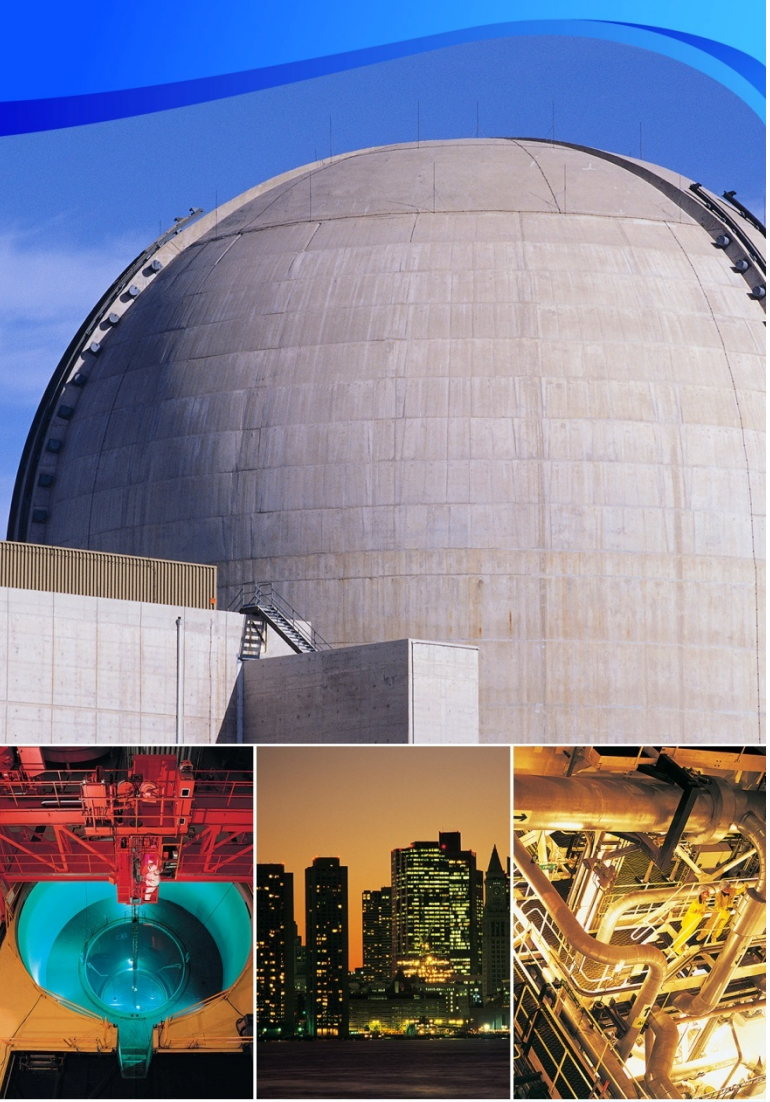

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Fire PRA Methods Development: Lessons Learned

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Fire PRA Methods Development

- Initial Methods Developed 20 Years Ago
- Modified by EPRI and NRC RES
- NUREG/CR-6850 and EPRI 1011989
  - State-of-the-art when released
  - Not fully piloted
  - Issues expected as a result of initial application
- Worked with Stakeholders to Improve Methods

Presentation Focuses on Process Improvements

Fire PRA Methods Development – Pilot Lesson Learned # 1

How not to Address Fire PRA Methods Issues

- Prior to Pilot
  - Researchers
  - Small groups
  - Long lead time
- During Pilot
  - Implementers
  - Extremely large group
  - Short lead time
- Group Dynamics
  - Higher stress
  - Different goals
  - Difficult consensus
- Result
  - Inefficient resource usage
  - Compromise methods

Fire PRA Methods Development – Pilot Lesson Learned # 2

Methods Should not be Developed in Abstract

- Single plant identified issues
- Method refinements proposed without benefit of multiple examples
- Abstraction has led to "… but what if …"

Fire PRA Methods Development – Pilot Lesson Learned # 3

Compromise Methods do not Solve Issues

- "Compromise Methods"
  - Use conservative and / or use bounding inputs
  - Analysis is done to remove conservatism
  - Results do not comport with experience
  - Interim solutions not applicable to all plants

Fire PRA Methods Future Development

- NFPA 805 is a Risk Informed Performance Based approach
  - Blend of deterministic and probabilistic
  - Methods should:
    - Use best information and analysis
    - Comport with operating experience
    - Encourage innovation, mature and refine over time with monitoring
    - Encourage increased safety

Fire PRA Action Plan

- Fire PRA Action Matrix of Methods issues
  - Characterization of the Issue
  - Owners (EPRI, Owners Groups, Others)
  - Resources and Schedules
- Approach
  - Begin with small team of knowledgeable experts
  - Specific solutions – not in abstract
  - Methods not “approved” but available for review
  - Refinements from
    - Implementers
    - Peer Reviews
    - NRC Request for Additional Information
    - Approval of methods in NRC Safety Evaluation Report

Fire PRA Methods – Current and Planned Activities

- High Energy Arcing Faults*
- Large Oil Fires*
- Incipient Fire Growth in Electrical Cabinets*
- Credit for Incipient Detection*
- Hot Short Probabilities
- Fire Ignition Frequency*
- Fire Suppression Probabilities*
- Hot Short Duration*
- Enhancement of Fire Event Database
- Peak heat release data review and analysis, testing
- Control Room Modeling and Treatment in the Fire PRA
- Human Reliability methods and performance shaping factors
- Control vs suppression of fires
- Ignition frequency treatment of standby components
- Fire growth and propagation investigation
- Incipient detection testing
- Transient Fire HRR
- Empirical data and comparison with fire PRA
- Update of the Fire PRA Standard
- Additional Peer Review Guidance

* indicates a "Compromise Method" that will need addition analysis and method development