



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

June 29, 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: DIABLO CANYON POWER PLANT, UNIT NOS. 1 AND 2 - REQUEST FOR
ADDITIONAL INFORMATION ASSOCIATED WITH NEAR-TERM TASK
FORCE RECOMMENDATION 2.1, SEISMIC REEVALUATIONS (TAC NOS.
MF5275 AND MF5276)

Dear Mr. Halpin:

By letter dated March 11, 2015¹, to the U. S. Nuclear Regulatory Commission (NRC), Pacific Gas and Electric Company (the licensee), submitted for NRC review its Seismic Hazard and Screening Report, Pursuant to Title 10 of the *Code of Federal Regulations* Part 50, Section 50.54(f), Response for Information Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident for the Diablo Canyon Power Plant, Unit Nos. 1 and 2 (Diablo Canyon). Included in the seismic hazard reevaluation report is an evaluation of the site response for Diablo Canyon using an alternative empirical approach.

The NRC staff has reviewed the information provided for Diablo Canyon and has determined that additional information is required to complete its review. Enclosed is a request for additional information (RAI) related to the site response evaluation. As discussed with your staff on June 8, 2015, it was agreed that a response to the RAI would be provided no later than July 30, 2015.

¹ The letter can be found under Agencywide Documents Access and Management System (ADAMS) No. ML15071A046.

E. Halpin

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If you have any questions related to the enclosed RAIs or the requested submission date, please contact me at 301-415-1115 or via e-mail at Nicholas.DiFrancesco@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Nick DiFrancesco", with a long horizontal flourish extending to the right.

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

Docket Nos. 50-275 and 50-323

Enclosure:
Request for Additional Information

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REQUEST FOR ADDITIONAL INFORMATION
NEAR-TERM TASK FORCE RECOMMENDATION 2.1
SEISMIC HAZARD AND SCREENING REPORT
FOR DIABLO CANYON POWER PLANT, UNIT NOS. 1 AND 2

Review of Alternative Empirical Site Response Evaluation

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) staff requested that licensees submit site specific hazard curves that capture the variability in soil depth (including depth to generic rock conditions), shear-wave velocities, layer thicknesses, damping, and strain dependent nonlinear material properties at the site. Specifically, Attachment 1 to "Seismic" Enclosure 1 of the March 12, 2012, letter stated that "site amplification curves should be developed over a broad range of annual exceedance frequencies to facilitate estimation of seismic core damage frequency."

By letter dated February 15, 2013 (ADAMS Accession No. ML12319A074), "Endorsement of Electric Power Research Institute [EPRI] Final Draft Report 1025287, 'Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID),' the NRC staff endorsed using the SPID guidance.

Regarding the development of site amplification curves for the NTTF Recommendation 2.1 seismic hazard reevaluations, Section 2 of the SPID states:

Site amplification factors should be calculated as described in Section 2.4. As discussed in that section, multiple models of site amplification factors (and associated uncertainties) should be developed, indicating the log-mean and log-standard deviation of control-point motion divided by input rock motion, for various spectral frequencies.

The SPID further recommends that the soil and/or rock uncertainties should be incorporated into the seismic hazard calculations via the site amplification and their uncertainties through the hazard integral to develop control-point hazard curves. The control-point elevation hazard curves should then be used to calculate the ground motion response spectra.

By letters dated March 11, 2015 (ADAMS Accession No. ML15071A046), Pacific Gas and Electric Company (the licensee) for Diablo Canyon Power Plant submitted an alternative site response evaluation, referred to as the empirical approach, which uses the observed ground motions at the site from two earthquakes to "constrain the site amplification rather than analytical models." While the staff considers the empirical site response approach as a viable alternative to the analytical approach, the method, as implemented by the licensee, was able to use only three site recordings from two earthquakes to constrain the local site amplification. As such, the licensee's estimate of the uncertainty in the local site term is potentially impacted by the limited amount of data. In

Enclosure

addition, the site term developed by the licensee using the empirical approach shows a significant amount of deviation in the negative direction over an important frequency range from the NGA-West2 ground motion models for a $V_{S30}=760$ m/s site.

Request for Additional Information

Consistent with the request for information issued pursuant to Title 10 of the *Code of Federal Regulations, Part 50, Section 50.54(f)* and the SPID guidance, a supplemental response to the March 2015 seismic hazard reevaluation that develops site amplification factors as recommended in Section 2.4 and Appendix B of the SPID is requested. Please provide (1) a detailed description of the subsurface profile properties including uncertainties, (2) the potential for nonlinear behavior at the strain levels produced by the scenario earthquakes of interest, and (3) the control point elevation. In addition, provide the adjustment factors (V_s -kappa corrections) needed to modify the median ground motion models for the selected reference or baserock elevation and velocity. Also include in the response, as a figure and a table, control point seismic hazard curves developed using the site amplification factors and their uncertainties through the hazard integral as recommended in Appendix B of the SPID.

E. Halpin

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If you have any questions related to the enclosed RAIs or the requested submission date, please contact me at 301-415-1115 or via e-mail at Nicholas.DiFrancesco@nrc.gov.

Sincerely,

/RA/

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

Docket Nos. 50-275 and 50-323

Enclosure:
Request for Additional Information

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