

## Guide to the Resolution of 10CFR50.54f Information Request 2.1 - Seismic

### Purpose for Guide

1. Background
  - 1.1. GI 199
  - 1.2. IPEEE Seismic
  - 1.3. NRC NTTF Recommendation
  - 1.4. NRC Information Request 2.1
    - 1.4.1. Phase 1/2
2. Seismic Hazard Development
  - 2.1. Background (CEUS vs WUS plants)
  - 2.2. Seismic Source Characterization
  - 2.3. Ground Motion Attenuation (**Position 1**) - (*EPRI plan coming out in several weeks*)
  - 2.4. Site Seismic Response (**Position 2**)
    - 2.4.1. Horizons and control point
    - 2.4.2. Addressing sites with limited data - (*EPRI preparing a generic example*)
  - 2.5. PSHA & Hazard Calculations (include CAV discussion and other key decisions within the hazard calculation process)
  - 2.6. Seismic Hazard Data Deliverables
    - 2.6.1. Soil profile and properties – including strain compatible
    - 2.6.2. Site Amp Factors
    - 2.6.3. Seismic hazard data at control points and base rock
      - 2.6.3.1. Curves over a range of specified spectral frequencies
      - 2.6.3.2. Fractile seismic hazards at specified fractile levels
      - 2.6.3.3. Range of annual exceedance frequencies
      - 2.6.3.4. Complete set of requested information from 50.54f related to seismic hazard
  - 2.7. GMRS Development
3. GMRS Comparisons and Screening of Plants
  - 3.1. Background on Screening
  - 3.2. Control Point for SSE and IPEEE HCLPF Spectrum
  - 3.3. SSE Screening Task (SSE to GMRS Comparison)
  - 3.4. IPEEE Screening Task – Optional Task (**Position 6**)
    - 3.4.1. IPEEE Adequacy
    - 3.4.2. Development of HCLPF Spectrum from IPEEE Results
    - 3.4.3. Comparison of IPEEE HCLPF Spectrum to GMRS
  - 3.5. Treatment of High Frequency Exceedances (Confirmation) (**Position 7**)
    - 3.5.1. Establish limited scope of high frequency sensitive components
      - 3.5.1.1. EPRI report 1015109
      - 3.5.1.2. Inform based on new plant results
    - 3.5.2. Phase 1 Testing
      - 3.5.2.1. Select sample components for Phase 1 testing
      - 3.5.2.2. Establish testing protocol
      - 3.5.2.3. Conduct sample testing and review results
    - 3.5.3. Phase 2 Testing
      - 3.5.3.1. Informed from Phase 1 Test Program
      - 3.5.3.2. Expanded sample

- 3.6. Interim evaluation and actions planned or taken to address exceedances (*need NRC guidance*)
  - 3.6.1. Conduct SPRA or SMA to address and assess
- 4. Prioritization (Schedule)
  - 4.1. 4 years min following hazard, no high priority 3 years
  - 4.2. Fleets could voluntarily offer to prioritize
- 5. Seismic Risk Evaluation
  - 5.1. Background on SPRA and SMA
    - 5.1.1. SPRA and Risk Based SMA methods and procedures
    - 5.1.2. References for SPRA and Risk Based SMA
  - 5.2. SPRA/SMA Screening Criteria
    - 5.2.1. 1.3 times IPEEE HCLPF Spectrum?
    - 5.2.2. Discuss with NRC
  - 5.3. Key Elements of Seismic Structural & SSI Response
    - 5.3.1. Control Point for FIRS
    - 5.3.2. Structure Modeling (**Position 3**)
    - 5.3.3. Seismic Response Scaling (**Position 4**)
    - 5.3.4. Fixed Based Analysis for Sites previously defined as “rock” (**Position 11**)
      - 5.3.4.1. > 3,500 ft/sec & <9,200 ft/sec sites
  - 5.4. Key Elements of Fragility/Capacity for 2.1 Resolution
    - 5.4.1. Hybrid Approach for Fragilities (**Position 8**)
      - 5.4.1.1. Description of approach
      - 5.4.1.2. Potential use of Separations of Variables for risk significant SSCs
      - 5.4.1.3. Possible sensitivity analyses
    - 5.4.2. High Frequency Capacities (**Position 7**)
    - 5.4.3. Screening based on Fragilities (**Position 5a**)
  - 5.5. Spent Fuel Pool Integrity Evaluation (**Position 9**)
    - 5.5.1. Description of procedures to Evaluate
    - 5.5.2. Results of Evaluation
    - 5.5.3. Peer Review
    - 5.5.4. Identify actions to address vulnerabilities
  - 5.6. Key Elements of SPRA/SMA Scope and Plant Logic Modeling
    - 5.6.1. LERF Considerations
      - 5.6.1.1. Definition of LERF consistent with internal events
    - 5.6.2. SEL Screening (systems based) (**Position 5b**)
  - 5.7. Comparison to ASME/ANS SPRA Standard and RG1.200 (**Position 10**)
  - 5.8. Peer Review
    - 5.8.1. Start with SPRA standard (RG1.200 inclusive) and specify any exceptions
      - 5.8.1.1. Independent fragilities not required by peer reviewers
    - 5.8.2. Review to methods within this guide for this application

5.9. Evaluation Criteria/Significance for Risk Contributors and Risk Contribution (*NRC Clarification required*)

5.9.1. "NRC and Industry & other stakeholders will continue to interact to develop acceptance criteria in order to identify potential vulnerabilities" *from 50.54f*

5.9.2. NRC request to submit action plan to evaluate seismic risk contributors

5.9.3. Risk Based SMA – Plant HCLPF greater than RLE (Envelope of GMRS & SSE)