

EPRI Activities in Spent Fuel Storage and Transportation

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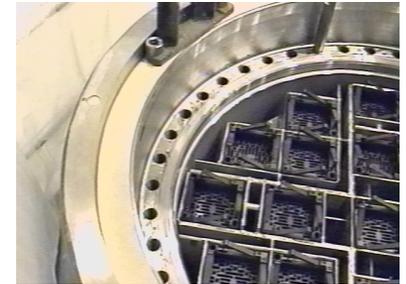
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EPRI Used Fuel & HLW Program Research Areas

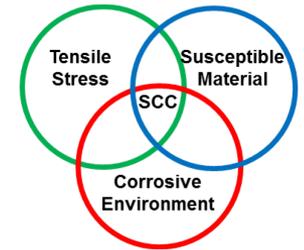
- Dry storage and transportation
 - Welded stainless steel canister aging management
 - High burnup spent fuel data project
 - Advanced cladding material properties
- Wet storage
 - Criticality
 - Neutron Absorbers



Welded Stainless Steel Canister Aging Management

■ Issue

- Chloride-Induced Stress Corrosion Cracking (CISCC) is a potential degradation mechanism for used fuel storage canisters in dry cask storage systems



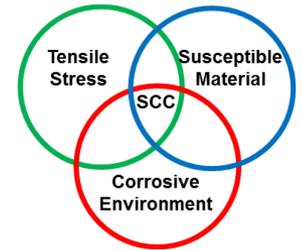
■ Goals

- Develop aging management guidance for recommended inspection and mitigation
- Develop and demonstrate inspection capability

Welded Stainless Steel Canister Aging Management Guidance

■ Key activities

- Develop aging management guidance based on results to date
 - FMEA, susceptibility assessment, etc.
- Support ASME Task Group on in-service inspection of spent fuel storage and transportation containments



■ Schedule

- Began in 2012
- Aging Management Guidance to be published in 2016
- Training and support for ASME Task Group to continue through 2019+
- Core effort expected to conclude in 2018

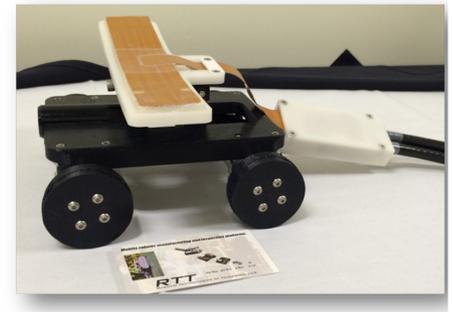
Stainless Steel Canister Inspection Capability

■ Key activities

- Fabricate mockups for testing technology/techniques
- Development of techniques and delivery system
 - Initial development efforts
 - Continue development and mock-up testing of promising techniques
 - Continue development of delivery systems
- Demonstrate inspection systems at candidate facilities

■ Schedule

- Began in 2014
- Effort expected to conclude in 2018



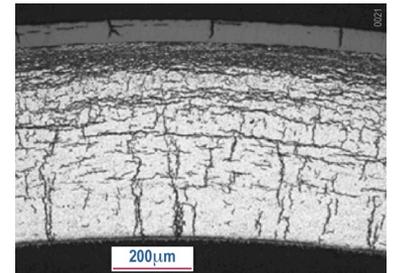
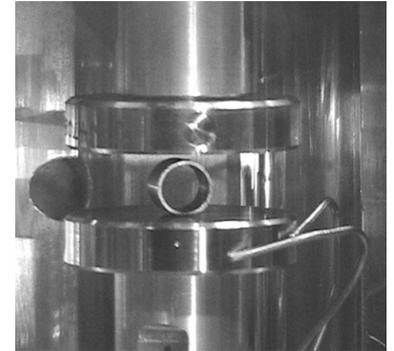
High Burnup Spent Fuel Data Project

■ Issue

- Lack of confirmatory data on high burnup fuel under dry storage conditions

■ Goals

- Provide data on behavior of multiple types of high burnup cladding under typical dry storage conditions
- Provide data for benchmarking models to predict performance of high burnup fuel over extended time periods



High Burnup Spent Fuel Data Project

■ Key activities

- Identify, extract and ship spent rods to a national lab for baseline properties
- Submit and obtain an NRC license amendment to store the cask
- Modify the cask and fabricate instrumentation
- Load the cask
- Collect data (temperatures, gas composition)
 - Data will be available as soon as cask is loaded (2017)



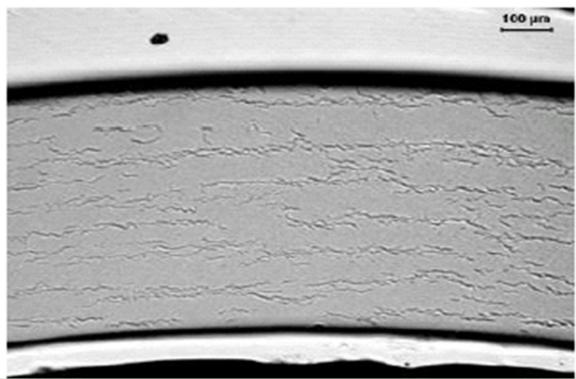
■ Schedule

- Began in 2013
- Initial phase expected to conclude in 2018
- Activity anticipated through 2027
 - Continue collecting data
 - Ship cask to fuel examination facility
 - Open cask, inspect, extract rods for post-characterization

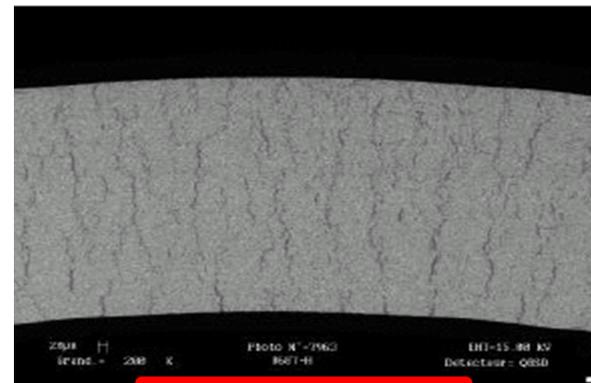
Performance of Advanced Cladding Materials

■ Issue

- Data on “advanced” claddings (Zirlo™, Optimized Zirlo™, M5®, AXIOM, etc.) are needed to verify that the performance of these claddings will satisfy the regulatory acceptance criteria (ISG-11) applicable to dry storage and transportation conditions
 - Criteria published in ISG-11 for storage of high-burnup fuel largely based on experimental data obtained on Zircaloy-4 cladding
 - Generic acceptance criteria for high-burnup fuel transportation applications have not been established



Circumferential Hydrides



Radial Hydrides

Performance of Advanced Cladding Materials

■ Goals

- Resolution of regulatory issues associated with
 - Dry storage license extensions (>20 y)
 - Transportability of high-burnup fuel

■ Key activities

- Participation in projects collecting post-irradiation data on fuel irradiated to high burnup
 - Thermal creep, Hydride Re-Orientation (HRO), Ductile-to-Brittle Transition Temperature (DBTT), Delayed Hydride Cracking (DHC)
- Incorporation of data into cladding and fuel performance models
- Provide active guidance to the high-burnup spent fuel data project

■ Schedule

- Ongoing



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