

IPRP Comments on Draft EIR for DCPD Seismic Studies

Introduction

The following comments on the Draft Environmental Impact Report (DEIR), issued by the California State Lands Commission on March 16, 2012, are submitted by the Independent Peer Review Panel (IPRP)¹ on PG&E's proposed Diablo Canyon Power Plant (DCPP) seismic studies. Under the auspices of the California Public Utilities Commission (CPUC), the IPRP is conducting an independent review of PG&E's on-shore and off-shore seismic hazard studies, including independently reviewing and commenting on PG&E's study plan, progress, and the findings of the study.

The comments below reflect the IPRP's review of the overall scope of the planned studies and the information required to perform the seismic hazard evaluation for DCPD. These comments do not address specific environmental impacts identified in the DEIR. As such, they are provided to inform the required discussion of project alternatives and to provide support for a statement of overriding considerations, should one be adopted as proposed.

Background on the Independent Peer Review Panel and AB 1632 Report

The CPUC established the IPRP in 2010 to provide an independent peer review and comment on PG&E's proposed advanced seismic studies for DCPD that were recommended in the California Energy Commission's (CEC) AB 1632 Report..² A significant seismic event and/or an extended plant shutdown at DCPD or the San Onofre Nuclear Generating Station (SONGS) would have significant economic, environmental, and electricity planning implications for California. As required by Assembly Bill 1632 (Blakeslee, Chapter 722, Statutes of 2006), the CEC in 2008 completed a comprehensive assessment of the vulnerability of DCPD and SONGS to a major disruption due to a seismic event or plant aging. As a result of this assessment, the CEC recommended that PG&E and Southern California Edison Company complete additional seismic studies including using three-dimensional seismic reflection mapping

¹ The CPUC in 2010 established the Independent Peer Review Panel (CPUC Decision D.10-08-003 in Application A.10-01-004) to review PG&E's additional seismic studies recommended by the California Energy Commission's November 2008 *Integrated Energy Policy Report*, The order convened the IPRP to include the California Geologic Survey, California Energy Commission, and the California Seismic Safety Commission; the panel was later expanded to include the California Emergency Management Agency and the County of San Luis Obispo.

² California Energy Commission, *2008 Integrated Energy Policy Report*, (CEC-100-2008-008-CMF, pp. 65-84; *An Assessment of California's Nuclear Power Plants: AB 1632 Report* available at [<http://www.energy.ca.gov/2008publications/CEC-100-2008-009/CEC-100-2008-009-CMF.pdf>]; and *AB 1632 Assessment of California's Operating Nuclear Plants: Final Report*, by MRW & Associates, October 2008, CEC-100-2008-005-F.

and other advanced geophysical techniques to explore fault zones near DCPD and SONGS.

The CPUC, the CEC, and the California Coastal Commission in 2009 and 2010 directed PG&E to complete these advanced seismic hazard studies for DCPD as part of its license renewal feasibility studies and reviews.³ Although the U.S. Nuclear Regulatory Commission (NRC) has authority over the safety and operation of U.S. nuclear power plants and issuance of their operating licenses, California regulatory agencies and officials have authority in other areas related to California's nuclear plants including financial matters (CPUC), coastal impacts (California Coastal Commission), and state electricity planning (CEC, CPUC, and CA ISO).

PG&E's Seismic Study Plans for DCPD

The IPRP review of survey plans has to date focused on the "geologic targets" of the surveys and the potential impact of the information from the surveys on the seismic hazard evaluation for the Diablo Canyon Power Plant. The high-energy offshore seismic survey is one component of a larger series of investigations that also includes on-shore seismic surveys and low energy offshore seismic surveys. The high energy offshore seismic surveys are proposed to assess some of the parameters that are significant to seismic hazard at DCPD; other parameters are being assessed using different techniques.

As discussed in detail below, the IPRP finds that, 1) the proposed survey generally covers the appropriate geologic targets, although we believe one area of the survey can be eliminated without compromising the seismic hazard analysis, and 2) that minor adjustments to the survey track orientation and extent in certain areas would be prudent to assure the best coverage of certain targets.

We should note that the IPRP intends to conduct a more detailed analysis of the survey design within the proposed footprint, in order to develop comments regarding the specific acquisition and data processing strategy proposed. While the IPRP may make subsequent comments regarding the survey, we do not know whether any recommended revisions to survey technique would change the environmental impact analysis.

The parameters described below are significant to seismic hazard at DCPD and can be further constrained by a high energy off-shore seismic survey. The additional

³ President Michael Peevey, CPUC, letter to Peter A. Darbee, PG&E, June 25, 2009; California Energy Commission *2009 Integrated Energy Policy Report*, p. 238; and the California Coastal Commission's letters to PG&E December 29, 2009 and letters to the NRC March 12, 2010 and November 20, 2010.

information that may only be gained from this type of survey and its use in analyzing the potential seismic hazards at DCPD are the reasons that this survey should be conducted, despite the potential impacts.

Hosgri – Shoreline Intersection

The nature of the Hosgri – Shoreline intersection has been a focus of recent studies because the Shoreline fault was only recently discovered. The intersection between the Hosgri and Shoreline faults remains one of the primary targets of the high energy off-shore seismic survey because potential “segmentation” of a fault zone can influence seismic hazard. If a fault intersection is a hard “segment boundary”, then earthquakes do not rupture through it and more frequent, smaller earthquakes are required to use up the available energy within that fault segment. If the earthquakes can simultaneously rupture the faults on both sides of the intersection, then less frequent, larger earthquakes can use up the available energy along the entire fault zone.

A deterministic seismic hazard analysis shows that a larger magnitude earthquake simultaneously rupturing both the Shoreline and Hosgri faults results in higher hazard and consequential risk at DCPD than earthquakes rupturing on the Shoreline or Hosgri faults alone. In probabilistic seismic hazard analysis, “unsegmented” faults may have much of the available energy used by infrequent large earthquakes, and consequently have less frequent smaller earthquakes. The overall lower rate of earthquakes when faults are connected results in lower long-term seismic hazard and consequential risk. It is important to know if there is a “direct connection” between the Shoreline fault and the Hosgri fault, not because such a connection would raise the potential hazard and consequential risk at DCPD but because it would lower them.

The IPRP has noted that there appears to be a small area that the surveys would not directly cover in the layout of the high energy off-shore surveys proposed by PG&E in submittals to the SLC (Between “Zone 2”, “Zone 4” and the coastline on the map, Figure 2.5-7, on page 2-21 of the DEIR). Although this area is smaller than gaps in PG&E’s previous survey map layouts, it may still leave a gap or area of lower resolution. The IPRP recommends that the State Lands Commission consider allowing minor adjustments to the preliminary survey layouts described in the EIR so long as impact of the surveys is not increased.

Dip of the Hosgri Fault

The dip (orientation) of the Hosgri fault is one of the primary targets of the high energy off-shore seismic survey. This parameter can be inferred from recorded seismicity, but the high energy seismic survey is the only technique that can provide an image of the fault zone at or near seismogenic depth (where earthquakes are generated). The dip of

the Hosgri fault is important to seismic hazard analysis because a northward dipping fault would be closer to DCP, and seismic hazards consequently higher.

Shoreline Fault Segmentation

The continuity of the Shoreline fault at depth is currently inferred from seismicity (the locations of recorded small earthquakes). The high energy seismic survey may provide further constraints on the continuity of the Shoreline fault. Results of this survey may help to distinguish between seismic hazard models in which the fault is “segmented” and models in which it is not.

Increased knowledge of the Shoreline fault is particularly important because the fault is located so close to DCP. Acquisition of seismic data in this shallow water environment is challenging and is proposed with seismic energy sources both on- and off-shore.

Los Osos Fault Dip

The IPRP has recommended to PG&E that the high energy off-shore seismic survey be configured so that it complements, as much as possible, the on-shore surveys, including providing as continuous as possible imaging of the areas between the on-shore and off-shore surveys. This would include configuring the high energy seismic survey to image the off-shore strands of the Los Osos fault. Potential intersections between the Los Osos and Hosgri and/or Shoreline faults are important components of a tectonic model of the Irish Hills underlying Diablo Canyon and would provide constraints on seismic hazard models. To enhance the proposed survey design, the IPRP recommends that the State Lands Commission consider allowing minor adjustments to the preliminary survey layouts described in the EIR so long as impact of the surveys is not increased.

Hosgri-San Simeon Step-Over

Similar to the situation at the potential intersection of the Hosgri and Shoreline faults, models of how the Hosgri and San Simeon faults interact are important components of a seismic hazard model. Ongoing investigation and more closely spaced seismic survey lines by USGS have shown that the direct connection between the San Simeon and Hosgri faults is by far the most likely explanation from the available data. Although the recent data is from low energy seismic surveys, and thus only shows the fault in the upper few hundred meters, it appears very unlikely that additional data from high energy survey of this area would significantly change the seismic hazard analysis results based on these faults. The IPRP has suggested to PG&E that the northern “racetrack” of the proposed high energy seismic survey (“Zone 3” on the map, Figure 2.5-7, on page 2-21 of the DEIR) has such a low likelihood of generating data that would change the existing

seismic hazard analysis that the additional cost and impacts of this part of the survey probably cannot be justified.

Conclusions

The IPRP finds that: (1) the proposed seismic hazard studies described in the Draft EIR cover the identified geologic targets for DCP, (2) minor adjustments to the high energy offshore survey track orientation and extent in certain areas would further enhance these studies, and (3) the area of the Hosgri-San Simeon step-over is a lower priority for study because existing data allows for relatively well-constrained interpretation. Better understanding of the fault zones is essential to understanding the seismic hazard at this site, particularly since DCP lies so close to major faults. Although the DCP seismic setting has been and continues to be extensively studied, further analysis using advanced technologies, such as three-dimensional geophysical seismic reflection mapping, might change conclusions about the seismic hazard of the plant. The CEC, the CPUC, and the California Coastal Commission have directed PG&E to complete the additional seismic studies recommended in the AB 1632 Report as part of DCP's license renewal feasibility studies and review.

IPRP

California Geological Survey
California Coastal Commission
California Emergency Management Agency
California Energy Commission
California Seismic Safety Commission
California Public Utilities Commission
County of San Luis Obispo