



*PRA Uncertainty Workshop
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Sources of Seismic Model Uncertainty

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Sources of Model Uncertainty

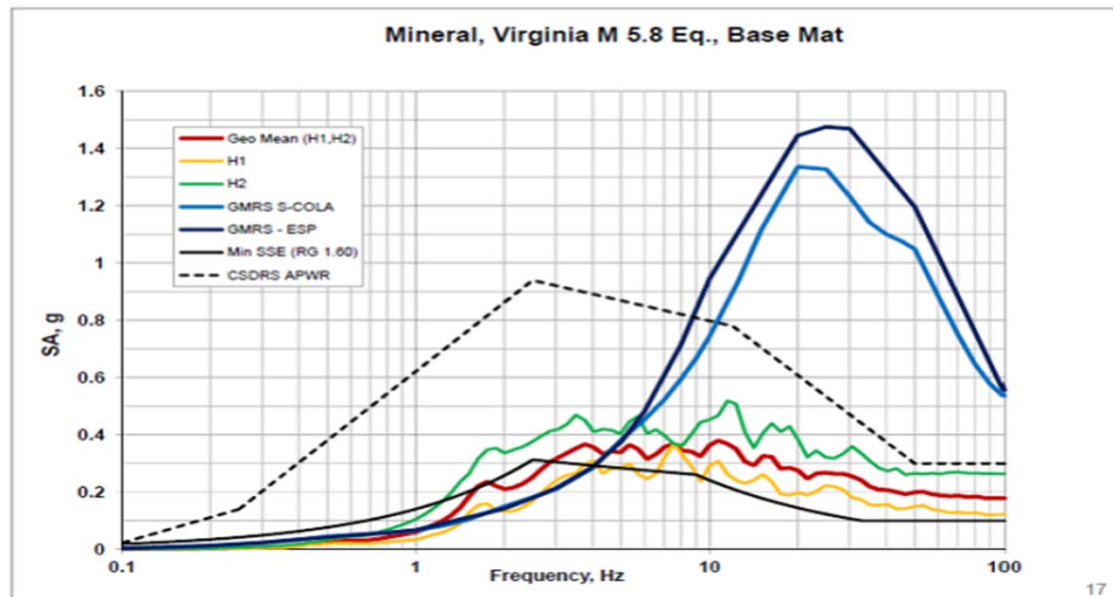
- Reliance on accepted hazard curve (e.g. 2009 EPRI hazard curves for sites east of the Rockies).
 - HLR-SHA-A
- Seismic fragility of SSCs based on analyses, testing, experience data.
- Modeling human performance following an earthquake is challenging especially for strong ground motion events.

1: Reliance on accepted hazard curve

- The hazard curve needs to be developed considering issues such as:
 - Seismic hazard characterization
 - Seismic source data
 - Seismic source location and geometry
 - Maximum earthquake magnitude
 - Earthquake recurrence
 - Hazard uncertainty characterization
 - Ground motion characterization
 - Ground motion attenuation
 - Local site characteristics on ground motion
 - Uncertainty propagation
 - Site specific response spectral shape

Source 1, cont.

- Both parameter and model uncertainties are high for CEUS sites. Recent Mineral Virginia earthquake data appeared much different from PSHA in both the shape and frequency content, require further investigation to determine if changes to PSHA model is needed.



Source 1, cont.

- Model Uncertainty Significance
 - HIGH
 - Reasons

2: Seismic Fragility of SSCs

- Seismic fragility of SSCs based on analyses, testing, experience data.
- Issues
 - Median capacity estimates
 - Uncertainty determination
 - Response attributes: such as SSI, incoherency effect on structural response, etc. are complex
 - Need an effort to standardize the fragility analysis for nuclear plant's SSC in a handbook which can significantly reduce both parameter and model uncertainties

Source 2, cont.

- Model Uncertainty Significance
 - HIGH
 - Reasons

3: Challenging Modeling Human Performance

- Modeling human performance following an earthquake is challenging especially for strong ground motion events.
- Issues
 - Modeling human performance in an earthquake event is very important in the seismic PRA
 - Adequate modeling of human reliability is more important in LPSD than at-power

Source 3, cont.

- Model Uncertainty Significance
 - HIGH
 - Reasons