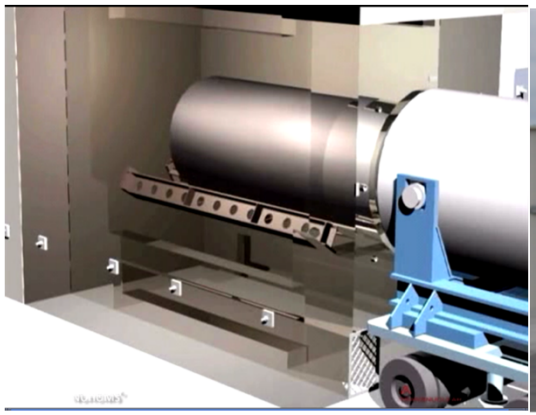

Transnuclear Inc. Overview

Dr. Michael V. McMahon
Chief Executive Officer

INMM 27th Spent Fuel Management Seminar
Arlington, VA
February 1st, 2012

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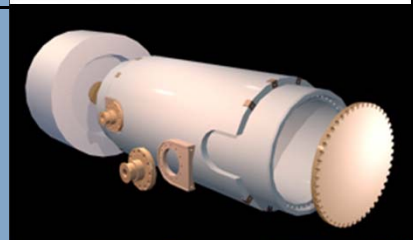
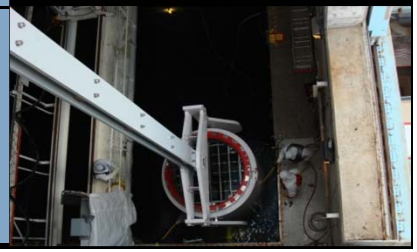
Questions you might have about Transnuclear

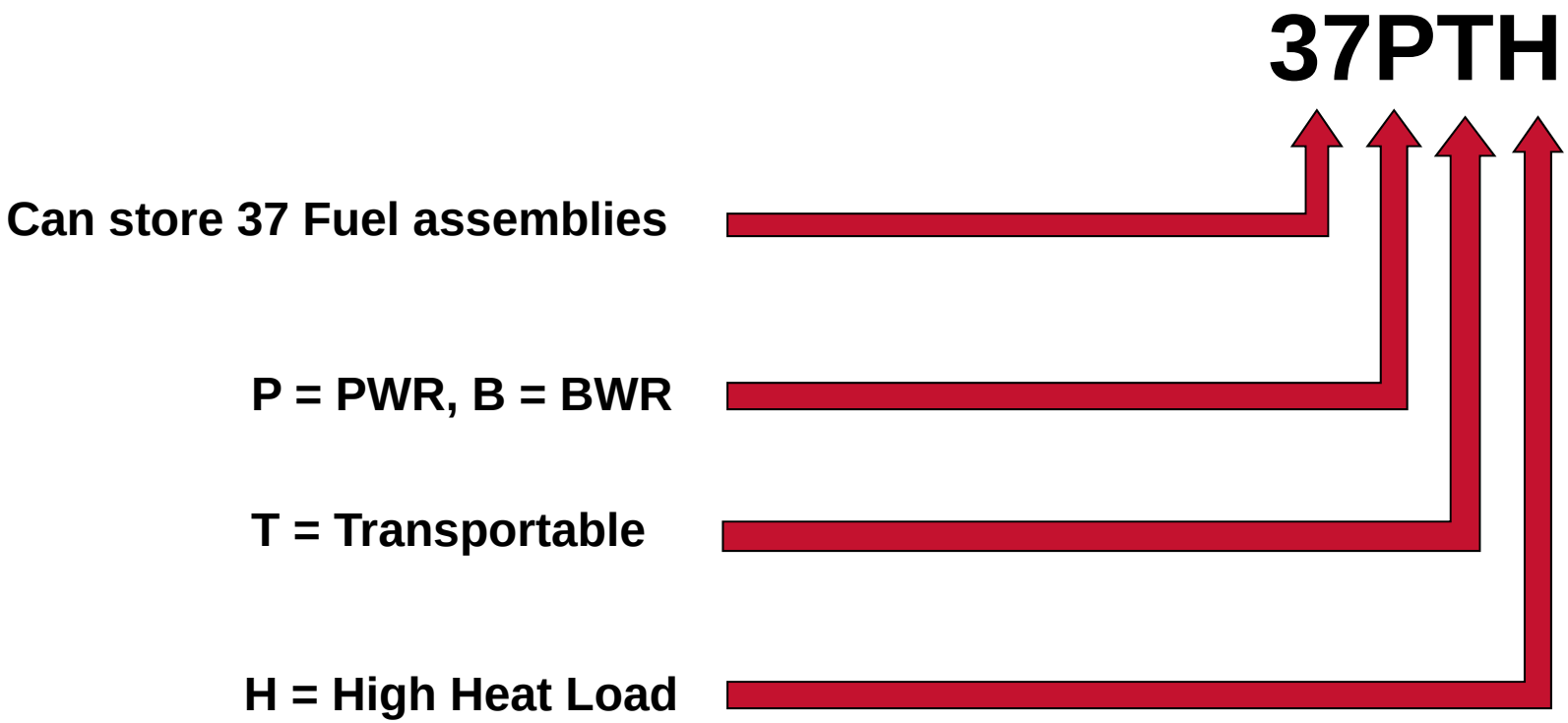
- What is TN's mission and is what is new at TN?
- What is TN doing about nuclear, radiation and industrial safety?
- What is TN doing to get ready for potential beyond design basis events?
- What is TN doing to prepare for transportation of used fuel and waste?

NUHOMS® Terminology

Dry Shielded Canister (DSC)	
Horizontal Storage Module (HSM)	
Transport Cask (offsite)	
Yoke Extension	

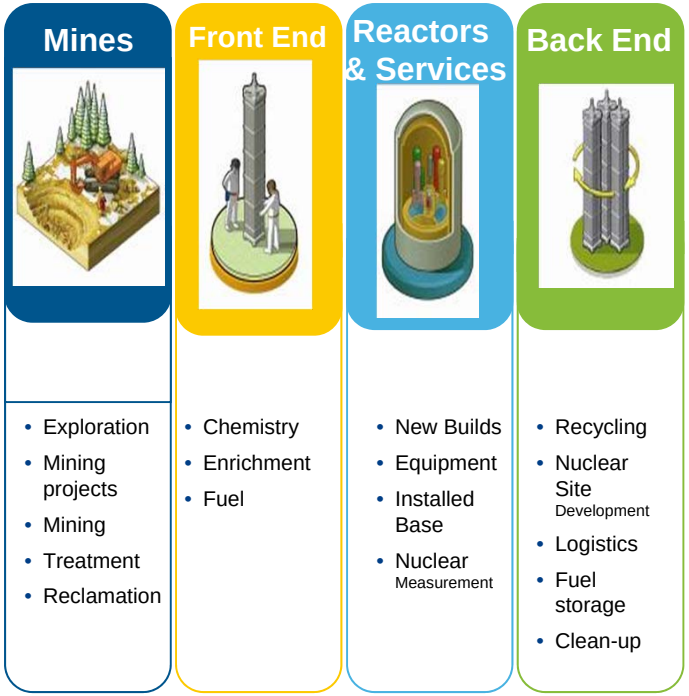
Transfer Trailer and Transfer Cask (onsite)	
Lifting Yoke	
Automated Welding System (AWS)	
Vacuum Drying System (VDS)	

NUHOMS® DSC Identification



Transnuclear Background & History

- In the Back-End Business Group of AREVA
- Established in 1965 to transport nuclear materials in the US
- In dry storage since 1985
- Acquired NUHOMS ® in 1998
- Integral part of AREVA
  - Back End Division
  - Logistics Business Unit (BUL)
- Market leader in dry fuel storage

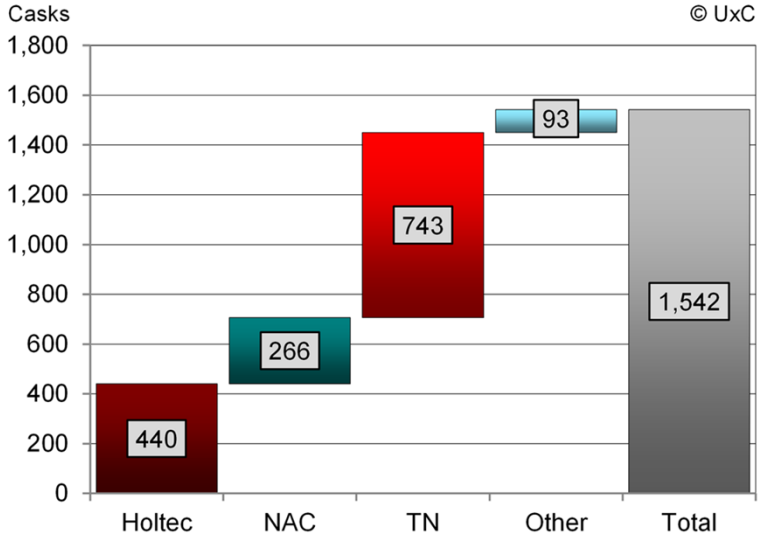


More Than 743 Systems Loaded…

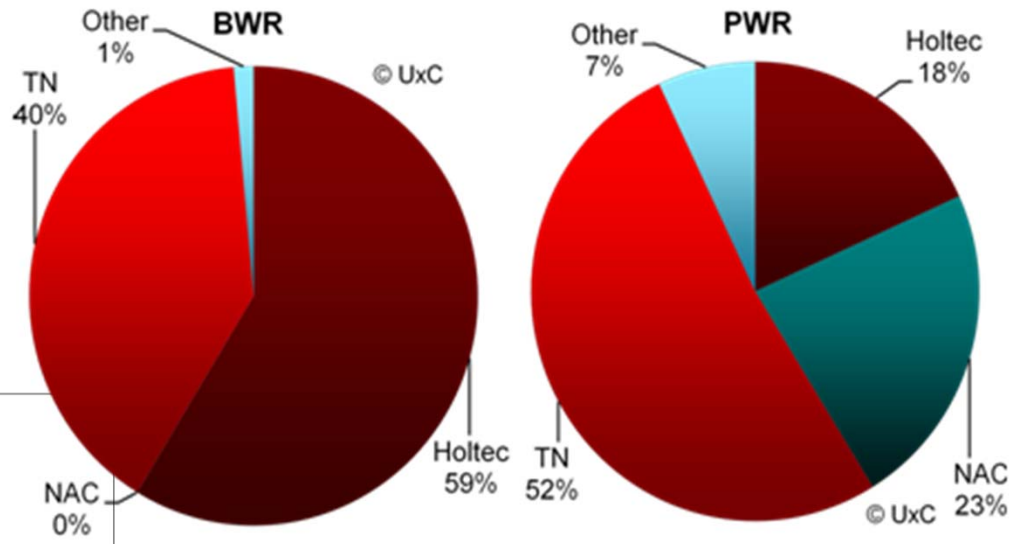
Additional systems loaded almost every week

US Dry Storage Market Status Jan 2012

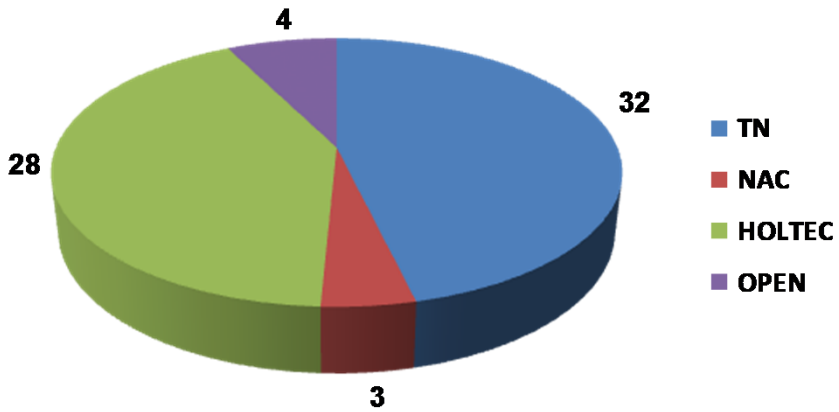
Dry Storage Systems Loaded in the U.S.



Assemblies in Storage



Reactor Sites



TN is the US market leader

Transnuclear Inc.

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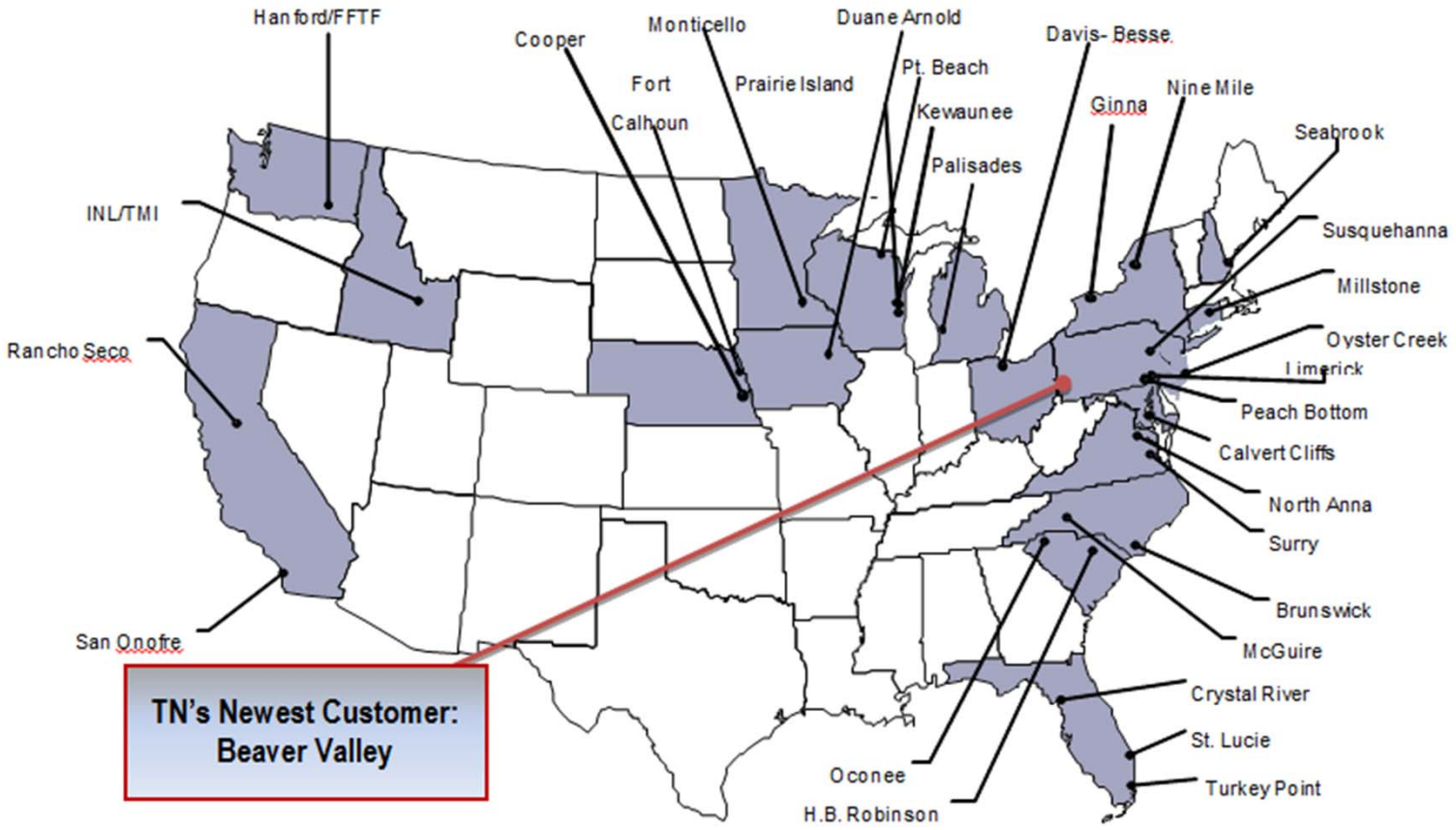
What is new with the Transnuclear Inc Users Group



32 Customer Sites & Growing…

Transnuclear Inc.'s Mission

To deliver to our customers cost-effective and worry-free total system solutions for used nuclear fuel and radioactive waste management and comprehensive transportation services for the entire nuclear fuel cycle.

We "get" that our most important job is error free, event free and accident free operations

What we strive for …….

Quote regarding the FOAK HSM fabrication on site at Nine Mile Point:

“TN has assembled a professional team that is meeting our high standards for safety and human performance while producing a quality product on schedule. There is a zero tolerance for safety violations at Nine Mile Point Nuclear Station and the TN team has embraced and internalized our expectations.”

Thanks, Ken

Kenneth A. Phy

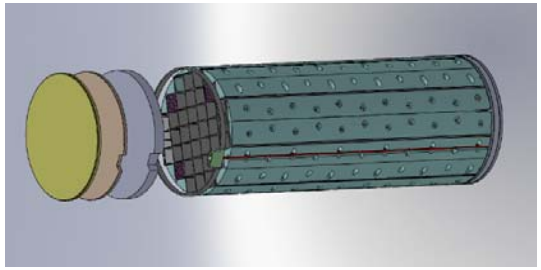
Project Manager - NMP ISFSI Project

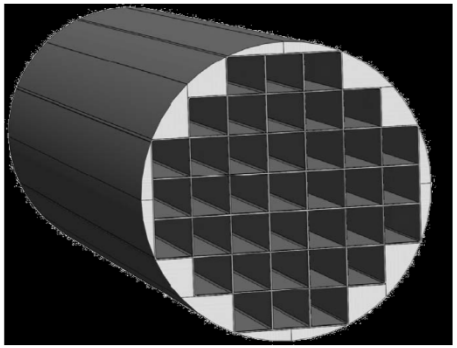
Office: (315) 349-7092

Cell: (315) 447-3584

37PTH Dry Shielded Canister (DSC)

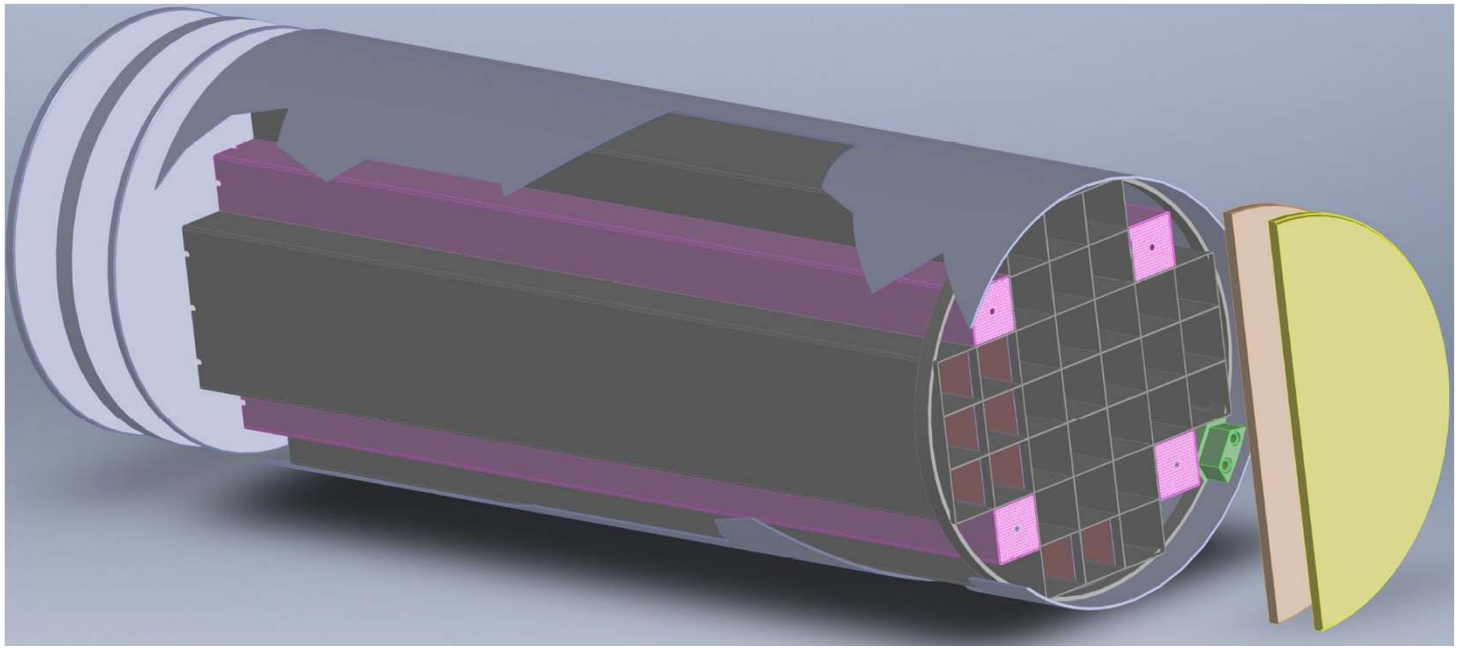
NUHOMS® – PWR 37PTH





- **37 assemblies**
- Payload
  - 37 PWR Intact Fuel Assemblies
  - 4 PWR **Damaged** Fuel Assemblies
  - Control components – BPRA/TPA/CRA/RCCA/APSRA, ITTRs
- **Intact Fuel**
  - Max Initial Enrichment – 4.85 wt% U235
    - 5% in future amendments
  - Min Initial Enrichment – 0.7 wt% U235
  - Min Cooling Time – 5 years
  - Max Burnup – 62 GWd/MTU
  - Max Decay Heat – 1.2 kW/Assembly
  - Max Heat Load – 30 kW for Storage, 22 kW for Transport
  - Max Uranium Content – 0.490 Mtu/Assembly
  - Max Fuel Assembly plus control component length (unirradiated) – 170 inches
- **Reconstituted and Damaged Fuel**

Damaged fuel storage - 37PTH



- 4 Damaged fuel assys can be stored in the 37PTH using end caps
- Transnuclear Fuel types
  - Intact fuel
  - Damaged fuel – leakers or suspects
    - Can be handled by normal means
  - Failed fuel – Gross damage or can not be handled by normal means

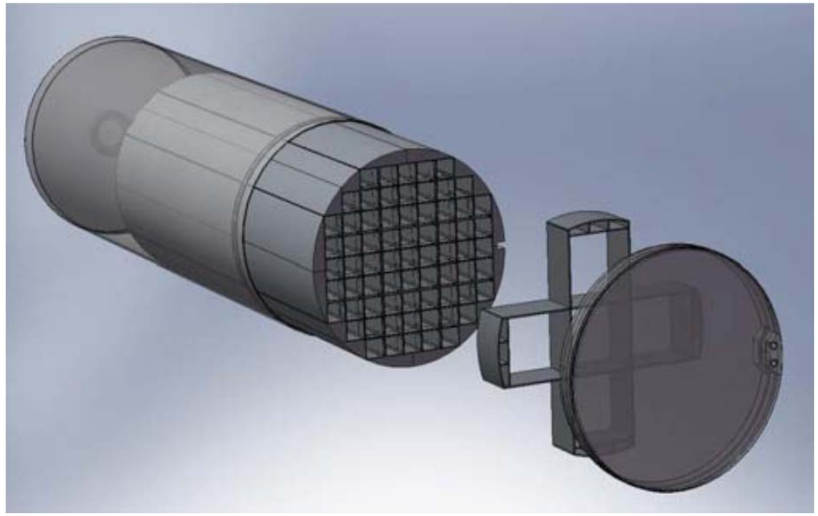
Ability to store Damaged fuel saves the cost of "canning" of confirmed or suspected leakers or sipping campaigns

69BTH Dry Shielded Canister (DSC)

NUHOMS® 69BTH

Payload

- 69 BWR Assemblies
- Intact Fuel with or w/o Channels
- Damaged Fuel – 24 Assembly max



Intact Fuel

- Zircaloy Cladding Material
- Max Initial Enrichment – 5 wt% U235
- Min Initial Enrichment – 0.9 wt% U235
- Min Cooling time – 5 years
- Max Burnup – 65 GWd/MTU
- Max Decay Heat – 700 W/Assembly
- Max Heat Load – 26 to 32 kW
- Max Uranium Content – 198 kg/Assembly
- Max Assembly Weight – 705 lbs
- Max Assembly Length (unirradiated) – 176.5 inches

Reconstituted and Damaged Fuel

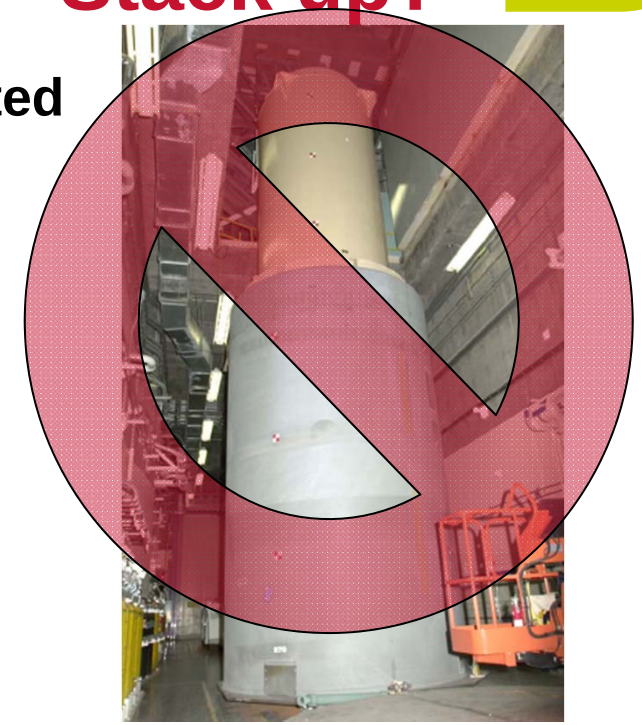
Horizontal Storage Module (HSM-H)

- Thick reinforced concrete
  - Remains @ ISFSI → floor loads in FHB not an issue
  - No gap between modules → maximum shielding
  - Massive composite door
- 16’ between inlet & outlet air vents
- Blockage of both inlet and outlet vents is unlikely, because the system is horizontal.
- Robust seismic capability
  - 0.3 G H, 0.25G V Model H
  - 1.0G H, 1.0G V Model HS
- Once NUHOMS is horizontal there are no more safety related heavy lifts to recover DSC from HSM.
  - No reverse “stackup”

Superior Thermal & Dose Performance

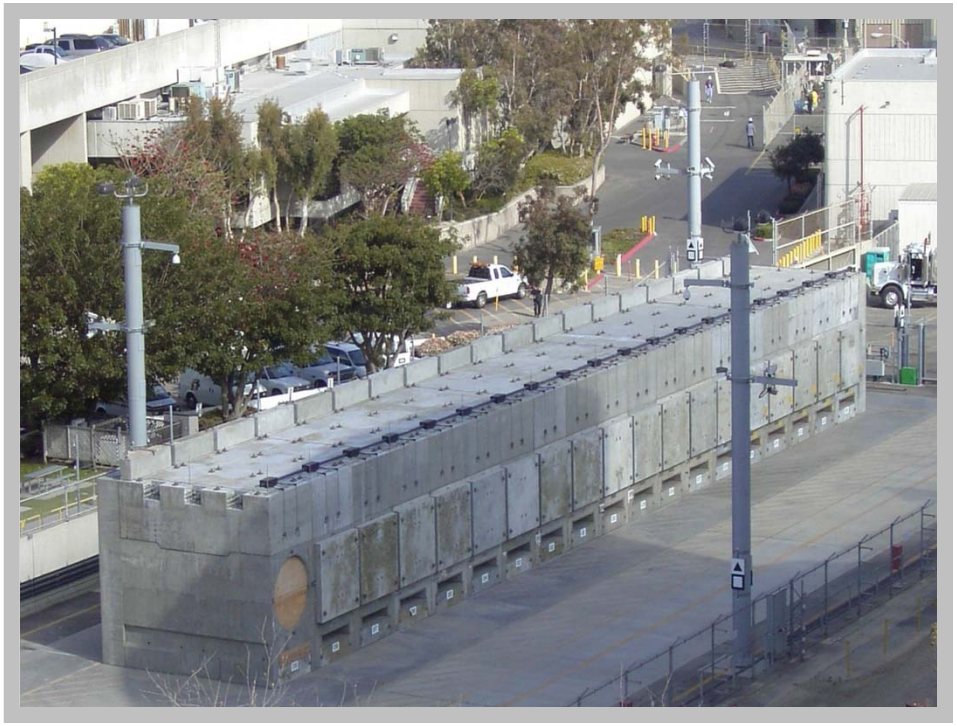
Is NUHOMS® affected by the Stack up?

- NUHOMS® seismic analyses and docketed evaluations cover the DSC and Transfer cask in the following configurations
  - In Pool
  - In Decon pit or SFP building deck
  - Rail bay floor
  - On single failure proof crane
  - In transition from vertical to horizontal
  - On the Transfer trailer
  - In transition from transfer trailer to HSM
  - In HSM
- NUHOMS® Tech Specs supported by analysis require seismic restraints if seismic accelerations > 0.4g
- No seismic restraints required < 0.4g



HSM-HS High Seismic Alternative

- HSM's carry and protect the DSCs
- 1.0g H and 1.0g V (more than 3x additional margin compared to HSM-H)
- HSMs tied together - overall HSM footprint remains unchanged
- Requires additional 10' of ISFSI pad adjacent to all HSM exterior faces (to allow for sliding)



Seismic Robustness of NUHOMS®

- **NUHOMS operated through a beyond design basis earthquake with only cosmetic damage**

Internal Inspection Recently Performed

Beyond Design Basis (BDB) Scenario Loss of DSC Confinement Boundary

- TN design credits helium backfill in DSC for thermal performance (helium credited for conduction only with no credit for convective heat transfer)
- Helium backfill established at nominal pressure of ~ 3 psig simply to maintain positive pressure in DSC
- In the event of BDB loss of confinement boundary, helium pressure could be reduced to atmospheric with essentially no adverse effect on heat transfer capability

NUHOMS® decay heat transfer not impacted by loss of confinement boundary

Dose to Occupants of Nearby buildings HSM–H

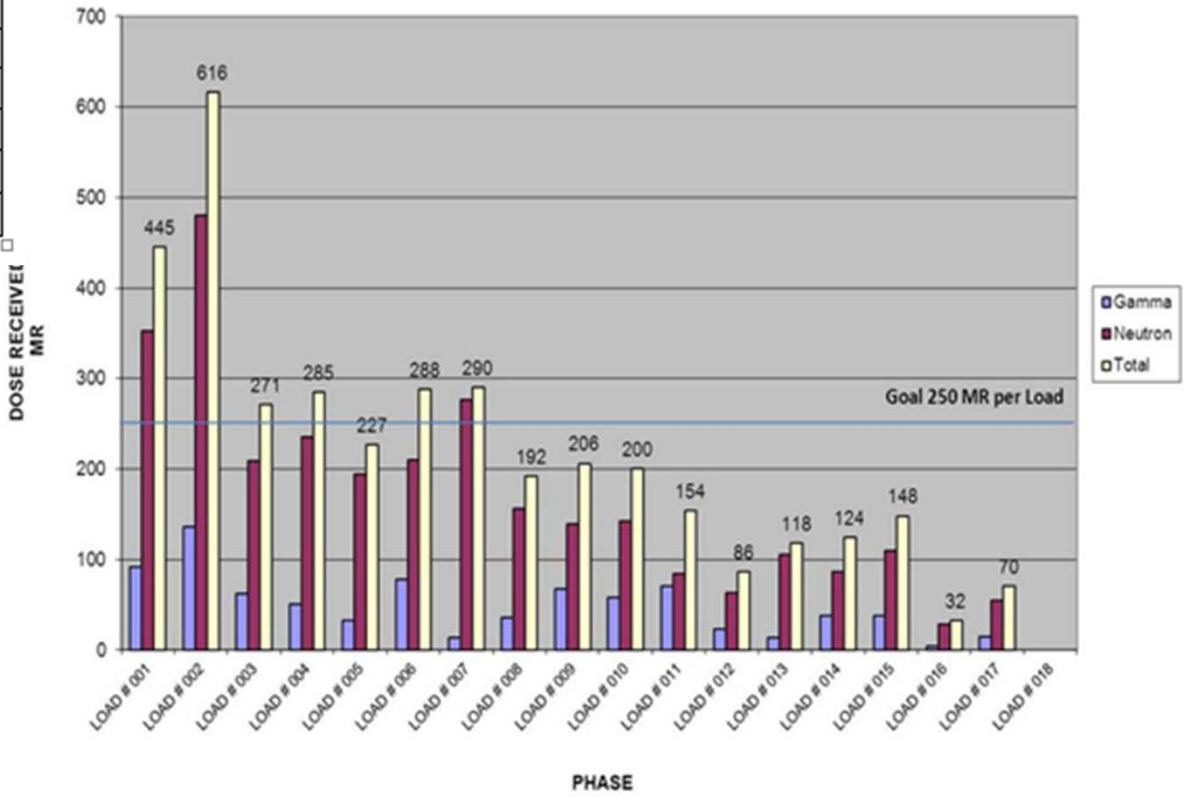
- Building 300 yards from ISFSI
- TN estimated annual dose for a building occupant be to significantly less than 10 mrem/year under the following assumptions
  - 50 Units loaded on ISFSI pad
  - DSCs loaded with average fuel parameters
  - Occupant is in building for 2,000 hrs/year
- Actual values are always much less than predicted, normally an order of magnitude lower.

Dose Performance

Actual Pool to Pad Dose Performance

Evolution / DSC	Final Dose (mR)	Heat Load (Kw)
Set-Up / Mob	3 mRem**	N/A
Internal "Wet" Run	0 mRem	N/A
DSC 1	267 mRem	24.7 Kw
DSC 2	212 mRem	25.7 Kw
DSC 3	272 mRem	28.7 Kw
DSC 4	210 mRem	29.3 kW
DSC 5	209 mRem	31.6 Kw
DSC 6	195 mRem	34.0 Kw
Canister Average	227 mRem	
Demobilization		N/A

NUHOMS technology and TN's Pool to Pad deliveries enables world class low dose performance



NUHOMS® University

- **Human performance improvement is the cornerstone of NUHOMS® University (NU)**
- **Created to respond to customer expectations on human performance**
  - **Comprehensive modeled on INPO's industry standard.**
  - **Two-week basic training course by industry experts, credentials in licensed reactor operations and INPO certified training.**
- **Classroom modules, regulatory and licensing basis, operation of loading equipment and implementation of the loading sequence; human performance techniques; and error prevention tools.**
- **OJT workshops simulate the NUHOMS® loading, students qualify on DSC vacuum drying, helium backfill and welding.**
- **Full size mock up of DSC / HSM under construction in Aiken SC**

Oral boards are used to demonstrate proficiency with both NUHOMS® and safety culture principles.

First NU Graduating Class

April 2011

Training HSM Jan 2012

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Transportation Expertise

- **Solid Transportation Expertise with all products of the fuel cycle Front End and Back End;**
  - **Transport flows risk assessment**
  - **Qualification of carriers (audit and inspections)**
  - **Assistance to shippers**
  - **Transport coordination with all stakeholders including authorities**
  - **Emergency response**
- **Access to unique expertise with spent fuel and vitrified waste shipments to and from La Hague recycling activities**
- **1,200 tons of UNF is safely shipped each year in France**

Transnuclear Inc.

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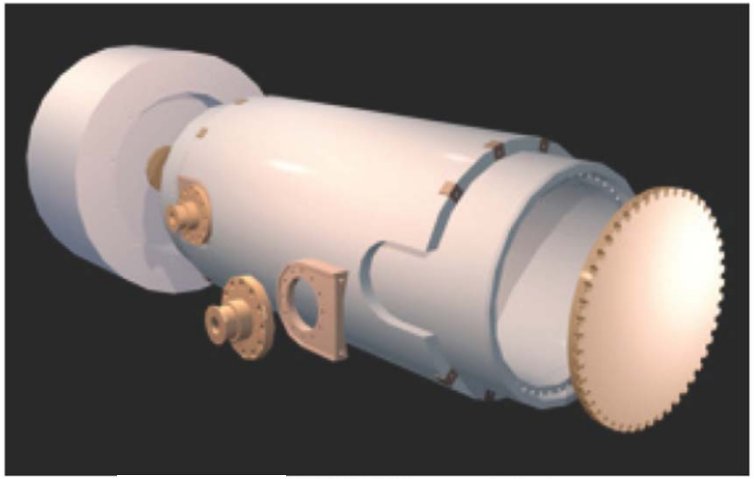
Offsite Transport - MP197HB

- TN Inc has a contract to build a Transport cask for transport of used fuel offsite from a reactor operator customer.
- NRC has issued a US Certificate of Conformance for this transport cask
- Beginning in 2015, Transnuclear will be transporting Used fuel loaded DSCs in this cask.
- Because this cask is licensed, if US customers need to ship DSCs offsite, TN can use the existing transport cask for US customers or fabricate additional casks to support the need.



MP197HB Transport Cask

No safety related lifts are required to insert the DCSs into Transport Casks

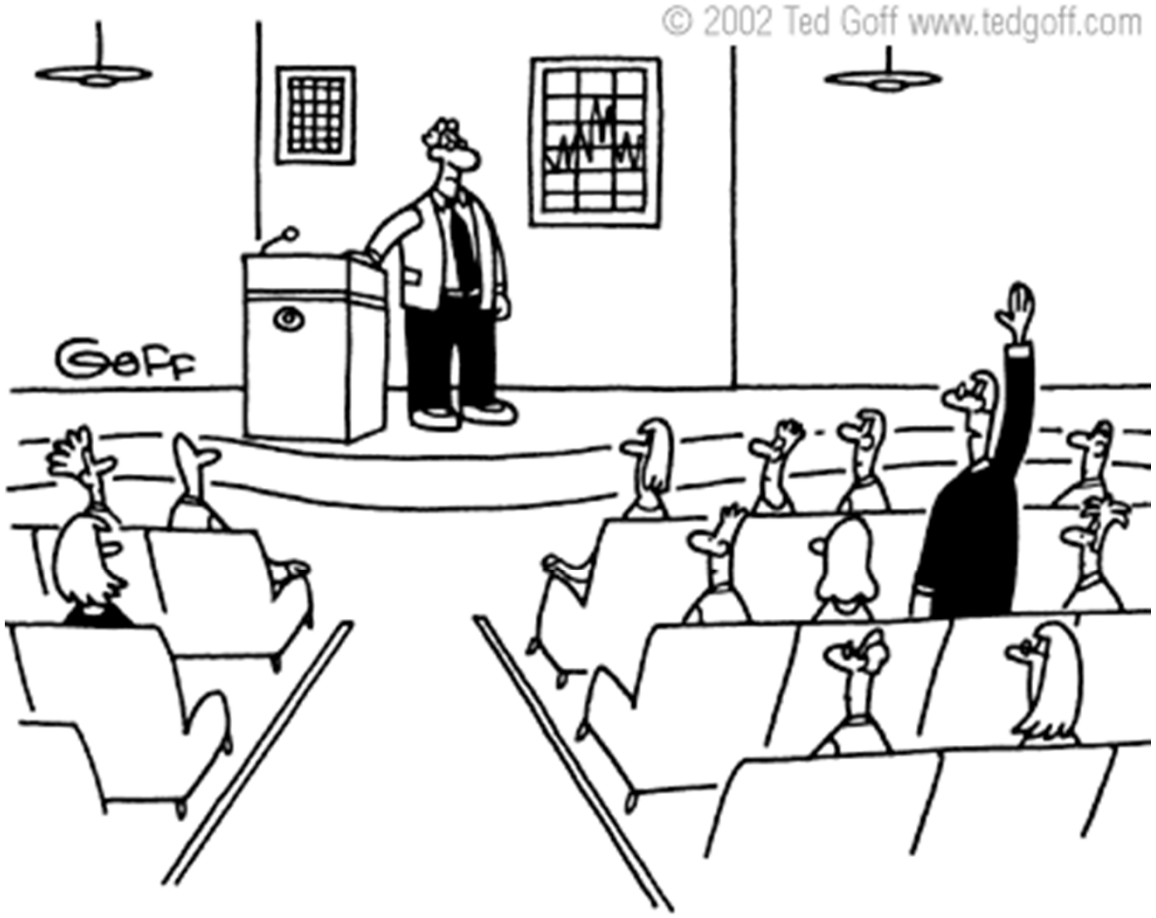
Active R&D Activities

- Simpler canister basket & transfer cask designs for faster fabrication
- Higher capacity, higher decay heat DSCs & HSMs
- Cask-HSM alignment by 3D laser mapping
- Enhanced concrete mixes for improved resistance to impact and to cracking for long term storage
- Canisters designed for resistance to stress corrosion cracking over very long term storage in marine atmospheres
- Improved low waste method of producing near net size shapes of neutron absorbing metal matrix composites (MMCs)

Summary & Conclusions

- **TN Inc. provides safe and secure storage and transport of nuclear materials with robust margin in hardware, licensing, analytical design and human performance**
- **Robust and conservative designs that have demonstrated safe performance in a beyond design basis earthquake**
- **Investment in hands-on training facilities to reduce human performance errors**
- **Designed for extremely low doses at the ISFSI and during loading operations**
- **Extensive UNF transportation experience and equipment available for "post-ISFSI" operations**

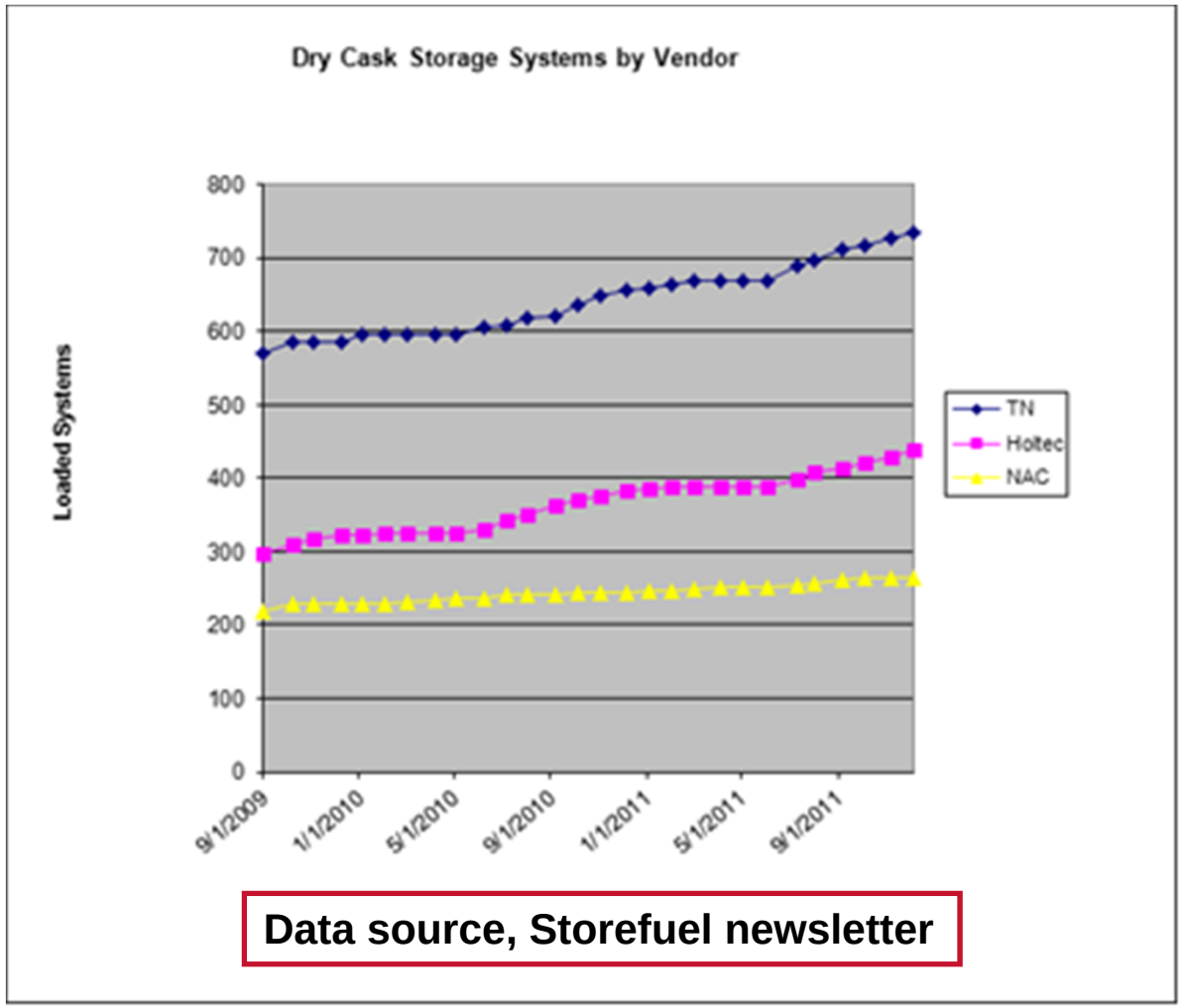
Questions?



"Did you just say that anyone who asks another question will be fired?"

Back-Up

Dry Fuel Storage systems loaded



Data source, Storefuel newsletter