



California Energy Commission
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Near-Term Task Force Recommendations 2.1: Seismic Hazard Analysis for WUS Plants

June 19, 2013

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Division of Site Safety and Environmental Analysis

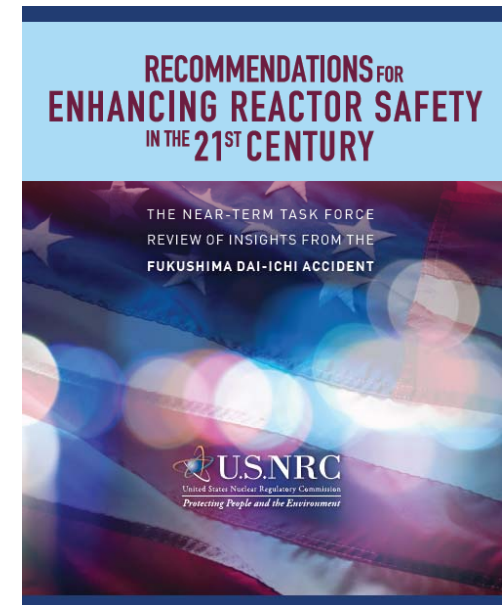
Office of New Reactors

U.S. Nuclear Regulatory Commission



Timeline of Events

- Fukushima accident occurs March 2011
- NRC forms Near Term Task Force
- Near Term Task Force Publishes Report with key recommendations July 2011
- NRC issues Request for Information 50.54(f) letter March 2012
 - To all operating power reactor licensees
 - Establishes a timeline and actions on a number of key issues



Seismic Recommendations

Ongoing	2.3	Walkdowns	11/2012 (+outages)	Walkdowns to assure plants are meeting licensing basis and to look for potential seismic issues. Reports due November 2012. Some equipment delayed until outage.
	2.1	Hazard evaluation	3/2014 (CEUS) 3/2015 (WUS)	Hazard evaluation due in 2 years for NPPs within the CEUS region. 3 years for western US NPPs performing SSHAC level 3 studies. Plant-specific analyses specified.
Ongoing		Risk evaluation	3 years after hazard	Full plant risk evaluations due 3 years after hazard results if reevaluated hazard exceeds plant design level.
		Regulatory Actions	Depends on findings	After receiving the information from the plant risk analyses, the NRC will determine appropriate regulatory actions.
Long term	2.2	10 year update	Rulemaking timeline	Rulemaking to require a reevaluation every 10 years.



Recommendation 2.1 & 2.3 Team

- NRC Japan Lessons Learned Directorate
- NRC offices providing technical support with assistance from contractors

Nilesh Chokshi – Overall Lead R2.1 & R2.3

Cliff Munson – Seismic Team Lead

Annie Kammerer – R2.3 Technical Lead

Jon Ake – R2.1 Technical Lead





R2.3 Seismic Plant Walkdowns

- Seismically qualified plant equipment inspected by each licensee
 - about 100 items and adjoining areas walked down
- Objective to confirm compliance with plant license and look for vulnerabilities
 - Equipment anchorage
 - Condition of equipment
 - Potential for equipment to interact during shaking
- Walkdown inspection reports submitted to NRC Nov 2012

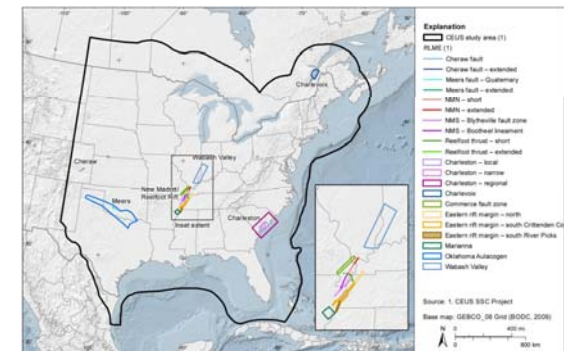


R2.1 Hazard & Plant Risk Reevaluation

- R2.1 divided into 2 phases
 - Phase 1 – Licensees perform hazard & risk evaluations
 - Phase 2 – NRC determines regulatory action
- Seismic hazard evaluations based on current practices for new reactors
- Risk evaluations are needed for NPPs whose reevaluated hazard exceeds design

R2.1 Seismic Hazard Reevaluation

- Licensees perform probabilistic seismic hazard analyses following NRC guidance (RG 1.208)
- CEUS licensees (96 units/59 sites)
 - **Regional** CEUS seismic source model
 - **Regional** CEUS ground motion model
 - Plant-specific site analyses
- WUS licensees (6 units/3 sites)
 - **Site-specific** [*SSHAC Level 3 studies*](#)
 - Plant-specific site analyses





What is SSHAC Process?

**A structured framework
and procedure for
conducting multiple-
expert assessments for
input to seismic hazard
analyses**

Prepared by

Senior Seismic Hazard Analysis Committee (SSHAC)

R. J. Budnitz (Chairman), G. Apostolakis, D. M. Boore, L. S. Cluff, K. J. Coppersmith, C. A. Cornell, P. A. Morris

**Procedures defined by
the Senior Seismic
Hazard Analysis
Committee (SSHAC)**

NUREG/CR-6372
UCRL-ID-122160
Vol. 1

Recommendations for
Probabilistic Seismic Hazard
Analysis: Guidance on
Uncertainty and Use of Experts

Main Report

Lawrence Livermore National Laboratory

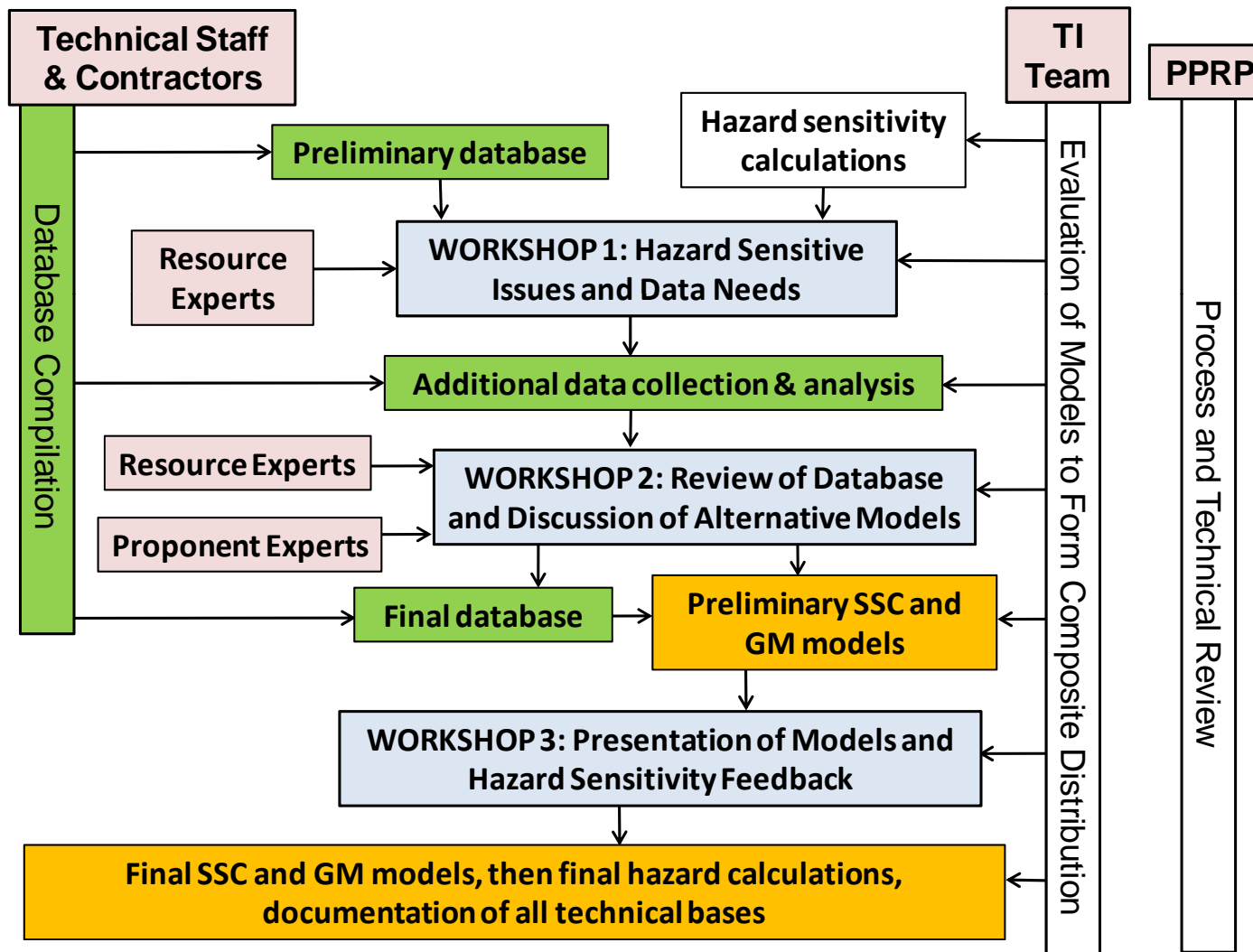
Prepared for
U.S. Nuclear Regulatory Commission
U.S. Department of Energy
Electric Power Research Institute



Key Features of SSHAC Process

- Comprehensive collection and assessment of available data, models and methods
- Structured interactions among participants in formal workshops
- Objective to create a model that incorporates the range of views that are present in the broader technical community
- Rigorous peer review of entire process

SSHAC Level 3 Process





PG&E SSHAC Studies

SSHAC* Studies for DCP - Microsoft Internet Explorer provided by USNRC

http://www.pge.com/mybusiness/edusafety/systemworks/dcpp/SSHAC/

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SSHAC* Studies for DCP

*Senior Seismic Hazard Analysis Committee

- Project Plan (PDF, 1.8 MB)
- Documents & Data
- Workshops


Southwestern US Ground Motion SSHAC

- Plan, Workshops, and Reports

FAQs


- Tsunami (PDF, 317 KB)
- Ground Motion (PDF, 745 KB)

Contact [Megan Stanton](#) with any questions about the SSHAC Studies website.




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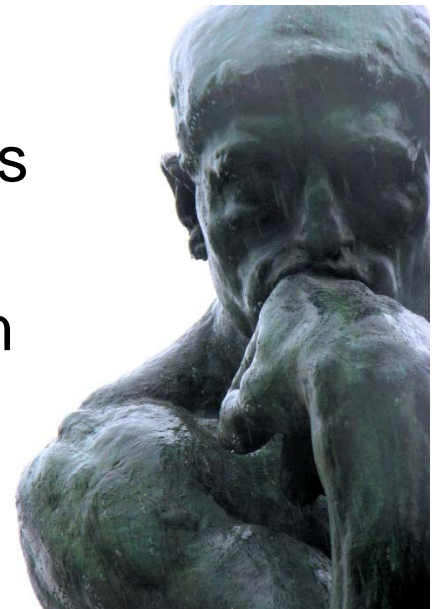
NRC Participation at SSHAC Workshops

- NRC staff geologists and seismologists have attended each of the SSHAC workshops
- NRC staff participating as observers to ensure conformance with NRC guidance
- Formal evaluation by NRC after submittal of seismic hazard analyses in March 2015



Key Issues for NRC Evaluation of SSHAC Studies

- SSHAC studies conducted following NRC guidance?
 - all available data, models and methods thoroughly considered
 - selection and inclusion of models and parameters in a logic tree with their weights adequately explained and justified
 - technical bases for all decisions have been comprehensively documented

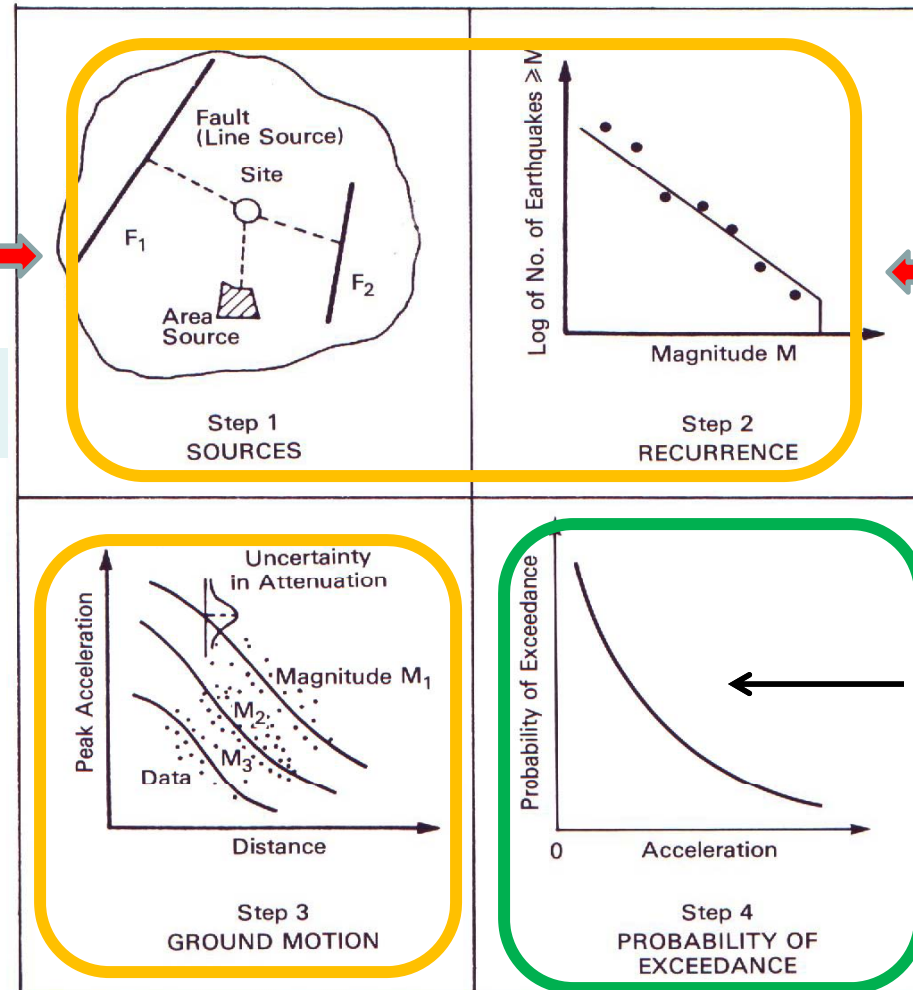


SSHAC Studies for Probabilistic Seismic Hazard Analysis

Seismic Source
Characterization
Model

Seismic Sources
Magnitudes & Locations

Ground Motion
Model



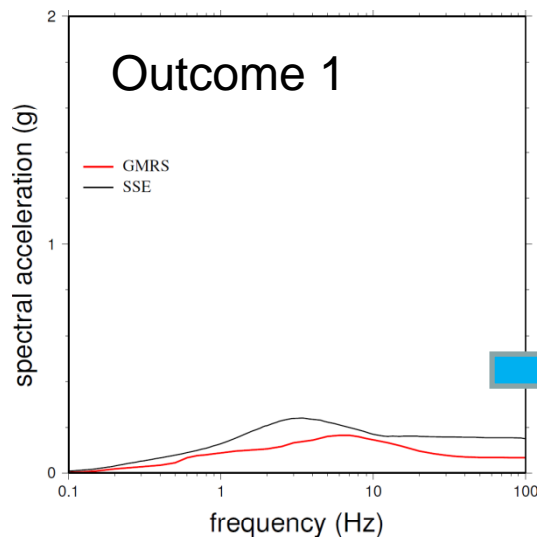
Earthquake
Recurrence

Seismic Hazard
Curves

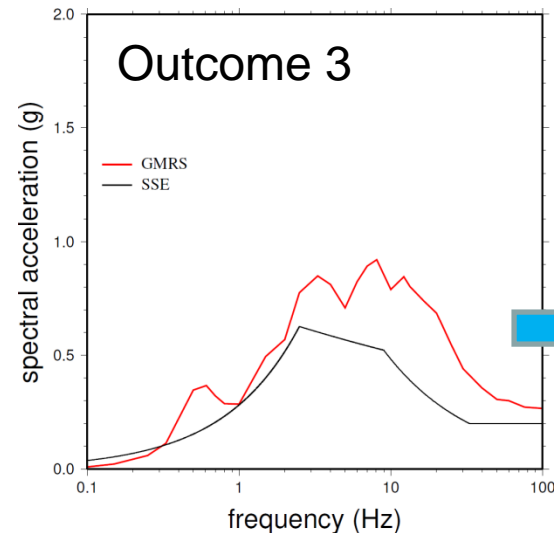
Local Site Response

GMRS

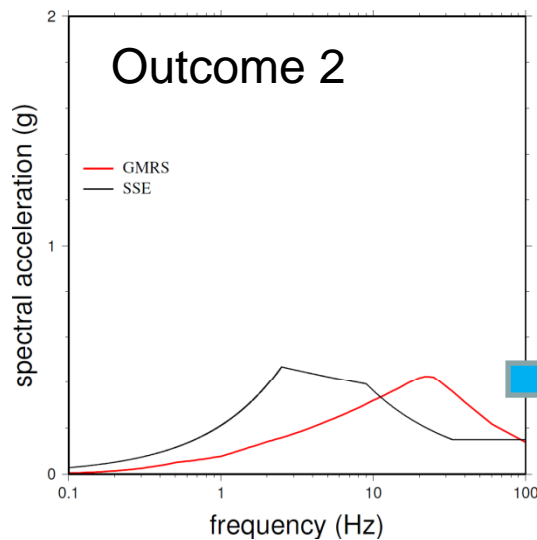
R2.1: Seismic Hazard Reevaluation Outcomes



No Further
Analysis



Plant Risk
Evaluation
Needed






Industry Testing Program for High Frequency
Sensitive components



Seismic Plant Evaluations

- Two seismic plant evaluations required if hazard exceeds plant design
- Expedited 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
- Complete 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

