



Briefing on the Status of Near-Term Task Force Recommendation 2 for Seismic Hazard Reevaluations

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Regulation

Seismic Protection and Knowledge Is Critical

- **Supports NRC Mission**
- **Advancements in state of knowledge**
- **Contributor to plant risk**
- **Common cause failures**
- **Extended loss of power**

Continuous Focus on Seismic Safety

Systematic Evaluation Program	Late 1970s	Evaluation of older plants against modern seismic standards	*
Unresolved Safety Issue-A46	1980s	Seismic qualification of equipment in older nuclear plants	*
Individual Plant Examinations for External Events	1990s	Evaluation for potential vulnerabilities against beyond design basis events	*
Generic Issue-199	2000s	Assess of impact of updated seismic hazard estimates in the central and eastern U.S.	*
Near-Term Task Force Recommendation 2	2012-Ongoing	Recommendation to conduct walkdowns and reevaluate seismic hazard and risk	*

*Regulatory activities that have resulted in plant enhancements

Diverse Sources of Seismic Information

- **Operating Experience**
- **Research Programs**
- **Interagency Activities**
- **International Activities**

Enhancing Seismic Safety

Scott Flanders, Director

**Division of Site Safety and
Environmental Analysis
Office of New Reactors**

Significant Seismic Progress on Rec. 2 Seismic Activities

-  Completed
-  In Progress
-  Nearing Completion
-  Scheduled/Future Activity

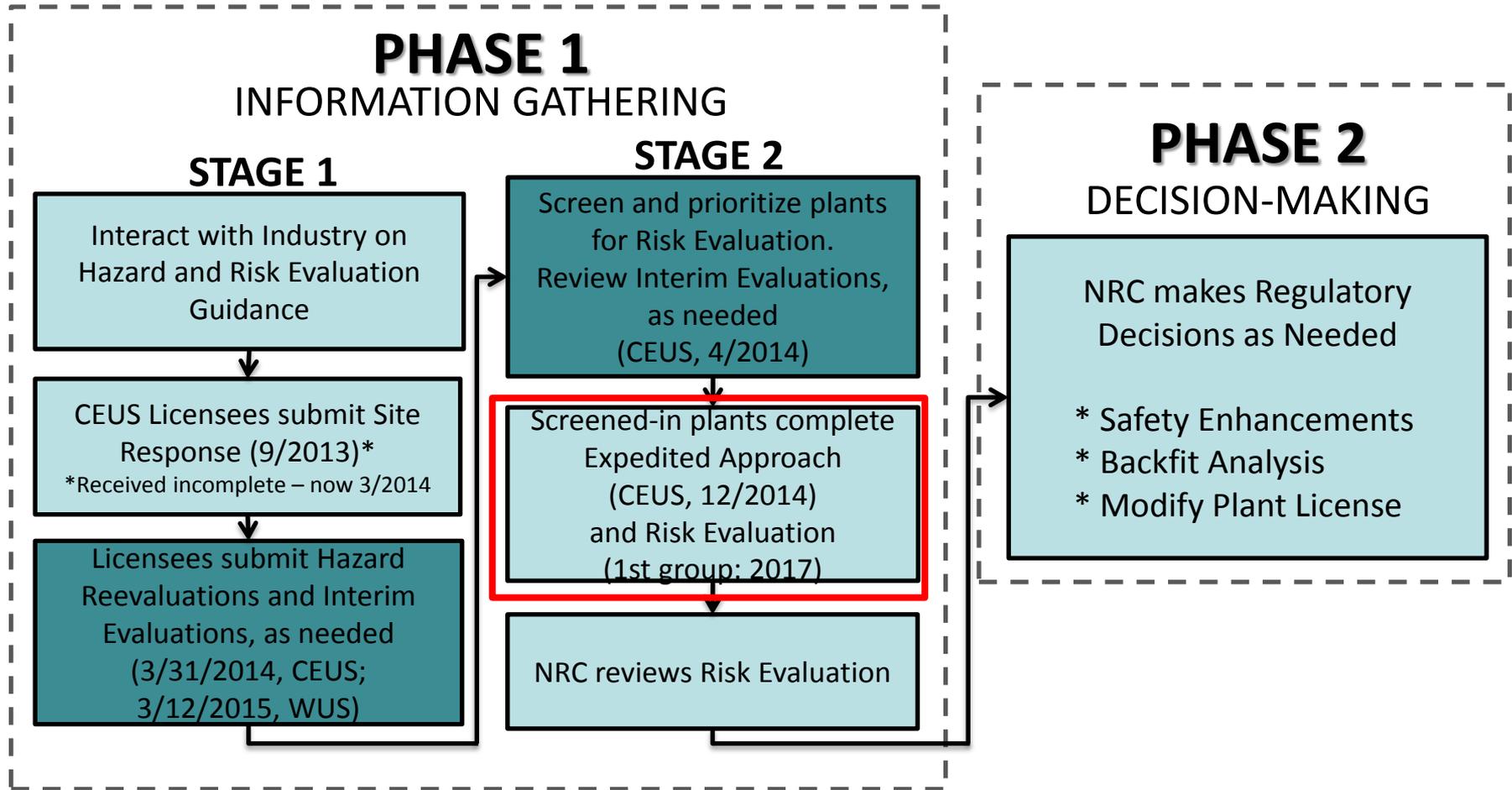
	Development of Guidance	Submittal	Screening & Prioritization	Licensee Action	NRC Assessment & Inspection	Regulatory Action
Seismic Walkdowns (NTTF Recommendation 2.3)						
Seismic Protection Walkdowns						
Seismic Hazard Reevaluations (NTTF Recommendation 2.1)						
Licensee Seismic Hazard Reevaluations (CEUS)						—
Expedited Seismic Evaluation Process			—			
Seismic Risk Evaluation			—			
Limited-Scope Evaluations			—			
Western Plants Hazard Reevaluation						
Rulemaking to Confirm Seismic Hazard Periodically (NTTF Recommendation 2.2)						
Periodic Confirmation of Seismic Hazard	—	—	—	—	—	

Walkdowns Met the Intent of Recommendation 2.3

- **All plants completed seismic walkdowns**
- **Staff completed several audits and issued assessments for all plants**
- **All plants complied with the walkdown guidance**



Seismic 2.1 Process Ensures Clarity, Consistency, and Risk-Informed Regulatory Decisions

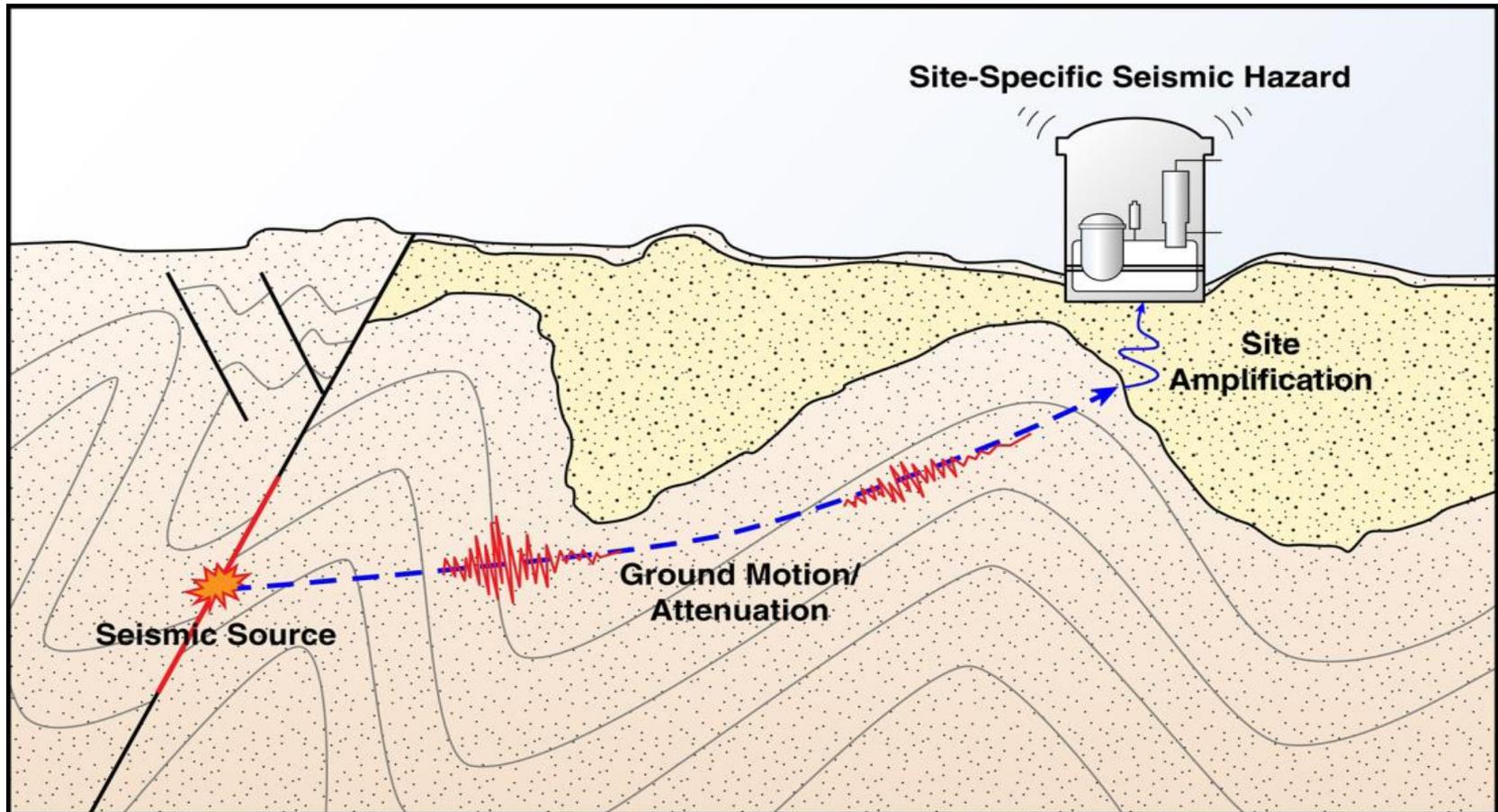


State of Seismic Reevaluation Reviews

**Clifford Munson
Senior Technical Advisor for Siting**

**Division of Site Safety and
Environmental Analysis
Office of New Reactors**

Seismic Design For Nuclear Plants - Deterministic

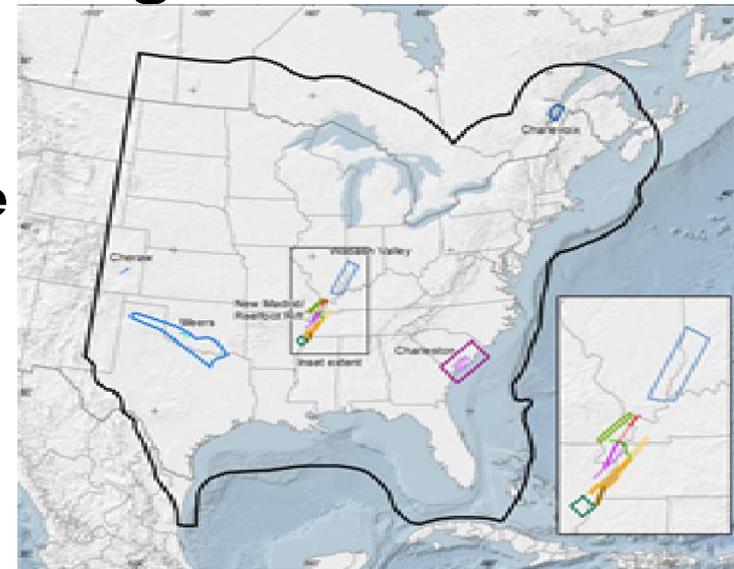


Methods for Seismic Risk Analysis Have Advanced

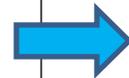
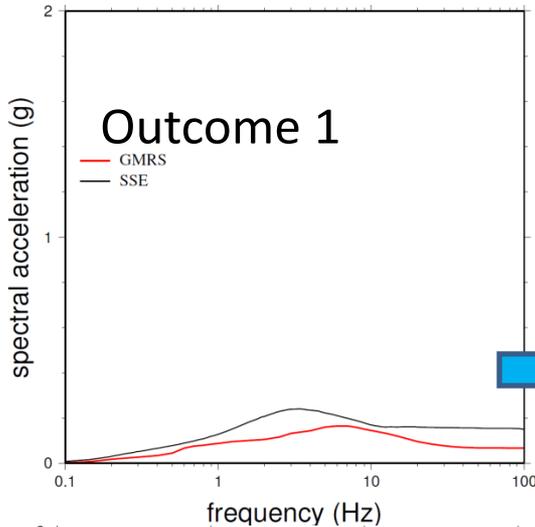
- **Recommendation 2.1 calls for seismic hazard reevaluations at each nuclear power plant using current NRC regulations**
- **Current NRC regulations and guidance specify a probabilistic approach for developing design ground motions**
- **Probabilistic ground motion hazards are characterized by a Ground Motion Response Spectrum or GMRS**

2.1 Seismic Hazard Reevaluations use Current Methods and Information

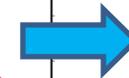
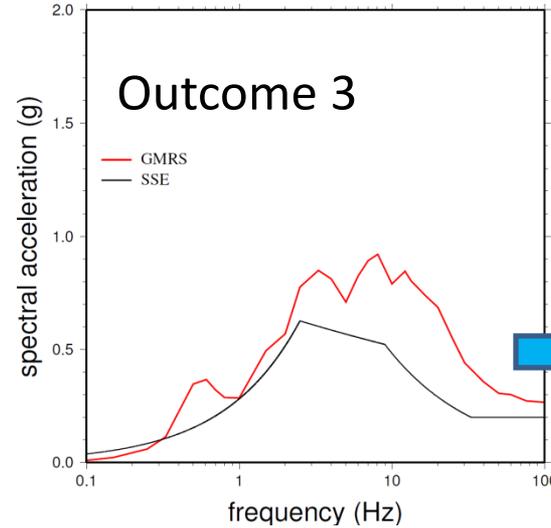
- **Licensees perform probabilistic seismic hazard analyses following NRC guidance (Regulatory Guide 1.208)**
- **CEUS licensees (60 sites)**
 - **Regional CEUS seismic source model**
 - **Regional CEUS ground motion model**
 - **Plant-specific site analyses**
- **WUS licensees (3 sites)**
 - **Regional source and ground motion models developed by each Licensee**
 - **Plant-specific site analyses**



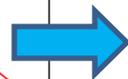
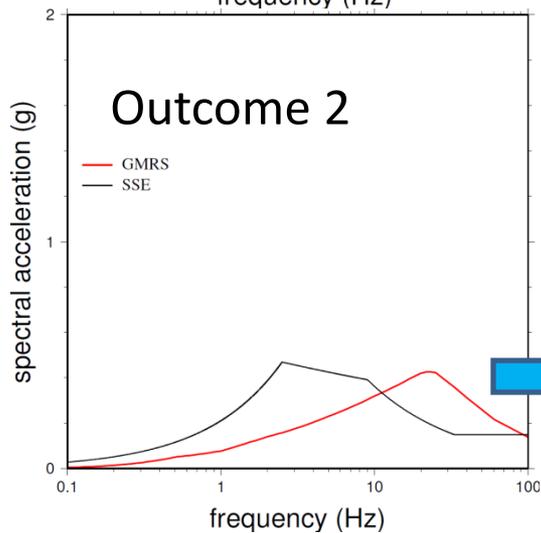
Potential Outcomes for 2.1 Reevaluations



No
Further
Analysis



Plant Risk
Evaluation
Needed

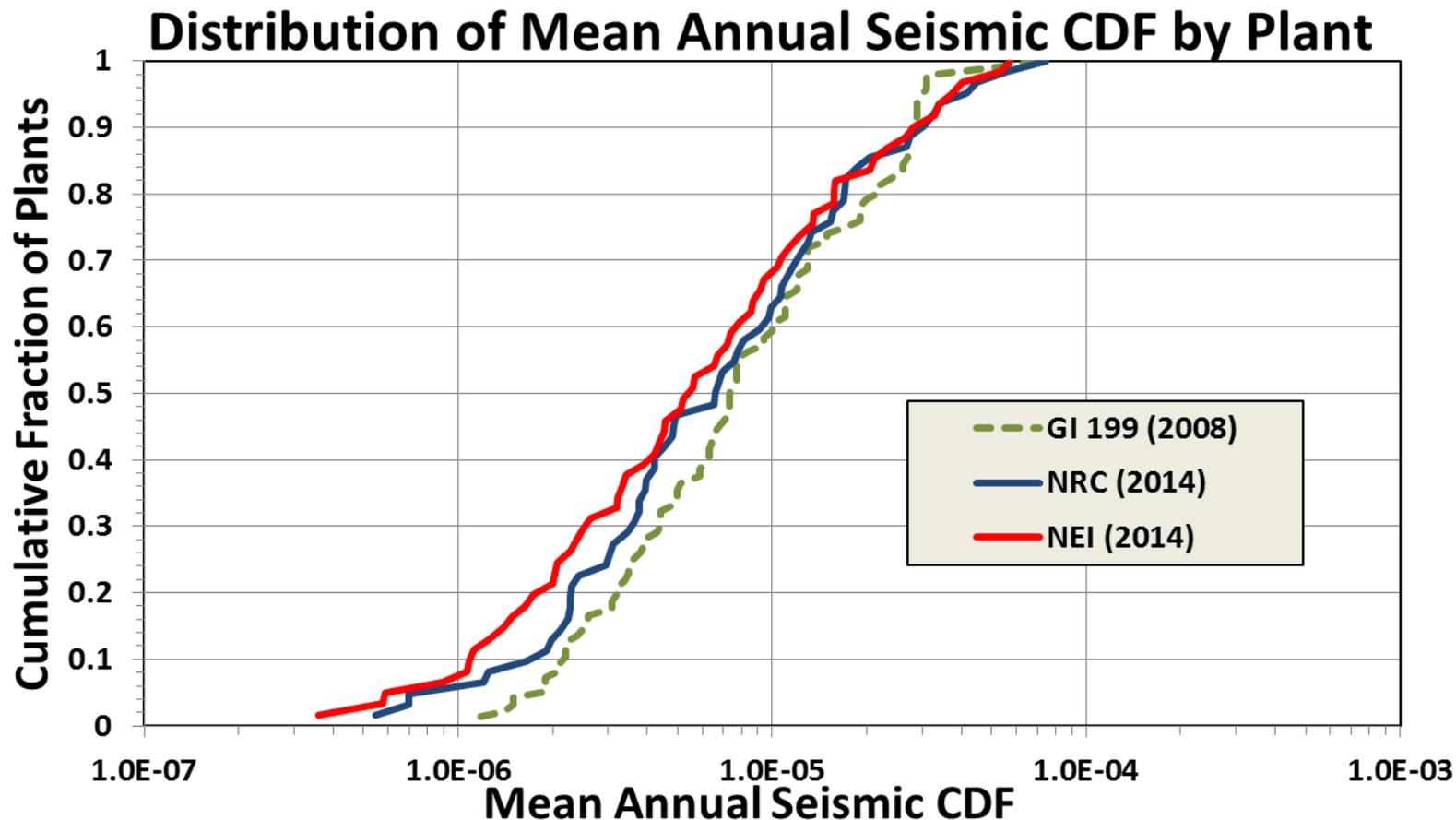


Industry Testing Program for High Frequency
Sensitive components

Screening Approach for 2.1 Reevaluations is Robust

- **Plants with GMRS > SSE “Screen In” for**
 - **Interim Evaluations**
 - **Expedited Seismic Evaluation Program**
 - **Seismic Risk Evaluations**
- **Screening approach specified in Industry Screening, Prioritization, and Implementation (SPID) Guidance**
- **SPID provides detailed guidance for**
 - **Development of GMRS**
 - **Seismic Risk Evaluations & Limited Scope Evaluations (high frequency, spent fuel pool)**

Interim Evaluation Demonstrates Plant Safety During 2.1 Evaluations

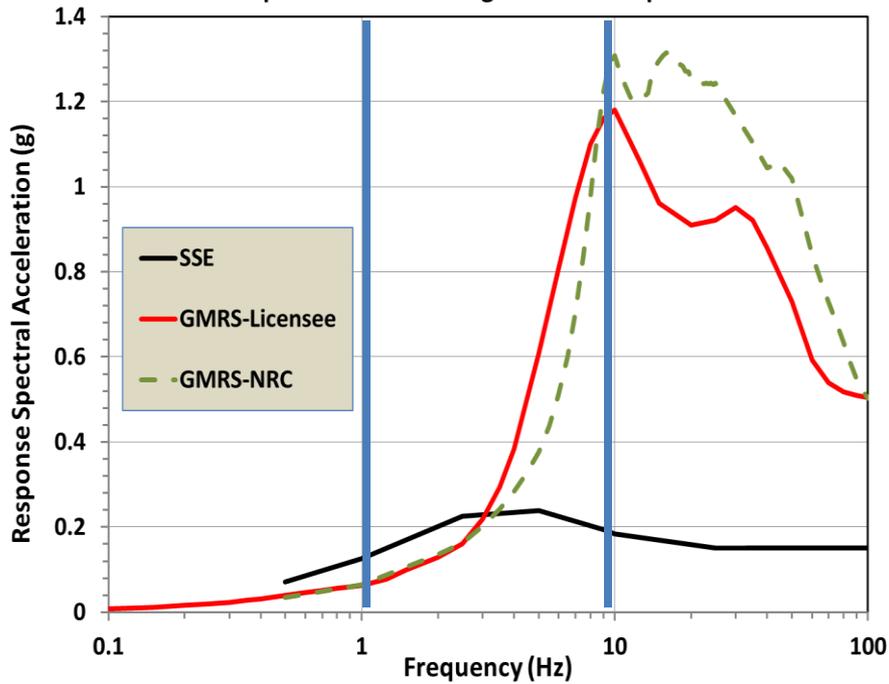


Staff Review of March 2014 CEUS Submittals

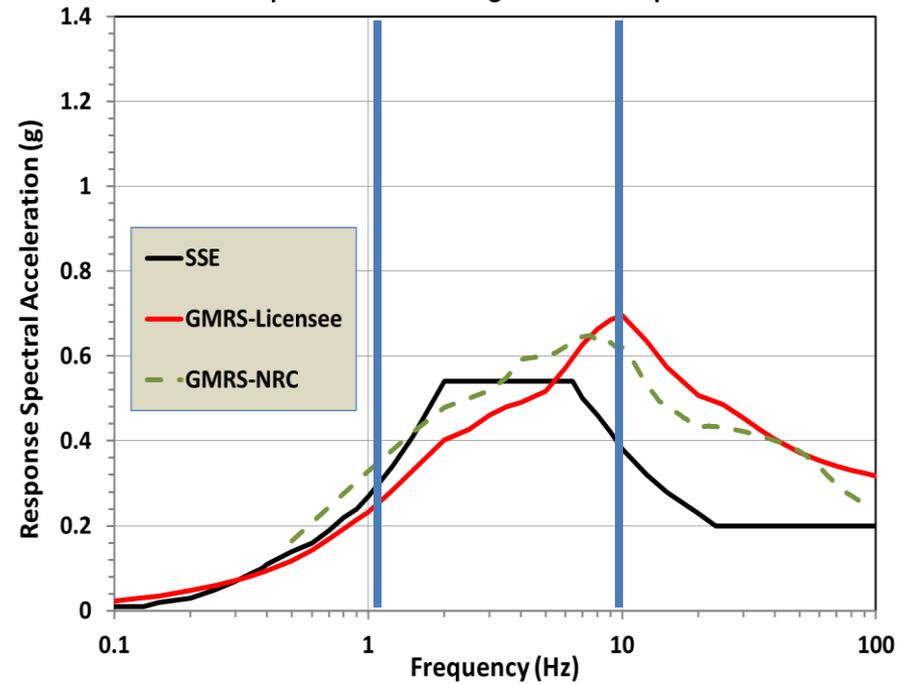
- **NRC formed a team of geoscientists and engineers to review each submittal**
- **For each CEUS plant site staff independently developed a GMRS for comparison with Licensee's GMRS**
- **Staff completed initial screening review and prioritization within 30 days**

Examples of Priority Groups 1 & 2

Comparison of Screening Results-Group 1

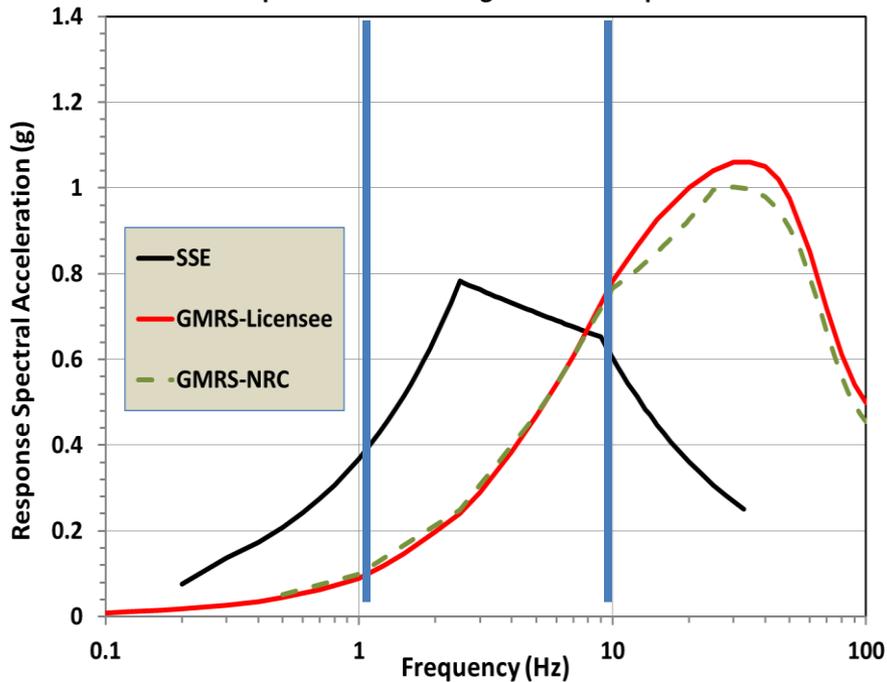


Comparison of Screening Results-Group 2

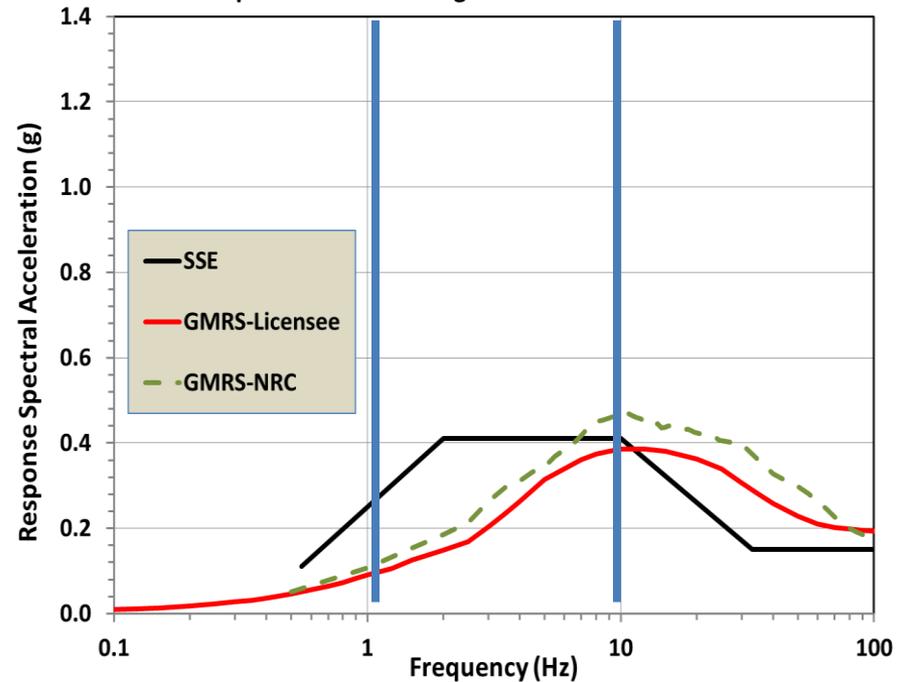


Examples of Priority Group 3 and Conditional-In

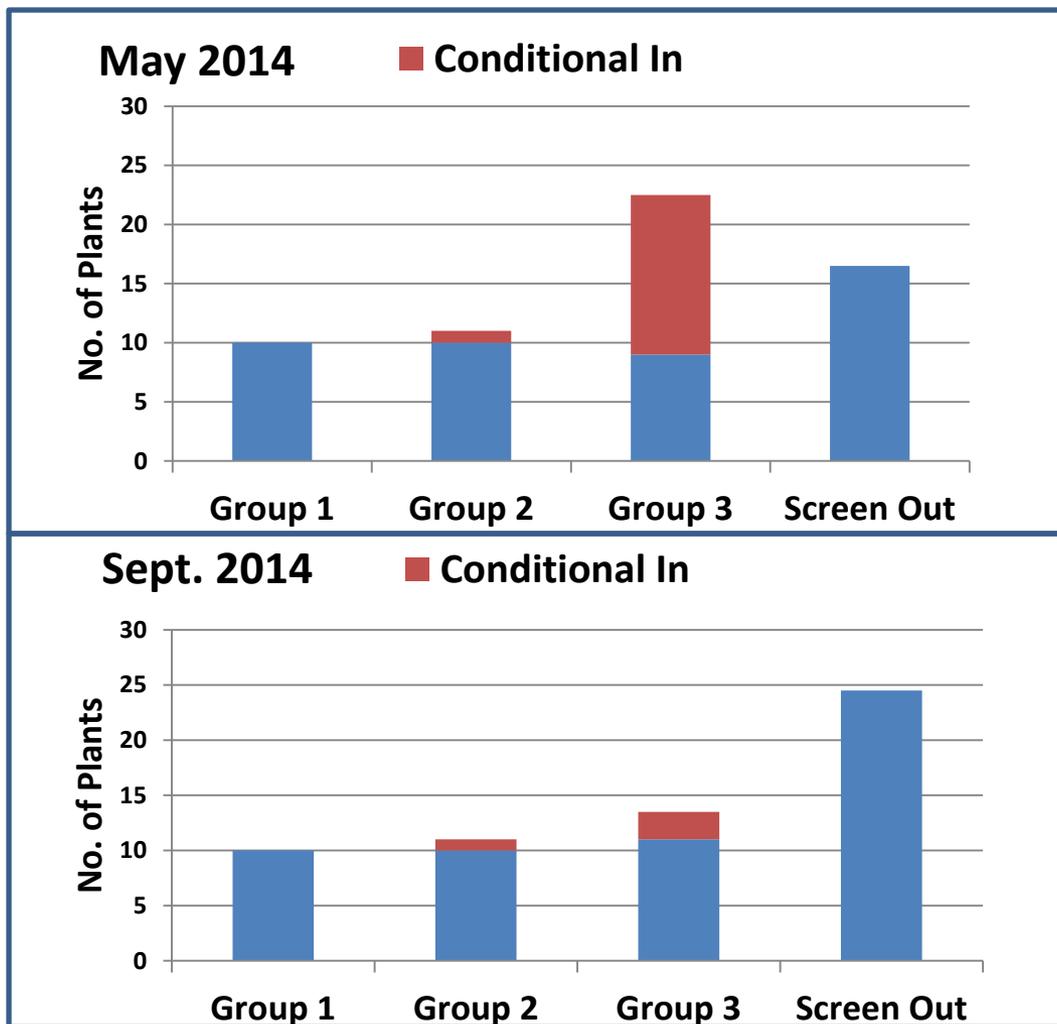
Comparison of Screening Results-Group 3



Comparison of Screening Results-Conditional In



Progress has Been Made Screening & Prioritization Results



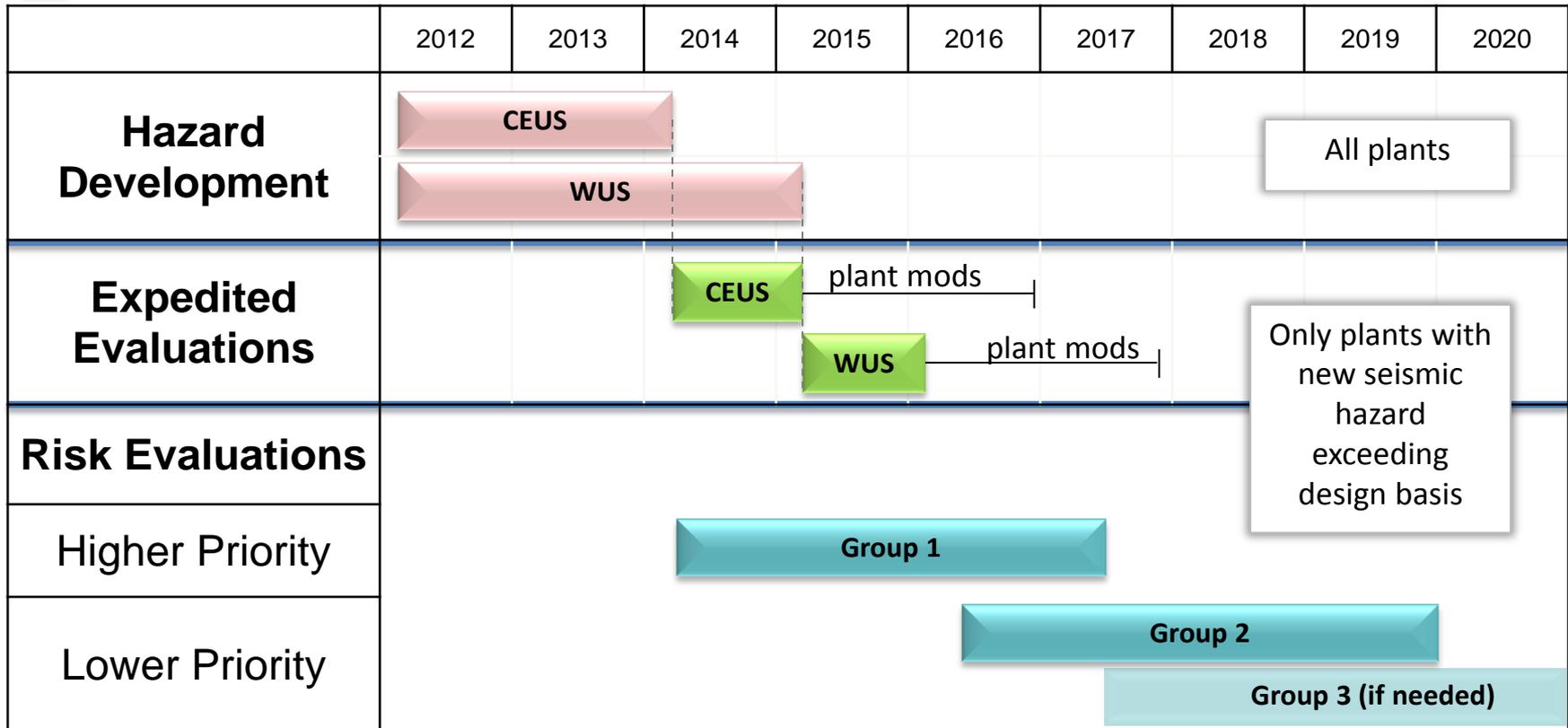
Seismic Plant Evaluations

Ensure Safety

- **Expedited Seismic Plant Evaluation**
 - **Licensees conduct while longer complete plant risk evaluations are underway**
 - **Evaluation and modification (as appropriate) of subset of plant equipment needed to protect reactor core following beyond design basis seismic event**
- **Seismic Plant Risk Evaluation**
 - **Systems/accident sequence analysis**
 - **Seismic fragility analysis of plant equipment and structures**
 - **Seismic risk quantification for plant**

Schedule for Seismic Hazard and Risk Evaluations

-  Hazard Analyses
-  Enhanced Interim Actions
-  Risk Evaluations



List of Acronyms

- **CDF – Core Damage Frequency**
- **CEUS – Central and Eastern United States**
- **GMRS – Ground Motion Response Spectrum**
- **NRC – U.S. Nuclear Regulatory Commission**
- **NTTF – Near-Term Task Force**
- **SSE – Safe Shutdown Earthquake**
- **SPID – Screening, Prioritization, and Implementation Details**
- **WUS – Western United States**