Brady Hanson, John Scaglione, Mike Billone, Sam Durbin, Elena Kalinina

Sandia National Laboratories, Pacific Northwest National Laboratory, Oak Ridge National Laboratory, Argonne National Laboratory

NWTRB Fact Finding Meeting

August 22, 2018, Las Vegas, NV

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IS OUR R&D RELATED?
IS OUR R&D RELEVANT?

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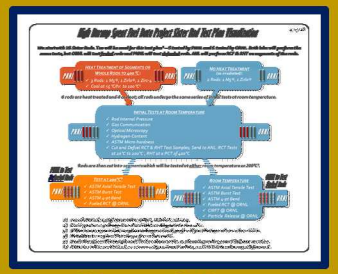
DOE Storage and Transportation Research Projects Synergize to Support Demonstrating that Spent Nuclear Fuel can be Stored and Shipped Safely for Years to Come

Sister Rod Mechanical Testing Data

We have fuel in hot cells.

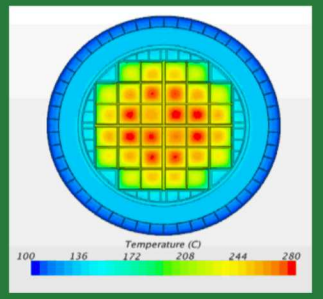
We completed non-destructive tests.



We are starting destructive analysis.

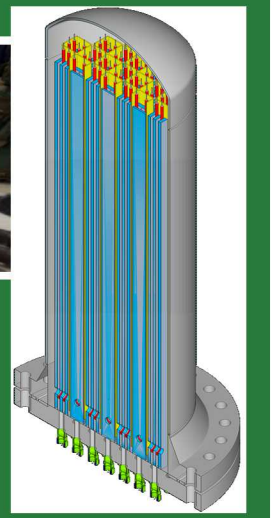
Thermal Behavior

We have thermal models.



We are getting new thermal data from the Demo.

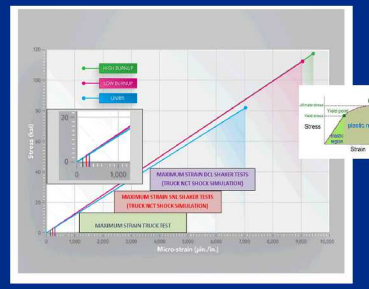
We will build a test apparatus to identify thermal conservatisms & develop more realistic assumptions.



Provides Knowledge and Data about Spent Fuel Integrity to Improve and Validate Models

Spent Fuel Triathlon: Quantification of Normal Transport Shocks & Vibrations

We have collected data in NCT Conditions.



We will compare the NCT data to the fuel mechanical properties

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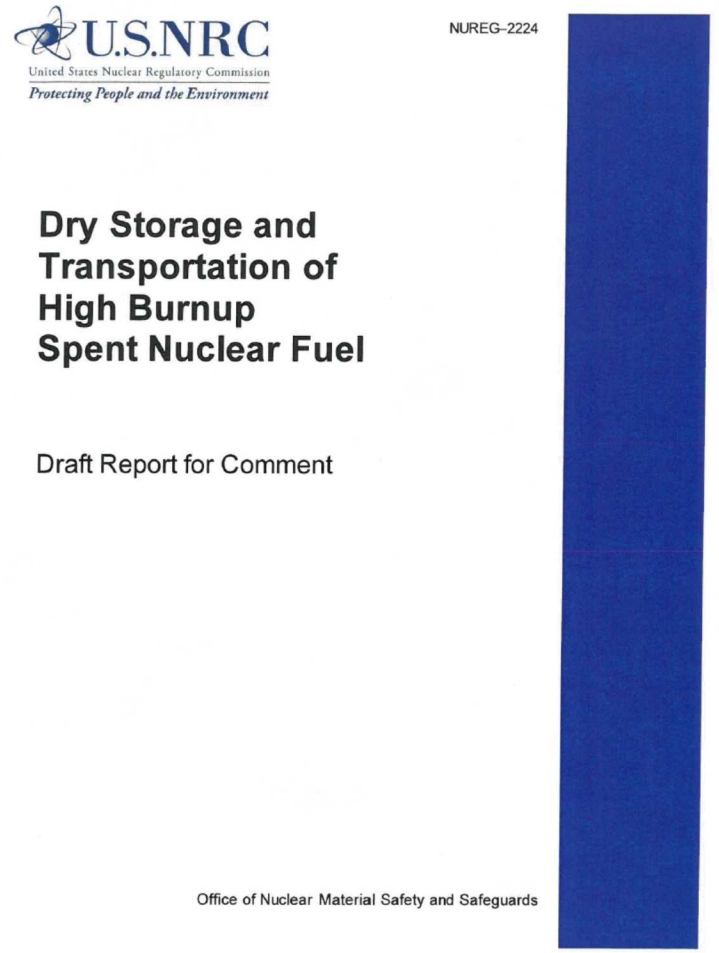
Is our R&D Relevant?

- **NRC draft NUREG on Confidence of High Burnup Fuel**
  - dependent on the EPRI HBU Demo
  - dependent on sister rod analysis, specifically RIP, RCT, and CIRFT

- **Monthly DOE/NRC meetings to discuss R&D agenda**
  - Thermal environment experienced by fuel and canister
    - *quantification of the actual cladding and canister temperatures*
    - *identification and reduction of uncertainties in the models*
  - Sister rod testing
    - *radial hydride reorientation*
    - *mechanical integrity*
  - Transportation strain and accelerations
    - *strain and accelerations experienced during most violent period of fuel and canister life*
    - *30 cm drop (pinch loads)*



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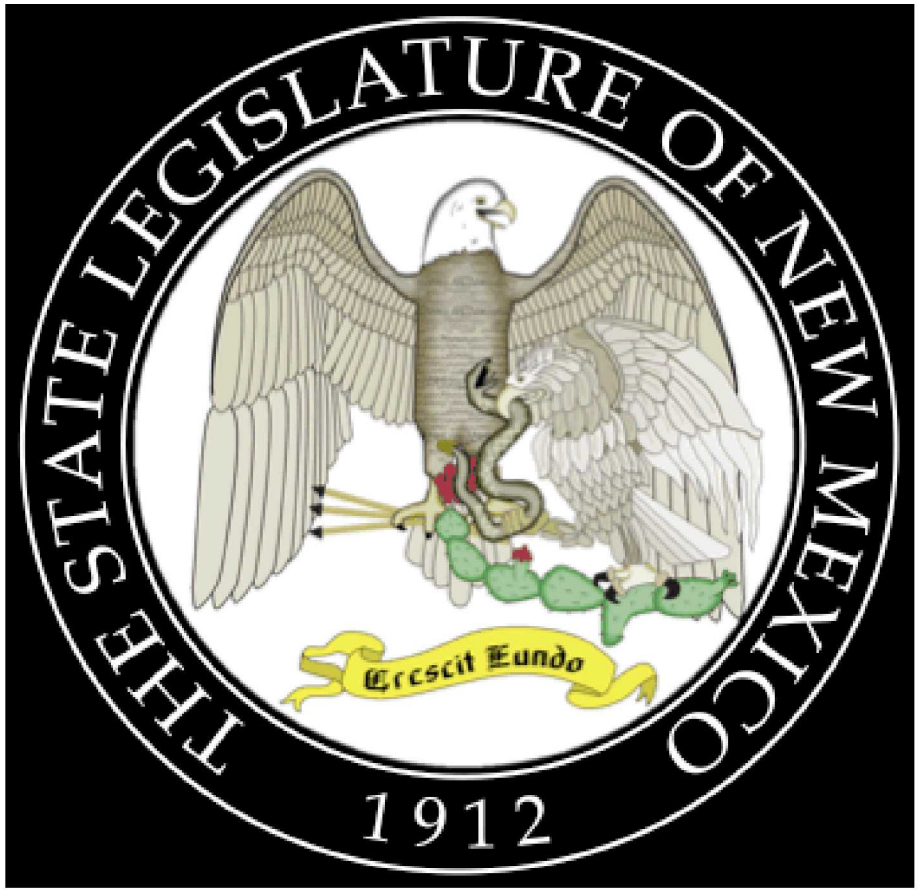
Is our R&D Relevant?

New Mexico Legislature Interim, Radioactive and Hazardous Materials Committee, August 15, 2018, *"Dry Cask Storage Systems for Spent Nuclear Fuel"*

- Tito Bonano presented for 20 minutes and was then asked questions for 1 hour and 20 minutes.
- ~30 people in the audience
- Questions asked by Senators and Representatives only to Tito



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Categories of Questions asked of Tito

- What if there is a crack? What can get out? How do you monitor for a crack or leak? (9)
- Who certifies the casks for S & T? Do they do a good job? (4)
- How is HBU different? Have we only tested simulated fuel? (4)
- How long have we stored fuel? Where? What are best places? Is the desert ok? (4)
- Is transportation safe? (3) *
- Do we study things long-term? How do we know projections are correct? Do we look at risks to communities? (3)
- Can the fuel inside of the canister catch fire or explode? (2)
- How long until YM could open? How long will funding last? (2)
- Why would we move it from where it is now? (1)
- How do they cool? How do we ensure they keep cooling? (1)

** These questions & answers were very involved.*

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How have we been Addressing the Questions of the NM Legislators?

Category of Question Asked		Gap and (Priority) from 2017 Gap Analysis*
Canister leak? What can come out?	9	Atmospheric Corrosion (3)
Certification ok? Who checks the NRC?	4	
Fuel integrity?	4	Cladding (3)
Transportation safe?	3	Stress Profiles (1)
Canister cooling?	1	Thermal Profiles (1)
Fire or explosion risk?	2	Canister Drying (2)
Modeling & projections?	3	Thermal, MMTT, CISCC, PRA
YM & Funding? How long would it take?	3	
Why move it?	1	

* SFWD-SFWST-2017-000005, Draft

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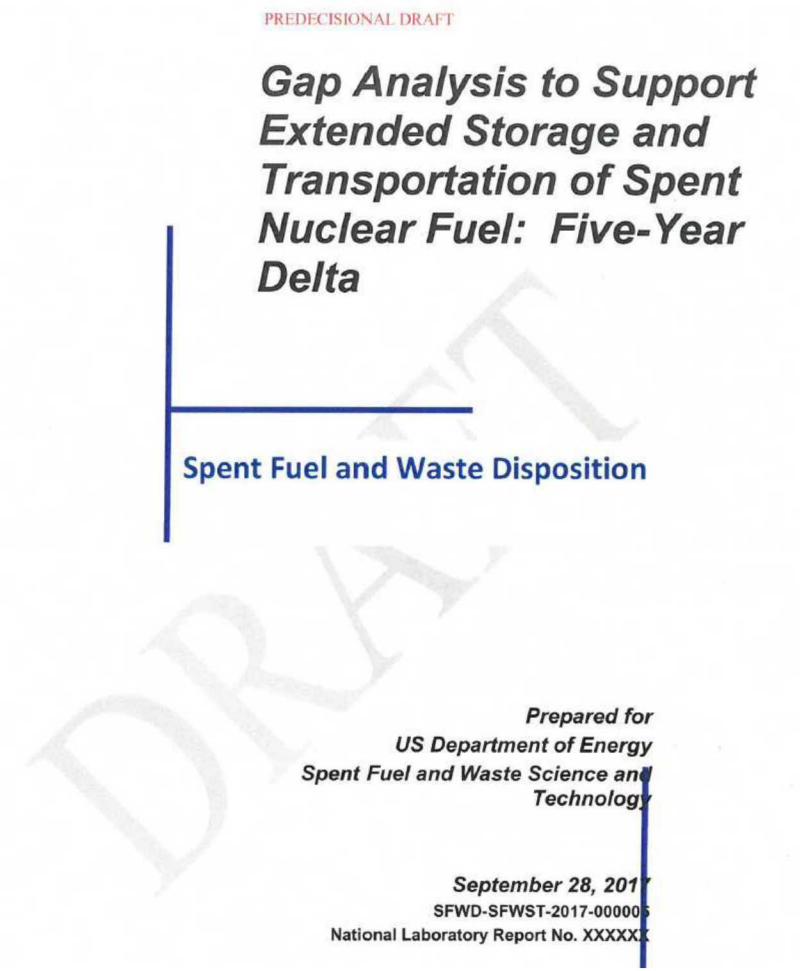
Where do we go from here? Follow the Gap Analysis.

The six talks you have asked for follow the Gap Analysis Priorities and are in alignment with NRC and stakeholders.

- **Cladding: Destructive Analysis of Sister Rods and Path Forward for Demo Cask (Billone, Hanson, Scaglione)**
- **Drying Issues: Understand drying and canister (Hanson)**
- **Thermal Issues: Expansion of Thermal Testing (Phase 1, 2, and 3) and reduction of uncertainty in models (Hanson and Durbin)**
- **Transportation loads: (Kalinina)**

- Atmospheric Corrosion: Increase understanding of canister corrosion both locally on canisters and national geographic differences. (Bryan, not part of today's scope)


PREDECISIONAL DRAFT

Gap Analysis to Support Extended Storage and Transportation of Spent Nuclear Fuel: Five-Year Delta

Spent Fuel and Waste Disposition

DRAFT

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September 28, 2017
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