



LINE Commission Meeting

Idaho Falls, ID
September 21, 2012

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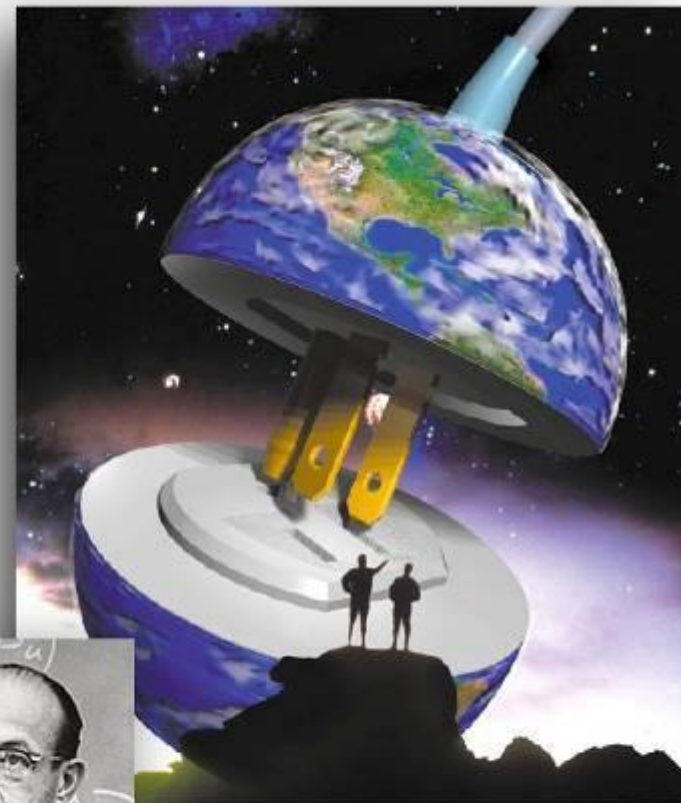
Outline

- Who is EPRI?
- Nuclear Sector R&D
- Collaboration Between INL and EPRI
- Nuclear Fuel R&D
- Capabilities & Summary

Who Is EPRI?

Our Mission and History...

- *Mission – to conduct research on key issues facing the electricity sector... on behalf of its members, energy stakeholders, and society.*
- Founded by and for the electricity industry in 1972
- Independent, nonprofit center for public interest energy and environmental research
- Collaborative resource for the electricity sector
- Major offices in Palo Alto, CA; Charlotte, NC and Knoxville, TN
 - Laboratories in Knoxville, Charlotte and Lenox, MA



Chauncey Starr
EPRI Founder

Who Is EPRI?

Portfolio Spans the Entire Electricity Sector



Generation

- Advanced Coal Plants, Carbon Capture and Storage
- Combustion Turbines
- Environmental Controls
- Generation Planning
- Major Component Reliability
- Operations and Maintenance
- Renewables

Nuclear Power

- Advanced Nuclear Technology
- Chemistry, Low-Level Waste and Radiation Management
- Equipment Reliability
- Fuel Reliability
- Long-Term Operations
- Material Degradation/Aging
- Nondestructive Evaluation and Material Characterization
- Risk and Safety Management
- Used Fuel and High-Level Waste Management

Power Delivery & Utilization

- Transmission Lines and Substations
- Grid Operations and Planning
- Distribution
- Energy Utilization
- Cross-Cutting Technologies

Environment

- Air Quality
- Environmental Aspects of Renewables
- Global Climate Change
- Land and Groundwater
- Occupational Health and Safety
- T&D Environmental Issues
- Water and Ecosystems

Nuclear Sector R&D Mission Statement



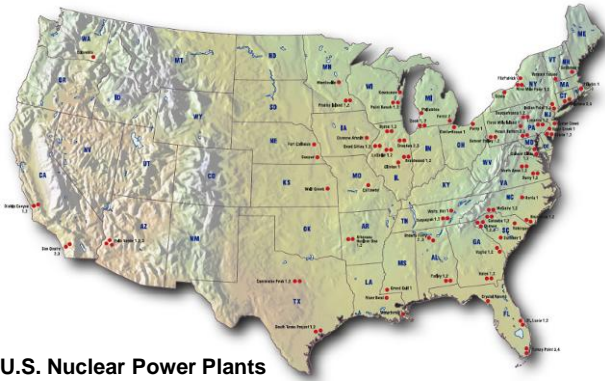
Through ***collaborative research and development***, global information exchange, and targeted services, the EPRI Nuclear Sector develops safe, reliable, economic, and environmentally responsible technologies that:

1. Maximize the utilization of existing nuclear plants
2. Enable the deployment of advanced nuclear plants
3. Support the long-term sustainability of nuclear resources

**Collaborative R&D to
Enhance Safety and Performance of Nuclear Plants Worldwide**

Nuclear Sector R&D Collaboration

U.S. Participants



U.S. Nuclear Power Plants

Source: NEI Website, 2009

- All U.S. nuclear owners/operators
- 104 reactors

Non-U.S. Participants



- 20 countries, >220 reactors

Global Breadth and Depth

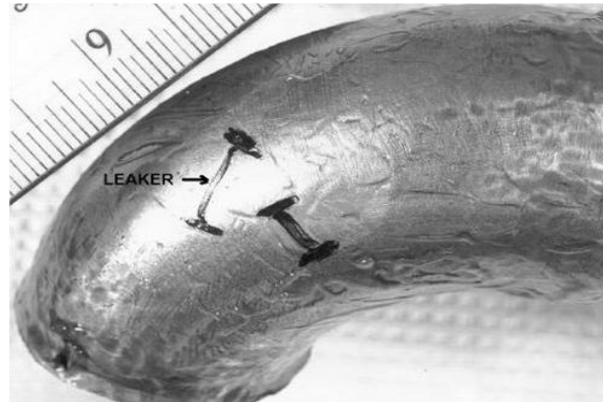
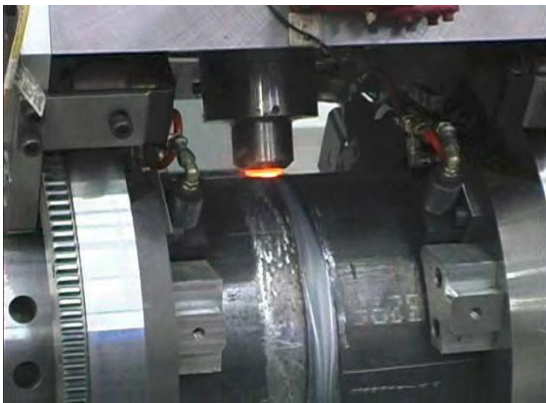


- >75% of the world's commercial nuclear units

Participants Encompass Most Nuclear Reactor Designs

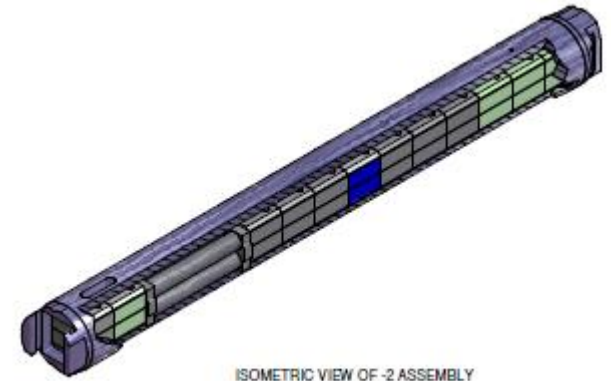
Collaboration Between INL & EPRI

- EPRI's LTO (Long-Term Operation) and DOE's LWRS (LWR Sustainability) programs are separate, but integrated, and complement each other
 - Materials aging, advanced welding, concrete structures, cable systems, advanced I&C, integrated life cycle management, and enhanced risk and safety analysis tools

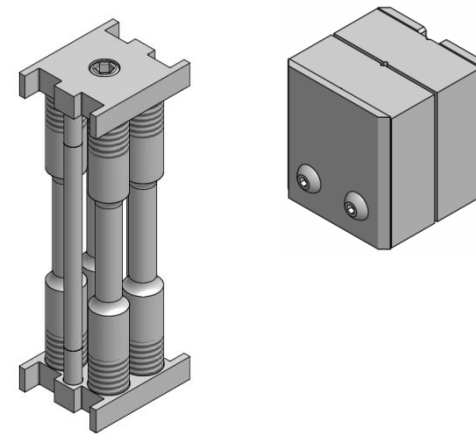


Collaboration Between INL & EPRI

- Irradiation, test and examinations of LWR materials
 - Testing in ATR Loop 2A to start in October, 2012
 - Will provide key data on long term performance of these materials in service



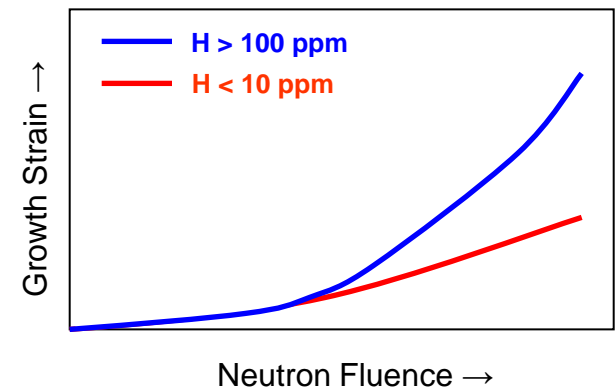
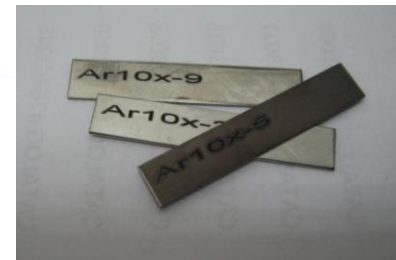
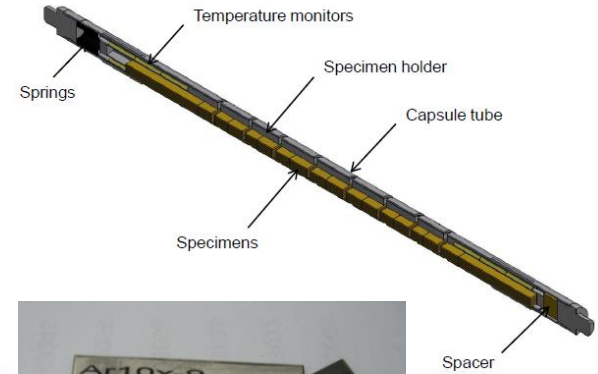
ISOMETRIC VIEW OF -2 ASSEMBLY
SHOWN FOR CLARITY ONLY
SCALE: NONE



INL provides unique facilities, staff knowledge and skills to support the nuclear industry to address critical issues

Collaboration Between INL & EPRI

- Irradiation, test and examinations of Zirconium-based alloys used in fuel assembly components and fuel rods
 - Testing in ATR began April 2011 and will complete in 2018
 - Supports understanding of fuel assembly distortion by quantifying the effects of fluence and hydrogen
 - In collaboration with Areva, GNF and Westinghouse

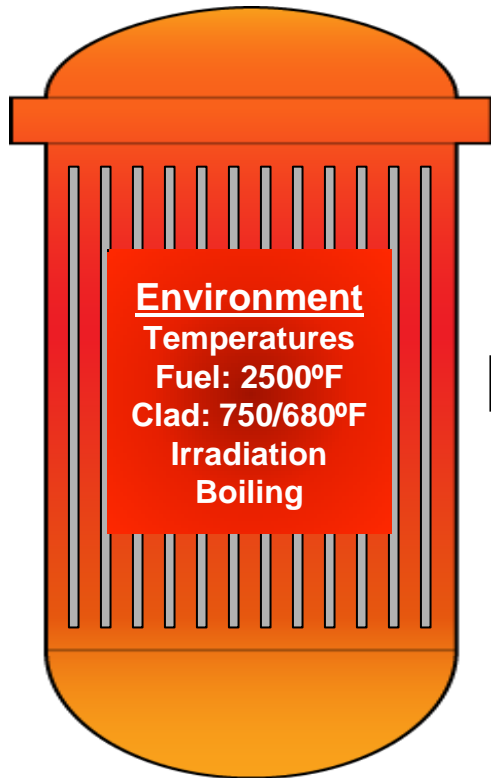


Nuclear Fuel R&D


Strategic Objectives

1. Help the industry make significant improvements in fuel reliability and performance by conducting research in key failure-related areas and fuel-related operational issues
2. Conduct research in the area of fuel regulatory issues to ensure regulations are technically based and not unnecessarily conservative
3. Investigate nuclear fuel designs that can lead to breakthroughs in the cost, performance or accident tolerance of fuel in existing plants

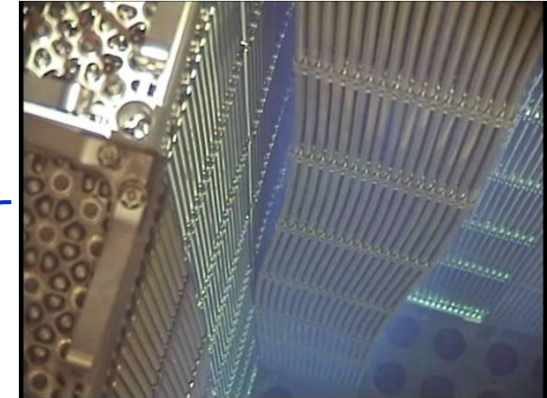
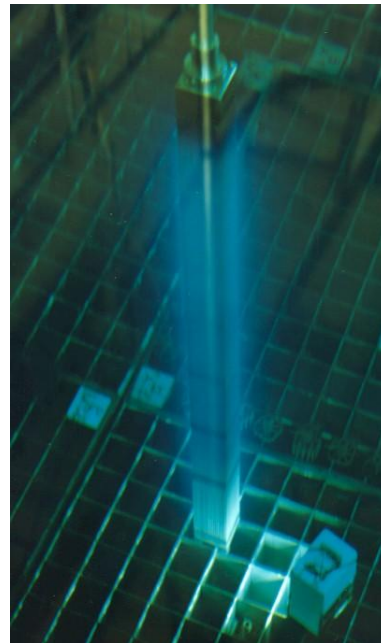
Nuclear Fuel Operating Environment



U.S. Fleet
104 Operating
Units



~5.1M Fuel Rods



Nuclear Fuel R&D

Addressing a Range of Issues

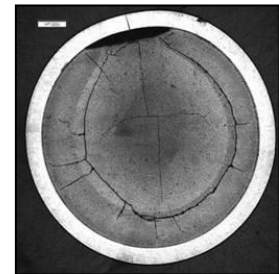
- **Generic issues**

- Control rods / Control Blades ★
- Regulatory issues ★
- Fuel reliability guidelines
- Independent fuel performance codes
- Advanced fuel NDE techniques
- Fuel reliability margins
- Fuel cleaning
- Workshops (e.g., Missing Pellet Surface Analysis)
- Etc.

- **Vendor-specific issues
(teaming with individual vendors)**

- Fuel design margin assessment ★
- Failure root cause investigations ★
- Etc.

★ can require hot cell facilities



Hot Cell Facilities Usage Last 10 Years



Capabilities & Summary

- U.S. has limited options for nuclear fuel
- INL offers world class facilities
 - Domestic ‘one shop’ capability
 - Loops and hot cell
 - Good opportunity for commercial nuclear industry
 - Materials & fuel testing
- Workshop with all stakeholders October 11-12 at INL
 - Utilities
 - Fuel Suppliers
 - EPRI

Together...Shaping the Future of Electricity