



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 14, 2015

Mr. Edward D. Halpin
Senior Vice President and Chief
Nuclear Officer
Pacific Gas and Electric Company
P.O. Box 56
Mail Code 104/6
Avila Beach, CA 93424

SUBJECT: NUCLEAR REGULATORY COMMISSION PLAN FOR THE AUDIT OF PACIFIC GAS AND ELECTRIC COMPANY'S SEISMIC HAZARD AND SCREENING REPORT SUBMITTAL RELATED TO THE NEAR-TERM TASK FORCE RECOMMENDATION 2.1 - SEISMIC FOR: DIABLO CANYON POWER PLANT, UNIT NOS. 1 AND 2 (TAC NOS. MF5275 AND MF5276)

Dear Mr. Halpin:

This letter documents the U.S Nuclear Regulatory Commission (NRC) staff's plan to perform a regulatory audit of Pacific Gas and Electric Company's (PG&E, the licensee) Seismic Hazard and Screening report (SHSR) submittal related to the Near-Term Task Force Recommendation 2.1-"Seismic" for Diablo Canyon Power Plant, Unit Nos. 1 and 2 (Diablo Canyon). The audit will take place at the South West Research Institute facilities in Rockville, MD and is expected to last all-day on Wednesday, August 26, 2015, and half-day on Thursday, August 27, 2015. This technical audit will be performed consistent with NRC Office of Nuclear Reactor Regulation, Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML082900195). The NRC staff will develop an audit summary report to document its observations and conclusions within 90 days of the completion of the audit.

The audit will provide the NRC with a better understanding of the seismic hazard reevaluation and the supporting analysis performed for Diablo Canyon, as documented in the SHSR (ADAMS Accession No. ML15071A046). The audit is intended to support the NRC staff review of the SHSR and the subsequent issuance of a Staff Assessment. Additional information is provided below.

The enclosed audit plan outlines the process that will allow the NRC staff to review the SHSR related documentation, identify additional information potentially necessary for PG&E to supplement its SHSR, and discuss technical concerns. The details of this audit have been discussed with Mr. Philippe Soenen of your staff.

E.Halpin

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If you have any questions, please contact me at (301) 415-1115 or by e-mail at Nicholas.DiFrancesco@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Nicholas DiFrancesco", with a large, stylized flourish extending to the right.

Nicholas DiFrancesco, Senior Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Enclosure:
Audit Plan

Docket Nos. 50-275 and 50-323

cc w/encl: Distribution via Listserv

NRC PLAN FOR THE AUDIT OF PACIFIC GAS AND ELECTRIC COMPANY'S SEISMIC
HAZARD AND SCREENING REPORT SUBMITTAL RELATED TO THE
NEAR-TERM TASK FORCE RECOMMENDATION 2.1-SEISMIC
DIABLO CANYON POWER PLANT, UNIT NOS. 1 AND 2

BACKGROUND AND AUDIT BASIS:

On March 12, 2012, the U.S Nuclear Regulatory Commission (NRC) issued a request for information pursuant to Title 10 of the *Code of Federal Regulations*, Part 50 (10 CFR), Section 50.54(f). The purpose of that request was to gather information concerning, in part, the seismic hazard at operating reactor sites to enable the NRC staff to determine whether licenses should be modified, suspended, or revoked. The "Required Response" section of Enclosure 1 of the request indicated that licensees should provide a seismic hazard evaluation and screening report within 3 years from the date of the letter for Western United States (WUS) plants.

By letter dated March 11, 2015¹, to the NRC, Pacific Gas and Electric Company (PG&E, the licensee) submitted for NRC review its Seismic Hazard and Screening Report (SHSR), Pursuant to 10 CFR 50.54(f), Request for Information Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident. On April 28, 2015, the NRC staff held a public meeting with PG&E² and by letter dated June 29, 2015, NRC staff issued a request of additional information (RAI)³ to gain a better understanding of the information provided in the SHSR. The NRC staff continues to review the information provided by PG&E and plans to conduct a regulatory audit of Diablo Canyon's seismic source models used to characterize the site's seismic hazard. Specific documents that will be reviewed by the staff during the audit are provided below.

REGULATORY AUDIT SCOPE AND METHODOLOGY:

The area(s) of focus for the regulatory audit is the information contained in Diablo Canyon's SHSR related to seismic source models and all associated and relevant supporting documentation used in the development of these models including, but not limited to, methodology, process information, calculations, computer models, etc.

¹ The licensee's SHSR can be found in Agencywide Documents Access and Management System (ADAMS) under Accession No. ML15071A046.

² The April 28, 2015, public meeting summary can be found in ADAMS under Accession No. ML15125A186.

³ The NRCs Staff's RAIs can be found in ADAMS under Accession No. ML15153A033.

DOCUMENTS REQUESTED FOR STAFF EXAMINATION

The staff requests that the below documents are available for examination and discussion during the audit:

- SSHAC Studies for DCPD Seismic Hazard Update
- Paper on Equivalent Poisson Approach
- An Assessment of California's Nuclear Power Plants: AB 1632 Report
- Independent Peer Review Panel (IPRP) Letters and PG&E Responses
- Full USGS report containing offshore data used in Johnson and Watt (2012) and Johnson et al., (2014)

AUDIT DISCUSSION TOPICS / REGULATORY QUESTIONS – SEISMIC SOURCE CHARACTERIZATION

1. **(Rupture models, fault rupture sources, slip rate allocation models- Sections 6.3.3, 6.3.4, 9.2.1 –9.2.5, 9.3, and 9.4).** The use of rupture models and slip allocation is a unique approach to seismic source characterization.

The staff would like to gain a better understanding of:

- a. how the collection of rupture models captures the range of epistemic uncertainty for all potential rupture scenarios.
 - b. how does the collection of rupture sources within each rupture model then account for the corresponding aleatory uncertainty.
 - c. how the Fault Geometry Models (FGMs) and rupture models capture the center, body, and range of the technically defensible interpretations of the fault sources.
 - d. how slip rates are allocated among these rupture models. Specifically, describe how changes in fault slip rate from fault section to fault section are accommodated such that the slip rate budget is maintained.
 - e. if the slip rate distributions simply the weights for the alternative fault model interpretations, or are other factors included.
2. **(Complex fault geometries of the three FGM for the San Luis Pismo Block faults; Sections 7.4 and 7.5)** The bounding, primarily reverse dip-slip faults of the San Luis-Pismo Block (Los Osos to the north and the San Luis Bay and Oceano faults to the south) are characterized by relatively steep dips (60 - 75 degrees).

The staff would like to gain a better understanding of:

- a. what constrains these dips and is it possible to increase the range of potential dips to lower values.
- b. how were shallow dips ruled out.

- c. The NE-vergent model appears to create a “room” problem for the hanging-wall blocks. How was this resolved in the model.

3. **(Extension associated with the Hosgri fault; Sections 5.2.1, 7.3, 8.3)** There is significant trans-tension along the Hosgri fault zone as exemplified by numerous extensional features associated with it (e.g., half-graben near Cambria, and grabens A and B northwest of Point Buchon).

The staff would like to gain a better understanding of:

- a. how the geologic information was related to these extensional features included in the seismic source characterization of the Hosgri fault.
- b. how well characterized is the stratigraphy of the sedimentary fill in these features.
- c. if the normal faulting associated with these features was included in the hazard assessment.
- d. how were the effects of trans-tensional deformation accounted for in the total slip-rate estimates for the Hosgri fault zone and the resulting slip-allocation models.

4. **(Details of fault offset and offset ages used to derive slip rates; Sections 8.3 and 8.4).** There appear to be relatively large uncertainties associated with the slip rate determinations.

The staff would like to gain a better understanding of:

- a. how the piercing-points used to estimate horizontal offsets across the Hosgri and Shoreline faults were constrained.
- b. how well-constrained are the offset age estimates based on the paleo-shoreline interpretations.

5. **(Time-dependent recurrence model; Chapter 11 and Appendix H).** To account for a non-Poisson recurrence model, the PSHA includes an “equivalent Poisson ratio (EPR)” for each fault source.

The staff would like to gain a better understanding of:

- a. how the EPRs were determined, particularly how “bounding values” were used to constrain the EPR estimates.
- b. how well constrained are the upper bounds of the EPR values.

NRC AUDIT TEAM:

Title	Team Member
Team Leader, NRR/JLD	Nicholas DiFrancesco
Branch Chief, NRO/DSEA	Diane Jackson
Technical Lead (NRO/DSEA)	Clifford Munson
Technical Support (NRO/DSEA)	Vladimir Graizer
Technical Support (NRC/RES)	John Ake
Technical Support (SWRC/Consultant)	John Stamatakos
Technical Support (NRO/DSEA)	Britt Hill
Technical Support (NRR/DE)	Yong Li

LOGISTICS:

The audit is expected to last approximately 1.5 days, starting on Wednesday, August 26, 2015, until Thursday, August 27, 2015. The audit will take place at the Southwest Research Institute facilities in Rockville, MD.

DELIVERABLES:

Within 90 days of the audit, the NRC staff will prepare a detailed audit report documenting the information reviewed during the audit, and any open items identified as a result of the audit. The NRC staff will also document its understanding of the proposed resolution of any identified open items.

The information discussed in these audits may be included, fully or in part, in the development of the NRC technical staff assessments as a result of the SHSR reviews.

E.Halpin

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If you have any questions, please contact me at (301) 415-1115 or by e-mail at Nicholas.Difrancesco@nrc.gov.

Sincerely,

/RA/

Nicholas DiFrancesco, Senior Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Enclosure:
Audit Plan

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