



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
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August 1, 2011

MEMORANDUM TO: Robert Nelson, Deputy Director  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

FROM: Kriss M. Kennedy, Director */RA/*  
Division of Reactor Projects  
Region IV

SUBJECT: TASK INTERFACE AGREEMENT (TIA) – CONCURRENCE ON DIABLO  
CANYON SEISMIC QUALIFICATION CURRENT LICENSING AND  
DESIGN BASIS (TIA 2011-010)

This Task Interface Agreement requests the Office of Nuclear Reactor Regulation (NRR) concur with Region IV that the Diablo Canyon current licensing basis (CLB) for the seismic qualification of safety related structures, systems and components includes the three design basis earthquakes with the associated analytical methods, initial conditions, etc., as described in the Final Safety Analysis Report Update (FSARU), and that new seismic information developed by the licensee affecting the assumed ground motions used in these analyses is required to be evaluated against the CLB rather than solely against the Long Term Seismic Program.

#### Background

On January 7, 2011, Pacific Gas and Electric transmitted to the NRC a report updating the local seismology in the vicinity of Diablo Canyon Power Plant ("Report on the Analysis of the Shoreline Fault Zone, Central Coast California to the USNRC," ADAMS ML110140400). This report included new deterministic evaluations for the Shoreline, Los Osos, and San Luis Bay earthquake faults. The licensee concluded that each of these faults was capable of producing between 0.6 gravity (g) and 0.7g peak ground acceleration at Diablo Canyon.

FSARU, Section 3.7.1.1, "Design Response Spectra," describes three design basis earthquakes used to develop the seismic qualification basis for plant structures, systems and components at Diablo Canyon:

- *Design Earthquake (0.2g)* - The amount of vibratory ground motion for which those plant features necessary for continued operation remain functional without undue risk to the health and safety of the public (all structures, systems and components must remain in the elastic range).
- *Double Design Earthquake (0.4g)* - The evaluation of the maximum earthquake potential (producing the maximum vibratory ground motion) for which structures, systems and components needed to prevent or mitigate an accident will remain

functional, allowing for some plastic deformation of structural material. This evaluation includes all earthquake epicenters within 200 miles and faults within 75 miles of the plant and implements the NRC regulatory requirements for the “safe shutdown earthquake” as described in 10 CFR Part 100, Appendix A.

- Hosgri Event (0.75g) - A postulated 7.5 M earthquake (unique to Diablo Canyon) assumed to occur on the Hosgri Fault line. Only equipment credited in the alternate Hosgri Event shutdown path is required to remain functional following a Hosgri design basis earthquake.

The Diablo Canyon Facility Operating License also included License Condition 2.C(7). This License Condition required Pacific Gas and Electric to develop and implement a program to reevaluate the plant seismic design bases. To meet this condition, the licensee developed a margin analysis to the Hosgri Event ground motion which became known as the Long Term Seismic Program (LTSP). The licensee submitted the final LTSP Report to the NRC in July 1988. This report concluded that the Hosgri Event design basis ground motion remained bounding when compared with a reevaluation of the fault using updated information and methods. In June 1991, the NRC concluded that the licensee had satisfied the License Condition and that the seismic qualification basis would continue to be the original design basis plus the Hosgri evaluation basis, along with associated analytical methods, initial conditions, et cetera.

In November 2008, Pacific Gas and Electric notified the NRC of a potential line of epicenters about one mile offshore from the plant (Event Notification No 44675). This line of epicenters became known as the Shoreline Fault Zone. In January 2011, the licensee transmitted a report to the NRC characterizing the effect that the Shoreline and other local faults had on the potential for vibratory ground motion at Diablo Canyon Power Plant. The licensee concluded the ground motion from the new fault was within the design basis of Diablo Canyon.

#### Licensee Position

Pacific Gas and Electric evaluated the new seismic information against the LTSP 84<sup>th</sup> percentile deterministic spectrum (a margin analysis to the Hosgri design basis). Pacific Gas and Electric stated that further review against the seismic qualification basis was not needed because the new predicted vibratory ground motions were bounded by the LTSP spectrum, which was based on the seismic source that could produce the maximum vibratory ground motion at the Diablo Canyon site (Hosgri Event). The licensee concluded that the new seismic information was therefore neither a nonconforming nor an unanalyzed condition. The licensee based these conclusions on three factors documented in Notification 50086062, Task 30:

1. The current licensing basis established that new information discovered during Long Term Seismic Program (LTSP) research efforts was only required to be evaluated under the LTSP deterministic margin analysis. The licensee based this conclusion on Supplemental Safety Evaluation Report (SSER) 34, Section 2.5.2.4, which referenced a commitment Pacific Gas and Electric made to the NRC to maintain a strong geosciences and engineering staff to keep abreast of new geological, seismic, and seismic engineering information and evaluate it with respect to its significance to Diablo Canyon.
2. New seismic information is only required to be evaluated under the LTSP deterministic margin analysis because the Hosgri Evaluation is the bounding seismic source for the

site. The licensee based this conclusion on SSER 34, Section 1.3.2, "Summary of NRC Staff Review of the LTSP," which stated that the Hosgri fault is the seismic source that could cause the maximum vibratory ground motion at the Diablo Canyon site. Because the new information is bounded by the LTSP deterministic ground motion spectrum, the plant can be safely shutdown in the event of an earthquake.

3. The new information is only required to be evaluated under the LTSP deterministic margin analysis because the Hosgri Event is the safe shutdown earthquake for Diablo Canyon. The licensee based this conclusion on SSER 07, Section 2.5.2, "Seismology," which said that the Hosgri earthquake is considered as the safe shutdown earthquake as defined in 10 CFR Part 100, Appendix A. Since the Shoreline Fault is completely bounded by the LTSP and the LTSP is considered bound by the Hosgri, the plant can be safely shutdown in the event of an earthquake on the Shoreline Fault.

#### Region IV Position

Based on a review of docketed information and the plant safety analysis, Region IV was unable to confirm the licensee's statements that new seismic information was only required to be evaluated under the LTSP. Although the LTSP margin analysis demonstrated that the new Shoreline Fault Zone information was bounded by the Hosgri event, the licensee didn't evaluate the new seismic information against the other two design basis earthquakes, the Design Earthquake and Double Design Earthquake. FSARU, Section 3.7.1.1 states that the Double Design Earthquake is the safe shutdown earthquake for Diablo Canyon, as described in Appendix A of 10 CFR Part 100. The FSARU further states in Section 2.5, "The LTSP contains extensive databases and analyses that update the basic geologic and seismic information in this FSAR Update. However, the LTSP material does not alter the design bases for DCCP." In SSER 34, the NRC states, "The Staff notes that the seismic qualification basis for Diablo Canyon will continue to be the original design basis plus the Hosgri evaluation basis, along with associated analytical methods, initial conditions, etc."

Region IV concluded that the Hosgri Event was not by itself bounding for Diablo Canyon seismic qualification. While the FSARU stated that the postulated 7.5 M earthquake on the Hosgri fault would produce the maximum vibratory ground motion at the site, the plant safety analyses concluded that seismic qualification for certain structures, systems and components was more limiting for the Design and Double Design earthquakes than for the Hosgri Event, based on the different assumptions used in the seismic qualification for these earthquakes, including damping values, methods of analysis, required load combinations, and the allowable stresses or other acceptance criteria. As a result, seismic qualification for some plant structures, systems and components may not be bound the Hosgri Event.

#### Conclusion

New seismic information developed by the licensee is required to be evaluated against all three of the seismic design basis earthquakes and the assumptions used in the supporting safety analysis as described in the FSARU. Comparison to the LTSP by itself is not sufficient to meet this requirement.

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