



**Regulatory Information Conference**  
**Risk Assessment:**  
**Emerging Challenges and Opportunities**

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Biff Bradley, NEI  
March 13, 2013

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**RIC 2013**  
**Overview of Risk Assessment**  
**Activities in the Office of Nuclear**  
**Regulatory Research**

Gary DeMoss  
NRC/RES  
March 13, 2013

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**Outline**

- Overall PRA Research Goals
  - Major activities under each goal
  
- Two important Commission-directed projects
  - Vogtle Site-wide Level 3 Probabilistic Risk Assessment (PRA)
  - Risk Management Regulatory Framework (RMRF)

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## Support Reactor Oversight and Operating Experience Programs

- SPAR Models & SAPHIRE computer code
  - Data collection & analysis
  - Support System Initiating Events (with EPRI)
  - All Hazard Models for selected plants
- Significance Determination Process (SDP)
  - RASP Handbook Revisions
  - Common Cause Failure Probability in Event & Condition Assessments
- Accident Sequence Precursor Program

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## Use Risk-informed Approaches to Improve Effectiveness and Efficiency of Regulation

- **Risk Management Task Force**
- Rev 1 to NUREG-1855 on Uncertainty (with EPRI)
- Newly issued NUREG-2122 on a PRA glossary
- Interim Staff Guidance Documents for NRR & NRO
- Economic Consequences
- Risk-informed Performance-based Plan (RPP)

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## Expand PRA Infrastructure to New and Advanced Reactors

- New Reactor SPAR Models
  - ABWR
  - AP-1000
  - US APWR
  - US EPR
- Pilot Application of Technology Neutral Framework

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## Support Continuous Advancement in PRA State-of-the-Art and State-of-Practice

- **Vogtle Level 3 PRA**
- Confirmatory Success Criteria Analyses
- Digital I&C Research
- Human Reliability Analysis (HRA)
  - HRA Data Collection (With participating licensees)
  - HRA Methodology (With EPRI)
  - Fire HRA - NUREG-1921 (With EPRI)

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## Major Commission Guided Projects

- Vogtle Level 3 PRA
  - Includes all major site radiological sources, all modes of operation, all hazards, and multi-source risk
  - Upcoming meetings – Spring 2013 Public Meeting & ACRS Subcommittee Meeting
- RMTF Working Group
  - Inter-office group to review NUREG-2150, identify options and make recommendations to the Commission
  - Upcoming meetings

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## RIC 2013 Overview of Risk Assessment Activities for New and Advanced Reactors

Lynn Mrowca  
 NRC/NRO  
 March 13, 2013

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## Overview of Risk Assessment

- New Reactor Licensing Reviews
- Advanced Reactor Pre-Application Activities
- Infrastructure Activities
- Emerging Challenges and Opportunities

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## New Reactor Licensing Reviews

- Focus on completion of current reviews
- Focus on pre-application activities (e.g., PRA audits) with future applicants

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## Advanced Reactor Pre-Application Activities

- Continuing PRA pre-application audits
- Support Design-Specific Review Standard (DSRS) development
- Initiated advanced reactor pilot study to test the concepts of a new, risk-informed regulatory framework
- Completed NGNP white paper assessments

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## Infrastructure Activities

- Updated Standard Review Plan (SRP) guidance (SRP Sections 19.0, 19.3) based on new reactor review lessons learned
- Initiated series of public meetings on risk-informed applications for new reactors
- Responding to Commission memo (SRM-SECY-12-0081) on risk-informed regulatory guidance for new reactors

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## Infrastructure Activities (cont.)

- Initiated development of Interim Staff Guidance (ISG) to address PRA standards for new reactors
- Continuing to develop full scope SPAR models for new reactors
- Continuing focus on PRA knowledge management

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## Emerging Challenges and Opportunities

- Participating in post-Fukushima activities (e.g., NTF Recommendations 1.0, 2.1, 2.3, 4.1, 8)
- Participating in Risk Management Task Force recommendations review
- Participating in Commission proposed initiative to improve nuclear safety and regulatory efficiency

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**RIC 2013  
Overview of Broad-Scope  
Risk-Informed Applications  
for Operating Reactors**

Donnie Harrison  
NRC/NRR  
March 13, 2013

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**Current Broad Scope  
Risk-Informed Topics**

- Surveillance Test Interval (Initiative 5B)
  - Large segment of the industry
- Fire Protection (NFPA 805)
  - Almost half of the industry
- Containment Sump & Core Flow (GSI-191)
  - South Texas Demonstration Pilot
- Special Treatment (10 CFR 50.69)
  - Vogtle Pilot
- Risk-Managed Technical Specification (Initiative 4B)
  - Vogtle Pilot

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**Other Broad Scope  
Risk-Informed Topics**

- Risk Management Regulatory Framework (NTTF 1, NUREG-2150, et al)
- Seismic re-evaluations (NTTF 2.1)
- External Flooding re-evaluations (NTTF 2.1)
- Other natural hazards
- Risk-informing aspects of 10 CFR 50.46c

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## Challenges

- Applications are expanding the scope needed of the plant-specific base PRA
  - PRA expertise needs to expand (breadth and depth)
- Maintaining NRC confidence in plant-specific PRAs for broad-scope applications in the implementation phase depends on licensee PRA performance

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## NRC's Grow Your Own PRA Analyst Training & Qualification Program

- Program involves:
  - PRA development learning project
  - independent study activities
  - classroom courses
  - on-the-job training
  - rotations
- 3-year program
- Initial implementation with 8 staff
  - Expected to expand based on identified needs and resource allocations

**Poster in lobby**

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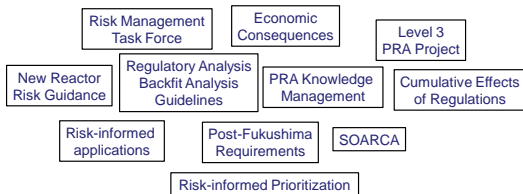
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## Conclusion

The NRC and the industry need to use the plant-specific PRA capability to make improvements, incorporate lessons learned, and gain efficiencies to achieve regulatory stability



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## Acronym List

- ABWR – Advanced Boiling Water Reactor
- ACRS – Advisory Committee on Reactor Safeguards
- ADAMS – Agencywide Document Access and Management System
- ASP – Accident Sequence Precursor
- DSRS – Design-Specific Review Standard
- EPR – European Pressurized Reactor
- EPRI – Electric Power Research Institute
- ISG – Interim Staff Guidance
- LERF – Large Early Release Frequency
- NGNP – Next Generation Nuclear Plant
- NRC – Nuclear Regulatory Commission
- NRO – Office of New Reactors
- NRR – Office of Nuclear Reactor Regulation
- NTTF – Near Term Task Force
- PRA – Probabilistic Risk Assessment
- PWR – Pressurized Water Reactor
- RES – Office of Nuclear Regulatory Research
- RMRF – Risk Management Regulatory Framework
- RMTF – Risk Management Task Force
- SAPHIRE - Systems Analysis Programs for Hands-on Integrated Reliability Evaluations
- SDP – Significance Determination Process
- SECY – Office of the Secretary
- SNC – Southern Nuclear Company
- SOARCA – State of the Art Reactor Consequence Analysis
- SPAR – Standardized Plant Analysis Risk
- SRM – Staff Requirements Memorandum
- SRP – Standard Review Plan
- US-APWR – U.S. Advanced Pressurized-Water Reactor

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## Recently-Issued Technical Reports and Guidance documents

- NUREG-1855 Draft Rev 1, "Guidance on the Treatment of Uncertainties Associated with PRA's in Risk-Informed Decision making"
- NUREG-1921, "EPRI/NRC-RES Fire Human Reliability Analysis Guidelines" [ADAMS # ML12216A104]
- NUREG-2117 Rev 1, "Practical Implementation Guidelines for SSHAC Level 3 and 4 Hazard Studies" [ADAMS # ML12118A445]
- NUREG-2122 – Draft, "Glossary of Risk-Related Terms in Support of Risk-Informed Decision Making" [ADAMS # ML121570620]
- NUREG-2125, "Spent Fuel Transportation Risk Assessment" [ADAMS # ML12125A218]
- NUREG-2150, "A Proposed Risk Management Framework" [ADAMS # ML12109A277]
- SRP 19.0 Draft Rev. 3, "Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors" [ADAMS # ML12132A481]
- SRP 19.3 Draft Rev. 0, "Regulatory Treatment of Non-Safety Systems for Passive Advanced Light Water Reactors" [ADAMS # ML12128A405]

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## Recently-Issued SECY Papers

- SRM-SECY-12-0081, "Staff Requirements – SECY-12-0081 – Risk-informed Regulatory Framework for New Reactors"
- SECY-12-0110, "Consideration of Economic Consequences within the U.S. Nuclear Regulatory Commission's Regulatory Framework"
- SECY-12-0123, "Update on Staff Plans to Apply the Full-Scope Site Level 3 PRA Project Results to the NRC's Regulatory Framework"
- SECY-12-0133, "Status of the Accident Sequence Precursor Program and the Standardized Plant Analysis Risk Models"
- SECY-12-0149, "Annual Update of the Risk-informed and Performance-based Plan"
- Risk-informed Performance-based Plan - <http://www.nrc.gov/about-nrc/regulatory/risk-informed/rpp.html>

Link to SECY Papers and SRMs:  
<http://www.nrc.gov/reading-rm/doc-collections/commission/secys/>  
<http://www.nrc.gov/reading-rm/doc-collections/commission/srm/>

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