


Technical Session T9

**Status of the Level 3 PRA Project for Vogtle,
Units 1 and 2**

Motivation, Objectives, and Potential Uses of the Integrated
Site Level 3 PRA Study


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Motivation

- Over 20 years since the last NRC sponsored Level 3 PRA study (NUREG-1150)
 - Consider scope items not covered in NUREG-1150
 - Reflect recent technical advances
- Apply methods developed by the State of the Art Reactor Consequence Analyses (SOARCA) project within a full risk context
- Enhance staff PRA capabilities

2



Background

- Commission paper SECY-11-0089 provided options for undertaking Level 3 probabilistic risk assessment (PRA) activities
 - In the associated staff requirements memorandum (SRM), the Commission directed the staff to conduct a full-scope, comprehensive site Level-3 PRA
- SRM-SECY-11-0089 also requested Staff's plans for applying project results to the NRC's regulatory framework (SECY-12-0123)
- SRM-SECY-11-0172 directed staff to pilot draft expert elicitation guidance as part of the Level 3 PRA project

3



Objectives

- Develop a Level 3 PRA, generally based on current state-of-practice methods, tools, and data,* that (1) reflects technical advances since completion of the NUREG-1150 studies, and (2) addresses scope considerations that were not previously considered (e.g., multi-unit risk)
- Extract new insights to enhance regulatory decision-making and to help focus limited agency resources on issues most directly related to the agency's mission to protect public health and safety

** "State-of-practice" methods, tools, and data are those that are routinely used by the NRC and licensees or have acceptance in the PRA technical community.*

4



Objectives (con't)

- Enhance NRC staff's PRA capability and expertise and improve documentation practices to make PRA information more accessible, retrievable, and understandable
- Obtain insight into the technical feasibility and cost of developing a Level 3 PRA

5



Scope Considerations

- Includes all significant site radiological sources (all reactor cores, spent fuel pools, and dry storage casks on site), all internal and external initiating event hazards, and all modes of operation
 - Excludes radiological sources involving fresh nuclear fuel, radiological waste, and minor radiological sources (e.g., calibration devices), and initiating events involving malevolent acts
- Excludes some aspects for which there is no current state of practice (e.g., software failure and aging)
- While the study is for a single site; it is anticipated that some insights can be obtained that may have applicability to similar plants.

6



Volunteer Site

Southern Nuclear Operating Company's (SNC's)
Vogtle Electric Generating Plant, Units 1 and 2

- Westinghouse 4-loop PWRs with large, dry containments
- Some unique plant features
- SNC has peer-reviewed Level 1, internal event, internal flood, and internal fire reactor PRAs*
- SNC recently completed (and peer reviewed) a seismic PRA*

* The NRC's Level 3 PRA project leverages previous SNC PRA work and related information.

7



Infrastructure

- Established Technical Advisory Group (TAG)
- Established communication protocols with SNC
 - Addresses transfer and control of plant information
- Developed and implemented staffing plan
 - Multi-disciplinary team of staff with varying degrees of experience in PRA and supporting technical areas
- Developed and implemented contracting plan
- Developed Technical Analysis Approach Plan (TAAP)

8



Technical Approach

- Overall technical approach
- Success criteria
- Systems analysis
- Data analysis
- Human reliability analysis
- Structural analysis
- Fragility analysis
- Hazard analysis
- Uncertainty analysis
- Reactor, at-power, internal hazard PRA (Levels 1-3)
- Reactor, at-power, external and other hazard PRA (Levels 1-3)
- Reactor, low power and shutdown, all hazard PRA (Levels 1-3)
- Spent fuel pool PRA
- Dry cask storage PRA
- Integrated site PRA
- Quality assurance

9



Quality Activities

- Internal reviews
 - Self-assessment
 - Technical Advisory Group (TAG)
- ASME/ANS PRA Standard based peer reviews
- Advisory Committee on Reactor Safeguards reviews
- General peer reviews (including public comment periods) on publicly available documents

10



Documentation

- Detailed documentation guidance and infrastructure have been developed
 - Covers assumptions, technical bases, sources of uncertainty, meeting summaries, decisions
- Currently envision four tiers of documentation
 - Top tier (NUREG report, technical analysis approach document) will be publicly available
 - Lower tiers (interim deliverables) will likely contain proprietary information, and will not be publicly available

11



Potential Uses

Described in SECY 12-0123:

- Enhancing the Technical Basis for the Use of Risk Information
- Improving the PRA State-of-Practice
- Identifying Safety and Regulatory Improvements
- Supporting Knowledge Management

12



Some References

- SECY 11-0089, "Options for Proceeding with Future Level 3 Probabilistic Risk Assessment Activities," July 7, 2011
- SECY 12-0123, "Update on Staff Plans to Apply the Full-Scope Site Level 3 PRA Project Results to the NRC's Regulatory Framework"
- Technical Analysis Approach Plan, Revision 0b, October 2013 (publicly available in ADAMS at ML13296A064)
- NUREG-1935, "State-of-the-Art Reactor Consequence Analyses (SOARCA) Report"
