

NRR-DMPSPeM Resource

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Subject: Slides for Jan 18, 2018, Public Meeting
Attachments: 50 69 Seismic Alternatives - 1-18-18 Public Meeting.pdf

Attached are the NEI/EPRI presentation slides for the January 28, 2018, public meeting to discuss seismic approaches to 10 CFR 50.69 LARs.

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50.69 Seismic Categorization Options

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NRC Meeting
January 18, 2018



50.69 Seismic Categorization Options

- **Review of October 23, 2017 meeting**
- **Results from additional sensitivity study**
- **Proposed Path Forward**
- **Discussion**

Summary of October 23, 2017 Meeting

- **Provided background on seismic risk inputs to the 50.69 Categorization process**
- **Presented results to two sensitivity studies at high seismic plants with new Seismic PRAs**
- **Described insights from the sensitivity studies and how those insights could affect the 50.69 categorization process**

NEI 00-04 Risk Informed Categorization – Seismic Inputs

- **Gap in information available to implement NEI 00-04**
 - **Some plants don't fit within any of the three available options**
 - **Includes plants that did not perform an SMA for IPEEE, and were not required to perform an SPRA in response to Fukushima**
- **Key question is whether seismic considerations provide unique risk insights in the 50.69 categorization process**
- **Would such insights drive SSCs to be HSS?**

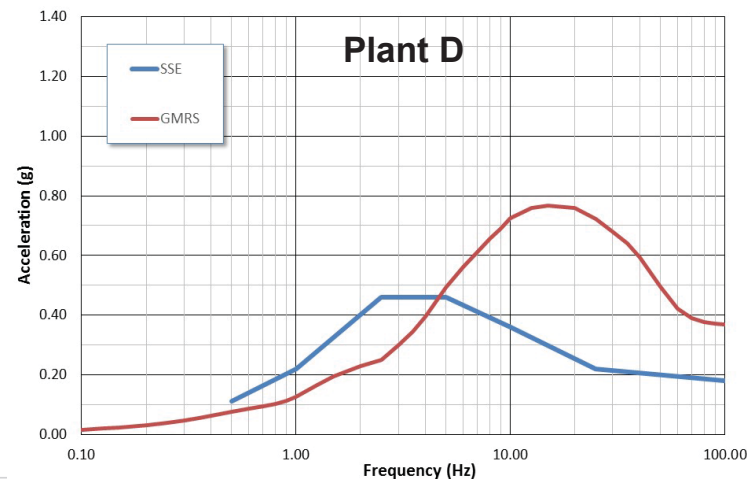
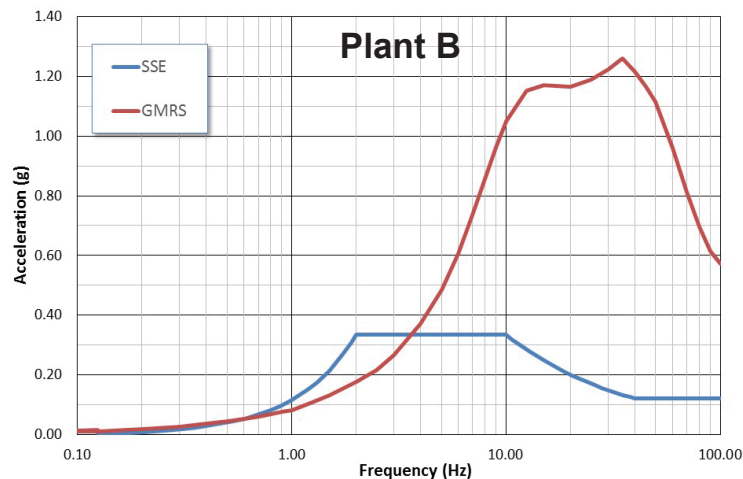
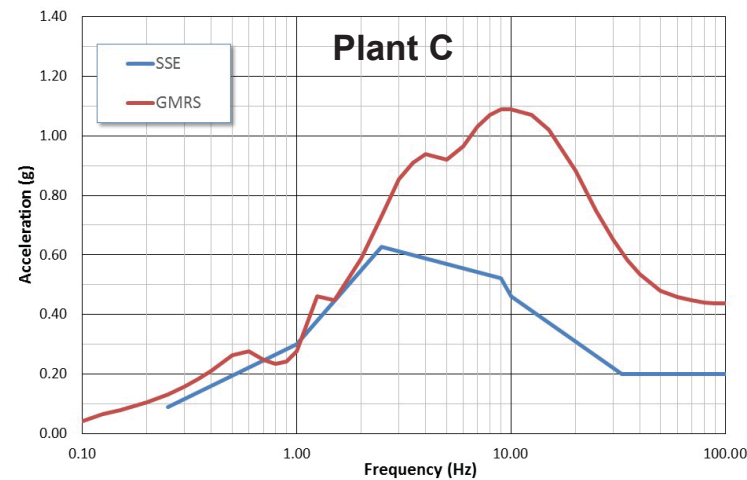
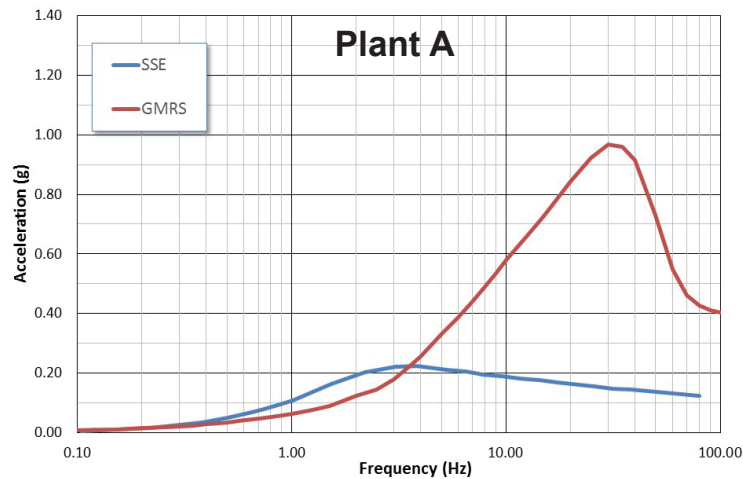
Premise

- **Categorization process is robust and integrated methodology**
 - Ensure all functions (system-level attribute) are considered
 - Includes risk insights, Defense-in-Depth reviews and IDP
 - Integral Importance Assessment (weighted average of importance measures)
- **Extensive seismic reviews performed over the last 5 years**
 - Plant walkdowns performed to validate design basis compliance
 - New site-specific seismic hazard estimates
 - NRC grading of plants based on comparisons of design vs. new hazards
- **Limited unique component insights, even for high hazard sites**
 - Sensitivity studies show SPRAs produce few (if any) unique HSS components
 - Insights for low and medium hazard plants expected to be more limited

50.69 Seismic Categorization Sensitivity Studies

- **High seismic ground motion plants with new SPRAs as test cases**
- **Determine how many/what kinds of SSCs are categorized as HSS**
 - **Identify HSS components using FPIE, Fire and Seismic PRA models**
 - **Compare HSS seismic components to those derived from other models**
- **Studies for 4 plants with high seismic hazards and new Seismic PRAs**

50.69 Categorization – Sensitivity Studies



- Results from Plants A and B were presented at the October 23, 2017 meeting
- Results from Plant C will be presented today
- Results from Plant D are under review and will be presented in a later meeting

Plant C Sensitivity Study

- **Use risk evaluation criteria in NEI 00-04**
- **Fussell-Vesely ≥ 0.005 or RAW > 2 identified as HSS**
- **Performed for all three models (internal, fire, seismic)**
- **Did not consider Integral Importance Assessment**

Plant C Sensitivity Study, Fragility Groups F-V ≥ 0.005 or RAW>2

Fragility Group ID	Fragility Group Description	HSS for FPIE or Fire PRA
1ACCBAA0205--D	INCOMING 1AA02 FDR BKR	Yes
1ACCBBA0301--D	INCOMING 1BA03 FDR BKR	Yes
1AFXV015-----P	AFW,TDAFW PUMP,DISCH, ISOLATION	Yes
1DCBYDD1B----F	125 VDC BATTERY 1DD1B	Yes
1LPMVHV8702A-D	RCS TO RHR PUMP B SUCTION MOV	Yes
1RCPOPV0455A-U, 456-U	PRESSURIZER PORVs	Yes
1RPCBS6---RTAD, RTBD	REACTOR TRIP BREAKER 'A', BREAKER 'B'	Yes
1SWFN1-F01---X to F04--X	BREAKER to A TRAIN NSCW FAN #1, #2, #3, #4	Yes
1SWFN2-F01---X to F04--X	BREAKER to B TRAIN NSCW FAN #1, #2, #3, #4	Yes
S_1ACBS-120PN-CB180	120 VAC PANEL CB 180	Yes
S_1ACIV-120-CB180	AC INVERTER CB180	Yes
S_1ACSD-SEQ	SFTY FEATURES SEQUENCER	Yes
S_1AFPM-MDP	BOTH AFW MDP	Yes
S_1AFPM-TDP	AFW TDP	Yes
S_1AFW-AOV-RLY	RELAY FOR AFW PUMP TURB TRIP & THROTTLE VLV	Yes
S_1CCTK-4	CCW SURGE TANK	*
S_1DCBC-CB180	BATTERY CHARGER CB180	Yes
S_1DCBS-MCC-AB	125 VDC MCC 1AD1M AND 1BD1M	Yes
S_1DCBS-MCC-ALL	ALL 125 VDC MCC	Yes
S_1DCBS-PN-CB180-1E	125 VDC 1E DISTR. PANEL - CB180	Yes
S_1DCBS-SGR-CB180	125 VDC SWITCHGEAR CB180	Yes
S_1DCBY-CB180	125 VDC BATTERY CB180	Yes
S_1DG	DIESEL GENERATOR	Yes
S_1DGDM-VENT	DG VENT DAMPER FOR FANS 1-4	Yes
S_1DGFN-FAN	DG BLDG ESF SUPPLY FAN	*
S_1FC-ACU-FLD	ANCHORAGE FAILURE OF ACU WITH NSCW FLD	*
S_1SWFN-NSCW-FANS	NSCW TOWER FANS	Yes
S_1XCTK-4	ACCW Surge Tank	*
S_CB-CHLR-NSCW-FLOOD	SEISMIC FAILURE OF CB ESF CHILLERS CAUSE NSCW FLOOD ON CB 260	*

* Notes:

- Components are HSS due to seismic correlated failures
- Several components would be HSS due to 50.69 Passive Categorization
- One component would be HSS due to implicit inclusion in FPIE HSS D/G components

50.69 Seismic Categorization Sensitivity Studies

Sensitivity studies from high seismic hazard sites show limited unique insights at the component level

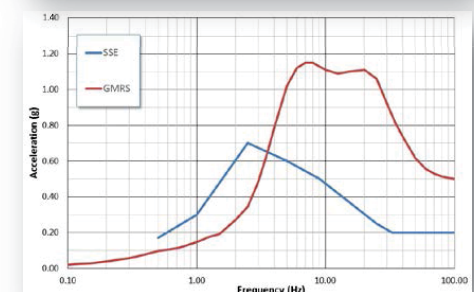
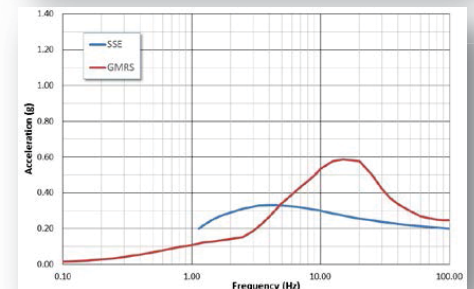
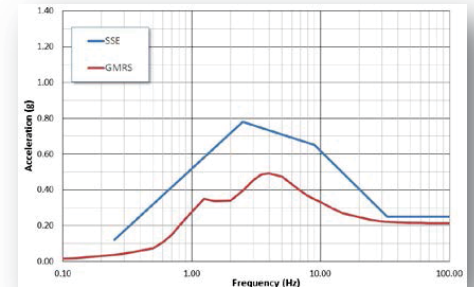
- **HSS SSCs identified in the seismic PRAs are also identified as risk significant in the FPIE PRA and/or Fire PRA**
- **In certain limited cases, correlated failures in the Seismic PRA can lead to different categorization results**
- **Only a handful of such unique components are expected**
- **Unique seismic HSS components expected to be even fewer at low and medium seismic hazard plants**

Relay Considerations

- **Relays can be important components in SPRAs (e.g. EDG control cabinets, chargers/inverters, 4kV switchgear)**
- **FPIE PRAs typically do not explicitly model relays; contributions implicitly modeled**
- **Backup power system functions are modeled**
- **Based on functional reviews, typically cabinets housing important relays identified HSS in FPIE PRA and by default, subcomponents in those cabinets considered HSS**
- **Subsequent categorization of subcomponents in enclosures would need to consider the functions of the subcomponents**

50.69 Seismic Categorization Proposed Path Forward

- Low hazard plants, with new GMRS generally below SSE
 - SPRAs provide very limited unique insights to 50.69 categorization and explicit consideration of seismic risks in the 50.69 categorization process is not necessary
- Moderate hazard plants, with new GMRS > SSE but not required to perform an SPRA for NTF 2.1 response
 - Sensitivity studies have shown that seismic correlated failures may contribute to 50.69 categorization decisions
 - Consider correlated failure sensitivity studies using the FPIE PRA for moderate seismic hazard plants
- High seismic hazard plants performing SPRAs
 - Use SPRA or SMA component list consistent with NEI 00-04



Summary

- **Confidence that SCC's are categorized in robust, integrated process**
 - Defense-in-Depth reviews
 - All functions (system-level attribute) are appropriately considered
 - Multi-discipline panel of experts reviews/approves the results
- **Formalized 3-tiered approach allows efficient review process**
 - Seismic considerations not expected to provide unique risk insights
 - Examining results of 4 sensitivity studies to define correlated failure insights for possible use by moderate hazard sites
- **Submittal strategy under development**



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Backup Slides

Sensitivity Study – Plant C, Fragility Groups F-V ≥ 0.005

Fragility Group ID	Fragility Group Description	HSS for FPiE or Fire PRA	Comments
1ACCBAA0205--D	INCOMING 1AA02 FDR BKR	Yes	
1ACCBBA0301--D	INCOMING 1BA03 FDR BKR	Yes	
1AFXV015-----P	AFW,TDAFW PUMP,DISCH, ISOLATION	Yes	
1DCBYDD1B----F	125 VDC BATTERY 1DD1B	Yes	
1LPMVHV8702A-D	RCS TO RHR PUMP B SUCTION MOV	Yes	
1RCPOPV0455A-U, 456-U	PRESSURIZER PORVs	Yes	
1RPCBS6---RTAD, RTBD	REACTOR TRIP BREAKER 'A' , BREAKER 'B'	Yes	
1SWFN1-F01---X to F04--X	BREAKER to A TRAIN NSCW FAN #1, #2, #3, #4	Yes	
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S_1ACBS-120PN-CB180	120 VAC PANEL CB 180	Yes	
S_1ACIV-120-CB180	AC INVERTER CB180	Yes	
S_1ACSD-SEQ	SFTY FEATURES SEQUENCER	Yes	
S_1AFPM-MDP	BOTH AFW MDP	Yes	
S_1AFPM-TDP	AFW TDP	Yes	
S_1AFW-AOV-RLY	RELAY FOR AFW PUMP TURB TRIP & THROTTLE VLV	Yes	
S_1CCTK-4	CCW SURGE TANK		Addressed by 50.69 Passive Categorization Process
S_1DCBC-CB180	BATTERY CHARGER CB180	Yes	
S_1DCBS-MCC-AB	125 VDC MCC 1AD1M AND 1BD1M	Yes	
S_1DCBS-MCC-ALL	ALL 125 VDC MCC	Yes	
S_1DCBS-PN-CB180-1E	125 VDC 1E DISTR. PANEL - CB180	Yes	
S_1DCBS-SGR-CB180	125 VDC SWITCHGEAR CB180	Yes	
S_1DCBY-CB180	125 VDC BATTERY CB180	Yes	
S_1DG	DIESEL GENERATOR	Yes	
S_1DGDM-VENT	DG VENT DAMPER FOR FANS 1-4	Yes	
S_1DGFM-FAN	DG BLDG ESF SUPPLY FAN		Function associated with loss of D/G, there would be identified as HSS due to its association with D/G
S_1FC-ACU-FLD	ANCHORAGE FAILURE OF ACU WITH NSCW FLD		Addressed by 50.69 Passive Categorization Process
S_1SWFN-NSCW-FANS	NSCW TOWER FANS	Yes	
S_1XCTK-4	ACCW Surge Tank		Addressed by 50.69 Passive Categorization Process
S_CB-CHLR-NSCW-FLOOD	SEISMIC FAILURE OF CB ESF CHILLERS CAUSE NSCW FLOOD ON CB 260		One train by itself would not make the loss of NSCW critical; Seismic correlated failure of both trains is assumed leading to NSCW flooding;