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Attachment 13

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VIA E-MAIL

Mr. Eric Greene
Independent Peer Review Panel
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA

Re: Pacific Gas and Electric Company's Response to CPUC Independent Peer Review Panel Report Nos. 7, 8, and 9

Dear Mr. Greene:

I. Introduction

This letter is to respond to the California Public Utility Commission (CPUC) Independent Peer Review Panel (IPRP) report Nos. 7, 8 and 9 regarding the Central Coastal California Seismic Imaging Project (CCCSIP) Report. The IPRP process has provided Pacific Gas and Electric Company (PG&E) with valuable insight and guidance on the CCCSIP. PG&E will use the IPRP comments as guidance for planning future seismic studies as part of the Diablo Canyon Power Plant (DCPP) Long Term Seismic Program (LTSP) to reduce the uncertainty in the seismic hazard at DCPP in the most effective way. PG&E will continue to submit the results of its LTSP to the U.S. Nuclear Regulatory Commission (NRC).

II. Background

PG&E submitted its CCCSIP Report to the CPUC and the CPUC IPRP in September 2014. The CCCSIP Report provided the findings from extensive scientific research performed in the area surrounding PG&E's DCPP. These findings demonstrated that the facility remains seismically safe and able to withstand the largest potential earthquakes in the region.

The CCCSIP Report contains a summary and 12 detailed technical reports of key regional seismic features in the vicinity of the DCPP. It also provides updated information on the level of potential ground motion that could be produced by scenario earthquakes occurring on local geologic faults. The CCCSIP studies were coordinated with the IPRP based on 1) the identification of key seismic source parameters that had a significant impact to the probabilistic seismic hazard at the DCPP and 2) the overall

likelihood that information from the proposed studies would reduce the uncertainty associated with each parameter.

Following the issuance of the CCCSIP Report, PG&E met with the IPRP on multiple occasions in a series of technical meetings, including three public meetings. The IPRP subsequently issued three reports as a result of its review: 1) IPRP Report No. 7, dated November 21, 2014; 2) IPRP Report No. 8, dated December 17, 2014; and 3) IPRP Report No. 9, dated March 6, 2015. PG&E had indicated to the IPRP at a January 8, 2015 IPRP meeting that it would respond to all IPRP reports on the CCCSIP in one letter, once the final report was received. This letter responds to the main comments of IPRP Report Nos. 7, 8, and 9.

III. CCCSIP Report and Seismic Hazard Re-Evaluation of the DCPP

To address the IPRP's comments on the CCCSIP Report, as well as comments concerning other studies that were not part of the CCCSIP scope of work, it is important to first explain the relationship between the concurrent CCCSIP and NRC-mandated seismic hazard re-evaluation programs. The CCCSIP was conducted following the recommendation of the California Energy Commission (CEC) in a report issued in response to state legislation (Assembly Bill 1632, or AB 1632). The CCCSIP studies feature the collection and interpretation of new data using advanced geophysical techniques with the objective of reducing the uncertainty in seismic hazard. The NRC-mandated seismic hazard re-evaluation includes an updated probabilistic seismic hazard analysis (PSHA) that used as inputs new models for the earthquake sources (seismic source characterization, or SSC), the strong ground shaking resulting from earthquakes on the sources (ground motion characterization, or GMC), and the characteristics of ground shaking specific to the DCPP site (site response). The seismic hazard re-evaluation for the DCPP was prepared by PG&E and submitted to the NRC on March 12, 2015 as required by federal regulation. As required, the SSC and GMC models used in the updated PSHA were developed using the Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 methodology. The SSHAC process utilizes an independent, scientific, peer-based review process for re-evaluating the seismic hazards under this regulatory process. Although the CCCSIP and seismic hazard re-evaluation programs are separate and distinct, the results from the CCCSIP help inform the SSC SSHAC and site response studies. The SSC SSHAC report, "Seismic Source Characterization for the Diablo Canyon Power Plant, San Luis Obispo County, California," and the Seismic Hazard Re-Evaluation Report, which contains the site response analysis, are available online at http://www.pge.com/dcpp-ltsp.

The CCCSIP Report presents information about seismic source parameters and site conditions that is useful for seismic hazard analysis. However, the CCCSIP Report itself does not include a comprehensive SSC model for use in PSHA. Instead, the CCCSIP Report presents new data, interpretations of those new data, and implications of the new data for seismic hazard analysis at the DCPP. The hazard implications are

presented in two ways: 1) as deterministic seismic hazard analyses, which show ground motions resulting from specific earthquake scenarios, and 2) as "tornado plots," which demonstrate how each model parameter contributes to total hazard uncertainty. These ways of presenting the hazard implications of the CCCSIP findings are preferable, as they keep separate the CCCSIP Report contents from the contents of the NRC-mandated seismic hazard re-evaluation reports that draw on both the CCCSIP and a broader body of current and previous research and analysis.

As mentioned above, the SSC SSHAC study used information from the CCCSIP. Consistent with the SSHAC methodology, the peer-based Technical Integrator (TI) Team was charged with reviewing all available data, methods, and models, including the new CCCSIP data, to construct a model that represents the center, body, and range of technically defensible interpretations. Finalizing the SSC model involved reviewing the CCCSIP Report, meeting with the report authors, and meeting with members of the IPRP. The meetings with members of the IPRP included discussions of the CCCSIP data and results as well as how the CCCSIP information was being evaluated under the SSHAC process and integrated into the SSC model.

The sections below present PG&E's responses to each of the three IPRP Reports.

IV. Response to IPRP Report No. 7

IPRP Report No. 7 addresses seismic source parameters presented in Chapters 2 and 3 of the CCCSIP Report. The key source parameters include the slip rate of the Hosgri fault zone, the slip rate and southern extent of the Shoreline fault zone, and the geometry of the intersection of the Shoreline and Hosgri fault zones and implications for earthquakes that may rupture both faults.

IPRP Report No. 7 notes that the two- and three-dimensional (2D/3D) marine low energy seismic (LESS) studies of the Hosgri and Shoreline fault zones resulted in a better understanding of the location, extent and relationships between the Hosgri, Shoreline and other faults in the offshore region. There is consensus between the CCCSIP and IPRP Reports that the Shoreline fault may extend farther south than previously mapped, and the possibility of joint earthquake ruptures involving the Shoreline and Hosgri faults should be considered in seismic hazard analysis. Both of these findings have been incorporated in the SSC SSHAC model. The CCCSIP and IPRP further agree that the recent studies of the Hosgri and Shoreline fault slip rates have reduced their uncertainties and the uncertainty in seismic hazard.

While the CCCSIP and IPRP Reports agree that slip rate uncertainties have been reduced from prior models, the IPRP Report No. 7 highlights that residual uncertainties remain. The IPRP states that, given the large uncertainties in the age model, and in some cases, the offsets, it is difficult to justify some of the preferred slip rates and the uncertainty ranges documented in the CCCSIP Report. The SSHAC process is

designed to consider such differences in expert interpretation and judgment, and the SSC SSHAC study was tasked with developing a model that captures the full range of technically defensible interpretations.

The relative merits of other offshore investigations of the Hosgri fault slip rate that were not a part of the CCCSIP are a subject for the SSC SSHAC study; the SSC SSHAC report documents the findings of the TI Team regarding the Hosgri fault slip rate and its uncertainty that is used in the updated PSHA.

IPRP Report No. 7 suggested areas for additional research, particularly to develop better constraints on age estimates of offset features mapped by the LESS, with an emphasis on the offsets of younger (<20 ka) rather than older offset features. Collecting data to improve the age dates and/or identify additional, younger offset features in the offshore region is a major task. As shown by the tornado plot on Figure 1 below (which is equivalent to Figure 4 of IPRP Report No. 9), the current uncertainties in the Hosgri and Shoreline slip rates, which incorporate large age uncertainties, lead to less uncertainty in the total seismic hazard than the current uncertainties in the rock ground motion models and site amplification models. Therefore, the collection of data to improve the age dates and/or resolution of offset features along the Hosgri or Shoreline fault will likely be a lower priority. The final prioritization of any additional studies to reduce the uncertainty in the hazard will be developed as part of PG&E's ongoing Long Term Seismic Program (LTSP).

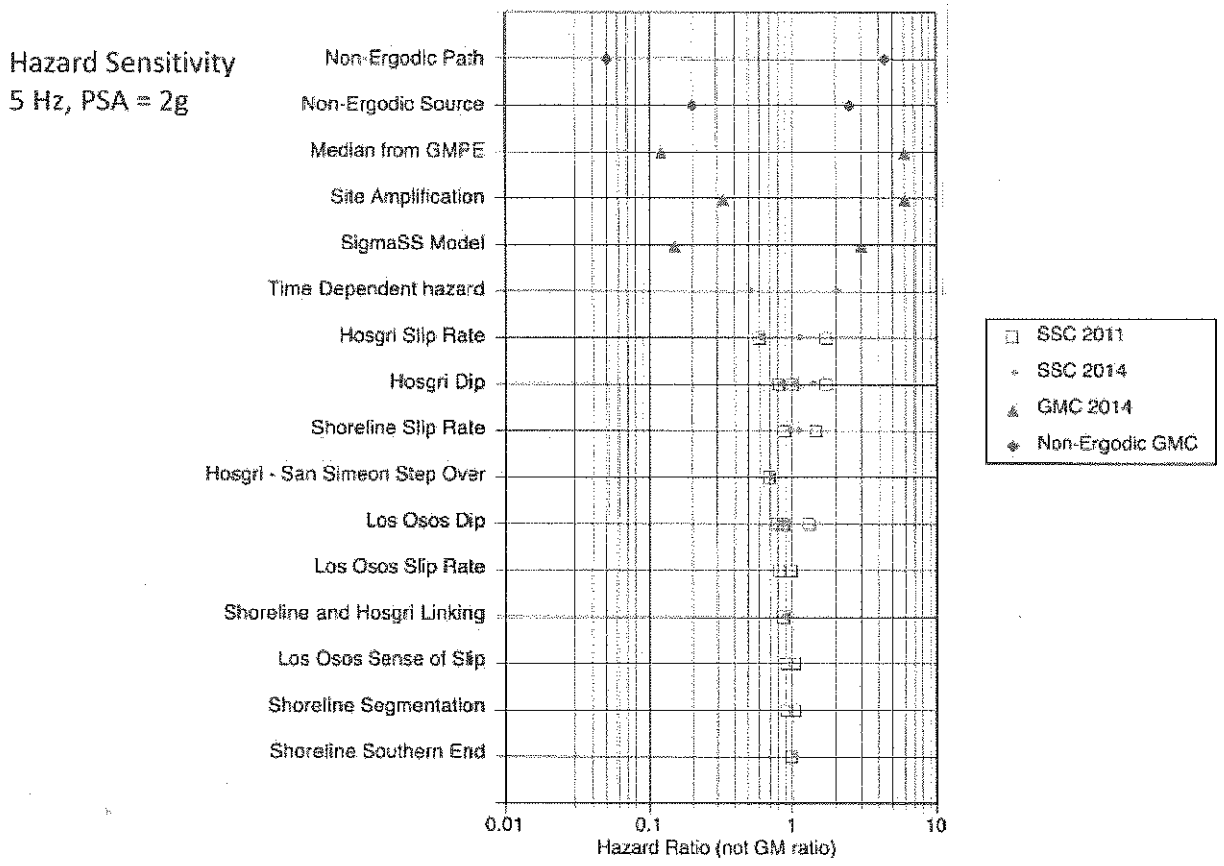

Figure 1. Tornado Plot summarizing seismic hazard parameters and the impact of parameter uncertainty on the total hazard uncertainty. Parameters whose uncertainties contribute more to total hazard uncertainty are shown at the top of the plot.

V. Response to IPRP Report No. 8

IPRP Report No. 8 addresses seismic source parameters and topics presented in Chapters 7, 8, 9, and 12 of the CCCSIP Report. The key seismic source topics include the tectonic model of the Irish Hills, the dip and sense of slip of the Los Osos fault zone, and the evaluation of the Diablo Cove and San Luis Range faults as proposed by Dr. D. Hamilton.

In IPRP Report No. 8, the IPRP noted that identifying the faults in the Irish Hills is challenging even with the new data collected as part of the CCCSIP. The IPRP concluded that significant uncertainty in the location, geometry and down-dip extensions of faults in the Irish Hills remains. In particular, the IPRP questioned the uniqueness of the interpretations presented in the CCCSIP Report. The IPRP endorsed the

consideration of alternative models of fault dip for faults beneath the Irish Hills in seismic hazard assessment.

The CCCSIP Report presents a preferred model of fault location and geometry in the Irish Hills that is consistent with the best available geologic, geophysical, and seismic-reflection data. The preferred model was the result of a rigorous process that included extensive analysis of map and well data, state-of-the art seismic-reflection processing, and thoughtful consideration of alternative interpretations. PG&E agrees with the IPRP that uncertainties remain in the interpretation of the geometries of the faults in the Irish Hills, but maintains that the tectonic model developed for the CCCSIP report is a defensible characterization supported by data and standard of practice interpretation methods.

The SSC SSHAC study addresses the broader uncertainties in the fault geometries in the Irish Hills that are discussed in the IPRP Report No. 8. As presented at the November 17, 2014 IPRP public meeting, the SSC SSHAC study explicitly addresses these uncertainties and includes a wider range of models than given in the CCCSIP model to capture the full range of the uncertainty in the fault geometries, and in particular, the range on the dips of the faults in the Irish Hills, including the Los Osos fault. The SSC SSHAC model includes alternatives that explain the uplift of the Irish Hills by either NE dipping faults, SW dipping faults, and both NW and SW dipping faults. The NE dipping fault model includes a 45-degree dipping Los Osos fault, which is less steep than interpreted by the CCCSIP team. The SSC SSHAC also includes source zones with additional faults in the Irish Hills that capture the seismic hazard contributions from less-well defined faults in the Irish Hills, including fault geometries postulated by the CCCSIP studies and other studies. The modeled fault dips for this additional source zone range from gently to steeply dipping and fully capture alternative dips suggested by experts during the SSHAC process. These models and the hazard sensitivity are described in the SSC SSHAC report. Even given the broad uncertainties in Irish Hills fault geometry in the SSC model, the uncertainties in fault geometries have a relatively small effect on the total hazard uncertainty as documented in the SSC SSHAC report.

VI. Response to IPRP Report No. 9

IPRP Report No. 9 addresses seismic hazard parameters and topics presented in Chapters 10, 11, and 13 of the CCCSIP Report. The key topics include the shear wave velocity beneath the DCPP, the uncertainty in site response amplification models, and hazard sensitivity.

The IPRP Report No. 9 identifies two main issues with the site response at the DCPP: 1) the uncertainty in the DCPP site terms, and 2) the uncertainty in the 3D velocity model. In addition, IPRP report 9 notes that PG&E has not submitted results from two of

the three tasks for evaluating the DCPP site terms. The two remaining tasks are as follows:

- Analyze broadband ground motion data and ground motions from small earthquakes to better quantify site-specific amplification terms.
- Evaluate site amplification using analytical approaches in which seismic waves were propagated through a velocity model.

A. Site Term

The uncertainty in the site terms is a key issue for the hazard uncertainty at the DCPP. This uncertainty is explicitly included in the seismic hazard results presented in the CCCSIP Report and in the seismic hazard re-evaluation submitted to the NRC on March 12, 2015.

PG&E has an additional peer review panel for site response. Following questions on the uncertainty raised by the site response peer review panel, an updated evaluation was conducted that explicitly addresses the uncertainty in the estimates of the source and path terms, and the aleatory variability of the recorded ground motion at DCPP after the source and path terms are removed. This updated uncertainty evaluation leads to an increase in the uncertainty of the site terms that is included in the March 12 submittal to the NRC.

B. 3D Velocity Model

In accordance with the 50.54(f) NRC letter, after completing the seismic source characterization and developing the probabilistic GMRS, PG&E is required to develop an updated Seismic Probabilistic Risk Assessment model. The 3D velocity model is being revised using additional constraints such as the dispersion curves at selected locations, V_S profiles from the borings, and the site amplification measured across the DCPP site area consistent with the IPRP comments on the calibration of the 3D model. As part of this effort, the uncertainty in the 3D velocity model is also being addressed. To focus the uncertainty evaluation, the site amplification at the key structures is used as the metric for classifying the 3D models. The study will result in three alternative 3D velocity models that capture the range of the site amplification at the key structures.

C. Evaluation of broadband data from small earthquakes

The currently available broadband data from small earthquakes does not provide improved constraints on the DCPP site terms because the station coverage is too sparse. Improved source, path, and site response terms are part of a separate longer term study being planned with the Southern California Earthquake Center. This project plan will be developed as part of the overall effort to reduce the uncertainty in the seismic hazard as presented in Figure 1.

D. Analytical modeling to evaluate site amplification

The site response based on analytical models using the 3D velocity models will be completed in the summer of 2015. The calculations required for the 3D velocity model and the uncertainty in the 3D velocity model are under revision based on site response peer review comments. The site response peer review is also addressing the numerical methods being used for the 3D site response. The results from the 3D site response study will be used as part of the Soil-Structure Interaction (SSI) analyses to characterize the lateral variation of ground motion from the control point to the foundation levels of the key structures. As noted above, this is required by the NRC as part of the updated Seismic Probabilistic Risk Assessment model. This process will be overseen by the NRC and is slated for completion in 2017 under the 50.54(f) process.

VII. Closure

Again, PG&E would like to thank the members of the IPRP for their valuable guidance and feedback on study plans that greatly helped optimize the data acquisition, and their diligent review and feedback on study results. PG&E proposes a future meeting with members of the IPRP to discuss specific comments provided in report Nos. 7-9.

Finally, PG&E will use the IPRP comments as guidance for planning future seismic studies as part of the DCPP LTSP to reduce the uncertainty in the seismic hazard at DCPP in the most effective way and will continue to submit the results of its LTSP to the NRC.

Sincerely,

/s/

Valerie Winn

cc: IPRP members