



Hazard Evaluation and Preliminary Approach for Screening & Prioritization

March 1-2, 2012

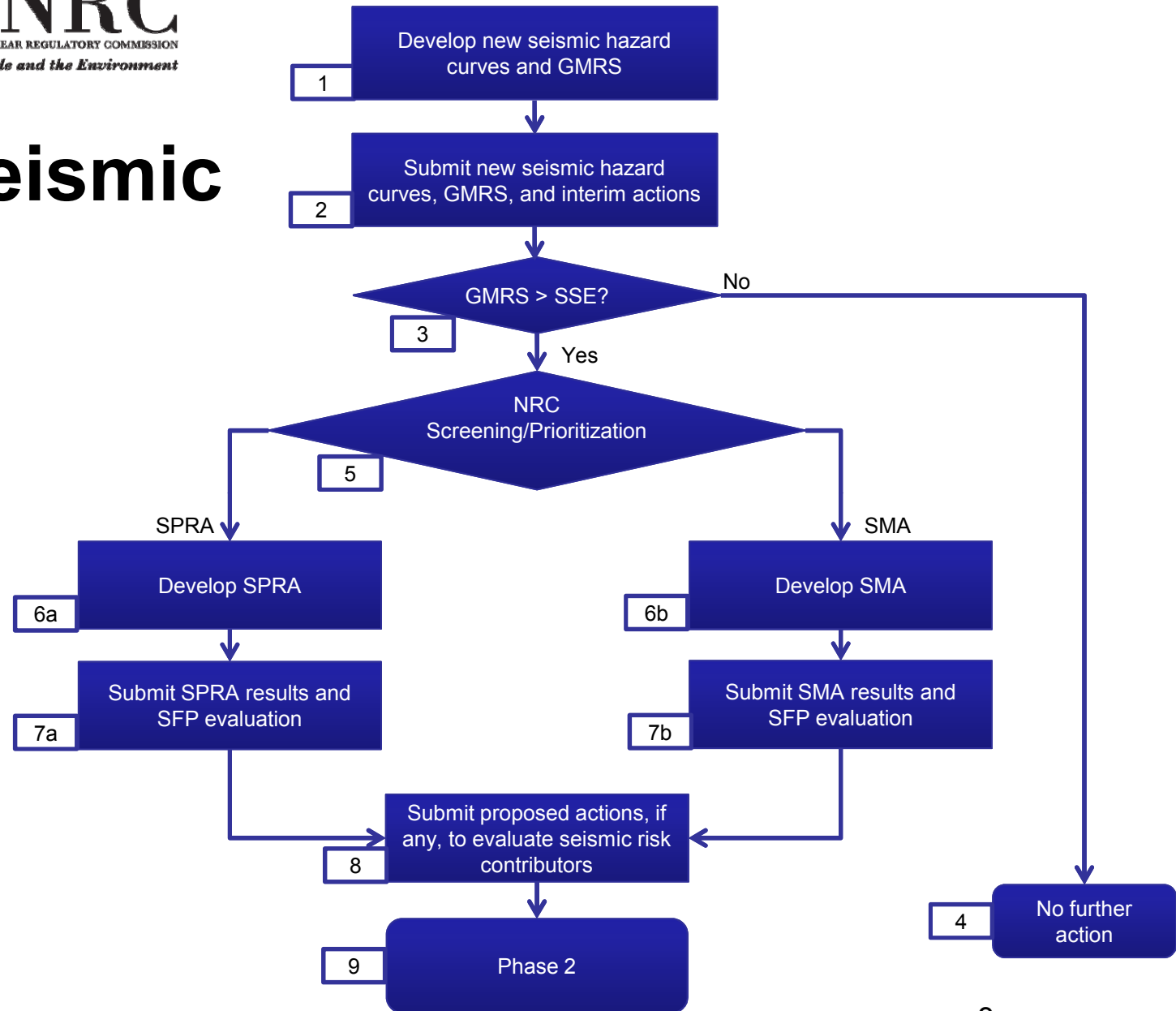
Cliff Munson, Jon Ake, Sarah Tabatabai
U.S. Nuclear Regulatory Commission



Outline

- Flow Chart
- Seismic Hazard Revaluation
- Screening Criteria
 - IPEEE Results
 - Comparison of GMRS and SSE
 - Lower Hazard Boundary
- Prioritization
- Risk Evaluation
- Next Steps

R2.1 Seismic





Seismic Hazard Reevaluation

- Determine Ground Motion Response Spectrum (GMRS) for Site
 - Use Probabilistic Method (PSHA)
 - Seismic Source Models
 - Seismic Ground Motion Models
 - Site Response Evaluation
- Compare GMRS with Safe Shutdown Earthquake with Plant (SSE) Spectrum



Seismic Hazard Reevaluation

- New seismic source models for CEUS developed jointly by NRC, DOE, EPRI
www.ceus-ssc.com
- EPRI (2004, 2006) ground motion prediction equations for CEUS
- WUS sites to be given more time to develop similar seismic source and ground motion models



Seismic Hazard Reevaluation

- **Site Response** – sparse geotechnical data for some sites
 - Types and scope of site investigations
 - Coordinated effort to gather more geotechnical data during first year
 - Characterizing uncertainty
- **Concerns with Industry Proposed Update of EPRI (2004, 2006) GMPE**
 - Basis and Scope for update
 - Impact on R2.1 schedule
 - Sufficient time for staff review
 - Impact on NGA-East schedule



Seismic Screening

- Results from IPEEE
- Comparison of GMRS and SSE
- Comparison of GMRS and “Lower Hazard” boundary



Part 1: Results from IPEEE

- Plants that performed more rigorous risk evaluations can use analyses and results
 - Full Scope IPEEE RLE anchored at demonstrated HCLPF greater than GMRS (1 to 10 Hz)
 - SPRA viability
 - Demonstrate continued viability of SPRA results and insights
 - Recalculate SCDF using updated seismic hazard curves

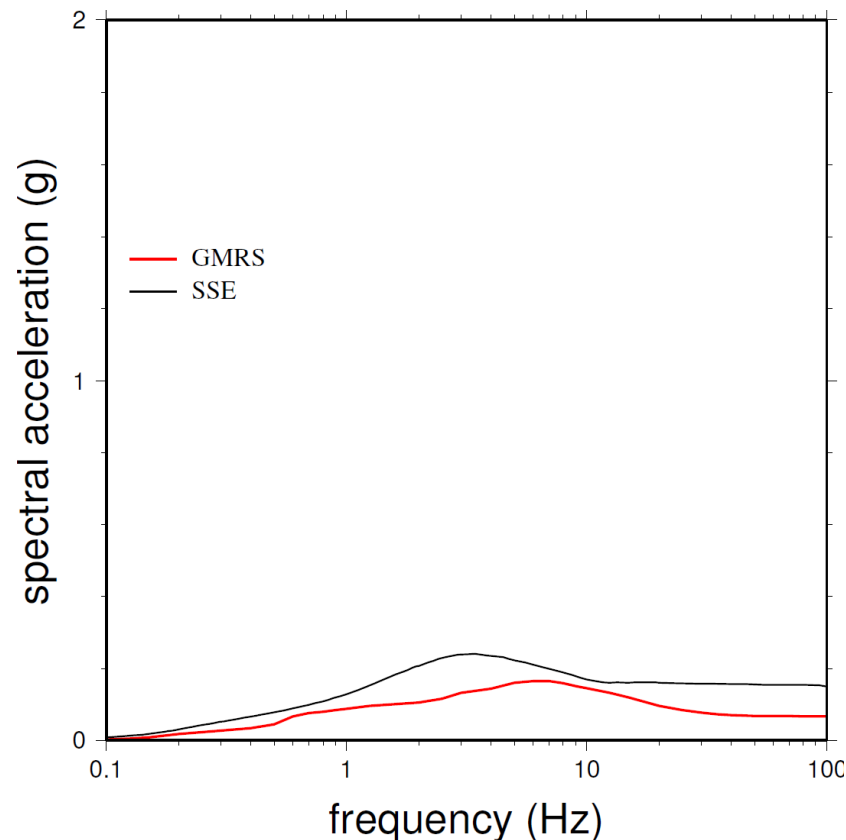


Part 2: Compare GMRS & SSE

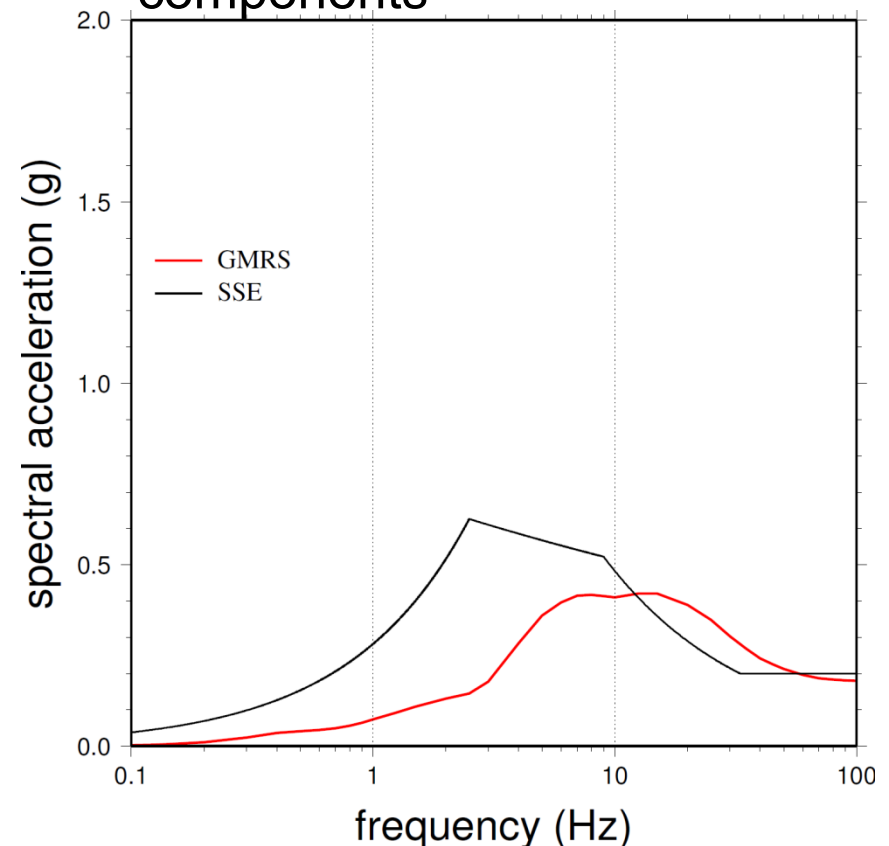
- Use factor of 1.3 as initial screening criterion to determine between SMA and SPRA risk evaluations
 - Focus between 1 to 10 Hz
 - **High frequency** exceedances for all cases
 - Large ($\text{GMRS} > \text{SSE}$ at anchor point)
 - Small ($\text{GMRS} < \text{SSE}$ at anchor point)
 - Need to develop appropriate evaluations for both large and small exceedances

Seismic Screening – Pt2

No Further Action: GMRS < SSE



Limited Further Action:
confirm adequacy of high-frequency sensitive components

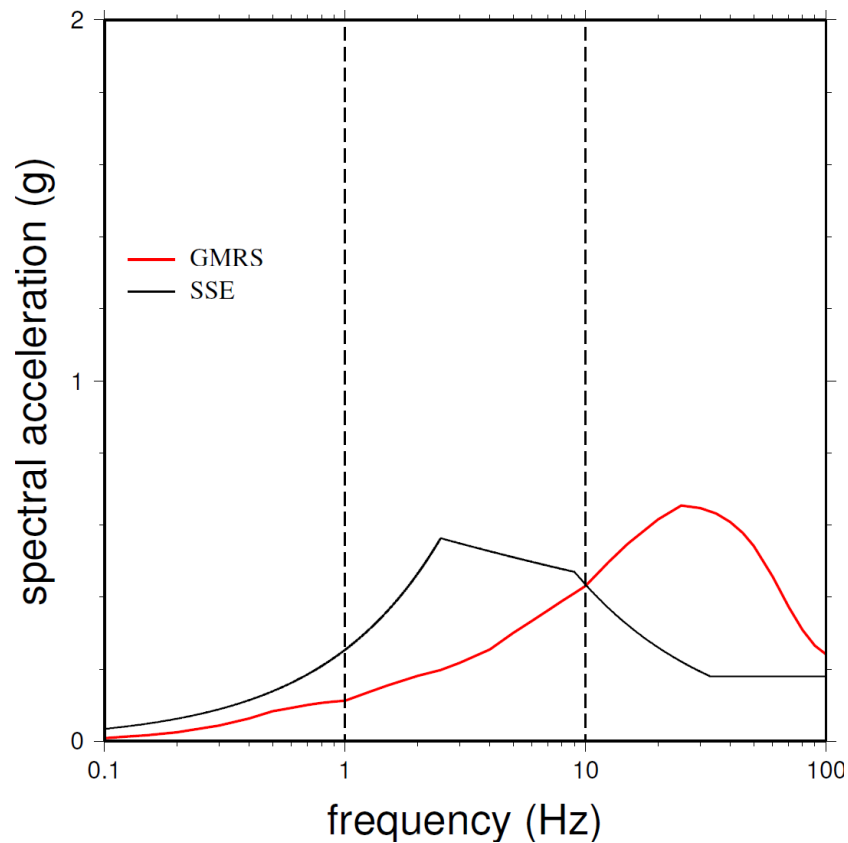




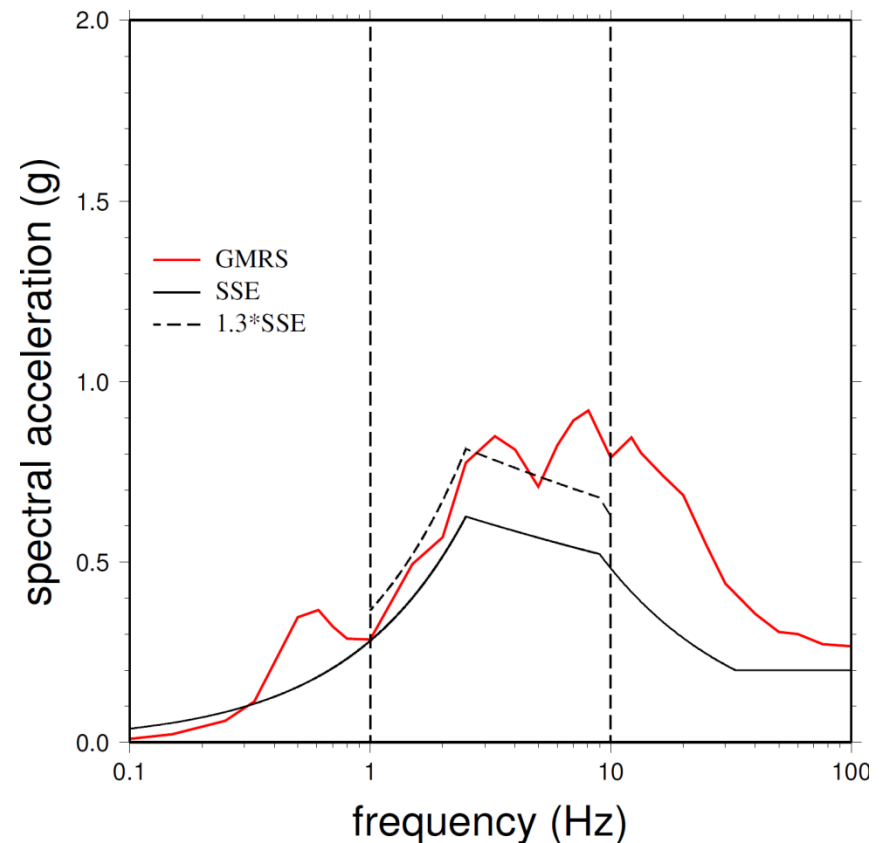
U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Seismic Screening – Pt2

Further Action: evaluate high-frequency sensitive components



Further Action: Risk Evaluation (SPRA)

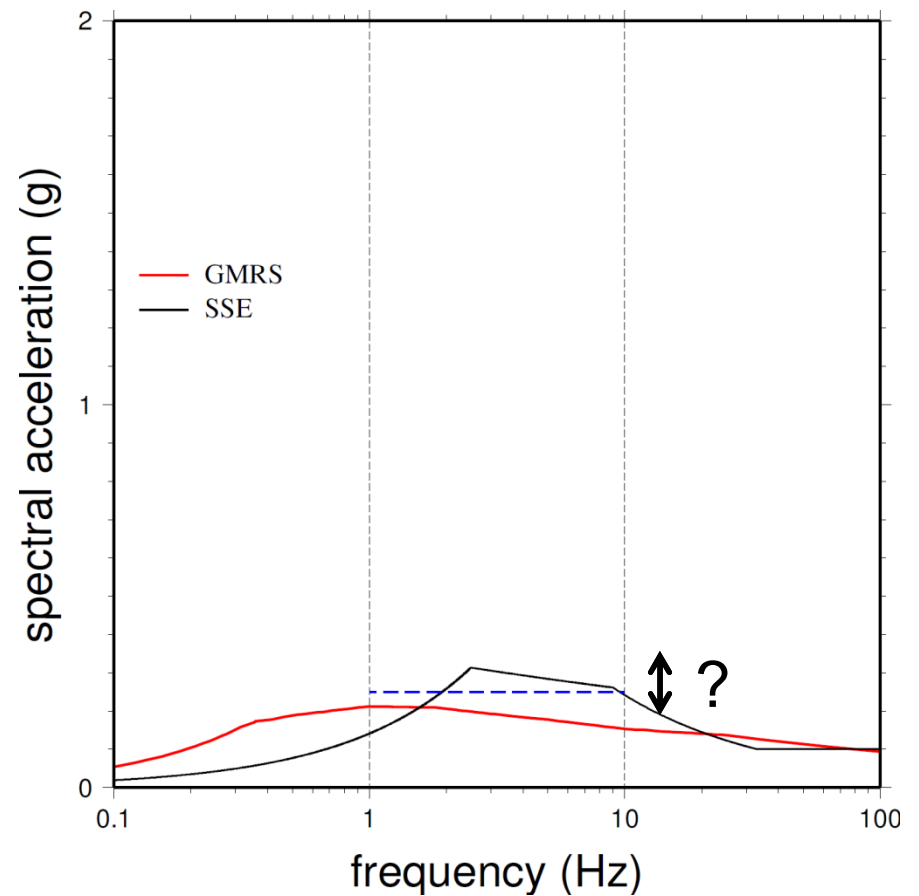
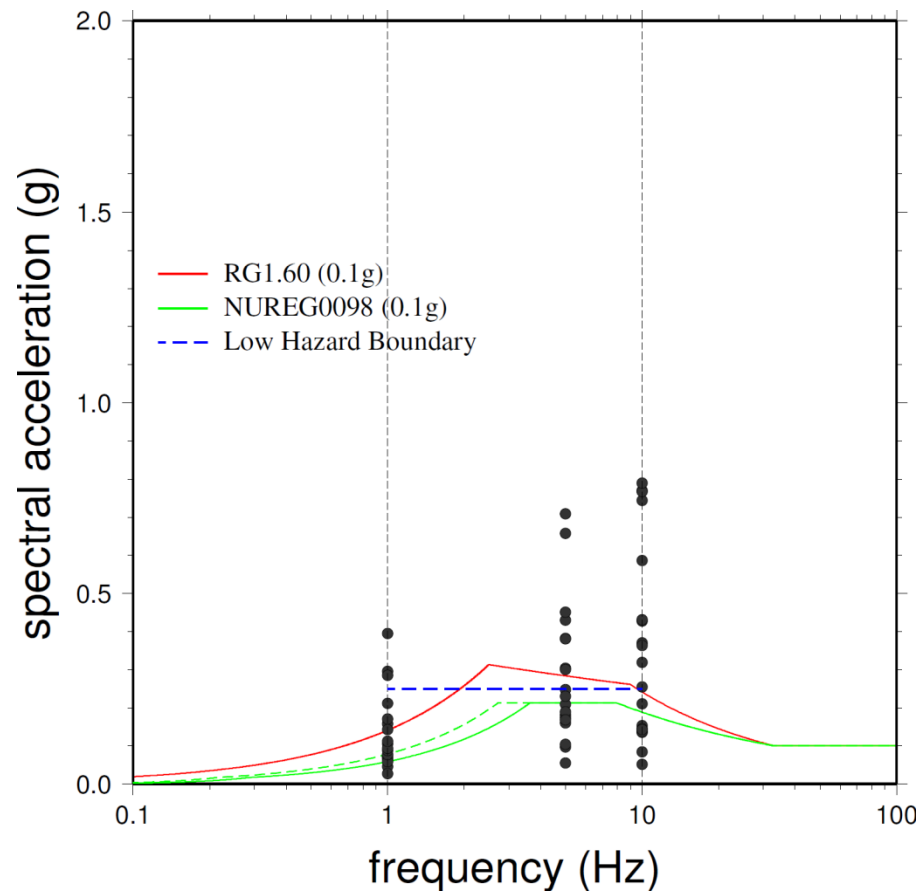




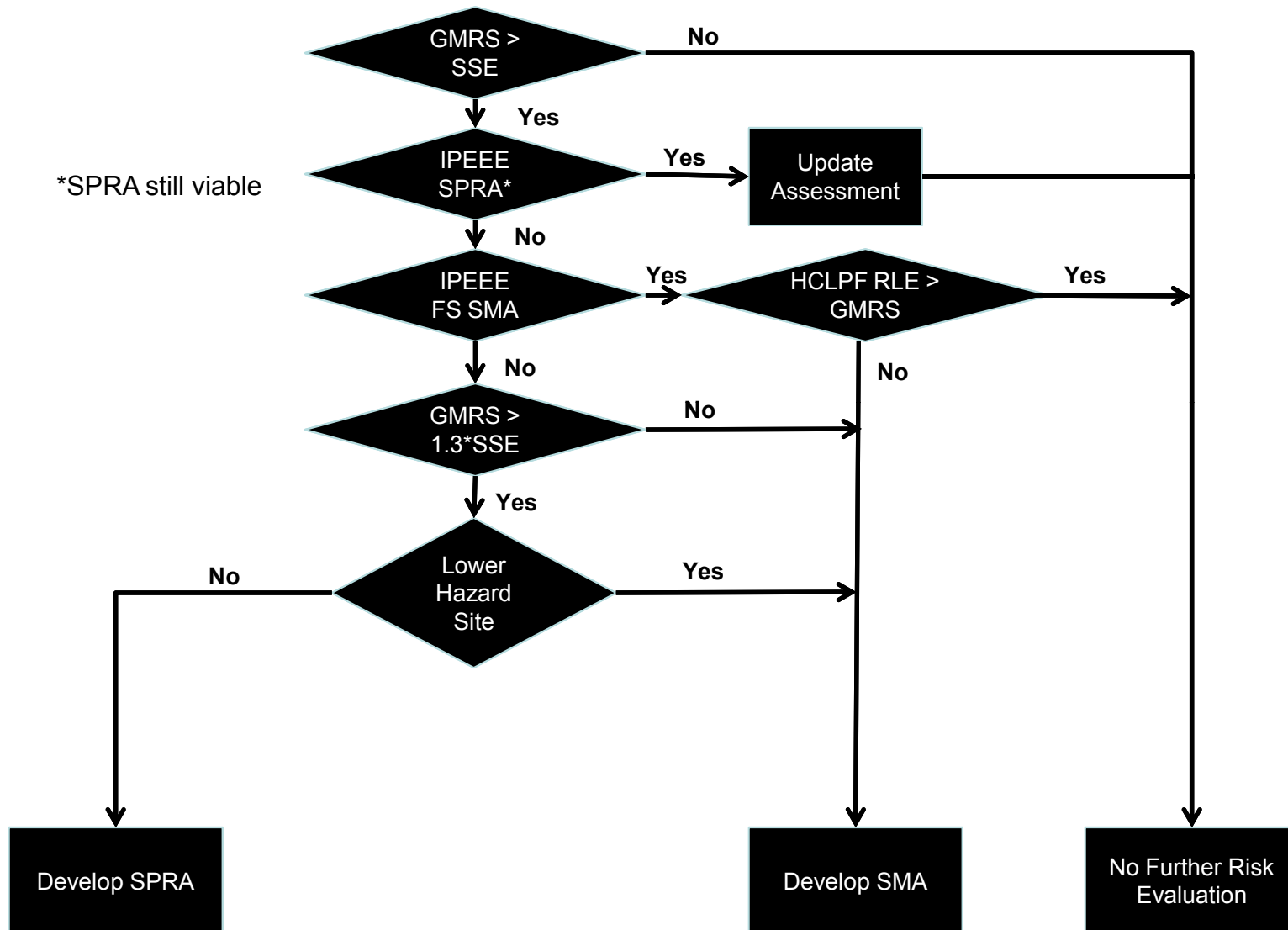
Part 3: Lower Hazard Boundary

- Develop a boundary level for “lower hazard” sites
- Compare site GMRS to boundary level
- “Lower Hazard” site plants would perform SMA at most

Lower Hazard Boundary



Screening Criteria





Prioritization

- Licensees that need to develop SPRA will be in higher priority group
- Licensees that perform SMA may be in higher or lower priority groups
- Licensees that update IPEEE SPRA results can either be higher or lower priority



Seismic Risk Evaluation

- Depending on Screening Results perform
 - Seismic Margin Analysis (SMA) or
 - Probabilistic Seismic Risk Analysis (SPRA)
- SMA method is NRC SMA (NUREG/CR-4334) as enhanced for full-scope plants in NUREG-1407
- SPRA approach is Level 1 with estimate of Large Early Release Frequency (LERF) described in RG 1.200



Next Steps

- Industry feedback on proposed screening and prioritization
- Criteria to determine continued use of IPEEE results
- Discuss need for update of EPRI GMPEs
- Strategies for Site Response for sites with sparse datasets