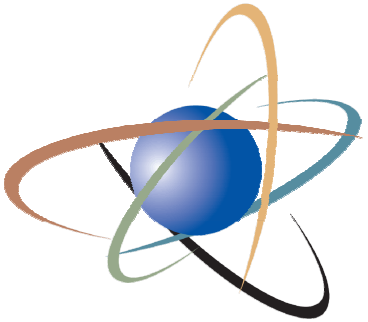

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OECD-NEA Sandia Fuel Project

Jennifer Uhle, Division Director
Division of Systems Analysis
Office of Nuclear Regulatory Research

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Outline of Presentation

- Objectives
- BWR Testing Program (Completed)
- BWR Results
- BWR and PWR Assembly Geometry Differences
- PWR Testing Program (Proposed)
- Budget and Schedule

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Objectives

- Provide prototypic thermal hydraulic and PWR zirconium fire data for code validation under air flow conditions
  - Spent fuel pool complete loss of inventory accident
  - Late phase core melt progression
  - Complete loss of water during refueling
  - Dry cask storage (thermal Hydraulic data)
- Data is needed to assess:
  - Cladding ballooning
  - Flow correlation under low Reynolds numbers
  - Initiation of zirconium fire
  - Propagation of zirconium fire
  - Mitigation strategies concerning fuel assembly management
- Code assessment
  - Blind pre-test
  - Post-test analysis
- Data from BWR test program will be provided to participants

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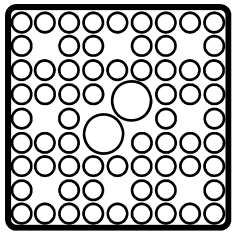
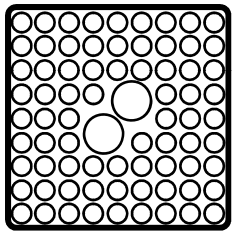
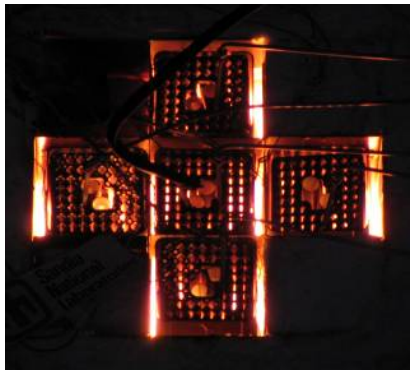
BWR Testing Program (Completed)







- Heater Rod Design
  - Test heater rod performance
- Separate Effects
  - Hydraulics to determine:
    - Form loss and laminar friction coefficients
  - Thermal hydraulics:
    - Buoyancy induced flow measurements
    - Temperature profiles measurements
- Integral Effects
  - Axial Ignition:
    - Temperature profiles measurements
    - Buoyancy Induced flow measurements
    - Axial O_2 profile measurements
    - Determine nature of fire
  - Radial Propagation in a 1 X 4 arrangement to determine:
    - Nature of radial fire propagation

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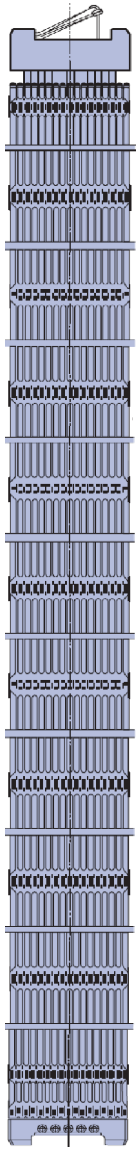
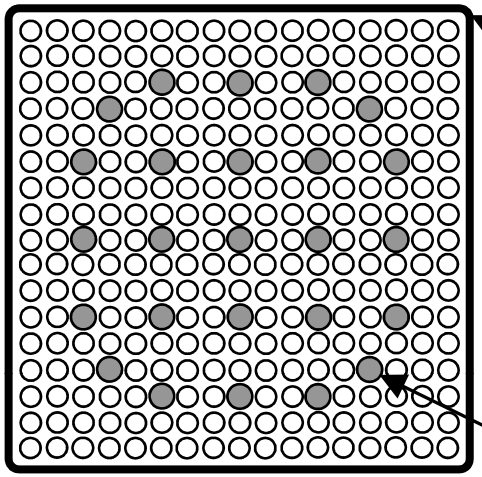
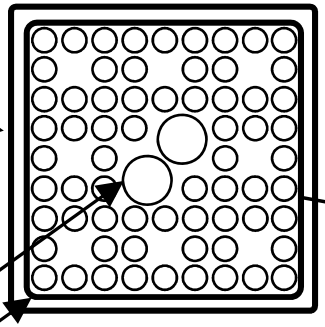
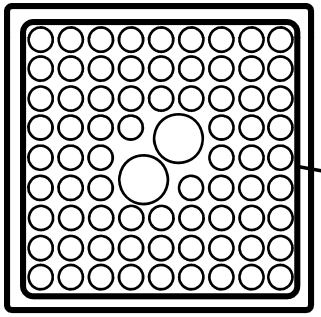
BWR and PWR Assembly Geometry Differences









- PWR 17×17
  - 264 Fuel rods
  - 24 Guide tubes
  - 1 Instrument tube
  - 11 spacers
- Storage cell

- BWR 9×9
  - 74 Fuel rods (8 partial length)
  - 2 Water tubes
  - 7 spacers
- Channel box
- Storage cell

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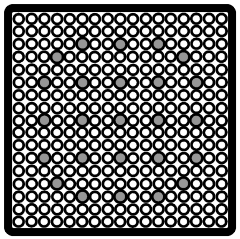
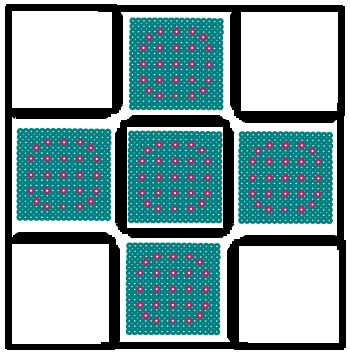
PWR testing program (Proposed)



- Ballooning rod design
  - Test pressurized rod performance
- Separate Effects
  - Hydraulics (NRC funded – Completed)
    - Determine form loss and laminar friction coefficients
  - Thermal hydraulics
    - Buoyancy induced flow measurements
    - Temperature profiles measurements
- Integral Effects
  - Axial Ignition
    - Temp profiles measurements
    - Buoyancy induced flow measurements
    - Axial O_2 profile measurements
    - Nature of fire
  - Radial Propagation in a 1 X 4 arrangement
    - Determine nature of radial fire propagation
    - Effect of fuel rod ballooning



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Very Draft Schedule

- Work at Sandia begins — July 2009
  - Ordering equipment, analyses
- Kick-off meeting Paris — July 21-22, 2009
- Phase 1 construction — January 2010
- Phase 1 tests start — March 2010
- Phase 1 tests complete — August 2010
- Second meeting — September 2010
- Phase 2 ballooning — November 2010
- Phase 2 construction — January 2011
- Phase 2 tests start — March 2011
- Phase 2 completion — December 2011
- Third meeting — January 2012
- Final report — June 2012