



RIC 2011

Challenges in Reviews of New Transient and Accident Safety Analysis Methods

Shanlai Lu, Ph.D
Office of New Reactors
U.S Nuclear Regulatory Commission
March 9, 2011

1



Presentation Outline

- Successes from AP1000 and ESBWR review
- Safety analysis method review process
- Review challenges and lessons learned
- Issue resolution and future applications

2



Successes From The Past

- Westinghouse AP1000 and GE ESBWR design certification reviews have been completed
- Large number of topical reports covering safety analysis methods have been reviewed and approved
- Staff gained significant knowledge and experience on passive designs
- Topical report review process has been established for staff to review new methods
- Confirmatory analysis infrastructure has been developed

3



Safety Analysis Method Review Process

- NUREG/CR-5249 and other regulatory guides established the foundation for staff to review new safety analysis methods
 - CSAU – Methodology
 - Code Scaling, Applicability and Uncertainty
- Testing for unique new reactor design features
- Computer model development and validation
- Uncertainty analysis: evaluation approach, input and model uncertainty evaluation



Safety Analysis Method Review Process

Confirmatory Analysis

- Confirmatory analysis model has been developed for each new reactor design using NRC computer codes
- Additional confirmatory analysis or testing have been performed on a case-by-case basis
- Results of regulatory analysis or testing are used to support staff review activities and issue resolution



Review Challenges and Lessons Learned

- Quality of submittals
 - The following are needed from applicants:
 1. Adequate understanding of new phenomenon
 2. Sufficient information/description provided
 3. Clear interface and applicability definition
 4. Legacy methodology deficiency identified
- Planning and early submittals
- Proper communication throughout the review process



Challenges And Issue Resolution

- Example I:
Model Deficiency – Reactor Core Initial Stored Energy

Resolution: IN-2009-23 was issued resulting in revised methodology for both new reactor and operating reactor applications
- Example II:
Long term cooling and downstream effects evaluation. Significant core blockage possible
Resolution: Further evaluation may be needed

7



Conclusion

- NRC staff has developed world-class analysis capability to review new safety analysis methods associated with new reactor designs
- Many challenging issues have been identified and are being, or, have been resolved
- The experience gained from previous review and the developed analytical capability will enable staff to perform timely review on new methods of advanced reactor designs

8
