

May 19, 2013

**VIA E-MAIL DOCKET@ENERGY.
CA.GOV**California Energy Commission
Dockets Office, MS-4
Re: Docket No. 13-IEP-1J
1516 Ninth Street
Sacramento, CA 95814-5512Re: 2013 Integrated Energy Policy Report Update: Pacific Gas and Electric Company
Response to Nuclear Data Request**I. INTRODUCTION**

Pacific Gas and Electric Company (PG&E) is pleased to provide responses to the California Energy Commission's (CEC) 2013 Integrated Energy Policy Report (IEPR) Nuclear Data Request.

In preparing this response, PG&E first repeats the question, as shown in the data request, followed by PG&E's response. PG&E's responses address Diablo Canyon only.

II. NUCLEAR POWER PLANT DATA REQUEST**PROGRESS IN COMPLETING AB 1632 REPORT/2008 IEPR2****Recommendations****A. Seismic Hazards at Diablo Canyon**

1. Please report on the overall status of ongoing efforts to understand the seismic hazards affecting the Diablo Canyon site through its Long Term Seismic Program (LTSP) and the results of the research efforts.

A seismic hazard update is currently underway for the Diablo Canyon Power Plan (DCPP) Site that will use an updated Seismic Source Characterization (SSC) and updated Ground Motion Characterization (GMC) as basic inputs to a site-specific probabilistic seismic hazard analysis (PSHA). The SSC describes the future earthquake potential (e.g., magnitudes, locations, and rates) for the region surrounding the DCPP site, and the GMC describes the distribution of the ground motion as a function of magnitude, style-of-faulting, source-to-site geometry, and site condition. For this project, both of these models will be developed following the guidelines of

the Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 process, following NUREG-2117, *Practical Implementation Guidelines for SSHAC Level 3 and 4 Hazard Studies*.

At the start of the Diablo Canyon SSHAC Level 3 study in April 2011, the project was designed as a combined SSC and GMC study. In June 2012, the study was divided into two separate SSHAC Level 3 studies – a site-specific SSC project for the Diablo Canyon site region, and a regional GMC study that would be applicable to the Southwest United States (SWUS). This separation of the project into separate SSC and GMC studies occurred after the completion of Workshop 0 “Kick-Off” and Workshop 1 “Key Issues, Available Data, and Data Needs”, held in November 2011. The Diablo Canyon SSC project will continue with the program as originally scheduled because all of the technical staff assigned to the project is continuing on the project. Because of the new project structure and organization, that included Southern California Edison (SCE) and Arizona Public Services (APS) utilities, the SWUS GMC study repeated Workshop 1 “Key Issues, Available Data, and Data Needs” in March 2013.

The SSC study held Workshop 2 in November 2012. The primary goal of Workshop 2 was to interactively use the “Proponent Experts” to explore the center, body, and range of technical defensible interpretations for the SSC for the DCPD region, with a focus on those parameters that are most significant to the seismic hazard. The schedule for the SWUS Workshop 2 is October 2013. Workshop 3, “Preliminary Model and Hazard Feedback” is scheduled for the first quarter of 2014 for both the SSC and SWUS GMC SSHAC studies. The completion of the study is on track to complete in March 2015, with an updated site-specific PSHA and new ground motion response spectra.

As part of the seismic hazard update, results from the ongoing PG&E field programs and ground motion research studies are being considered, evaluated, and integrated into the SSC and GMC logic tree models. These studies will include:

- Initial 3-D Tectonic Model Results
- Initial Low Energy 2D/3D Offshore Seismic Survey Results
- Initial 2D Onshore Seismic Survey Results
- Light Detection and Ranging (LIDAR), Gravity and Magnetic Surveys Results
- Offshore Multi-Beam Echo Sounding (MBES) Survey Results
- NGA-west2 ground motion data base
- Comparisons of NGA models and updated data sets (residuals of V0 models)
- Validation of finite-fault simulations
- Updated methodology for inputs to dynamic rupture models

2. Please discuss whether updates to ground motion models developed to date through the Senior Seismic Hazard Analysis Committee (SSHAC) Level 3 process³ indicate larger than expected seismic hazards at Diablo Canyon and, if so, whether the plant was built with sufficient design margins to continue operating reliably after experiencing these larger ground motions. (Diablo Canyon)

The current status of the SWUS GMC and SSC SSHAC Level 3 studies are not at a point where the new ground motion models are developed. It is not possible to reliably predict whether the site-specific seismic hazard and ground shaking levels from which to assess the DCPD critical structures, systems, and components will increase or decrease at this stage of the seismic hazard update. This will be known in March 2015.

B. Seismic Hazards at SONGS – Not Applicable to PG&E

C. Tsunami Hazards at Diablo Canyon

1. Please submit to the Energy Commission an updated tsunami hazard study for DCPD incorporating the following new information and research conducted since the draft 2010 PTHA was completed:

- a. the Energy Commission's 2012 California Climate Change Assessments specific to sea level rise and extreme wave characteristics;***
- b. any applicable Pacific Earthquake Engineering Research Center (PEER) research reports (e.g., Probabilistic Tsunami Hazard in California, October 2010); and***
- c. improved scientific understanding of tsunamis and hazard assessment, including lessons learned from the 2011 Tōhoku/Great East Japan earthquake and tsunami.***

PG&E completed a tsunami hazard study in light of recent research to improve scientific understanding of tsunamis. The results of these evaluations are included in "Pacific Gas & Electric Company, Methodology for Probabilistic Tsunami Hazard Analysis: Trial Application for the Diablo Canyon Power Plant Site," dated April 9, 2010.¹ PG&E found no new hazards that warrant inclusion into the DCPD design and license basis.

The NRC 50.54(f) request for information regarding Recommendation 2.1 directed all licensees to perform a flood hazard reevaluation of all appropriate external flooding sources, including the effects from local intense precipitation on the site, probable maximum flood (PMF) on stream and rivers, storm surges, seiches, tsunami, and dam failures. The flood hazard reevaluation serves to collect information to facilitate Nuclear Regulatory Commission's (NRC) determination if there is a need to update the design basis and systems, structure, and components (SSCs) important to safety to protect against updated hazards at operating reactor sites. In response to this request, PG&E committed to perform a flood hazard reevaluation and provide a final report documenting results, as well as pertinent site information and detailed

¹ This report was provided to the Energy Commission in "PG&E's Response to Nuclear Data Request" dated June 9, 2011.

analysis by March 12, 2015 in PG&E letter DCL-12-059 dated June 7, 2012.² In line with this flood hazard reevaluation, PG&E will consider new and significant information and research conducted since the 2010 Probabilistic Tsunami Hazard Analysis (PTHA) draft was completed (e.g., sea level rise).

2. Based on the updates to the tsunami study, identify any new hazards that warrant inclusion into the DCPD design and license basis.

Please see response to C.1.

D. Tsunami Hazards at SONGS – Not Applicable to PG&E

E. Vulnerability of Power Plant Buildings and Structures

1. Please report on the progress of PG&E's and SCE's investigations on the extent to which the respective plants' non-safety-related systems, structures, and components (SSCs) comply with current building codes and seismic design standards for nonnuclear power plants and report to the Energy Commission the findings of such investigations. (Diablo Canyon, SONGS)

PG&E has completed its evaluation of this topic as discussed in Attachment 2 to its 2011 Nuclear Data Request Response.³

2.a. Please report on the progress of PG&E's and SCE's evaluations of the seismic vulnerability and reliability implications for the nuclear plants' non-safety related SSCs from changes to seismic design standards that have occurred since the plants were designed and built.

b. The progress report should 1) consider IAEA (International Atomic Energy Agency) Standards and Safety Reports and any retrofits that the plant owners may have undertaken, and 2) discuss how the evaluations focused on those plant systems or components whose failure could lead to extended outages. (Diablo Canyon, SONGS)

PG&E has completed its evaluation of the seismic vulnerability and reliability implications for non-safety related system structures and components. The results of this evaluation are included in the March 2010 "Seismic Assessment of Diablo Canyon Power Plant Non-Safety Related Structures, Systems, and Components" (March 2010 Report).⁴

² See <http://pbadupws.nrc.gov/docs/ML1233/ML12333A145.pdf>

³ See Attachment 2 of "PG&E's Responses to CEC's Nuclear Power Plant Data Requests," dated June 9, 2011.

⁴ See Attachment 2 of "PG&E's Responses to CEC's Nuclear Power Plant Data Requests," dated June 9, 2011.

The findings from PG&E's evaluation of the seismic vulnerability and plant reliability implications for the non-safety related SSCs from changes to seismic design standards that have occurred since the plants were designed and built and any retrofits, focusing on systems or components whose failure could lead to extended outages were provided in the March 2010 Report.

3. Please report on the status of PG&E's and SCE's plant component repair/replacement plans. The status report should describe how the plans:

a. identify key plant systems or components;

b. estimate the time needed to repair or replace key plant systems or components that could cause a prolonged plant outage as a result of earthquake damage, and;

c. consider the fragility of components both in their operating positions and when relocated for refueling or plant maintenance. (Diablo Canyon, SONGS)

The plant component repair/replacement plans including initial estimates of time needed to repair or replace key plant systems or components that could cause a prolonged plant outage or compromise plant safety as a result of being damaged from an earthquake are provided in the March 2010 Report.

Note: The above evaluation was performed for plant operating conditions, not refueling outage conditions. The reasoning is that the time duration that equipment is disassembled in a refueling outage is short compared to the operating time and the configuration of what is disassembled from outage to outage varies. Also, in a refueling outage, Balance of Plant (BOP) equipment is not rotating, weighs less because it is empty (examples: condenser and feedwater heaters) and is cold and depressurized. All of these increase the seismic load capacity of the BOP equipment.

F. Vulnerability of Spent Fuel Storage Facilities to Seismic and Terrorist Events

1. Please provide a progress report on the return of the spent fuel pools to open racking arrangements. (Diablo Canyon, SONGS)

Fuel assembly storage in the spent fuel pools is in compliance with all Nuclear Regulatory Commission (NRC) requirements. No action has been taken to modify the spent fuel pool racking to a less dense orientation. The projected cask loading schedule will decrease the pool density with each subsequent cask loading.

G. Vulnerability of Roadways and Transmission Systems

1. Please provide the most recent roadway assessment completed to satisfy this recommendation. (Diablo Canyon, SONGS)

The roadway assessment was completed as part of the 2012 HAZUS study for Evacuation Time Estimates (ETE) following a seismic event. Although the HAZUS study is complete the ETE has not been finalized for seismic events. The findings from the study were presented to the County of San Luis Obispo on May 3, 2013. Comments resulting from the presentation will be incorporated in the ETE and provided in final draft to all stakeholders in June. DCPD plans on releasing the final ETE following a seismic event by July 2013.

H. Vulnerability of Plant Aging-Related Degradation – Not Applicable to PG&E

I. Economic, Environmental and Policy Issues

1. Please provide the most recent local economic impact study completed to satisfy this recommendation. (Diablo Canyon, SONGS)

PG&E's most recent local economic impact study was provided as Attachment 5 to its 2011 Nuclear Data Request Response.

J. Nuclear Waste Accumulation

1. Please provide the most recent disposal cost assessments and low-level waste (categorized as Class A, B, C, or Greater-than Class-C) and spent nuclear fuel storage and disposal plans completed to satisfy this recommendation. (Diablo Canyon, SONGS)

To be provided.

K. License Renewal Issues for State Policymakers

1. Please provide a status report on and the results of all license renewal feasibility studies in-progress or completed for license applications currently under review or planned for submittal with the NRC including but not limited to:

- a. the adequacy of the plants' maintenance programs and safety cultures;***
 - b. plans for waste storage, transport and disposal;***
 - c. seismic hazard and vulnerability assessments;***
 - d. the life cycle or "cradle-to-grave" environmental and economic impact evaluation of the nuclear plants compared with alternative generating and transmission resources;***
 - e. contingency plans in the event the state's nuclear power plants have prolonged outages;***
 - f. implications for grid reliability if these plants shut down;***
 - g. assessments of the options and costs for complying with the State Water Resources Control Board policy requiring a phase-out of once-through cooling, and;***
 - h. the overall economic and environmental costs and benefits of license extension.***
- (Diablo Canyon, SONGS)***

PG&E completed the License Renewal Feasibility Study (LRFS) supporting license renewal for DCPD prior to filing the DCPD license renewal application with the NRC (Docket Nos. 50-275-LR and 50-323-LR) in November 2009. PG&E submitted the LRFS to the California Public Utilities Commission (CPUC) along with the Application to Recover the Costs Associated with Renewal of the Diablo Canyon Power Plant Operating Licenses in January 2010, Application 10-

01-022. In May 2011, the NRC granted PG&E's request to suspend the license renewal proceeding at the NRC pending completion of certain seismic studies recommended by the CEC. Subsequently, the CPUC dismissed PG&E's license renewal application pending completion of the seismic studies recommended by the CEC. PG&E currently expects to complete the seismic studies recommended by the CEC in June 2014, and will update its license renewal applications, as necessary, upon completion of the seismic studies.

Progress in Completing 2011 IEPR Recommendations

A. Seismic Issues

1. Please provide an update on the progress in completing the AB 1632 Report recommended seismic studies, including the technical details and any significant updates of seismic hazard study plans completed, in progress or proposed since 2011 (as recommended in the 2008 IEPR Update) and the associated findings as applicable.

(Diablo Canyon, SONGS)

The CEC AB1632 Report – *An Assessment of California's Nuclear Power Plants*, recommended that PG&E 1] Continue ongoing efforts to understand seismic hazards affecting the Diablo Canyon site through its Long-Term Seismic Program

- PG&E's continuing DCCP Long-Term Seismic Program (LTSP) efforts are described in the response to Question IIA. Seismic Hazards at Diablo Canyon.

2] Use three-dimensional geophysical seismic reflection mapping and other advanced techniques to explore fault zones near Diablo Canyon.

- On January 5, 2010, PG&E filed Application (A.) 10-01-014 with the CPUC for cost recovery of \$16.73 million associated with the enhanced seismic studies recommended by the CEC AB1632 Report. The CPUC adopted Decision (D.) 10-08-003 to perform these additional seismic studies on August 12, 2010.
- On September 23, 2011, PG&E filed a Motion to re-open A.10-01-014 to request additional funding for increased costs of the enhanced seismic studies at DCCP. On September 13, 2012 the CPUC issued D.12-09-008 authorizing PG&E to recover in rates an additional \$47.5 million above the \$16.73 million already approved in D.10-08-003 for a total of \$64.25 million.
- Plans to conduct these studies were presented to, and reviewed by, the Independent Peer Review Panel (IPRP) in 2010, 2011, and 2012 (see IPRP Reports provided in response to Seismic Issues, Question 2).

These studies included:

- High-resolution low energy 2-dimensional (D) and 3D marine seismic reflection surveys of the northern and southern ends of the Shoreline Fault Zone (conducted in 2010, 2011 and 2011, 2012, respectively) and the Hosgri Fault Zone in 2012. Objectives of these surveys were to:

- determine the nature of the structural linkage between the Shoreline and Hosgri Faults offshore Point Buchon,
- determine the southern extent of the Shoreline Fault Zone in San Luis Bay, and
- investigate possible piercing points (intersections of paleo-stream channels with fault zones) along the Shoreline and Hosgri Faults to document slip rates (i.e., rates of fault displacement) for use in seismic hazard studies.
- A Technical Report describing the 2010/2011 2D/3D Survey of the northern segment of the Shoreline Fault was released in 2012 (*DCPP 3D/2D Seismic-Reflection Investigation of Structures Associated with the Northern Shoreline Seismicity Sublineament of the Point Buchon Region*, PG&E GEO.DCPP.TR.12.01 R0)⁵ and was transmitted to the IPRP as well as the PG&E SSHAC study to support ongoing seismic hazard assessment activities at DCP.
- Technical reports describing the 2011 and 2012 surveys of the southern segment of the Shoreline Fault Zone and Hosgri Fault Zone will be issued in the fourth quarter of 2013. This information will also be transmitted to the IPRP as well as the PG&E SSHAC study to support ongoing seismic hazard assessment activities at DCP.
- High-resolution shallow- and deep-penetrating 2D and 3D land seismic surveys were conducted in and around the Irish Hills and DCP plant area in 2011 and 2012. Objectives of these surveys were to:
 - Determine the geometry of onshore faults recognized in the 2011 NRC *Report on the Analysis of the Shoreline Fault Zone, Central Coastal California* (PG&E, 2011-NRC Docket No. 50-275 and 50-323; DCL-11-005)⁶ as having the most importance to the DCP – the Los Osos and San Luis Bay Fault Zones.
 - Conduct high resolution seismic studies in and around the DCP site.
 - Data from these land surveys are currently being processed and interpreted and are scheduled to be issued as a Technical Report during the second quarter of 2014. This information will also be transmitted to the IPRP as well as the PG&E SSHAC study to support ongoing seismic hazard assessment activities at DCP.
- In 2012, PG&E applied for the necessary state and federal permits to conduct high-energy 3D seismic studies offshore DCP. PG&E received a Geophysical Survey Permit from the California State Lands Commission in August 2012, but was denied a Coastal Development Permit by the California Coastal Commission in November 2012. As a result, no high-energy marine seismic surveys have been conducted. A final decision on

⁵ Found on CD#1, Attachment 1 to this data request response.

⁶ Found in CD# 2, Attachment 2 to this data request response.

whether PG&E conducts high-energy 3D marine seismic surveys is pending review of existing data.

- PG&E has applied for and received the necessary state and federal permits to deploy and operate a network of four (4) Ocean Bottom Seismometers (OBS) offshore Point Buchon, near the proposed northern Shoreline/Hosgri Fault intersection. The objective of the OBS network is to improve the detection capability and location accuracy of earthquakes in this region.
- OBS instruments are schedule to be deployed during the third quarter of 2013.

2. Please provide the reports, findings and recommendations from the California Independent Peer Review Panel (IPRP)/ Independent Peer Review Group (IPRG) on seismic studies, including onshore and offshore seismic studies funded by CPUC Decision's 10-08-003 and Decision 12-05-004. (Diablo Canyon, SONGS)

Please see CD#3, Attachments 3 through 10 to this data request response, as follows:

Attachment 3: IPRP Report No. 1

Attachment 4: IPRP Report No. 2

Attachment 5: PG&E's Response to IPRP Report No. 2

Attachment 6: IPRP Report No. 3

Attachment 7: PG&E's Response to IPRP Report No. 3

Attachment 8: IPRP Report No. 4

Attachment 9: IPRP Report No. 5

Attachment 10: PG&E's Response to IPRP Report No. 5

3. Please provide an update on the composition of SONGS' Seismic Advisory Board and efforts SCE has made in to include independent seismic experts with no current or prior professional affiliation with utilities, including SCE or PG&E, or their consultants. (SONGS)

Not Applicable to PG&E.

B. Spent Fuel Pool and Independent Spent Fuel Storage Installation

- 1. Please provide an update on progress in adding safety-related instrumentation (capable of withstanding design basis natural phenomena) to monitor in the control room key spent fuel pool parameters, for example, water level, temperature, and radiation levels, during a severe accident in which radiation levels within the spent fuel pool building are unsafe. (Diablo Canyon, SONGS)***

There is a common spent fuel pool (SFP) annunciator for each unit in the main Control Room which actuates to indicate abnormal level (high or low) and temperature (high/rate of change). The associated annunciator response procedure directs local actions to confirm the abnormal conditions and take remedial actions. There is also indication of SFP temperature available to

the control room and other locations on the plant computer. The instruments which supply signals to the annunciator and the plant computer are not environmentally qualified and are subject to failure in a harsh temperature or radiation environment.

In compliance with NRC Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," PG&E developed and committed to an integrated plan to install reliable SFP level instrumentation by October 19, 2015 for Unit 1, and May 31, 2016 for Unit 2 in PG&E letter DCL-13-011, dated February 27, 2013.⁷ The design of the instruments is currently under development and will be consistent with the guidelines of the NRC endorsed NEI 12-02 "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation.'"

2. Please provide a progress report on the transfer of spent fuel from pools into dry casks (in compliance with NRC spent fuel cask and pool storage requirements). (Diablo Canyon, SONGS)

DCPP utilizes a mix of wet and dry storage technology for the interim storage of spent nuclear fuel. Once spent nuclear fuel is discharged from the reactor, it is stored for a minimum of five years in the spent fuel pools prior to becoming a candidate for placement into the dry storage system.

PG&E intends to perform cask loading campaigns in 2013 to remove sufficient spent fuel from the pools to provide an operational buffer that would allow a cycle of performing loading campaigns every other year.

3. Please provide an updated evaluation of the potential long-term impacts and projected costs of spent fuel storage in pools versus dry cask storage of higher burn-up fuels in densely packed pools, and the potential degradation of fuels and package integrity during long-term wet and dry storage and transportation offsite. (Diablo Canyon, SONGS)

The operational cost of maintaining the dry storage facility is approximately \$2.5 million annually. This cost includes security and operational support. PG&E does not have specific numbers for the cost to maintain and operate the systems that support the spent fuel pool operation.

Cost/benefit studies have not been developed for the long-term storage of spent nuclear fuel at the DCPP site. It is assumed in budget development that PG&E will store spent nuclear fuel on site until the United States (US) Department of Energy (DOE) is ready to perform the removal of the spent fuel. Estimates of Direct Cost for movement of spent nuclear fuel into dry storage have

⁷ See <http://pbadupws.nrc.gov/docs/ML1305/ML13059A500.pdf>

been developed and planned for the near-term operating budgets. PG&E has developed a dry storage facility that is licensed and permitted to store all of the spent nuclear fuel generated during the 40 year licensed life of DCP. It is still PG&E's position that the facility is an interim solution until the DOE assumes their responsibility and collects the fuel for reprocessing or long-term storage.

Risk has been addressed during the licensing process. DCP has a site specific license in which the environmental effects and consequences of spent fuel storage have been addressed.

Please refer to the 10 CFR Part 50 and Part 72 environmental impact reports for specific information.

PG&E has not performed any studies in consideration of returning the spent fuel pools to the storage levels conceived during the original plant licensing.

C. Station Blackout

1. Please provide a progress report in addressing the lessons learned from the station blackout at the Fukushima Daiichi Nuclear Power Plant and how well-equipped the plants are to safely withstand a station blackout lasting longer than seven days. Include in the progress report:
a. any significant changes, including estimated costs, associated with NRC requirements to address station blackout; and
b. arrangements for accessing emergency backup generation and fuel, responding to multiple unit events, seismically and flooding protected equipment and addressing the lessons learned from Fukushima. (Diablo Canyon, SONGS)

Following the accident at the Fukushima Daiichi Nuclear power plant resulting from the March 11, 2011 Great Tōhoku Earthquake and subsequent tsunami, the NRC initiated lessons learned evaluations for U.S. nuclear plants. The NRC established the Near-Term Task Force (NTTF) to develop a comprehensive set of recommendations using defense-in-depth concepts of prevention, mitigation, and emergency preparedness (EP). These recommendations were prioritized into three tiers. The first tier consists of those recommendations which the NRC determined should be started without unnecessary delay.

PG&E is currently addressing Tier 1 recommendations.

The Tier 1 recommendations are the following:

- 2.1 Seismic and flood hazard reevaluations
- 2.3 Seismic and flood walkdowns
- 4.1 Station blackout (SBO) regulatory actions
- 4.2 Equipment covered under Title 10 of the Code of Federal Regulations (10 CFR) 50.54(hh)(2) (FLEX)
- 7.1 SFP instrumentation

- 8 Strengthening and integration of emergency operating procedures, severe accident management guidelines (SAMGs), and extensive damage mitigation guidelines
- 9.3 Emergency preparedness regulatory actions (staffing and communications)

Recommendation 2.1/2.3: Seismic

DCPP Unit 1 seismic walkdowns of accessible components were completed in November 2012. The results of these walkdowns were provided to the NRC in PG&E letter DCL-12-118 dated November 27, 2012. None of the walkdown findings were determined to have any adverse effect on the performance of any required safety function. There are no planned or newly-installed changes to Unit 1. Components that were inaccessible will be walked down at a later date.

DCPP Unit 2 seismic walkdowns of accessible components were completed in November, 2012. The results of these walkdowns were provided to the NRC in PG&E letter DCL-12-119 dated November 27, 2012.⁸ None of the walkdown findings were determined to have any adverse effect on the performance of any required safety function.

DCPP Unit 2 seismic walkdowns of inaccessible components were completed in April 2013. None of the walkdown findings were determined to have any adverse effect on the performance of any required safety function. Results of these walkdowns will be provided to the NRC by May 2013.

Recommendation 2.1/2.3: Flooding

The DCPP flooding walkdowns were completed in November, 2012. The results of the flooding design basis walkdowns were provided to the NRC in PG&E letter DCL-12-114 dated November 27, 2012.⁹ No vulnerabilities were identified to external flooding at DCPP and no design changes or further actions were determined to be required.

Recommendation 4.1: SBO

The NRC published a notice in the Federal Register seeking public comment on the draft regulatory basis to amend current requirements for plants to safely withstand a SBO. The NRC is amending the station blackout rule based on lessons learned from the accident in Fukushima. At this point in time, final NRC rulemaking on SBO mitigation strategies has not been issued.

Recommendation 4.2: FLEX

An overall integrated plan providing DCPP's approach for providing mitigation strategies for beyond-design-basis external events in accordance with NTTF Recommendations was developed and submitted to the NRC in PG&E letter DCL-13-007 dated February 27, 2013.¹⁰ These

⁸ See <http://pbadupws.nrc.gov/docs/ML1233/ML12333A270.pdf>

⁹ See <http://pbadupws.nrc.gov/docs/ML1233/ML12333A145.pdf>

¹⁰ See <http://pbadupws.nrc.gov/docs/ML1305/ML13059A501.pdf>

strategies rely on installed plant equipment as well as onsite and offsite portable (FLEX) equipment. These strategies will be implemented by October 30, 2015 for Unit 1 and May 31, 2016 for Unit 2.

Recommendation 7.1: SFP Instrumentation

For PG&E's plans for providing reliable spent fuel pool instrumentation in accordance with NRC Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," please see discussion under Progress in Completing 2011 IEPR Recommendations section B.1.

Recommendation 8: Onsite Emergency Response Capability

An advance notice of public rulemaking regarding onsite emergency response capabilities was issued by the NRC May 3, 2012. At this point in time, final NRC rulemaking on onsite emergency response capabilities has not been issued.

Recommendation 9.3: Staffing

The DCPD phase 1 staffing study was completed in March, 2013 and provided to the NRC in PG&E letter DCL-13-040 dated April 24, 2013. The results of this study found: 1) the minimum on-shift staffing is sufficient to support the implementation of current DCPD procedures simultaneously for Units 1 and 2 with no collateral duties; 2) DCPD has the staffing needed to support an expanded response capability for a beyond-design-basis external event; and 3) procedures will need to be enhanced to integrate the expanded response and transportation capabilities.

Recommendation 9.3: Communications

In accordance with NTTF Recommendations, results of the assessment to review DCPD's capability of Emergency Preparedness communications systems to perform their intended function during a large-scale loss of AC power event were submitted to the NRC in PG&E letter DCL-12-110 dated October 29, 2012.

Based on this assessment enhancements will be implemented, which include additional phones, radios, radio console, and communications trailers. These enhancements will be implemented in two phases. The satellite phone "footballs" and communication trailers will be implemented by December 31, 2013. The remaining enhancements will be implemented by October 27, 2015.

2. Please provide a progress report on the adequacy of trained people, equipment, and external support, including written agreements, for providing emergency power equipment and fuel for handling an extended station blackout. (Diablo Canyon, SONGS)

The adequacy of trained people, equipment, and external support for providing emergency power equipment and fuel for handling an extended station blackout are addressed under the NRC

Near-Term Task Force Recommendations. For PG&E's plans for addressing Tier 1 NTTF recommendations, please see discussion under C.1.

D. Nuclear Plant Liability Coverage

1. Please provide the comprehensive study on the adequacy of Price-Anderson Act liability coverage for a severe event. (Diablo Canyon, SONGS)

PG&E has not conducted such a study, but PG&E purchases the maximum limits for Diablo Canyon Power Plant as required based on criteria in 10CFR140.11. PG&E provides the following information on the four types of nuclear liability coverage it purchases from American Nuclear Insurers (ANI). They are:

- Facility Form Policy
- Secondary Financial Protection (SFP) Policy
- Master Worker Policy
- Supplier and Transporters Policy

ANI Facility Form Policy is purchased by all commercial nuclear power plant operators in the United States and satisfies the Price-Anderson Act requirement for primary financial protection.

Coverage under this policy is limited to liability for bodily injury or offsite property damage caused by nuclear material at the defined location. No coverage is afforded for damage to any property on site. The policy also excludes coverage for workers' compensation or employers' liability.

The maximum limit written under the Facility Form Policy is \$375 million. PG&E purchases the maximum limits for Diablo Canyon Power Plant as required based on criteria in 10CFR140.11. PG&E purchases \$53 million of nuclear liability coverage for the Humboldt Bay Power Plant. This amount is based on criteria in 10CFR140.12 "Amount of financial protection required for other reactors".

The SFP Policy is used by the operators of nuclear power plants that produce >100 MWe to meet financial protection requirements under the Price-Anderson Act. The policy provides "following form" Coverage for losses that exceed the primary limit available under the Facility Form Policy and the Master Worker Policy. Diablo Canyon Units 1 and 2 each has a certificate to the SFP program. There are currently 104 power reactors in the SFP program and the \$117.495 million per reactor maximum retrospective premium call results in an approximately \$12.2 billion layer of insurance. The total protection amount for nuclear claims at Diablo Canyon is equal to the primary and SFP program for a total of approximately \$12.6 billion.

Humboldt Bay is not enrolled in the SFP program because it was designed to produce less than 100 MWe. The NRC Indemnity agreement is still applicable at Humboldt Bay and provides an indemnity from the NRC above the ANI facility form to a total amount of \$560 million.

The Master Worker Policy covers radiation cross party tort claims of nuclear workers employed at facilities insured by ANI. This master policy provides a guaranteed cost, industry aggregate limit of \$375 million.

The Suppliers & Transporters Policy is purchased by companies that provide products or services to operator of nuclear facilities in the US. The policy is also purchased by the operators of nuclear facilities to provide stopgap coverage to the Facility Form Policy. The policy is designed primarily to apply excess of the limit available under someone else's Facility Form Policy up to a maximum combined limit of \$375 million under all policies that may apply to the same occurrence.

The Nuclear Liability coverage provided by ANI does not have any specific exclusions for natural disasters. The coverage trigger for the ANI policies is that there is third party offsite bodily injury or property damage arising out of the nuclear energy hazard.

The ANI policies are nuclear liability policies and will respond to the type of losses listed above as long as the request for damage is from bodily injury or property damage. Business Interruption of fisheries, wineries, etc. would be a property damage claim and would be expected to be covered.

All ANI policies are written on a guaranteed cost basis. There is no deductible option available.

The ANI policy only responds to Covered Environmental Clean-Up Costs as specifically defined in the policies. These costs are only covered in the event of a transportation incident or "Extraordinary Nuclear Occurrence" as defined by the Atomic Energy Act of 1954.

In addition, PG&E purchases nuclear property, decontamination and debris removal insurance from Nuclear Energy Insurance Limited (NEIL) to address loss to the site itself. PG&E purchases the maximum property coverage offered by NEIL for Diablo Canyon in the amount of \$2,750 million with a deductible of \$2.5 million for nuclear events and \$1,500 million with a deductible of \$2.5 million for non-nuclear events. PG&E purchases \$131 million damage insurance for Humboldt Bay Unit 3 with a \$1 million deductible. These policies have decontamination and debris removal coverage for damage on-site.

PG&E also purchases accidental outage extra expense coverage for DCPD from NEIL. The maximum coverage is \$490 million for an outage caused by a nuclear event and \$327 million for a non-nuclear event. The coverage has a waiting period or deductible of 12 weeks.

The ANI policies have no exclusion for Terrorism. Therefore, the ANI policies will respond to a Terrorism event [certified or non-certified] just as it would for any other event. As stated above, the ANI policies are all written on a guaranteed cost basis.

The property insurance purchased by PG&E for Diablo Canyon and Humboldt Bay Power Plants will respond in the event of non-certified acts (as defined by the Terrorism Risk Insurance Act)

for terrorism-related losses, including replacement power costs Diablo Canyon. If one or more acts of terrorism cause property damage covered under any of the nuclear insurance policies issued by NEIL to any NEIL member with a 12-month period, the maximum recovery under all those nuclear insurance policies may not exceed \$3.2 billion plus the additional amounts recovered by NEIL for these losses from re-insurance.

E. Fukushima Lessons Learned

1. Please provide a progress report and cost estimate for carrying out the recommendations of the NRC Near-Term Fukushima Task Force Report, including orders for Mitigation Strategies to Respond to Extreme Natural Events Resulting in the Loss of Power at Plants and for Enhancing Spent Fuel Pool Instrumentation. (Diablo Canyon, SONGS)

For PG&E's plans for addressing the recommendations of the NRC Near-Term Fukushima Task Force Report, including orders for Mitigation Strategies to Respond to Extreme Natural Events Resulting in the Loss of Power at Plants and for Enhancing Spent Fuel Pool Instrumentation please see discussion under C.1.

2. Please provide a progress report on the adequacy of resources, training, and equipment to cope with severe plant events including a station blackout combined with natural or man-made events (earthquake, flooding, fires, or terrorist attack). Include a discussion of the availability of:

- a. seismically robust and flood protected essential safety systems and equipment;***
- b. suitably shielded, ventilated, and well-equipped facilities needed for the workers to manage the accident;***
- c. ability to respond to multiple events and multiple-unit events; and***
- d. trained onsite and offsite responders for a long-term station blackout or loss of all heat sinks. (Diablo Canyon, SONGS)***

The adequacy of resources, training, and equipment to cope with severe plant events including a station blackout combined with natural or man-made events (earthquake, flooding, fires, or terrorist attack) are addressed under the recommendations of the NRC Near-Term Task Force Report. For PG&E's plans for addressing Tier 1 NTTF recommendations, please see discussion under C.1.

F. Plant Safety

1. Please provide a status report on efforts to improve the safety culture at Diablo Canyon and SONGS and on the NRC's evaluation of these efforts and overall plant performance. (Diablo Canyon) (SONGS - see also AB1632 Report/2008 IEPR H.1))

An independent safety culture assessment is performed approximately every two years at DCP by Utilities Service Alliance (USA). This assessment was performed in 2010 and again in 2012. The 2010 assessment determined overall that Diablo Canyon has a strong nuclear safety culture. The team identified one weakness during the 2010 assessment, that being some degree of

mistrust challenges the station. This issue was entered into the corrective action program and resulted in the creation and implementation of an organizational trust improvement plan.

The 2012 survey was performed in the first quarter of 2012. Overall, the USA assessment team noted that DCPD has a strong nuclear safety culture, a healthy respect for nuclear safety, and that nuclear safety is not compromised by production priorities. The team evaluated the weakness previously identified in the 2010 assessment and determined this issue was addressed and there were no continuing concerns with this attribute. The team identified no weaknesses during the 2012 assessment.

In 2011, as part of evaluating a number of NRC inspection findings in the area of security, a critical examination of NRC safety culture components was conducted and a safety culture survey was performed. The results of the evaluation suggested the safety culture within a few DCPD organizations appeared to be challenged in one or more areas. A safety culture improvement plan was created and implemented that contained actions specifically addressing decision making processes, employee engagement, identification and resolutions of organizational contributors to problems, safety concerns, management engagement and recognition of employee contributions, management of change, and interaction between management and employees. In addition, a site procedure was developed and implemented which provides the process and guidance for assessing and reporting the health of the nuclear safety culture at DCPD.

In the first quarter of 2010, the NRC identified a weakness associated with evaluation thoroughness. This resulted in the NRC opening a substantive cross-cutting issue (SCCI) in the problem identification and resolution area associated with the aspect of thoroughness of problem evaluation. In response to this issue, DCPD performed a root cause analysis, the action from which included improved governance of evaluation activities, improved procedures for evaluation activities, and enhanced training for personnel involved in performing, overseeing, and approving evaluation activities and products.

In July and December 2011, the NRC performed inspections of PG&E's root cause analysis and corrective actions for the SCCI. The inspectors determined that PG&E had made significant changes to programs, processes and procedures to address the SCCI. The inspectors noted an overall positive performance trend in DCPD's implementation of the revised processes such that evaluations were more complete, thorough, and accurate. DCPD performance in the area of problem evaluation has continued to show improved performance, with only one violation issued in the past 12 months with a cross-cutting aspect of problem evaluation. This performance indicates the sustained effectiveness of the corrective actions taken by DCPD to address the previously identified cross-cutting issue. The NRC annual assessment letter for Diablo Canyon dated March 5, 2012 for period January 1, 2011 through December 31, 2011 stated that Diablo Canyon staff had identified appropriate root causes and took appropriate corrective action and performance has shown sustained improvement over the last year and that the NRC closed this SCCI.

Actions specific to maintaining emergency power and back-up cooling are being addressed using industry guidance from the Nuclear Energy Institute (NEI) for addressing emergency operational response. Development of this guidance is in-progress and is being developed in response to the 2011 post-Fukushima nuclear power plant event in Japan.

DCPP, working with the U.S. nuclear industry and NEI has proposed a strategy which provides a range of portable equipment for nuclear plants to maintain cooling capability and power during severe natural events.¹¹ Implementation of this strategy will be consistent with industry guidance and regulations.

Finally, with respect to safety culture, DCPP has implemented an industry initiative on safety culture sponsored by the NEI. Specifically, NEI provided guidance describing an industry approach to assessing and addressing nuclear safety culture issues. DCPP continues to follow the NEI initiative into 2013.

The NRC completed its end-of-cycle performance review of DCPP on March 4, 2013. The review included the most recent quarterly performance indicators in addition to inspection results and enforcement actions from January 1, 2012 through December 31, 2012. The NRC determined that overall, Diablo Canyon operated in a manner that preserved public health and safety. All inspection findings had very low safety significance and all performance indicators were within the nominal expected range.

Other Issues

A. Environmental Impacts – Diablo Canyon

1. Please provide the following information:

a. documentation to support PG&E's 2009 conclusion that the environmental impacts associated with tritium contamination in the groundwater are SMALL17 by NRC standards;

On February 13, 2008; the NRC issued "Regulatory Issue Summary (RIS) 2008-03, Return/Re-use of Previously Discharged Radioactive Effluents".

On page 3 of the RIS 2008-03, the document states as an example:

"In the second scenario, a licensee disposes of radioactive material within gaseous effluents to the atmosphere in accordance with 10CFR20.2001(a)(3), and that radioactive material returns to the licensed facility as part of a natural process, such as rainfall, or through equipment condensation. The radioactive material is subsequently discharged through a drain line to a receiving body of water in the unrestricted area. The licensee has evaluated the radiological hazards to members of the public with the same results as in the first scenario. Thus, the subsequent discharge of this radioactive material would not be subject to additional disposal requirements, provided that the concentration of radioactive material in the discharge remains

¹¹ See <http://safetyfirst.nei.org/industry-actions/industry-presents-new-strategy-to-increase-safety-address-nrcs-post-fukushima-recommendations/>

within the 10CFR30 exempt concentration limits and that the discharge of such water does not involve the entraining of any unaccounted for radioactive materials."

The 10CFR30 exempt concentration for tritium (H3) in liquid is $3\text{E-}2$ uCi/ml which is equivalent to $3\text{E}7$ pCi/L (30,000,000 pCi/L). The highest historical tritium concentration detected in shallow monitoring wells around the DCPD power block and reported in the AREOR was 64,800 pCi/L in February 2011. The maximum detected tritium concentration in these shallow monitoring wells is a factor of over 460 times lower than the 10CFR30 exempt concentration value for tritium.

All other groundwater monitoring wells tritium results have been well below the Environmental Protection Agency's (EPA) *Drinking Water* standard of 20,000 pCi/L.

Further explanation of the NRC stance on tritium and groundwater can be found at:
<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/tritium-radiation-fs.html>

As stated in the 2010, 2011, and 2012 AREOR, the subsurface water (groundwater) located below the DCPD power block is not used as a source of drinking water. The DCPD site groundwater gradient analysis has determined that any groundwater located beneath the DCPD power block flows toward and discharges into the Pacific Ocean.

b. a discussion of any new information since 2009 that may alter the above referenced conclusion (e.g., increased tritium contamination in the groundwater, new or previously undiscovered sources of tritium contamination, etc.);

There is no new information that would alter the above referenced conclusion.

c. the suspected source(s) of the tritium discovered and how that determination was made;

As stated in the 2010, 2011, and 2012 AREOR's (Section 5), tritium detected in the shallow monitoring wells around the site has been evaluated and attributed to rain-washout of gaseous tritium exiting the plant vent systems via an approved and monitored radioactive effluents discharge pathway.

DCPD REMP has conducted rain-washout studies to document this phenomenon (2011 and 2012 AREOR Section 5.2).

The 2011 and 2012 Annual Radiological Effluents Release Report (ARERR) also discusses this phenomenon with references to sampling and analysis of the Auxiliary building roof drains. The ARERR also attributes monitoring well tritium to rain-washout of gaseous tritium exiting the plant vent systems via an approved and monitored radioactive effluents discharge pathway.

d. how PG&E concluded that tritium found in groundwater at DCPD does not indicate a leak from the spent fuel pool;

DCPP REMP has conducted rain-washout studies to document this phenomenon (2011 and 2012 AREOR Section 5.2).

Both U-1 and U-2 spent fuel pools have an external plenum completely surrounding the liners of the spent fuel pools. These plenums have spent fuel pool leak detection systems to detect any leakage from the spent fuel pools. Any possible leakage from the spent fuel pools would be detected by these systems. Any leakage would be entered into the DCPP corrective action program (CAP) for evaluation and resolution.

The DCPP spent fuel pools are also completely enclosed within the fuel handling building. The fuel handling building has floor drains and internal systems that connect with the radwaste processing system. Any possible leakage into the fuel handling building from the spent fuel pools would be contained within the building.

e. National Pollutant Discharge Elimination System (NPDES) Annual Summary Reports on Discharge Monitoring at DCPP for 2009 through 2012;

Please see the following attachments on CD#3:

Attachment 11: 2009 Annual Summary Report on Discharge Monitoring at the Diablo Canyon Power Plant;

Attachment 12: 2010 Annual Summary Report on Discharge Monitoring at the Diablo Canyon Power Plant;

Attachment 13: 2011 Annual Summary Report on Discharge Monitoring at the Diablo Canyon Power Plant; and

Attachment 14: 2012 Annual Summary Report on Discharge Monitoring at the Diablo Canyon Power Plant.

f. a determination of whether the levels of tritium have increased in site groundwater between 2008 and 2012;

The levels of tritium detected in the DCPP shallow monitoring wells (groundwater) have remained constant, evaluated, and attributed to normal rain-water wash out variances. There have been no indications of DCPP system leaks or spills contributing tritium to groundwater.

g. the status of remediation, if any, for tritium contamination below the DCPP facility;

No remediation is necessary.

h. an explanation of why PG&E believes tritium contamination beneath the powerblock and in the groundwater at DCPP does not pose a health risk to the public or employees of DCPP;

The tritium has been detected in low concentrations within shallow monitoring wells around the power block. These detected concentrations are all conservatively below regulatory limits.

The site groundwater gradient analysis (see 2012 AREOR section 5.0) has evaluated that any groundwater movement from these wells would flow toward and discharge into the Pacific Ocean.

The groundwater located beneath the DCPD power block is not used as a source of drinking water nor is it expected to be used as a future source of drinking water.

i. an explanation of why PG&E believes DCPD site releases of tritiated water above 400 pCi/L do not have a harmful effect on living organisms in the marine environment (e.g., causing genetic damage or by transport along the food chain); and

Federal regulations and DCPD License Bases regarding environmental isotopic releases (including tritium) are based on National Council on Radiation Protection (NCRP) and International Commission on Radiological Protection (ICRP) recommendations. DCPD isotopic effluent releases are typically < 0.1% of license technical specifications.

j. documentation demonstrating how DCPD site releases of tritiated groundwater or tritiated stormwater are in compliance with the NPDES permit and the Clean Water Act, the NRC operating license and EPA standards (e.g., meeting concentration limits for release into the general environment).

On February 13, 2008; the NRC issued "Regulatory Issue Summary (RIS) 2008-03, Return/Re-use of Previously Discharged Radioactive Effluents".

On page 3 of the RIS 2008-03, the document states as an example:

"In the second scenario, a licensee disposes of radioactive material within gaseous effluents to the atmosphere in accordance with 10CFR20.2001(a)(3), and that radioactive material returns to the licensed facility as part of a natural process, such as rainfall, or through equipment condensation. The radioactive material is subsequently discharged through a drain line to a receiving body of water in the unrestricted area. The licensee has evaluated the radiological hazards to members of the public with the same results as in the first scenario. Thus, the subsequent discharge of this radioactive material would not be subject to additional disposal requirements, provided that the concentration of radioactive material in the discharge remains within the 10CFR30 exempt concentration limits and that the discharge of such water does not involve the entraining of any unaccounted for radioactive materials."

The 10CFR30 exempt concentration for tritium (H3) in liquid is 3E-2 uCi/ml which is equivalent to 3E7 pCi/L (30,000,000 pCi/L). The highest historical tritium concentration detected in shallow monitoring wells around the DCPD power block and reported in the AREOR was 64,800 pCi/L in February 2011. The maximum detected tritium concentration in these shallow

monitoring wells is a factor of over 460 times lower than the 10CFR30 exempt concentration value for tritium.

B. Presence of the Shoreline Fault (offshore of San Luis Obispo County)

1. Please provide documentation to support PG&E's conclusion that the presence of the Shoreline fault is still not considered significant, including any new information since 2009;

As shown in the PGE&E 2011 Shoreline Fault report, the presence of the Shoreline Fault does affect the seismic hazard at DCPD: the Shoreline Fault contributes about 20% of the probabilistic hazard for high frequency ground motion at DCPD. PG&E also showed that DCPD has been previously evaluated and found to have adequate margin for ground shaking that is larger than deterministic ground motion levels estimated for the full rupture of the Shoreline Fault.

The reasons for this is that the models for estimating the strength of the ground motion from a given earthquake have improved since the earlier DCPD evaluations due to large increases in the data sets of ground motions close to large earthquakes. The models based on the expended data sets show that the earlier DCPD evaluations over-estimated the strength of the ground motion. So although the Shoreline Fault is located closer to DCPD than the Hosgri Fault, the new models show that that ground motion from the Shoreline Fault is lower than 1977 estimates of the ground motion from the Hosgri Fault used for the design of DCPD.

The presence of the Shoreline Fault is significant to the seismic hazard at DCPD, but the ground motion from the Shoreline Fault is already bounded by the current design basis.

2. Please explain the apparent discrepancies between the Hardebeck Report and PG&E's assertions about the Shoreline fault (i.e., low or no potential for interaction between the Shoreline and the Hosgri faults).

The apparent discrepancy between the Hardebeck paper and the PG&E study results from these two studies addressing different questions. The Hardebeck paper asked if a joint rupture of the Shoreline and Hosgri Faults is possible. The PG&E 2011 Shoreline fault report asked if the chance of a joint rupture of the Hosgri and Shoreline Faults that includes the part of the Shoreline Fault nearest DCPD (such that it affects the ground motion at DCPD) is significant relative to the chance of separate ruptures.

Hardebeck concluded that the Hosgri and Shoreline Faults are connected and that a joint rupture is possible. PG&E concluded that the Hosgri and Shoreline Fault may be connected, but that a joint rupture which includes the part of the Shoreline Fault closest to DCPD is negligible, given the fault geometries (differences in strikes), sense of slip, and direction of principal stress in the region. The PG&E conclusions were based on the Kame et al. (2003) study (see CD#3, Attachment 15) that used 2D dynamic rupture models that evaluate multi-fault ruptures for strike-slip faults for a range of geometries and on a review of the observations of multi-fault ruptures around the world. The Kame et al. study showed that the geometry of the Hosgri and

Shoreline Faults and direction of principal stress did not favor joint ruptures of the two faults and if there was joint rupture, it only involved a few kilometers of the splay fault.

More recently, at the recent SWUS ground motion characterization workshop #1, Harris (2013) (see CD#3, Attachment 16) found similar results as part of dynamic rupture modeling being conducted by the Southern California Earthquake Center (SCEC) dynamic rupture technical activity group. This group used multiple computer programs with different modeling approaches to evaluate the splay fault ruptures using 3D dynamic rupture models. For the Hosgri-Shoreline Fault geometry, they found that the rupture onto the Shoreline Fault was limited to a few kilometers, consistent with the Kame et al. results. So, if there is a joint rupture, the small part of the Shoreline Fault that is involved in the joint rupture is located too far from DCPD to affect the ground motion at the site and does not affect the level of the ground motion at the DCPD site.

If it is possible for joint ruptures, it may seem that a reasonable approach would be to assume that joint rupture occurs regardless of its likelihood; however, as explained below, this is not a conservative assumption.

The NRC evaluates the seismic safety of power plants using a risk-informed regulation approach which requires a PSHA. A PSHA depends on magnitude, location, and rates of earthquakes and their resulting ground motion. In the DCPD PSHA, the total energy released in earthquakes on faults is constrained by geologic data. The energy can be released in rare large earthquakes or in more frequent moderate magnitude earthquakes (or some combination of the two). Although larger magnitude earthquakes lead to larger ground motions on average, there is large variability of the ground motion so that in some cases, moderate magnitude earthquakes can lead to higher ground motions than from larger magnitude earthquakes, particularly at short distances. As a result, assuming larger magnitude earthquakes occur on the Shoreline Fault due to joint rupture with the Hosgri Fault is not a conservative assumption: it leads to a reduction in the probabilistic hazard. The assumptions of separate rupture used by PG&E in the 2011 Shoreline Report is a conservative assumption for the probabilistic hazard and better represents that expected behavior of the Shoreline and Hosgri Faults based on the results of the dynamic rupture models.

PG&E is currently updating its seismic hazard analysis per a NRC request to all US nuclear power plants. Dr. Hardebeck presented her paper at the seismic source characterization workshop #2 and her position along with other fault models are currently being evaluated for impact on the seismic hazard update.

3. Discuss the implications for seismic hazard at Diablo Canyon related to the design basis of the plant, and how PG&E will address this issue in future seismic research plans.

Please see PG&E's response to Question B.1. above.

B. Environmental Impacts – SONGS – Not Applicable to PG&E

C. Evacuation Planning

1. PG&E's response to the 2009 Nuclear Power Plant Data Request M.6 indicated that another full update of the Evacuation Time Assessment (ETA) for Transient and Permanent Population from Various Areas Within the Plume Exposure Pathway Emergency Planning Zone would be prepared in 2012. Please provide a copy of the full update of the assessment reflecting 2010 census data and including a comparative assessment of the evacuation time estimates following an earthquake event. (Diablo Canyon)

An updated Evacuation Time Estimate (ETE) report, which did not include an ETE following a seismic event, was submitted to the Nuclear Regulatory Commission (NRC) in December 2012. Per NRC regulation there is a six month timeframe in which the NRC has an opportunity to review and comment on the report. At the end of the six month timeframe the utility can finalize and implement the report, with or without having received comments from the NRC. DCPD plans on finalizing the report and to begin implementation in June 2013. The current version of the report, as provided on April 18, 2013, to San Luis Obispo County, is provided on CD#3, Attachment 17.

2. SCE's response to the 2009 Nuclear Power Plant Data Request M.6 indicated that as a matter of good emergency planning practice, an Evacuation Time Estimate (ETE) is conducted at SONGS approximately every six years. An ETE was performed in June 2007 by Wilbur Smith Associates. Please provide an updated Evacuation Time Estimate (ETE) for 2013 including earthquake assumptions, road closures and updated population data, transportation facilities, schools and special institutions, and the emergency response of the various jurisdictions in the SONGS EPZ. (SONGS)

Not Applicable to PG&E.

D. Spent Nuclear Fuel Generation

1. Please provide any updates to Table 12: Waste Generated at Diablo Canyon (Units 1 and 2) and SONGS (Unit 1, 2 and Unit 3) from the AB 1632 Assessment of California's Operating Nuclear Plants: Final Report, October 2008 (CEC-100-2008-005-F, page 213). (Diablo Canyon, SONGS)

Table 12: Waste Generated at Diablo Canyon (Units 1 and 2)

| | | Spent Fuel | | Low-Level Waste | |
|---------------|-------------------------------------|---------------------|--------------------------|----------------------------|-------------------------|
| | | (No. of Assemblies) | (Metric Tons of Uranium) | Class C (ft ³) | GTCC (ft ³) |
| Diablo Canyon | Total Generated through 2011 | 2676 | 1150.68 | 1023 | unknown |
| | 2012 Through end of initial license | 1704 | 732.72 | 1,320 to 2,790 | unknown |
| | License Extension | 2194 | 943.42 | 1,760 to 3,720 | unknown |
| | Decommissioning | 0 | 0 | 1,148 | 866 |
| | Total | 6574 | 2826.82 | 5,251 to 8,681 | 866 |

E. Spent Nuclear Fuel Storage

1. Please provide any updates to Table 14: On-Site Spent Fuel Capacity (number of assemblies) from the AB 1632 Assessment of California's Operating Nuclear Plants: Final Report, October 2008 (CEC-100-2008-005-F, page 217).

Table 14: On-Site Spent Fuel Storage Capacity for Diablo Canyon (number of assemblies)

| | Diablo Canyon | |
|--|---------------|---------|
| | Assemblies | MTU |
| ISFSI Capacity | 1,216 | 522.88 |
| Planned Expansions | 3200 | 1376.0 |
| Total Planned ISFSI Capacity | 4,416 | 1898.88 |
| Spent Fuel Pool Current Capacity | 2,621 | 1127.03 |
| Total On-site Storage Capacity | 7,037 | 3025.91 |
| Assemblies Generated during Current Licensing period | 4,380 | 1883.4 |
| Spent Fuel Pool Original Design Capacity (Before re-racking) | 540 | 232.2 |

III. TABLE OF ENCLOSURES

The table below lists all enclosures to this document, in order of reference in the text.

| <i>Attachment</i> | <i>Title</i> |
|------------------------|--|
| CD#1, Attachment 1 | DCPP 3D/2D Seismic-Reflection Investigation of Structures Associated with the Northern Shoreline Seismicity Sublineament of the Point Buchon Region, PG&E GEO.DCPP.TR.12.01 R0 |
| CD#2, Attachment 2 | Report on the Analysis of the Shoreline Fault Zone, Central Coastal California (PG&E, 2011-NRC Docket No. 50-275 and 50-323; DCL-11-005 |
| CD#3, Attachment 3 | IPRP Report No. 1 |
| CD#3, Attachment 4 | IPRP Report No. 2 |
| CD#3, Attachment 5 | PG&E's Response to IPRP Report No. 2 |
| CD#3, Attachment 6 | IPRP Report No. 3 |
| CD#3, Attachment 7 | PG&E's Response to IPRP Report No. 3 |
| CD#3, Attachment 8 | IPRP Report No. 4 |
| CD#3, Attachment 9 | IPRP Report No. 5 |
| CD#3, Attachment 10 | PG&E's Response to IPRP Report No. 5 |
| CD#3, Attachment 11 | 2009 Annual Summary Report on Discharge Monitoring at the Diablo Canyon Power Plant |
| CD#3, Attachment 12 | 2010 Annual Summary Report on Discharge Monitoring at the Diablo Canyon Power Plant |
| CD#3, Attachment 13 | 2011 Annual Summary Report on Discharge Monitoring at the Diablo Canyon Power Plant |
| CD#3, Attachment 14 | 2012 Annual Summary Report on Discharge Monitoring at the Diablo Canyon Power Plant |
| CD#3, Attachment 15 | Appendix J: Analysis of Inhibition of Faulting at Fault Branches |
| CD#3, Attachment 16 | The SCEC/USGS Rupture Dynamics -- Code Comparison Exercise |
| CD#3, Attachment 17 | DCL-13-039: Evacuation Time Estimate Study - Diablo Canyon Power Plant Development of Evacuation Time Estimates for Each Protective Action Zone |

IV. CONCLUSION

Please feel free to contact me with any questions you may have on PG&E's responses to this data request.

Sincerely,

/s/

Valerie J. Winn

cc: S. Korosec by email (Suzanne.korosec@[energy.ca.gov](mailto:Suzanne.korosec@energy.ca.gov))
L. Green by email (lynette.green@energy.ca.gov)
J. Walter by email (joan.walter@energy.ca.gov)