

SOARCA Seismic Issue

Briefing for the Commissioners'
Technical Assistants

Dec. 17, 2008

Background

- Sequences for Peach Bottom and Surry selected early 2007 – briefed ACRS July 2007
- ACRS in an October 2, 2008 public meeting identified a potential LERF seismic event for Surry from NUREG-1150
 - SBO + LOCA + direct containment failure
 - In NUREG-1150, consequence analysis for this sequence was not reported because of a lack of quantification of non-nuclear seismic risks necessary for comparison. Performed as a sensitivity calculation in NUREG/CR
- Sequence originally screened out, qualitatively, by project
 - Low frequency
 - Lack of current plant specific quantification for fragility
 - Lack of licensee analysis for identification / quantification
- First quantitative estimate in October at roughly 5×10^{-8} , below our criterion
- Recent quantitative reassessment using updated seismic hazard curve (but old fragility estimates) suggests this sequence has a frequency of $\sim 2 \times 10^{-7}$ which meets screening criterion
- Questions remain on the state of quantification of the event
- How do we address?

Path Forward

- Approach – exclude sequence from SOARCA analyses, acknowledge existence but defer to future resolution in separate project (development of better quantification is needed)
 - No delay in analyses
 - Develop a separate seismic research program to address this long-standing issue
 - Investigate the recent Japanese seismic experience at the Kashiwazaki-Kariwa nuclear power plant
 - Develop seismic PRA guidance

Path Forward (cont)

- Advantages
 - No delay
 - Seismic event is poorly quantified
 - Seismic hazard curve
 - Fragility estimates
 - Individual ACRS members consented
 - GI-199 ongoing
 - Near term resolution highly unlikely - much work needed (Plant specific detailed seismic modeling is ultimately required, reconciliation of Japanese seismic experience for US plants) – methods must be developed
 - Consistent with current PRA treatment (event not identified in Surry or Peach Bottom IPEEE)
 - No requirement for seismic PRA
 - Consistent with SOARCA focus on mitigation – extreme seismic event has little/no remedy
- Disadvantages
 - Potential LERF event not analyzed
 - Potential conflict with some stakeholders

Other approaches considered

- Address event with expedited and limited update of fragility and seismic
- Address event rigorously both seismic hazard and plant specific fragility for LOCA and containment failure
- Assume worst case and calculate the consequences for the event

Summary

- Identification of potential large seismic event does not diminish the overall SOARCA messages
 - Sequences in the 10^{-5} to 10^{-7} /reactor-year range can be mitigated by SAMGs, post-9/11 measures
 - Releases from sequences, assuming no mitigation, are small and delayed
 - Phenomena that resulted in large early release shown to be extremely unlikely or unfeasible
 - alpha-mode failure
 - direct containment heating
 - Releases from thermally induced steam generator tube rupture are small, due to subsequent hot leg and lower head failure