NRC FORM 464 Part I (01-2015)

U.S. NUCLEAR REGULATORY COMMISSION

RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) / PRIVACY ACT (PA) REQUEST

FOIA/PA	RESPONSE NUMBER
2015-0071	1

RESPONSE TYPE ☐ INTERIM ☑ FINAL

REQUESTER: Damon Moglen

DATE:

PART I. -- INFORMATION RELEASED

☐ No additional agency records subject to the request have been located.

☐ Requested records are available through another public distribution program. See Comments section.

☑ GROUP A — Agency records subject to the request that are identified in the specified group are already available in public ADAMS or on microfiche in the NRC Public Document Room.

☑ GROUP B, C — Agency records subject to the request that are contained in the specified group are being made available in public ADAMS.

☑ GROUP B, C — Agency records subject to the request are enclosed.

☐ Records subject to the request that contain information originated by or of interest to another Federal agency have been referred to that agency (see comments section) for a disclosure determination and direct response to you.

☐ We are continuing to process your request.

☑ See Comments.

PART I.A -- FEES

AMOUNT*
$
* See comments for details

☐ You will be billed by NRC for the amount listed.

☐ You will receive a refund for the amount listed.

☐ None. Minimum fee threshold not met.

☑ Fees waived.

PART I.B -- INFORMATION NOT LOCATED OR WITHHELD FROM DISCLOSURE

☐ We did not locate any agency records responsive to your request. *Note*: Congress allowed agencies to treat three discrete categories of law enforcement and national security records as not subject to the FOIA ("exclusions"). *See* 5 U.S.C. 552(c). This is a standard notification that we give to all requesters; it should not be taken as an indication that any of these excluded records do, or do not, exist.

☑ We have withheld certain information in the records from disclosure pursuant to the FOIA exemptions described, and for the reasons stated, in Part II.

☐ Because this is an interim response to your request, you may not appeal this determination at this time. We will notify you of your right to appeal any of the responses we have issued in response to your request when we issue our final determination on your request.

☑ You may appeal this final determination within 30 calendar days of the date of this response, by writing to the FOIA Officer, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001. Please be sure to mark your letter/envelope or email that it is a "FOIA Appeal."

PART I.C COMMENTS (Use attached Comments continuation page if required)

The incoming request will be made available in ADAMS as ML14335A177. Records with an ML accession number are publicly available in the NRC's Public Electronic Reading Room at http://www.nrc.gov/reading-rm.html. If you need assistance in obtaining these records, please contact the NRC's Public Document Room (PDR) at 301-415-4737, or 1-800-397-4209, or by email to PDR.Resource@nrc.gov.

After submitting your request, we agreed to modify its scope to reach "records that mention, refer to, or are related to" the DPO

[continued on next page]

SIGNATURE - FREEDOM OF INFORMATION ACT AND PRIVACY ACT OFFICER: Roger D. Andoh

DISTRIBUTION--FOIA/PA Subject, Action Officer, FOIA/PA Officer, Other (Specify): NRR, OE, RIV, OPA

OFFICE	ACTION OFFICER	FOIA/PA OFFICER	OGC			
NAME	ML Stevens	RD Andoh	J Adler NLO			
DATE	06/12/2015	6/25/15	6/25/15			

☑ PUBLIC ADAMS
☐ NON-PUBLIC ADAMS

NLO based on changes made by Margo Stevens

NRC FORM 464 Part I (01-2015)	U.S. NUCLEAR REGULATORY COMMISSION	FOIA/PA	RESPONSE NUMBER
RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) / PRIVACY ACT (PA) REQUEST (Continued)		2015-0071	1
		RESPONSE TYPE ☐ INTERIM ☑ FINAL	
REQUESTER: Damon Moglen		DATE:	

PART I.C COMMENTS (Continued)

submitted by Dr. Michael Peck (including those in the possession of the NRC staff members named in your request) for two time periods: July 18, 2013 through May 31, 2014, and September 19, 2014 through December 11, 2014 inasmuch as records in the intervening time period are already being processed in response to a related request, FOIA-2014-0488. which you also submitted.

MEMORANDUM TO: Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

FROM: Renée M. Pedersen, Differing Views Program Manager
Office of Enforcement

SUBJECT: DIFFERING PROFESSIONAL OPINION INVOLVING DIABLO CANYON SEISMIC ISSUES (DPO-2013-002)

The purpose of this memorandum is to advise you of a Differing Professional Opinion (DPO) that was submitted to me as the Differing Views Program Manager (DVPM). I received the DPO on July 19, 2013, and screened it in accordance with the guidance included in Management Directive (MD) 10.159, "The NRC Differing Professional Opinions Program." On July 31, 2013, I notified senior management and the submitter that the preconditions for acceptance were met and that the submittal was accepted for review within the DPO Program as DPO-2013-002.

The DPO (Enclosure 1) raises concerns about a 2011 Pacific Gas and Electric (PG&E) report to the NRC that included a reevaluation of the local geology surrounding the Diablo Canyon Power Plant. In particular, the DPO focuses on whether adequate action was taken to address the new seismic information into the current licensing basis and whether appropriate actions were taken to address operability.

Because the DPO takes issue with positions established by your organization, in accordance with section (D)(3)(c) of the MD Handbook, I am forwarding this DPO to you for appropriate action.

MD 10.159-036 specifically addresses your responsibilities as Office Director. In brief, you are required to:

- ❑ Establish an independent ad hoc panel (DPO Panel) to review the issue, draw conclusions, and make recommendations to you regarding the disposition of the issues presented in the DPO.

CONTACT: Renée M. Pedersen, OE
Renee.Pedersen@nrc.gov.
(301) 415-2742

- ❑ Provide appropriate oversight of and support to the DPO Panel to ensure a thorough and timely review of the DPO (while maintaining process independence).

- ❑ Review the DPO Panel's report to ensure that it clearly, accurately, and completely addresses the tasks outlined in your memorandum establishing the panel. Issue a DPO Decision to the submitter within the current 120-day timeliness goal (November 29, 2013).

- ❑ Request EDO approval for DPO extensions beyond the 120-day timeliness goal. (Requests should be forwarded thru the DVPM with the reason for the delay and a new completion date.)

- ❑ Forward status updates during the disposition of the DPO and until the time that all follow-up actions are complete. (Updates should be emailed to the DVPM by the last day of the month and will be communicated to the submitter and distributed to all DPO participants and the cognizant DEDO and the Commission in the DPO Monthly Status Report.)

- ❑ Identify and assign appropriate follow-up actions and establish completion dates within 2 weeks of issuing the DPO Decision. (The DVPM and submitter should be copied on any follow-up action memoranda or correspondence.)

- ❑ Notify the DVPM of follow-up action schedule delays, including the reason for the delay and a revised completion schedule. (The DVPM will subsequently notify the submitter, reflect it in the DPO Monthly Status Report, and report it to the applicable DEDO.)

- ❑ Forward a summary of the DPO to the DVPM for inclusion in the Weekly Information Report. (In the event the DPO is appealed, the summary will be postponed until the DPO Appeal Decision is issued.)

- ❑ Take action to positively recognize the DPO submitter if the submitter's actions result in significant contributions to the mission of the agency.

- ❑ Review the DPO Case File for public release when the case is closed if the submitter requests public release.

Disposition of this DPO should be considered an important and time sensitive activity. DPO timeliness is calculated beginning on the day the DPO is accepted for review (July 31, 2013) until the day the DPO Decision is issued (November 29, 2013).

Process Milestones and Timeliness Goals for this DPO are included as Enclosure 2. The timeframes for completing process milestones are identified strictly as goals—a way of working towards reaching the DPO timeliness goal of 120 calendar days.

Although timeliness is an important DPO Program objective, the DPO Program also sets out to ensure that issues receive a thorough and independent review. Therefore, if you or the DPO Panel determines that an extension beyond 120 calendar days is necessary at any time during the process, please send me an email with the reason for the extension request and a new completion date. I will subsequently forward this request to the EDO for approval.

In an effort to provide necessary oversight and tracking, you should open an action item to address the three key deliverables:

(1) DPO Decision (November 29, 2013);
(2) Follow-up action memorandum (2 weeks after DPO Decision); and
(3) Weekly Information Report Summary (2 weeks after DPO Decision).

Please ensure that all DPO-related activities are charged to Activity Code ZG0007.

Because this process is not routine, I will be meeting and communicating with all parties during the process to ensure that everyone understands the process, goals, and responsibilities. I will be subsequently sending you information intended to aid you, the DPO Panel, and support staff in implementing the DPO process.

An important aspect of our internal safety culture includes respect for differing views. As such, all employees involved in the process should be instructed to exercise discretion and treat this matter sensitively. In an effort to preserve privacy, minimize the effect on the work unit, and keep the focus on the issues, employees should be instructed to simply refer to the employee as the DPO submitter. Managers and staff should be counseled against "hallway talk" on the issue.

As a final administrative note, please ensure that all correspondence associated with this case include the DPO number in the subject line, be profiled in accordance with ADAMS template OE-011, be identified as non-public with limited viewer rights to those included on distribution of correspondence and be filed in the applicable DPO Case File folder in the ADAMS Main Library.

Enclosures:
1. DPO submittal
2. Milestones and Timeliness Goals

cc: (w/o enclosures)
M. Johnson, DEDRP
R. Mitchell, AO

DISTRIBUTION:

TBergman	VCampbell	KFuller	DDorman	JUhl	AHowell
MEvans	MMarkley	TWertz	MWeber	DMerzke	MPeck
ACampbell	NRutledge	NOKeefe	BWittick	DPO-2013-002 File	

OE R/F

ADAMS ACCESSION NO.: (Package) ML

OFFICE	OE/CRB	OE/CRB	OE/CRB	OE:D
NAME	MSewell	RPedersen	DSolorio	RZimmerman
DATE	8/ /2013	8/ /2013	8/ /2013	8/ /2013

DPO Milestones and Timeliness Goals

DPO-2013-002: Diablo Canyon Seismic Issues

Assigned to: Eric Leeds, NRR

DPO Panel: Michael Case, Panel Chair;
Britt Hill, Panel Member; Rudolph Bernhard, Panel Member

DPO Milestone	Timeliness Goals*	Actual Date
Individual submits DPO (NRC Form 680)	None	7/19/2013
DPOPM receives, screens, and accepts DPO	8 days	7/31/2013
DPOPM forwards DPO to office manager	7 days	8/2/2013
Office manager establishes DPO Panel	14 days	9/3/2013
DPO Panel conducts review and issues report – meets with submitter (≈7 days) – establishes Statement of Concern (≈7 days) – confirms schedule with office manager (≈7 days) – completes review (≈ 49 days after start of review) – writes report (≈21 days after completion of review)	70 days	
Office manager issues DPO Decision	21 days	5/29/2014
DPO TIMELINESS GOAL (time from acceptance of DPO to DPO Decision)	120 days 11/29/2013 1/31/2014 (1) 3/28/2014 (2) 4/30/2014 (3) 5/30/2014 (4)	302 days

*The timeframes for completing process milestones are identified strictly as goals—a way of working towards reaching the Differing Professional Opinions (DPO) timeliness goal of 120 calendar days.

Office managers should e-mail requests for extension beyond the 120-day timeframe to DPOPM.Resource@nrc.gov and the DPOPM will forward the request to the EDO with a recommendation.

(1) New Schedule approved by EDO 12/3/2013. Extension due to several scheduling issues including leave commitments, the Government Shutdown, and the complex nature of the issue.

(2) New Schedule approved by EDO 1/30/2014 . Extension due to development of information from the licensee (which has been delayed due to the holidays and an illness), addition of a peer review of the information, and the complex nature of the issue.

(3) New Schedule approved by EDO 3/28/2014. Extension due to complex nature of issue and need for Panel to gather information from the licensee.

(4) New schedule approved by EDO 5/9/2014. The schedule has been impacted by the complex nature of the issue, the need to gather information from the licensee, and competing schedule commitments.

DPO Appeal Milestone	Timeliness Goals*	Actual Date
Individual submits DPO Appeal (NRC Form 690)	NLT 21 days of DPO Decision	6/23/2014
DPOPM screens, accepts, and requests statement of views from OD or RA	4 days	6/24/2014
OD or RA provides statement of views to DPOPM	14 days	6/27/2014
DPOPM provides DPO appeal package to EDO	2 days	7/7/2014
EDO issues DPO Appeal Decision	30-60 days	9/9/2014
DPO APPEAL TIMELINESS GOAL (time from acceptance of appeal to DPO Appeal Decision)	50-80 days	77 days

*The timeframes for completing process milestones are identified strictly as goals—a way of working towards reaching the DPO appeal timeliness goal of 80 calendar days.

MEMORANDUM TO: Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

FROM: Renée M. Pedersen, Sr. Differing Views Program Manager
Office of Enforcement

SUBJECT: APPEAL OF DIFFERING PROFESSIONAL OPINION DECISION INVOLVING DIABLO CANYON SEISMIC ISSUES (DPO-2013-002)

In my capacity as the Differing Professionals Opinion Program Manager (DPOPM), and in coordination with the Acting Director, OE, I am notifying you that we have received, screened, and accepted a DPO appeal for DPO-2013-002, involving seismic issues at the Diablo Canyon Power Plant. On June 24, 2014, I notified senior management and the submitter that the appeal was accepted for review within the DPO Program.

The DPO appeal process is included in Section E of the handbook for Management Directive (MD) 10.159, "The NRC Differing Professional Opinions Program."
http://www.internal.nrc.gov/ADM/DAS/cag/Management_Directives/md10.159.pdf

In accordance with the guidance in MD 10.159, the office director is required to develop a written statement of views (SOVs) on the contested issues included in the appeal and provide it to the Executive Director for Operations (EDO) through the DPOPM.

In providing the SOVs, please keep in mind that the scope of the DPO appeal is dictated by the scope of the DPO. Thus, notwithstanding any additional issues addressed in other documents (e.g., DPO Panel report, DPO Decision, DPO appeal submittal), the DPO appeal evaluation conducted by the EDO will focus on the scope of the DPO.

Please forward the office director's SOVs by July 11, 2014.

Once the DPOPM receives the SOVs from the office director, we will forward the SOVs to the EDO along with the DPO appeal package for review and issuance of a DPO Appeal Decision.

In accordance with MD 10.159, the EDO has complete discretion to conduct the review of the DPO appeal in any manner deemed appropriate. As such, the EDO may choose to:

- conduct a series of interviews (including one with the submitter),
- establish another independent review of the issues, or
- implement another evaluation strategy.

CONTACT: Renée M. Pedersen, DPOPM
Renee.Pedersen@nrc.gov.
(301) 415-2742

Marge Sewell, DPOPM/Backup
Margaret.Sewell@nrc.gov
(301) 415-8045

Therefore, the office director, members of the staff responsible for the established position, members of the DPO Panel, and the DPO submitter may be contacted by the EDO to engage in a discussion on this case.

The timeliness goal for the DPO Appeal Decision is 30 to 60 calendar days of receiving the DPO appeal package from the DPOPM.

On an administrative note, please ensure that the memorandum including the SOVs includes the DPO number in the subject line, be profiled in accordance with the Agencywide Document Access Management System (ADAMS) template OE-011, be identified as non-public with limited viewer rights to those included on distribution of the correspondence, and declared an official agency record *when the correspondence is issued.* Please email the ADAMS accession number for the record to DPOPM.Resource@nrc.gov and the record will be filed in the applicable DPO case file folder in the ADAMS Main Library. Following this process will ensure that a complete agency record is generated for the disposition of this DPO. If the submitter requests that the documents included in the DPO Case File be made public when the process is complete, you will be provided specific releasability review guidance to support discretionary release.

Please do not hesitate to contact me or Marge Sewell if you have any questions.

We're here to help!!

Enclosure:
DPO appeal submittal

cc: (w/o enclosures)
R. Zimmerman, Acting DEDMRT
M. Galloway, AO

DISTRIBUTION:
Dan Dorman, NRR
P. Holahan, OE
N. Hilton, OE
D. Solorio, OE
M. Peck, OCHCO
M. Case, OIP
B. Hill, NRO
R. Bernhard, RII
DPO-2013-002 File

OE R/F

ADAMS ACCESSION NO.: (Package) ML

OFFICE	OE/CRB	OE/CRB	OE:D
NAME	RPedersen	DSolorio	PHolahan
DATE	6/ /2014	6/ /2014	6/ /2014

From: Peck, Michael
Sent: Friday, July 19, 2013 2:42 PM
To: Pedersen, Renee; DifferingViews Resource
Cc: Howell, Art; Evans, Michele; Rutledge, Steven
Subject: ACTION REQUESTED: Attached DPO
Attachments: DPO Diablo Canyon Seismic Issues.pdf

Note: This DPO is publicly available as part of ML14252A743.

Ms. Pedersen,

Please accept and process the attached DPO.

Thank you,
Michael Peck
423-855-6515

From: Peck, Michael
Sent: Tuesday, August 20, 2013 10:17 AM
To: Pedersen, Renee
Subject: QUESTION: DPO-2013-002, Memo Forwarding Differing Professional Opinion Involving Diablo Canyon Seismic Issues

Ms. Pedersen,

Please provide an update on the status of DPO-2013-002. Has Mr. Leeds assigned a committee chair person?

Thank you,
Michael Peck
423-855-6515

From: Hasan, Nasreen
Sent: Friday, August 02, 2013 4:01 PM
To: Leeds, Eric
Cc: Bergman, Thomas; Campbell, Andy; Campbell, Vivian; Fuller, Karla; Dorman, Dan; Uhle, Jennifer; Howell, Art; Evans, Michele; Markley, Michael; Wertz, Trent; Weber, Michael; Merzke, Daniel; Peck, Michael; Rutledge, Steven; OKeefe, Neil; Wittick, Brian; Sewell, Margaret; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Johnson, Michael; Mitchell, Reggie
Subject: DPO-2013-002, Memo Forwarding Differing Professional Opinion Involving Diablo Canyon Seismic Issues

August 2, 2013

MEMORANDUM TO: Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

FROM: Renée M. Pedersen, Sr. Differing Views Program Manager ***/RA/***
Office of Enforcement

Please see the link below.

View ADAMS P8 Properties ML13213A248
Open ADAMS P8 Package (DPO 2013 002, Differing Professional Opinion Involving Diablo Canyon Seismic Issues)

ADAMS Package: ML13213A248
Memo: ML13213A249
DPO Submittal: ML13214A162
Milestones and Timeliness Goals: ML13213A259

Note: This document is limited to those on distribution only

Thank you,
Nasreen Hasan
Administrative Assistant

Office of Enforcement
Location / Mailstop: O-4A15A
Office #: (301)415-2741
Fax: (301)415-3431

From: Peck, Michael
Sent: Thursday, August 29, 2013 6:46 AM
To: Pedersen, Renee
Cc: Sewell, Margaret
Subject: QUES: Status of DPO Panel

Renée,

Thank you for the update. I was beginning to think that the DPO had been lost in the system.

While seismic is in the title of the DPO, this DPO is really not about seismic technical issues. I've made the assumption that all seismic evaluations (included in the FSAR or presented in the NRC Research Information Letters) are correct. This DPO is about how the agency enforces design and licensing bases requirements and verifies operability for non-conforming and unanalyzed conditions. These issues could be applied to any NRC licensing basis requirements (flooding, ECCS acceptance criteria, containment accident response).

Looking at Handbook 10.159, Section D, "Implementation of the Differing Professional Opinions Program," the panel should also include a third panel member submitted by the employee filing the DPO. Will this DPO panel include one of the individuals I named on the NRC Form 680?

Thank you,
Michael

From: Pedersen, Renee
Sent: Wednesday, August 28, 2013 12:48 PM
To: Peck, Michael
Cc: Sewell, Margaret
Subject: Status of DPO Panel

Hi Michael,

Just letting you know that NRR is in the final stages of putting the DPO Panel together. So far, it looks like Mike Case (RES) as the DPO Panel Chair. I think that Mike will bring his licensing experience and his previous experience as a DPO Panel Chair, not to mention his all around deep thinking and common sense to the team. They are also looking at Cliff Munson (NRO) as a panel member. I think that Cliff will bring seismic technical skills to the team.

I'll let you know when the panel is finalized.

Renée

From: Peck, Michael
Sent: Thursday, August 29, 2013 8:37 AM
To: Pedersen, Renee
Cc: Sewell, Margaret
Subject: DPO-2013-002 - Potential Panel Conflict

Ms. Pedersen,

I would like to alert you to a potential conflict with Mr. Munson as a DPO panel member. Mr. Munson is listed as a senior advisor with the Division of Site Safety and Environmental Analysis. Annie Kammerer is shown on the NRC web page as currently assigned to this division. Dr. Kammerer was largely responsible for the prevailing NRC position on the Diablo Canyon seismic issues and was the primary contributor to the NRC response to my non-concurrence. Dr. Kammerer went so far pressing her viewpoint to include making OIG allegations against me related to the Diablo Canyon seismic issues (I subsequently received an OIG clearance letter related to these allegations).

Please consider Mr. Munson's organizational relationship with Dr. Kammerer during panel selection.

Thank you,
Michael Peck, PhD

From: Pedersen, Renee
Sent: Wednesday, August 28, 2013 12:48 PM
To: Peck, Michael
Cc: Sewell, Margaret
Subject: Status of DPO Panel

Hi Michael,

Just letting you know that NRR is in the final stages of putting the DPO Panel together. So far, it looks like Mike Case (RES) as the DPO Panel Chair. I think that Mike will bring his licensing experience and his previous experience as a DPO Panel Chair, not to mention his all around deep thinking and common sense to the team. They are also looking at Cliff Munson (NRO) as a panel member. I think that Cliff will bring seismic technical skills to the team.

I'll let you know when the panel is finalized.

Renée

From: Peck, Michael
Sent: Tuesday, September 03, 2013 10:12 AM
To: Pedersen, Renee
Cc: Sewell, Margaret
Subject: RES: DPO Panel

Thank you for the update. Mr. Hill would have the same potential conflict as Mr. Munson, both belonging to DSEA. I think as long as everyone recognizes that Dr. Kammerer should not provide input or review to the DPO, the proposed panel should be fine.

Michael Peck

From: Pedersen, Renee
Sent: Friday, August 30, 2013 4:35 PM
To: Peck, Michael
Cc: Sewell, Margaret
Subject: DPO Panel

Happy Friday!

What are your thoughts on a panel including:

Mike Case, Panel Chair
Britt Hill, Panel member
Rudy Bernhard, Panel member

Renée

From: Peck, Michael
Sent: Monday, September 09, 2013 12:06 PM
To: Hill, Brittain
Cc: Pedersen, Renee
Subject: RES: ACTION: DPO Panel needs viewer rights to DPO
Attachments: DPO Diablo Canyon Seismic Issues.docx

Note: This attachment is publicly available as part of ML14252A743.

Attached as requested.

msp

From: Pedersen, Renee
Sent: Monday, September 09, 2013 11:58 AM
To: Peck, Michael
Subject: FW: ACTION: DPO Panel needs viewer rights to DPO

Michael,

Can you send Britt a copy of the Word file that you used to create your DPO submittal?

Renée

From: Hill, Brittain
Sent: Monday, September 09, 2013 11:48 AM
To: Pedersen, Renee
Subject: RE: ACTION: DPO Panel needs viewer rights to DPO

Hi Renée -

Thanks for getting the read permissions set for the ADAMS file, but the pdf appears to be just a scan of a printed document rather than a searchable, workable text file generated from the original word processing document.

Is it possible to simply get an electronic version of the original file for Enclosure 1 (pages 2-42)? Looks like it was prepared in Word, and most word processers print directly to pdf (rather than paper-scan) these days. There are a number of small figures and small (e.g., <8-pt) text with highlights, superscripts etc. (e.g., p 9-18), which scan and print poorly but should be legible in the original file.

Thanks-
Britt

From:	Peck, Michael
Sent:	Monday, September 23, 2013 1:31 PM
To:	Case, Michael
Cc:	Bernhard, Rudolph; Hill, Brittain; Pedersen, Renee
Subject:	RES: DPO-2013-002 - Response to Action Items
Attachments:	E-Mail - Seismic Issues.pdf; NCP 2012-001 public.pdf

Note: The attached email is publicly available as ML12151A173.

Mr. Case,

In response to the Actions Items from our September 18th call:

1. **The Big Picture:** My differing view focused on the failure of Region IV to take enforcement action following discovery that Diablo Canyon was no longer operating within the bounds of the plant design bases as required by the Operating License.

   - 10 CFR 50, App B, Criterion III, required PG&E to ensure that the design bases and regulatory requirements were translated into the plant design (http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appb.html)

   - App B, Criterion XVI required PG&E to take prompt corrective actions when the design basis no longer matched the plant.

   Corrective action may include changing the plant design bases to match the non-conforming condition (FSARU under 50.71.e, see NEI 98-03, http://www.nrc.gov/reading-rm/doc-collections/reg-guides/power-reactors/rg/01-181/). For this corrective action path, 10 CFR 50.59 is used to determine if an amendment to the license (50.90) is required before the licensee makes the proposed FSARU changes (see NEI 96-07, "Guidelines for 10 CFR 50.59 Evaluations," ML003636043).

   In this case, prior NRC approval was required. However, the NRC refused to accept the licensee's amendment request (LAR). The NRR PM stated that agency would not accept the LAR for review because of deviations between the proposed new design basis and the agency acceptance criteria.

   The failure to meet the plant design bases and regulatory requirements also called into question the operability of technical specification required equipment (see the attachment to RIS 2005-20, Appendix C-1, http://pbadupws.nrc.gov/docs/ML0735/ML073531346.pdf). Plant operation may only continue during the corrective action period if:

   (1) The licensee demonstrates that specified safety function(s) for technical specification required equipment can still be met, given effect of the non-conforming condition, or
   (2) The NRC provides exemption or waver for the applicable regulatory requirement(s).

   Plant operation should cease since neither of these actions were completed.

2. **Past Attempts for Resolution have Been Unsuccessful:** A good understanding of the agency's use of design bases, including the 50.59 process (NEI 96-07), is required before these issues can be effectively addressed. Over the past several years I've heard many folks argue about what design bases is or is not and how operability is defined. In most of these cases, these positions were not based on written agency guidance but rather on what the individual thought it was or should be at that point in time. From my prospective, it appeared that many consensuses on the Diablo Canyon design bases were reached based on the position of the loudest person in the room rather than on agency policy.

The non-concurrence (attached, NCP-2012-001, ML120450843) addressed the failure of PG&E to meet the license and agency operability policy. The NRC response appeared to focused more on a technical argument justifying why it didn't make sense to meet the current licensing basis. The response also included broad statements that the operability requirements were met. However, I felt that the agency did not address the specific issues raised in the non-concurrence:

- ASME Code requirements were not meet
- Use of the Hosgri as an alternate method was inappropriate because the evaluation was not limiting for seismic qualification of technical specification equipment.

3. NRC Personnel Involved With Diablo Canyon Seismic Issues

NRR - DORL

Allen Wong, NRR PM (301-415-3081): Mr. Wong was the Diablo Canyon PM until about 2010. He authored the April 2009 transmittal letter for Research Information Letter 09-001, "Preliminary Deterministic Analysis of Seismic Hazard at Diablo Canyon NPP from Newly Identified 'Shoreline Fault." Mr. Wong added the conclusion (on his own) that the new seismic information was within the Diablo Canon design and licensing bases in this letter. I later understood from Mr. Wong that he included this statement based on unverified statements from PG&E.

James Polickoski, NRR PM (301-415-5430): Mr. Polickoski replaced Mr. Wong as the Diablo PM. He conducted several public meetings with PG&E during 2011 to discuss how the new seismic information should be incorporated into the Diablo Canyon Operating License. These meetings resulted in consensus that a license amendment was required. PG&E followed these meetings with License Amendment Request 11-05 to designate the Hosgri Evaluation as the SSE for the plant. My view was that NRC approval of this request would have resolved many of these issues. At the NRC's request, PG&E also submitted Letter DCL-1-124 identifying deviations between the Hosgri analysis and the Standard Review Plan requirements for the SSE. The NRC subsequently requested PG&E withdraw LAR 11-05 after review of DCL-1-124. Transcripts are available for several of these public meetings.

Joseph Sebrosky, NRR PM (301-415-1132): Mr. Sebrosky replaced Mr. Polickoski early 2012 as the Diablo PM.

Michael Markley, NRR Branch Chief, Plant Licensing Branch 4 (301-415-2064): Mr. Markley expressed the view PG&E was required to update the FSARU with the new seismic information, as required by 50.71(e), but not required to evaluate new information on the operability of technical specification equipment. Mr. Markley's position on operability was contrary to both NEI 98-03 and RIS 2005-20 and appeared to have political motivation. At this point PG&E had concluded that operability could not be successfully demonstrated based on comparing the new information to the SSE. Mr. Markley's group would have been task with coordinating the review of a PG&E waiver request to support continued plant operation following a declaration that technical specification equipment were inoperable. Giving the public controversy involving reversing the NRC position on seismic operability after several years and the level of Diablo intervener involvement, processing a waiver request would have been a difficult task.

RES

Annie Kammerer (currently assigned to NRO, 301-873-3923): Dr. Kammerer was the primary contributor to RIL 09-001 and RIL 12-01 "Confirmatory Analysis of Seismic Hazard at the Diablo Canyon Power Plant from the Shoreline Fault Zone." I understood that that she was the agency's' seismic design bases expert. She maintained that the Hosgri ground motion spectrum, as the controlling fault for Diablo Canyon, solely established the plant seismic design basis. Dr. Kammerer was also the primary contributor to the agency response to NCP-2012-001. On several occasions I tried to discuss the requirements of NEI 97-04, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases," Appendix B (http://www.nrc.gov/reading-rm/doc-collections/reg-guides/power-reactors/rg/division-1/division-1-181.html), the Diablo Canyon FSARU, RIS 2005-20 "Operability Guidance," and NEI 96-07 for 50.59s. She

made it very clear that these details were a waste of her time since seismic design basis was only depend on ground motion.

Region IV

Kriss Kennedy, Director Division, Region IV Reactor Projects – requested the Task Interface Agreement (TIA) – Concurrence on Diablo Canyon Seismic Qualification Current Licensing and Design Basis (TIA 2011-010), August 1, 2011, ML112130665).

Neil O'Keefe Chief Branch B Director Division, Region IV Reactor Projects(817-200-1141): Mr. O'Keefe supervised the Diablo Canyon resident inspectors and relied heavily on the NRR for Diablo Canyon licensing basis issues.

Elmo Collins (retired) Regional Administrator for the Region IV

Tom Farnholtz Chief Engineering Branch 1 Division of Reactor Safety Region IV 817-200-1243 , - Responsible for inspection activities affecting Diablo Canyon seismic issues

4. **Travel to Rockville:** My management will support an overnight trip to Rockville to discuss DPO issues, provided that the trip takes place prior to the end of the current fiscal year (we are thinking that training travel may be hard during a continued resolution). If a trip is needed, then my management request that I schedule it in the next couple of days to commit the travel funds. Please let me know if you feel that an in-person meeting would enhance your knowledge of the DPO issues.

5. I have attached a copy of the February 2011 e-mail (not in Adams) recommending initiation of enforcement action against PG&E.

Thank you,
Michael

From: Case, Michael
Sent: Friday, September 13, 2013 1:39 PM
To: Peck, Michael
Cc: Bernhard, Rudolph; Hill, Brittain
Subject: Diablo Canyon DPO Panel

Hi Mike. I volunteered to be the chair for your DPO on Diablo Canyon seismic issues. Eric (Leeds) set up the panel and got the information to us last week. He was going to meet with the panel for a kickoff meeting but it's not until the week of the 23rd. My faithful advisor Rene advises me to not let any spare time go to waste so our panel is trying to get together for a meet and greet next week. We would like to have a similar meet and greet with you so we all can get to know each other and see if we can get some preliminary next steps set up.

From a schedule perspective, I'm out Thursday and Friday so we're trying to see if we can get this meeting set up on Monday, Tuesday, or Wednesday. Could you give me some time frames that might be good those days and I'll have someone set up a teleconference.

Thanks for your contributions and I'm looking forward to getting your insights on this issue.

Best regards,

Mike

From: Peck, Michael
To: Allen, Don; Miller, Geoffrey
Cc: Deese, Rick; Wang, Alan; Polickoski, James; Pruett, Troy; Farnholtz, Thomas; Denissen, Christie; Braisted, Jonathan; Markley, Michael; Kennedy, Kriss
Subject: ACT: Diablo Canyon - Recommendation for Regulatory Disposition
Date: Thursday, February 03, 2011 11:39:53 AM
Attachments: Diablo Canyon Seismic White Paper.docx

Don, Geoff,
I have attached the resident inspectors recommendation for the regulatory disposition of the failure of PG&E to perform an operability evaluation following discovery of the shoreline fault. This recommendation includes a potential greater than green finding (we believe an SDP Phase III is needed) and potential escalated traditional enforcement issue. These are ongoing violations.

Thank you,
Michael Peck, Ph.D.
Senior Resident Inspector
Diablo Canyon Power Plant
Office: (805) 595-2354
Cell : (805) 602-1120

Resident Inspectors Recommendation for Regulatory Disposition of the Failure of Pacific Gas & Electric to Perform an Operability Evaluation Following Discovery of the Shoreline Fault

(February 2, 2011)

Summary

The inspectors identified that Pacific Gas and Electric (PG&E) did not evaluate new seismic information against the plant design and licensing basis. This new information resulted in about 60% increase in the safe shutdown earthquake peak ground accelerations than previously evaluated for plant seismic qualification. The licensee has not evaluated the affect this new information has on the operability of plant structures, systems and components (SSC) as required by regulatory requirements and station procedures. The licensee did compare the new seismic information against the Long Term Seismic Program (LTSP) deterministic spectrum. However, the inspectors concluded that this comparison was not adequate to demonstrate plant seismic safety. This comparison only provided indication of seismic margin to the Hosgri Event (HE), one of the three design basis earthquakes. The inspectors identified that the Operating Basis Earthquake (OBE) and Safe Shutdown Earthquake (SSE) were more limiting for seismic qualification in some cases.

The inspectors concluded that PG&E provided incomplete and/or inaccurate information to the Nuclear Regulatory Commission (NRC) in Event Notification 44675 and in the corrective action program regarding the affect of the Shoreline Fault on the current plant seismic qualification design and licensing basis. This incomplete and/or inaccurate information was used by the NRC Staff to make incorrect conclusions related to the affect of the new seismic information on plant safety.

Nuclear Safety Concern

Diablo Canyon SSCs may not be able to perform their specified safety functions following a Safe Shutdown Earthquake. Figure 1 shows the increase in predicted ground motions at the site from an reevaluation of three near plant earthquake faults. New seismic studies established that ground motions from the Los Osos, San Luis Bay, and Shoreline Faults now exceed the ground motions of the Safe Shutdown Earthquake (not shown on the graph). Table 1 compares the peak ground acceleration from each fault (at 5% damping)[1] with the OBE and SSE peak ground motions (0.2 g and 0.4 g).[2] PG&E has not evaluated the increase in seismic ground motion against the SSC qualification basis for the OBE and SSE. The previous NRC replacement reactor head inspection concluded very little seismic margin exists for some RCS pressure boundary ASME Section III Boiler and Pressure Vessel Code limits.[3] The increases in OBE and SSE seismic loading from the new information would likely result, if evaluated, in ASME Code allowable limits being exceeded; rendering some RCS pressure boundary components inoperable.

Diablo Canyon Seismic Design and Licensing Basis

The Diablo Canyon design and licensing basis required that plant Seismic Class I SSC maintain their safety function following an earthquake. This design basis included:

- Part 50, Appendix A, General Design Criterion (GDC) 2, Design Bases for Protection Against Natural Phenomena. GDC 2 required that Diablo Canyon SSC important to safety be designed to withstand the effects of earthquakes without loss of capability to perform their safety functions.[4,5]

- Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants. Appendix B established the quality assurance requirements for the design, construction, and operation of nuclear power plant structures, systems, and components that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. The requirements of Appendix B apply to the seismic qualification of SSC.[6]

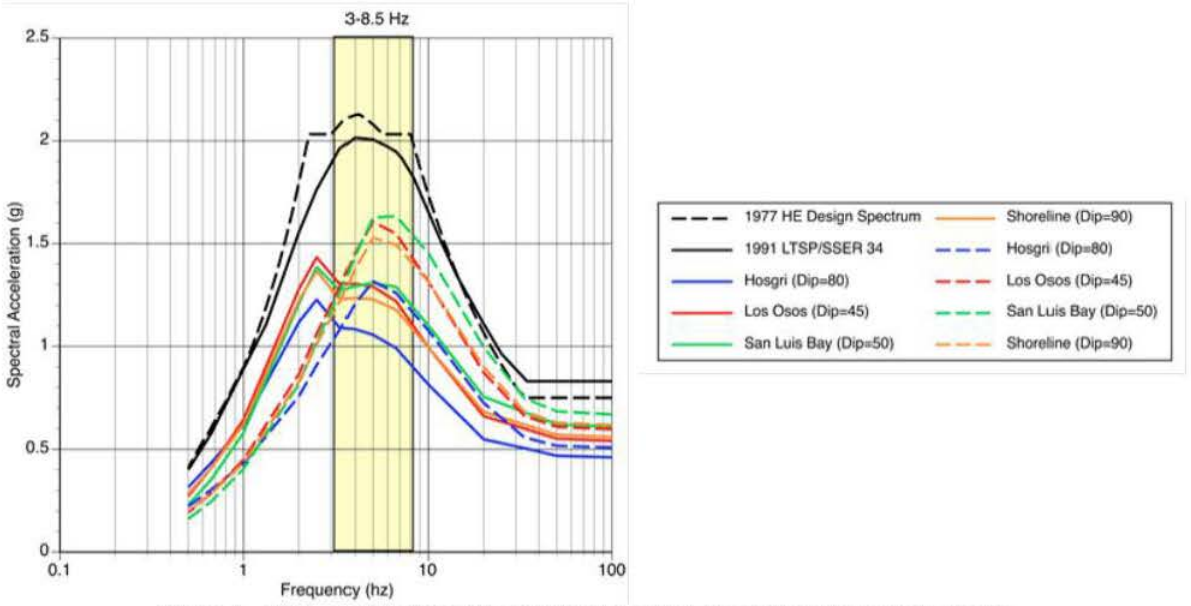

Figure 1. Increased Predicted Ground Motions from Near Plant Earthquake Faults

Table 1. Comparison of Reanalysis to Diablo Canyon SSE

Reanalyzed Fault[7]	Peak Ground Acceleration[8]	Ratio of increased peak ground motion to current SSE	Ratio of increased peak ground motion to current OBE
Shoreline Faults	0.62 g[(a)]	1.6 g[(b)]	1.6 g[(c)]
Los Osos	0.60 g[(a)]	1.5 g[(b)]	1.5 g[(c)]
San Luis Bay	0.68 g[(a)]	1.7 g[(b)]	1.7 g[(c)]

Notes: [(a)] peak ground at 84pecentile at 5% damping
[(b)] ratio with SSE peak ground acceleration 0.40 g at 2% damping
[(c)] ratio with SSE peak ground acceleration 0.40 g at 2% damping
(peak ground motion defined as point of max frequency, (right side of chart)[9]

- Part 100, Appendix A, Seismic and Geologic Siting Criteria for Nuclear Power Plants. Appendix A required that Diablo Canyon be designed that certain SSC remain functional following a shutdown earthquake.[10] These plant features are those necessary to ensure:

  (1) The integrity of the reactor coolant pressure boundary,
  (2) The capability to shut down the reactor and maintain it in a safe shutdown condition, or
  (3) The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guideline exposures of 10 CFR Part 100.

These requirements lead to the establishment of three design basis earthquakes for Diablo Canyon:

(1) *Operating Basis Earthquake* (Design Earthquake) - That earthquake which could reasonably be expected to affect the plant site during the operating life of the plant; it is that earthquake which produces the vibratory ground motion for which those features of the nuclear power plant necessary for continued operation without undue risk to the health and safety of the public are designed to remain functional.

(2) *Safe Shutdown Earthquake* (Double Design Earthquake) - That earthquake based upon an evaluation of the maximum earthquake potential which produces the maximum vibratory ground motion for which certain structures, systems, and components are designed to remain functional.

(3) *Hosgri Event* - a special postulated 7.5 M earthquake to occur on the Hosgri Fault line.

Factors Affecting Seismic Qualification

Seismic qualification of SSC begins with the ground motion from each design basis earthquake. However, others factors including the shape of the associated spectra, the damping values used, the methods of analysis, the load combinations employed, the allowable stresses, or other acceptance criteria are equally or more significant in seismic qualification.[11] While counterintuitive, the OBE, the earthquake with the least ground motion, was more limiting for some SSC than the larger HE earthquake.

Damping is an important factor used in seismic qualification. Damping is a quantitative measure of the energy dissipation of a material or structural system as it responds to dynamic excitation. Damping is used in seismic qualification to mathematically model and solve dynamic equations of motion for a vibratory system in which energy is dissipated. In an elastic dynamic seismic analysis, the analytical model calculates the amount of energy dissipated by specifying the amount of viscous damping (proportional to the velocity). Two important applications of seismic damping are considered for seismic qualification of SSCs. The first is the critical seismic damping value applied to the response spectrum for a given earthquake. The licensee developed response spectra for each of the three design basis earthquakes. These response spectra include critical seismic damping specific to each design basis earthquake (2% for the OBE, 2% and 5% for the SSE, and 7% for the Hosgri Event).[12] A second set of damping values, also specific to each design basis earthquake, and dependent upon the structure, system, or component under consideration, are used in seismic qualification analyses, and are listed in Table 2.

Table 2. Specific Percentages of Critical Damping Used for Seismic Class I & II SSC[13]

Type of Structure	% of Critical Damping		
	OBE	SSE	HE
Welded structural steel assemblies	1.0	1.0	4.0
Bolted or riveted steel assemblies	2.0	2.0	7.0
Mechanical components (PG&E purchased)	2.0	2.0	4.0
Vital piping systems (except reactor coolant loop)	0.5	0.5	3.0
Reactor coolant loop	1.0	1.0	4.0
Replacement Steam Generators	2.0	4.0	4.0
Integrated Head Assembly	4.0	6.85	6.85
CRDMs (Unit 2)	3.0	4.0	4.0
Foundation rocking (containment structure only)	5.0	5.0	NA
Containment structures and all internal concrete structures	2.0	5.0	7.0
Other conventionally reinforced concrete structures above ground, such as shear walls or rigid frames	5.0	5.0	7.0

Figure 2 illustrates the affect that damping has on component amplification and displacement velocity for an earthquake normalized with a 1.0 g peak horizontal ground acceleration (Point A).[14] For the natural frequency range for most seismically qualified SSC (3.3 – 8 Hz, between Points B &C), velocity and acceleration can vary greatly with damping. For example, the figure shows that a component with a natural frequency of 3.3 Hz, using a damping value of 0.5% results in a velocity of approximately 125 in/sec, while using a damping value of 10% results in a velocity of only about 55 in/sec. Figure 3 illustrates how changes in assumed damping directly affect acceleration at the auxiliary building floor for the Hosgri Event. The figure shows that applying a larger damping value results in a much lower acceleration.

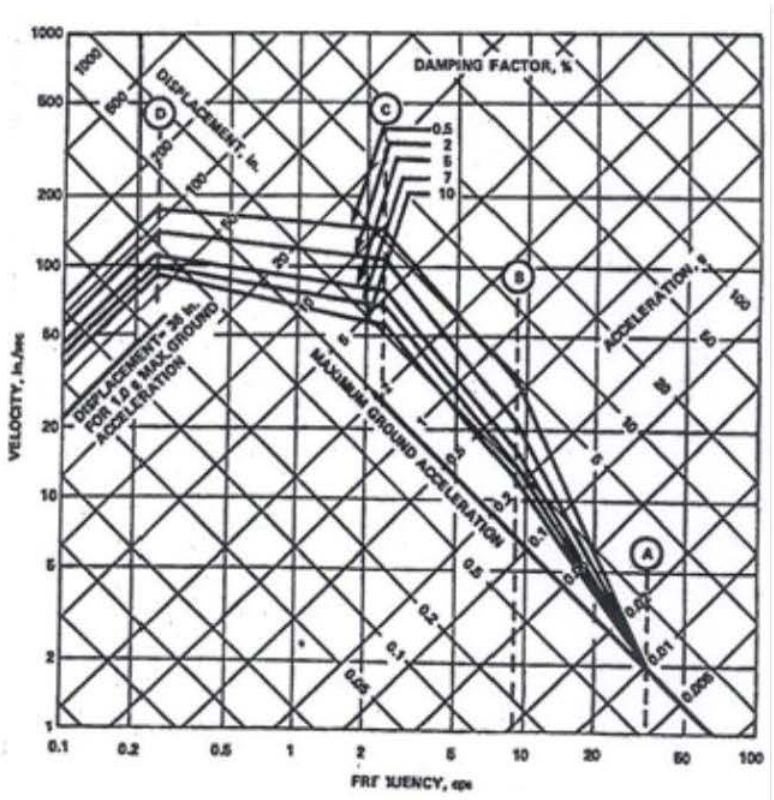

Figure 2. Horizontal Design Response Spectra – Scaled to 1g Horizontal Ground Acceleration

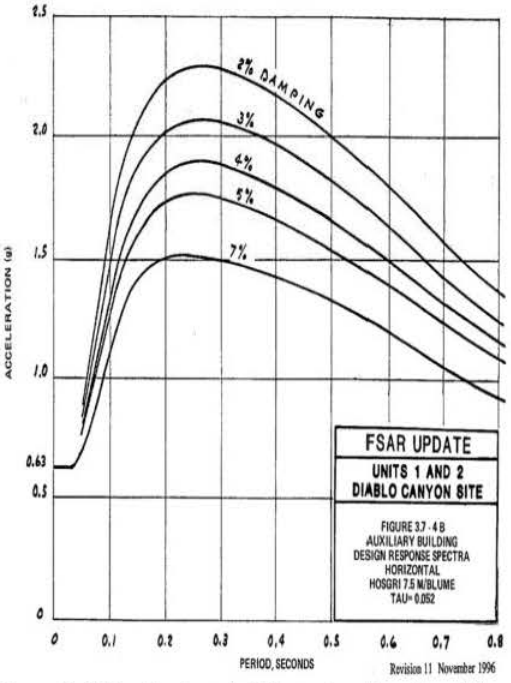

Figure 3. Comparison of Auxiliary Building Horizontal Floor Acceleration (Hosgri) as a Function of Damping

Another important factor affecting seismic qualification of plant SSC are the load combinations for each design basis earthquakes. For example, seismic qualification for the reactor coolant system (RCS) requires compliance with ASME Sec III Section III Boiler and Pressure Vessel Code. The required RCS load combinations are different for each of the three design basis earthquakes:[15]

OBE = Deadweight + Pressure + Thermal
SSE = Deadweight + Pressure + Reactor Coolant Loop Pipe Rupture
HE = Deadweight + Pressure

The ASME Code reactor coolant loop pipe rupture evaluation was excluded for the Hosgri Event because this design basis earthquake was not considered the Safe Shutdown Earthquake for Diablo Canyon.[16] The Hosgri Event is a unique earthquake to Diablo Canyon and differs from the Safe Shutdown Earthquake when considering SSC seismic qualification. Qualification for the Hosgri Event was limited to specific Class I components needed to support the alternate safe shutdown path.[17]

Examples of SSCs limited by the OBE or SSE

Seismic qualification of the primary RCS pressure boundary was limited by all three design basis earthquakes. For some SSC, the HE was more limiting, for others, the SSE or OBE was more limiting for seismic qualification. For example, the inspectors identified that the OBE and SSE were more limiting for some RCS pressure boundary components during the Unit 2 replacement reactor head inspection. The replacement head designer used inappropriately high seismic damping values when demonstrating that RCS pressure boundary met Section III of the ASME Boiler and Pressure Vessel Code. For corrective action, the designer recalculated RCS component stress using the current licensing basis (CLB) damping values and discovered that some reactor head components exceeded Code allowable values for the OBE.[18] The designer again recalculated Code allowable stress using the higher damping values provided in RG 1.61, "Damping Values for Seismic Design of Nuclear Power Plants," Revision 1. The second recalculation also resulting in component stress levels exceeding Code allowable. The design subsequently demonstrated Code acceptance criteria by substituting the time history method with response spectrum method. Incorporating the higher RG 1.61 damp values into the CLB required a licensee amendment. The end result did not provide for much margin to accommodate an increase in the design basis earthquake. The recalculation concluded that the SSE was more limiting.[19] For example, as shown in Figures 4 and 5, the control rod drive mechanism pressure housing assembly (CRDM) bending moments were more limiting for the SSE than the HE.

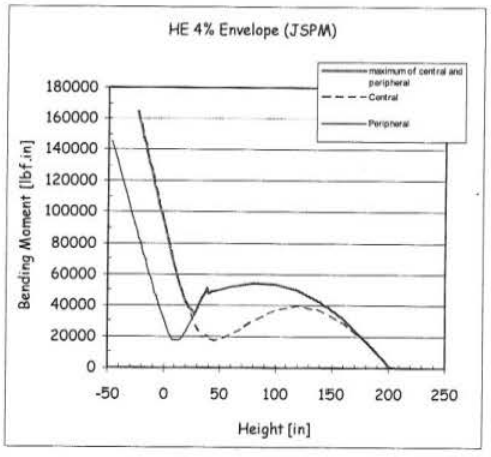

Figure 4
HE Maximum CRDM Bending Moments

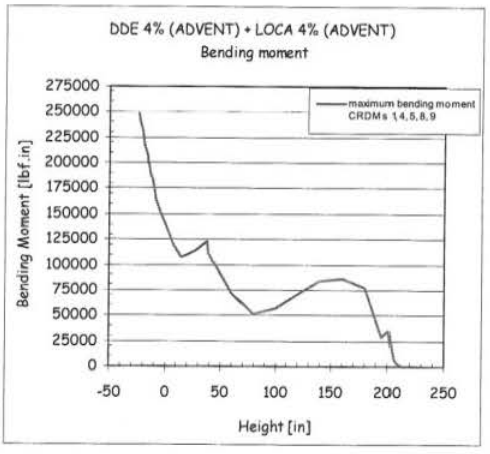

Figure 5
SSE Maximum CRDM Bending Moments

The recalculation also identified that SSE loads were more limiting than the HE for the control rod drive mechanism pressure housing assembly and the external loads for the vessel head closure weld shear forces (6,332 lbs for the SSE compared to 4,431 lbs for the HE). Also, both the OBE and SSE inner and outer diameter shear forces were more limiting than the HE (OBE was 9,764 lbs, SSE was 6,567 lbs, while the HE was only 4,432 lbs).[20]

Similar to the RCS pressure boundary, the inspectors also identified that the seismic qualification for many reactor components were limited by the SSE. For example, the SSE was more limiting for Unit 2 replacement reactor head integrated head assemble seismic analysis[21] and the reactor vessel level system nozzle connections to the reactor vessel head torsion moments.[22]

The Diablo Canyon FSARU stated that the seismic qualification of other components, including the reactor coolant pump support feet,[23] the reactor vessel evaluation,[24] the pressurizer and surge line analysis, and the dynamic reactor coolant loop analysis[25] were all limited by the SSE, rather than the HE.

Table 3. Comparison of Diablo Canyon Seismic Analysis

	Operating Basis Earthquake (Design earthquake)	**Safe Shutdown Earthquake** (Double design earthquake)	**Hosgri Event**	**Long Term Seismic Program Deterministic Spectrum**
Part of Plant Design Basis (10CFR 50.2)	Yes	Yes	Yes	No – Presented as a margin analysis for the Hosgri Event
Quality Assurance Requirements	10 CFR 50, App B	10 CFR 50, App B	10 CFR 50, App B	Peer review
Method of Analysis	Part 100, App A	Part 100, App A	Geological Survey Circular 672	Best estimate 7.2 M (84% ground motion)
Description	Earthquake epicenters within 200 and faults within 75 miles of the plant	Earthquake epicenters within 200 miles and faults within 75 miles of the plant	Limited to a 7.5 M earthquake on the Hosgri Fault	Limited to an earthquake on the Hosgri Fault (weighted average of 3 faulting styles)
Design Response Spectra	Time history (RG 1.60)	Time history (RG 1.60)	Time history (alternate method)	Best estimate - From Fault Model
SSC Qualification	Equipment necessary to remain functional for continued operation	Class I SSC qualified per FSAR design basis (RG 1.29 & RG 1.100)	Limited Class I to support alternate safe shutdown path (exceptions to RG 1.29)[26]	Not included - Used HCLPF[(a)] values from probabilistic analysis
Damping	2%	2%	7%	5% (84% ground motion)
Reactor coolant system seismic qualification	Compliant with 50.55a (ASME Sec III Code allowable stress) Deadweight + Pressure Deadweight + Pressure + Thermal	Compliant with 50.55a (ASME Sec III Code allowable stress) Deadweight + Pressure Deadweight + Pressure + Reactor coolant loop pipe rupture (LPR)	Compliant with 50.55a (ASME Sec III Code Allowable stress) Deadweight + Pressure only (no LPR – HE not considered a shut shutdown earthquake)[27]	N/A – Not used for qualification (used probabilistic values to determine failure points)
RCS Loop Damping	1.0% Code Case N-411	1.0% Code Case N-411	4.0% Code Case N-411	N/A – Not used
Vital Piping Systems Damping	0.5%	0.5%	3.0% (2% for piping less than 12" diameter)	N/A – Not used
Limiting for Seismic Qualification of SSC?	Yes – In some cases OBE is the most limiting	Yes – In some cases SSE is the most limiting	Yes – In some cases HE is the most limiting	Not used for seismic qualification

Notes: [(a)]HCLPF (high confidence low probability of failure) probabilistic value derived from the following terms: Fs – Strength factor, Fu – Inelastic energy absorption factor (ductility), Fqm – Qualification method factor, Fd – Damping factor (level expected at or near failure), Fm – Modeling factor, Fmc – Mode combination factor (adjusts for conservatism in testing), Fecc – Earthquake component combination factor , Fss – Spectral shape factor, Fgmi – Ground motion incoherency factor, & Fir – Inelastic structural response factor.

The seismic qualification of the containment and turbine building were limited by the SSE at some locations.[28] For example, the maximum containment horizontal seismic displacement was greater for the SSE than for the HE at the 88 foot through 206 foot levels. The SSE was not only limiting in some cases for structural loading, but also for location dependent seismic displacements used for SSC qualification at those locations.

Long Term Seismic Program (LTSP)

PG&E limited their evaluation of the Shoreline Fault to a comparison of the LTSP deterministic spectrum. This comparison only provided an indication of seismic margin to the HE, not the OBE or the SSE. As previously indicated, the OBE and SSE are more limiting than the HE for seismic qualification of many SSC. In 1988, PG&E issued the LTSP Final Report. The Final Report included a 7.2 M deterministic evaluation of the HE ground motion using a weighted average for faulting style (strike-slip, oblique, and thrust).[29] This deterministic evaluation became known as the LTSP 84% Spectrum. At the completion of the LTSP, PG&E concluded that the original plant seismic design basis (OBE, SSE and HE) was adequate.

The NRC documented acceptance of the LTSP Final Report in SSER 34 (1991). The Staff stated that the LTSP provided a supplemental verification that the plant could withstand a 7.2 M event on the Hosgri Fault. The SSER stated that the LTSP did not change the plant design bases for Diablo Canyon.[30] The Diablo Canyon seismic design and licensing basis would continue to be the OBE and SSE, plus the HE evaluation basis, along with the associated analytical methods, initial conditions, and original qualification-basis criteria.

In 1991, PG&E made three commitments associated with the closure of the LTSP:

(1) Use the LTSP to maintain seismic margins prior to future modifications of certain plant equipment,[31]

(2) Maintain a strong geosciences and engineering staff to keep abreast of new geological, seismic, and seismic engineering information and evaluate it with respect to its significance to Diablo Canyon, and [32]

(3) Continue to operate a strong-motion accelerometer array and coastal seismic network.[33]

Table 3 compares the Diablo Canyon seismic design basis with the LTSP. As the table indicates, the LTSP 84% deterministic Spectrum was a margin analysis for the Hosgri Event and was not used for SSC seismic qualification or as part of the plant design basis.

Recommended Regulatory Disposition

The licensee has not evaluated the affect of the new seismic information on the operability of SSC.

Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, Criterion XVI, "Corrective Action," required PG&E to establish measures to assure that conditions adverse to quality, such as nonconformances, are promptly identified and corrected. On September 14, 2010, the inspectors identified that PG&E did not promptly identify or correct a nonconforming condition. The inspectors identified that the predicted Shoreline Fault ground motion was outside of the bounds of the FSARU safety analysis, this was a nonconforming condition. This is an ongoing violation.

Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," required PG&E to perform activities affecting quality accomplished in accordance with these instructions and procedures. Quality related plant procedure OM7.ID12, "Operability Determination," required plant personnel to evaluate the affect of unanalyzed conditions on the operability of plant SSC. On October 4, 2010, the inspectors identified that PG&E did not evaluate the affect of an unanalyzed condition on the operability of plant SSC in accordance with Procedure OM7.ID12. The inspectors identified that the Shoreline Fault ground motion was outside of the bounds of the FSARU safety analysis. As a result, the licensee has not established reasonable assurance that seismically qualified SSC are capable of performing the specified safety functions following an SSE. This is an ongoing violation.

The failure of plant personnel to follow the requirements of Procedure OM7.ID12 to evaluate the operability of SSC following discovery of the unanalyzed condition was a performance deficiency. The finding is more than minor because the performance deficiency could be reasonably viewed as a precursor to a significant event. Also, the performance deficiency is similar to minor questions 3.k & 3.j (MC 0612, App E Examples of Minor Issues) because the condition resulted in reasonable doubt on the operability of a system or component. Based on Attachment 0609.04, Phase 1 - Initial Screening and Characterization of Findings, the inspectors concluded that finding should be evaluated with a Phase 3 SDP because the finding was a design or qualification deficiency and the inspector was not able to confirm that the finding did not result in loss of operability or functionality (Use the IPEEE or other existing plant-specific analyses to identify core damage scenarios of concern and provide this input for Phase 3 analysis.)

10 CFR Part 50.9, "Completeness and accuracy of information," required that information provided by PG&E to the Commission or information required by the Commission's regulations be maintained by the applicant or the licensee shall be complete and accurate in all material respects.

The inspectors identified four examples of the failure of PG&E to provide or maintain complete and accurate information related to the Shoreline Fault and the plant current design and licensing bases:

- On November 14, 2008; April 16, 2009; and December 15, 2009; PG&E entered into the corrective action program (as Notification 50086062), required by Commission's regulations, that the Shoreline Fault was within the plant design and licensing basis because the ground movement spectra was bound by the LTSP analysis. Contrary to the above, the LTSP was not part of the plant design and licensing basis. FSARU Section 3.7.1, "Seismic Input," stated:

  "The LTSP contains extensive databases and analyses that update the basic geologic and seismic information in this FSAR Update. However, the LTSP material does not alter the design bases for DCPP. In SSER 34, the NRC states, "The Staff notes that the seismic qualification basis for Diablo Canyon will continue to be the original design basis plus the Hosgri evaluation basis, along with associated analytical methods, initial conditions, etc."

- On November 21, 2008, PG&E stated in NRC Event Number 44675, "Offsite Notification and Media Briefing due to Potential Discovery of Off Shore Fault near Plant," that discovery of a previously unknown zone of seismicity located offshore of the Diablo Canyon Power Plant, and that the potential fault is expected to be bound by the existing seismic design bases for DCPP." Contrary to the above, the Shoreline Fault was not expected to be bound by the existing seismic design bases for DCPP.

- On December 16, 2010, PG&E placed in Notification 50086062, Task 30, that the LTSP was the NRC accepted method for evaluating new seismic information. Contrary to the above, the LTSP was not NRC approved method for evaluation new seismic information.

- On December 16, 2010, PG&E placed in Notification 50086062, Task 30, that SSER 7 stated that the NRC considered the HE the safe shutdown earthquake for the site as defined in Part 100, Appendix A. Contrary to the above, the HE was not the SSE for the site as defined in Part 100, Appendix A. While SSER 7 included this statement, the NRC agreed to the PG&E request to maintain the double design earthquake as the safe shutdown earthquake prior to plant licensing. FSARU 3.7.6.1, Post-Hosgri Shutdown Requirements and Assumed Conditions, stated: "This is consistent with the DCPP design basis stated in FSAR Section 3.7.1.1 that the DDE is the SSE for DCPP, and that the guidelines presented in RG 1.29 apply to the DDE."

The NRC used the incomplete and/or inaccurate information in the following documents with the conclusion that the Shoreline Fault was bound by the current design and licensing bases:

- Transmittal letter from NRR to PG&E for the April 08, 2009 NRC Research Information Letter 09-001 (Preliminary Deterministic Analysis of Seismic Hazard at Diablo Canyon NPP From Newly Identified "Shoreline Fault")
- Diablo Canyon Power Plant - NRC Integrated Inspection Reports 05000275/2009005 AND 05000323/2009005 February 3, 2010 (ML100341199)
- Diablo Canyon Power Plant - NRC Integrated Inspection Reports 05000275/2009002 AND 05000323/2009002, May 5, 2009 (ML091250142)

The *NRC Enforcement Policy,* September 30, 2010, stated:

Severity Level III violations involve, for example: Inaccurate or incomplete information is provided or maintained. If this information had been completely and accurately provided or maintained, it would likely have caused the NRC to reconsider a regulatory position or undertake a substantial further inquiry;

Severity Level IV violations involve, for example: A licensee fails to make a required report which, had it been submitted, would have resulted in, for instance, increasing the inspection scope of the next regularly scheduled inspection.

Sequence of Events

November 14, 2008: Pacific Gas and Electric entered into the corrective action program[34] identification of a new line of earthquake epicenters located about 1 km from the plant. PG&E documented that this line of epicenters may represent an active earthquake fault that had not been previously evaluated. The Plant operating authority reviewed the new information on November 15 and concluded that that condition was within the plant design and licensing basis (not a nonconforming condition) because the ground movement spectra that could be produced by the new line of epicenters was bound by the LTSP analysis.[35]

November 21, 2008: Pacific Gas and Electric notified the NRC[36] of discovery of a previously unknown "zone of seismicity" located offshore of the Diablo Canyon Power Plant. In the Notification Report the licensee stated that "Initial assessment indicates that the ground motion from this potential fault is expected to be bounded by the existing seismic design bases for DCPP."

January 15, 2009: Plant operations again concluded that the Shoreline Fault was not an entry condition for the station operability procedure because the expected effects of the potential earthquake are bounded by the Hosgri analysis.[37] This entry was subsequently corrected to change "Hosgri analysis" to the "LTSP."

April 8, 2009: The NRC issued Research Information Letter 09-001, "Preliminary Deterministic Analysis of Seismic Hazard at Diablo Canyon NPP From Newly Identified 'Shoreline Fault'" to the public.[38] The Research Information Letter included a confirmatory analysis that concluded potential ground motion from the Shoreline fault was bound by the LTSP spectrum. The Research Information Letter did not draw any conclusions related to the Shoreline fault ground motion being within Diablo Canyon CLB. However, the NRR transmittal letter included the following statements:

> *"PG&E informed the NRC staff that it had performed an initial evaluation of the potential ground motion levels at the DCPP from the hypothesized fault which concluded that these motions would be bounded by the ground motion levels previously determined for the current licensing basis."*
>
> *"Based on the NRC staff review of the preliminary geophysical data provided by PG&E in preparation for the call and the license's' preliminary analysis provided during the conference call, the NRC staff concluded that the current licensing basis is bounding and continues to support safe operation of the DCPP. "*
>
> *"Therefore, based on the currently available information, the NRC staff concludes that the design and*

licensing basis evaluations of the DCPP structures, systems, and components are not expected to be adversely affected and the current licensing basis remains valid and supports continued operability of the DCPP site."

April 16, 2009: PG&E concluded that the Shoreline Fault did not have an adverse impact on the seismic qualification of ISFSI road and transporter seismic stability analysis based on the April 8, 2009 RIL.[39]

May 5, 2009: Region IV issued a Diablo Canyon inspection report stating that the licensee concluded that the postulated spectrum was bounded by the ground motion previously analyzed as part of the plant seismic design and licensing basis.[40]

December 15, 2009: PG&E concluded that the Shoreline Fault was only 300 meters from the plant inlet (600 meters from the power block). PG&E again concluded that a nonconforming condition did not exist because the results were bounded by the LTSP.[41]

January 7, 2010: PG&E licensing personnel raised a concern that preliminary Shoreline Fault response spectrum exceeds the Hosgri Event in the 15 to 20 Hz frequency range. PG&E stated that the Hosgri spectrum plot was included for information only. The purpose of the plot was to demonstrate that the Shoreline was bounded by the LTSP spectrum.[42] PG&E stated that the fact that the Shoreline was outside of the Hosgri qualification basis did not have any implications with respect to the seismic design or analysis of the plant.

January 2010: Pacific Gas and Electric submitted to the NRC "Progress Report: Shoreline Fault Zone, Central Coastal California" and "Confirmatory Analysis of Evaluation of Secondary Fault Rupture Hazard from the Shoreline Fault Zone" (ADAMS ML100190142). In these reports the licensee concluded that the fault was closer to the plant than originally estimated about 300 meters from the intake and 600 meters from the power block. The licensee also determined that secondary ground faulting was very unlikely based on a probabilistic analysis.

February 3, 2010: Region IV issued a Diablo Canyon inspection report stating,[43]

"On December 15, 2009, Pacific Gas and Electric provided the inspectors a summary of shoreline fault characterization activities conducted over the past year. The licensee concluded that the postulated ground movement spectrum was bounded by the current plant seismic design and licensing bases."

September 9, 2010: PG&E presented the preliminary results of the deterministic and probabilistic Shoreline Fault evaluations at the NRC Seismic Workshop in San Luis Obispo, Ca. PG&E stated that they compared the Shoreline Fault against the LTSP rather than the current design and licensing basis.

September 14, 2010: The resident inspectors identified that ground motion from the Shoreline Fault was outside of the plant CLB.[44]

September 28, 2010: The resident inspectors identified and communicated to PG&E that the Shoreline Fault was a condition outside the bounds of the FSARU seismic safety analysis and was an entry condition in the station operability evaluation procedure. PG&E did not take any corrective actions.

October 4, 2010: The resident inspectors recommended an unresolved item be included in the third quarter DC RI inspection report to document that an earthquake produced by the Shoreline fault was outside the plant seismic design basis. Region IV disapproved the resident inspectors's recommendation.

October 5, 2010: The resident inspectors briefed the NRR PM (Alan Wang) and Chief (Mike Markey) on the Shoreline fault findings.

October 10, 2010: PG&E reviewed the Shoreline Fault for operability concerns prior to releasing Unit 1 for Mode 4 operations. PG&E again concluded that a nonconforming condition did not exist because predicted ground

motions were within the LTSP spectrum.[45] As a result, the licensee did not enter the plant operability determination procedure.

October 14, 2010: The resident inspectors briefed the Region IV RA (Collins) on the Shoreline Fault findings.

October 19, 2010: The resident inspectors met with the PG&E Engineering Director and discussed operability concerns. The Engineering Director stated that the plant docket was incomplete because it did not include the NRC agreement with PG&E to use the LTSP (HE margin evaluation) as a basis for evaluation of new seismic information.

November 30, 2010: The resident inspectors briefed the DRP Division Director on the Shoreline Fault findings.

December 2, 2010: The DRP Deputy Division Director (Pruett) requested PG&E (Ken Peters) enter into the corrective action program the failure to evaluate the affect of the Shoreline Fault on SSC as required by station procedures. The licensee did not enter the condition into the station corrective action program.

December 16, 2010: In response to the DRP Deputy Division Director December 2 call, PG&E updated the condition report to include a justification for not evaluating the operability of Technical Specification required SSC following identification of the Shoreline Fault greater than the FSARU safety analysis:[46]

- In the April 8, 2009 letter NRR stated: *"Therefore, based on the currently available information, the NRC staff concludes that the design and licensing basis evaluations of the DCPP structures, systems, and components are not expected to be adversely affected and the current licensing basis remains valid and supports continued operability of the DCPP site."*

- Statement in NRC SSER 7, that the NRC considered the HE the SSE for the site as defined in Part 100, Appendix A.

- The Shoreline Fault is within the plant CLB because the LTSP ground motion spectra was approved by the NRC (1991 SSER 34)

- The CLB for the evaluation of new seismic information was to use the LTSP per a commitment PG&E made during a 1991 meeting with the NRC.

December 31, 2010: PG&E completed an estimate of the deterministic ground motion for the Shoreline Fault.[47] PG&E documented that because the results (deterministic and probabilistic) were within the LTSP adequate seismic margin exists and new information is within the CLB for the facility. PG&E again concluded that a nonconforming condition did not exist (because ground motions were within the LTSP/HE spectrum).

January 2011: PG&E issued "Report on the Analysis of the Shoreline Fault Zone, Central Coast California to the USNRC." The report describes an updated evaluation of three earthquake faults (Los Osos, San Luis Bay, and Shoreline) that would produce ground motion greater than assumed in the FSARU SSE safety analysis.[48]

Endnotes

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[1] Report on the Analysis of the Shoreline Fault Zone, Central Coast California to the USNRC, PG&E , January 2011, Figure 6-19, page 6-51

[2] FSARU Table 3.7-1, Containment And Auxiliary Building Criteria Comparison
[3] Diablo Canyon Intergraded Inspection Report, NCV 05000323/2009005-04, " Less than Adequate Replacement Reactor Head Modification Design Control"
[4] FSARU Section 3.11, Environmental Design of Mechanical and Electrical Equipment
[5] Diablo Canyon Subliminal Safety Evaluation Report 16, Section 1, Introduction and Discussion
[6] Regulatory Guide 1.29, Seismic Design Classification
[7]: Report on the Analysis of the Shoreline Fault Zone, Central Coast California to the USNRC, PG&E , January 2011
[8] From Figure 6-19, Report on the Analysis of the Shoreline Fault Zone, Central Coast California to the USNRC, PG&E , January 2011
[9] Per Norm Abramson, NRC PGE Meeting, January 19, 2011
[10] FSARU Section 3.2.1, Seismic Classification
[11] SSER 7, Section 2.5.2, Seismology, page 2-4
[12] FSARU Section 3.7.1.2, Design Response Spectra Derivation
[13] Diablo Canyon FSARU, Section, Diablo Canyon FSARU, Section 3.7.1.3 Critical Damping Values, Revision 19
[14] Regulatory Guide 1.60, Design Response Spectra for Seismic Design of Nuclear Power Plants. Revision 1
[15] UFSAR Table 5.2-6, Load Combinations And Stress Criteria For Westinghouse Primary Equipment, Revision 19
[16] FSARU Section 5.2.1.5.4, Faulted Conditions
[17] FSARU Section 3.7.6.1, Post-Hosgri Shutdown Requirements and Assumed Conditions
[18] Areva Calculation 6 CS 20327, Revision A, Analyses of the Impact of Reduced Damping Factor on the results of the design Report
[19] Areva Replacement reactor head, Calculation 6 CS 20327, Appendix 2, revision A, "Primary Stress Evaluations, Design Conditions DE 3%, DDE 4% + LOCA, HE 4% + Displacement
[20] Areva CRDM Load Reconciliation, Calculation 9000008579, Revision 3 (page 77)
[21] Diablo Canyon NRC Intergraded Inspection Report, NCV 05000323/2009005-04, " Less than Adequate Replacement Reactor Head Modification Design Control"
[22] Areva Calculation 51-9125626-000, Evaluation of IHA Reduced Damping
[23] FSARU Section 5.2.1.15.3, Reactor Coolant Pump Evaluation
[24] FSARU Section, 5.2.1.15.4, Reactor Vessel Evaluation
[25] FSARU Section 5.2.1.15.9, Pressurizer Evaluation
[26] FSARU Section 3.7.6.1, Post-Hosgri Shutdown Requirements and Assumed Conditions
[27] FSARU Section 5.2.1.5.4, Faulted Conditions
[28] Design Criteria Memorandum C-28, "Criteria for Maximum Building Displacement for Hosgri, design, and Double Design Earthquakes or LOCA," Revision 21A (page 8)
[29] PG&E Long Term Seismic Program Final Report, DCL-88-192, July 1988, Section 4 & Pages 7.1 – 7.3 1
[30] FSARU Section 3.7.1, Seismic Input
[31] PG&E Letter to NRC, DSCL 91-178, LTSP Future Plant Modifications, July 16, 1991
[32] SSER 34, Section 2.5.2.4, Seismology Conclusions, page 2-49
[33] SSER 34, S Section 2.5.2.4eismology Conclusions , page 2-49
[34] Notification 50086062, "LTCA-Ident of Seis Lineament Offsiter," November 14, 2008
[35] Notification 50086062, "LTCA-Ident of Seis Lineament Offsiter," November 14, 2008
[36] Event Number 44675, Offsite Notification and Media Briefing due to Potential Discovery of Off Shore Fault near Plant, November 21, 2008
[37] Notification 50086062, "LTCA-Ident of Seis Lineament Offsiter," January 15, 2010
[38] Diablo Canyon Power Plant, Unit Nos. 1 and 2 – NRC Preliminary Review of Potential Shoreline Fault, April 8, 2009
[39] Notification 50086062, "LTCA-Ident of Seis Lineament Offsiter," Task 10, April 15, 2009
[40] Diablo Canyon Power Plant - NRC Integrated Inspection Report 05000275/2009002 AND 05000323/2009002, May 5, 2009 (ML091250142)
[41] Notification 50086062, "LTCA-Ident of Seis Lineament Offsiter," November 14, 2008
[42] Notification 50086062, "LTCA-Ident of Seis Lineament Offsiter," Task 11, January 7, 2010

[43] Diablo Canyon Power Plant - NRC Integrated Inspection Report 05000275/2009005 AND 05000323/2009005 February 3, 2010 ML# 100341199
[44] Notification 50341463, NRC SRI Question on the Shoreline Fault Study, September 14, 2010
[45] Notification 50086062, "LTCA-Ident of Seis Lineament Offsiter," Task 24, October 10, 2010
[46] Notification 50086062, "LTCA-Ident of Seis Lineament Offsiter," Task 30, December 16, 2010
[47] Notification 50368351, Shoreline Fault Zone Study Report Update, December 31, 2010
[48] Report on the Analysis of the Shoreline Fault Zone, Central Coast California to the USNRC, Figure 6-19

From: Case, Michael
Sent: Wednesday, November 27, 2013 11:36 AM
To: Peck, Michael
Cc: Hill, Brittain; Bernhard, Rudolph; Sewell, Margaret
Subject: DPO Update
Attachments: Appendix A.docx

Hi Michael. Happy Thanksgiving. I just wanted to give you a quick update on where we are and what we've been up to. First, attached is the statement of concerns that we're using. We're basically using the markup you provided earlier (there may be typos; my AA had to rekey it in). Since you've been back from leave, we've been mostly talking with other folks related to the DPO so we've done Mike Markley, Neil O'Keefe and Jon Ake. Quite frankly, we're still pulling information related to Diablo. After all, it is about 45 years of history.

Schedule wise, we're not going to make the initial timeline that I think you got when the DPO was initiated. We actually have started to write, but mostly it's just getting background information into the document. As far as estimates on getting our report done, I'm shooting for mid-December. If that turned out to be a final draft, I would be shocked but we have a good chance at a "report with holes" if you are familiar with how SERs are sometimes built.

Britt said you might be in town teaching in December. I'm sure the panel would enjoy meeting with you in person (except for Rudy who is out in Region II). If you have questions about what's going on, feel free to call (although email might be better in some respects. If I have free time, I'll be off working on the DPO which is almost impossible for me to do in my office).

Mike

From: Leeds, Eric
Sent: Wednesday, November 27, 2013 12:05 PM
To: DPOPM Resource
Cc: Sewell, Margaret; Pedersen, Renee; Wertz, Trent; Case, Michael
Subject: DPO Extension Request

To Whom It May Concern,

In accordance with Management Directive 10.159, Handbook (D)(5)(b), DPOs are expected to be completed within 120 days and the 120-day time frame may only be extended with the approval of the EDO through the DPOPM for offices that report to the EDO.

The purpose of this email is to request an extension for DPO-2013-002.

In particular, please revise the current due date from November 29, 2013 to January 31, 2014.

The schedule has been impacted by several issues including the unavailability of one of the panel members due to prior work and leave commitments, the furlough in October, and the complex nature of the issue.

The DPO process affords employees an opportunity to have their views expressed to and considered by high level managers. Ensuring that managers have sufficient time to fully consider the issues is critical to the success of the process. We have reviewed the extension request and think that it is reasonable and consistent with the goals of the DPO Program.

Thank you for your consideration of this request.

Eric J. Leeds
Director, Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-1270

From: Sewell, Margaret
Sent: Tuesday, December 03, 2013 9:15 AM
To: Leeds, Eric
Cc: Pedersen, Renee; Solorio, Dave; Wertz, Trent; Case, Michael; Hill, Brittain; Bernhard, Rudolph; Peck, Michael; Zimmerman, Roy
Subject: FW: Extension Request for DPO-2013-002
Attachments: DPO Extension Request; Milestones and Timeliness Goals.docx

Importance: High

Eric,

Based on the approved subject extension, attached is the new, updated schedule for DPO-
2013-002.

If you have any questions, please feel free to contact us.

Thank you.
Marge

Marge Sewell
Safety Culture Specialist
Office of Enforcement/Concerns Resolution Branch
301-415-8045
margaret.sewell@nrc.gov

From: Khanna, Meena
Sent: Monday, December 02, 2013 9:19 PM
To: Sewell, Margaret; Pedersen, Renee
Cc: Wertz, Trent
Subject: FW: Extension Request for DPO-2013-002
Importance: High

Just an fyi…thanks!

From: Khanna, Meena
Sent: Monday, December 02, 2013 4:28 PM
To: ExtensionRequest, EDO
Cc: Sanfilippo, Nathan
Subject: FW: Extension Request for DPO-2013-002
Importance: High

Denise, I approve NRR's extension request for DPO-2013-002 from Nov 29, 2013 to January
31, 2014.

Thanks,
Meena

From: ExtensionRequest, EDO
Sent: Monday, December 02, 2013 4:22 PM
To: Khanna, Meena
Subject: FW: Extension Request for DPO-2013-002
Importance: High

Hi Meena,

For your review and approval.

Thanks,
Denise

From: Sewell, Margaret
Sent: Wednesday, November 27, 2013 1:05 PM
To: ExtensionRequest, EDO
Cc: Khanna, Meena; Leeds, Eric; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Peck, Michael; Case,
Michael; Hill, Brittain; Bernhard, Rudolph; Wertz, Trent
Subject: Extension Request for DPO-2013-002
Importance: High

In accordance with Management Directive 10.159, Handbook (D)(5)(b), DPOs are expected to
be completed within 120 days and the 120-day time frame may only be extended with the
approval of the EDO through the DPOPM for offices that report to the EDO.

The purpose of this email is to request an extension on behalf of Eric Leeds, Director, Office of
Nuclear Reactor Regulation, for DPO-2013-002.

In particular, please revise the current due date from November 29, 2013 to January 31, 2014.

I am attaching Eric Leeds' extension request. The schedule has been impacted by several
scheduling issues including leave commitments, the Government Shutdown, and the complex
nature of the issue.

The DPO process affords employees an opportunity to have their views expressed to and
considered by high level managers. Ensuring that managers have sufficient time to fully
consider the issue is critical to the success of the process. I have reviewed the extension
request and think that it is reasonable and consistent with the goals of the DPO Program.

I am also including the current Milestones and Timeliness Goals for this case.

Please let me or Renée Pedersen know if you have any questions. Thank you for your
consideration of this request and we look forward to hearing from you.

Marge Sewell
Safety Culture Specialist
Office of Enforcement/Concerns Resolution Branch
301-415-8045

Renée Pedersen
Office of Enforcement/Concerns Resolution Branch
Sr. Differing Views Program Manager
301-415-2742

From: ExtensionRequest, EDO
Sent: Tuesday, December 03, 2013 12:12 PM
To: Sewell, Margaret
Cc: Khanna, Meena; Leeds, Eric; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Peck, Michael; Case, Michael; Hill, Brittain; Bernhard, Rudolph; Wertz, Trent
Subject: RE: Extension Request for DPO-2013-002

Good Afternoon,

OEDO has reviewed and approved your extension request. The new due date is 01/31/14.

Thanks,
Denise

From: Sewell, Margaret
Sent: Wednesday, November 27, 2013 1:05 PM
To: ExtensionRequest, EDO
Cc: Khanna, Meena; Leeds, Eric; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Peck, Michael; Case, Michael; Hill, Brittain; Bernhard, Rudolph; Wertz, Trent
Subject: Extension Request for DPO-2013-002
Importance: High

In accordance with Management Directive 10.159, Handbook (D)(5)(b), DPOs are expected to be completed within 120 days and the 120-day time frame may only be extended with the approval of the EDO through the DPOPM for offices that report to the EDO.

The purpose of this email is to request an extension on behalf of Eric Leeds, Director, Office of Nuclear Reactor Regulation, for DPO-2013-002.

In particular, please revise the current due date from November 29, 2013 to January 31, 2014.

I am attaching Eric Leeds' extension request. The schedule has been impacted by several scheduling issues including leave commitments, the Government Shutdown, and the complex nature of the issue.

The DPO process affords employees an opportunity to have their views expressed to and considered by high level managers. Ensuring that managers have sufficient time to fully consider the issue is critical to the success of the process. I have reviewed the extension request and think that it is reasonable and consistent with the goals of the DPO Program.

I am also including the current Milestones and Timeliness Goals for this case.

Please let me or Renée Pedersen know if you have any questions. Thank you for your consideration of this request and we look forward to hearing from you.

Marge Sewell
Safety Culture Specialist
Office of Enforcement/Concerns Resolution Branch
301-415-8045

Renée Pedersen
Office of Enforcement/Concerns Resolution Branch
Sr. Differing Views Program Manager
301-415-2742

Eric's DPO Extension request.txt

From: Leeds, Eric
Sent: Wednesday, January 29, 2014 1:33 PM
To: Sewell, Margaret
Cc: Pedersen, Renee; Wertz, Trent; Case, Michael; Dorman, Dan; Uhle, Jennifer
Subject: DPO Extension request

Marge (and/or Renee),

In accordance with Management Directive 10.159, Handbook (D)(5)(b), DPOs are expected to be completed within 120 days and the 120-day time frame may only be extended with the approval of the EDO through the DPOPM for offices that report to the EDO.

The purpose of this email is to request an extension for DPO-2013-002.

In particular, please revise the current due date from January 31, 2014 to March 28, 2014..

The schedule has been impacted by several issues including the development of information from the licensee (which has been delayed due to the holidays and an illness), addition of a peer review of the information, and the complex nature of the issue.

Thanks!

Eric

Eric J. Leeds
Director, Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-1270

OEDO Extension Request Approval for DPO-2013-002.txt

From: ExtensionRequest, EDO
Sent: Thursday, January 30, 2014 4:59 PM
To: Sewell, Margaret; ExtensionRequest, EDO
Cc: Brock, Kathryn; Leeds, Eric; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Campbell, Andy; Peck, Michael; Case, Michael; Hill, Brittain; Bernhard, Rudolph; Wertz, Trent; Dorman, Dan; Uhle, Jennifer
Subject: RE: Extension Request for DPO-2013-002

OEDO has reviewed and approved the subject extension. The new due date is 03/28/14.

Thanks,
Denise

From: Sewell, Margaret
Sent: Wednesday, January 29, 2014 2:28 PM
To: ExtensionRequest, EDO
Cc: Brock, Kathryn; Leeds, Eric; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Campbell, Andy; Peck, Michael; Case, Michael; Hill, Brittain; Bernhard, Rudolph; Wertz, Trent; Dorman, Dan; Uhle, Jennifer
Subject: Extension Request for DPO-2013-002

In accordance with Management Directive 10.159, Handbook (D)(5)(b), DPOs are expected to be completed within 120 days and the 120-day time frame may only be extended with the approval of the EDO through the DPOPM for offices that report to the EDO.

The purpose of this email is to request an extension on behalf of Eric Leeds, Director, Office of Nuclear Reactor Regulation, for DPO-2013-002.

In particular, please revise the current due date from January 31, 2014 to March 28, 2014.

I am attaching Eric Leeds' extension request. The schedule has been impacted by several issues including the development of information from the licensee (which has been delayed due to the holidays and an illness), addition of a peer review of the information, and the complex nature of the issue.

The DPO process affords employees an opportunity to have their views expressed to and considered by high level managers. Ensuring that managers have sufficient time to fully consider the issue is critical to the success of the process. I have reviewed the extension request and think that it is reasonable and consistent with the goals of the DPO Program.

I am also including the current Milestones and Timeliness Goals for this case.

Please let me or Renée Pedersen know if you have any questions. Thank you for your consideration of this request and we look forward to hearing from you.

Marge Sewell
Safety Culture Specialist
Office of Enforcement/Concerns Resolution Branch
301-415-8045

From: Leeds, Eric
Sent: Tuesday, March 25, 2014 10:56 AM
To: DPOPM Resource
Cc: Sewell, Margaret; Pederson, Cynthia; Case, Michael; Wertz, Trent
Subject: DPO Extension request

To Whom It May Concern,

In accordance with Management Directive 10.159, Handbook (D)(5)(b), DPOs are expected to be completed within 120 days and the 120-day time frame may only be extended with the approval of the EDO through the DPOPM for offices that report to the EDO.

The purpose of this email is to request an extension for DPO-2013-002.

In particular, please revise the current due date from March 28, 2014 to April 30, 2014.

The schedule has been impacted by the complex nature of the issue and the need to gather information from the licensee.

The DPO process affords employees an opportunity to have their views expressed to and considered by high level managers. Ensuring that managers have sufficient time to fully consider the issues is critical to the success of the process. We have reviewed the extension request and think that it is reasonable and consistent with the goals of the DPO Program.

Thank you for your consideration of this request.

Eric J. Leeds
Director, Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-1270

From: Brock, Kathryn
Sent: Friday, March 28, 2014 11:14 AM
To: Sewell, Margaret
Cc: Foster, Jack; Jaegers, Cathy
Subject: RE: Extension Request for DPO-2013-002

Approved.

Cathy will follow up and ensure it is in STARS. For the next time please work with Jack to be sure we get
it in STARS.

Thanks.

From: Sewell, Margaret
Sent: Friday, March 28, 2014 10:38 AM
To: Brock, Kathryn
Cc: Foster, Jack
Subject: FW: Extension Request for DPO-2013-002

Kathryn,

I don't think I got approval for this extension request yet. Is it possible for you to approve this
one as well, so we don't hold it up?

Thanks!
Marge

Marge Sewell
Safety Culture Specialist
Office of Enforcement/Concerns Resolution Branch
301-415-8045
margaret.sewell@nrc.gov

From: Sewell, Margaret
Sent: Tuesday, March 25, 2014 4:24 PM
To: ExtensionRequest, EDO
Cc: Brock, Kathryn; Leeds, Eric; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Case, Michael; Case,
Michael; Hill, Brittain; Bernhard, Rudolph; Wertz, Trent
Subject: Extension Request for DPO-2013-002

In accordance with Management Directive 10.159, Handbook (D)(5)(b), DPOs are expected to
be completed within 120 days and the 120-day time frame may only be extended with the
approval of the EDO through the DPOPM for offices that report to the EDO.

The purpose of this email is to request an extension on behalf of Eric Leeds, Director, Office of
Nuclear Reactor Regulation, for DPO-2013-002.

In particular, please revise the current due date from March 28, 2014 to April 30, 2014.

I am attaching Eric Leeds' extension request. The schedule has been impacted by the complex
nature of the issue and the need to gather information from the licensee.

The DPO process affords employees an opportunity to have their views expressed to and
considered by high level managers. Ensuring that managers have sufficient time to

fully
consider the issue is critical to the success of the process. I have reviewed the extension
request and think that it is reasonable and consistent with the goals of the DPO Program.

I am also including the current Milestones and Timeliness Goals for this case.

Please let me or Renée Pedersen know if you have any questions. Thank you for your consideration of this request and we look forward to hearing from you.

Marge

Marge Sewell
Safety Culture Specialist
Office of Enforcement/Concerns Resolution Branch
301-415-8045
margaret.sewell@nrc.gov

From: Peck, Michael
Sent: Wednesday, April 09, 2014 2:41 PM
To: Sewell, Margaret
Cc: Pedersen, Renee
Subject: QUESTION: DPO-2013-002 - Receipt of the OD or RA Decision

Ms. Sewell,

I received the completed Panel Report for DOP 2013-002 last week. I'm I correct in my assumption that I should also be receiving a memo describing the Office Directors decision in the near future?

If so, would I have 21 calendar days of receiving this memo to file an appeal?

Thank you,
Michael

From: Sewell, Margaret
Sent: Friday, January 31, 2014 9:32 AM
To: Leeds, Eric
Cc: Brock, Kathryn; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Campbell, Andy; Case, Michael; Peck, Michael; Hill, Brittain; Bernhard, Rudolph; Wertz, Trent
Subject: Extension Request for DPO-2013-003

Eric,

OEDO has approved the subject extension request (see attached email). Based on OEDO's approval, the new due date is 3/28/2014. Attached is the updated Milestones & Timeliness Goals for DPO-2013-002.

If you have any questions, please feel free to contact Renée or me.

Thank you.
Marge

From: Peck, Michael
Sent: Friday, April 25, 2014 6:19 AM
To: Pedersen, Renee
Cc: Case, Michael
Subject: RES: DPO 2013-002

Ms. Pedersen,

Following up your phone message - I received an electronic copy of the DPO Panel Report on April 4th.

I provided written comments related to the report to Mr. Case on April 9th.

I had a phone conversation with Mr. Leeds on April 21st to discuss the DPO issues. Mr. Leeds indicated that he may want to have a follow up call prior to making a decision on the issue.

Please let me know if I can provide any additional information related to DPO 2013-002.

Thank you,
Michael Peck, Ph.D.
Senior Reactor Technology Instructor
TTC, 432-855-6515

From: Peck, Michael
Sent: Friday, May 30, 2014 8:50 AM
To: DPOPM Resource
Cc: Pedersen, Renee; Solorio, Dave; Hilton, Nick; Sewell, Margaret
Subject: QUESTION: DPO-2013-00 - Extension Requested for Appeal Opportunity

Ms. Pedersen,

I received Mr. Leeds' DPO 2013-002 decision memo this morning. I understand that MD 10.159 provides 21 calendar days for me to appeal the decision May I have an extension to the appeal deadline until June 30, 2014?

I request the additional time to comprehensively address the highly complex issues involved in the DPO Panel Report and to compensate for my unavailability during the first two weeks in June due to official travel.

Thank you,
Michael

From: DPOPM Resource
Sent: Thursday, May 29, 2014 5:56 PM
To: Peck, Michael
Cc: Pedersen, Renee; Solorio, Dave; Hilton, Nick; Sewell, Margaret
Subject: DPO-2013-002 - Diablo Canyon Seismic Issues - Opportunity to Appeal

Michael,

By now you should have received the DPO Decision dated May 29, 2014. In accordance with the guidance in MD 10.159, "The NRC Differing Professional Opinions Program," you have 21 calendar days from the date you received the DPO Decision to submit an appeal if you choose.

If you have questions about the appeal process or any other DPO-related questions or concerns, please feel free to contact us.

If you do not send an appeal by June 19, 2014, we will assume that you do not want to submit an appeal. At this point, the DPO process will be considered complete. When the DPO process is complete, we will contact you about whether you would like to request that the DPO Case File be made public or remain non-public. The DPO Case File serves as a valuable KM tool. The DPO Case File will be posted on the internal Web site and the ADAMS accession number (if public) will be included in the summary of the case that is included in the Commission's Weekly Information Report (e.g., http://www.internal.nrc.gov/OE/dpo/dpo-2012-003.html).

As a reminder, we are still in a predecisional process and you should not release or discuss documents until the process is complete and records are reviewed in accordance with procedures for discretionary release.

Thank you for exercising your responsibility as an NRC employee and ensuring that agency decision-makers have all the information they need to make well-informed decisions that help us fulfill our regulatory mission. We understand that the DPO process can be an emotional journey and we appreciate your professionalism during the process.

Please feel free to call Renée Pedersen or Marge Sewell if you have any questions.

Renée Pedersen

OE/CRB
Senior Differing Views Program Manager
301-415-2742

Marge Sewell
OE/CRB
Safety Culture Specialist
301-415-8045

From: Peck, Michael
Sent: Monday, September 30, 2013 11:52 AM
To: Case, Michael
Cc: Bernhard, Rudolph; Hill, Brittain; Pedersen, Renee
Subject: DPO-2013-002 - Potential Precedent at Watts Bar
Attachments: SEQUOYAH 2013-09.pdf; Watts Bar 2013-09.pdf; Watts Bar 2012-09.pdf; SEQUOYAH 2013-09.pdf

Note: The attachments are publicly available as ML13071A253, ML13155A572, and ML13071A289.

Mr. Case,

In July 2009, TVA personnel concluded that a dam spillway coefficient previously used in the Watts Barr GDC 2 maximum flooding analysis was inconsistent with a more recent model. Correction of the coefficient resulted in a higher maximum flood that described in the original design basis. The NRC subsequently issued

- A Severity Level III violation for failing to report an unanalyzed condition related to external flooding
- A Yellow Finding following the failure to maintain an adequate abnormal condition procedure to implement the flood mitigation strategy
- A White Finding following inadequate abnormal condition procedure for flood mitigation strategy

These Watts Barr violations have similarities to the issues raised in DPO-2013-002. Similar issues were also disposition at Sequoyah. I have attached electronic copies of the inspection reports and final significance determination for these issues for your info.

Thank you,
msp

From: Scott, Michael
Sent: Wednesday, November 12, 2014 11:11 AM
To: Pedersen, Renee
Cc: Burnell, Scott; Markley, Michael; Scott, Michael; Oesterle, Eric; Screnci, Diane; Sheehan, Neil; Solorio, Dave; Sewell, Margaret; Sosa, Belkys; Holahan, Patricia
Subject: RE: Diablo Canyon Ask Management

Got it - thanks for your help.

Sent via My Workspace for iOS

On Wednesday, November 12, 2014 at 10:56:42 AM, "Pedersen, Renee" <Renee.Pedersen@nrc.gov> wrote:
Thanks for sharing this with OE. We support the brief response from Scott, including that it is
consistent with our agency guidance.

"Consistent with NRC guidance, the EDO's response to the DPO appeal is the final resolution to
this matter."

We would appreciate it if OE could be copied on any responses related to the DPO. (DPOPM.Resource@nrc.gov)

Renée Pedersen
Sr. Differing Views Program Manager
Office of Enforcement
(301) 415-2742

From: Burnell, Scott
Sent: Wednesday, November 12, 2014 8:22 AM
To: Markley, Michael; Scott, Michael; Oesterle, Eric; Screnci, Diane; Sheehan, Neil
Cc: Pedersen, Renee
Subject: RE: Re: Diablo Canyon Ask Management

This should particularly go through the RI OPA folks, and I'd offer the answer is "The EDO's
response to the DPO is the final resolution to this matter."

From: Markley, Michael
Sent: Wednesday, November 12, 2014 8:03 AM
To: Scott, Michael; Oesterle, Eric
Cc: Burnell, Scott; Pedersen, Renee
Subject: RE: Re: Diablo Canyon Ask Management

Mike

Again, I think you need to go through OE and OPA. My preference is not to respond.

Mike

From: Scott, Michael
Sent: Monday, November 10, 2014 6:14 PM
To: Markley, Michael; Oesterle, Eric
Subject: Re: Diablo Canyon Ask Management

Mike and Eric:

Thanks for the input you provided me. Hopefully the below would seem reasonable. If you
have any concerns please let me know. If agreed by senior management here, this

would be e-
mail blasted to the Region 1 staff.

Q: On September 19, The Santa Barbara Independent ran an article, which was also put on the
R1 website, about the former Diablo Canyon SRI who had a concern about how Diablo Canyon's new seismic information was handled and did not feel that is DPO about this concern
was adequately addressed. Does the NRC plan to do any
thing additional to address his concern in light of the recent article? If so, please inform us of
the resolution to this when it is concluded.

Proposed Response:

The following is quoted from the Commission Weekly Information Report dated September 19,
2014: "On September 9, 2014, the EDO issued a decision on the appeal of DPO 2013-002,
concerning seismic issues at the Diablo Canyon Nuclear Power Plant (DCNPP). The EDO's
decision on the appeal supported both the DPO panel's independent technical conclusions and
subsequent Office of Nuclear Reactor Regulation Director's decision that there was not a
significant or immediate concern with seismic safety at DCPP, and that the licensee and staff
had followed appropriate processes for technical specification operability of plant equipment and
Title 10 Code of Federal Regulations 50.59 evaluations with a reasonable technical and safety
rationale. The EDO noted that the DPO raised awareness of the complexity of the DCNPP
seismic licensing basis, but also illustrated the need for the agency to ensure there are clear
guidelines for staff and licensees regarding how changes in natural hazards should be
evaluated for all licensees. The public records for this DPO are available in the DPO case file
package in the Agencywide Document Access and Management System, Accession No. ML14252A743."

According to the cognizant NRR licensing staff, no specific additional actions are planned in
response to the referenced article. There has been substantial press coverage of the DPO, and
numerous correspondence from stakeholders, including members of Congress and the public. The staff is handling inquiries in accordance with established processes.

From: Oesterle, Eric
To: Markley, Michael; Wilson, George
Subject: FW: ADDITIONAL INFO: In federal court filing, PG&E and NRC accused of Diablo quake safety coverup
Date: Tuesday, October 28, 2014 10:36:03 AM

Fyi...

From: Alexander, Ryan
Sent: Tuesday, October 28, 2014 10:26 AM
To: Hipschman, Thomas; Reynoso, John; Walker, Wayne; Oesterle, Eric; Pruett, Troy; Kozal, Jason
Cc: OKeefe, Neil; Uselding, Lara
Subject: ADDITIONAL INFO: In federal court filing, PG&E and NRC accused of Diablo quake safety coverup

All:

Based on Lara's e-mail, I went to the FOE website and found their press release and link to the filing they indicated was submitted to the Court of Appeals this morning.

FOE Press Release: http://www.foe.org/news/news-releases/2014-10-in-federal-court-filing-pge-and-nuclear-regulator-said-to-collude-in-secret-diablo-canyon-decision

FOE Filing (as referenced in the Press Release):
http://libcloud.s3.amazonaws.com/93/f4/7/4937/14-10-28_FoE_Petition_FSAR.pdf

In my quick read of the filing, it notes the following:

"[The Petitioner] hereby petitions the Court for review of the final order of the United States Nuclear Regulatory Commission ("NRC") approving Revision 21 to the Final Safety Analysis Report as Updated (FSARU) for Diablo Canyon Units 1 & 2 without the required license amendment proceeding, in violation of 42 U.S.C. § 2239. The NRC acted arbitrarily, abused its discretion, and violated the Atomic Energy Act, the Administrative Procedure Act, the Commission's policies and regulations, and other applicable laws and regulations in approving Revision 21."

As such, the filing appears to be directly based on the sections of the FSAR that were released as part of the PDR request and based on the release of information associated with the DPO.

-- Ryan

From: Uselding, Lara
Sent: Tuesday, October 28, 2014 9:07 AM
To: Dapas, Marc; Pruett, Troy; Kozal, Jason; OKeefe, Neil; Walker, Wayne; Alexander, Ryan; Sebrosky, Joseph; Oesterle, Eric; Markley, Michael; Burnell, Scott
Subject: Fw: In federal court filing, PG&E and NRC accused of Diablo quake safety coverup

Lara Uselding
NRC Region 4 Public Affairs
817-200-1519

From: Bowers, Anthony
Sent: Tuesday, December 02, 2014 7:41 AM
To: Johnson, Michael; Satorius, Mark
Subject: FW: Discussion with Chairman

Mike/Mark,

See below questions from the Chairman to staff. The Chairman is requesting a meeting this morning or early afternoon to discuss in preparation for the tomorrow's hearing. The Chairman requested to meet specifically with Cliff Munson (NRO) and Jon Ake (Research).

Tony

From: Gilles, Nanette
Sent: Monday, December 01, 2014 4:37 PM
To: Munson, Clifford; Ake, Jon
Cc: Bowers, Anthony
Subject: Discussion with Chairman

Cliff & Jon,

I understand a time is being finalized for you to talk to the Chairman tomorrow about the latest on Diablo Canyon seismic issues so that she is up to date in preparation for Wednesday's EPW hearing. I wanted to make you aware of a couple of specific topics she is interested in hearing about.

1. How does the Hosgri EQ fit into the licensing basis for the plant? Apparently, Michael Peck has made statements to the effect that the staff assumed that Hosgri was the SSE, but it's not.
2. Can you explain Michael Peck's statements regarding the smaller Hosgri EQ producing more forces on mechanical equipment than the larger Hosgri EQ due to the methodologies use? (Sorry if this is cryptic, but you're getting it third hand.)
3. With regard to the recent PG&E report commissioned by the State, she wants to understand what it had to say with regard to the San Luis Bay and Los Osos faults.

Nan

Nanette V. Gilles
Policy Advisor for Reactors
Office of Chairman Macfarlane
U.S. Nuclear Regulatory Commission
301-415-1830

From: Satorius, Mark
Sent: Wednesday, October 22, 2014 4:41 PM
To: Pedersen, Renee
Cc: Kreuter, Jane
Subject: Re: Certificates of Appreciation for Diablo Canyon DPO

Yes. Agree we need to make it happen. I saw mike in the OWFN lobby and we greeted and shook hands. Jane can help w/ timing and the cakendar.
Mark Satorius

From: Pedersen, Renee
Sent: Wednesday, October 22, 2014 04:33 PM
To: Satorius, Mark
Cc: Kreuter, Jane
Subject: Certificates of Appreciation for Diablo Canyon DPO

Hi Mark,

I know you're probably busy, but I wanted to let you know that Michael Peck came to see me this afternoon (I'd never met him before). He is teaching a class tomorrow and ½ day on Friday. If you could squeeze in a few minutes, this would be a great opportunity to give him a Certificate of Appreciation. If the schedule doesn't work, we can figure something else out.

Just let me know.

Renée

From: Satorius, Mark
Sent: Friday, October 31, 2014 4:12 PM
To: Peck, Michael
Cc: Pedersen, Renee
Subject: Re: Follow Up From Diablo Canyon Seismic DPO Discussion

Thanks Michael. I was glad that we were able to talk last week. Thanks again for using the DPO process and further adding value by identifying several areas that the agency needs to focus on and improve.
Mark Satorius

From: Peck, Michael
Sent: Thursday, October 30, 2014 09:37 AM
To: Satorius, Mark
Cc: Pedersen, Renee
Subject: RES: Follow Up From Diablo Canyon Seismic DPO Discussion

Mr. Satorius,

Thank you for recognizing my contribution to the agency's Differing Professional Opinions (DPO) Program. I also appreciated the consolatory language used in your reply to my appeal and the opportunity to discuss the Diablo Canyon DPO issues with you in person.

During our meeting this past Friday and in late July, I understood you to say that the agency will focus forward rather than expending resources on past issues that have been corrected. After considering your feedback, I wanted to ensure that you understood that I view the issues identified in the DPO and Appeal as ongoing violations of NRC Rules and Diablo Canyon license requirements. I believe these uncorrected violations do have an impact on plant safety.

During 2013, Pacific Gas and Electric (PG&E) made changes to the Diablo Canyon FSARU. These changes were sufficient to lead the DPO Panel to conclude that the Hosgri Event was the/a facility safe shutdown earthquake for the facility. Since these changes would require an amendment to the Operating License, and no amendment was approved by the agency, PG&E's action represents an ongoing violation of 10 CFR 50.59 and should be promptly addressed in accordance with the NRC Enforcement Policy.

I realize enforcing the Diablo Canyon seismic design basis would result agency challenges. The most obvious corrective action would include agency approval of the Hosgri as the facility safe shutdown earthquake. However, this proposed action was previously considered and rejected by agency technical staff. Without a safe shutdown earthquake methodology that is both acceptable to the staff and can accommodate the new higher seismic loading results in ongoing violation of NRC 10 CFR 50, Appendix B, quality assurance requirements and should be promptly addressed in accordance with the NRC Enforcement Policy.

PG&E's failure to adequately demonstrate operability of important to safety SSCs also remains as an ongoing issue. ASME, Section III, Code acceptance limits are exceeded when the new seismic loads are summed with the required load combinations using the NRC approved safe shutdown earthquake methodology (considering the new maximum capable ground motion). The NRC requires that licensee satisfy Code acceptance limits for operability of reactor coolant pressure boundary components. PG&E's failure to demonstrate that Code requirements were met was not addressed in either the DPO Panel Report or your DPO Appeal response letter. The failure to meet Code acceptance limits represents an ongoing violation of 10 CFR 50.55a and the

facility Technical Specifications and should be promptly addressed in accordance with the NRC Enforcement Policy.

I appreciated the summary of the Diablo Canyon seismic licensing bases included in your September 9, 2014 memorandum. This summary acknowledged the original design bases as presented in the Preliminary Safety Analysis Report, NRC review of the Hosgri Evaluation provided in Supplemental Safety Evaluation Report 7, a description of the NRC review of Long Term Seismic Program provided in Supplemental Safety Evaluation Report 34, and requested actions associated with Recommendation 2.1 from the Near-Term Task Force Review of the Fukushima Accident. While this information provides insight into the Diablo Canyon seismic licensing bases and may be used to support future NRC licensing actions, none of this information may be used by the licensee as a bases to change the facility safe shutdown earthquake methodology without prior NRC approval. 10 CFR 50.59 and agency endorsed guidance established the threshold for facility changes that require an amendment to the Operating License. This threshold was based on the methodology described in the FSAR for meeting regulatory driven design bases requirements, such as General Design Criteria (GDC) 2 for protection against earthquakes. Prior to the 2013 changes, the Diablo Canyon FSARU clearly stated that the GDC 2 facility safe shutdown earthquake requirement was meet by the Double Design Earthquake safety analysis. The FSARU when on to explicitly state that the Hosgri Evaluation methodology did not satisfy NRC GDC 2 design bases requirements for the facility safe shutdown earthquake.

I would like to thank you again for your time and attention to the Diablo Canyon issues raised in DPO 2013-02. Please feel free to contact me if I can provide any additional information regarding ongoing compliance issues at Diablo Canyon.

Thank you,
Michael Peck, Ph.D.
Senior Reactor Technology Instructor
TTC, 423-855-6515

From: Oesterle, Eric
Sent: Monday, December 01, 2014 7:16 AM
To: Uhle, Jennifer; Evans, Michele; Wilson, George
Cc: Sebrosky, Joseph; Orf, Tracy; Rihm, Roger
Subject: RE: Question on DCPP for EPW hearing
Attachments: ANTICIPATED QUESTIONS AND ANSWERS_DCPP_1.docx; NRR_Diablo Canyon Seismic Studies_updated2014_1.docx

Note: The first attachment, consisting of 3 pages, is withheld in its entirety under FOIA exemption 5.

Importance: High

Jennifer,

Just getting in this morning (Monday 12/1) and seeing your email. I am reviewing the responses and addressing your comments this morning. See also responses below.

The updated responses are included as attachments.

Eric R. Oesterle
Acting Branch Chief
NRR/DORL/LPL4-1
301-415-1014

From: Uhle, Jennifer
Sent: Friday, November 28, 2014 6:01 PM
To: Evans, Michele; Wilson, George
Cc: Oesterle, Eric; Sebrosky, Joseph
Subject: Question on DCPP for EPW hearing

(b)(5)

(b)(5)

Roger Rihm has the electronic version and you can email him the change. We need it first thing tomorrow. I am emailing you guys to verify you agree. Please cc me.

Thanks,

Jennifer

(b)(5)

(b)(5)

(b)(5)

Diablo Canyon Seismic Studies
(also and Sewell Report on Tsunami Hazards)

Message: Seismic studies at Diablo Canyon Power Plant (DCPP) performed to comply with California implementation of federal coastal management law have been completed. The results of these studies have also been provided to the NRC. To date, these studies provide reasonable assurance that DCPP operation is consistent with the adequate protection of public health and safety.

1. On September 10, 2014, Pacific Gas & Electric (PG&E) submitted their Central Coastal California Seismic Imaging Project (CCCSIP) Report to the State of California and to the NRC. The report documented the results of advanced seismic studies performed by PG&E using state-of-the-art low- and high-energy, 2D and 3D, seismic reflection mapping to further document the characteristics of fault zones in the region surrounding Diablo Canyon. The results were provided to the NRC in accordance with a regulatory commitment documented in PG&E letter dated October 25, 2012. This commitment required that in the event new faults are discovered or information is learned that would suggest the Shoreline fault (discovered in 2008 and evaluated to be within the facility licensing basis) is more capable than currently believed, the licensee would provide the NRC with an interim evaluation that describes actions taken or planned to address the higher seismic hazard relative to the design basis, as appropriate, prior to completion of evaluations requested in the NRC Staff's March 12, 2012, request for information under 10 CFR 50.54(f) (i.e., NTTF Rec. 2.1 - seismic hazards re-evaluation). The licensee concluded that the results of the advanced seismic studies confirm previous analyses that the plant is designed to withstand a major seismic event. The NRC has independently assessed the new data and has confirmed that previous evaluations of ground motions for which the plant was evaluated and demonstrated to have a reasonable assurance of ~~safety~~ adequate protection remain bounding.

2. PG&E must respond to the NRC's March 12, 2012 request for information, under 10 CFR 50.54(hf) by March 2015. To respond to the request for information, PG&E is expected to utilize the results of their recently completed advanced seismic studies to support the NRC-mandated seismic hazard risk assessment. The NRC staff continues to monitor PG&E's progress in assessing the information necessary to update the seismic hazard information for DCPP and notes that the new seismic information will be peer-reviewed via the NRC-mandated Senior Seismic Hazard Analysis Committee (SSHAC) process. The NRC staff understands ~~'s current assessment is~~ that PG&E is on track to meet the March 2015 date for responding to the March 12, 2012 request for information. The ~~NRC continues to believe that the~~ seismic hazards re-evaluation scheduled to be submitted in March 2015 is expected to~~will~~ provide the most up-to-date and accurate assessment of seismic hazard risk for the Diablo Canyon Power Plant. The NRC will review PG&E's response along with other seismic hazard re-evaluation responses provided in accordance with the 10 CFR 50.54(f) letter.

Key Points:

- Seismic studies at DCPP have been ongoing since original licensing which resulted in three design basis earthquakes used to develop the seismic qualification basis for DCPP structures, systems, and components: Design Earthquake (DE)[0.2g], Double Design Earthquake (DDE)[0.4g], and the Hosgri Earthquake (HE)[0.75g]. The Unit 1 operating license, issued in 1984, contained a license condition for future deterministic and probabilistic seismic reevaluation resulting in PG&E's Long Term Seismic Program (LTSP)

and an NRC staff evaluation in 1991 confirming the earlier conclusions. In continuation of the LTSP seismic studies in November 2008, PG&E identified what later became known as the Shoreline fault. The Shoreline fault lies approximately 600 meters from the DCPP reactors and 300 meters offshore and was the subject of the NRC staff independent assessment discussed above. The Shoreline fault was evaluated by PG&E and it was determined that ground motions due to a seismic event along the Shoreline fault remains within the DCPP licensing basis. The NRC independently confirmed in its Research Information Letter (RIL 12-01) that the ground motions due to a seismic event along the newly discovered Shoreline fault was at or below the previously evaluated ground motions for the Hosgri earthquake.

- During NRC staff regulatory review related to DCPP license renewal, PG&E was required to obtain a coastal consistency certification for its federal operating license due to California's interpretation and implementation of the federal Coastal Zone Management Act (executed via the California Coastal Commission). To support the coastal consistency determination, PG&E agreed to perform state-of-the-art, 2D and 3D, onshore and offshore, low and high power seismic mapping techniques to explore the fault zones around DCPP and to identify potential seismic vulnerability not evident from previous technologies. The low-energy, onshore and offshore 2D and 3D seismic mapping have been completed along with high energy 3D seismic onshore mapping. This mapping supported the advanced seismic studies which were completed by PG&E in 2014.

- The advanced seismic studies undertaken by PG&E to implement requirements from the California Coastal Commission have been completed and the results of these studies were provided in a report to the State of California and to the NRC on September 10, 2014. These studies revealed that the Shoreline fault which was evaluated previously ~~evaluated~~ by PG&E in their 2011 Shoreline Fault report is longer and more capable that than previously evaluated and also indicated that the soil properties found in the 2011 report have been updated based on the new information. The report also included new information relative to other faults in the area (e.g., Hosgri, San Simeon, Los Osos, and San Luis Bay). Although this new information indicated increases in certain fault lengths, changes in fault dip angles, potential fault connections, increased in magnitudes, and changes to soil characteristics and resultant energy attention, the new information was determined by the licensee to remain enveloped by the previous 1977 Hosgri earthquake evaluation and the Long Term Seismic Program. Operability assessments are the licensee's primary tools for assessing safety when new problems or conditions are identified. The licensee performed an operability assessment as a result of this new information and determined that the plant remained operable. NRC resident inspectors have reviewed the operability assessment and determined that it followed appropriate NRC processes and there were no indications that challenge the NRC staff's assessment of DCPP's reasonable assurance of safety. However, an ~~more in-depth~~ inspection of the licensee's operability determination is currently being performed and includes a review by NRC ~~with the support of HQ~~ technical staff of ~~to review~~ the information contained in the PG&E seismic report upon which the operability assessment is based.

- PG&E has conducted six workshops related to the seismic studies process to date, with five of six open to the public. All of the planned workshops are now complete. The NRC staff attended these meetings as observers and will continue to monitor the process. To date, no new issues have been identified that have challenged the NRC staff's assessment of DCPP's reasonable assurance of adequate protection~~safety~~.

Possible Questions

1. **Can the NRC provide absolute assurance that the new seismic information for Diablo Canyon recently provided in PG&E's seismic report to the State of California and to the NRC does not put the plant outside its design basis?**

   The NRC reviews plants against a different standard than absolute assurance. The NRC review is based on reasonable assurance of adequate protection. The recent seismic report from PG&E conclude that the maximum ground motions that could occur from the earthquake faults evaluated, including the Shoreline fault, remain within the current licensing basis that postulates 0.75g ground motion. Operability assessments are the licensee's primary tools for assessing safety when new problems or conditions are identified. The licensee performed an operability assessment as a result of this new information and determined that the plant remained operable. NRC resident inspectors have reviewed the operability assessment and determined that it followed appropriate NRC processes and there were no indications that challenge the NRC staff's assessment of DCPP's reasonable assurance of adequate protection~~safety~~. However, an ~~more in-depth~~ inspection of the licensee's operability determination is underway and includes a review by NRC ~~with the support of HQ t~~technical staff of~~to review~~ the information contained in the PG&E seismic report upon which the operability assessment is based.

   Additionally, to ensure public health and safety, the DCPP units have an automatic seismic reactor trip set point of 0.35g. If the ground acceleration at the DCPP units from any earthquake that meets or exceeds this 0.35g set point, both reactors will automatically shut down.

2. **Based on concerns raised by the former NRC Senior Resident Inspector and recent claims from other groups that the NRC has "changed the rules" to allow Diablo Canyon to continue to operate in light of new information that revealed increased seismic hazards to the plant why isn't NRC taking immediate action to require Diablo Canyon to demonstrate that it is still within its seismic design and licensing bases?**

   The former SRI at the Diablo Canyon Power Plant (DCPP) submitted non-concurrence papers (NCPs) in January 2011 and January 2012, followed by a Differing Professional Opinion (DPO) in July 2013 (DPO 2013-02) detailing a disagreement with the NRC about how new seismic information should be compared to the plant's current seismic license requirements. DPO 2013-02 restated the issues presented in NCP 2012-01 and added a concern that a license amendment was needed incorporate the Shoreline fault into Diablo Canyon's FSAR as described in the RIL 12-01 cover letter. In accordance with MD 10.159, a DPO Ad Hoc Review Panel was established to review the DPO submittal, meet with the DPO submitter, and issue a DPO report including conclusions and recommendations regarding disposition of the issues presented in the DPO. The panel completed its report in May 2014 and a decision on the DPO was rendered in letter dated May 29, 2014, to the DPO submitter. The decision on the DPO was that there was not a safety concern over the seismic hazards considerations for Diablo Canyon. The DPO submitter appealed the decision to the EDO and the EDO completed his consideration of the DPO appeal on September 9, 2014, concluding that he was in agreement with the original decision that there is no safety concern and that the plant remains within its current licensing basis. Claims that the NRC has "changed the rules" to allow Diablo Canyon to continue to operate in light of new information that revealed increased seismic hazards to the plant are being handled by our Office of General Counsel. Notwithstanding, the licensee has concluded that the increased seismic hazards are still within the current licensing basis and has performed an operability assessment based on this new information that determined that important structures, systems, and components in the plant will remain operable following a

seismic event. NRC resident inspectors have reviewed the operability assessment and determined that it followed appropriate NRC processes and there were no indications that challenge the NRC staff's assessment of DCPP's reasonable assurance of adequate protectionsafety. However, an ~~more in-depth~~ inspection of the licensee's operability determination is underway and includes ~~with the support of HQ technical staff to~~ review by NRC technical staff of the information contained in the PG&E seismic report upon which the operability assessment is based.

3. **Given that it may take several months for the NRC to review PG&E's responses to the NRC's March 12, 2012, letter, why is the plant safe to operate during that time?**

The request for information process related to the March 12, 2012 letter, ~~dictates~~ directs ~~that~~ PG&E to provide interim evaluations to the NRC prior to the risk evaluations being performed (i.e., within 3 years). Further evaluations would be warranted should higher seismic hazards be revealed relative to the design basis. The responses to the March 12, 2012 letter, are scheduled to be submitted in March 2015. Based on the information contained in the recent PG&E seismic report, the licensee concluded that the maximum ground motions that could occur from the earthquake faults evaluated, including the Shoreline fault, remain within the current licensing basis that postulates 0.75g ground motion. Operability assessments are the licensee's primary tools for assessing safety when new problems or conditions are identified. The licensee performed an operability assessment as a result of this new information and determined that the plant remained operable. NRC resident inspectors have reviewed the operability assessment and determined that it followed appropriate NRC processes and there were no indications that challenge the NRC staff's assessment of DCPP's reasonable assurance of safety. However, an ~~more in-depth~~ inspection of the licensee's operability determination is underway and includes review by ~~with the support of HQ~~ NRC technical staff ~~to review~~ of the information contained in the PG&E seismic report upon which the operability assessment is based.

Additionally, to ensure public health and safety, the DCPP units have an automatic seismic reactor trip set point of 0.35g. If the ground acceleration at the DCPP units from any earthquake that meets or exceeds this 0.35g set point, both reactors will automatically shut down. Structures, systems, and components necessary to achieve and maintain safe shut down conditions were designed to the maximum ground motion of 0.75g. The responses due to the NRC in March 2015 will be supported by the new information contained in the PG&E seismic report that shows that the plant remains bounded by the current licensing basis. In addition, risk information associated with slip rates and recurrence of seismic events along the evaluated earthquake faults will be provided in the March 2015 timeframe to further inform the responses.

4. **Why was the PG&E license amendment associated with seismic issues allowed to be withdrawn and are there future plans for a license amendment?**

The October 20, 2011, PG&E license amendment requested approval to revise the current licensing basis, as described in the Updated Final Safety Analysis Report and Technical Specifications, to provide requirements for the actions, evaluations, and reports necessary when PG&E identifies new seismic information relevant to the design and operation of DCPP. In the October 12, 2012, letter from the NRC to PG&E, PG&E was informed of the issuance of the staff's independent assessment of the Shoreline Fault and the staff provided guidance on how new seismic information at Diablo Canyon should be evaluated.

Specifically the October 12, 2012, letter indicated that the NRC was aware of PG&Es efforts to obtain new seismic hazards information in support of the March 12, 2012, request for information, using advanced offshore and onshore 2D and 3D seismic reflection mapping and that this new seismic information should be evaluated in accordance with the process outlined in that March 12, 2012 letter. Therefore, the October 12, 2012, letter in conjunction with the March 12, 2012, request for information provides a process for assessing new seismic information at Diablo Canyon and rendered the portion of the October 20, 2011, PG&E license amendment in this area unnecessary. In a letter dated October 25, 2012, PG&E provided the basis for withdrawing its October 20, 2011, license amendment request. The staff accepted the withdrawal of the license amendment in a letter dated October 31, 2012.

Since the licensee's withdrawal of the October 20, 2011, ~~m~~ license amendment request, PG&E's ~~the~~ advanced seismic studies have been completed and a report was~~has been~~ provided to the State of California and to the NRC. Going forward the staff expects the licensee to follow the March 12, 2012, request for information, for assessing this new seismic information, and, in particular, to follow the peer-review SSHAC process. In addition to the request for additional information, by letter dated February 20, 2014, the Director of the NRC's Office of Nuclear Reactor Regulation provided supplemental information to all power reactor licensees and construction permit holders, including Diablo Canyon, regarding the performance of the seismic re-evaluations. Specifically, the February 20, 2014, letter reminded licensees, in part, that if an error is identified in the current design or licensing basis during performance of the seismic reevaluations that the NRC staff expects that licensees will evaluate affected structures, systems and components for operability in accordance with the Corrective Action Program. As described in the March 12, 2012, request for information, the NRC staff will determine whether additional regulatory actions are necessary once the information becomes available for review. As discussed above the staff continues to assess new seismic information as it becomes available (e.g., monitoring the Senior Seismic Hazard Analysis Committee (SSHAC) meetings). If new information suggests that the plant is not operating within its licensing basis or is not safe to continue operation the staff will immediately take the necessary regulatory actions to ensure the plant's licensing basis is changed, and if appropriate will require the plant to shutdown until it is demonstrated that it can be safely operated.

5. Why, if PG&E is completing seismic studies at DCPP, has the NRC staff already approved a final SER for license renewal?

The staff issued the final SER to preserve the staff's evaluation of the information that was available at the time. The staff plans to supplement the SER, as necessary, at a time closer to when a final decision on license renewal can be made after receipt of the coastal consistency certification and its accompanying seismic study information.

Regarding the license renewal environmental review, the Generic Environmental Impact Statement (GEIS) (NUREG-1437) is the generic EIS prepared to assess the environmental impacts of license renewal, identifying which environmental issues need to be addressed on a site-specific basis and which are best handled generically. Supplements to the GEIS are issued to address site-specific issues in the license renewal process. The NRC has not yet prepared or published a site-specific supplement to the GEIS for Diablo Canyon. When the licensee requests that the NRC restart the review, the environmental review will resume and the NRC staff will prepare a site-specific supplement related to the environmental impacts of Diablo Canyon.

6. Shouldn't seismic issues be addressed before license renewal is completed?

The NRC staff license renewal review schedule has been deferred at PG&E's request to reflect delays associated with the completion of seismic studies and the coastal consistency certification. While the pause in the NRC license renewal review schedule is not a stay or suspension of the license renewal process, the revised schedule will allow time to consider information from the seismic studies, if appropriate, following PG&E's request for recommencement of review.

Sewell Report on Tsunami Hazards

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Message: NRC guidance and criteria for reviewing tsunami hazards has been updated over the last several years to take into account new studies and information gathered from tsunami events worldwide by USGS, NOAA, and other research organizations and governmental agencies. The NRC has requested that all operating power reactors re-evaluate their flooding hazards, including tsunamis, per the March 12, 2012, 10 CFR 50.54(f) letter to determine if additional regulatory action is required to provide additional protection from updated hazards. To date, the NRC has no new information that would challenge its reasonable assurance conclusion that DCPP operation is consistent with the adequate protection of public health and safety

1. Dr. Robert Sewell, a consultant for the Center for Nuclear Waste Regulatory Analysis (CNWRA), prepared the draft report during the technical review of the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI). CNWRA provided the draft report to the Nuclear Regulatory Commission (NRC) staff with an accompanying explanation that CNWRA did not formally review or accept the conclusions of the draft report. The NRC staff assessed the concerns identified in the draft report and concluded that the preliminary nature of the study precluded its use as a basis for any regulatory decisions. The NRC did not release the draft Diablo Canyon tsunami report at the time of its initial review for two reasons. First, although the staff considered the draft report during the licensing of the Diablo Canyon ISFSI, the draft report did not contribute to the NRC's decision making on that proceeding. Second, the NRC staff considered the report preliminary because its conclusions were based on limited data and methods. COMSECY-14-0033, dated October 10, 2014, requested Commission approval for the staff to publicly release the Sewell Report along with several other documents that were previously withheld that would put the report into appropriate context. The SRM is pending and the staff will proceed in accordance with the direction in the SRM when issued.

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2. PG&E must respond to the NRC's March 12, 2012 request for information, under 10 CFR 50.54(f), regarding flooding hazards re-evaluation, including flooding resulting from a tsunami, by March 2015. To respond to the request for information, PG&E is expected to follow guidance provided by the NRC for performing a tsunami, surge, or seiche hazard assessment (JLD-ISG-2012-06) that was issued on January 4, 2013.

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Key Points:

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- In February 2006, the Office of Nuclear Reactor Regulation's (NRR's) Division of Engineering terminated further consideration of the Sewell Report, based on NRC participation in other cooperative government reviews of tsunami hazards under the President's Office of Science and Technology Policy (OTSP). NRR concluded that the OTSP effort would provide a more technically credible forum to broaden the NRC's understanding of tsunamis and inform efforts to reassess the tsunami design criteria in the Standard Review Plan. The design basis tsunami for DCPP considers distantly-generated tsunamis and locally-generated tsunamis. The design basis tsunami is the greater of these tsunamis and is 34.6 feet. Additionally, DCPP sits atop a coastal bluff, 85 feet above sea level, decreasing its vulnerability to a tsunami hazard.

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- The intake structure auxiliary salt water pump room vents are extended with steel snorkels to prevent seawater ingestion due to splash-up during the design flood event and is thus ensured of operation during extreme tsunami drawdown and combined tsunami and storm wave conditions. The only safety-related system that has components within the projected sea wave zone is the auxiliary salt water system. The auxiliary salt water pump motors are housed in watertight compartments within the intake structure. These compartments are designed for a combination tsunami-storm wave activity to elevation +48 feet MLLW (+45.4 feet MSL). The massive concrete intake structure ensures that the pumps remain in place and operate during extreme wave events. The intake structure is arranged to provide redundant paths for seawater to the pumps, ensuring a dependable supply of seawater.

- As documented in a memorandum dated February 27, 2006, from Michael Mayfield, Director, Division of Engineering in NRC's Office of Nuclear Reactor Regulation to E. William Brach, Director, Spent Fuel Project Office, Office of Nuclear Materials Safety and Safeguards, "Disposition of Draft Report Entitled, 'A Preliminary Numerical Study of the Hazard from Local Landslide Tsunami Scenarios at the Diablo Canyon Site in Central California'" (ADAMS Accession No. ML060460441), the staff received direction from the Commission that the report was not to be released, absent a thorough review by the staff and resolution of the staff comments. However, based on the limitations associated with the draft report, the NRC's Seismic Issues Technical Advisory Group assessment of the draft report, and the ongoing technically robust and broad review of tsunamis by the Office of Science and Technology Policy, the NRC staff made a decision to terminate any further consideration, or review, of the draft report.

- To place the draft Diablo Canyon tsunami report in the appropriate context, if the Commission approves release of the draft report, then the NRC staff plans to release these two related documents:

    - A memorandum dated March 17, 2004, from CNWRA, "Tsunami Hazard Study for the Diablo Canyon Site in Central California" (ADAMS Accession No. ML050450106). This memorandum forwards the report to the NRC and states that CNWRA has not formally reviewed the report nor does the CNWRA accept the report. The memorandum states in part that "the methodology is beyond state of the art, the uncertainties too large, and the results too speculative to be considered in current licensing decisions."

    - A memorandum dated November 17, 2005, from Andrew Murphy, Chairman Seismic Issues Technical Advisory Group in NRC's Office of Nuclear Regulatory Research, to Michele Evans, Branch Chief, Engineering Research Applications Branch in NRC's Office of Nuclear Regulatory Research and Eugene Imbro, Deputy Director, Division of Engineering, Office of Nuclear Reactor Regulation, "Transmittal of Seismic Issues Technical Advisory Group Evaluation of Tsunami Hazard Report and Tsunami Hazard Research Plan" (ADAMS Package Accession No. ML053210413). This memorandum provided the results of the Seismic Issues Technical Advisory Group (SITAG) review of the draft tsunami hazards report and provides its recommendation on the appropriate disposition of the draft report in a regulatory context.

- Recently, in response to FOIA request 2014-0222 (ADAMS Package Accession No. ML14170A719), the staff publicly released several documents associated with this draft Diablo Canyon tsunami report including: (1) a memorandum dated January 17, 2006,

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from Andrew Murphy, Chairman, Seismic Issues Technical Advisory Group, Office of Nuclear Regulatory Research, to Michele Evans, Branch Chief, Engineering Research Applications Branch, Office of Nuclear Regulatory Research, and Eugene Imbro, Deputy Director, Division of Engineering in NRC's Office of Nuclear Reactor Regulation, "Transmittal of Seismic Issues Technical Advisory Group Updated Evaluation of Tsunami Hazard Report" (ADAMS Package Accession No. ML060170138) – this memorandum provided an update to the SITAG's previous evaluation discussed above based on additional internal NRC interactions but with no resultant change in their recommendation; and (2) the memorandum dated February 27, 2006, from Michael Mayfield, Director, Division of Engineering, Office of Nuclear Reactor Regulation, to E. William Brach, Director, Spent Fuel Project Office, Office of Nuclear Material Safety and Safeguards, discussed above. If the Commission approves the requested release, all four of these documents will be grouped in an ADAMS package with the draft Diablo Canyon tsunami report.

- The staff notes that the draft Diablo Canyon tsunami report has been withheld previously from public disclosure and is referenced as being withheld in the following documents:
  - In response to FOIA/PA-2011-0118, FOIA/PA-2011-0119, and FOIA/PA-2011-0120 (ADAMS Accession No. ML13183A466)
  - In an e-mail response dated June 12, 2014, to Mr. David Weisman of the Alliance for Nuclear Responsibility (ADAMS Accession No. ML14191A100)
  - In an August 8, 2014, letter to Senator Boxer from Eugene Dacus, Acting Director, NRC Office of Congressional Affairs, dated August 8, 2014 (ADAMS Package Accession No. ML14232A137)

Possible Questions

1. Why is the staff releasing the report now when it previously withheld the report?

The staff has recently reassessed its previous determination to withhold the November 22, 2003, draft report because the passage of time and subsequent NRC staff actions associated with tsunami hazard review guidance and criteria have made it unlikely that release of this report will result in any foreseeable harm and is therefore releasing it in response to a recent Freedom of Information Act (FOIA) request.

The NRC did not release the report previously for two reasons. First, although considered during the licensing of DCPP ISFSI, it did not form the basis for that licensing action. Second, the draft report was considered preliminary and its conclusions based on limited data and methods.

2. What has the NRC done to evaluate the report?

The NRC was assisted by experts from the Center for Nuclear Waste Regulatory Analyses (CNWRA) in performing a comprehensive safety and technical review of PG&E's license application for an ISFSI. The CNWRA, in turn, contracted the services of Dr. Robert Sewell specifically to assess PG&E's application with respect to tsunami hazards.

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The NRC and CNWRA concluded that the probable maximum tsunami flooding at the proposed ISFSI was adequately addressed by PG&E, based on PG&E's assessment of more recent tsunami information in the area, and the much higher elevations of the ISFSI site and transporter route relative to the previously analyzed hazard for the power plant.

The CNWRA assessed the information in Dr. Sewell's report upon receiving it in November 2003. The report was forwarded for NRC's consideration in March 2004, after CNWRA had completed its review of the DCPP ISFSI application. Both the principal investigator for the CNWRA, an expert geologist and seismologist, and the NRC determined that the findings in the report were too speculative to be considered in current licensing decisions, but that they might warrant further review by the NRC. In February 2005, the NRC staff initiated further review of the report, consistent with its efforts to assess the December 2004 tsunami in southeast Asia. In May 2005, the NRC directed that a special review of the report be performed by NRC seismic experts. That group reached its preliminary conclusions on Dr. Sewell's report in November 2005, and completed its evaluation in January 2006.

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3. Has NRC assessed the potential impact of a tsunami, as predicted by Dr. Sewell, on the DCPP and public safety?

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The NRC's assessment of potential tsunami hazard is ongoing and the DCPP response to the 50.54(f) letter is due March 2015. However, the NRC has concluded that the tsunami scenarios described by Dr. Sewell in the report are based on preliminary data and analysis and should not be used as a basis for any licensing action. NRC continues to evaluate the potential tsunami hazard for coastal nuclear facilities to ensure the most up to date scientific information is assessed and properly considered.

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From: Pruett, Troy
Sent: Tuesday, October 29, 2013 1:39 PM
To: Peck, Michael
Subject: RE: Information Request

I personally cannot speak to that. I believe DRS was evaluating how other sections in the FSAR were treated. The FSAR revision is in ADAMS as a non-public document. The ML number is ML13280A392. I meant to include the ML number in the initial email. My apologies.

troy

From: Peck, Michael
Sent: Tuesday, October 29, 2013 12:35 PM
To: Pruett, Troy
Subject: RE: Information Request

This change should also had a major effect on FSARU Sections 3.7 & 5.2 and minor effect on Sections 3.8, 3.9, & 3.10.

Do you know if PG&E also changed these FSARU Sections?

msp

From: Pruett, Troy
Sent: Tuesday, October 29, 2013 1:28 PM
To: Peck, Michael
Subject: RE: Information Request

I'm not so sure. I haven't read the material in detail as of yet. I did flip through the stack to see what was included. I thought I saw a screening sheet in the material and an explanation of the changes at the very end. I'll reserve judgment until I have time to study the material.

troy

From: Peck, Michael
Sent: Tuesday, October 29, 2013 12:09 PM
To: Pruett, Troy
Subject: RE: Information Request

Looks like to me that PG&E concluded all the changes were "editorial" in nature and did not need to be screen against 50.59.

msp

From: Pruett, Troy
Sent: Tuesday, October 29, 2013 12:40 PM
To: Peck, Michael
Subject: Information Request

Michael,

Hope you are doing well in TN. I've always enjoyed Eastern TN and the mountains around Chattanooga.

As a courtesy to you, I have attached two PDF files associated with the FSAR update at Diablo. I believe this is the material that is the subject of your inquiry.

Take care - Troy

From: Peck, Michael
Sent: Thursday, October 24, 2013 12:27 PM
To: OKeefe, Neil
Cc: Kennedy, Kriss; Pruett, Troy; Walker, Wayne; George, Gerond
Subject: RES: REQUEST: Diablo Canyon 50.59 for Shorline Fault

Neil,

The DPO was written based on the NRC's conclusion presented in the RIL – Instructing the licensee to update the FSARU in accordance with 50.71(e). Given my knowledge of the Diablo Canyon FSARU and NEI 96-07, I concluded that the addition of the Shoreline fault as a "lesser case of the HE" would require an amendment to the Operating License. I would have expected that the PG&E 50.59 process to come to similar conclusion. Now that PG&E has completed the screen and/or evaluation, they may have included a prospective that I didn't consider when drafting the DPO. If the licensee found a way to correctly follow 50.59/NEI 96-07 when updating the FSARU, then my issue pretty much goes away. Also, I would think that if the supporting 50.59 screen/evaluation was bad, then the Region would want to get in front of the issue, given that a DPO is pending and the issue involves Diablo Canyon seismic qualification.

I wouldn't think that the DPO Panel would request the licensee's screen/evaluation, since the evaluation was not part of the issue I raised.

I haven't requested any information from either the licensee nor the Diablo Canyon residents. That's why I sent the e-mail to you. Since you are no longer the Diablo BC, then please pass my request on to the appropriate Region IV manager for their consideration.

Thank you,
Michael

From: OKeefe, Neil
Sent: Thursday, October 24, 2013 11:44 AM
To: Peck, Michael
Cc: Kennedy, Kriss; Pruett, Troy; Walker, Wayne
Subject: Re: REQUEST: Diablo Canyon 50.59 for Shorline Fault

Michael,

I don't have the documents you requested. I am no longer the BC for Diablo, so I don't have access, either.

Since your current position does not entitle you to request them directly, I recommend that you let the DPO panel do the, as you have already put the issue into the DPO process.

Fyi - the DPO panel has not yet interviewed any RIV folks that I know of.

Neil

From: Peck, Michael
To: OKeefe, Neil
Cc: George, Gerond
Sent: Thu Oct 24 07:04:50 2013
Subject: REQUEST: Diablo Canyon 50.59 for Shorline Fault

Neil,

In the DPO, I made the assertion than addition of the Shoreline Serrano (as a less case of the HE) in the FSARU would require a license amendment under 50.59. During our telephone call I understood that PG&E had completed this FSARU update under 50.71(e). Please forward a copy of the supporting PG&E 50.59 screen and/or evaluation. The PG&E 50.59 screen and/or evaluation may include an aspect of the 50.59 (NEI 96-07) process that I had not previously considered. If the licensee's evaluation was consistent with 50.59, then this evaluation may provide a path to resolve my DPO issue. It would follow that if this FSARU update could be made under 50.59, then the DPO operability concern would also go away. This would only leave the disposition of the Los Osos and San Luis Bay faults as the remaining DPO issue.

Also, Gerond as the Region IV 50.59 subject matter expert, may be able to provide additional insight into the adequacy of the PG&E 50.59 screen and/or evaluation.

Thank you,
Michael
423-885-6515

The stratification of the Monterey rocks dips generally northward throughout the plant foundation area. Steepness of dips increases progressively and, in places, sharply from north to south, ranging from 10 to 15° on the north side of Unit 1 to 75 to 80° in the area of Unit 2. A local reversal in direction of dip reflects a small open fold or warp in the Unit 1 area. The axis of this fold is parallel to the overall strike of the bedding, and strata on the north limb dip southward at angles of 10 to 15°. The more general steepening of dips from north to south may reflect buttressing by the large masses of Obispo Tuff south of the plant site.

The bedrock of the plant area is traversed throughout by fractures, including various planar, broadly curving, and irregular breaks. A dominant set of steeply dipping to vertical joints trends northerly, nearly normal to the strike of bedding. Other joints are diversely oriented with strikes in various directions and dips ranging from 10° to vertical. Many fractures curve abruptly, terminate against other breaks, or die out within single beds or groups of beds.

Most of the joints are widely spaced, ranging from about 1 to 10 feet apart, but within several northerly trending zones, ranging in width from 10 to 20 feet, closely spaced near vertical fractures give the rocks a blocky or platy appearance. The fracture and joint surfaces are predominantly clean and tight, although some irregular ones are thinly coated with clay or gypsum. Others could be traced into thin zones of breccia with calcite cement.

Several small faults were mapped in the foundation excavations for Unit 1 and the outlet structure. A detailed discussion of these breaks and their relationship to faults that were mapped earlier along the sea cliff and in the exploratory trenches is included in the following section.

2.5.2~~1~~.2.5.8 Relationships of Faults and Shear Surfaces

Edited for Clarity - Revised Section Number

Several subparallel breaks are recognizable on the sea cliff immediately south of Diablo Canyon, where they transect moderately thick-bedded sandstone of the kind exposed in the exploratory trenches to the east. These breaks are nearly concordant with the bedrock stratification but, in general, they dip more steeply (refer to~~see~~ detailed structure section, Figure 2.5-14) and trend more northerly than the stratification. Their trend differs significantly from much of their mapped trace, as the trace of each inclined surface is markedly affected by the local steep topography. The indicated trend, which projects eastward toward ground north of the Unit 1 reactor site, has been summed from numerous individual measurements of strike on the sea cliff exposures, and it also corresponds to the trace of the main break as observed in nearly horizontal outcrop within the tidal zone west of the cliff.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

The structure section shows all recognizable surfaces of faulting and shearing in the sea cliff that are continuous for distances of 10 feet or more. Taken together, they represent a zone of dislocation along which rocks on the north have moved upward with respect to those on the south as indicated by the attitude and roughness sense of

slickensides. The total amount of movement cannot be determined by any direct means, but it probably is not more than a few tens of feet and could well be less than 10 feet. This is suggested by the following observed features:

(1) All individual breaks are sharp and narrow, and the strata between them are essentially undeformed except for their gross inclination.

(2) Some breaks plainly die out as traced upward along the cliff surface, and others merge with adjoining breaks. At least one well-defined break butts downward against a cross-break, which in turn butts upward against a break that branches and dies out approximately 20 feet away (refer to see structure section, Figure 2.5-14, for details).

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

(3) Nearly all the breaks curve moderately to abruptly in the general direction of movement along them.

(4) Most of the breaks are little more than knife-edge features along which rock is in direct contact with rock, and others are marked by thin films of gouge. Maximum thickness of gouge anywhere observed is about 1/2 inch, and such exceptional occurrences are confined to short curving segments of the main break at the southerly margin of the zone.

(5) No fault breccia is present; instead, the zone represents transection of otherwise undeformed rocks by sharply-defined breaks. No bedrock unit is cut off and juxtaposed against a unit of different lithology along any of the breaks.

(6) Local prominence of the exposed breaks, and especially the main one, is due to slickensides, surface coatings of gypsum, and iron-oxide stains rather than to any features reflecting large-scale movements.

This zone of faulting cannot be regarded as a major tectonic element, nor is it the kind of feature normally associated with the generation of earthquakes. It appears instead to reflect second-order rupturing related to a marked change in dip of strata to the south, and its general sense of movement is what one would expect if the breaks were developed during folding of the Monterey section against what amounts to a broad buttress of Obispo Tuff farther south (refer to see geologic map, Figure 2.5-8). That the fault and shear movements were ancient is positively indicated by upward truncation of the zone at the bench of marine erosion along the base of the overlying terrace deposits.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

As indicated earlier, bedrock was continuously exposed along several exploratory trenches. This bedrock is traversed by numerous fractures, most of which represent no more than rupture and very small amounts of simple separation. The others additionally represent displacement of the bedrock, and the map in Figure 2.5-14 shows every exposed break in the initial set of trenches along which any amount of displacement could be recognized or inferred.

That the surfaces of movement constitute no more than minor elements of the bedrock structure was verified by detailed mapping of the large excavations for the plant structures. Detailed examination of the excavation walls indicated that the faults exposed in the sea cliff south of Diablo Canyon continue through the rock under the Unit 1 turbine-generator building, where they are expressed as three subparallel breaks with easterly trend and moderately steep northerly dips (Figure 2.5-15). Stratigraphic separation along these breaks ranges from a few inches to nearly 5 feet, and, in general, decreases eastward on each of them. They evidently die out in the ground immediately west of the containment excavation, and their eastward projections are represented by several joints along which no offsets have occurred. Such joints, with eastward trend and northward dip, also are abundant in some of the ground adjacent to the faults on the south (Figure 2.5-15).

The easterly reach of the Diablo Canyon sea cliff faults apparently corresponds to the two most northerly of the north-dipping faults mapped in Trench A (Figure 2.5-14). Dying out of these breaks, as established from subsequent large excavations in the ground east of where Trench A was located, explains and verifies the absence of faults in the exposed rocks of Trenches B and C. Other minor faults and shear surfaces mapped in the trench exposures could not be identified in the more extensive exposures of fresher rocks in the Unit 1 containment and turbine-generator building excavations. The few other minor faults that were mapped in these large excavations evidently are not sufficiently continuous to have been present in the exploratory trenches.

2.5.24.2.6 Site Engineering Properties

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2.5.24.2.6.1 Field and Laboratory Investigations

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In order to determine anticipated ground accelerations at the site, it was necessary to conduct field surveys and laboratory testing to evaluate the engineering properties of the materials underlying the site.

Bore holes were drilled into the rock upon which PG&E Design Class ~~Category~~ I structures are founded. The borings were located at or near the intersection of the then existing Unit 1 exploration trenches. (~~Refer to~~See Figures 2.5-11, 2.5-12, and 2.5-13 for exploratory trenching programs and boring locations.) These holes were cored continuously and representative samples were taken from the cores and submitted for laboratory testing.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

The field work also included a reconnaissance to evaluate physical condition of the rocks that were exposed in trenches, and samples were collected from the ground surface in the trenches for laboratory testing. These investigations included seismic refraction measurements across the ground surface and uphole seismic measurements in the various drill holes to determine shear and compressional velocities of vertically propagated waves.

Laboratory testing, performed by Woodward-Clyde-Sherard & Associates, included unconfined compression tests, dynamic elastic moduli tests under controlled stress conditions, density and water content determinations, and Poisson's ratio tests. Tests were also carried out by Geo-Recon, Incorporated, to determine seismic velocities on selected rock samples in the laboratory. The results of seismic measurements in the field were used to construct a three-dimensional model of the subsurface materials beneath the plant site showing variations of shear wave velocity and compressional wave velocity both laterally and vertically. The seismic velocity data and elastic moduli determined from laboratory testing were correlated to determine representative values of elastic moduli necessary for use in dynamic analyses of structures.

Details of field investigations and results of laboratory testing and correlation of data are contained in Appendices 2.5A and 2.5B of Reference 27 in Section 2.3.

2.5.24.2.6.2 Summary and Correlation of Data

Edited for Clarity - Revised Section Number

The foundation material at the site can be categorized as a stratified sequence of fine to very fine grained sandstone deeply weathered to an average elevation of 75 to 80 feet, mean sea level (MSL). The rock is closely fractured, with tightly closed or healed fractures generally present below elevation 75 feet. Compressional and shear wave velocity interfaces generally are at an average elevation of 75 feet, correlating with fracture conditions.

Time-distance plots and seismic velocity profiles presenting results of each seismic refraction line and time depth plots with results for each uphole seismic survey are included in Appendices 2.5A and 2.5B of Reference 27 in Section 2.3. Compressional wave velocities range from 2350 to 5700 feet per second and shear wave velocities from 1400 to 3600 feet per second as determined by the refraction survey. These same parameters range from 2450 to 9800 and 1060 to 6050 feet per second as determined by the uphole survey. For the Hosgri Evaluation an average shear wave velocity of 3600 feet per second is used at the foundation grade. An isometric diagram summarizing results of the refraction survey for Unit 1 is also included in Appendix 2.5A of Reference 27 in Section 2.3.

Added for Clarity – Refer to Applicability Determination Matrix Item # 8

Table 1 of Appendix 2.5A of Reference 27 of Section 2.3 shows calculations of Poisson's ratio and Young's Modulus based on representative compressional and shear wave velocities from the field geophysical investigations and laboratory measurements of compressional wave velocities. Table 2 of Appendix 2.5A of the same reference presents laboratory test results including density, unconfined compressive strength, Poisson's ratio and calculated values for compressional and shear wave velocities, shear modulus, and constrained modulus. Secant modulus values in Table 2 were determined from cyclic stress-controlled laboratory tests.

Compressional wave velocity measurements were made in the laboratory of four selected core samples and three hand specimens from exposures in the trench excavations. Measured values ranged from 5700 to 9500 feet per second. A complete

tabulation of these results can be found in Appendix 2.5A of Reference 27 of Section 2.3.

2.5.24.2.6.3 Dynamic Elastic Moduli and Poisson's Ratio

Edited for Clarity - Revised Section Number

Laboratory test results are considered to be indicative of intact specimens of foundation materials. Field test results are considered to be indicative of the gross assemblage of foundation materials, including fractures and other defects. Load stress conditions are obtained by evaluating cyclic load tests. In-place load stress conditions and confinement of the material at depth are also influential in determining elastic behavior. Because of these considerations, originally recommended representative values for Young's Modulus of Elasticity and Poisson's ratio for the site were:

Depth Below Bottom of Trench	E	δ
0 to approximately 15 feet	44×10^6 lb/ft^2	0.20
Below 15 feet	148×10^6 lb/ft^2	0.18

A single value was selected for Young's Modulus below 15 feet because the initial analyses of the seismic response of the structures utilized a single value that was considered representative of the foundation earth materials as a whole.

More detailed seismic analyses were performed subsequent to the initial analyses. These analyses, discussed in Section 3.7.2, incorporated the finite element method and made it possible to model the rock beneath the plant site in a more refined manner by accounting for changes in properties with increasing depth. To determine the refined properties of the founding materials for these analyses, the test data were reviewed and consideration was given to: (a) strain range of the materials at the site, (b) overburden pressure and confinement, (c) load imposed by the structure, (d) observation of fracture condition and geometry of the founding rock in the open excavation, (e) decreases in Poisson's ratio with depth, and (f) significant advances in state-of-the-art techniques of testing and analysis in rock mechanics that had been made and which resulted in considerably more being known about the behavior of rock under seismic strains in 1970 than in 1968 or 1969.

For the purposes of developing the mathematical models that represented the rock mass, the foundation was divided into horizontal layers based on: (a) the estimated depth of disturbance of the foundation rock below the base of the excavation, (b) changes in rock type and physical condition as determined from bore hole logs, (c) velocity interfaces as determined by refraction geophysical surveys, and (d) estimated depth limit of fractures across which movement cannot take place because of confinement and combined overburden and structural load. Based on these considerations, the founding material properties as shown in Figure 2.5-19 were selected as being representative of the physical conditions in the founding rock.

2.5.24.2.6.4 Engineered Backfill

Edited for Clarity - Revised Section Number

Backfill operations were carefully controlled to ensure stability and safety. All engineered backfill was placed in lifts not exceeding 8 inches in loose depth. Yard areas and roads were compacted to 95 percent relative compaction as determined by the method specified in ASTM D1557. Rock larger than 8 inches in its largest dimension that would not break down under the compactors was not permitted. Figures 2.5-17 and 2.5-18 show the plan and profile view of excavation and backfill for major plant structures.

2.5.24.2.6.5 Foundation Bearing Pressures

Edited for Clarity - Revised Section Number

PG&E Design Class I~~Seismic Category I~~ structures were analyzed to determine the foundation pressures resulting from the combination of dead load, live load, and the double design earthquake (DDE). The maximum pressure was found to be 158 ksf and occurs under the containment structure foundation slab. This analysis assumed that the lateral seismic shear force will be transferred to the rock at the base of the slab which is embedded 11 feet into rock. This computed bearing pressure is considered conservative in that no passive lateral pressure was assumed to act on the sides of the slab. Based on the results of the laboratory tests of unconfined compressive strength of representative samples of rock at the site, which ranged from 800 to 1300 ksf, the calculated foundation pressure is well below the ultimate in situ rock bearing capacity.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

Adverse hydrologic effects on the foundations of PG&E Design Class I~~Seismic Category I~~ structures (there are no PG&E Design Class I~~Seismic Category I~~ embankments) can be safely neglected at this site, since PG&E Design Class I~~Seismic Category I~~ structures are founded on a substantial layer of bedrock, and the groundwater level lies well below grade, at a level corresponding to that of Diablo Creek. Additionally, the computed factors of safety (minimum of 5 under DDE) of foundation pressures versus unconfined compressive strength of rock are sufficiently high to ensure foundation integrity in the unlikely event groundwater levels temporarily rose to foundation grade.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

Soil properties such as grain size, Atterberg limits, and water content need not be considered since PG&E Design Class I~~Seismic Category I~~ structures and PG&E Design Class II~~non-Seismic Category I~~ structures housing PG&E Design Class I equipment are founded on rock.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

2.5.32 VIBRATORY GROUND MOTION

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

2.5.32.1 Geologic Conditions of the Site and Vicinity

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

DCPP is situated at the coastline on the southwest flank of the San Luis Range, in the southern Coast Ranges of California. The San Luis Range branches from the main coastal mountain chain, the Santa Lucia Range, in the area north of the Santa Maria Valley and southeast of the plant site, and thence follows an alignment that curves toward the west. Owing to this divergence in structural grain, the range juts out from the regional coastline as a broad peninsula and is separated from the Santa Lucia

Edited for Clarity

Edited for Clarity - Revised Section Number

Range by an elongated lowland that extends southeasterly from Morro Bay and includes Los Osos and San Luis Obispo Valleys. It is characterized by rugged west-northwesterly trending ridges and canyons, and by a narrow fringe of coastal terraces along its southwesterly flank.

Diablo Canyon follows a generally west-southwesterly course from the central part of the range to the north-central part of the terraced coastal strip. Detailed discussions of the lithology, stratigraphy, structure, and geologic history of the plant site and surrounding region are presented in Section 2.5.24.

Edited for Clarity - Revised Section Number

2.5.32.2 Underlying Tectonic Structures

Edited for Clarity - Revised Section Number

Evidence pertaining to tectonic and seismic conditions in the region of the DCPP site, developed during the original design phase, is summarized later in the section, and is illustrated in Figures 2.5-2, 2.5-3, 2.5-4, and 2.5-5. Table 2.5-1 includes a summary listing of the nature and effects of all significant historic earthquakes within 75 miles of the site that have been reported through the end of 1972. Table 2.5-2 shows locations of 19 selected earthquakes that have been investigated by S. W. Smith. Table 2.5-3 lists the principal faults in the region that were identified during the original design phase and indicates major elements of their histories of displacement, in geological time units.

Added for Clarity – Refer to Applicability Determination Matrix Item # 4

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

Added for Clarity – Refer to Applicability Determination Matrix Item # 4

Prior to the start of construction of DCPP, Benioff and Smith (Reference 5)[5] ~~have~~ assessed the maximum earthquakes to be expected at the site, and John A. Blume and Associates (References 6 and 7)[6,7] ~~have~~ derived the site vibratory motions that could result from these maximum earthquakes, which form the basis of the Design Earthquake. An extensive discussion of the geology of the southern Coast Ranges, the western Transverse Ranges, and the adjoining offshore region is presented in Appendix 2.5D of Reference 27 of Section 2.3. Tectonic features of the central coastal region are discussed in Section 2.5.24.1.2, Regional Geologic and Tectonic Setting.

Added for Clarity – Refer to Applicability Determination Matrix Item # 9

Edited for Consistency

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Additional information about the tectonic and seismic conditions was gathered during the Hosgri evaluation and LTSP evaluation phases, as discussed in Sections 2.5.3.9.3 and 2.5.3.9.4, respectively.

Added for Clarity – Refer to Applicability Determination Matrix Item # 10

Edited for Clarity

2.5.32.3 Behavior During Prior Earthquakes

Added for Clarity – Section pointer.

Physical evidence that indicates the behavior of subsurface materials, strata, and structure during prior earthquakes is presented in Section 2.5.24.2.5. The section presents the findings of the exploratory trenching programs conducted at the site.

Edited for Clarity - Revised Section Number

Edited for Clarity - Revised Section Number

2.5.32.4 Engineering Properties of Materials Underlying the Site

Edited for Clarity - Revised Section Number

A description of the static and dynamic engineering properties of the materials underlying the site is presented in Section 2.5.24.2.6, Site Engineering Properties.

Edited for Clarity - Revised Section Number

2.5.32.5 Earthquake History

Edited for Clarity - Revised Section Number

The seismicity of the southern Coast Ranges region is known from scattered records extending back to the beginning of the 19th century, and from instrumental records dating from about 1900. Detailed records of earthquake locations and magnitudes became available following installation of the California Institute of Technology and University of California (Berkeley) seismograph arrays in 1932.

A plot of the epicenters for all large historical earthquakes and for all instrumentally recorded earthquakes of Magnitude 4 or larger that have occurred within 200 miles of DCPP site, through the end of 1972, is given in Figure 2.5-2. Plots of all historically and instrumentally recorded epicenters and all mapped faults within about 75 miles of the site, known through the end of 1972, are shown in Figures 2.5-3 and 2.5-4.

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

A tabulated list of seismic events through the end of 1972, representing the computer printout from the Berkeley Seismograph Station records, supplemented with records of individual shocks of greater than Magnitude 4 that appear only in the Caltech records, is included as Table 2.5-1. Table 2.5-2 gives a summary of revised epicenters of a representative sample of earthquakes off the coast of California near San Luis Obispo, as determined by S. W. Smith.

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

2.5.32.6 Correlation of Epicenters With Geologic Structures

Edited for Clarity - Revised Section Number

Studies of particular aspects of the seismicity of the southern Coast Ranges region have been made by Benioff and Smith, Richter, and Allen. From results of these studies, together with data pertaining to the broader aspects of the geology and seismicity of central and eastern California, it can be concluded that, although the southern Coast Ranges region may be subjected to vibratory ground motion from earthquakes originating along faults as distant as 200 miles or more, the region itself is traversed by faults capable of producing large earthquakes, and that the strongest shaking possible for sites within the region probably would be caused by earthquakes no more than a few tens of miles away. Therefore, only the seismicity of the southern Coast Ranges, the adjacent offshore area, and the western Transverse Ranges is reviewed in detail.

Figure 2.5-3 shows three principal concentrations of earthquake epicenters, three smaller or more diffuse areas of activity, and a scattering of other epicenters, for earthquakes recorded through 1972. The most active areas, in terms of numbers of shocks, are the reach of the San Andreas fault north of about 35°7' latitude, the offshore area near Santa Barbara, and the offshore Santa Lucia Bank area. Notable concentrations of epicenters also are located as occurring in Salinas Valley, at Point San Simeon, and near Point Conception. The scattered epicenters are most numerous in the general vicinities of the most active areas, but they also occur at isolated points throughout the region.

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

The reliability of the position of instrumentally located epicenters of small shocks in the central California region has been relatively poor in the past, owing to its position

between the areas covered by the Berkeley and Caltech seismograph networks. A recent study by Smith, however, resulted in relocation of nineteen epicenters in the coastal and offshore region between the latitudes of Point Arguello and Point Sur. Studies by Gawthrop (Reference 29)[29] and reported in Wagner have led to results that seem to accord generally with those achieved by Smith.

Edited for Consistency

The epicenters relocated by Smith and those recorded by Gawthrop are plotted in Figure 2.5-3. This plot shows that most of the epicenters recorded in the offshore region seem to be spatially associated with faults in the Santa Lucia Bank region, the East Boundary zone, and the San Simeon fault. Other epicenters, including ones for the 1952 Bryson shock, and several smaller shocks originally located in the offshore area, were determined to be centered on or near the Sur-Nacimiento fault north of the latitude of San Simeon.

2.5.~~3~~2.7 Identification of Active Faults

Edited for Clarity - Revised Section Number

Faults that have evidence of recent activity and have portions passing within 200 miles of the site, as known through the end of 1972, are identified in Section 2.5.~~2~~4.1.2.

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

2.5.~~3~~2.8 Description of Active Faults

Edited for Clarity - Revised Section Number

Active faults that have any part passing within 200 miles of the site, as known through the end of 1972, are described in Section 2.5.~~2~~4.1.2. Additional active faults were identified during the Hosgri and LTSP evaluation phases, as described in Sections 2.5.3.9.3 and 2.5.3.9.4, respectively.

Edited for Clarity- Revised Section Number

2.5.~~3~~2.9 Design and Licensing Basis Earthquakes~~Maximum Earthquake~~

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

The seismic design and evaluation of DCPP is based on the earthquakes described in the following four subsections. Refer to Section 3.7 for the design criteria associated with the application of these earthquakes to the structures, systems, and components. The DE, DDE, and HE are design bases earthquakes and the LTSP is a licensing bases earthquake.

Edited for Clarity - Revised Section Number

2.5.3.9.1 Design Earthquake

Added for Clarity – Section Pointer

Edited for Clarity - Revised Section Number

Edited for Clarity – Revised Sub-section header
Refer to Applicability Determination Matrix Item # 11

During the original design phase, Benioff and Smith, in reviewing the seismicity of the region around DCPP site, determined the maximum earthquakes that could reasonably be expected to affect the site. Their conclusions regarding the maximum size earthquakes that can be expected to occur during the life of the reactor are listed below:

Added for Clarity – New Paragraph to clarify the purpose of content in the following sub-sections.

(1) Earthquake A: A great earthquake may occur on the San Andreas fault at a distance from the site of more than 48 miles. It would be likely to produce surface rupture along the San Andreas fault over a distance of 200 miles with a horizontal slip of about 20 feet and a vertical slip of 3 feet.

Added for Clarity – New Sub-section for Design Earthquake
UFSAR Section 3.7.1.1
Refer to Applicability Determination Matrix Item # 12

Added for Clarity – Refer to Applicability Determination Matrix Item # 4

The duration of strong shaking from such an event would be about 40 seconds, and the equivalent magnitude would be 8.5.

(2) Earthquake B: A large earthquake on the Nacimiento (Rinconada) fault at a distance from the site of more than 20 miles would be likely to produce a 60 mile surface rupture along the Nacimiento fault, a slip of 6 feet in the horizontal direction, and have a duration of 10 seconds. The equivalent magnitude would be 7.25.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 13

(3) Earthquake C: Possible large earthquakes occurring on offshore fault systems that may need to be considered for the generation of seismic sea waves are listed below:

Location	Length of Fault Break	Slip, feet	Magnitude	Distance to Site
Santa Ynez Extension	80 miles	10 horizontal	7.5	50 miles
Cape Mendocino, NW Extension of San Andreas fault	100 miles	10 horizontal	7.5	420 miles
Gorda Escarpment	40 miles	5 vertical or horizontal	7	420 miles

(4) Earthquake D: Should a great earthquake occur on the San Andreas fault, as described in "A" above, large aftershocks may occur out to distances of about 50 miles from the San Andreas fault, but those aftershocks which are not located on existing faults would not be expected to produce new surface faulting, and would be restricted to depths of about 6 miles or more and magnitudes of about 6.75 or less. The distance from the site to such aftershocks would thus be more than 6 miles.

~~A further assessment of the seismic potential of faults mapped in the region of DCPP site has been made following the extensive additional studies of on- and offshore geology of the last few years that are reported in Appendix 2.5D of Reference 27 of Section 2.3. This was done in terms of observed Holocene activity, to achieve assessment of what seismic activity is reasonably probable, in terms of observed late Pleistocene activity, fault dimensions, and style of deformation.~~

~~PG&E was requested by the NRC to evaluate the plant's capability to withstand a postulated Richter Magnitude 7.5 earthquake centered along an offshore zone of geologic faulting, generally referred to as the "Hosgri fault." The detailed methods, results, and plant modifications performed based on this evaluation are dealt with in Section 3.7.~~

Moved Text to Enhanced Section 2.5.3.9.3

The available information suggests that the faults in this region can be associated with contrasting general levels of seismic potential. These are as follows:

(1) Level I: Potential for great earthquakes involving surface faulting over distances on the order of 100 miles: seismic activity at this level should occur only on the reach of the San Andreas fault that extends between the locales of Cajon Pass and Parkfield. This was the source of the 1857 Fort Tejon earthquake, estimated to have been of Magnitude 8.

(2) Level II: Potential for large earthquakes involving faulting over distances on the order of tens of miles: seismic activity at this level can occur along offshore faults in the Santa Lucia Bank region (the likely source of the Magnitude 7.3 earthquake of 1927), and possibly along the Big Pine and Santa Ynez faults in the Transverse Ranges.

Although the Rinconada-San Marcos-Jolon, Espinosa, Sur-Nacimiento, and San Simeon faults do not exhibit historical or even Holocene activity indicating this level of seismic potential, the fault dimensions, together with evidence of late Pleistocene movements along these faults, suggest that they may be regarded as capable of generating similarly large earthquakes.

(3) Level III: Potential for earthquakes resulting chiefly from movement at depth with no surface faulting, but at least with some possibility of surface faulting of as much as a few miles strike length and a few feet of slip: Seismic activity at this level probably could occur on almost any major fault in the southern Coast Ranges and adjacent regions.

From the observed geologic record of limited fault activity extending into Quaternary time, and from the historical record of apparently associated seismicity, it can be inferred that both the greater frequency of earthquake activity and larger shocks from earthquake source structures having this level of seismic potential probably will be associated with one of the relatively extensive faults. Faults in the vicinity of the San Luis Range that may be considered to have such seismic potential include the West Huasna, Edna, and offshore Santa Maria Basin East Boundary zone.

(4) Level IV: Potential for earthquakes and aftershocks resulting from crustal movements that cannot be associated with any near-surface fault structures: such earthquakes apparently can occur almost anywhere in the region.

This information forms the basis of the Design Earthquake described in Section 2.5.3.10.1

Added for Clarity – Section pointer

2.5.3.9.2 Double Design Earthquake

During the original design phase, in order to assure adequate reserve seismic resisting capability of safety related structures, systems, and components, an earthquake producing two-times the acceleration values of the Design Earthquake was also considered (Reference 51).

Added for Clarity – New Sub-section for Double Design Earthquake
UFSAR Section 3.7.1.1
Refer to Applicability Determination Matrix Item # 14

2.5.3.9.3 Hosgri Earthquake

Added for Clarity – New Sub-section for Hosgri Earthquake
UFSAR Section 3.7.1.1
SSER 4
Refer to Applicability Determination Matrix Item # 15

In 1976, subsequent to the issuance of the construction permit of Unit 1, PG&E was requested by the NRC to evaluate the plant's capability to withstand a postulated Richter Magnitude 7.5 earthquake centered along an offshore zone of geologic faulting, approximately 3 miles offshore, generally referred to as the "Hosgri fault." ~~The detailed methods, results, and plant modifications performed based on this evaluation are dealt with in Section 3.7.~~ Details of the investigations associated with this fault are provided in Appendices 2.5D, 2.5E, and 2.5F of Reference 27 in Section 2.3. An overview is provided in Section 2.5.3.10.3. Note that the Shoreline Fault Zone (refer to Section 2.5.7.1) is considered to be a lesser included case under the Hosgri evaluation (Reference 55).

Added for Clarity – Refer to Applicability Determination Matrix Item # 16

A further assessment of the seismic potential of faults mapped in the region of DCPP site was~~has been~~ made following the extensive additional studies of on- and offshore geology and is~~of the last few years that are~~ reported in Appendix 2.5D of Reference 27 of Section 2.3. This was done in terms of observed Holocene activity, to achieve assessment of what seismic activity is reasonably probable, in terms of observed late Pleistocene activity, fault dimensions, and style of deformation.

Added for Clarity – Refer to Applicability Determination Matrix Item # 17

Deleted – Content reference pointer to section 3.7 included as part of Enhanced Section 2.5.3.9.

Added for Clarity – Provides reference to existing UFSAR material and sections with further details.

2.5.3.9.4 1991 Long Term Seismic Program Earthquake

Added for Clarity – Refer to Applicability Determination Matrix Item # 18

Edited for Clarity

PG&E performed a reevaluation of the seismic design bases of DCPP in response to License Condition No. 2.C.(7) of the Unit 1 Operating License. Details of this reevaluation, referred to as the Long Term Seismic Program, are provided in Section 2.5.7.

Added for Clarity – Refer to Applicability Determination Matrix Item # 19

Moved Text from Section 2.5.2.9

PG&E's evaluations included the development of significant additional data applicable to the geology, seismology, and tectonics of the DCPP region, including characterization of the Hosgri, Los Osos, San Luis Bay, Olson, San Simeon, and Wilmar Avenue faults. These faults were evaluated as potential seismic sources (Reference 40, Chapter 3). However, PG&E determined that the potential seismic sources of significance to the ground motions at the site are: the Hosgri and Los Osos fault zones, and the San Luis Bay fault, based on the probabilistic seismic hazard analysis, and the Hosgri fault zone, based on the deterministic analysis. Details are provided in Reference 40, Chapters 2 and 3, and summarized in SSER 34, Section 2.5.1, "Geology" and 2.5.2, "Seismology".

Added for Clarity – New Sub-section for 1991 Long Term Seismic Program Earthquake.

The NRC's review of PG&E's evaluations is documented in References 42 and 43.

Added for Clarity – Refer to Applicability Determination Matrix Item # 20

2.5.32.10 Ground Accelerations and Response Spectra

Edited for Clarity - Revised Section Number

The seismic design and evaluation of DCPP is based on the earthquakes described in the following four subsections. Refer to Section 3.7 for the design criteria associated with the application of the DE, DDE, and HE to the structures, systems, and components and the seismic margin assessment of the LTSP.

Added for Clarity – New introductory paragraph to define sub-section content.

2.5.3.10.1 Design Earthquake

Added for Clarity – New Sub-section for Design Earthquake
UFSAR Section 3.7.1.1
Refer to Applicability Determination Matrix Item # 21

During the original design phase, the~~The~~ maximum ground acceleration that would occur at DCPP site was~~has been~~ estimated for each of the postulated earthquakes listed in Section 2.5.32.9, using the methods set forth in References 12 and 24. The plant site acceleration was~~is~~ primarily dependent on the following parameters: Gutenberg-Richter magnitude and released energy, distance from the earthquake focus to the plant site, shear and compressional velocities of the rock media, and density of the rock. Rock properties are discussed under Section 2.5.24.2.6, Site Engineering Properties.

Added for Clarity – Refer to Applicability Determination Matrix Item # 4

Edited for Clarity

The maximum rock accelerations that would occur at the DCPP site were~~are~~ estimated as:

Edited for Clarity - Revised Section Number

Earthquake A	0.10 g	Earthquake C	0.05 g
Earthquake B	0.12 g	Earthquake D	0.20 g

Edited for Clarity

In addition to the maximum acceleration, the frequency distribution of earthquake motions is important for comparison of the effects on plant structures and equipment. In general, the parameters affecting the frequency distribution are distance, properties of the transmitting media, length of faulting, focus depth, and total energy release. Earthquakes that might reach the site after traveling over great distances would tend to have their high frequency waves filtered out. Earthquakes that might be centered close to the site would tend to produce wave forms at the site having minor low frequency characteristics.

In order to evaluate the frequency distribution of earthquakes, the concept of the response spectrum is used.

For nearby earthquakes, the resulting response spectra accelerations would peak sharply at short periods and would decay rapidly at longer periods. Earthquake D would produce such response spectra. The March 1957 San Francisco earthquake as recorded in Golden Gate Park (S80°E component) was the same type. It produced a maximum recorded ground acceleration of 0.13 g (on rock) at a distance of about 8 miles from the epicenter. Since Earthquake D has an assigned hypocentral distance of 12 miles, it would be expected to produce response spectra similar in shape to those of the 1957 event.

Large earthquakes centered at some distance from the plant site would tend to produce response spectra accelerations that peak at longer periods than those for nearby smaller shocks. Such spectra maintain a higher spectral acceleration throughout the period range beyond the peak period. Earthquakes A and C are events that would tend to produce this type of spectra. The intensity of shaking as indicated by the maximum predicted ground acceleration shows that Earthquake C would always have lower spectral accelerations than Earthquake A.

Since the two shocks would have approximately the same shape spectra, Earthquake C would always have lower spectral accelerations than Earthquake A, and it is therefore eliminated from further consideration. The north-south component of the 1940 El Centro earthquake produced response spectra that emphasized the long period characteristics described above. Earthquake A, because of its distance from the plant site, would be expected to produce response spectra similar in shape to those produced by the El Centro event. Smoothed response spectra for Earthquake A were constructed by normalizing the El Centro spectra to 0.10 g. These spectra, however, show smaller accelerations than the corresponding spectra for Earthquake B (discussed in the next paragraph) for all building periods, and thus Earthquake A is also eliminated from further consideration.

Earthquake B would tend to produce response spectra that emphasize the intermediate period range inasmuch as the epicenter is not close enough to the plant site to produce large high frequency (short-period) effects, and it is too close to the site and too small in magnitude to produce large low frequency (long-period) effects. The N69°W component to the 1952 Taft earthquake produced response spectra having such characteristics. That shock was therefore used as a guide in establishing the shape of the response spectra that would be expected for Earthquake B.

Following several meetings with the AEC staff and their consultants, the following two modifications were made in order to make the criteria more conservative:

(1) The Earthquake D time-history was modified in order to obtain better continuity of frequency distribution between Earthquakes D and B.

(2) The accelerations of Earthquake B were increased by 25 percent in order to provide the required margin of safety to compensate for possible uncertainties in the basic earthquake data.

Accordingly, Earthquake D-modified was derived by modifying the S80°E component of the 1957 Golden Gate Park, San Francisco earthquake, and then normalizing to a maximum ground acceleration of 0.20 g. Smoothed response spectra for this earthquake are shown in Figure 2.5-21. Likewise, Earthquake B was derived by normalizing the N69°W component of the 1952 Taft earthquake to a maximum ground acceleration of 0.15 g. Smoothed response spectra for Earthquake B are shown in Figure 2.5-20. The maximum vibratory motion at the plant site would be produced by

either Earthquake D-modified or Earthquake B, depending on the natural period of the vibrating body.

2.5.3.10.2 Double Design Earthquake

The maximum ground acceleration and response spectra for the Double Design Earthquake are twice those associated with the design earthquake, as described in Section 2.5.3.10.1 (Reference 51).

Added for Clarity – New Sub-section for Double Design Earthquake UFSAR Section 3.7.1.1 Refer to Applicability Determination Matrix Item # 22

2.5.3.10.3 Hosgri Earthquake

As mentioned earlier, based on a review of the studies presented in Appendices 2.5D and 2.5E (of Reference 27 in Section 2.3) by the NRC and the United States Geologic Survey (USGS) (acting as the NRC's geological consultant), the NRC issued SSER 4 ~~Supplement No. 4 to the NRC Safety Evaluation Report (SER) was issued~~ in May 1976. This supplement included the USGS conclusion that a magnitude 7.5 earthquake could occur on the Hosgri fault at a point nearest to the Diablo Canyon site. The USGS further concluded that such an earthquake should be described in terms of near fault horizontal ground motion using techniques and conditions presented in Geological Survey Circular 672. The USGS also recommended that an effective, rather than instrumental, acceleration be derived for seismic analysis.

Added for Clarity – New Sub-section for 1977 Hosgri Earthquake UFSAR Section 3.7.1.1 Refer to Applicability Determination Matrix Item # 23

Edited for Clarity – Defined Abbreviated Title

Edited for Clarity

The NRC adopted the USGS recommendation of the seismic potential of the Hosgri fault. In addition, based on the recommendation of Dr. N. M. Newmark, the NRC prescribed that an effective horizontal ground acceleration of 0.75g be used for the development of response spectra to be employed in a seismic evaluation of the plant. The NRC outlined procedures considered appropriate for the evaluation including an adjustment of the response spectra to account for the filtering effect of the large building foundations. An appropriate allowance for torsion and tilting was to be included in the analysis. A guideline for the consideration of inelastic behavior, with an associated ductility ratio, was also established.

The NRC issued SSER 5~~Supplement No. 5 to the SER~~ in September 1976. This supplement included independently-derived response spectra and the rationale for their development. Parameters to be used in the foundation filtering calculation were delineated for each major structure. The supplement prescribed that either the spectra developed by Blume or Newmark would be acceptable for use in the evaluation with the following conditions:

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(1) In the case of the Newmark spectra no reduction for nonlinear effects would be taken except in certain specific areas on an individual case basis.

(2) In the case of the Blume spectra a reduction for nonlinear behavior using a ductility ratio of up to 1.3 may be employed.

(3) The Blume spectra would be adjusted so as not to fall below the Newmark spectra at any frequency.

The development of the Blume ground response spectra, including the effect of foundation filtering, is briefly discussed below. The rationale and derivation of the Newmark ground response spectra is discussed in Appendix C to Supplement No. 5 of the SER.

The time-histories of strong motion for selected earthquakes recorded on rock close to the epicenters were normalized to a 0.75g peak acceleration. Such records provide the best available models for the Diablo Canyon conditions relative to the Hosgri fault zone. The eight earthquake records used are listed in the table below.

Earthquake	M	Depth, km	Recorded at	Epicentral Distance, km	Component	Peak Acceleration g
Helena 1935	6	5	Helena	3 to 8	EW	0.16
Helena 1935	6	5	Helena	3 to 8	NS	0.13
Daly City 1957	5.3	9	Golden Gate Park	8	N80W	0.13
Daly City 1957	5.3	9	Golden Gate Park	8	N10E	0.11
Parkfield 1966	5.6	7	Temblor 2	7	S25W	0.33
Parkfield 1966	5.6	7	Temblor 2	7	N65W	0.28
San Fernando 1971	6.6	13	Pacoima Dam	3	S14W	1.17
San Fernando 1971	6.6	13	Pacoima	3	N76W	1.08

The magnitudes are the greatest recorded thus far (September 1985) close in on rock stations and range from 5.3 to 6.6. Adjustments were made subsequently in the period range of the response spectrum above 0.40 sec for the greater long period energy expected in a 7.5M shock as compared to the model magnitudes.

The procedure followed was to develop 7 percent damped response spectra for each of the eight records normalized to 0.75g and then to treat the results statistically according to period bands to obtain the mean, the median, and the standard deviations of spectral response. At this stage, no adjustments for the size of the foundation or for ductility were made. The 7 percent damped response spectra were used as the basis for calculating spectra at other damping values.

Figures 2.5-29 and 2.5-30 show free-field horizontal ground response spectra as determined by Blume and Newmark, respectively, at damping levels from two to seven percent.

Figures 2.5-31 and 2.5-32 show vertical ground response spectra as determined by Blume and Newmark, respectively, for two to seven percent damping. The ordinates of vertical spectra are taken as two-thirds of the corresponding ordinates of the horizontal spectra. These response spectra finalized in 1977, are described as the "1977 Hosgri

response spectra ". Note that the Shoreline Fault Zone (refer to Section 2.5.7.1) is considered to be a lesser included case under the Hosgri evaluation (Reference 55).

Added for Clarity – Refer to Applicability Determination Matrix Item # 24

2.5.3.10.4 1991 Long Term Seismic Program Earthquake

Added for Clarity – Refer to Applicability Determination Matrix Item # 18

Added for Clarity – New Sub-section.

As discussed in Section 2.5.3.9.4, the Long Term Seismic Program, in response to License Condition No. 2.C.(7) determined that the governing earthquake source for the deterministic seismic margins evaluation of DCPP (84th percentile ground motion response spectrum) is the Hosgri fault. Ground motions, and the corresponding free-field response spectra for a Richter Magnitude 7.2 earthquake centered along the Hosgri fault, approximately 4.5 km from DCPP, were developed by PG&E, as documented in Reference 40. This event is referred to as the "LTSP Earthquake." As part of their review of Reference 40, the NRC concluded that spectra developed by PG&E could underestimate the ground motion (Reference 42). As a result, the final spectra, applicable to the LTSP evaluation of DCPP, is an envelope of that developed by PG&E and that developed by the NRC. Figures 2.5-33 and 2.5-34 show the 84th percentile ground motion response spectrum at 5% damping for the horizontal and vertical directions, respectively, described as the "1991 LTSP response spectra". These spectra define the current licensing basis for the LTSP.

Figure 2.5-35 shows a comparison of the horizontal 1991 LTSP response spectrum with the 1977 Newmark Hosgri spectrum (based on Reference 40, Figure 7-2). This comparison indicates that the 1977 Hosgri spectrum is greater than the 1991 LTSP spectrum at all frequencies less than about 15 Hz, but the 1991 LTSP spectrum exceeds the 1977 Hosgri spectrum by approximately 10 percent for frequencies above 15 Hz. This exceedance was accepted by the NRC in SSER 34 (Reference 42), Section 3.8.1.1 (Ground-Motion Input for Deterministic Evaluations):

> "On the basis of PG&E's margins evaluation discussed in Section 3.8.1.7 of this SSER, the staff concludes that these high-frequency spectral exceedances are not significant."

In addition, the NRC states in SSER 34 (Reference 42), Section 1.4 (Summary of Staff Conclusions):

> "The staff notes that the seismic qualification basis for Diablo Canyon will continue to be the original design basis plus the Hosgri evaluation basis, along with the associated analytical methods, initial conditions, etc. The LTSP has served as a useful check of the adequacy of the seismic margins and has generally confirmed that the margins are acceptable."

Therefore, the 1991 LTSP ground motion response spectra does not replace or modify, the DE, DDE, or 1977 Hosgri response spectra described above.

Added for Clarity – Refer to Applicability Determination Matrix Item # 25

2.5.43 SURFACE FAULTING

Edited for Clarity - Revised Section Number

2.5.43.1 Geologic Conditions of the Site

Edited for Clarity - Revised Section Number

The geologic history and lithologic, stratigraphic, and structural conditions of the site and the surrounding area are described in Section 2.5.24 and are illustrated in the various figures included in Section 2.5.

Edited for Clarity - Revised Section Number

2.5.43.2 Evidence for Fault Offset

Edited for Clarity - Revised Section Number

Substantive geologic evidence, described under Section 2.5.24.2, Site Geology of DCPP Site, indicates that the ground at and near the site has not been displaced by faulting for at least 80,000 to 120,000 years. It can be inferred, on the basis of regional geologic history, that minor faults in the site bedrock date from the mid-Pliocene or, at the latest, from mid-Pleistocene episodes of tectonic activity.

Edited for Clarity - Revised Section Number

Edited for Clarity – Section title reference revised to match section title.

2.5.43.3 Identification of Active Faults

Edited for Clarity - Revised Section Number

Three zones that include faults greater than 1000 feet in length werehave been mapped within about 5 miles of the site. Two of these, the Edna and San Miguelito fault zones, were mapped on land in the San Luis Range. The third, consisting of several breaks associated with the offshore Santa Maria Basin East Boundary zone of folding and faulting, is described in Sections 2.5.24.1.2.3 and 2.5.24.1.5.5 under Regional Geologic and Tectonic Setting. The mapped trace of each of these structures is shown in Figures 2.5-3 and 2.5-4. Additional active faults that were identified through the studies associated with the Hosgri Evaluation and LTSP are discussed in Sections 2.5.3.9.3 and 2.5.3.9.4, respectively

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Edited for Clarity - Revised Section Number

Edited for Clarity - Revised Section Number

Added for Clarity – Section Pointer

2.5.43.4 Earthquakes Associated With Active Faults

Edited for Clarity - Revised Section Number

The earthquakes discussions are limited to those identified during the original design phase and do not include any earthquakes recorded since 1971.

Added for Clarity – Refer to Applicability Determination Matrix Item # 26

The Edna fault or fault zone has been active at some time since the deposition of the Plio-Pleistocene Paso Robles Formation, which it displaces. It has no morphologic expression suggestive of late Pleistocene activity, nor is it known to displace late Pleistocene or younger deposits. Four epicenters of small (3.9 to 3M) shocks and 42 other epicenters for shocks of "small" or "unknown" intensity have been reported as occurring in the approximate vicinity of the Edna fault (Figures 2.5-3 and 2.5-4). Owing to the small size of the earthquakes that they represent, however, all of these epicenters are only approximately located. Further, they fall in the energy range of shocks that can be generated by fairly large construction blasts. At present, no conclusive evidence is available to determine whether the Edna fault could be classified as seismically active, or as geologically active in the sense of having undergone multiple movements within the last 500,000 years.

The San Miguelito fault has been mapped as not displacing the Plio-Pleistocene Paso Robles Formation. No instrumental epicenter has been reliably recorded from its vicinity, but the Berkeley Seismological Laboratory indicates Avila Bay as the presumed epicentral location for a moderately damaging (Intensity VII at Avila) earthquake that occurred on December 1, 1916. It seems likely, however, that this shock occurred along the offshore East Boundary zone rather than on the San Miguelito fault zone.

The East Boundary zone has an overall length of about 70 miles. Individual breaks within the zone are as much as 30 miles long, though the varying amount of displacement that occurs along specific breaks indicates that movement along them is not uniform, and it suggests that breakage may have occurred on separate, limited segments of the faults. The reach of the zone that is opposite DCPP site contains four fault breaks. These breaks range from 1 to 15 miles in length, and they have minimum distances of 2.1 to 4.5 miles from the site. The East Boundary zone is considered to be seismically active, since at least five instrumentally well located epicenters and as many as ten less reliably located other epicenters are centered along or near the zone. One of the breaks (located 3-1/2 miles offshore from the site) exhibits topographic expression that may represent a tectonic offset of the sea floor surface at a point along its trace 6 miles north of the site. Other faults in the East Boundary zone have associated erosion features, a few of which could possibly be partly of faultline origin.

The earthquake of December 1, 1916, though listed as having an epicentral location at Avila Bay, is considered more probably to have originated along either the East Boundary zone or, possibly, the Santa Lucia Bank fault. Effects of this shock at Avila included landsliding in Dairy Canyon, 2 miles north of town, and "...disturbance of waters in the Bay of San Luis Obispo." "...plaster in several cottages...was jarred loose...while some of the smokestacks on the (Union Oil Company) refinery were toppled over." It is apparently on this basis that the Berkeley listing of earthquakes assigns this shock a "large" intensity and places its approximate epicentral location at Port San Luis.

A small (Magnitude 2.9) shock that apparently originated near the East Boundary zone a short distance south of DCPP site was lightly felt at the site on September 24, 1974. This shock, like most of those recorded along the East Boundary zone, was not damaging.

The minor fault zone that was mapped in the sea cliff at the mouth of Diablo Creek and in the excavation for the Unit 1 turbine building has an onshore length of about 550 feet, and it probably continues for some distance offshore. It has been definitely determined to be not active.

2.5.~~13~~.5 Correlation of Epicenters With Active Faults

Edited for Clarity - Revised Section Number

Earthquake epicenters located within 50 miles of DCPP site, for earthquakes recorded through 1972, have been approximately located in the vicinity of each of the faults. The

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

reported earthquakes are listed in Table 2.5-1 and as follows, and their indicated epicentral locations are shown in Figures 2.5-3 and 2.5-4:

Earthquake Epicenters Reported as Being Located Approximately in the Vicinities of San Luis Obispo, Avila, and Arroyo Grande

Date	Geographic N Latitude	Coordinates W Longitude	Magni-tude	Inten-sity	Notes and Greenwich Mean Time (GMT)
7.10.1889	35.17°	120.58°			Arroyo Grande. Shocks for several days.
12.1.1916	35.17°	120.75°		VII	VII at Avila. Considerable glass broken and goods in stores thrown from shelves at San Luis Obispo. Water in bay disturbed, plaster in cottages jarred loose, smoke stacks of Union Oil refinery toppled over at Avila. Severe at Port San Luis. III at Santa Maria: 22:53:00
4.26.1950	35.20°	120.60°	3.5	V	V at Santa Maria. Also felt at Orcutt: 7:23:29
1.26.1971	35.20°	120.70°	3		Near San Luis Obispo: 21:53:53
1830 to 7.21.1931	35.25°	120.67°			42 epicenters

Earthquake Epicenters Reported as Being Located Approximately in the Vicinity of the Offshore Santa Maria Basin East Boundary Zone

Date	Geographic Coordinates N Latitude	W Longitude	Magnitude	Intensity	Notes and Greenwich Mean Time (GMT)
5.27.1935(30-1)	35.62°	121.64°	3	III	Felt at Templeton: 16:08:00
9.7.1939(30-6)	35.46°	121.50°	3		Off San Luis Obispo County; felt at Cambria: 2:50:30
1.27.1945	34.75°	120.67°	3.9		17:50:31
12.31.1948(30-10)	35.60°	121.23°	4.6		Felt along coast from Lompoc to Moss Landing. VI at San Simeon. V at Cayucos, Creston, Moss Landing, Piedras Blancas Light Station: 14:35:46
11.17.1949	34.80°	120.70°	2.8		IV at Santa Maria. Near Priest: 5:06:60
2.5.1955(30-23)	35.86°	121.15°	3.3		West of San Simeon: 7:10:19
6.21.1957(30-25A)	35.23°	120.95°	3.7		Off Coast. Felt in San Luis Obispo, Morro Bay: 20:46:42
8.18.1958	35.60°	121.30	3.4		Near San Simeon: 5:30:42
10.25.1967	35.73°	121.45°	2.6		Near San Simeon: 23:05:39.5

(Figures in parentheses refer to events relocated by S. W. Smith, refer to see Table 2.5-2).

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

2.5.43.6 Description of Active Faults

Edited for Clarity - Revised Section Number

Data pertaining to faults with lengths greater than 1000 feet and reaches within 50 miles of the site as identified during the original design phase, are included in Section 2.5.24.1.5, Structure of the San Luis Range and Vicinity, and in Figures 2.5-3 and 2.5-4. These data indicate the fault lengths, relationship of the faults to regional tectonic structures, known history of displacements, outer limits, and whether the faults can be considered as active.

Added for Clarity – Refer to Applicability Determination Matrix Item # 4

Edited for Clarity - Revised Section Number

2.5.43.7 Results of Faulting Investigation

Edited for Clarity - Revised Section Number

The site for Units 1 and 2 of DCPP was investigated in detail for faulting and other possibly detrimental geologic conditions. From studies made prior to design of the plant, it was determined that there was need to take into account the possibility of surface faulting in such design. The data on which this determination was based are presented in Section 2.5.24.2, Site Geology.

Edited for Clarity - Revised Section Number

2.5.54 Stability of Subsurface Materials

Edited for Clarity - Revised Section Number

The possibility of past or potential surface or subsurface ground subsidence, uplift, or collapse in the vicinity of DCPP was considered during the course of the geologic investigations for Units 1 and 2.

2.5.54.1 Geologic Features

Edited for Clarity - Revised Section Number

The site is underlain by folded bedrock strata consisting predominantly of sandy mudstone and fine-grained sandstone. The existence of an unbroken and otherwise undeformed section of upper Pleistocene terrace deposits overlying a wave-cut bedrock bench at the site provides positive evidence that all folding and faulting in the bedrock antedated formation of the terrace. Local depressions and other irregularities on the bedrock surface plainly reflect erosion in an ancient surf zone.

The rocks that constitute the bedrock section are not subject to significant solution effects (i.e., development of cavities or channels that could affect the engineering or fluid conducting character of the rock) because the bedrock section does not contain thick or continuous bodies of soluble rock types such as limestone or gypsum. Voids encountered during excavation at the site were limited to thin zones of vuggy breccia and isolated vugs in some beds of calcareous mudstone. Areas where such minor vuggy conditions were present were noted at a few locations in the excavation for the Unit 2 containment and fuel handling structures (at plant grid coordinates N59, N597, E10, E005 and N59, N700, E10, E120).

The maximum size of any individual opening was 3 inches or less, and most were less than 1 inch in maximum dimension. Because of the limited extent and isolated nature of these small voids, they were not considered significant in foundation engineering or slope stability analyses.

It has been determined by field examination that no sea caves exist in the immediate vicinity of the site. The only cave like natural features in the area are shallow pits and hollows in some of the sea cliff outcrops of resistant tuff. These features generally have dimensions of a few inches to about 10 feet. They are superficial, and have originated through differential weathering of variably cemented rock.

Several exploratory wells have been drilled for petroleum within the San Luis Range, but no production was achieved and the wells were abandoned. The area is not now active in terms of either production or exploration. The location of the abandoned wells is shown in Figure 2.5-6, and the geologic relationships in the Range are illustrated in Section A-A' of Figure 2.5-6 and in Figure 2.5-7, Section D-D'. The nearest oil-producing area is the Arroyo Grande field, about 15 miles to the southeast.

The potential for future problems of ground instability at the site, because of nearby petroleum production, can be assessed in terms of the geologic potential for the occurrence of oil within, or offshore from, the San Luis Range. In addition, assessment can be made in terms of the geologic relationships in the site as contrasted with geologic conditions in places where oil field exploitation has resulted in deformation of the ground surface.

As shown in Figures 2.5-6 and 2.5-7, the San Luis Range has the structural form of a broad synclinal fold, which in turn is made up of several tightly compressed anticlines and synclines of lesser order. The configuration is not conducive to entrapment of hydrocarbon fluids, as such fluids tend to migrate upward through bedding and fracture-controlled zones of higher primary and secondary permeability until they reach a local trap or escape into the near surface or surface environment.

Within the San Luis Range, the only recognizable structural traps are in local zones where plunge reversals exist along the crests of the second-order anticlines. Such structures evidently were the actual or hoped-for targets for most of the exploratory wells that have been drilled in the San Luis Range, but none of these wells has produced enough oil or gas to record; thus, the traps have not been effective, or perhaps the strata are essentially lacking in hydrocarbon fluids. Other conditions that indicate poor petroleum prospects for the Range include the general absence of good reservoir rocks within the section and the relatively shallow basement of non petroliferous Franciscan rocks.

In the offshore, adjacent to the southerly flank of the San Luis Range, subsurface conditions are not well known, but are probably generally similar. Scattered data suggest that a structural high, perhaps defined by a west-northwest plunging anticline, may exist a few miles offshore from DCPP site. Such a feature could conceivably serve as a structural trap, if local closure were present along its axis; however, it seems unlikely that it would contain significant amounts of petroleum.

Available data pertaining to exploratory oil wells drilled in the region of the site are given here:

Exploratory Oil Wells in the Vicinity of DCPP Site

Data from exploratory wells drilled outside of oil and gas fields in California to December 31, 1963: Division of Oil and Gas, San Francisco.

Mount Diablo B. & M. T R Sec	Operator	Well No.	Elev, ft	Date Started	Total Depth, ft	Stratigraphy (depth in ft) Age at Bottom of Hole
31S 10E 3	Tidewater Oil Co.	"Montadoro" 1	365	April 1954	6,146	Monterey 0-3800; Obispo Tuff 3800: Franciscan; U. Jurassic
30S 10E 24	Gretna Corp.	"Maino-Gonzales" 1	275	March 1937	1,575	Franciscan; Jurassic
24	Wm. H. Provost	"Spooner" 1	325	July 1952	1,749	Jurassic
24	Shell Oil Co.	"Buchon"	-	-	-	-
34	A. O. Lewis	"Pecho" 1	177	May 1937	2,745	Monterey 0-2612; U. Miocene
30S 11E 9	Van Stone and Dallaston	"Souza" 1	42	Oct 1951	1,233	Franciscan; Jurassic
31S 11E 15	Tidewater Oil Co.	"Honolulu-Tidewater-U.S.L.-Heller Lease "-1"	1,614	Jan 1958	10,788	Monterey 0-4363; Pt. Sal 4363; Obispo Tuff 4722; Rincon Shale 5370; 2nd Tuff 5546; 2nd Rincon Shale 6354; 3rd Tuff 10,174; L. Miocene

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For the purpose of assessing the potential for the occurrence of adverse oil field related ground deformation effects at DCPP site, in the unlikely event that petroleum should be discovered and produced at a nearby location, it is useful to review the nature and

causes of such ground deformation, and the types of geologic conditions at places where it has been observed.

The general subject of surface deformation associated with oil and gas field operations has been reviewed by Yerkes and Castle (Reference 22)[PG&E], among others. Such deformation includes differential subsidence, development of horizontally compressive strain effects within the central parts of subsidence bowls and horizontally extensive strain effects around their margins, and development or activation of cracks and faults. Pull-apart cracks and normal faults may develop in the marginal zone of extensive strain, while reverse and thrust faults sometimes occur in the central, compressive part of subsidence bowls. These effects all can develop when extraction of petroleum, water, and sand, plus lowering of fluid pressures, result in compression within and adjacent to producing zones, and attendant subsidence of the overlying ground. Other effects, including rebound of the ground surface, fault activation, and earthquake generation, have resulted from injection of fluid into the ground for purposes of secondary recovery, subsidence control, and disposal of fluid waste.

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In virtually all instances of ground-surface deformation associated with petroleum production, the producing field has been centered on an anticlinal structure, in general relatively broad and internally faulted. The strata in the producing and overlying parts of the section typically are poorly consolidated sandstone, siltstone, claystone, and shale of low structural competence. The field generally is one with relatively large production, with significant decline of fluid pressure in the producing zones.

The conditions just cited can be contrasted with those obtained in the vicinity of DCPP site, where the rocks lie along the flank of a major syncline. They consist of tight sandstone, tuffaceous sandstone, mudstone, and shale, together with large resistant masses of tuff and diabase. Bedding dips range from near horizontal to vertical and steeply overturned, as shown in Section D-D' of Figure 2.5-7 and Section A-B of Figure 2.5-10. This structural setting is unlike any reported from areas where oil-field-associated surface deformation has occurred.

The foregoing discussion leads to the following conclusions: (a) future development of a producing oil field in the vicinity of DCPP site is highly unlikely because of unfavorable geologic conditions, and (b) geologic conditions in the site vicinity are not conducive to the occurrence of surface deformation, even if nearby petroleum production could be achieved.

As was noted in Section 2.4, the rocks underlying the site do not constitute a significant groundwater reservoir, so that future development of deep rock water wells in the vicinity is not a reasonable possibility. The considerations pertaining to surface deformation resulting from water extraction are about the same as for petroleum extraction, so there is no likelihood that DCPP site could experience artificially induced and potentially damaging subsidence, uplift, collapse, or changes in subsurface effective stress related to pore pressure phenomena.

There are no mineral deposits of economic significance in the ground underlying the site.

Although some regional warping and uplift may well be taking place in the southern Coast Ranges, such deformation cannot be sufficiently rapid and local to impose significant effects on coastal installations. Apparent elevation of the San Luis Range has increased about 100 feet relative to sea level since the cutting of the main terrace bench at least 80,000 years ago.

Expressions of deformation preserved in the bedrock at the site include minor faults, folds, and zones of blocky fracturing in sandstone and intra-bed shearing in claystone. Zones of cemented breccia also are present, as is widespread evidence of disturbance adjacent to intrusive bodies of tuff. Local weakening of the rocks in some of these zones led to some problems during construction, but these were handled by conventional techniques such as overexcavation and rock bolting. No observed features of deformation are large or continuous enough to impose significant effects on the overall performance of the site foundation.

The foundation excavations for Units 1 and 2 were extended below the zone of intense near surface weathering so that the exposed bedrock was found to be relatively fresh and firm. The principal zones of structural weakness are associated with small bodies of altered tuff and with internally sheared beds of claystone. The claystone intra-bed shear was expressed by the development of numerous slickensided shear surfaces within parts of the beds, especially in places where the claystone had locally been squeezed into pod like masses. The shearing and local squeezing clearly are expressions of the preferential occurrence of differential adjustments in the relatively weaker claystone beds during folding of the section.

The claystone beds are localized in a part of the rock section that underlies the discharge structure and extends across the southerly part of the Unit 2 turbine-generator building, thence continuing easterly, along a strike through the ground south of the Unit 2 containment. The bedding dips 48 to 75° north within this zone. Individual claystone beds range from 1/2 inch to about 6 inches in thickness, and they occur as interbeds in the sandstone-mudstone rock section.

The relationship of the claystone layers to the foundation excavation is such that they crop out in several narrow bands across the floor and walls (~~refer to~~see Figures 2.5-15 and 2.5-16). Thus, the claystone bed remains confined within the rock section, except in a narrow strip at the face of the excavation. Because of the small amount of claystone mass and the geometric relationship of the steeply dipping claystone interbeds to the foundation structures, it was determined that the finished structure would not be affected by any tendency of the claystone to undergo further changes in volume.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

The only area in which claystone swelling was monitored was along the north wall of the lower part of the large slot cut for the cooling water discharge structure. There are several thin (6 inches or less) claystone interbeds in the sandstone-mudstone section. Because the orientation of the bedding and the plane of the cut face differ by only about 30°, and the bedding dips steeply into the face, opening of the cut served both to remove lateral support from the rock behind the face, and also to expose the clay beds to rainfall and runoff. This apparently resulted in both load relief and hydration swelling of the newly exposed claystone, which in turn caused some outward movement of the cut face. The movement then continued as gravity creep of the locally destabilized mass of rock between the claystone beds and the free face. The movement was finally controlled by installation of drilled-in lateral tie-backs, prior to placement of the reinforced concrete wall of the discharge structure.

No evidence of unrelieved residual stresses in the bedrock was noted during the excavation or subsequent construction of the plant foundation. Isolated occurrences of temporary slope instability clearly were related to locally weathered and fractured rock, hydration swelling of claystone interbeds, and local saturation by surface runoff. The Units 1 and 2 power plant facilities are founded on physically and chemically stable bedrock.

2.5.~~5~~4.2 Properties of Underlying Materials

Edited for Clarity - Revised Section Number

Static and dynamic engineering properties of materials in the subsurface at the site are presented in Section 2.5.~~2~~4.2.6, Site Engineering Properties.

Edited for Clarity - Revised Section Number

2.5.~~5~~4.3 Plot Plan

Edited for Clarity - Revised Section Number

Plan views of the site indicating exploratory boring and trenching locations are presented in Figures 2.5-8 and 2.5-11 through 2.5-15. Profiles illustrating the subsurface conditions relative to the PG&E Design Class I~~Seismic Category I~~ structures are furnished in Figures 2.5-12 through 2.5-16. Discussions of engineering properties of materials and groundwater conditions are included in Section 2.5.~~2~~4.2.6, Site Engineering Properties.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

Edited for Clarity - Revised Section Number

2.5.~~5~~4.4 Soil and Rock Characteristics

Edited for Clarity - Revised Section Number

Information on compressional and shear wave velocity surveys performed at the site are included in Appendices 2.5A and 2.5B of Reference 27 of Section 2.3. Values of soil modulus of elasticity and Poisson's ratio calculated from seismic measurements are presented in Table 1 of Appendix 2.5A of Reference 27 of Section 2.3, and in Figure 2.5-19. Boring and trench logs are presented in Figures 2.5-23 through 2.5-28.

2.5.~~5~~4.5 Excavations and Backfill

Edited for Clarity - Revised Section Number

Plan and profile drawings of excavations and backfill at the site are presented in Figures 2.5-17 and 2.5-18. The engineered backfill placement operations are discussed in Section 2.5.~~2~~4.2.6.4, Engineered Backfill.

Edited for Clarity - Revised Section Number

2.5.~~5~~4.6 Groundwater Conditions

Edited for Clarity - Revised Section Number

Groundwater conditions at the site are discussed in Section 2.4.13. The effect on foundations of PG&E Design Class I~~Seismic Category I~~ structures is discussed in Section 2.5.~~2~~4.2.6, Site Engineering Properties.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

2.5.~~5~~4.7 Response of Soil and Rock to Dynamic Loading

Edited for Clarity - Revised Section Number

Details of dynamic testing on site materials are contained in Appendices 2.5A and 2.5B of Reference 27 in Section 2.3.

Edited for Clarity - Revised Section Number

2.5.~~5~~4.8 Liquefaction Potential

Edited for Clarity - Revised Section Number

As stated in Section 2.5.~~2~~4.2.6.5, adverse hydrologic effects on foundations of PG&E Design Class I~~Seismic Category I~~ structures can be neglected due to the structures being founded on bedrock and the groundwater level lying well below final grade.

Edited for Clarity - Revised Section Number

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

There is a small local zone of medium dense sand located northeast of the intake structure and beneath a portion of buried ASW piping that is not attached to the circulating water tunnels. This zone is susceptible to liquefaction during design basis seismic events (References 45 and 46). The associated liquefaction-induced settlements from seismic events are considered in the design of the buried ASW piping. (References 48 and 49)

2.5.~~5~~4.9 Earthquake Design Basis

Edited for Clarity - Revised Section Number

The earthquake~~s postulated~~ design bases for the DCPP site are discussed in Section 2.5.~~3~~2.9, ~~and~~ a discussion of the design response spectra is provided in Section 2.5.3.10, and the application of the earthquake ground motions to the seismic analysis of structures, systems, and components is provided in Section 3.7. Response acceleration curves for the site resulting from Earthquake B and Earthquake D-modified are shown in Figures 2.5-20 and 2.5-21, respectively. Response spectrum curves for the ~~7.6M~~ Hosgri earthquake are shown in Figures 2.5-29 through 2.5-32.

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Edited for Clarity - Revised Section Number

Edited for Clarity

Added for Clarity – Section pointers revised to be more accurate.

2.5.~~5~~4.10 Static Analysis

Edited for Clarity - Revised Section Number

A discussion of the analyses performed on materials at the site is presented in Section 2.5.~~2~~4.2.6, Site Engineering Properties.

Edited for Clarity - Revised Section Number

2.5.54.11 Criteria and Design Methods

Edited for Clarity - Revised Section Number

The criteria and methods used in evaluating subsurface material stability are presented in Section 2.5.24.2.6, Site Engineering Properties.

Edited for Clarity - Revised Section Number

2.5.54.12 Techniques to Improve Subsurface Conditions

Edited for Clarity - Revised Section Number

Due to the bearing of in situ rock being well in excess of the foundation pressure, no treatment of the in situ rock is necessary. Compaction specifications for backfill are presented in Section 2.5.24.2.6.4, Engineered Backfill.

Edited for Clarity - Revised Section Number

2.5.65 SLOPE STABILITY

Edited for Clarity - Revised Section Number

2.5.65.1 Slope Characteristics

Edited for Clarity - Revised Section Number

The only slope whose failure during a DDE could adversely affect the nuclear power plant is the slope east of the building complex (refer to~~se~~ Figures 2.5-17, 2.5-18, and 2.5-22). To evaluate the stability of this slope, the soil and rock conditions were investigated by exploratory borings, test pits, and a thorough geological reconnaissance by the soil consultant, Harding-Lawson Associates, and was in addition to the overall geologic investigation performed by other consultants.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

The slope configuration and representative locations of the subsurface conditions determined from the exploration are shown on Plates 2, 3, and 4 of Appendix 2.5C of Reference 27 of Section 2.3. Reference 44 provides further information compiled in 1997 in response to NRC questions on landslide potential.

Bedrock is exposed along the lower portions of the cut slope up to about the lower bench at elevation 115 feet. It consists of tuffaceous siltstone and fine-grained sandstone of the Monterey Formation. Terrace gravel overlies bedrock and extends to an approximate elevation of 145 feet. Stiff clays and silty soils with gravel and rock fragments constitute the upper material on the site. The upper few feet of fine-grained soils are dark brown and expansive.

No free groundwater was observed in any of the borings which were drilled in April 1971, nor was any evidence of groundwater observed in this slope during the previous years of investigation and construction of the project.

In response to an NRC request in early 1997, PG&E conducted further investigations of slope stability at the site (Reference 44)~~[44]~~. The results of the investigations showed that earthquake loading, as a result of an earthquake on the Hosgri fault zone, following periods of prolonged precipitation will not produce any significant slope failure that can impact Design Class I structures and equipment. In addition, potential slope failures under such conditions will not adversely impact other important facilities, including the raw water reservoirs, the 230 kV and 500 kV switchyards, and the intake and discharge structures. Potential landslides may temporarily block the access road at several

Edited for Consistency

Added for Clarity – Refer to Applicability Determination Matrix Item # 27

locations. However, there is considerable room adjacent to and north of the road to reroute emergency traffic.

Moved text from Section 2.5.5.2

The investigation of the cut slope included geologic mapping of the soil and rock conditions exposed on the surface of slope and existing benches. Subsurface conditions were investigated by drilling test borings and by excavating test pits in the natural slope above the plant site (refer to~~see~~ Figure 2.5-22). The test borings were drilled with a truck mounted, 24 inch flight auger drill rig, and the test pits were excavated with a track-mounted backhoe. Boring and Log of Test Pits 1, 2, and 3 were logged by the soil consultant; borings 2 and 3 were logged by PG&E engineering personnel. The logs of all borings were verified by the soil consultant, who examined all samples obtained from each boring. Undisturbed samples were obtained from boring 2 and each of the test pits. Because of the stiffness of the soil, hardness of the rock, and type of drilling equipment used, the undisturbed samples were obtained by pushing an 18-inch steel tube that measured 2.5 inches in outside diameter. A Sprague & Henwood split-barrel sampler containing brass liners was used to obtain undisturbed soil samples from the test pits. The brass liners measured 2.5 inches in outside diameter and 6 inches in height. Logs of the borings and pits are shown in Figures 2.5-23 through 2.5-27. The soils were classified in accordance with the Unified Soil Classification System presented in Figure 2.5-28.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

2.5.6~~5~~.2 Design Criteria and Analyses

Edited for Clarity - Revised Section Number

Undisturbed samples of the materials encountered in pits and borings were examined by the soil consultant in the laboratory and were subsequently tested to determine the shear strength, moisture content, and dry density. Strain controlled, unconsolidated, undrained triaxial tests at field moisture were performed on the clay to evaluate the shear strength of the materials penetrated. (The samples were maintained at field moisture since adverse moisture or seepage conditions were not encountered during this investigation nor previous investigations.) The confining stress was varied in relation to depth at which the undisturbed sample was taken. The test results are presented on the boring logs and are explained by the Key to Test Data, Figure 2.5-28.

The results of strength tests were correlated with the results developed during earlier investigations of DCPP site. Mohr circles of stresses at failure (6 to 7 percent strain) were drawn for each strength test result, and failure lines were developed through points representing one-half the deviator stresses. An average C-θ strength equal to a cohesion (C) value of 1000 psf and an angle of internal friction (θ) of 29° was selected for the slope stability analysis. The analysis was checked by maintaining the angle of internal friction (θ) constant at 19° and varying the cohesion (C) from 950 psf (weakest layer) to 3400 psf (deepest and strongest layer).

Because of the presence of large gravel sizes, it was not possible to accurately determine the strength of the sand and gravel lense. However, based on tests on sand samples from other parts of the site, an angle of internal friction of 35° was selected as being the minimum available. An assumed rock strength of 5000 psf was used. This

value is consistent with strength tests performed on remold rock samples from other areas of the site.

The stability of the slope was analyzed for the forces of gravity using a static method that is, the conventional method of slices. This analysis was checked using Bishop's modified method. The static method of analysis was chosen because, for the soil conditions at the site, it was judged to be more conservative than a dynamic analysis.

Because the overall strength of the rock would preclude a stability failure except along a plane of weakness which was not encountered in the borings or during the many geologic mappings of the slope, only the stability of the soil over the rock was analyzed. The strength parameters were varied as previously discussed to determine the minimum factor of safety under the most critical strength condition. For the static analysis excluding horizontal forces, the factor of safety was computed to be 3. When the additional unbalanced horizontal force of 0.4 times the weight of the soil within the critical surface combined with a vertical force of 0.26 times the weight was included, the minimum computed factor of safety was 1.1.

On the basis of the investigation and analysis, it was concluded that the slope adjacent to DCPP site would not experience instability of sufficient magnitude to damage adjacent safety-related structures.

The above conclusion is substantiated by additional field exploration, laboratory tests, and dynamic analyses using finite element techniques. Refer to~~See~~ Appendix 2.5C of Reference 27 in Section 2.3, Harding-Lawson Associates' report on this work.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

~~In response to an NRC request in early 1997, PG&E conducted further investigations of slope stability at the site[44]. The results of the investigations showed that earthquake loading following periods of prolonged precipitation will not produce any significant slope failure that can impact Design Class I structures and equipment. In addition, potential slope failures under such conditions will not adversely impact other important facilities, including the raw water reservoirs, the 230 kV and 500 kV switchyards, and the intake and discharge structures. Potential landslides may temporarily block the access road at several locations. However, there is considerable room adjacent to and north of the road to reroute emergency traffic.~~

Moved text to Enhanced Section 2.5.6.1.

~~2.5.5.3 Field Exploration~~

Deleted – Sub-section text relocated to Enhanced Section 2.5.6.1.

~~The investigation of the cut slope included geologic mapping of the soil and rock conditions exposed on the surface of slope and existing benches. Subsurface conditions were investigated by drilling test borings and by excavating test pits in the natural slope above the plant site (see Figure 2.5-22). The test borings were drilled with a truck mounted, 24 inch flight auger drill rig, and the test pits were excavated with a track-mounted backhoe. Boring and Log of Test Pits 1, 2, and 3 were logged by the soil consultant; borings 2 and 3 were logged by PG&E engineering personnel. The logs of all borings were verified by the soil consultant, who examined all samples obtained from~~

~~each boring. Undisturbed samples were obtained from boring 2 and each of the test pits. Because of the stiffness of the soil, hardness of the rock, and type of drilling equipment used, the undisturbed samples were obtained by pushing an 18-inch steel tube that measured 2.5 inches in outside diameter. A Sprague & Henwood split-barrel sampler containing brass liners was used to obtain undisturbed soil samples from the test pits. The brass liners measured 2.5 inches in outside diameter and 6 inches in height. Logs of the borings and pits are shown in Figures 2.5-23 through 2.5-27. The soils were classified in accordance with the Unified Soil Classification System, presented in Figure 2.5-28.~~

Moved text to Enhanced Section 2.5.6.1.

2.5.6.35.4 Slope Stability for Buried Auxiliary Saltwater System Piping

Edited for Clarity - Revised Section Number

A portion of the buried ASW piping for Unit 1 ascends an approximate 2:1 (horizontal/vertical) slope to the parking area near the meteorology tower (Plates 1 and 2 of Reference 47). To ensure the stability of this slope in which the ASW piping is buried, a geotechnical evaluation, considering various design basis seismic events, was performed by Harding Lawson Associates. This evaluation is described in Reference 47. Based on this evaluation, it was concluded that this slope will be stable during seismic events and that additional loads resulting from permanent deformation of the slope will not impact the buried ASW piping.

2.5.7 Long Term Seismic Program

Added for Clarity – New Sub-section for the Term Seismic Program.

On November 2, 1984, the NRC issued the Diablo Canyon Unit 1 Facility Operating License DPR-80. In DPR-80, License Condition Item 2.C.(7), the NRC stated, in part:

> "PG&E shall develop and implement a program to reevaluate the seismic design bases used for the Diablo Canyon Power Plant."

PG&E's reevaluation effort in response to the license condition was titled the "Long Term Seismic Program" (LTSP). PG&E prepared and submitted to the NRC the "Final Report of the Diablo Canyon Long Term Seismic Program" in July 1988 (Reference 40)[42]. Between 1988 and 1991, the NRC performed an extensive review of the Final Report, and PG&E prepared and submitted written responses to formal NRC questions. In February 1991, PG&E issued the "Addendum to the 1988 Final Report of the Diablo Canyon Long Term Seismic Program" (Reference 41)[43]. In June 1991, the NRC issued Supplement Number 34 to the Diablo Canyon Safety Evaluation Report (SSER) (Reference 42)[44]. in which the NRC concluded that PG&E had satisfied License Condition 2.C.(7) of Facility Operating License DPR-80. In the SSER the NRC requested certain confirmatory analyses from PG&E, and PG&E subsequently submitted the requested analyses. The NRC's final acceptance of the LTSP is documented in a letter to PG&E dated April 17, 1992 (Reference 43)[45].

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The LTSP contains extensive data bases and analyses that update the basic geologic and seismic information in this section of the FSAR Update. However, the LTSP material does not address or alter the current design licensing basis for the plant. ~~and~~

~~thus is not included in the FSAR Update~~. In SSER 34 (Reference 42), the NRC stated, "The Staff notes that the seismic qualification basis for Diablo Canyon will continue to be the original design basis plus the Hosgri Evaluation basis, along with associated analytical methods, initial conditions, etc."

Deleted for Clarity – Refer to Applicability Determination Matrix Item # 29

Moved Text from Section 2.5

As a condition of the NRC's close out of License Condition 2.C.(7), PG&E committed to several ongoing activities in support of the LTSP, as discussed in a public meeting between PG&E and the NRC on March 15, 1991 (Reference 53), described as the "Framework for the Future," in a letter to the NRC, dated April 17, 1991 (Reference 50), and affirmed by the NRC in SSER 34 (Reference 43). These ongoing activities include the following that are related to geology and seismology (Reference 42, Section 2.5.2.4):

(1) To continue to maintain a strong geosciences and engineering staff to keep abreast of new geological, seismic, and seismic engineering information and evaluate it with respect to its significance to Diablo Canyon.

(2) To continue to operate the strong-motion accelerometer array and the coastal seismic network.

A complete listing of bibliographic references to the LTSP reports and other documents may be found in References 40, 41 and 42.

Added for Clarity – Refer to Applicability Determination Matrix Item # 28

Moved text from Enhanced Section 2.5.

2.5.7.1 Shoreline Fault Zone

In November 2008, as a result of the ongoing activities described in Section 2.5.7, the USGS, working in collaboration with the PG&E Geosciences Department, identified an alignment of microseismicity subparallel to the coastline adjacent to DCPP indicating the possible presence of a previously unidentified fault located approximately 1 km offshore of DCPP. The offshore region associated with this fault was subsequently named the Shoreline fault zone.

PG&E developed estimates of the 84th percentile deterministic ground motion response spectrum for earthquakes associated with the Shoreline fault zone. The results of the study of the Shoreline fault zone are documented in Reference 52. A map showing the location of the Shoreline Fault Zone is provided in Figure 2.5-36. This report includes a comparison of the updated 84th percentile deterministic response spectra with the 1991 LTSP and 1977 Hosgri earthquake response spectra. This comparison indicates that the updated deterministic response spectra are enveloped by both the 1977 Hosgri earthquake spectrum and the 1991 LTSP earthquake spectrum.

The NRC developed an independent assessment of the seismic source characteristics of the Shoreline fault and performed an independent deterministic seismic hazard assessment (References 54 and 55). The NRC concluded that their conservative estimates for the potential ground motions from the Shoreline fault are at or below the

ground motions for which the DCPP has been evaluated previously and demonstrated to have a reasonable assurance of safety (i.e., the 1977 Hosgri earthquake and 1991 LTSP earthquake ground motion response spectra). The NRC stated that the "Shoreline scenario should be considered as a lesser included case under the Hosgri evaluation."

Added for Clarity – New Sub-section to describe the Shoreline Fault Zone
Refer to Applicability Determination Matrix Item # 30

2.5.7.2 Evaluation of Updated Estimates of Ground Motion

As an outcome of the Shoreline fault zone evaluation described in Section 2.5.7.1, the process to be used for the evaluation of new/updated geological/seismological information has been developed (References 55 and 56). The new/updated geological/seismological information, resulting from the activities described in Section 2.5.7, will be evaluated using a process that is consistent with the evaluation process defined by the NRC in Reference 57.

Added for Clarity – New Sub-section to describe the Evaluation of Updated Estimates of Ground Motion
Refer to Applicability Determination Matrix Item # 31

2.5.8 Safety Evaluation

2.5.8.1 General Design Criterion 2, 1967 Performance Standards

Added for Clarity – New Sub-section to Justify Design Bases Criteria

The determination of the appropriate earthquake parameters for design of plant SSCs is addressed throughout Section 2.5, and the maximum earthquakes for the plant site are presented in Sections 2.5.3.9.1, 2.5.3.9.2, and 2.5.3.9.3. The associated design basis site free field accelerations and response spectra are presented in Sections 2.5.3.10.1, 2.5.3.10.2, and 2.5.3.10.3. The seismic design of these SSC is addressed in Section 3.7.

Discussion Added to Justify Design Basis Requirement
UFSAR Section 3.2.1
UFSAR Section 3.7
UFSAR Section 2.5.3.9
UFSAR Section 2.5.3.10
Refer to Applicability Determination Matrix Item # 32

2.5.8.2 License Condition 2.C(7) of DCPP Facility Operating License DPR-80 Rev 44 (LTSP), Elements (1), (2) and (3)

PG&E's reevaluation effort in response to the license condition was titled the "Long Term Seismic Program" (LTSP). PG&E prepared and submitted to the NRC the "Final Report of the Diablo Canyon Long Term Seismic Program" in July 1988. Between 1988 and 1991, the NRC performed an extensive review of the Final Report, and PG&E prepared and submitted written responses to formal NRC questions. In February 1991, PG&E issued the "Addendum to the 1988 Final Report of the Diablo Canyon Long Term Seismic Program". In June 1991, the NRC issued Supplement Number 34 to the Diablo Canyon Safety Evaluation Report (SSER) in which the NRC concluded that PG&E had satisfied License Condition 2.C.(7) of Facility Operating License DPR-80. In the SSER the NRC requested certain confirmatory analyses from PG&E, and PG&E subsequently submitted the requested analyses. The NRC's final acceptance of the LTSP is documented in a letter to PG&E dated April 17, 1992.

The commitments made as a part of the Diablo Canyon Long Term Seismic Program are detailed in Section 2.5.3.9.4 and Section 2.5.7.

Discussion Added to Justify Design Basis Requirement
SSER 34
Refer to Applicability Determination Matrix Item # 33

2.5.8.3 10 CFR Part 100, March 1966 - Reactor Site Criteria

As described in Sections 2.5.2 through 2.5.6 above, the physical characteristics of the site, including seismology and geology have been considered.

Discussion Added to Justify Design Basis Requirement
Refer to Applicability Determination Matrix Item # 34

2.5.96 REFERENCES

Edited for Clarity - Revised Section Number

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3. Deleted in Revision 1

4. Deleted in Revision 1

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9. Deleted in Revision 1

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17. Deleted in Revision 1

18. Deleted in Revision 1

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20. C. A. Hall, "Geologic Map of the Morro Bay South and Port San Luis Quadrangles, San Luis County, California," U.S. Geological Survey Miscellaneous Field Studies Map MF-511, 1973.

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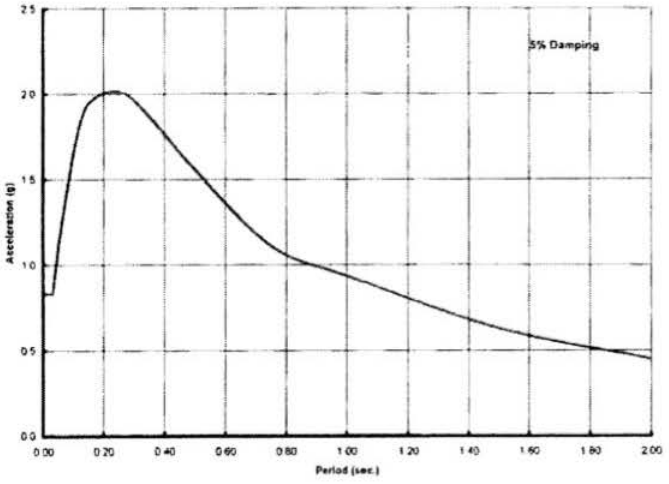
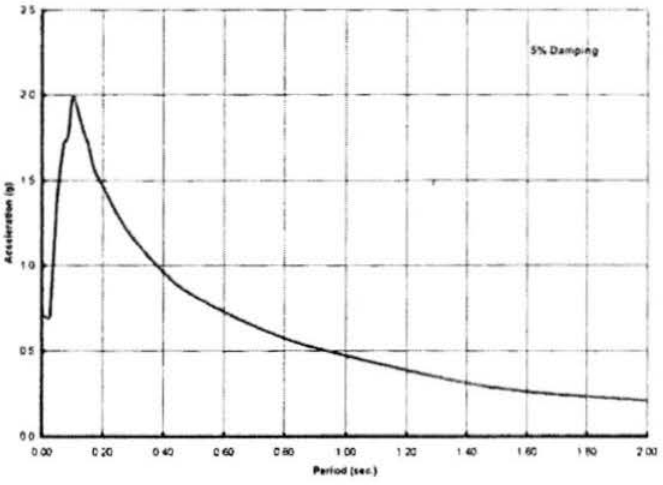
Added for Clarity – Refer to Applicability Determination Matrix Item # 35



Notes:
1. This figure is based on Reference 42, Figure 2.4

FSAR UPDATE
UNITS 1 AND 2 DIABLO CANYON SITE
FIGURE 2.5-33 FREE FIELD SPECTRUM HORIZONTAL 1991 LTSP (84TH PERCENTILE NON-EXCEEDANCE) AS MODIFIED PER SSER 34

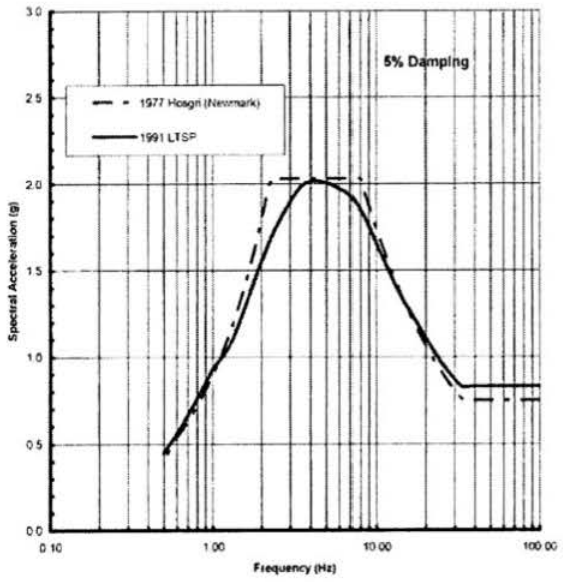
Added for Clarity – Refer to Applicability Determination Matrix Item # 36



Notes:
1. This figure is based on Reference 42, Figure 2.5

FSAR UPDATE
UNITS 1 AND 2 DIABLO CANYON SITE
FIGURE 2.5-34 FREE FIELD SPECTRUM VERTICAL 1991 LTSP (84TH PERCENTILE NON-EXCEEDANCE) AS MODIFIED PER SSER-34

Added for Clarity – Refer to Applicability Determination Matrix Item # 37

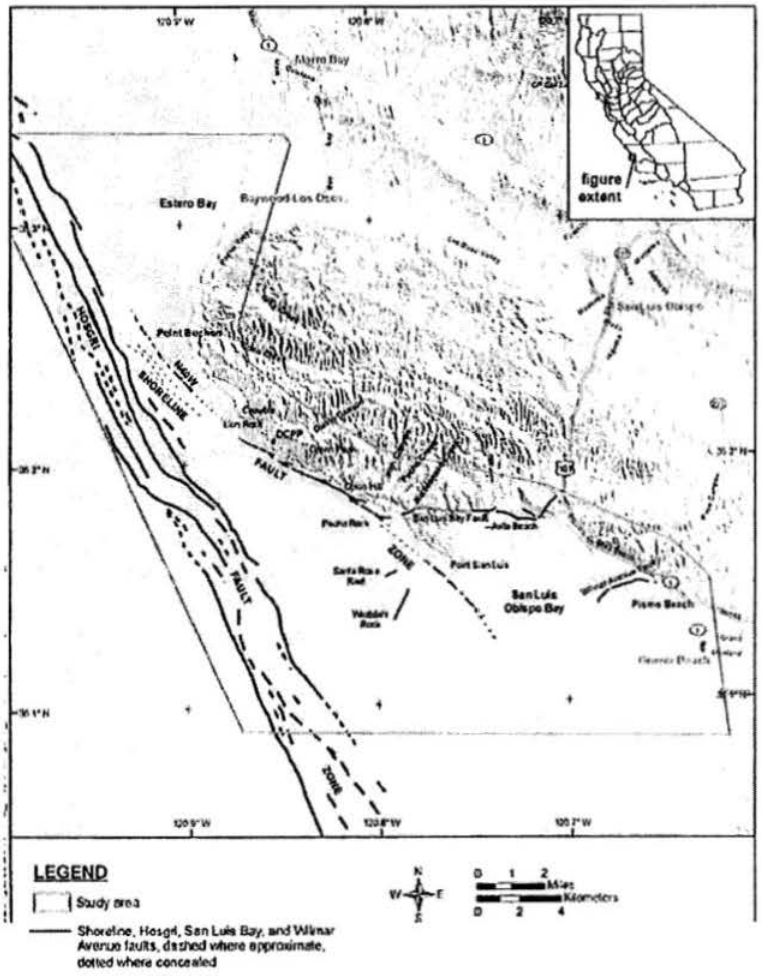


Notes

1. This figure is based on Reference 40, Figure 7-2, but the LTSP response spectrum has been adjusted in accordance with Reference 42, Figure 2.5.
2. This figure is for comparison purposes only and shall not be used for design.
3. Legend:
   - 1977 Hosgri (Newmark) corresponds to the spectrum shown in Figure 2.5-30
   - 1991 LTSP corresponds to the spectrum shown in Figure 2.5-33

FSAR UPDATE
UNITS 1 AND 2 DIABLO CANYON SITE
FIGURE 2.5-35 FREE FIELD SPECTRA HORIZONTAL LTSP (PG&E 1988) GROUND MOTION VS HOSGRI (NEWMARK 1977)

Added for Clarity – Refer to Applicability Determination Matrix Item # 38



Notes:
1. This figure is based on Reference 52, Figure 1-1.

FSAR UPDATE
UNITS 1 AND 2 DIABLO CANYON SITE
FIGURE 2.5-36 MAP OF SHORELINE FAULT STUDY AREA

Added for Clarity – Refer to Applicability Determination Matrix Item # 39

Applicability Determination

1. Proposed Activity Title/Implementing Document No:	Unit:	Imp Doc Rev No:
UFSAR Section 2.5 (Geology and Seismology)	☐ 1 ☐ 2 ☒ 1&2	0

Briefly describe what is being changed and why:

UFSAR Section 2.5 (Geology and Seismology) is revised to reflect the results of the Licensing Basis Verification Project for the Geology and Seismology section. The proposed change is being processed against UFSAR Revision 20. Changes include added text (e.g. to explicitly identify the licensing basis design requirements), revised text (e.g. to provide clarification), deleted text (e.g. to remove excessive detail), and moved text (e.g. to re-organize existing information to improve reader understanding). The changes and the justification for each are shown in the attached annotated markup or Applicability Determination Matrix. Refer to the attached AD approach description for a discussion of the Applicability Determination Matrix.

2. Applicability Determinations (refer to Section 8 for instructions). Does the proposed activity **involve**:

a.	A change to the Facility License, Environmental Protection Plan, or Technical Specifications?	☐ Y	☒ N
b.	A change to the Quality Assurance Program?	☐ Y	☒ N
c.	A change to the Security Plan (PSP, SCP, STQP, or CSP)?	☐ Y	☒ N
d.	A change to the Emergency Plan?	☐ Y	☒ N
e.	A change to the Inservice Testing (IST) Program Plan?	☐ Y	☒ N
f.	A change to the Inservice Inspection (ISI) Program Plan?	☐ Y	☒ N
g.	A change to the Fire Protection Program?	☐ Y	☒ N
h.	A noncompliance with the Environmental Protection Plan or the potential creation of a situation adverse to the environment?	☐ Y	☒ N
i.	A change to the UFSAR (including documents incorporated by reference) excluded from the requirement to perform a 50.59/72.48 review?	☒ Y	☐ N
j.	Maintenance that restores SSCs to their original or newly approved designed condition? (Check "N" if activity is related to ISFSI.)	☐ Y	☒ N
k.	A temporary alteration in support of maintenance (TASM) that will be in effect during non-power operations and/or for 90 days or less during at power operations? (Check "N" if activity is related to ISFSI.)	☐ Y	☒ N
l.	Managerial or administrative procedure/process controlled under 10 CFR 50, Appendix B or 10 CFR 72, subpart G?	☐ Y	☒ N
m.	Regulatory commitment not covered by another regulatory based change process?	☐ Y	☒ N
n.	An impact to other plant specific programs (e.g., the ODCM) that are controlled by regulations, the Operating License, or Technical Specifications?	☐ Y	☒ N

3. Applicability Determination Conclusions (refer to Section 8.18 for instructions):

☒ **A 10 CFR 50.59 or 72.48 screen is NOT required** because ALL aspects of the activity are controlled by one or more of the processes listed above, or have been approved by the NRC, or are covered in full in another LBIE review.

☐ **A 10 CFR 50.59 or 72.48** screen **will be completed** because some or all the aspects of the activity are not controlled by any of the processes listed above or cannot be exempted from the 10 CFR 50.59/72.48 screen.

4. Does the proposed activity involve a change to the plant that requires a safety assessment? (refer to Section 15 for instructions)	☐ Y	☒ N

5. Remarks: (Use this section to provide sufficient justification(s) per step 5.1.2 for determinations in step 2 and conclusion in step 3.)

The changes do not involve changes to the Facility/ISFSI OL, EPP or TS, or the identified Plans/Programs (items 2.a through 2.g), non-compliance with the Environmental Plan (Item 2.h), maintenance (Item 2.j), temporary alterations ((Item 2.K), managerial or administrative procedure/process (Item 2.l), regulatory commitment not covered by another regulatory process (Item 2.m), or an impact to other plant-specific programs (Item 2.n). The proposed change does involve changes to the UFSAR, some of which are excluded from the requirements to perform a 10 CFR 50.59 review.

Item 2.i

The proposed activity involves changes to the UFSAR that explicitly identify the licensing basis design requirements and their bases submitted to, and approved by, the NRC in docketed correspondence. Other changes are made for clarification and to remove excessive detail or repetitive information. The attached annotated markup and Applicability Determination Matrix identify the changes and associated justifications. Note the Applicability Determination Matrix provides further justification of specific proposed UFSAR changes and are identified in the attached annotated markups as "Refer to Applicability Determination Matrix" (refer to attached approach discussion). The changes are excluded from the requirement to perform a 10 CFR 50.59/72.48 review per the guidance of NEI 98-03, Appendix A, Section A2. The changes are "editorial changes, clarifications to improve reader understanding, and incorporation of information approved by the NRC as a result of a license amendment or other docketed correspondence" (TS3.ID2 Section 8.12, Block 2.i, Note 2). Refer to attached License Basis Impact Evaluation (LBIE) and Licensing Basis Verification Project UFSAR Enhancement initiative, LBIE Applicability Determination Approach.

Item 3

A 10 CFR 50.59 screen is not required because all aspects of the proposed activity are controlled by the processes listed in Section 2. An Applicability Determination Matrix has been attached to provide justification as to why the identified changes/activities do not require a 10 CFR 50.59."

Item 4

A review of Section 15 of TS3.ID2 has been performed and it has been determined that a safety assessment is not required. As stated in Section 15.3 the proposed activity has no safety significance. The proposed activity also does not include any of the activities defined in Section 15.4.

Preparer Signature: (Qual: TLBIEAD or TLBIE) Paul Angelucci	Date: 6/4/13	Print Last Name: Angelucci
Reviewer Signature: (Qual: TLBIEAD or TLBIE)	Date: 6/4/13	Print Last Name: Tyman
PG&E Acceptance Signature: (Qual: TLBIEAD or TLBIE) (N/A if prepared or reviewed by PG&E) ☐ N/A William R. Horstman	Date: 6/9/13	Print Last Name: Horstman

Refer to Section 6, for instructions on handling completed forms.

Licensing Basis Verification Project UFSAR Enhancement Initiative
LBIE Applicability Determination Approach

Approach Discussion

The primary objective of the Licensing Basis Verification Project (LBVP) Updated Final Safety Analysis Report (UFSAR) Enhancement initiative is to modify the DCPP UFSAR such that it clearly and succinctly states the licensing basis design requirements to which PG&E has committed for DCPP and which the U.S. Nuclear Regulatory Commission (NRC) has approved.

UFSAR changes are made in accordance with applicable regulations, DCPP procedures, and industry/NRC guidance, including the Nuclear Energy Institute's (NEI's) *Guidelines for Updating Final Safety Analysis Reports* (NEI 98-03, Revision 1), NEI's *Guidelines for 10 CFR 50.59 Implementation* (NEI 96-07, Revision 1), and NRC's *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants* (Regulatory Guide [RG] 1.70, Revision 1). By LBVP definition and scope, the project's UFSAR enhancement Change Requests (CRs) involve documentation-only changes; any physical changes that are identified as a result of LBVP review will be done separate from and outside of the LBVP.

LBVP-initiated UFSAR CRs will include up to four types of UFSAR changes, as follows:

1. Added text (e.g., to explicitly identify the licensing basis design requirements)
2. Revised text (e.g., to provide clarification)
3. Deleted text (e.g., to remove excessive detail)
4. Moved text (e.g., to reorganize existing information to improve reader understanding)

Because the LBVP is not changing the physical plant, its design, its design basis, or its licensing basis, it is anticipated that most, if not all, of the UFSAR changes will not be subject to 10 CFR 50.59 (i.e., Title 10 of the U.S. Code of Federal Regulations, Section 50.59) and the Licensing Basis Impact Evaluation (LBIE) review process will appropriately terminate at the Applicability Determination (AD) stage. Any individual change(s) for which the AD concludes that 10 CFR 50.59 screening is required will be documented in a separate CR to facilitate processing.

The LBVP will generally submit UFSAR enhancements on a section-by-section basis (or by groups of sections, as appropriate for the subject). The first LBVP enhancement change request, which has been incorporated, addressed Section 3.1 (including subsections, tables, and Appendix 3.1A). That section describes DCPP's conformance with AEC/NRC General Design Criteria (GDCs) and the basic design requirements for plant structures, systems, and components important to safety. The Section 3.1 revision was based on a thorough but general licensing basis review for the plant. As the LBVP continues the enhancement process, any conflicts identified between revised Section 3.1 and other sections of the UFSAR will be resolved in accordance with procedure OM7.ID1. The licensing basis review for the UFSAR section(s) that are the subject of this enhancement CR identified the applicable GDCs and found no conflicts with UFSAR Section 3.1 (an inconsistent / ambiguous text reference to GDC 44, 1971 was deleted).

The specific guidance that is expected to be applicable to disposition LBVP-initiated UFSAR CRs at the LBIE AD stage includes:

DCPP Procedure TS3.ID2, *Licensing Basis Impact Evaluations*:

- Block 2i Instructions (Sec. 8.12, Note 2) – "UFSAR changes that can be excluded from the requirement to perform a 10 CFR 50.59 ... review include editorial changes, clarifications to improve reader understanding, ... and incorporation of information approved by the NRC as a result of a license amendment request or other docketed correspondence."

- Block 3 on Attachment 1 (AD) Form – "A 10 CFR 50.59 ... screen is NOT required because ALL aspects of the activity ... are covered in full in another LBIE review."

DCPP Procedure XI3.ID2, *Final Safety Analysis Report Update Revision and Maintenance*:

- Attachment 2, Section 9.a, sixth bullet – "Examples of editorial non-technical corrections allowed (without a 10 CFR 50.59 evaluation) include ... [c]orrections or clarification of text or table information that do not affect technical content (as agreed to by the UFSAR licensing engineer and the section owner.)"

NEI 98-03, Revision 1, Appendix A ("Modifying the Updated FSAR"):

- Section A3 – "[A] licensee may elect to reformat the UFSAR to more clearly identify the design bases as defined in 10 CFR 50.2."

- Section A4 – "Licensees may elect to simplify information contained in the UFSAR to improve its focus, clarity and maintainability. ... Detailed text and drawings may be removed from the UFSAR to the extent that the information provided exceeds that necessary to present the plant design bases, safety analyses and appropriate UFSAR description. ... The following types of excessively detailed textual information may be removed from UFSARs, except as indicated by applicable regulatory guidance or NRC Safety Evaluation Reports: [1] Descriptive information that is not important to providing an understanding of the plant's design and operation from either a general or system functional perspective, [2] Design information that is not important to the description of the facility or presentation of its safety analysis and design bases, [3] Design information that, if changed during the life of the plant, would have no impact on the ability of plant systems, structures and components described in the UFSAR to perform their design basis function(s), [and] [4] Analytical information, e.g., detailed calculations, that is not important to providing an understanding of the safety analysis methodology, input assumptions and results, and/or compliance with relevant regulatory and industry standards."

- Section A5 – "Licensees may remove obsolete and redundant information and commitments from UFSARs."

NEI 96-07, Revision 1

- Section 4.1.3 – "[M]odifications to the UFSAR that are not the result of activities performed under 10 CFR 50.59 are not subject to control under 10 CFR 50.59. Such modifications include reformatting and simplification of UFSAR information and removal

> of obsolete or redundant information and excessive detail. ... Similarly, 10 CFR 50.59 need not be applied to the following types of activities: [e]ditorial changes to the UFSAR[;] [c]larifications to improve reader understanding[;] [c]orrection of inconsistencies within the UFSAR (e.g., between sections)[;] [m]inor corrections to drawings, e.g., correcting mislabeled valves[; and] [s]imilar changes to UFSAR information that do not change the meaning or substance of information presented."

NEI 98-03, Revision 1, is endorsed by NRC RG 1.181, *Content of the Updated Final Safety Analysis Report in Accordance with 10 CFR 50.71(e)*, dated September 1999. NEI 96-07, Revision 1, is endorsed by NRC RG 1.187, *Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments*, dated November 2000.

Applicability Determination Matrix

In addition to providing annotations in the UFSAR Change Request Markup, some items may require additional discussion and justification for the change. These changes are identified in the annotated markup as "Refer to Applicability Determination Matrix." The applicability matrix provides further discussion of the proposed changes and identifies associated LBIEs, LARs, LAs, and analyses that provide the justification for the activities not requiring a 10 CFR 50.59 screen. The applicability determination matrix also identifies activities that do require a 10 CFR 50.59 screen.

UFSAR Section 8.1- Introduction Applicability Determination Matrix [1]

Item #	Affected Living UFSAR Section [2]			LBVP Enhanced UFSAR Section	Brief Change Description	UFSAR Rev.	Associated Licensing Documentation				Comment	Regulatory Guide 1.70, Rev 1 Impact Review	50.59 Applicability Discussion	10 CFR 50.59 Screen Required (Yes/No)
	Section(s)	Table(s)	Figure(s)				SER / SSER	LA	LAR	LBIE				
1	2.5	N/A	N/A	2.5	Added text "Since the development of the seismic inputs for DCPP predates the issuance of 10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," the following DCPP earthquakes are plant specific." from DCL 12-118 to include Appendix A and DBE/SSE equivalency statement.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the relationships between DCPP and the 10 CFR Part 100 Appendix A.	Regulatory Guide 1.70, Rev 1 states "Proposed Appendix A to 10 CFR Part 100, "Seismic and Geologic Siting Criteria for Nuclear Power Plants" (published for comment and interim guidance in the Federal Register, Vol. 36, No. 228, November 25, 1971), sets forth the principal seismic and geologic considerations that guide the regulatory staff in its evaluation of the acceptability of sites and seismic design bases." This enhancement provides a connection between DCPP and this statement as DCPP predates 10 CFR Part 100 Appendix A.	This is an enhancement to improve the reader understanding of the applicable sections. The enhancements clarify the relationship between DCPP's earthquakes and those described in 10 CFR Part 100 Appendix A. DCL 12-118, Response to Recommendation 2.3 Seismic Unit 1, dated November 27, 2012, states "Since the development of the seismic inputs for DCPP predates the issuance of 10 CFR 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," the following DCPP-specific earthquakes are defined." RB, 12-01, "Confirmatory Analyses of Seismic Hazard at the DCPP from the Shoreline Fault", dated September 2012, states "The Atomic Energy Commission originally issued construction permits to PG&E for DCPP Units 1 and 2 in 1968 and 1970, respectively. These construction permits included a "Double Design Earthquake" (DDE) ground motion response spectrum with a horizontal peak ground acceleration (PGA) of 0.4g and a "Design Earthquake" (DE) ground motion response spectrum with a horizontal PGA of 0.2g. The DDE ground motion and the DE ground motion were similar to the regulatory ground motion levels that the NRC subsequently developed as the "Safe Shutdown Earthquake (SSE)" ground motion and the "Operating Basis Earthquake (OBE)" ground motion." As can be seen in these two statements DCPP predates 10 CFR Part 100 Appendix A, therefore, the earthquake design basis of DCPP is unique. These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No
2	2.5	N/A	N/A	2.5	Added text to clearly describe the historical earthquake progression detailed in the section.	N/A	SSER 01	N/A	N/A	N/A	LBVP Enhancement to clearly delineate the historical progression of information presented in the section.	Regulatory Guide 1.70, Rev 1, Section 2.5 recommends a brief description of the site, the investigations performed, results of investigations, and a statement as to who did the work. This addition provides a historical context to these investigations.	These enhancements provide a high level summary of the "historical progress of the geotechnical and seismological investigations associated with the DCPP site..." The results of the Original Design Phase, Hosgri Evaluation Phase, and Long Term Seismic Program Evaluation Phase are presented in enhanced UFSAR sections 2.5.3.9 and 2.5.3.10. SSER 01 states "For design purposes, an envelope of the S and D response spectra was used. The operating basis earthquake (OBE) encompassed Earthquake B with a horizontal acceleration at 0.15g and Earthquake D with a horizontal acceleration of 0.2g. The use of two earthquake response spectra for the OBE was extended because the characteristics of ground motion for the two earthquakes would be different in consideration of unequal attenuation due to earthquake location, i.e., Earthquake D would have relatively higher accelerations in the high frequency part of its spectrum. The same spectra and 0.4g were used for the SSE." While not referred to as the DE and DDE the OBE and SSE described correspond to the 0.2g and 0.4g DE and DDE. RB, 12-01, "Confirmatory Analyses of Seismic Hazard at the DCPP from the Shoreline Fault", dated September 2012, states "The Atomic Energy Commission originally issued construction permits to PG&E for DCPP Units 1 and 2 in 1968 and 1970, respectively. These construction permits included a "Double Design Earthquake" (DDE) ground motion response spectrum with a horizontal peak ground acceleration (PGA) of 0.4g and a "Design Earthquake" (DE) ground motion response spectrum with a horizontal PGA of 0.2g. The DDE ground motion and the DE ground motion were similar to the regulatory ground motion levels that the NRC subsequently developed as the "Safe Shutdown Earthquake (SSE)" ground motion and the "Operating Basis Earthquake (OBE)" ground motion." SSER 04 states "In 1971, two geologists with the Shell Oil Company published previously proprietary data indicating the presence of a 90 miles long fault about 4 1/2 miles offshore from the Diablo Canyon plant site (Hoskins and Griffiths, 1971)....The U. S. Geological Survey concluded that a magnitude 7.5 earthquake could occur on the Hosgri fault. As stated in Appendix C to this supplement, the Survey's report is intended to form a basis for deriving an effective acceleration for input into the process leading to seismic design analyses (which in this case will be a reevaluation of the seismic capabilities of the Diablo Canyon Nuclear Power Station)." SSER 34 states "In summary, the staff has reviewed the PG&E submittals relating to the LTSP and, subject to confirmation by PG&E that the plant seismic margins are adequate to accommodate the specified extraordinary discussed under element 4 above, the staff finds that License Condition 2.C.(7) of DPR-80 has been met. The staff holds that the seismic qualification basis for Diablo Canyon will continue to be the original design basis plus the Hosgri evaluation basis, along with the associated analytical methods, initial conditions, etc. The LTSP has served as a useful check on the adequacy of the seismic margins and has generally confirmed that the margins are acceptable." These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No
3	Multiple	N/A	N/A	Multiple	Added text clarifying that the information collected is for "earthquakes through 1972" to clearly quantify the applicable time frame for the information presented.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the time period applicable to the information being presented in the section.	This is an editorial change to improve reader clarity. This enhancement does not add or change either the functional or licensing basis requirements. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	These are editorial enhancements to improve the reader understanding of the applicable sections. The enhancements clarify the time frame applicable to the material being presented. These enhancements are based on existing material in the UFSAR. They are a clarification that the material being presented is based on information collected before or during 1972. This is made evident in the following figures and tables from Section 2.5 Table 2.5-1, the latest earthquake is 1971. Table 2.5-2, the latest earthquake is 1969. Figure 2.5-2, the latest earthquake is 1971. Figure 2.5-3, the latest earthquake is 1972. Figure 2.5-4, the latest earthquake is 1971. These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No
													These are editorial enhancements to improve the reader understanding of the applicable sections. The enhancements clarify the time frame applicable to the material being presented. These enhancements are based on existing material in the UFSAR. They are a clarification that the material being presented is based on information collected before or during the original design phase. The SER for the Unit 1 FSAR states "...the Seismology Division of the Coast and Geodetic Survey has evaluated the seismicity of the area around the proposed reactor site in Diablo Canyon, San Luis Obispo County, California, and has reviewed the similar analysis made by the applicant in the Preliminary Safety Analysis Report of the Nuclear Plant of the Diablo Canyon Site, Pacific Gas and Electric Company. The applicant's seismicity report is complete for both nearby and distant earthquakes which may have affected the proposed site. The safety of sources of the potential maximum earthquakes along the San Andreas Fault, the Hosgri Fault, the Santa Ynez Fault and the San Andreas offshore to the west of the fault includes not only a review of the historical earthquakes but a discussion of those	

UFSAR Section 8.1- Introduction Applicability Determination Matrix [1]

Item #	Affected Living UFSAR Section [1]			LBVP Enhanced UFSAR Section	Brief Change Description	UFSAR Rev.	Associated Licensing Documentation				Comment	Regulatory Guide 1.70, Rev 1 Impact Review	50.59 Applicability Discussion	10 CFR 50.59 Screen Required (Yes/No)
	Section(s)	Table(s)	Figure(s)				SER / SSER	LA	LAR	LBIE				
4	Multiple	N/A	N/A	Multiple	Added text, "during the original design phase" to clearly quantify the applicable time frame for the information presented.	N/A	SSER 01	N/A	N/A	N/A	LBVP Enhancement to clearly define the time period applicable to the information being presented in the section.	This is an editorial change to improve reader clarity. This enhancement does not add or change either the functional or licensing basis requirements. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	parameters related to the earthquake frequency spectrum as fault length, depth of focus, slip and duration of strong shaking." The SER for the Unit 2 PSAR states "The analysis of the geology of the Diablo Canyon Nuclear Plant Site presented in A.E.C. Docket No. 50-275 and supplements was reviewed and compared with the available literature, and the exploratory trenches at the site were examined on August 14-15, 1968. The analysis appears to be carefully derived and to present an adequate appraisal of those aspects of the geology which would be pertinent to an engineering evaluation of the site." SSER 01 states "This geology and seismology evaluation reflects our review of investigations conducted since 1968. These investigations are described in the Final Safety Analyses Report (FSAR) for the Diablo Canyon Nuclear Plant site and in a report by Wagner (1974). The geology and seismology of the Diablo Canyon site were reviewed by the AEC staff and its geological and seismological advisors, the U.S. Geological Survey (USGS) and the U.S. Coast and Geodetic Survey, during the construction permit review. The findings of that review were published on November 18, 1969, as part of the SER for Unit 2. With respect to seismic design input, the SER concluded: (1) "There are no identifiable major faults or other geologic structures in the area that could be expected to localize seismicity in the immediate vicinity of the site. The nearest seismically active major fault is the Nacimiento fault, a northwest-trending fault zone that approaches to within about 15-20 miles of the site to the northeast," and (2) "...the Coast and Geodetic Survey agrees with the applicant's statement of 0.20g at the site and on rock for the predicted maximum ground accelerations of the design earthquake and feels that values of 0.40g on the rock for the safe shut-down conditions." These enhancements are clarifying statements to clearly state that the investigations and dams described were performed as a part of the original design phase at the plant. The site and regional investigations were performed to determine the adequacy of the site as a reactor site and then to determine the basis for the design criteria at the site. This enhancement is an editorial clarification to improve reader understanding per NEI 98-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 Screen is not required.	No
5	Multiple	N/A	N/A	Multiple	Revised all occurrences of "Seismic Category I" to "PG&E Design Class I"	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to ensure nomenclature consistency with DCPP G-List and other UFSAR Sections.	Regulatory Guide 1.70, Rev 1 does not address the nomenclature to be used for safety related equipment and structures. Therefore, this activity does not impact DCPP's commitment to this regulatory guide.	This proposed activity revises all occurrences of "Seismic Category I" to "PG&E Design Class I" as defined in the DCPP G-List Section 2.2.3.4 and Table 1. The proposed activity revises all occurrences of "Non-Seismic Category I" to "PG&E Design Class II" as defined in the DCPP G-List Section 2.2.3.4 and Table 1. The proposed activity clarifies text in the UFSAR based on the terminology that is contained in the DCPP G-list, which is controlled by the 10 CFR 50.59 process. Therefore, a 10 CFR 50.59 Screen is not required.	No
6	2.5	N/A	N/A	2.5.1.1 2.5.1.2 2.5.1.3	Added new Design Basis sections to identify license basis requirements.	N/A	SSER 34	N/A	N/A	N/A	LBVP Enhancement to clearly define applicable license basis requirements.	Refer to AD Matrix for Enhanced Sections 2.5.8.1 - 2.5.8.3.	Enhancements are based on approved licensing basis source documents as enumerated in the attached UFSAR markup, identification of applicable Licensing Basis requirements provides clarity of the DCPP licensing requirements and maintainability of the UFSAR. This text is derived from source documents enumerated in the comment bubbles that have been previously approved by the NRC, by license amendment, or original Safety Evaluation Report (NUREG-0675), therefore, a 10 CFR 50.59 Screen is not required. Refer to below AD Matrix for Enhanced Sections 2.5.8.1 - 2.5.8.3 for safety evaluation discussion.	No
7	Multiple	N/A	N/A	Multiple	Revised all occurrences of "See Figure" to "Refer to Figure"	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to ensure nomenclature consistency with other UFSAR Sections.	Regulatory Guide 1.70, Rev 1 is not applicable to this change.	This is a clarification to enhance reader understanding of the DCPP UFSAR text. This change brings UFSAR Section 2.5 into alignment with the text in the rest of the UFSAR. It has no effect on the functional or licensing basis requirements. This enhancement is an editorial clarification to improve reader understanding per NEI 98-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No
8	2.5.1.2.6.2	N/A	N/A	2.5.1.2.3.4.2	Added text "For the Hosgri Evaluation an average shear wave velocity of 3600 feet per second is used as the foundation grade."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define conditions of the Hosgri Evaluation.	This proposed activity discusses the site geology as required by Regulatory Guide 1.70, Rev 1. Therefore, this activity does not impact DCPP's commitment to this activity.	This enhancement is information derived from the Hosgri Report. This material clarifies the values used for the average shear wave velocity during the Hosgri Evaluation as they were different than those used for the original design phase. The Hosgri Report, in section 4.1.2 Material Properties, states "The material at foundation grade has an average shear wave velocity of 3600 ft per sec, a poisson ratio of 0.23, and a specific gravity of 2.24." These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No
9	2.5.3.2	N/A	N/A	2.5.3.2	Added text "Prior to the start of construction of DCPP."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define when Benioff and Smith conducted their investigations.	Regulatory Guide 1.70, Rev 1 is not applicable to this change.	Figure 1 of DCL 87-018, Reply to 50.54(f) letter Regarding Adequacy and Availability of Design Basis Information, provides a timeline of key licensing milestones, including the date of the start of construction of unit 1, July 22, 1968. Benioff and Smith's "Seismic Evaluation of the Diablo Canyon Site," published January 9, 1967, provides the information that was used as the basis of the design earthquake as described below in AD Matrix Item #10. This occurred during the evaluation of the area as a viable site and concluded before the start of Unit 1 construction. These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No
10	2.5.3.2	N/A	N/A	2.5.3.3	Added text ", which form the basis of the Design Earthquake."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define that the maximum earthquakes presented by Benioff and Smith are the basis for the DE.	This is a clarification to improve reader clarity. The earthquake licensing basis at DCPP is unique and does not conform to the OBE/DDE configuration specified in Regulatory Guide 1.70, Rev 1 as DCPP received its initial license before the publishing of Appendix A. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	This enhancement is information derived from existing UFSAR text in enhanced sections 2.5.3.8.1 and 2.5.3.10.1 as well as existing UFSAR Section 3.7.1.1. It is being added to this section to clarify the purpose of the maximum earthquakes defined by Benioff and Smith. Enhanced UFSAR Section 2.5.3.8.1 states "Benioff and Smith, in reviewing the seismicity of the region around DCPP site, determined the maximum earthquakes that could reasonably be expected to affect the site." Enhanced UFSAR Section 2.5.3.10.1 states "Accordingly, Earthquake D-modified was derived by ... maximum vibratory motion at the plant site would be produced by either Earthquake D-modified or Earthquake B, depending on the natural period of the vibrating body. UFSAR Section 3.7.1.1 states "For design purposes, the response spectra for each damping value from Earthquake B and Earthquake D-modified are combined to produce an envelope spectrum. The acceleration value for any period on the envelope spectrum is equal to the larger of the two values from the Earthquake B spectrum and the Earthquake D-modified spectrum. Vertical free field ground accelerations and the vertical free-field ground motion response spectra are assumed to be two-thirds of the corresponding horizontal spectra. The DE is the hypothetical earthquake that would produce stress horizontal and vertical vibratory simultaneously." These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No

UFSAR Section 8.1- Introduction Applicability Determination Matrix [1]

Item #	Affected Living UFSAR Section [2]			LBVP Enhanced UFSAR Section	Brief Change Description	UFSAR Rev.	Associated Licensing Documentation				Comment	Regulatory Guide 1.70, Rev 1 Impact Review	50.59 Applicability Discussion	10 CFR 50.59 Screen Required (Yes/No)
	Section(s)	Table(s)	Figure(s)				SER / SSER	LA	LAR	LBE				
11	2.5.2.9	N/A	N/A	2.5.3.9	Revised section header from "Maximum Earthquake" to "Design and Licensing Basis Earthquakes."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to create a section that clearly defines the unique earthquake licensing basis at DCPP.	Regulatory Guide 1.70, Rev 1 requires discussion on the maximum earthquake, the safe shutdown earthquake, and the operating basis earthquake in sections 2.5.2.8, 2.5.2.10, and 2.5.2.11, respectively. As OBE and SSE do not apply to DCPP this section has been edited and the following subsections created to clearly present the DCPP licensing basis as pertains to the requirements of these section of Regulatory Guide 1.70, Rev 1.	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. The subsections included define the DCPP earthquake licensing basis in a clear and concise manner. This enhancement is an editorial clarification to improve reader understanding per NEI 98-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No
12	2.5.2.9	N/A	N/A	2.5.3.9.1	Added sub-section to discuss the Design Earthquake as it pertains to Design and Licensing Basis Earthquakes.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the Design Earthquake as one of the DCPP design and licensing basis earthquakes.	Refer to Regulatory Guide 1.70, Rev 1 Impact Review for Applicability Determination Matrix Item #8	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. The subsections included define the DCPP earthquake licensing basis in a clear and concise manner. The DE earthquake is clearly defined in UFSAR section 3.7.1.1. "For design purposes, the response spectra for each damping value from Earthquake B and Earthquake D-modified are combined to produce an envelope spectrum. The acceleration value for any period on the envelope spectrum is equal to the larger of the two values from the Earthquake B spectrum and the Earthquake D-modified spectrum. Vertical free field ground accelerations, and the vertical free-field ground motion response spectra are assumed to be two-thirds of the corresponding horizontal spectra. The DE is the hypothetical earthquake that would produce these horizontal and vertical vibratory accelerations." This enhancement is an editorial clarification to improve reader understanding per NEI 98-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No
13	2.5.2.9	N/A	N/A	2.5.3.9.1	Changed "7.5" to "7.25"	N/A	SSER 01	N/A	N/A	N/A	LBVP Enhancement to correct a typographical error introduced in Amendment 20.	This is an editorial change to improve reader clarity. This enhancement does not add or change either the functional or licensing basis requirements. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	This is a clarification to correct a typographical error introduced in Amendment 20 to the Original 197.0 FSAR in response to an NRC request for additional information (RAI) dated January 4, 1974. This RAI does not directly affect the section in question. This change is supported by the original design report, "Seismic Evaluation of the Diablo Canyon Site," by Benioff and Smith, and by BMER 01. The Benioff and Smith report states "The equivalent magnitude would be 7-1/4." In SSER 01, January 1975, earthquake B is discussed as Magnitude 7-1/4 along offshore..." These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No
14	2.5.2.9	N/A	N/A	2.5.3.9.2	Added sub-section to discuss the Double Design Earthquake as it pertains to Design and Licensing Basis Earthquakes.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the Double Design Earthquake as one of the DCPP design and licensing basis earthquakes.	Refer to Regulatory Guide 1.70, Rev 1 Impact Review for Applicability Determination Matrix Item #8	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. The subsections included define the DCPP earthquake licensing basis in a clear and concise manner. The DDE earthquake is clearly defined in UFSAR section 3.7.1.1. "The DDE is the hypothetical earthquake that would produce accelerations twice those of the DE." This enhancement is an editorial clarification to improve reader understanding per NEI 98-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No
15	2.5.2.9	N/A	N/A	2.5.3.9.3	Added sub-section to discuss the Hosgri Earthquake as it pertains to Design and Licensing Basis Earthquakes.	N/A	SSER 04	N/A	N/A	N/A	LBVP Enhancement to clearly define the Hosgri Earthquake as one of the DCPP design and licensing basis earthquakes.	Refer to Regulatory Guide 1.70, Rev 1 Impact Review for Applicability Determination Matrix Item #8	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. The subsections included define the DCPP HE earthquake licensing basis in a clear and concise manner. The HE is clearly defined in UFSAR section 3.7.1.1. "PG&E was requested by the NRC to evaluate the plant's capability to withstand a postulated Richter magnitude 7.5 earthquake centered along an offshore zone of geologic faulting, generally referred to as the Hosgri Fault. This evaluation is discussed in the various chapters when it is specifically referred to as the Hosgri evaluation or Hosgri event evaluation. Acceleration response spectra curves for horizontal and vertical free field ground motion at the plant site from the HE are the Newmark and Blume spectra described in Section 2.5" This enhancement is an editorial clarification to improve reader understanding per NEI 98-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No
16	2.5.2.9	N/A	N/A	2.5.3.9.3	Added text "In 1978, subsequent to the issuance of the construction permit at Unit 1," to sub-section.	N/A	SSER 4	N/A	N/A	N/A	LBVP Enhancement to define the sequence of the activities described.	This is an editorial change to improve reader clarity. This enhancement does not add or change either the functional or licensing basis requirements. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. As summarized in DCL-78-518, Meeting Summary of 4-26-78 ISE Seismic Design Reorientation, the NRC requested, and PG&E agreed to a seismic reevaluation of the plant's capability to withstand a magnitude 7.5 earthquake on the Hosgri Fault. This came approximately 8 years after the issuance of construction permit CPR-39 on April 23, 1968, as referenced in DCL 780706, Construction Permit Extension. DCL 780518 stated "We informed the applicant that we had not yet received a final U. S. Geological Survey (USGS) report, so the magnitude of the earthquake to be postulated on the Hosgri fault was not yet fixed. Nevertheless, based on the USGS draft reports, we had been "Working to determine what procedures and criteria could be used for evaluating the plant's capability for withstanding a magnitude 7.5 earthquake on the Hosgri fault. The criteria and procedures that we believed could be justified had been developed in outline (general) form. We had requested the meeting to provide these Criteria and procedures to PG&E and to request that they begin such an evaluation. ... PG&E representatives stated that, although they did not agree that the earthquake magnitude should be 7.5, they would proceed with the analyses as quickly as possible." These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text. therefore, a 10 CFR 50.59 Screen is not required.	No
17	2.5.2.9	N/A	N/A	2.5.3.9.3	Added text "approximately 3 miles offshore," to sub-section.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the proximity of the Hosgri Fault to the DCPP site.	This is an editorial change to improve reader clarity. This enhancement does not add or change either the functional or licensing basis requirements. All material included in this change was already licensing basis. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	This enhancement is information derived from the Hosgri Report. This material clarifies the proximity of the Hosgri Fault to the DCPP site The Hosgri Report, Section 3.2, states "These studies, as cited above, support the Company's view that: (1) the Hosgri fault zone passes within about 3 miles of the site, (2) that its overall length is approximately 90 miles and (3) that two-thirds, or 60 miles, represents relatively continuous faulting." These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No
18	2.5.2.9	N/A	N/A	2.5.3.9.3	Added text "Note that the Shoreline Fault Zone (refer to Section 2.5.7.1) is considered to be a lesser included case under the Hosgri evaluation."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the Shoreline Fault Zone as a lesser included case of the Hosgri evaluation.	This is a clarification to improve reader clarity. The earthquake licensing basis at DCPP is unique and does not conform to the OBE/SSE configuration specified in Regulatory Guide 1.70. Rev 1 as DCPP received its initial license before the publishing of Appendix A. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	Refer to Applicability Determination Matrix Item # 30 In RA 12-01 "confirmatory Analyses of Seismic Hazard at the Diablo Canyon Power Plant from the Shoreline Fault Zone" the NRC states "The results indicate that the 84th-percentile deterministic seismic-loading levels predicted for all the Shoreline fault earthquake scenarios developed and analyzed by the NRC are at or below those levels for the HE ground motion and the LTSP ground motion. The HE ground motion and the LTSP ground motion are those for which the plant was evaluated previously and demonstrated to have reasonable assurance of safety." These enhancements are derived from correspondence with the NRC, NRC Regulatory documentation and specific UFSAR text, Therefore, a 10 CFR 50.59 screen is not required.	No

UFSAR Section 8.1- Introduction Applicability Determination Matrix [1]

Item #	Affected Living UFSAR Section [2]			LBVP Enhanced UFSAR Section	Brief Change Description	UFSAR Rev.	Associated Licensing Documentation				Comment	Regulatory Guide 1.70, Rev 1 Impact Review	50.59 Applicability Discussion	10 CFR 50.59 Screen Required (Yes/No)
	Section(s)	Table(s)	Figure(s)				SER / SSER	LA	LAR	LBIE				
19	2.5.2.9	N/A	N/A	2.5.3.9.3	Edited text " extensive additional studies of on- and offshore geology of the last few years that are reported in Appendix 2.5D of Reference 27 of Section 2.3." to read "extensive additional studies of on- and offshore geology and is reported in Appendix 2.5D of Reference 27 of Section 2.3."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to update the tense of a statement to avoid misleading the reader.	This is an editorial change to improve reader clarity. This enhancement does not add or change either the functional or licensing basis requirements. All material included in this change was already licensing basis. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	This enhancement is intended to clarify the historical nature of the additional studies that were performed. As the UFSAR is currently written the reader is led to believe that the studies have been performed in the past few years. Appendix 2.5D is a Report from October of 1974 By Earth Sciences Associates titled "Geology of the Southern Coast Ranges and the Adjoining Offshore Continental Margin of California, With Special Reference to the Geology in the Vicinity of The San Luis Range and Estero Bay." Appendix 2.5E presents "Additional Geologic and Seismologic Studies - 1975" and answers NRC questions. Appendix 2.5F presents "Additional Geologic and Seismologic Studies - 1976" and answers more NRC questions. This enhancement clarifies the historical nature of the "extensive additional studies." This enhancement is derived from correspondence with the NRC, NRC Regulatory Documentation, and specific UFSAR text. Therefore, a 10 CFR 50.59 screen is not required.	No
20	2.5.2.9	N/A	N/A	2.5.3.9.4	Added new sub-section text describing LTSP License Condition 2.C.(7) As it pertains to Design and Licensing Basis Earthquakes.	N/A	SSER 34	N/A	N/A	N/A	LBVP Enhancement to provide information about the LTSP license condition, evaluation, and its acceptance by the NRC in SSER 34.	Refer to Regulatory Guide 1.70, Rev 1 Impact Review for Applicability Determination Matrix item #8	The LTSP was instituted as a result of License Condition 2.C.(7) implemented as a part of the initial operating license. PG&E presented the evaluations used to satisfy this license condition in the 1988 LTSP Final Report. An addendum to this report to answer an RAI from the NRC was issued in 1991. The NRC's review and acceptance of these analyses are documented in SSER 34 and DCL 970417, Transmittal of Safety Evaluation Closing Out Diablo Canyon Long-Term Seismic Program. SSER 34 states "As a result of its review, conducted with the assistance of a number of expert consultants, the NRC staff has concluded that, subject to satisfactory analytical substantiation of the confirmatory item discussed below, PG&E has met all aspects of License Condition 2.C.(7) of Facility Operating License DPR-80." DCL 970417 states " By letters dated December 26, 1991, and April 3, 1992, PG&E submitted the requested confirmatory analyses. Based on these analyses PG&E concluded that the structures and equipment that are affected by the increased ground motion have adequate seismic margins, and that the overall plant margin is not significantly affected. The staff has reviewed these submittals and concurs with PG&E's conclusions. On this basis the staff finds that the confirmatory item from SSER 34 has been satisfactorily resolved. The staff safety evaluation is given in Enclosure 1. This completes the staff effort on the Diablo Canyon Long-Term Seismic Program and closes TAC Nos. M80670 and M80671." These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No
21	2.5.2.10	N/A	N/A	2.5.3.10.1	Added sub-section to discuss the Design Earthquake as it pertains to Ground Accelerations and Response Spectra.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the Design Earthquake as one of the DCPP design and licensing basis earthquakes.	Refer to Regulatory Guide 1.70, Rev 1 Impact Review for Applicability Determination Matrix item #8	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. The subsections included define the DCPP earthquake licensing basis in a clear and concise manner. The DE earthquake is clearly defined in UFSAR section 3.7.1.1, "For design purposes, the response spectra for each damping value from Earthquake B and Earthquake D modified are combined to produce an envelope spectrum. The acceleration value for any period on the envelope spectrum is equal to the larger of the two values from the Earthquake D spectrum and the Earthquake D modified spectrum. Vertical free field ground accelerations, and the vertical free-field ground motion response spectra are assumed to be two-thirds of the corresponding horizontal spectra. The DE is the hypothetical earthquake that would produce these horizontal and vertical vibratory accelerations." This enhancement is an editorial clarification to improve reader understanding per NEI 96-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No
22	2.5.2.10	N/A	N/A	2.5.3.10.2	Added sub-section to discuss the Double Design Earthquake as it pertains to Ground Accelerations and Response Spectra.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the Double Design Earthquake as one of the DCPP design and licensing basis earthquakes.	Refer to Regulatory Guide 1.70, Rev 1 Impact Review for Applicability Determination Matrix item #8	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. The subsections included define the DCPP earthquake licensing basis in a clear and concise manner. The DDE earthquake is clearly defined in UFSAR section 3.7.1.1. "The DDE is the hypothetical earthquake that would produce accelerations twice those of the DE." This enhancement is an editorial clarification to improve reader understanding per NEI 96-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No
23	2.5.2.10	N/A	N/A	2.5.3.10.3	Added sub-section to discuss the 1997 Hosgri Earthquake as it pertains to Ground Accelerations and Response Spectra.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the Hosgri Earthquake as one of the DCPP design and licensing basis earthquakes.	Refer to Regulatory Guide 1.70, Rev 1 Impact Review for Applicability Determination Matrix item #8	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. The subsections included define the DCPP HE earthquake licensing basis in a clear and concise manner. The HE is clearly defined in UFSAR section 3.7.1.1, "PG&E was requested by the NRC to evaluate the plant's capability to withstand a postulated Richter magnitude 7.5 earthquake centered along an offshore zone of geologic faulting, generally referred to as the Hosgri Fault. This evaluation is discussed in the various chapters when it is specifically referred to as the Hosgri evaluation or Hosgri event evaluation. Acceleration response spectra curves for horizontal and vertical free field ground motion at the plant site from the HE are the Newmark and Blume spectra described in Section 2.5" This enhancement is an editorial clarification to improve reader understanding per NEI 96-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No
24	2.5.2.10	N/A	N/A	2.5.3.10.3	Added text "Those response spectra, finalized in 1977 are described as the "1977 hosgri response spectra."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define a title for the response spectra produced in this evaluation.	This is an editorial change to improve reader clarity. This enhancement does not add or change either the functional or licensing basis requirements. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. This enhancement provides a clear naming scheme for the response spectra in question. This is to avoid confusion with terminology from the LTSP which took place at a later date. This enhancement is an editorial clarification to improve reader understanding per NEI 96-07, Rev 1, Section 4.1.3 and does not add or change either the functional or licensing basis requirements. Therefore, a 10 CFR 50.59 Screen is not required.	No

UFSAR Section 8.1- Introduction Applicability Determination Matrix [1]

Item #	Affected Living UFSAR Section [2]			LBVP Enhanced UFSAR Section	Brief Change Description	UFSAR Rev.	Associated Licensing Documentation				Comment	Regulatory Guide 1.70, Rev 1 Impact Review	50.59 Applicability Discussion	10 CFR 50.59 Screen Required (Yes/No)
	Section(s)	Table(s)	Figure(s)				SER / SSER	LA	LAR	LBIE				
25	2.5.2.10	N/A	N/A	2.5.3.10.4	Added new sub-section text describing LTSP License Condition 2.C.(7) as it pertains to Ground Accelerations and Response Spectra.	N/A	SSER 34	N/A	N/A	N/A	LBVP Enhancement to provide information about the LTSP license condition, evaluation, and its acceptance by the NRC in SSER 34	Refer to Regulatory Guide 1.70, Rev 1 Impact Review for Applicability Determination Matrix Item #8	The LTSP was instituted as a result of License Condition 2.C.(7) implemented as a part of the initial operating license. PG&E presented the evaluations used in satisfy this license condition in the 1988 LTSP Final Report. An addendum to this report to answer an RAI from the NRC was issued in 1991. The NRC's review and acceptance of these analyses are documented in SSER 34 and DCL 920417, Transmittal of Safety Evaluation Closing Out Diablo Canyon Long-Term Seismic Program. SSER 34 states "As a result of its review, conducted with the assistance of a number of expert consultants, the NRC staff has concluded that, subject to satisfactory analytical substantiation of the confirmatory item discussed below, PG&E has met all aspects of License Condition 2.C.(7) of Facility Operating License DPR-80." DCL 920417 states " By letters dated December 26, 1991, and April 3, 1992, PG&E submitted the requested confirmatory analyses. Based on these analyses PG&E concluded that the structures and equipment that are affected by the increased ground motion have adequate seismic margins, and that the overall plant margin is not significantly affected. The staff has reviewed these submittals and concurs with PG&E's conclusions. On this basis the staff finds that the confirmatory item from SSER 34 has been satisfactorily resolved. The staff safety evaluation is given in Enclosure 1. This completes the staff effort on the Diablo Canyon Long-Term Seismic Program and closes TAC Nos. M80670 and M80671." These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No
26	2.5.3.4	N/A	N/A	2.5.4.4	Added text "The earthquakes discussions are limited to those identified during the original design phase and do not include any earthquakes recorded since 1971."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the time frame of the discussion presented.	Regulatory Guide 1.70, Rev 1 requires the presentation of all historically reported earthquakes. This enhancement does not alter this presentation, it only provides clear guidance as to the time frame discussed.	This enhancement is based on Table 2.5-1 Listing of Earthquakes within 75 Miles of the Diablo Canyon Power Plant Site Selected Earthquakes. This table provides a history of earthquakes in the region of DCPP up until November 30, 1971. This is material that was used for site selection criteria during the original design phase of the plant. These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No
27	2.5.5.1	N/A	N/A	2.5.6.1	Added text ", as a result of an earthquake on the Hosgri fault zone," to the discussion of slope stability.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define that the slope stability analyses qualifies the slope for the ME.	Regulatory Guide 1.70, Rev 1 requires that licensees provide information "...concerning the stability of all slopes, both natural and manmade..." This enhancement incorporates the requirements of Regulatory Guide 1.70, Rev 1 and therefore does not impact DCPP's commitment to this Regulatory Guide.	This is a clarification to improve reader understanding of the slope stability qualifications of the DCPP site. This enhancement is based on information presented in the report, "Assessment of Slope Stability Near the Diablo Canyon Power Plant", April 1997, which is an enclosure to DCL-97-079, Response to Request for Additional Information Regarding the Landslide Potential at Diablo Canyon Power Plant. This report details the results of both PG&E and NRC evaluations of slope stability "assuming a peak horizontal earthquake acceleration of 0.75 g (the Hosgri event)." DCL 97-097 states "The investigations included aerial and field reconnaissance, documentation reviews, detailed mapping, and slope stability analyses. The results of the investigations showed that earthquake loading following periods of prolonged precipitation will not produce any significant slope failure that can impact Design Class I structures and equipment at the site. In addition, potential slope failures under such conditions will not adversely impact other important facilities, including the raw water reservoirs, the 230-kV and 500-kV switchyards, and the intake and discharge structures. Potential landslides may temporarily block the access road at several locations. However, should blockage occur, there is considerable room adjacent to and north of the road to provide emergency traffic." In DCL 98-103, SAFETY EVALUATION OF THE ASSESSMENT OF SLOPE STABILITY NEAR DIABLO CANYON POWER PLANT, the NRC states "The NRC has reviewed Pacific Gas and Electric Company's (PG&E) letter dated April 28, 1997, that responded to the staff's request for information about the landslide potential at Diablo Canyon Power Plant (DCPP). The information request was made after PG&E declared an Unusual Event due to a mud slide on the county road leading to the plant entrance at DCPP. Based on its detailed investigations related to the landslide potential at Diablo Canyon Power Plant, PG&E has concluded, and the staff agrees, that earthquake loading following periods of prolonged rainfall will not produce any significant slope failure that can adversely affect the Category I structures including the intake and discharge structures at the site; ... Therefore, the staff concurs with PG&E's conclusions described above. Our evaluation of PG&E's assessment of the slope stability problem at DCPP site is enclosed." These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No
28	N/A	N/A	N/A	2.5.7	Added text describing the commitments made as condition to the NRC's acceptance of the LTSP in 1991.	N/A	SSER 34	N/A	N/A	N/A	LBVP Enhancement to clearly define the commitments that were made as a condition of the NRC's approval	This enhancement provides clarification about the LTSP, which is unique to the DCPP earthquake licensing bases, and therefore does not affect its commitment to Regulatory Guide 1.70, Rev 1.	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. These enhancements are based on commitments made by PG&E at a public meeting on March 15, 1991 and reiterated in DCL 91-091. "The Central Coast Seismic Network will continue to monitor microearthquake activity in the region, and will assist us in accurately locating and characterizing relevant earthquakes. The strong motion array will continue to operate to help us assess site response to ground motions," and "The Long Term Seismic Program will allow PG&E to anticipate and respond in a timely manner to new issues and concerns as they arise. For example, through the expertise available in the Long Term Seismic Program, we were able to test and verify the results of the Program's ground motion evaluation by using the new data from the October 17, 1989, Loma Prieta earthquake, a well recorded event. This ability provided increased confidence that new earthquakes are not likely to produce surprising or conflicting data. The Long Term Seismic Program will continue to provide a focus for addressing seismic issues related to Diablo Canyon." The NRC confirmed these commitments in SSER 34 in June of 1991: "PG&E made the following commitments at the public meeting on March 15, 1991, and in a letter (now PG&E to the NRC (Shiffer, 19910: (1) to continue to maintain a strong geosciences and engineering staff to keep abreast of new geological, seismic, and seismic engineering information and evaluate it with respect to its significance to Diablo Canyon, and (2) to continue to operate a strong-motion accelerometer array and the coastal seismic network, although likely with fewer stations than are currently operating." These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required. SAPN 50552587 discusses the need for the development of an implementing procedure to define the LTSP Commitments and Process. These enhancements provide an overview of the commitments but a procedure is necessary to define the scope, responsibilities and interfaces.	No
29	N/A	N/A	N/A	2.5.7	Deleted text ", and thus is not included in the FSAR Update."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to remove unnecessary reference to FSAR Update.	This is an editorial change to improve reader clarity. This enhancement does not add or change either the functional or licensing basis requirements. Therefore, this change does not impact Regulatory Guide 1.70, Rev 1.	The LTSP does not affect the design basis for the plant. However, it is licensing basis and discussion of LTSP was included in the FSAR in Revision 11. This is an editorial change to remove an outdated statement from the UFSAR. Per NEI 96-07, Revision 1, Section 4.1.3, "...modifications to the UFSAR that are not the result of activities performed under 10 CFR 50.59 are not subject to control over 10 CFR 50.59. Such modifications include reformatting and simplification of UFSAR information and removal of obsolete or redundant information and excessive detail." This item is being made obsolete by the incorporation of additional LTSP material. Therefore a 10 CFR 50.59 screen is not required.	No

UFSAR Section 8.1- Introduction Applicability Determination Matrix [1]

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	Section(s)	Table(s)	Figure(s)				SER / SSER	LA	LAR	LBIE				
30	N/A	N/A	N/A	2.5.1.1	New sub-section to describe the discovery and analyses of the Shoreline Fault Zone.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to clearly define the discovery and analyses of the shoreline fault zone by PG&E and the confirmation and approval of said analyses by the NRC.	This enhancement provides clarification about material that is unique to the DCPP earthquake licensing basis and therefore does not affect its commitment to Regulatory Guide 1.70, Rev 1.	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. The information presented resulted from the ongoing investigations performed as part of the commitments made for the LTSP. PG&E developed the "Report on the Analyses of the Shoreline Fault Zone, Central Coastal California" to present the results of its extensive analyses. This report is the basis for these enhancements. It describes the geography of the fault. "In November 2008, Pacific Gas and Electric (PG&E) informed the US Nuclear Regulatory Commission (NRC) that preliminary results from the Diablo Canyon Power Plant (DCPP) Long Term Seismic Program (LTSP) Update showed that there was an alignment of microseismicity subparallel to the coastline indicating the possible presence of a previously unidentified fault located about 1 km offshore of DCPP. This previously undescribed fault was named the 'Shoreline fault zone.' The NRC performed an independent assessment in P.N. 12-01 and concluded that the Shoreline scenario should be considered as a lesser included case under the Hosgri evaluation. "In this review of the hazard from the Shoreline fault, the NRC compared the resulting deterministic seismic ground motions to loading levels for which the plant has been previously reviewed, specifically the Hosgri Earthquake (HE) ground motion response spectrum as described in NUREG-0675, "Safety Evaluation Report Related to the Operation of Diablo Canyon Power Plant, Units 1 and 2," Supplement No. 7 (NRC, 1978), and the LTSP ground motion response spectrum as detailed in NUREG-0675, Supplement No. 34 (NRC, 1991). The results indicate that the 84th-percentile deterministic seismic-loading levels predicted for all the Shoreline fault earthquake scenarios developed and analyzed by the NRC are at or below those levels for the HE ground motion and the LTSP ground motion. The HE ground motion and the LTSP ground motion are those for which the plant was evaluated previously and demonstrated to have reasonable assurance of safety." These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text; therefore, a 10 CFR 50.59 Screen is not required.	No
31	N/A	N/A	N/A	2.5.1.2	New sub-section to describe the process for Evaluation of Updated Estimates of Ground Motion based on NRC guidance.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to describe PG&E's agreement to use an NRC defined process for the evaluation of future updates to geological/seismological information.	This enhancement provides clarification about material that is unique to the DCPP earthquake licensing basis and therefore does not affect its commitment to Regulatory Guide 1.70, Rev 1.	This is a clarification to improve reader understanding of the DCPP earthquake licensing basis. Three enhancements are based upon commitments made by PG&E in DCL-12-106. These commitments were made in response to DCL-121012 which states "Therefore, for purposes of the response to the March 12, 2012, request for information, the NRC staff expects PG&E to use the DDE for comparison with the reevaluated seismic hazard GMRS." The referenced March 12, 2012 letter is DCL 120312, RFI - Recommendations 2.1, 2.3, and 9.3. This letter states "The Nuclear Regulatory Commission shall require reactor licensees to re-evaluate the seismic, tsunami, flooding, and other external hazards at their sites against current applicable Commission requirements and guidance for such licensees, as expeditiously as possible, and thereafter when appropriate, as determined by the Commission, and require each licensee to respond to the Commission that the design basis for each reactor meets the requirements of its license, current applicable Commission requirements and guidance for such license. Based upon the evaluations conducted pursuant to this section and other information it deems relevant, the Commission shall require licensees to update the design basis for each reactor, if necessary." These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text; therefore, a 10 CFR 50.59 Screen is not required.	No
32	N/A	N/A	N/A	2.5.8.1	Added Safety Evaluation Section and Discussion for "General Design Criterion 2. 1967 Performance Standards."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to justify licensee basis criteria.	Regulatory Guide 1.70, Rev 1 requires that licensees "Provide analysis to demonstrate compliance with the AEC General Design Criteria." This enhancement incorporates the requirements of Regulatory Guide 1.70, Rev 1 and therefore does not impact DCPP's commitment to the Regulatory Guide.	Enhanced UFSAR Sections 2.5.3.9 and 2.5.3.10 provide discussions on the maximum earthquake and the associated design basis site free field accelerations and response spectra, respectively, for the design of the PG&E Structures, Systems, and Components (SSCs). These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text; therefore, a 10 CFR 50.59 Screen is not required.	No
33	N/A	N/A	N/A	2.5.8.2	Added Safety Evaluation Section and Discussion for "License Condition 2.C.(7) of DCPP Facility Operating License DPR-80 Rev 44 (LTSP), Elements (1), (2), and (3)."	N/A	SSER 34	N/A	N/A	N/A	LBVP Enhancement to justify licensee basis criteria.	Regulatory Guide 1.70, Rev 1 does not address the requirements of License Condition 2.C.(7) of DCPP Facility Operating License DPR-80 Rev 44 (LTSP), Elements (1), (2), and (3).	Enhanced UFSAR Section 2.5.3.9.4 discusses the commitments made as a part of the License Condition. DCPP developed and implemented a program to re-evaluate the seismic design bases used for the Diablo Canyon Nuclear Power Plant. This program included (1) the identification, examination, and evaluation of all relevant geologic and seismic data, information, and interpretations that have become available since the 1978 ASLB hearing in order to update the geology, seismology and tectonics in the region of the Diablo Canyon Nuclear Power Plant, (2) a re-evaluation of the magnitude of the earthquakes used to determine the seismic basis of the Diablo Canyon Power Plant using the information from element 1, and (3) a re-evaluation of the ground motion at the site based on the results of element 2 with full consideration of site and other relevant effects. NRC SSER 34 discusses and approves the DCPP Long Term Seismic Program. SSER 34 states "As a result of its review, conducted with the assistance of a number of expert consultants, the NRC staff has concluded that, subject to satisfactory analytical substantiation of the confirmatory item discussed below, PG&E has met all aspects of License Condition 2.C.(7) of Facility Operating License DPR-80." DCL 920417 states " By letters dated December 26, 1991, and April 3, 1992, PG&E submitted the requested confirmatory analyses. Based on these analyses PG&E concluded that the structures and equipment that are affected by the increased ground motion have adequate seismic margins, and that the overall plant margin is not significantly affected. The staff has reviewed these submittals and concurs with PG&E's conclusions. On this basis the staff finds that the confirmatory item from SSER 34 has been satisfactorily resolved. The staff safety evaluation is given in Enclosure 1. This completes the staff effort on the Diablo Canyon Long-Term Seismic Program and closes TAC Nos. M80678 and M80671." These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text; therefore, a 10 CFR 50.59 Screen is not required.	No
34	N/A	N/A	N/A	2.5.8.3	Added Safety Evaluation Section and Discussion for "10 CFR Part 100, March 1969 - Reactor Site Criteria."	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to justify license basis criteria.	Regulatory Guide 1.70, Rev 1 requires that licensees "Provide information regarding the seismic and geologic characteristics of the site and the region surrounding the site." This enhancement incorporates the requirements of Regulatory Guide 1.70, Rev 1 and therefore does not impact DCPP's commitment to this Regulatory Guide.	The proposed activity incorporates the evaluation of the physical characteristics of the site, including the geology and seismology. This section is added based upon the Licensing Basis Requirement of 10 CFR 100, March 1969 - Reactor Site Criteria. 10 CFR 100, March 1969 - Reactor Site Criteria is the basis to which UFSAR Section 2.5 designed to. It is a part of the Code of Federal Regulations which are "...binding on all persons and organizations who receive a license from the NRC to use nuclear materials or operate nuclear facilities." The SER states "Structures, systems and components important to safety that are required to be designed to withstand the effects of a safe shutdown earthquake (SSE) and remain functional have been properly classified as Seismic Category I (Applicant's Design Class I) items. These plant features are those necessary to assure (1) the integrity of the reactor coolant pressure boundary (RCPB), (2) the capability to shutdown the reactor and maintain it in a safe shutdown condition, or (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of 10 CFR Part 100." Sections 2.5.2 - 2.5.6 validate this aspect of the licensing basis regarding the seismology and geology of the site. These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text; therefore, a 10 CFR 50.59 Screen is not required.	No

UFSAR Section 8.1- Introduction Applicability Determination Matrix [1]

Item #	Affected Living UFSAR Section [2]			LBVP Enhanced UFSAR Section	Brief Change Description	UFSAR Rev.	Associated Licensing Documentation				Comment	Regulatory Guide 1.70, Rev 1 Impact Review	50.59 Applicability Discussion	10 CFR 50.59 Screen Required (Yes/No)
	Section(s)	Table(s)	Figure(s)				SER / SSER	LA	LAR	LBE				
35	N/A	N/A	N/A	2.5.9	Added references 50-57.	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to add references 50-58 in support of enhancements to the body of section 2.5.	N/A	Reference 50 was added in support of Enhanced UFSAR Section 2.5.7, refer to AD Matrix Item #28 Reference 51 was added in support of Enhanced UFSAR Section 2.5.3.9.2, refer to AD Matrix Item #34 Reference 52 was added in support of Enhanced UFSAR Section 2.5.7.1, refer to AD Matrix Item #30 Reference 53 was added in support of Enhanced UFSAR Section 2.5.7, refer to AD Matrix Item #28 Reference 54 was added in support of Enhanced UFSAR Section 2.5.7.1, refer to AD Matrix Item #30 Reference 55 was added in support of Enhanced UFSAR Section 2.5.7.1, refer to AD Matrix Item #32 Reference 56 was added in support of Enhanced UFSAR Section 2.5.7.2, refer to AD Matrix Item #31 Reference 57 was added in support of Enhanced UFSAR Section 2.5.7.2, refer to AD Matrix Item #31 These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No
36	N/A	N/A	2.5-33	N/A	Added Figure 2.5-33 Free Field Spectra Horizontal 1991 LTSP as Modified per SSER 34	N/A	SSER 34	N/A	N/A	N/A	LBVP Enhancement to add a figure in support of enhancements to the body of section 2.5.3.10.4.	N/A	This figure is based on Figure 2.4 SSER 34. Calculation 72.2.7 details the alteration from being a frequency based plot to a period based plot. This figure is used as support for material added in AD Matrix Item # 24. These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No
37	N/A	N/A	2.5-34	N/A	Added Figure 2.5-34 Free Field Spectra Vertical 1991 LTSP as Modified per SSER 34	N/A	SSER 34	N/A	N/A	N/A	LBVP Enhancement to add a figure in support of enhancements to the body of section 2.5.3.10.4.	N/A	This figure is based on Figure 2.5 SSER 34. Calculation 72.2.7 details the alteration from being a frequency based plot to a period based plot. This figure is used as support for material added in AD Matrix Item # 24. These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No
38	N/A	N/A	2.5-35	N/A	Added Figure 2.5-35 Free Field Spectra - Horizontal LTSP (PG&E 1988) Ground Motion vs. Hosgri (Hosgri/K 1977)	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to add a figure in support of enhancements to the body of section 2.5.3.10.4.	N/A	This figure is based on Figure 7-2 of the Final Report of the Diablo Canyon Long Term Seismic Program, July 1988, adjusted as stated in SSER 34. This figure is used as support for material added in AD Matrix Item # 24. These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No
39	N/A	N/A	2.5-36	N/A	Added Figure 2.5-36 Map of Shoreline Fault Study Area	N/A	N/A	N/A	N/A	N/A	LBVP Enhancement to add a figure in support of enhancements to the body of section 2.5.7.1.	N/A	This figure is based on Figure 1-1 of the Report on the Analysis of the Shoreline Fault Zone - Central Coastal California, January 2011. This figure is used as support for material added in AD Matrix Item #79. These enhancements are derived from correspondence with the NRC, NRC regulatory documentation, and specific UFSAR text, therefore, a 10 CFR 50.59 Screen is not required.	No

1) The Applicability Determination Matrix does NOT discuss all changes associated with this UFSAR change request. Changes associated with clarification and to remove excessive detail or repetitive information are considered under Item 2J of the Applicability Determination and are identified in the attached annotated markup. Changes that require further discussion or justification are included in this matrix. Note that specific changes addressed in this matrix are identified in the attached annotated markup and are identified with the statement "Refer to Applicability Determination Matrix."

2) UFSAR Section, Table, and Figure numbers listed are the current Living UFSAR Section, Table, and Figure numbers; the Enhanced UFSAR Section numbering may have changed.

UFSAR Change Request

1. UFSAR AFFECTED CONTENT:

Living UFSAR to be Changed (check only one): ☒ Living DCPP UFSAR or ☐ Living DC ISFSI UFSAR	
Section(s): 2.5 (Seismology and Geology)	
Table(s): N/A	Figure(s): 2.5-33, 2.5-34, 2.5-35, 2.5-36

2. DESCRIPTION OF CHANGE:

Summary description of the proposed change (use additional pages if required):

UFSAR Section 2.5 (Seismology and Geology) is revised to reflect the results of the Licensing Basis Verification Project review of the Seismology and Geology section and proposed enhancements. The proposed change is being processed against UFSAR Revision 20.

3. UFSAR REVISED CONTENT MARKUPS:

Mark up a copy of all the affected pages in the Living UFSAR to clearly show the proposed changes, additions, and deletions to text, tables, figures, and appendices. The track changes feature in MS Word is preferred for all changes to text. Enter the number of pages included in the attached markup:

No. of marked up pages attached: 94

4. JUSTIFICATION/BASIS for the CHANGE:

Check all that apply and enter document number where applicable: _____

☒ Attached Applicability Determination (AD)	☐ License Amendment No.: _____
☐ Attached LBIE Screen	☐ Required by Regulation: _____
☐ LBIE No. _____	☐ Minor Editorial Correction - See Instructions
☐ DCP No. _____	☒ Other (describe): Annotated Markup
☐ SAP Notification: _____	

5. AFFECT ON OTHER DOCUMENTS

Does the UFSAR change require a change any of the following? If so, process per the applicable procedure.			
Design Criteria Memorandum	☐ Yes ☒ No	DCM No.:	SAPN No:
Procedures	☐ Yes ☒ No	Proc No.:	SAPN No:
Technical Specification Bases	☐ Yes ☒ No	TS Bases No.:	SAPN No:

FOR LICENSING USE:

CR No:	V-2.5 (4)
Tracking SAPN:	50567477

Signatures are on the next page.

6. INITIATOR

Print Last Name	Signature	LAN ID	Date
Angelucci	Paul Angelucci	PJA9	6/4/13

7. REVIEWER

Print Last Name	Signature	LAN ID	Date
Tyman		JPTH	6/4/13

8. TECHNICAL APPROVAL

Print Last Name	Signature	LAN ID	Date
SHARP		MAS2	6/4/13

9. QV DIRECTOR APPROVAL

Signature is only required if the change affects Chapter 17 of the DCPP UFSAR, or Chapter 11 of the DC ISFSI UFSAR. Attach the Evaluation of QA Program Changes form.

Print Last Name	Signature	LAN ID	Date

10. LEAD ORGANIZATION SECTION OWNER

If the change affects more than one section owner, attach a separate copy of this sheet for each.

Print Last Name	Signature	LAN ID	Date
BAKER	Stephen Baker	SPB8	6/6/13

FOR LICENSING USE ONLY

11. UFSAR LICENSING ENGINEER APPROVAL

Print Last Name	Signature	LAN ID	Date
LOYD		JBL3	06/06/13

12. CHANGE INCORPORATED INTO LIVING UFSAR

Print Last Name	Signature	LAN ID	Date
LOYD		JBL3	06/06/13

13. CHANGE INCORPORATION VERIFIED

Print Last Name	Signature	LAN ID	Date

14. CLOSURE COMMENTS (OPTIONAL):

CR No:	V-2.5 (4)
Tracking SAPN:	50567477

INSTRUCTIONS for COMPLETING THE UFSAR CHANGE REQUEST
(Do Not Use for S/I Display Change Requests)

Initiator

Block 1 - Check which UFSAR is to be changed and identify the section(s), table(s), and figure(s). If both the DCPP UFSAR and DC ISFSI UFSAR are to be changed, use a separate change request form for each.

Block 2 - Provide a description of the proposed change.

Block 3 - Markup the affected pages from the Living UFSAR to clearly indicate the changes being made. Enter the total number of pages in the markup.

- The resulting level of detail should be consistent with or exceed the level of detail in the current UFSAR.
- Verify the format and content of the change comply with the guidance provided in Reg. Guide 1.70 Rev. 1 and NEI 98-03, Rev. 1 for the DCPP UFSAR and Reg. Guide 3.62 for the DC ISFSI UFSAR. Refer to Attachment 2 for additional guidance.
- Use the CLB Search Tool to confirm that all affected pages of the UFSAR are included in the markup.
- Changes to the LBVP enhanced sections must maintain the enhanced format. Electronic markups using MS Word track changes are preferred.

Block 4 - Check the applicable box(es) and enter information for the documents used to justify the proposed change.

- The documents cited in Block 4 must be approved before licensing will make the changes to the Living UFSAR.
- Any proposed changes to the UFSAR must include the accompanying LBIE Screen documents from the TS3.ID2 evaluation.
- As a minimum, the UFSAR Change Request must have an accompanying LBIE Applicability Determination (AD). The only time an AD is not required is if the changes are strictly minor editorial changes (e.g., corrections to spelling, grammar, page and table number, table of contents pages).

Block 5 - Determine if the UFSAR change will require a change to DCMs, procedures, or TS Bases. If so, check yes and enter the document number and tracking SAPN tracking the change request to DCMS, procedures, or TS Bases. Otherwise check no.

Block 6 - Print name, sign, enter your LAN ID, and date. Following this step:

- Obtain reviews from other disciplines if deemed necessary and have reviewer(s) sign Block 7.
- Obtain a technical approval from a knowledgeable supervisor or manager for Block 8.
- Obtain QV director's approval in Block 9 if change affects Chapter 17 of the DCPP UFSAR or Chapter 11 of the DC ISFSI UFSAR.
- Obtain the affected section owner's approval in Block 10. Attach additional copies if more than one section owner is affected. Section owners are identified in FileNet (NPG Library:/Licensing Bases - DCPP/"FSAR Update/Administrative Documents/Lead Organization Assignments).
- Submit the approved request and supporting documentation to licensing.

Reviewer(s)

Block 7 - Review the proposed UFSAR change using the source for the change (e.g., design change package, corrective action SAPN, license amendment, etc.) and the instructions provided in Section 5.5. Upon completion of the review, print name, sign, enter LAN ID, and date.

Technical Approval

Block 8 - A knowledgeable supervisor or manager reviews and approves the proposed change. Print name, sign, enter LAN ID, and date to approve the change.

- The individual signing as the technical approver and shall not be the change request initiator.

QV Director Approval

Block 9 - The QV director must approve any UFSAR changes that affect Chapter 17 of the DCPP UFSAR or Chapter 11 of the DC ISFSI UFSAR. Print name, sign, enter LAN ID, and date to approve the change.

- The QV director can also sign as the individual signing as the technical approver (Block 8), but cannot be the change request initiator.
- The "Evaluation of QA Program Changes" form AD1.NQ2 must be attached.

Lead Organization Section Owner Approval

Block 10 - The section owner reviews and approves the change request. Refer to Section 4.3 for responsibilities. The lead organizations and section owners for the DCPP UFSAR are found in FileNet at: NPG Library:/Licensing Bases - DCPP/"FSAR Update/Administrative Documents/Lead Organization Assignments.

FOR LICENSING USE ONLY

Licensing

Block11 - Review the change request. Assign a CR number from the CR log and initiate a tracking SAPN. Enter the CR number and SAPN number in the spaces provided. Print name, sign, enter LAN ID, and date to approve the change.

Block12 - Print name, sign, enter LAN ID, and date to indicate the change has been incorporated into the Living UFSAR the affected files have checked back into FileNet.

Block13 - The FileNet copy should be opened and checked to confirm the change has been properly incorporated. This verification of incorporation may be performed by anyone in licensing, the LBVP, or the ISFSI project as requested by the UFSAR licensing engineer.

Block14 - Record any closing information that may be warranted from a historical perspective or for future reference. Entry in this block is optional.

2.5 GEOLOGY AND SEISMOLOGY

This section presents the findings of the regional and site-specific geologic and seismologic investigations of the Diablo Canyon Power Plant (DCPP) site. Information presented is in compliance with the criteria in Appendix A of 10 CFR Part 100, as described below, and meets the format and content recommendations of Regulatory Guide 1.70, Revision 1 (Reference 39)~~(39)~~. Since the development of the seismic inputs for DCPP predates the issuance of 10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," the following DCPP earthquakes are plant specific.

Edited for Consistency

Added for Clarity

Edited for Consistency

Added for Clarity – Refer to Applicability Determination Matrix Item # 1

In order to capture the historical progress of the geotechnical and seismological investigations associated with the DCPP site, information pertaining to the following three time periods is described herein:

(1) Original Design Phase: investigations performed in support of the Preliminary Safety Analysis Report, prior to the issuance of the Unit 1 construction permit (1967), through the early stages of the construction of Unit 1 (1971). The Design Earthquake and Double Design Earthquake ground motions are associated with this phase. These earthquakes are similar to the regulatory ground motion level that the NRC subsequently developed in 10 CFR Part 100 Appendix A as the "Operating Basis Earthquake (OBE)" ground motion and the "Safe Shutdown Earthquake (SSE)" ground motion, respectively.

(2) Hosgri Evaluation Phase: investigations performed in response to the identification of the offshore Hosgri fault zone (1971) through the issuance of the Unit 1 operating license (1984). The 1977 Hosgri Earthquake ground motions are associated with this phase. The Hosgri Evaluation Phase does not affect or change the investigations and conclusions of the Original Design Phase.

(3) Long Term Seismic Program (LTSP) Evaluation Phase: investigations performed in response to the License Condition Item No. 2.C.(7) of the Unit 1 operating license (1984) through the removal of the License Condition (1991), including current on-going investigations. The 1991 LTSP ground motion is associated with this phase. The LTSP Evaluation Phase does not affect or change the investigations and conclusions of either the Original Design Phase or the Hosgri Evaluation Phase.

Added for Clarity – Refer to Applicability Determination Matrix Item # 2

Added for Clarity

Edited for Clarity

Overview

Locations of earthquake epicenters within 200 miles of the plant site, and faults and earthquake epicenters within 75 miles of the plant site for either magnitudes or intensities, respectively, are shown in Figures 2.5-2, 2.5-3, and 2.5-4 (through 1972). A geologic and tectonic map of the region surrounding the site is ~~given in two sheets of~~ shown in Figure 2.5-5, and detailed information about site geology is presented in

Added for Clarity – Refer to Applicability Determination Matrix Item # 3

Edited for Clarity

Figures 2.5-8 through 2.5-16. Geology and seismology are discussed in detail in Sections 2.5.24 through 2.5.54. Additional information on site geology is contained in References 1 and 2.

Edited for Clarity- Revised Section Number

Edited for Clarity- Revised Section Number

~~On November 2, 1984, the NRC issued the Diablo Canyon Unit 1 Facility Operating License DPR-80. In DPR-80, License Condition Item 2.C.(7), the NRC stated, in part:~~

~~"PG&E shall develop and implement a program to reevaluate the seismic design bases used for the Diablo Canyon Power Plant."~~

~~PG&E's reevaluation effort in response to the license condition was titled the "Long-Term Seismic Program" (LTSP). PG&E prepared and submitted to the NRC the "Final Report of the Diablo Canyon Long Term Seismic Program" in July 1988[40]. Between 1988 and 1991, the NRC performed an extensive review of the Final Report, and PG&E prepared and submitted written responses to formal NRC questions. In February 1991, PG&E issued the "Addendum to the 1988 Final Report of the Diablo Canyon Long Term Seismic Program"[41]. In June 1991, the NRC issued Supplement Number 34 to the Diablo Canyon Safety Evaluation Report (SSER)[42], in which the NRC concluded that PG&E had satisfied License Condition 2.C.(7) of Facility Operating License DPR-80. In the SSER the NRC requested certain confirmatory analyses from PG&E, and PG&E subsequently submitted the requested analyses. The NRC's final acceptance of the LTSP is documented in a letter to PG&E dated April 17, 1992[43].~~

~~The LTSP contains extensive data bases and analyses that update the basic geologic and seismic information in this section of the FSAR Update. However, the LTSP material does not address or alter the current design licensing basis for the plant, and thus is not included in the FSAR Update. A complete listing of bibliographic references to the LTSP reports and other documents may be found in References 40, 41 and 42.~~

Moved Text to Enhanced Section 2.5.7

Detailed supporting data pertaining to this section are presented in Appendices 2.5A, 2.5B, 2.5C, and 2.5D of Reference 27 in Section 2.3. Geologic and seismic information from investigations that responded to Nuclear Regulatory Commission (NRC) licensing review questions are presented Appendices 2.5E and 2.5F of the same reference. A brief synopsis of the information presented in Reference 27 (Section 2.3) is given below. The DCPP site is located in San Luis Obispo County approximately 190 miles south of San Francisco and 150 miles northwest of Los Angeles, California. It is adjacent to the Pacific Ocean, 12 miles west-southwest of the city of San Luis Obispo, the county seat. The plant site location and topography are shown in Figure 2.5-1.

The site is located near the mouth of Diablo Creek which flows out of the San Luis Range, the dominant feature to the northeast. The Pacific Ocean is southwest of the site. Facilities for the power plant are located on a marine terrace that is situated between the mountain range and the ocean.

The terrace is bedrock overlain by surficial deposits of marine and nonmarine origin. PG&E Design Class I~~Seismic Category I~~ structures at the site are situated on bedrock

Edited for Clarity – Refer to Applicability Determination Matrix Item # 5

that is predominantly stratified marine sedimentary rocks and volcanics, all of Miocene age. A more extensive discussion of the regional geology is presented in Section 2.5.24.1 and site geology in Section 2.5.24.2.

Edited for Clarity - Revised Section Number

Edited for Clarity- Revised Section Number

Several investigations were performed at the site and in the vicinity of the site to determine: potential vibratory ground motion characteristics, existence of surface faulting, and stability of subsurface materials and cut slopes adjacent to Seismic Category I structures. Details of these investigations are presented in Sections 2.5.2 through 2.5.5. Consultants retained to perform these studies included: Earth Science Associates (geology and seismicity), John A. Blume and Associates (seismic design and foundation materials dynamic response), Harding-Lawson and Associates (stability of cut slope), Woodward-Clyde-Sherard and Associates (soil testing), and Geo-Recon, Incorporated (rock seismic velocity determinations). The findings of these consultants are summarized in this section and the detailed reports are included in Appendices 2.5A, 2.5B, 2.5C, 2.5D, 2.5E, and 2.5F of Reference 27 in Section 2.3.

Geologic investigation of the Diablo Canyon coastal area, including detailed mapping of all natural exposures and exploratory trenches, yielded the following basic conclusions:

(1) The area is underlain by sedimentary and volcanic bedrock units of Miocene age. Within this area, the power plant site is underlain almost wholly by sedimentary strata of the Monterey Formation, which dip northward at moderate to very steep angles. More specifically, the reactor site is underlain by thick-bedded to almost massive Monterey sandstone that is well indurated and firm. Where exposed on the nearby hillslope, this rock is markedly resistant to erosion.

(2) The bedrock beneath the main terrace area, within which the power plant site has been located, is covered by 3 to 35 feet of surficial deposits. These include marine sediments of Pleistocene age and nonmarine sediments of Pleistocene and Holocene age. In general, they are thickest in the vicinity of the reactor site.

(3) The interface between the unconsolidated terrace deposits and the underlying bedrock comprises flat to moderately irregular surfaces of Pleistocene marine planation and intervening steeper slopes that also represent erosion in Pleistocene time.

(4) The bedrock beneath the power plant site occupies the southerly flank of a major syncline that trends west to northwest. No evidence of a major fault has been recognized within or near the coastal area, and bedrock relationships in the exploratory trenches positively indicate that no such fault is present within the area of the power plant site.

(5) Minor surfaces of disturbance, some of which plainly are faults, are present within the bedrock that underlies the power plant site. None of

these breaks offsets the interface between bedrock and the cover of terrace deposits, and none of them extends upward into the surficial cover. Thus, the latest movements along these small faults must have antedated erosion of the bedrock section in Pleistocene time.

(6) No landslide masses or other gross expressions of ground instability are present within the power plant site or on the main hillslope east of the site. Some landslides have been identified in adjacent ground, but these are minor features confined to the naturally oversteepened walls of Diablo Canyon.

(7) No water of subsurface origin was encountered in the exploratory trenches, and the level of permanent groundwater beneath the main terrace area probably is little different from that of the adjacent lower reaches of the deeply incised Diablo Creek.

2.5.1. Design Basis

Added for Clarity – New Sub-section to Justify Design Bases Criteria
Refer to Applicability Determination Matrix Item # 6

2.5.1.1 General Design Criterion 2, 1967 Performance Standards

DCPP systems, structures, and components have been located, designed and analyzed to withstand those forces that might result from the most severe natural earthquake phenomena.

Added for Clarity – New Sub-section to Identify License Requirement
UFSAR Section 3.1.2.2
Refer to Applicability Determination Matrix Item # 6

2.5.1.2 License Condition 2.C(7) of DCPP Facility Operating License DPR-80 Rev 44 (LTSP), Elements (1), (2) and (3)

DCPP developed and implemented a program to re-evaluate the seismic design bases used for the Diablo Canyon Power Plant.

The program included the following three Elements that were completed and accepted by the NRC (References 40, 41, and 43):

(1) The identification, examination, and evaluation of all relevant geologic and seismic data, information, and interpretations that have become available since the 1979 ASLB hearing in order to update the geology, seismology and tectonics in the region of the Diablo Canyon Nuclear Power Plant. If needed to define the earthquake potential of the region as it affects the Diablo Canyon Plant, PG&E has also re-evaluated the earlier information and acquired additional data.

(2) DCPP has re-evaluated the magnitude of the earthquakes used to determine the seismic basis of the Diablo Canyon Nuclear Plant using the information from Element 1.

(3) DCPP has re-evaluated the ground motion at the site based on the results obtained from Element 2 with full consideration of site and other relevant effects.

As a condition of the NRC's closeout of License Condition 2.C.(7), PG&E committed to several ongoing activities in support of the LTSP, as discussed in a public meeting between PG&E and the NRC on March 15, 1991 (Reference 53), described as the "Framework for the Future," in a letter to the NRC, dated April 17, 1991 (Reference 50), and affirmed by the NRC in SSER 34 (Reference 43). These ongoing activities are discussed in Section 2.5.7.

Added for Clarity – New Sub-section to Identify License Requirement SSER 34
Refer to Applicability Determination Matrix Item # 6

2.5.1.3 10 CFR Part 100, March 1966 - Reactor Site Criteria

During the determination of the location of the Diablo Canyon Power Plan, consideration was given to the physical characteristics of the site, including seismology and geology.

Added for Clarity – New Sub-section to Identify License Requirement
Refer to Applicability Determination Matrix Item # 6

2.5.24 BASIC GEOLOGIC AND SEISMIC INFORMATION

Edited for Clarity - Revised Section Number

This section presents the basic geologic and seismic information for DCPP site and surrounding region. Information contained herein has been obtained from literature studies, field investigations, and laboratory testing and is to be used as a basis for evaluations required to provide a safe design for the facility. The basic data contained in this section and in Reference 27 of Section 2.3 are referenced in several other sections of this FSAR Update. Additional information, developed during the Hosgri and LTSP evaluations, is described in Sections 2.5.3.9.3 and 2.5.3.9.4, respectively.

Edited for Clarity – Added Section Pointer

2.5.24.1 Regional Geology

Edited for Clarity - Revised Section Number

2.5.24.1.1 Regional Physiography

Edited for Clarity - Revised Section Number

Diablo Canyon is in the southern Coast Range which is a part of the California Coast Ranges section of the Pacific Border physiographic province (refer to~~see~~ Figure 2.5-1). The region surrounding the power plant site consists of mountains, foothills, marine terraces, and valleys. The dominant features are the San Luis Range adjacent to the site to the northeast, the Santa Lucia Range farther inland, the lowlands of the Los Osos and San Luis Obispo Valleys separating the San Luis and Santa Lucia Ranges, and the marine terrace along the coastal margin of the San Luis Range.

Edited for Clarity – Refer to Applicability Determination Matrix Item # 7

Landforms of the San Luis Range and the adjacent marine terrace produce the physiography at the site and in the region surrounding the site. The westerly end of the San Luis Range is a mass of rugged high ground that extends from San Luis Obispo Creek and San Luis Obispo Bay on the east and is bounded by the Pacific Ocean on the south and west. Except for its narrow fringe of coastal terraces, the range is featured by west-northwesterly-trending ridge and canyon topography. Ridge crest

altitudes range from about 800 to 1800 feet. Nearly all of the slopes are steep, and they are modified locally by extensive slump and earthflow landslides.

Most of the canyons have narrow-bottomed, V-shaped cross sections. Alluvial fans and talus aprons are prominent features along the bases of many slopes and at localities where ravines debouch onto relatively gentle terrace surfaces. The coastal terrace belt extends between a steep mountain-front backscarp and a near-vertical sea cliff 40 to 200 feet in height. Both the bedrock benches of the terraces and the present offshore wave-cut bench are irregular in detail, with numerous basins and rock projections.

The main terrace along the coastal margin of the San Luis Range is a gently to moderately sloping strip of land as much as 2000 feet in maximum width. The more landward parts of its surface are defined by broad aprons of alluvial deposits. This cover thins progressively in a seaward direction and is absent altogether in a few places along the present sea cliff. The main terrace represents a series of at least three wave-cut rock benches that have approximate shoreline-angle elevations of 70, 100, and 120 feet.

Owing to both the prevailing seaward slopes of the rock surfaces and the variable thickness of overlying marine and nonmarine cover, the present surface of the main terrace ranges from 70 to more than 200 feet in elevation. Remnants of higher terraces exist at scattered locations along upper slopes and ridge crests. The most extensive among these is a series of terrace surfaces at altitudes of 300+, 400+, and 700+ feet at the west end of the ridge between Coon and Islay Creeks, north of Point Buchon. A surface described by Headlee (Reference 19)[19] as a marine terrace at an altitude of about 700 feet forms the top of San Luis Hill. Remnants of a lower terrace at an altitude of 30 to 45 feet are preserved at the mouth of Diablo Canyon and at several places farther north.

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Owing to contrasting resistance to erosion among the various bedrock units of the San Luis Range, the detailed topography of the wave-cut benches commonly is very irregular. As extreme examples, both modern and fossil sea stacks rise as much as 100 feet above the general levels of adjacent marine-eroded surfaces at several localities.

2.5.24.1.2 Regional Geologic and Tectonic Setting

Edited for Clarity - Revised Section Number

2.5.24.1.2.1 Geologic Setting

Edited for Clarity - Revised Section Number

The San Luis Range is underlain by a synclinal section of Tertiary sedimentary and volcanic rocks, which have been downfolded into a basement of Mesozoic rocks now exposed along its southwest and northeast sides. Two zones of faulting have been recognized within the range. The Edna fault zone trends along its northeast side, and the Miguelito fault zone extends into the range from the vicinity of Avila Bay. Minor faults and bedding-plane shears can be seen in the parts of the section that are well exposed along the sea cliff fringing the coastal terrace benches. None of these faults shows evidence of geologically recent activity, and the most recent movements along those in the rocks underlying the youngest coastal terraces can be positively dated as older than 80,000 to 120,000 years. Geologic and tectonic maps of the region surrounding the site are shown in Figures 2.5-5 (2 sheets), 2.5-6, 2.5-8, and 2.5-9.

2.5.24.1.2.2 Tectonic Features of the Central Coastal Region

Edited for Clarity - Revised Section Number

DCPP site lies within the southern Coast Ranges structural province, and approximately upon the centerline axis of the northwest-trending block of crust that is bounded by the San Andreas fault on the northeast and the continental margin on the southwest. This crustal block is characterized by northwest-trending structural and geomorphic features, in contrast to the west-trending features of the Transverse Ranges to the south. A major geologic boundary within the block is associated with the Sur-Nacimiento and Rinconada faults, which separate terrains of contrasting basement rock types. The ground southwest of the Sur-Nacimiento zone and the southerly half of the Rinconada fault, referred to as the Coastal Block, is underlain by Franciscan basement rocks of dominantly oceanic types, whereas that to the northeast, referred to as the Salinia Block, is underlain by granitic and metamorphic basement rocks of continental types. Page (Reference 10)[12a] outlined the geology of the Coast Ranges, describing it generally in terms of "core complexes" of basement rocks and surrounding sections of younger sedimentary rocks. The principal Franciscan core complex of the southern Coast Range crops out on the coastal side of the Santa Lucia Range from the vicinity of San Luis Obispo to Point Sur, a distance of 120 miles. Its complex features reflect numerous episodes of deformation that evidently included folding, faulting, and the tectonic emplacement of extensive bodies of ultrabasic rocks. Other core complexes consisting of granitic and metamorphic basement rocks are exposed in the southern Coast Ranges in the ground between the Sur-Nacimiento and Rinconada and in the San Andreas fault zones. The locations of these areas of basement rock exposure are shown in Figure 2.5-6 and in Figure 1 of Appendix 2.5D of Reference 27 in Section 2.3.

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Younger structural features include thick folded basins of Tertiary strata and the large faults that form structural boundaries between and within the core complexes and basins.

The structure of the southern Coast Ranges has evolved during a lengthy history of deformation extending from the time when the ancestral Sur-Nacimiento zone was a site for subduction (a Benioff zone) along the then-existing continental margin, through subsequent parts of Cenozoic time when the San Andreas fault system was the principal expression of the regional stress-strain system. The latest episodes of major deformation involved folding and faulting of Pliocene and older sediments during mid-Pliocene time, and renewed movements along preexisting faults during early or mid-Pliocene time. Present tectonic activity within the region is dominated by interaction between the Pacific and American crustal plates on opposite sides of the San Andreas fault and by continuing vertical uplift of the Coast Ranges. In the regional setting of DCPP site, the major structural features addressed during the original design phase are the San Andreas, Rinconada-San Marcos-Jolon, Sur-Nacimiento, and Santa Lucia Bank faults. Additional faults were identified during the Hosgri evaluation and LTSP evaluation phases, discussed in Sections 2.5.3.9.3 and 2.5.3.9.4, respectively. The San Simeon fault may also be included with this group. These original design phase faults are described as follows:

Added for Clarity – Refer to Applicability Determination Matrix Item # 4

Added for Clarity – Section pointer

Added for Clarity – Refer to Applicability Determination Matrix Item # 4

1. San Andreas Fault

The San Andreas fault is recognized as a major transform fault of regional dimensions that forms an active boundary between the Pacific and North American crustal plates. Cumulative slip along the San Andreas fault may have amounted to several hundred miles, and a substantial fraction of the total slip has occurred during late Cenozoic time. The fault has spectacular topographic expression, generally lying within a rift valley or along an escarpment mountain front, and having associated sag ponds, low scarps, right-laterally deflected streams, and related manifestations of recent activity.

The most recent episode of large-scale movement along the reach of the San Andreas fault that is closest to the San Luis Range occurred during the great Fort Tejon earthquake of 1857. Geologic evidence pertinent to the behavior of the fault during this and earlier seismic events was studied in great detail by Wallace (References 15 and 32)[15,32] who reported in terms of infrequent great earthquakes accompanied by ground rupture of 10 to 30 feet, with intervening periods of near total quiescence. Allen (Reference 16)[16] suggested that such behavior has been typical for this reach of the San Andreas fault and has been fundamentally different from the behavior of the fault along the reach farther northwest, where creep and numerous small earthquakes have occurred. He further suggested that release of accumulating strain energy might have been facilitated by the presence of large amounts of serpentine in the fault zone to the northwest, and retarded by the locking effect of the broad bend of the fault zone where it crosses the Transverse Ranges to the southeast.

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Movement is currently taking place along large segments of the San Andreas fault. The active reach of the fault between Parkfield and San Francisco is currently undergoing relative movement of at least 3 to 4 cm/yr, as determined geodetically and analyzed by Savage and Burford (Reference 33)[33]. When the movement that occurs during the episodes of fault displacement in the western part of the Basin and Ranges Province is

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added to the minimum of 3 to 4 cm/yr of continuously and intermittently released strain, the total probably amounts to at least 5 to 6 cm/yr. This may account for essentially all of the relative motion between the Pacific and North American plates at present. In the Transverse Ranges to the south, this strain is distributed between lateral slip along the San Andreas system and east-west striking lateral slip faulting, thrust faulting, and folding. North of the latitude of Monterey Bay and south of the Transverse Ranges, transcurrent movement is again concentrated along the San Andreas system, but in those regions, it is distributed among several major strands of the system.

2. Sur-Nacimiento Fault Zone

The Sur-Nacimiento fault zone has been regarded as the system of faults that extends from the vicinity of Point Sur, near the northwest end of the Santa Lucia Range, to the Big Pine fault in the western Transverse Ranges, and that separates the granitic-metamorphic basement of the Salinian Block from the Franciscan basement of the Coastal Block. The most prominent faults that are included within this zone are, from northwest to southeast, the Sur, Nacimiento, Rinconada, and (south) Nacimiento faults. The Sur fault, which extends as far northward as Point Sur on land, continues to the northwest in the offshore continental margin. At its southerly end, the zone terminates where the (south) Nacimiento fault is cut off by the Big Pine fault. The overall length of the Sur-Nacimiento fault zone between Point Sur and the Transverse Ranges is about 180 miles. The 60 mile long Nacimiento fault, between points of juncture with the Sur and Rinconada faults, forms the longest segment within this zone. Page (Reference 11)[44] stated that: Edited for Consistency

> "It is unlikely that the Nacimiento fault proper has displaced the ground surface in Late Quaternary time, as there are no indicative offsets of streams, ridges, terrace deposits, or other topographic features. The Great Valley-type rocks on the northeast side must have been down-dropped against the older Franciscan rocks on the southwest, yet they commonly stand higher in the topography. This implies relative quiescence of the Late Quaternary time, allowing differential erosion to take place. In a few localities, the northeast side is the low side, and this inconsistency favors the same conclusion. In addition to the foregoing circumstances, the fault is offset by minor cross-faults in a manner suggesting that little, if any, Late Quaternary near-surface movement had occurred along the main fracture."

Hart (Reference 14)[44], on the other hand, stated that: ". . . youthful topographic features (offset streams, sag ponds, possible fault scarplets, and apparently oversteepened slopes) suggest movement along both (Sur-Nacimiento and Rinconada) fault zones." The map compiled by Jennings (Reference 23)[23], however, shows only the Rinconada with a symbol indicating "Quaternary fault displacement." Edited for Consistency Edited for Consistency

The results of photogeologic study of the region traversed by the Sur-Nacimiento fault zone tend to support Page's view. A pronounced zone of fault-controlled topographic lineaments can be traced from the northwest end of the Nacimiento fault southeastward

to the Rinconada (south Nacimiento), East Huasna, and West Huasna faults. Only along the Rinconada, however, are there topographic features that seem to have originated through fault disturbances of the ground surface rather than through differential erosion along zones of shearing and juxtaposition of differing rocks. Richter (Reference 13)[125] noted that some historic seismicity, particularly the 1952 Bryson earthquake, appears to have originated along the Nacimiento fault. This view is supported by recent work of S. W. Smith (Reference 30)[165] that indicates that the Bryson shock and the epicenters of several smaller, more recent earthquakes were located along or near the trace of the Nacimiento.

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3. Rinconada (Nacimiento)-San Marcos-Jolon-San Antonio Fault System

A system of major faults extends northwestward, parallel to the San Andreas fault, from a point of junction with the Big Pine fault in the western Transverse Ranges. This system includes several faults that have been mapped as separate features and assigned individual names. Dibblee (Reference 27)[127] however, has suggested that these faults are part of a single system, provisionally termed the Rinconada fault zone after one of its more prominent members. He also proposed abandoning the name Nacimiento for the large fault that constitutes the most southerly part of this system, as it is not continuous with the Nacimiento fault to the north, near the Nacimiento River. The newly defined Rinconada fault system comprises the old (south) Nacimiento, Rinconada, and San Marcos faults. Dibblee proposed that the system also include the Espinosa and Reliz faults, to the north, but detailed work by Durham (Reference 28)[128] does not seem to support this interpretation. Instead, the system may extend into Lockwood Valley and die out there along the Jolon and San Antonio faults. All the faults of the Rinconada system have undergone significant movement during middle and late Cenozoic time, though the entire system did not behave as a unit. Dibblee pointed out that: "Relative vertical displacements are controversial, inconsistent, reversed from one segment to another; the major movement may be strike slip, as on the San Andreas fault."

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Regarding the structural relationship of the Rinconada fault to nearby faults, Dibblee wrote as follows:

> "Thrust or reverse faults of Quaternary age are associated with the Rinconada fault along much of its course on one or both sides, within 9 miles, especially in areas of intense folding. In the northern part several, including the San Antonio fault, are present along both margins of the range of hills between the Salinas and Lockwood Valleys . . . . along which this range was elevated in part. Near the southern part are the major southwest-dipping South Cuyama and Ozena faults along which the Sierra Madre Range was elevated against Cuyama Valley, with vertical displacements possibly up to 8000 feet. All these thrust or reverse faults dip inward toward the Rinconada fault and presumably either splay from it at depth, or are branches of it. These faults, combined with the intense folding between them, indicated that severe compression accompanied possible transcurrent movement along the Rinconada fault."

"The La Panza fault along which the La Panza Range was elevated .... in Quaternary time, is a reverse fault that dips northeast under the range, and is not directly related to the Rinconada fault.

"The Big Pine fault against which the Rinconada fault abuts . . . is a high angle left-lateral transcurrent fault active in Quaternary time (Reference 35)[4b2]. The Pine Mountain fault south of it . . . . is a northeast-dipping reverse fault along which the Pine Mountain Range was elevated in Quaternary time. This fault may have been reactivated along an earlier fault that may have been continuous with the Rinconada fault, but displaced about 8 miles from it by left slip on the Big Pine fault (Reference 12)[4b3] in Quaternary time." Edited for Consistency Edited for Consistency

"The Rinconada and Reliz faults were active after deposition of the Monterey Shale and Pancho Rico Formation, which are severely deformed adjacent and near the faults. The faults were again active after deposition of the Paso Robles Formation but to a lesser degree. These faults do not affect the alluvium or terrace deposits. There are no offset stream channels along these faults. However, in two areas several canyons and streams are deviated, possibly by right-lateral movement on the (Espinosa and San Marcos segments of the) Rinconada fault. There are no indications that these faults are presently active."

4. San Simeon Fault

The fault here referred to as the San Simeon fault trends along the base of the peninsula that lies north of the settlement of San Simeon. This fault is on land for a distance of 12 miles between its only outcrop, north of Ragged Point, and Point San Simeon. It may extend as much as 16 miles farther to the southeast, to the vicinity of Point Estero. This possibility is suggested by the straight reach of coastline between Cambria and Point Estero, which is directly aligned with the onshore trend of the fault; its linear form may well have been controlled by a zone of structural weakness associated with the inferred southerly part of the fault. South of Port Estero, however, there is no evidence of faulting observable in the seismic reflection profiles across Estero Bay, and the trend defined by the Los Osos Valley-Estero Bay series of lower Miocene or Oligocene intrusives extends across the San Simeon trend without deviation.

North of Point Piedras Blancas, Silver (Reference 26)[4b4] reports a fault with about 5 kilometers of vertical separation between the 4-kilometer-thick Tertiary section in the offshore basin and the nearby 1-kilometer-high exposure of Franciscan basement rocks in the coastline mountain front. The existence of a fault in this region is also indicated by the 30- milligal gravity anomaly between the offshore basin and the onshore ranges (Plate II of Appendix 2.5D of Reference 27 in Section 2.3). This postulated fault may well be a northward extension of the San Simeon fault. If this is the case, the San Simeon fault may have a total length of as much as 60 miles. Edited for Consistency

Between Point San Simeon and Ragged Point, the San Simeon fault lies along the base of a broad peninsula, the surface of which is characterized by elevated marine terraces and younger, steep-walled ravines and canyons. The low, terraced topography of the peninsula contrasts sharply with that of the steep mountain front that rises immediately behind it. Clearly, the ground west of the main fault represents a part of the sea floor that has been locally arched up.

This has resulted in exposure of the fault, which elsewhere is concealed underwater off the shoreline.

The ground between the San Simeon fault and the southwest coastline of the Piedras Blancas peninsula is underlain by faulted blocks and slivers of Franciscan rocks, serpentinites, Tertiary sedimentary breccia and volcanic rocks, and Miocene shale. The faulted contacts between these rock masses trend somewhat more westerly than the trend of the San Simeon fault. One north-dipping reverse fault, which separates serpentinite from graywacke, has broken marine terrace deposits in at least two places, one of them in the basal part of the lowest and youngest terrace. Movement along this branch fault has therefore occurred less than 130,000 years before the present, although the uppermost, youngest Pleistocene deposits are apparently not broken. Prominent topographic lineations defined by northwest-aligned ravines that incise the upper terrace surface, on the other hand, apparently have originated through headward gully erosion along faults and faulted contacts, rather than through the effects of surface faulting.

The characteristics of the San Simeon fault can be summarized as follows: The fault may be related to a fault along the coast to the north that displays some 5 kilometers of vertical displacement. Near San Simeon, it exhibits probable Pleistocene right-lateral strike-slip movement of as much as 1500 feet near San Simeon, although it apparently does not break dune sand deposits of late Pleistocene or early Holocene age. A branch reverse fault, however, breaks upper Pleistocene marine terrace deposits. The San Simeon fault may extend as far south as Point Estero, but it dies out before crossing the northern part of Estero Bay.

5. Santa Lucia Bank Fault

South of the latitude of Point Piedras Blancas, the western boundary of the main offshore Santa Maria Basin is defined by the east-facing scarp along the east side of the Santa Lucia Bank. This scarp is associated with the Santa Lucia Bank fault, the structure that separates the subsided block under the basin from the structural high of the bank. The escarpment that rises above the west side of the fault trace has a maximum height of about 450 feet, as shown on U.S. Coast and Geodetic Survey (USC&GS) Bathymetric Map 1306N-20.

The Santa Lucia Bank fault can be traced on the sea floor for a distance of about 65 miles. Extensions that are overlapped by upper Tertiary strata continue to the south for at least another 10 miles, as well as to the north. The northern extension may be

related to another, largely buried fault that crosses and may intersect the trend of the Santa Lucia Bank fault. This second fault extends to the surface only at points north of the latitude of Point Piedras Blancas.

West of the Santa Lucia Bank fault, between N latitudes 34°30' and 30°, several subparallel faults are characterized by apparent surface scarps. The longest of these faults trends along the upper continental slope for a distance of as much as 45 miles, and generally exhibits a west-facing scarp. Other faults are present in a zone about 30 miles long lying between the 45 mile fault and the Santa Lucia Bank fault. These faults range from 5 to 15 or more miles in length, and have both east-and west-facing scarps.

This zone of faulting corresponds closely in space with the cluster of earthquake epicenters around N latitude 34°45' and 121°30'W longitude, and it probably represents the source structure for those shocks (Figure 2.5-3).

2.5.24.1.2.3 Tectonic Features in the Vicinity of the DCPP Site

Edited for Clarity - Revised Section Number

Geologic relationships between the major fold and fault structures in the vicinity of Diablo Canyon are shown in Figures 2.5-5, 2.5-6, and 2.5-7, and are described and illustrated in Appendix 2.5D of Reference 27 of Section 2.3. The San Luis Ranges-Estero Bay area is characterized structurally by west-northwest-trending folds and faults. These include the San Luis-Pismo syncline and the bordering Los Osos Valley and Point San Luis antiformal highs, and the West Huasna, Edna, and San Miguelito faults. A few miles offshore, the structural features associated with this trend merge into a north-northwest-trending zone of folds and faults that is referred to herein as the offshore Santa Maria Basin East Boundary zone of folding and faulting. The general pattern of structural highs and lows of the onshore area is warped and stepped downward to the west across this boundary zone, to be replaced by more northerly-trending folds in the lower part of the offshore basin section. The overall relationship between the onshore Coast Ranges and the offshore continental margin is one of differential uplift and subsidence. The East Boundary zone represents the structural expression of the zone of inflection between these regions of contrasting vertical movement.

In terms of regional relationships, structural style, and history of movement, the faults in the San Luis Ranges-Estero Bay vicinity, identified during the original design phase, may be characterized as follows:

Added for Clarity – Refer to Applicability Determination Matrix Item # 4

1. West Huasna Fault

This fault zone separates the large downwarp of the Huasna syncline on the northeast from Franciscan assemblage rocks of the Los Osos Valley antiform and the Tertiary section of the southerly part of the San Luis-Pismo syncline on the southwest. The West Huasna fault is thought to join with the Suey fault to the south. Differences in thicknesses and facies relationships between units of apparently equivalent age on

opposite sides of the fault are interpreted as indicating lateral movement along the fault; however, the available evidence regarding the amount and even the relative sense of displacement is not consistent. The West Huasna shows no evidence of late Quaternary activity.

2. Edna Fault Zone

The Edna fault zone lies along a west-northwesterly trend that extends obliquely from the West Huasna fault at its southeast end to the hills of the San Luis Range south of Morro Bay. Several isolated breaks that lie on a line with the trend are present in the Tertiary strata beneath the south part of Estero Bay, east of the Santa Maria Basin East Boundary fault zone across the mouth of the bay.

The Edna fault is typically a zone of two or more anastomosing branches that range in width from 1/2 mile to as much as 1-1/2 miles. Although individual strands are variously oriented and exhibit various senses of amounts of movement, the zone as a whole clearly expresses high-angle dip-slip displacement (down to the southwest). The irregular traces of major strands suggest that little, if any, strike-slip movement has occurred. Preliminary geologic sections shown by Hall and Surdam (Reference 21)[25] and Hall (Reference 20)[26] imply that the total amount of vertical separation ranges from 1500 to a few thousand feet along the central part of the fault zone. The amount of displacement across the main fault trend evidently decreases to the northwest, where the zone is mostly overlapped by upper Tertiary strata.

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It may be, however, that most of the movement in the Baywood Park vicinity has been transferred to the north-trending branch of the Edna, which juxtaposes Pliocene and Franciscan rocks where last exposed. In the northwesterly part of the San Luis Range, the Edna fault forms much of the boundary between the Tertiary and basement rock sections. Most of the measurable displacements along this zone of rupture occurred during or after folding of the Pliocene Pismo Formation but prior to deposition of the lower Pleistocene Paso Robles Formation. Some additional movement has occurred during or since early Pleistocene time, however, because Monterey strata have been faulted against Paso Robles deposits along at least one strand of the Edna near the head of Arroyo Grande valley. This involved steep reverse fault movement, with the southwest side raised, in contrast to the earlier normal displacement down to the southwest.

Search has failed to reveal dislocation of deposits younger than the Paso Robles Formation, disturbance of late Quaternary landforms, or other evidence of Holocene or late Pleistocene activity.

3. San Miguelito Fault Zone

Northwesterly-trending faults have been mapped in the area between Pismo Beach and Arroyo Grande, and from Avila Beach to the vicinity of the west fork of Vineyard Canyon, north of San Luis Hill. Because these faults lie on the same trend, appear to

reflect similar senses of movement, and are "separated" only by an area of no exposure along the shoreline between Pismo Beach and Avila Beach, they may well be part of a more or less continuous zone about 10 miles long. As on the Edna fault, movements along the San Miguelito fault appear to have been predominantly dip-slip, but with displacement down on the northeast. Hall's preliminary cross section indicates total vertical separation of about 1400 feet. The fault is mapped as being overlain by unbroken deposits of the Paso Robles Formation near Arroyo Grande.

Field checking of the ground along the projected trend of the San Miguelito fault zone northwest of Vineyard Canyon in the San Luis Range has substantiated Hall's note that the fault cannot be traced west of that area.

Detailed mapping of the nearly continuous sea cliff exposures extending across this trend northeast of Point Buchon has shown there is no faulting along the San Miguelito trend at the northwesterly end of the range. Like the Edna fault zone, the San Miguelito fault zone evidently represents a zone of high-angle dip-slip rupturing along the flank of the San Luis-Pismo syncline.

4. East Boundary Zone of the Offshore Santa Maria Basin

The boundary between the offshore Santa Maria Basin and the onshore features of the southern Coast Ranges is a 4 to 5 wide zone of generally north-northwest-trending folds, faults, and onlap unconformities referred to as the "Hosgri fault zone" by Wagner (Reference 31)[63]. The geology of this boundary zone has been investigated in detail by means of extensive seismic reflection profiling, high resolution surface profiling, and side scan sonar surveying.

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More general information about structural relationships along the boundary zone has been obtained from the pattern of Bouguer Gravity anomaly values that exist in its vicinity. These data show the East Boundary zone to consist of a series of generally parallel north-northwest-trending faults and folds, developed chiefly in upper Pliocene strata that flank upwarped lower Pliocene and older rocks. The zone extends from south of the latitude of Point Sal to north of Point Piedras Blancas. Within the zone, individual fault breaks range in length from less than 1000 feet up to a maximum of about 30 miles. The overall length of the zone is approximately 90 miles, with about 60 miles of relatively continuous faulting.

The apparent vertical component of movement is down to the west across some faults and down to the east across others. Along the central reach of the zone, opposite the San Luis Range, a block of ground has been dropped between the two main strands of the fault to form a graben structure. Within the graben, and at other points along the East Boundary zone, bedding in the rock has been folded down toward the upthrown side of the west side down fault. This feature evidently is an expression of "reverse drag" phenomena.

The axes of folds in the ground on either side of the principal fault breaks can be traced for distances of as much as 22 miles. The fold axes typically are nearly horizontal; maximum axial plunges seem to be 5° or less. The structure and onlap relationships of the upper Pliocene, as reflected in the configuration of the unconformity at its base, are such that it consistently rises from the offshore basin and across the boundary zone via a series of upwarps, asymmetric folds, and faults. This configuration seems to correspond generally to a zone of warping and partial disruption along the boundary between relatively uplifting and subsiding regions.

2.5.24.1.3 Geologic History

Edited for Clarity - Revised Section Number

The geologic history reflected by the rocks, structural features, and landforms of the San Luis Range is typical of that of the southern Coast Ranges of California in its length and complexity. Six general episodes for which there is direct evidence can be tabulated as follows:

Age	Episode	Evidence
Late Mesozoic	Development of Franciscan and Upper Cretaceous rock assemblages	Franciscan and other Mesozoic rocks
Late Mesozoic - Early Tertiary	Early Coast Ranges deformation	Structural features pre-served in the Mesozoic rocks
Mid-Tertiary	Uplift and erosion	Erosion surface at the base of the Tertiary section
Mid- and late-Tertiary	Accumulation of Miocene and Pliocene sedimentary and volcanic rocks	Vaqueros, Rincon, Obispo, Point Sal, Monterey, and Pismo Formation and associated volcanic intrusive, and brecciated rocks
Pliocene	Folding and faulting associated with the Pliocene Coast Ranges deformation	Folding and faulting of the Tertiary and basement rocks
Pleistocene	Uplift and erosion, development of successive tiers of wave-cut-benches alluvial fan, talus, and landslide deposition.	Pleistocene and Holocene deposits, present land-forms.

The earliest recognizable geologic history of the southern Coast Ranges began in Mesozoic time, during the Jurassic period when eugeosynclinal deposits (graywacke sandstone, shale, chert, and basalt) accumulated in an offshore trench developed in oceanic crust.

Some time after the initiation of Franciscan sedimentation, deposition of a sequence of miogeosynclinal or shelf sandstones and shales, known as the Great Valley Sequence, began on the continental crust, at some distance to the east of the Franciscan trench.

Deposition of both sequences continued into Cretaceous time, even while the crustal basement section on which the Great Valley strata were being deposited was undergoing plutonism involving emplacement of granitic rocks. Subsequently, the Franciscan assemblage, the Great Valley Sequence, and the granite-intruded basement rocks were tectonically juxtaposed. The resulting terrane consisted generally of granitic basement thrust over intensely deformed Franciscan, with Great Valley Sequence strata overlying the basement, but thrust over and faulted into the Franciscan.

The processes that were involved in the tectonic juxtaposition evidently were active during the Mesozoic, and continued into the early Tertiary. Page (Reference 25)[24] has shown that they were completed by no later than Oligocene time, so that the dual core complex basement of the southern Coast Ranges was formed by then.

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The Miocene and later geologic history of the southern Coast Ranges region began with deposition of the Vaqueros and Rincon Formations on a surface eroded on the Franciscan and Great Valley core complex rocks.

Following deposition and some deformation and erosion of these formations, the stratigraphic unit that includes the Point Sal and Obispo Formations as approximately contemporaneous facies was laid down. The Obispo consists of a section of tuffaceous sandstone and mudstone, with lesser amounts of shale, and lensing layers of vitric and lithic-crystal tuff. Locally, the unit is featured by masses of clastic-textured tuffaceous rock that exhibit cross-cutting intrusive relations with the bedded parts of the formation. The Obispo and Point Sal were folded and locally eroded prior to initiation of the main episode of upper Miocene and Pliocene marine sedimentation.

During late middle Miocene to late Miocene time, deposition of the thick sections of silica-rich shale of the Monterey Formation began. Deposition of this formation and equivalent strata took place throughout much of the coastal region of California, but apparently was centered in a series of offshore basins that all developed at about the same time, some 10 to 12 million years ago. Local volcanism toward the latter part of this time is shown by the presence of diabase dikes and sills in the Monterey. Near the end of the Miocene, the Monterey strata were subjected to compressional deformation resulting in folding, in part with great complexity, and in faulting. Near the old continental margin, represented by the Sur-Nacimiento fault zone, the deformation was most intense, and was accompanied by uplift. This apparently resulted in the first development of many of the large folds of the southern Coast Ranges including the Huasna and San Luis-Pismo synclines, and in the partial erosion of the folded Monterey section in areas of uplift. The pattern of regional uplift of the Coast Ranges and subsidence of the offshore basins, with local upwarping and faulting in a zone of inflection along the boundary between the two regions, apparently became well established during the episode of late Miocene and Mio-Pliocene diastrophism.

Sedimentation resumed in Pliocene time throughout much of the region of the Miocene basins, and several thousand feet of siltstone and sandstone was deposited. This was the last significant episode of marine sedimentation in the region of the present Coast

Ranges. Pliocene deposits in the region of uplift were then folded, and there was renewed movement along most of the preexisting larger faults.

Differential movements between the Coast Ranges uplift and the offshore basins were again concentrated along the boundary zone of inflection, resulting in upwarping and faulting of the basement, Miocene, and Pliocene sections. Relative displacement across parts of this zone evidently was dominantly vertical, because the faulting in the Pliocene has definitely extensional character, and Miocene structures can be traced across the zone without apparent lateral offset. The basement and Tertiary sections step down seaward, away from the uplift, along a system of normal faults having hundreds to nearly a thousand feet of dip-slip offset. A second, more seaward system of normal faults is antithetic to the master set and exhibits only tens to a few hundreds of feet of displacement. Strata between these faults locally exhibit reverse drag downfolding toward the edge of the Pliocene basin, whereas the section is essentially undeformed farther offshore. This style of deformation indicates a passive response, through gravity tectonics, to the onshore uplift.

The Plio-Pleistocene uplift was accompanied by rapid erosion, with consequent nearby deposition of clastic sediments such as the Paso Robles Formation in valleys throughout the southern Coast Ranges. The high-angle reverse and normal faulting observed by Compton (Reference 38)[38] in the northern Santa Lucia Range also occurred farther south, probably more or less contemporaneously with accumulation of the continental deposits. Much of the Quaternary faulting other than that related to the San Andreas right lateral stress-strain system may well have occurred at this time.

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Tectonic activity during the Quaternary has involved continued general uplift of the southern Coast Ranges, with superimposed local downwarping and continued movement along faults of the San Andreas system. The uplift is shown by the general high elevation and steep youthful topography that characterizes the Coast Ranges and by the widespread uplifted marine and stream terraces. Local downwarping can be seen in valleys, such as the Santa Maria Valley, where thick sections of Plio-Pleistocene and younger deposits have accumulated. Evidence of significant late Quaternary fault movement is seen in the topography along the Rinconada-San Marcos, Espinosa, San Simeon, and Santa Lucia Bank faults, as well as along the San Andreas itself. Only along the San Andreas, however, is there evidence of Holocene or contemporary movement.

The latest stage in the evolution of the San Luis Range has extended from mid-Pleistocene time to the present, and has involved more or less continuous interaction between apparent uplift of the range and alternating periods of erosion or deposition, especially along the coast, during times of relatively rising, falling, or unchanging sea level. The development of wave-cut benches and the accumulation of marine deposits on these benches have provided a reliable guide to the minimum age of latest displacements along breaks in the underlying bedrock. Detailed exploration of the interfaces between wave-cut benches and overlying marine deposits at the site of DCPP has shown that no breaks extend across these interfaces. This demonstrates

that the youngest faulting or other bedrock breakage in that area antedated the time of terrace cutting, which is on the order of 80,000 to 120,000 years before the present.

The bedrock section and the surficial deposits that formerly capped this bedrock on which the power plant facilities are located have been studied in detail to determine whether they express any evidence of deformation or dislocation ascribable to earthquake effects.

The surficial geologic materials at the site consisted of a thin, discontinuous basal section of rubbly marine sand and silty sand, and an overlying section of nonmarine rocky sand and sandy clay alluvial and colluvial deposits. These deposits were extensively exposed by exploratory trenches, and were examined and mapped in detail. No evidence of earthquake-induced effects such as lurching, slumping, fissuring, and liquefaction was detected during this investigation.

The initial movement of some of the landslide masses now present in Diablo Canyon upstream from the switchyard area may have been triggered by earthquake shaking. It is also possible that some local talus deposits may represent earthquake-triggered rock falls from the sea cliff or other steep slopes in the vicinity.

Deformation of the rock substrata in the site area may well have been accompanied by earthquake activity at the time of its occurrence in the geologic past. There is no evidence, however, of post-terrace earthquake effects in the bedrock where the power plant is being constructed.

2.5.24.1.4 Stratigraphy of the San Luis Range and Vicinity

Edited for Clarity - Revised Section Number

The geologic section exposed in the San Luis Range comprises sedimentary, igneous, and tectonically emplaced ultrabasic rocks of Mesozoic age, sedimentary, pyroclastic, and hypabyssal intrusive rocks of Tertiary age, and a variety of surficial deposits of Quaternary age. The lithology, age, and distribution of these rocks were studied by Headlee and more recently have been mapped in detail by Hall. The geology of the San Luis Range is shown in Figure 2.5-6 with a geologic cross section constructed using exploratory oil wells shown in Figure 2.5-7. The geologic events that resulted in the stratigraphic units described in this section are discussed in Section 2.5.24.1.3, Geologic History.

Edited for Clarity - Revised Section Number

2.5.24.1.4.1 Basement Rocks

Edited for Clarity - Revised Section Number

An assemblage of rocks typical of the Coast Ranges basement terrane west of the Nacimiento fault zone is exposed along the south and northeast sides of the San Luis Range. As described by Headlee, this assemblage includes quartzose and greywacke sandstone, shale, radiolarian chert, intrusive serpentine and diabase, and pillow basalt. Some of these rocks have been dated as Upper Cretaceous from contained microfossils, including pollen and spores, and Headlee suggested that they may represent dislocated parts of the Great Valley Sequence. There is contrasting

evidence, however, that at least the pillow basalt and associated cherty rocks may be more typically Franciscan. Certainly, such rocks are characteristic of the Franciscan terrane. Further, a potassium-argon age of 156 million years, equivalent to Upper Jurassic, has been determined for a core of similar rocks obtained from the bottom of the Montodoro Well No. 1 near Point Buchon.

2.5.24.1.4.2 Tertiary Rocks

Edited for Clarity - Revised Section Number

Five formational units are represented in the Tertiary section of the San Luis Range. The lower part of this section comprises rocks of the Vaqueros, Rincon, and Obispo Formations, which range in age from lower Miocene through middle Miocene. These strata crop out in the vicinity of Hazard Canyon, at the northwest end of the range, and in a broad band along the south coastal margin of the range. In both areas the Vaqueros rests directly on Mesozoic basement rocks. The core of the western San Luis Range is underlain by the Upper Miocene Monterey Formation, which constitutes the bulk of the Tertiary section. The Upper Miocene to Lower Pliocene Pismo Formation crops out in a discontinuous band along the southwest flank and across the west end of the range, resting with some discordance on the Monterey section and elsewhere directly on older Tertiary or basement rocks.

The coastal area in the vicinity of Diablo Canyon is underlain by strata that have been variously correlated with the Obispo, Point Sal, and Monterey Formations. Headlee, for example, has shown the Point Sal as overlying the Obispo, whereas Hall has considered these two units as different facies of a single time-stratigraphic unit. Whatever the exact stratigraphic relationships of these rocks might prove to be, it is clear that they lie above the main body of tuffaceous sedimentary rocks of the Obispo Formation and below the main part of the Monterey Formation. The existence of intrusive bodies of both tuff breccia and diabase in this part of the section indicates either that local volcanic activity continued beyond the time of deposition of the Obispo Formation, or that the section represents a predominantly sedimentary facies of the upper part of the Obispo Formation. In either case, the strata underlying the power plant site range downward through the Obispo Formation and presumably include a few hundred feet of the Rincon and Vaqueros Formations resting upon a basement of Mesozoic rocks.

A generalized description of the major units in the Tertiary section follows, and a more detailed description of the rocks exposed at the power plant site is included in a later section.

The Vaqueros Formation has been described by Headlee as consisting of 100 to 400 feet of resistant, massive, coarse-grained, calcareously cemented bioclastic sandstone. The overlying Rincon Formation consists of 200 to 300 feet of dark gray to chocolate brown calcareous shale and mudstone.

The Obispo Formation (or Obispo Tuff) is 800 to 2000 feet thick and comprises alternating massive to thick-bedded, medium to fine grained vitric-lithic tuffs, finely

laminated black and brown marine siltstone and shale, and medium grained light tan marine sandstone. Headlee assigned to the Point Sal Formation a section described as consisting chiefly of medium to fine grained silty sandstone, with several thin silty and fossiliferous limestone lenses; it is gradational upward into siliceous shale characteristic of the Monterey Formation. The Monterey Formation itself is composed predominantly of porcelaneous and finely laminated siliceous and cherty shales.
The Pismo Formation consists of massive, medium to fine grained arkosic sandstone, with subordinate amounts of siltstone, sandy shale, mudstone, hard siliceous shale, and chert.

2.5.24.1.4.3 Quaternary Deposits

Edited for Clarity - Revised Section Number

Deposits of Pleistocene and Holocene age are widespread on the coastal terrace benches along the southwest margin of the San Luis Range, and they exist farther onshore as local alluvial and stream-terrace deposits, landslide debris, and various colluvial accumulations. The coastal terrace deposits include discontinuous thin basal sections of marine silt, sand, gravel, and rubble, some of which are highly fossiliferous, and generally much thicker overlying sections of talus, alluvial-fan debris, and other deposits of landward origin. All of the marine deposits and most of the overlying nonmarine accumulations are of Pleistocene age, but some of the uppermost talus and alluvial deposits are Holocene. Most of the alluvial and colluvial materials consist of silty clayey sand with irregularly distributed fragments and blocks of locally exposed rock types. The landslide deposits include chaotic mixtures of rock fragments and fine-grained matrix debris, as well as some large masses of nearly intact to thoroughly disrupted bedrock.

A more detailed description of surficial deposits that are present in the vicinity of the power plant site is included in a later section.

2.5.24.1.5 Structure of the San Luis Range and Vicinity

Edited for Clarity - Revised Section Number

2.5.24.1.5.1 General Features

Edited for Clarity - Revised Section Number

The geologic structure of the San Luis Range-Estero Bay and adjacent offshore area is characterized by a complex set of folds and faults (Figures 2.5-5, 2.5-6, and 2.5-7). Tectonic events that produced these folds and faults are discussed in Section 2.5.24.1.3, Geologic History. The San Luis Range-Estero Bay and adjacent offshore area lies within the zone of transition from the west-trending Transverse Range structural province to the northwest-trending Coast Ranges province. Major structural features are the long narrow downfold of the San Luis-Pismo syncline and the bordering antiformal structural highs of Los Osos Valley on the northeast, and of Point San Luis and the adjacent offshore area on the southwest. This set of folds trends obliquely into a north-northwest aligned zone of basement upwarping, folding, and high-angle normal faulting that lies a few miles off the coast. The main onshore folds can be recognized, by seismic reflection and gravity techniques, in the structure of the buried, downfaulted Miocene section that lies across (west of) this zone.

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Lesser, but yet important structural features in this area include smaller zones of faulting and trends of volcanic intrusives. The Edna and San Miguelito fault zones disrupt parts of the northeast and southwest flanks of the San Luis-Pismo syncline. A southward extension of the San Simeon fault, the existence of which is inferred on the basis of the linearity of the coastline between Cambria and Point Estero, and of the gravity gradient in that area, may extend into, and die out within, the northern part of Estero Bay. An aligned series of plugs and lensoid masses of Tertiary volcanic rocks that intrude the Franciscan Formation along the axis of the Los Osos Valley antiform extends from the outer part of Estero Bay southeastward for 22 miles (Figure 2.5-6).

These features define the major elements of geologic structure in the San Luis Range-Estero Bay area. Other structural elements include the complex fold and fault structures within the Franciscan core complex rocks and the numerous smaller folds within the Tertiary section.

2.5.24.1.5.2 San Luis-Pismo Syncline

Edited for Clarity - Revised Section Number

The main synclinal fold of the San Luis Range, referred to here as the San Luis-Pismo syncline, trends about N60°W and forms a structural trend more than 15 miles in length. The fold system comprises several parallel anticlines and synclines across its maximum onshore width of about 5 miles. Individual folds of the system typically range in length from hundreds of feet to as much as 10,000 feet. The folds range from zero to more than 30° in plunge, and have flank dips as steep as 90°. Various kinds of smaller folds exist locally, especially flexures and drag folds associated with tuff intrusions and with zones of shear deformation.

Near Estero Bay, the major fold extends to a depth of more than 6000 feet. Farther south, in the central part of the San Luis Range, it is more than 11,000 feet deep. Parts of the northeast flank of the fold are disrupted by faults associated with the Edna fault zone. Local breaks along the central part of the southwest flank have been referred to as the San Miguelito fault zone.

2.5.24.1.5.3 Los Osos Valley Antiform

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The body of Franciscan and Great Valley Sequence rocks that crops out between the San Luis-Pismo and Huasna synclines is here referred to as the Los Osos Valley antiform. This composite structure extends southward from the Santa Lucia Range, across the central and northern part of Estero Bay, and thence southeastward to the point where it is faulted out at the juncture of the Edna and the West Huasna fault zones.

Notable structural features within this core complex include northwest- and west-northwest- trending-faults that separate Franciscan melange, graywacke, metavolcanic, and serpentinite units. The serpentinites have been intruded or dragged within faults, apparently over a wide range of scales. One of the more persistent zones

of serpentinite bodies occurs along a trend which extends west-northwestward from the West Huasna fault. It has been suggested that movement from this fault may have taken place within this serpentine belt. The range of hills that lies between the coast and Highway 1 between Estero Bay and Cambria is underlain by sandstone and minor shale of the Great Valley Sequence, referred to as the Cambria slab, which has been underthrust by Franciscan rocks. The thrust contact extends southeastward under Estero Bay near Cayucos. This contact is probably related to the fault contact between Great Valley and Franciscan rocks located just north of San Luis Obispo, which Page has shown to be overlain by unbroken lower Miocene strata.

A prominent feature of the Los Osos Valley antiform is the line of plugs and lensoid masses of intrusive Tertiary volcanic rocks. These distinctive bodies are present at isolated points along the approximate axis of the antiform over a distance of 22 miles, extending from the center of outer Estero Bay to the upper part of Los Osos Valley (Figure 2.5-6). The consistent trend of the intrusives provides a useful reference for assessing the possibility of northwest-trending lateral slip faulting within Estero Bay. It shows that such faulting has not extended across the trend from either the inferred San Simeon fault offshore south extension, or from faults in the ground east of the San Simeon trend.

2.5.24.1.5.4 Edna and San Miguelito Fault Zones

Edited for Clarity - Revised Section Number

These fault zones are described in Section 2.5.24.1.2.3.

Edited for Clarity - Revised Section Number

2.5.24.1.5.5 Adjacent Offshore Area and East Boundary of the Offshore Santa Maria Basin

Edited for Clarity - Revised Section Number

The stratigraphy and west-northwest-trending structure that characterize the onshore region from Point Sal to north of Point Estero have been shown by extensive marine geophysical surveying to extend into the adjacent offshore area as far as the north-northwest trending structural zone that forms a boundary with the main offshore Santa Maria Basin. Owing to the irregular outline of the coast, the width of the offshore shelf east of this boundary zone ranges from 2-1/2 to as much as 12 miles. The shelf area is narrowest opposite the reach of coast between Point San Luis and Point Buchon, and widest in Estero Bay and south of San Luis Bay.

The major geologic features that underlie the near-shore shelf include, from south to north, the Casmalia Hills anticline, the broad Santa Maria Valley downwarp, the anticlinal structural high off Point San Luis, the San Luis-Pismo syncline, and the Los Osos Valley antiform.

The form of these features is defined by the outcrop pattern and structure of the older Pliocene, Miocene, and basement core complex rocks. The younger Pliocene strata that constitute the upper 1000 to 2000 feet of section in the adjacent offshore Santa Maria Basin are partly buttressed and partly faulted against the rocks that underlie the

near-shore shelf, and they unconformably overlap the boundary zone and parts of the shelf in several areas.

The boundaries between the San Luis-Pismo syncline and the adjacent Los Osos Valley and Point San Luis antiforms can be seen in the offshore area to be expressed chiefly as zones of inflection between synclinal and anticlinal folds, rather than as zones of fault rupture such as occurs farther south along the Edna and San Miguelito faults. Isolated west-northwest- trending faults of no more than a few hundred feet displacement are located along the northeast flank of the syncline in Estero Bay. These faults evidently are the northwesternmost expressions of breakage along the Edna fault trend.

The main San Luis-Pismo synclinal structure opens to the northwest, attaining a maximum width of 8 or 9 miles in the southerly part of Estero Bay. The Point San Luis high, on the other hand, is a domal structure, the exposed basement rock core of which is about 10 miles long and 5 miles wide.

The general characteristics of the Santa Maria Basin East Boundary zone have been described in Section 2.5.24.1.2.3. As was noted there, the zone is essentially an expression of the boundary between the synclinorial downwarp of the offshore basin and the regional uplift of the southern Coast Ranges. In the vicinity of the San Luis Range, the zone is characterized by pronounced upwarping and normal faulting of the basement and overlying Tertiary rock sections. Both modes of deformation have contributed to the structural relief of about 500 feet in the Pliocene section, and of 1500 feet or more in the basement rocks, across this boundary. Successively younger strata are banked unconformably against the slopes that have formed from time to time in response to the relative uplifting of the ground east of the boundary zone.

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A series of near-surface structural troughs forms prominent features within the segment of the boundary zone structure that extends between the approximate latitudes of Arroyo Grande and Estero Bay. This trough structure apparently has formed through the extension and subsidence of a block of ground in the zone where the downwarp of the offshore basin has pulled away from the Santa Lucia uplift. Continued subsidence of this block has resulted in deformation and partial disruption of the buttress unconformity between the offshore Pliocene section and the near-shore Miocene and older rocks. This deformation is expressed by normal faulting and reverse drag type downfolding of the Pliocene strata adjacent to the contact, along the east side of the trough.

On the opposite, seaward side of the trough, a series of antithetic down-to-the-east normal faults of small displacement has formed in the Pliocene strata west of the contact zone. These faults exhibit only a few tens of feet displacement, and they seem to exhibit constant or even decreasing displacement downward.

The structural evolution of the offshore area near Estero Bay and the San Luis Range involved episodes of compressional deformation that affected the upper Tertiary section

similarly on opposite sides of the boundary zone. The section on either side exhibits about the same intensity and style of folding. Major folds, such as the San Luis-Pismo syncline and the Piedras Blancas anticline, can be traced into the ground across the boundary zone.

The internal structure of the zone, including the presence of several on-lap unconformities in the adjacent Pliocene section, shows that, at least during Pliocene and early Pleistocene time, the boundary zone has been the inflection line between the Coast Ranges uplift and the offshore Santa Maria Basin downwarp.

Evidence that uplift has continued through late Pleistocene time, at least in the vicinity of the San Luis Range, is given by the presence of successive tiers of marine terraces along the seaward flank of the range. The wave-cut benches and back scarps of these terraces now exist at elevations ranging from about -300 feet (below sea level) to more than 300 feet above sea level.

The ground within which the East Boundary zone lies has been beveled by the post-Wisconsin marine transgression, and so the zone generally is not expressed topographically. Small topographic features, such as a seaward topographic step-up of the sea floor surface across the east-down fault at the BBN (Reference 37)[52] (offshore) survey line 27 crossing, in Estero Bay, and several possible fault-line notch back scarps, however, may represent minor topographic expressions of deformation within the zone.

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2.5.24.1.6 Structural Stability

Edited for Clarity - Revised Section Number

The potential for surface or subsurface subsidence, uplift, or collapse at the site or in the region surrounding the site, is discussed in Section 2.5.54, Stability of Subsurface Materials.

Edited for Clarity - Revised Section Number

2.5.24.1.7 Regional Groundwater

Edited for Clarity - Revised Section Number

Groundwater in the region surrounding the site is used as a backup source due to its poor quality and the lack of a significant groundwater reservoir. Section 2.4.13 states that most of the groundwater at the site or in the area around the site is either in the alluvial deposits of Diablo Creek or seeps from springs encountered in excavations at the site.

2.5.24.2 Site Geology

Edited for Clarity - Revised Section Number

2.5.24.2.1 Site Physiography

Edited for Clarity - Revised Section Number

The site consists of approximately 750 acres near the mouth of Diablo Creek and is located on a sloping coastal terrace, ranging from 60 to 150 feet above sea level. The terrace terminates at the Pacific Ocean on the southwest and extends toward the San

Luis Mountains on the northeast. The terrace consists of bedrock overlain by surficial deposits of marine and nonmarine origin.

The remainder of this section presents a detailed description of site geology.

2.5.24.2.2 General Features

Edited for Clarity - Revised Section Number

The area of the DCPP site is a coastal tract in San Luis Obispo County approximately 6.5 miles northwest of Point San Luis. It lies immediately southeast of the mouth of Diablo Canyon, a major westward-draining feature of the San Luis Range, and about a mile southeast of Lion Rock, a prominent offshore element of the highly irregular coastline.

The ground being developed as a power plant site occupies an extensive topographic terrace about 1000 feet in average width. In its pregrading, natural state, the gently undulating surface of this terrace sloped gradually southwestward to an abrupt termination along a cliff fronting the ocean; in a landward, or northeasterly, direction, it rose with progressively increasing slope to merge with the much steeper front of a foothill ridge of the San Luis Range. The surface ranged in altitude from 65 to 80 feet along the coastline to a maximum of nearly 300 feet along the base of the hillslope to the northeast, but nowhere was its local relief greater than 10 feet. Its only major interruption was the steep-walled canyon of lower Diablo Creek, a gash about 75 feet in average depth.

The entire subject area is underlain by a complex sequence of stratified marine sedimentary rocks and tuffaceous volcanic rocks, all of Tertiary (Miocene) age. Diabasic intrusive rocks are locally exposed high on the walls of Diablo Canyon at the edge of the area. Both the sedimentary and volcanic rocks have been folded and otherwise disturbed over a considerable range of scales.

Surficial deposits of Quaternary age are widespread. In a few places, they are as thick as 50 feet, but their average thickness probably is on the order of 20 feet over the terrace areas and 10 feet or less over the entire mapped ground. The most extensive deposits underlie the main topographic terrace.

Like many other parts of the California coast, the Diablo Canyon area is characterized by several wave-cut benches of Pleistocene age. These surfaces of irregular but generally low relief were developed across bedrock by marine erosion, and they are ancient analogues of the benches now being cut approximately at sea level along the present coast. They were formed during periods when the sea level was higher, relative to the adjacent land, than it is now. Each is thinly and discontinuously mantled with marine sand, gravel, and rubble similar to the beach and offshore deposits that are accumulating along the present coastline. Along its landward margin each bears thicker and more localized coarse deposits similar to the modern talus along the base of the present sea cliff.

Both the ancient wave-cut benches and their overlying marine and shoreline deposits have been buried beneath silty to gravelly detritus derived from landward sources after the benches were, in effect, abandoned by the ocean. This nonmarine cover is essentially an apron of coalescing fan deposits and other alluvial debris that is thickest adjacent to the mouths of major canyons.

Where they have been deeply trenched by subsequent erosion, as along Diablo Canyon in the map areas, these deposits can be seen to have buried some of the benches so deeply that their individual identities are not reflected by the present (pregrading) rather smooth terrace topography. Thus, the surface of the main terrace is defined mainly by nonmarine deposits that conceal both the older benches of marine erosion and some of the abruptly rising ground that separates them (refer to see Figures 2.5-8 and 2.5-10).

Edited for Clarity – Refer to Applicability Matrix Item # 7

The observed and inferred relationships among the terrace surfaces and the wave-cut benches buried beneath them can be summarized as follows:

Wave-cut Bench		Terrace Surface	
Altitude, feet	Location	Altitude, feet	Location
170-175	Small remnants on side of Diablo Canyon	Mainly 170-190	Sides of Diablo Canyon upper parts of main terrace; in places separated from lower
145-155	Very small remnants on sides of Diablo Canyon	Mainly 150-170	parts of terrace by scarps
120-130 90-100	Subparallel benches elongate in a northwest-southeast direction but with considerable aggregate width wholly beneath main terrace surface	Mainly 70-160	Most of main terrace, a widespread surface on a composite section of nonmarine deposits; no well-defined scarps
30-45	Small remnants above modern sea cliff		No depositional terrace
Approx. 0	Small to moderately large area along present coastline		

Within the subject area the wave-cut benches increase progressively in age with increasing elevation above present sea level; hence, their order in the above list is one of decreasing age. By far, the most extensive of these benches slopes gently seaward from a shoreline angle that lies at an elevation of 100 feet above present sea level.

The geology of the power plant site is shown in the site geologic maps, Figures 2.5-8 and 2.5-9, and geologic section, Figure 2.5-10.

2.5.24.2.3 Stratigraphy

Edited for Clarity - Revised Section Number

2.5.24.2.3.1 Obispo Tuff

Edited for Clarity - Revised Section Number

The Obispo Tuff, which has been classified either as a separate formation or as a member of the Miocene Monterey Formation, is the oldest bedrock unit exposed in the site area. Its constituent rocks generally are well exposed, appear extensively in the coastward parts of the area, and form nearly all of the offshore prominences and shoals. They are dense to highly porous, and thinly layered to almost massive. Their color ranges from white to buff in fresh exposures, and from yellowish to reddish brown on weathered surfaces, many of which are variegated in shades of brown. Outcrop surfaces have a characteristic "punky" to crusty appearance, but the rocks in general are tough, cohesive, and relatively resistant to erosion.

Several pyroclastic rock types constitute the Obispo Tuff ("To" on map, Figure 2.5-8) in and near the subject area. By far, the most widespread is fine-grained vitric tuff with rare to moderately abundant tabular crystals of sodic plagioclase. The constituent glass commonly appears as fresh shards, but in many places it has been partly or completely devitrified. Crystal tuffs are locally prominent, and some of these are so crowded with 1/8 to 3/8 inch crystals of plagioclase that they superficially resemble granitoid plutonic rocks. Other observed rock types include pumiceous tuffs, pumice-pellet tuff breccias, perlitic vitreous tuffs, tuffaceous siltstones and mudstones, and fine-grained tuff breccias with fragments of glass and various Monterey rocks. No massive flow rocks were recognized anywhere in the exposed volcanic section.

In terms of bulk composition, the pyroclastic rocks appear to be chiefly soda rhyolites and soda quartz latites. Their plagioclase, which ranges from calcic albite to sodic oligoclase, commonly is accompanied by lesser amounts of quartz as small rounded crystals and irregular crystal fragments. Biotite, zircon, and apatite also are present in many of the specimens that were examined under the microscope. Most of the tuffaceous rocks, and especially the more vitreous ones, have been locally to pervasively altered. Products of silicification, zeolitization, and pyritization are readily recognizable in many exposures, where the rocks generally are traversed by numerous thin, irregular veinlets and layers of cherty to opaline material. Veinlets and thin, pod-like concentrations of gypsum also are widespread. Where pyrite is present, the rocks weather yellowish to brownish and are marked by gossan-like crusts.

The various contrasting rock types are simply interlayered in only a few places; much more typical are abutting, intertonguing, and irregularly interpenetrating relationships over a wide range of scales. Septa and inclusions of Monterey rocks are abundant, and a few of them are large enough to be shown separately on the accompanying geologic map (Figure 2.5-8). Highly irregular inclusions, a few inches to several feet in maximum dimension, are so densely packed together in some places that they form breccias with volcanic matrices.

The Obispo Tuff is underlain by mudstones of early Miocene (pre-Monterey) age, on which it rests with a highly irregular contact that appears to be in part intrusive. This contact lies offshore in the vicinity of the power plant site, but it is exposed along the seacoast to the southeast.

In a gross way, the Obispo underlies the basal part of the Monterey formation, but many of its contacts with these sedimentary strata are plainly intrusive. Moreover, individual sills and dikes of slightly to thoroughly altered tuffaceous rocks appear here and there in the Monterey section, not uncommonly at stratigraphic levels well above its base (refer to see Figures 2.5-8 and 2.5-13). The observed physical relationships, together with the local occurrence of diatoms and foraminifera within the principal masses of volcanic rocks, indicate that much of the Obispo Tuff in this area probably was emplaced at shallow depths beneath the Miocene sea floor during accumulation of the Monterey strata. The tuff unit does not appear to represent a single, well-defined eruptive event, nor is it likely to have been derived from a single source conduit.

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2.5.24.2.3.2 Monterey Formation

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Stratified marine rocks variously correlated with the Monterey Formation, Point Sal Formation, and Obispo Tuff underlie most of the subject area, including all of that portion intended for power plant location. They are almost continuously exposed along the crescentic sea cliff that borders Diablo Cove, and elsewhere they appear in much more localized outcrops. For convenience, they are here assigned to the Monterey Formation ("Tm" on map, Figure 2.5-8) in order to delineate them from the adjacent more tuffaceous rocks so typical of the Obispo Tuff.

The observed rock types, listed in general order of decreasing abundance, are silty and tuffaceous sandstone, siliceous shale, shaly siltstone and mudstone, diatomaceous shale, sandy to highly tuffaceous shale, calcareous shale and impure limestone, bituminous shale, fine- to coarse-grained sandstone, impure vitric tuff, silicified limestone and shale, and tuff-pellet sandstone. Dark colored and relatively fine-grained strata are most abundant in the lowest part of the section, as exposed along the east side of Diablo Cove, whereas lighter colored sandstones and siliceous shales are dominant at stratigraphically higher levels farther north. In detail, however, the different rock types are interbedded in various combinations, and intervals of uniform lithology rarely are thicker than 30 feet. Indeed, the closely-spaced alternations of contrasting strata yield a prominent rib-like pattern of outcrop along much of the sea cliff and shoreline bench forming the margin of Diablo Cove.

The sandstones are mainly fine- to medium-grained, and most are distinctly tuffaceous. Shards of volcanic glass generally are recognizable under the microscope, and the very fine-grained siliceous matrix may well have been derived largely through alteration of original glassy material. Some of the sandstone contains small but megascopically visible fragments of pumice, perlitic glass, and tuff, and a few beds grade along strike into submarine tuff breccia. The sandstones are thinly to very thickly layered; individual beds 6 inches to 4 feet thick are fairly common, and a few appear to be as thick as

15 feet. Some of them are hard and very resistant to erosion, and they typically form subdued but nearly continuous elongated projections on major hillslopes (Figure 2.5-8).

The siliceous shales are buff to light gray platy rocks that are moderately hard to extremely hard according to their silica content, but they tend to break readily along bedding and fracture surfaces. The bituminous rocks and the siltstones and mudstones are darker colored, softer, and grossly more compact. Some of them are very thinly bedded or laminated, others appear almost massive or form matrices for irregularly ellipsoidal masses of somewhat sandier material. The diatomaceous, tuffaceous, and sandy rocks are lighter colored. The more tuffaceous types are softer, and the diatomaceous ones are soft to the degree of punkiness; both kinds of rocks are easily eroded, but are markedly cohesive and tend to retain their gross positions on even the steepest of slopes.

The siliceous shale and most of the hardest, highly silicified rocks weather to very light gray, and the dark colored, fine-grained rocks tend to bleach when weathered. The other types, including the sandstones, weather to various shades of buff and light brown. Stains of iron oxides are widespread on exposures of nearly all the Monterey rocks, and are especially well developed on some of the finest-grained shales that contain disseminated pyrite. All but the hardest and most thick-bedded rocks are considerably broken to depths of as much as 6 feet in the zone of weathering on slopes other than the present sea cliff, and the broken fragments have been separated and displaced by surface creep to somewhat lesser depths.

2.5.24.2.3.3 Diabasic Intrusive Rocks

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Small, irregular bodies of diabasic rocks are poorly exposed high on the walls of Diablo Canyon at and beyond the northeasterly edge of the map area. Contact relationships are readily determined at only a few places where these rocks evidently are intrusive into the Monterey Formation. They are considerably weathered, but an ophitic texture is recognizable. They consist chiefly of calcic plagioclase and augite, with some olivine, opaque minerals, and zeolitic alteration products.

2.5.24.2.3.4 Masses of Brecciated Rocks

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Highly irregular masses of coarsely brecciated rocks, a few feet to many tens of feet in maximum dimension, are present in some of the relatively siliceous parts of the Monterey section that adjoin the principal bodies of Obispo Tuff. The fracturing and dislocation is not genetically related to any recognizable faults, but instead seems to have been associated with emplacement of the volcanic rocks; it evidently was accompanied by, or soon followed by, extensive silicification. Many adjacent fragments in the breccias are closely juxtaposed and have matching opposed surfaces, so that they plainly represent no more than coarse crackling of the brittle rocks. Other fragments, though angular or subangular, are not readily matched with adjacent fragments and hence may represent significant translation within the entire rock masses.

The ratio of matrix materials to coarse fragments is very low in most of the breccias and nowhere was it observed to exceed about 1:3. The matrices generally comprise smaller angular fragments of the same Monterey rocks that are elsewhere dominant in the breccias, and they characteristically are set in a siliceous cement. Tuffaceous matrices, with or without Monterey fragments, also are widespread and commonly show the effects of pervasive silicification. All the exposed breccias are firmly cemented, and they rank among the hardest and most resistant units in the entire bedrock section.

A few 3 to 18 inch beds of sandstone have been pulled apart to form separate tabular masses along specific stratigraphic horizons in higher parts of the Monterey sequence. Such individual tablets, which are boudins rather than ordinary breccia fragments, are especially well exposed in the sea cliff at the northern corner of Diablo Cove. They are flanked by much finer-grained strata that converge around their ends and continue essentially unbroken beyond them. This boudinage or separation and stringing out of sandstone beds that lie within intervals of much softer and more shaly rocks has resulted from compression during folding of the Monterey section. Its distribution is stratigraphically controlled and is not systematically related to recognizable faults in the area.

2.5.24.2.3.5 Surficial Deposits

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1. Coastal Terrace Deposits

The coastal wave-cut benches of Pleistocene age, as described in a foregoing section, are almost continuously blanketed by terrace deposits (Qter in Figure 2.5-8) of several contrasting types and modes of origin. The oldest of these deposits are relatively thin and patchy in their occurrence, and were laid down along and adjacent to ancient beaches during Pleistocene time. They are covered by considerably thicker and more extensive nonmarine accumulations of detrital materials derived from various landward sources.

The marine deposits consist of silt, sand, gravel, and cobbly to bouldery rubble. They are approximately 2 feet in average thickness over the entire terrace area and reach a maximum observed thickness of about 8 feet. They rest directly upon bedrock, some of which is marked by numerous holes attributable to the action of boring marine mollusks, and they commonly contain large rounded cobbles and boulders of Monterey and Obispo rocks that have been similarly bored. Lenses and pockets of highly fossiliferous sand and gravel are present locally.

The marine sediments are poorly to very well sorted and loose to moderately well consolidated. All of them have been naturally compacted; the degree of compaction varies according to the material, but it is consistently greater than that observed in any of the associated surficial deposits of other types. Near the inner margins of individual wave-cut benches the marine deposits merge landward into coarser and less well-sorted debris that evidently accumulated along the bases of ancient sea cliffs or

other shoreline slopes. This debris is locally as much as 12 feet thick; it forms broad but very short aprons, now buried beneath younger deposits, that are ancient analogues of the talus accumulations along the inner margin of the present beach in Diablo Cove. One of these occurrences, identified as "fossil Qtb" in the geologic map of Figure 2.5-8, is well exposed high on the northerly wall of Diablo Canyon.

A younger, thicker, and much more continuous nonmarine cover is present over most of the coastal terrace area. It consistently overlies the marine deposits noted above, and, where these are absent, it rests directly upon bedrock. It is composed in part of alluvial detritus contributed during Pleistocene time from Diablo Canyon and several smaller drainage courses, and it thickens markedly as traced sourceward toward these canyons. The detritus represents a series of alluvial fans, some of which appear to have partly coalesced with adjacent ones. It is chiefly fine- to moderately-coarse-grained gravel and rubble characterized by tabular fragments of Monterey rocks in a rather abundant silty to clayey matrix. Most of it is thinly and regularly stratified, but the distinctness of this layering varies greatly from place to place.

Slump, creep, and slope-wash deposits, derived from adjacent hillsides by relatively slow downhill movement over long periods of time, also form major parts of the nonmarine terrace cover. All are loose and uncompacted. They comprise fragments of Monterey rocks in dark colored clayey matrices, and their internal structure is essentially chaotic. In some places they are crudely interlayered with the alluvial fan deposits, and elsewhere they overlie these bedded sediments. On parts of the main terrace area not reached by any of the alluvial fans, a cover of slump, creep, and slope-wash deposits, a few inches to nearly 10 feet thick, rests directly upon either marine terrace deposits or bedrock.

Thus, the entire section of terrace deposits that caps the coastal benches of Pleistocene marine erosion is heterogeneous and internally complex; it includes contributions of detritus from contrasting sources, from different directions at different times, and via several basically different modes of transport and deposition.

2. Stream-terrace Deposits

Several narrow, irregular benches along the walls of Diablo Canyon are veneered by a few inches to 6 feet of silty gravels that are somewhat coarser but otherwise similar to the alluvial fan deposits described above. These stream-terrace deposits (Qst) originally occupied the bottom of the canyon at a time when the lower course of Diablo Creek had been cut downward through the alluvial fan sediments of the main terrace and well into the underlying bedrock. Subsequent deepening of the canyon left remnants of the deposits as cappings on scattered small terraces.

3. Landslide Deposits

The walls of Diablo Canyon also are marked by tongue- and bench-like accumulations of loose, rubbly landslide debris (Qls), consisting mainly of highly broken and jumbled

masses of Monterey rocks with abundant silty and soily matrix materials. These landslide bodies represent localized failure on naturally oversteepened slopes, generally confined to fractured bedrock in and immediately beneath the zone of weathering. Individual bodies within the mapped area are small, with probable maximum thicknesses no greater than 20 feet. All of them lie outside the area intended for power plant construction.

Landslide deposits along the sea cliff have been recognized at only one locality, on the north side of Diablo Cove about 400 feet northwest of the mouth of Diablo Canyon. Here slippage has occurred along bedding and fracture surfaces in siliceous Monterey rocks, and it has been confined essentially to the axial region of a well-defined syncline (refer to Figure 2.5-8). Several episodes of sliding are attested by thin, elongate masses of highly broken ground separated from one another by well-defined zones of dislocation. Some of these masses are still capped by terrace deposits. The entire composite accumulation of debris is not more than 35 feet in maximum thickness, and ground failure at this locality does not appear to have resulted in major recession of the cliff. Elsewhere within the mapped area, landsliding along the sea cliff evidently has not been a significant process.

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Large landslides, some of them involving substantial thickness of bedrock, are present on both sides of Diablo Canyon not far northeast of the power plant area. These occurrences need not be considered in connection with the plant site, but they have been regarded as significant factors in establishing a satisfactory grading design for the switchyard and other up-canyon installations. They are not dealt with in this section.

4. Slump, Creep, and Slope-wash Deposits

As noted earlier, slump, creep, and slope-wash deposits (Qsw) form parts of the nonmarine sedimentary blanket on the main terrace. These materials are shown separately on the geologic map only in those limited areas where they have been considerably concentrated along well-defined swales and are readily distinguished from other surficial deposits. Their actual distribution is much wider, and they undoubtedly are present over a large fraction of the areas designated as Qter; their average thickness in such areas, however, is probably less than 5 feet.

Angular fragments of Monterey rocks are sparsely to very abundantly scattered through the slump, creep, and slope-wash deposits, whose most characteristic feature is a fine-grained matrix that is dark colored, moderately rich in clay minerals, and extremely soft when wet. Internal layering is rarely observable and nowhere is sharply expressed. The debris seems to have been rather thoroughly intermixed during its slow migration down hillslopes in response to gravity. That it was derived mainly from broken materials in the zone of weathering is shown by several exposures in which it grades downward through soily debris into highly disturbed and partly weathered bedrock, and thence into progressively fresher and less broken bedrock.

5. Talus and Beach Deposits

Much of the present coastline in the subject area is marked by bare rock, but Diablo Cove and a few other large indentations are fringed by narrow, discontinuous beaches and irregular concentrations of sea cliff talus. These deposits (Qtb) are very coarse grained. Their total volume is small, and they are of interest mainly as modern analogues of much older deposits at higher levels beneath the main terrace surface.

The beach deposits consist chiefly of well-rounded cobbles. They form thin veneers over bedrock, and in Diablo Cove they grade seaward into patches of coarse pebbly sand. The floors of both Diablo Cove and South Cove probably are irregular in detail and are featured by rather hard, fresh bedrock that is discontinuously overlain by irregular thin bodies of sand and gravel. The distribution and abundance of kelp suggest that bedrock crops out over large parts of these cove areas where the sea bottom cannot be observed from onshore points.

6. Stream-laid Alluvium

Stream-laid alluvium (Qal) occurs as a strip along the present narrow floor of Diablo Canyon, where it is only a few feet in average thickness. It is composed of irregularly intertongued silt, sand, gravel, and rubble. It is crudely to sharply stratified, poorly to well sorted, and, in general, somewhat compacted. Most of it is at least moderately porous.

7. Other Deposits

Earlier inhabitation of the area by Indians is indicated by several midden deposits that are rich in charcoal and fragments of shells and bones. The most extensive of these occurrences marks the site of a long-abandoned village along the edge of the main terrace immediately northwest of Diablo Canyon. Others have been noted on the main terrace just east of the mouth of Diablo Canyon, on the shoreward end of South Point, and at several places in and near the plant site.

2.5.24.2.4 Structure

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2.5.24.2.4.1 Tectonic Structures Underlying the Region Surrounding the Site

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The dominant tectonic structure in the region of the power plant site is the San Luis-Pismo downwarp system of west-northwest-trending folds. This structure is bounded on the northeast by the antiformal basement rock structure of the Los Osos and San Luis Valley trend. The west-northwest-trending Edna fault zone lies along the northeast flank of the range, and the parallel Miguelito fault extends into the southeasterly end of the range. A north-northwest- trending structural discontinuity that may be a fault has been inferred or interpolated from widely spaced traverses in the offshore, extending within about 5 miles of the site at its point of closest approach. To the west of this discontinuity, the structure is dominated by north to north-

northwest-trending folds in Tertiary rocks. These features are illustrated in Figure 2.5-3 and described in this section.

Tectonic structures underlying the site and region surrounding the site are identified in the above and following sections, and they are shown in Figures 2.5-3, 2.5-5, 2.5-8, 2.5-10, 2.5-15, and 2.5-16. They are listed as follows:

2.5.24.2.4.2 Tectonic Structures Underlying the Site

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The rocks underlying the DCPP site have been subjected to intrusive volcanic activity and to later compressional deformation that has given rise to folding, jointing and fracturing, minor faulting, and local brecciation. The site is situated in a section of moderately to steeply north-dipping strata, about 300 feet south of an east-west-trending synclinal fold axis (Figures 2.5-8 and 2.5-10). The rocks are jointed throughout, and they contain local zones of closely spaced high-angle fractures (Figure 2.5-16).

A minor fault zone extends into the site from the west, but dies out in the vicinity of the Unit 1 turbine building. Two other minor faults were mapped for distances of 35 to more than 200 feet in the bedrock section exposed in the excavation for the Unit 1 containment structure. In addition to these features, cross-cutting bodies of tuff and tuff brecia, and cemented "crackle breccia" could be considered as tectonic structures.

Exact ages of the various tectonic structures at the site are not known. It has been clearly demonstrated, however, that all of them are truncated by, and therefore antedate, the principal marine erosion surface that underlies the coastal terrace bench. This terrace can be correlated with coastal terraces to the north and south that have been dated as 80,000 to 120,000 years old. The tectonic structures probably are related to the Pliocene-lower Pleistocene episode of Coast Ranges deformation, which occurred more than 1 million years ago.

The bedrock units within the entire subject area form part of the southerly flank of a very large syncline that is a major feature of the San Luis Range. The northerly-dipping sequence of strata is marked by several smaller folds with subparallel trends and flank-to-flank dimensions measured in hundreds of feet. One of these, a syncline with gentle to moderate westerly plunge, is the largest flexure recognized in the vicinity of the power plant site. Its axis lies a short distance north of the site and about 450 feet northeast of the mouth of Diablo Canyon (Figures 2.5-8 and 2.5-10). East of the canyon this fold appears to be rather open and simple in form, but farther west it probably is complicated by several large wrinkles and may well lose its identity as a single feature. Some of this complexity is clearly revealed along the northerly margin of Diablo Cove, where the beds exposed in the sea cliff have been closely folded along east to northeast trends. Here a tight syncline (shown in Figure 2.5-8) and several smaller folds can be recognized, and steep to near-vertical dips are dominant in several parts of the section.

The southerly flank of the main syncline within the map area steepens markedly as traced southward away from the fold axis. Most of this steepening is concentrated within an across-strike distance of about 300 feet as revealed by the strata exposed in the sea cliff southeastward from the mouth of Diablo Canyon; farther southward the beds of sandstone and finer-grained rocks dip rather uniformly at angles of 70° or more. A slight overturning through the vertical characterizes the several hundred feet of section exposed immediately north of the Obispo Tuff that underlies South Point and the north shore of South Cove (refer to~~see~~ Figure 2.5-8). Thus the main syncline, though simple in gross form, is distinctly asymmetric. The steepness of its southerly flank may well have resulted from buttressing, during the folding, by the relatively massive and competent unit of tuffaceous rocks that adjoins the Monterey strata at this general level of exposure.

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Smaller folds, corrugations, and highly irregular convolutions are widespread among the Monterey rocks, especially the finest-grained and most shaley types. Some of these flexures trend east to southeast and appear to be drag features systematically related to the larger-scale folding in the area. Most, however, reflect no consistent form or trend, range in scale from inches to only a few feet, and evidently are confined to relatively soft rocks that are flanked by intervals of harder and more massive strata. They constitute crudely tabular zones of contortion within which individual rock layers can be traced for short distances but rarely are continuous throughout the deformed ground.

Some of this contortion appears to have derived from slumping and sliding of unconsolidated sediments on the Miocene sea floor during accumulation of the Monterey section. Most of it, in contrast, plainly occurred at much later times, presumably after conversion of the sediments to sedimentary rocks, and it can be most readily attributed to highly localized deformation during the ancient folding of a section that comprises rocks with contrasting degrees of structural competence.

2.5.24.2.4.3 Faults

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Numerous faults with total displacements ranging from a few inches to several feet cut the exposed Monterey rocks. Most of these occur within, or along the margins of, the zones of contortion noted above. They are sharp, tight breaks with highly diverse attitudes, and they typically are marked by 1/16-inch or less of gouge or microbreccia. Nearly all of them are curving or otherwise somewhat irregular surfaces, and many can be seen to terminate abruptly or to die out gradually within masses of tightly folded rocks. These small faults appear to have been developed as end products of localized intense deformation caused by folding of the bedrock section. Their unsystematic attitudes, small displacements, and limited effects upon the host rocks identify them as second-order features, i.e., as results rather than causes of the localized folding and convolution with which they are associated.

Three distinctly larger and more continuous faults also were recognized within the mapped area. They are well exposed on the sea cliff that fringes Diablo Cove (refer to~~see~~ Figure 2.5-8), and each lies within a zone of moderately to severely contorted fine-grained Monterey strata. Each is actually a zone, 6 inches to several feet wide,

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within which two or more subparallel tight breaks are marked by slickensides, 1/4-inch or less of gouge, and local stringers of gypsum. None of these breaks appears to be systematically related to individual folds within the adjoining rocks. None of them extends upward into the overlying blanket of Quaternary terrace deposits.

One of these faults, exposed on the north side of the cove, trends north-northwest essentially parallel to the flanking Monterey beds, but it dips more steeply than these beds. Another, exposed on the east side of the cove, trends east-southeast and is essentially vertical; thus, it is essentially parallel to the structure of the host Monterey section. Neither of these faults projects toward the ground intended for power plant construction. The third fault, which appears on the sea cliff at the mouth of Diablo Canyon, trends northeast and projects toward the ground in the northernmost part of the power plant site. It dips northward somewhat more steeply than the adjacent strata.

Total displacement is not known for any of these three faults on the basis of natural exposures, but it could amount to as much as tens of feet. That these breaks are not major features, however, is strongly suggested by their sharpness, by the thinness of gouge along individual surfaces of slippage, and by the essential lack of correlation between the highly irregular geometry of deformation in the enclosing strata and any directions of movement along the slip surfaces.

The possibility that these surfaces are late-stage expressions of much larger-scale faulting at this general locality was tested by careful examination of the deformed rocks that they transect. On megascopic scales, the rocks appear to have been deformed much more by flexing than by rupture and slippage, as evidenced by local continuity of numerous thin beds that denies the existence of pervasive faulting within much of the ground in question. That the finer-grained rocks are not themselves fault gouged was confirmed by examination of 34 samples under the microscope.

Sedimentary layering, recognized in 27 of these samples, was observed to be grossly continuous even though dislocated here and there by tiny fractures. Moreover, nearly all the samples were found to contain shards of volcanic glass and/or the tests of foraminifera; some of these delicate components showed effects of microfracturing and a few had been offset a millimeter or less along tiny shear surfaces, but none appeared to have been smeared out or partially obliterated by intense shearing or grinding. Thus, the three larger faults in the area evidently were superimposed upon ground that already had been deformed primarily by small-scale and locally very intense folding rather than by pervasive grinding and milling.

It is not known whether these faults were late-stage results of major folding in the region or were products of independent tectonic activity. In either case, they are relatively ancient features, as they are capped without break by the Quaternary terrace deposits exposed along the upper part of the sea cliff. They probably are not large-scale elements of regional structure, as examination of the nearest areas of exposed bedrock along their respective landward projections revealed no evidence of substantial offsets among recognizable stratigraphic units.

Seaward projection of one or more of these faults might be taken to explain a possible large offset of the Obispo Tuff units exposed on North Point and South Point. The notion of such an offset, however, would rest upon the assumption that these two units are displaced parts of an originally continuous body, for which there is no real evidence. Indeed, the two tuff units are bounded on their northerly sides by lithologically different parts of the Monterey Formation; hence, they were clearly originally emplaced at different stratigraphic levels and are not directly correlative.

2.5.24.2.5 Geological Relationships at the Units 1 and 2 Power Plant Site

Edited for Clarity - Revised Section Number

2.5.24.2.5.1 Geologic Investigations at the Site

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The geologic relationships at DCPP site have been studied in terms of both local and regional stratigraphy and structure, with an emphasis on relationships that could aid in dating the youngest tectonic activity in the area. Geologic conditions that could affect the design, construction, and performance of various components of the plant installation also were identified and evaluated. The investigations were carried out in three main phases, which spanned the time between initial site selection and completion of foundation construction.

2.5.24.2.5.2 Feasibility Investigation Phase

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Work directed toward determining the pertinent general geologic conditions at the plant site comprised detailed mapping of available exposures, limited hand trenching in areas with critical relationships, and petrographic study of the principal rock types. The results of this feasibility program were presented in a report that also included recommendations for determining suitability of the site in terms of geologic conditions. Information from this early phase of studies is included in the preceding four sections and illustrated in Figures 2.5-8, 2.5-9, and 2.5-10.

2.5.24.2.5.3 Suitability Investigation Phase

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The record phase of investigations was directed toward testing and confirming the favorable judgments concerning site feasibility. Inasmuch as the principal remaining uncertainties involved structural features in the local bedrock, additional effort was made to expose and map these features and their relationships. This was accomplished through excavation of large trenches on a grid pattern that extended throughout the plant area, followed by photographing the trench walls and logging the exposed geologic features. Large-scale photographs were used as a mapping base, and the recorded data were then transferred to controlled vertical sections at a scale of 1 inch = 20 feet. The results of this work were reported in three supplements to the original geologic report (Reference 1)[41]. Supplementary Reports I and III presented data and interpretation based on trench exposures in the areas of the Unit 1 and Unit 2 installations, respectively. Supplementary Report II described the relationships of small bedrock faults exposed in the exploratory trenches and in the nearby sea cliff.

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During these suitability investigations, special attention was given to the contact between bedrock and overlying terrace deposits in the plant site area. It was determined that none of the discontinuities present in the bedrock section displaces either the erosional surface developed across the bedrock or the terrace deposits that rest upon this surface. The pertinent data are presented farther on in this section and illustrated in Figures 2.5-11, 2.5-12, 2.5-13, and 2.5-14.

2.5.24.2.5.4 Construction Geology Investigation Phase

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Geologic work done during the course of construction at the plant site spanned an interval of 5 years, which encompassed the period of large-scale excavation. It included detailed mapping of all significant excavations, as well as special studies in some areas of rock bolting and other work involving rock reinforcement and temporary instrumentation. The mapping covered essentially all parts of the area to be occupied by structures for Units 1 and 2, including the excavations for the circulating water intake and outlet, the turbine-generator building, the auxiliary building, and the containment structures. The results of this mapping are described farther on and illustrated in Figures 2.5-15 and 2.5-16.

2.5.24.2.5.5 Exploratory Trenching Program, Unit 1 Site

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Four exploratory trenches were cut beneath the main terrace surface at the power plant site, as shown in Figures 2.5-8, 2.5-11, 2.5-12, and 2.5-13. Trench AF (Trench A), about 1080 feet long, extended in a north-northwesterly direction and thus was roughly parallel to the nearby margin of Diablo Cove. Trench BE (Trench B), 380 feet long, was parallel to Trench A and lay about 150 feet east of the northerly one-third of the longer trench. Trenches C and D, 450 and 490 feet long, respectively were nearly parallel to each other, 130 to 150 feet apart, and lay essentially normal to Trenches A and B. The two pairs of trenches crossed each other to form a "#" pattern that would have been symmetrical were it not for the long southerly extension of Trench A. They covered the area intended for Unit 1 power plant construction, and the intersection of Trenches B and C coincided in position with the center of the Unit 1 nuclear reactor structure.

All four trenches, throughout their aggregate length of approximately 2400 feet, revealed a section of surficial deposits and underlying bedrock that corresponds to the two-ply sequence of surficial deposits and Monterey strata exposed along the sea cliff in nearby Diablo Cove. The trenches ranged in depth from 10 feet to nearly 40 feet, and all had sloping sides that gave way downward to essentially vertical walls in the bedrock encountered 3 to 8 feet above their floors.

To facilitate detailed geologic mapping, the easterly walls of Trenches A and B and the southerly walls of Trenches C and D were trimmed to near-vertical slopes extending upward from the trench floors to levels well above the top of bedrock. These walls subsequently were scaled back by means of hand tools in order to provide fresh, clean exposures prior to mapping of the contact between bedrock and overlying unconsolidated materials.

1. Bedrock

The bedrock that was continuously exposed in the lowest parts of all the exploratory trenches lies within a portion of the Montery Formation characterized by a preponderance of sandstone. It corresponds to the part of the section that crops out in lower Diablo Canyon and along the sea cliff souteastward from the canyon mouth. The sandstone ranges from light gray through buff to light reddish brown, from silty to markedly tuffaceous, and from thin-bedded and platy to massive. The distribution and thickness of beds can be readily appraised from sections along Trenches A and B (Figure 2.5-12) that show nearly all individual bedding surfaces that could be recognized on the ground.

The sandstone ranges from very hard to moderately soft, and some of it feels slightly punky when struck with a pick. All of it is, however, firm and very compact. In general, the most platy parts of the sequence are also the hardest, but the soundest rock in the area is almost massive sandstone of the kind that underlies the site of the intended reactor structure. This rock is well exposed on the nearby hillslope adjoining the main terrace area, where it has been markedly resistant to erosion and stands out as distinct low ridges.

Tuff, consisting chiefly of altered volcanic glass, forms irregular sills and dikes in several parts of the bedrock section. This material, generally light gray to buff, is compact but distinctly softer than the enclosing sandstone. Individual bodies are 1/2 inch to 4 feet thick. They are locally abundant in Trench C west of Trench A, and in Trench A southward beyond the end of the section in Figure 2.5-12. They are very rare or absent in Trenches B and D, and in the easterly parts of Trench C and the northerly parts of Trench A. These volcanic rocks probably are related to the Obispo Tuff as described earlier, but all known masses of typical Obispo rocks in this area lie at considerable distances west and south of the ground occupied by the trenches.

2. Bedrock Structure

The stratification of the Monterey rocks dips northward wherever it was observable in the trenches, in general, at angles of 35 to 55°. Thus, the bedrock beneath the power plant site evidently lies on the southerly flank of the major syncline noted and described earlier. Zones of convolution and other expressions of locally intense folding were not recognized, and probably are much less common in this general part of the section than in other, previously described parts that include intervals of softer and more shaley rocks.

Much of the sandstone is traversed by fractures. Planar, curving, and irregular surfaces are well represented, and, in places, they are abundant and closely spaced. All prominent fractures and many of the minor and discontinuous ones are shown in the sections of Figure 2.5-12. Also shown in these sections are all recognized slip joints, shear surfaces, and faults, i.e., all surfaces along which the bedrock has been

displaced. Such features are most abundant in Trenches A and C near their intersection, in Trench D west of the intersection with Trench A, and near the northerly end of Trench B.

Most of the surfaces of movement are hairline features with or without thin films of clay and/or gypsum. Displacements range from a small fraction of an inch to several inches. The other surfaces are more prominent, with well-defined zones of gouge and fine-grained breccia ordinarily 1/8 inch or less in thickness. Such zones were observed to reach a maximum thickness of nearly 1/2 inch along two small faults, but only as local lenses or pockets. Exposures were not sufficiently extensive in three dimensions for definitely determining the magnitude of slip along the more prominent faults, but all of these breaks appeared to be minor features. Indeed, no expressions of major faulting were recognized in any of the trenches despite careful search, and the continuous bedrock exposures precluded the possibility that such features could have been readily overlooked.

A northeast-trending fault that appears on the sea cliff at the mouth of Diablo Canyon projects toward the ground in the northernmost part of the power plant site, as noted in a foregoing section. No zone of breaks as prominent as this one was identified in the trench exposures, and any distinct northeastward continuation of the fault would necessarily lie north of the trenched ground. Alternatively, this fault might well separate northeastward into several smaller faults; some or all of these could correspond to some or all of the breaks mapped in the northerly parts of Trenches A and B.

3. Terrace Deposits

Marine terrace deposits of Pleistocene age form a cover, generally 2 to 5 feet thick, over the bedrock that lies beneath the power plant site. This cover was observed to be continuous in Trench C and the northerly part of Trench A, and to be nearly continuous in the other two trenches. Its lithology is highly variable, and includes bouldery rubble, loose beach sand, pebbly silt, silty to clayey sand with abundant shell fragments, and soft clay derived from underlying tuffaceous rocks. Nearly all of these deposits are at least sparsely fossiliferous, and, in a few places, they consist mainly of shells and shell fragments. Vertebrate fossils, chiefly vertebral and rib materials representing large marine mammals, are present locally; recognized occurrences are designated by the symbol X in the sections of Figure 2.5-12.

At the easterly ends of Trenches C and D, the marine deposits intergrade and intertongue in a landward direction with thicker and coarser accumulations of poorly sorted debris. This material evidently is talus that was formed along the base of an ancient sea cliff or other shoreline slope. In some places, the marine deposits are overlain by nonmarine terrace sediments with a sharp break, but elsewhere the contact between these two kinds of deposits is a dark colored zone, a few inches to as much as 2 feet thick, that appears to represent a soil developed on the marine section. Fragments of these soily materials appear here and there in the basal parts of the nonmarine section.

The nonmarine sediments that were exposed in Trenches B, C, and D and in the northerly part of Trench A are mainly alluvial deposits derived in ancient times from Diablo Canyon. They consist of numerous tabular fragments of Monterey rocks in a relatively dark colored silty to clayey matrix, and, in general, they are distinctly bedded and moderately to highly compact. As indicated in the sections of Figure 2.5-12, they thicken progressively in a north-northeastward direction, i.e., toward their principal source, the ancient mouth of Diablo Canyon.

Slump, creep, and slope-wash deposits, which constitute the youngest major element of the terrace section, overlie the alluvial fan gravels and locally are interlayered with them. Where the gravels are absent, as in the southerly part of Trench A, this younger cover rests directly upon bedrock. It is loose and uncompacted, internally chaotic, and is composed of fragments of Monterey rocks in an abundant dark colored clayey matrix.

All the terrace deposits are soft and unconsolidated, and hence are much less resistant to erosion than is the underlying bedrock. Those appearing along the walls of exploratory trenches were exposed to heavy rainfall during two storms, and showed some tendency to wash and locally to rill. Little slumping and no gross failure were noted in the trenches, however, and it was not anticipated that these materials would cause special problems during construction of a power plant.

4. Interface Between Bedrock and Surficial Deposits

As once exposed continuously in the exploratory trenches, the contact between bedrock and overlying terrace deposits represents a broad wave-cut platform of Pleistocene age. This buried surface of ancient marine erosion ranges in altitude between extremes of 82 and 100 feet, and more than three-fourths of it lies within the more limited range of 90 to 100 feet. It terminates eastward against a moderately steep shoreline slope, the lowest parts of which were encountered at the extreme easterly ends of Trenches C and D, and beyond this slope is an older buried bench at an altitude of 120 to 130 feet.

Available exposures indicate that the configuration of the erosional platform is markedly similar, over a wide range of scales, to that of the platform now being cut approximately at sea level along the present coast. Grossly viewed, it slopes very gently in a seaward (westerly) direction and is marked by broad, shallow channels and by upward projections that must have appeared as low spines and reefs when the bench was being formed (Figures 2.5-12 and 2.5-13). The most prominent reef, formerly exposed in Trenches B and D at and near their intersection, is a wide, westerly-trending projection that rises 5 to 15 feet above neighboring parts of the bench surface. It is composed of massive sandstone that was relatively resistant to the ancient wave erosion.

As shown in the sections and sketches of Figure 2.5-12, the surface of the platform is nearly planar in some places but elsewhere is highly irregular in detail. The small-scale irregularities, generally 3 feet or less in vertical extent, including knob, spine, and rib like

projections and various wave-scoured pits, crevices, notches, and channels. The upward projections clearly correspond to relatively hard, resistant beds or parts of beds in the sandstone section. The depressions consistently mark the positions of relatively soft silty or shaley sandstone, of very soft tuffaceous rocks, or of extensively jointed rocks. The surface traces of most faults and some of the most prominent joints are in sharp depressions, some of them with overhanging walls. All these irregularities of detail have modern analogues that can be recognized on the bedrock bench now being cut along the margins of Diablo Cove.

The interface between bedrock and overlying surficial deposits is of particular interest in the trenched area because it provides information concerning the age of youngest fault movements within the bedrock section. This interface is nowhere offset by faults revealed in the trenches, but instead has been developed irregularly across these faults after their latest movements. The consistency of this general relationship was established by highly detailed tracing and inspection of the contact as freshly exhumed by scaling of the trench walls. Gaps in exposure of the interface necessarily were developed at the four intersections of trenches; at these localities, the bedrock was carefully laid bare so that all joints and faults could be recognized and traced along the trench floors to points where their relationships with the exposed interface could be determined.

Corroborative evidence concerning the age of the most recent fault displacements stems from the marine deposits that overlie the bedrock bench and form the basal part of the terrace section. That these deposits rest without break across the traces of faults in the underlying bedrock was shown by the continuity of individual sedimentary beds and lenses that could be clearly recognized and traced.

Further, some of the faults are directly capped by individual boulders, cobbles, pebbles, shells, and fossil bones, none of which have been affected by fault movements. Thus, the most recent fault displacements in the plant site area occurred prior to marine planation of the bedrock and deposition of the overlying terrace sediments. As pointed out earlier, the age of the most recent faulting in this area is therefore at least 80,000 years and more probably at least 120,000 years. It might be millions of years.

2.5.21.2.5.6 Exploratory Trenching Program, Unit 2 Site

Edited for Clarity - Revised Section Number

Eight additional trenches were cut beneath the main terrace surface south of Diablo Canyon (Figure 2.5-13) in order to extend the scope of subsurface exploration to include all ground in the Unit 2 plant site. As in the area of the Unit 1 plant site, the trenches formed two groups; those in each group were parallel with one another and were oriented nearly normal to those of the other group. The excavations pertinent to the Unit 2 plant site can be briefly identified as follows:

1. *North-northwest Alignment*

a. Trench EJ, 240 feet long, was a southerly extension of older Trench BE (originally designated as Trench B).

b. Trench WU, 1300 feet long, extended southward from Trench DG (originally designated as Trench D), and its northerly part lay about 65 feet east of Trench EJ. The northernmost 485 feet of this trench was mapped in connection with the Unit 2 trenching program.

c. Trench MV, 700 feet long, lay about 190 feet east of Trench WU. The northernmost 250 feet of this trench was mapped in connection with the Unit 2 trenching program.

d. Trench AF (originally designated as Trench A) was mapped earlier in connection with the detailed study of the Unit 1 plant site. A section for this trench, which lay about 140 feet west of Trench EJ, was included with others in the report on the Unit 1 trenching program.

2. *East-northeast Alignment*

a. Trench KL, about 750 feet long, lay 180 feet south of Trench DG (originally designated as Trench D) and crossed Trenches AF, EJ, and WU.

b. Trench NO, about 730 feet long, lay 250 feet south of Trench KL and crossed Trenches AF, WU, and MV.

These trenches, or parts thereof, covered the area intended for the Unit 2 power plant construction, and the intersection of Trenches WU and KL coincided in position with the center of the Unit 2 nuclear reactor structure.

All five additional trenches, throughout their aggregate length of nearly half a mile, revealed a section of surficial deposits and underlying Monterey bedrock that corresponded to the two-ply sequence of surficial deposits and Monterey strata exposed in the older trenches and along the sea cliff in nearby Diablo Cove. The trenches ranged in depth from 10 feet (or less along their approach ramps) to nearly 35 feet, and all had sloping sides that gave way downward to essentially vertical walls in the bedrock encountered 3 to 22 feet above their floors. To facilitate detailed geologic mapping, the easterly walls of Trenches EJ, WU, and MV and the southerly walls of Trenches KL and NO were trimmed to near-vertical slopes extending upward from the trench floors to levels well above the top of bedrock. These walls subsequently were scaled back by means of hand tools in order to provide fresh, clean exposures prior to mapping of the contact between bedrock and overlying unconsolidated materials.

The geologic sections shown in Figures 2.5-12 and 2.5-13 correspond in position to the vertical portions of the mapped trench walls. Relationships exposed at higher levels on sloping portions of the trench walls have been projected to the vertical planes of the sections. Centerlines of intersecting trenches are shown for convenience, but the

planes of the geologic sections do not contain the centerlines of the respective trenches.

3. Bedrock

The bedrock that was continuously exposed in the lowest parts of all the exploratory trenches lies within a part of the Monterey Formation characterized by a preponderance of sandstone. It corresponds to the portion of the section that crops out along the sea cliff southward from the mouth of Diablo Canyon. The sandstone is light to medium gray where fresh, and light gray to buff and reddish brown where weathered. It ranges from silty to markedly tuffaceous, with tuffaceous units tending to dominate southward and southwestward from the central parts of the trenched area (refer to see geologic section in Figure 2.5-13). Much of the sandstone is thin-bedded and platy, but the most siliceous parts of the section are characterized by a strata a foot or more in thickness. Individual beds commonly are well defined by adjacent thin layers of more silty material.

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Bedding is less distinct in the more tuffaceous parts of the section, some of which seem to be almost massive. These rocks typically are broken by numerous tight fractures disposed at high angles to one another so that, where weathered, their appearance is coarsely blocky rather than layered.

As broadly indicated in the geologic sections, the sandstone ranges from very hard to moderately soft, and some of it feels slightly punky when struck with a pick. All of it, however, is firm and very compact. In general, the most platy parts of the sequence are relatively hard, but the hardest and soundest rock in the area is thick-bedded to almost massive sandstone of the kind at and immediately north of the site for the intended reactor structure. This resistant rock is well exposed as distinct low ridges on the nearby hillslope adjoining the main terrace area.

Tuff, consisting chiefly of altered volcanic glass, is abundant within the bedrock section. Also widely scattered, but much less abundant, is tuff breccia, consisting typically of small fragments of older tuff, pumice, or Monterey rocks in a matrix of fresh to altered volcanic glass. These materials, which form sills, dikes, and highly irregular intrusive masses, are generally light gray to buff, gritty, and compact but distinctly softer than much of the enclosing sandstone. Individual bodies range from stringers less than a quarter of an inch thick to bulbous or mushroom-shaped masses with maximum exposed dimensions measured in tens of feet. As shown on the geologic sections, they are abundant in all the trenches.

These volcanic rocks probably are related to the Obispo Tuff, large masses of which are well exposed west and south of the trenched ground. The bodies exposed in the trenches doubtless represent a rather lengthy period of Miocene volcanism, during which the Monterey strata were repeatedly invaded by both tuff and tuff breccia. Indeed, several of the mapped tuff units were themselves intruded by dikes of younger tuff, as shown, for example, in Sections KL and NO.

4. Bedrock Structure

The stratification of the Monterey rocks dips northward wherever it was observable in the trenches, in general, at angles of 45 to 85°. The steepness of dip increases progressively from north to south in the trenched ground, a relationship also noted along the sea cliff southward from the mouth of Diablo Canyon. Thus, the bedrock beneath the power plant site evidently lies on the southerly flank of the major syncline that was described previously. Zones of convolution and other expressions of locally intense folding were not recognized, and they probably are much less common in this general part of the section than in other (previously described) parts that include intervals of softer and more shaley rocks.

Much of the sandstone is traversed by fractures. Planar, curving, and irregular surfaces are well represented, and in places they are abundant and closely spaced. All prominent fractures and nearly all of the minor and discontinuous ones are shown on the geologic sections (Figure 2.5-13). Also shown in these sections are all recognized shear surfaces, faults, and other discontinuities along which the bedrock has been displaced. Such features are nowhere abundant in the trench exposures.

Most of the surfaces of movement are hairline breaks with or without thin films of clay, calcite, and/or gypsum. Displacements range from a small fraction of an inch to several inches. A few other surfaces are more prominent, with well-defined zones of fine-grained breccia and/or infilling mineral material ordinarily 1/8 inch or less in thickness. Such zones were observed to reach maximum thicknesses of 3/8 to 1/2 inch along three small faults, but only as local lenses or pockets.

Exposures are not sufficiently extensive in three dimensions for definitely determining the magnitude of slip along all the faults, but for most of them it is plainly a few inches or less. None of them appears to be more than a minor break in a bedrock section that has been folded on a large scale. Indeed, no expressions of major faulting were recognized in any of the trenches despite careful search, and the continuous bedrock exposures preclude the possibility that such features could be readily overlooked.

Most surfaces of past movement probably were active during times when the Monterey rocks were being deformed by folding, when rupture and some differential movements would be expected in a section comprising such markedly differing rock types. Some of the fault displacements may well have been older, as attested in two places by relationships involving small faults, the Monterey rocks, and tuff.

In Trench WU south of Trench KL, for example, sandstone beds were seen to have been offset about a foot along a small fault. A thin sill of tuff occupies the same stratigraphic horizon on opposite sides of this fault, but the sill has not been displaced by the fault. Instead, the tuff occupies a short segment of the fault to effect the slight jog between its positions in the strata on either side. Intrusion of the tuff plainly postdated all movements along this fault.

5. Terrace Deposits

Marine terrace deposits of Pleistocene age form covers, generally 2 to 5 feet thick, but locally as much as 12 feet thick, over the bedrock that lies beneath the Unit 2 plant site. These covers were observed to be continuous in some parts of all the trenches, and thin and discontinuous in a few other parts. Elsewhere, the marine sediments were absent altogether, as in the lower and more southerly parts of Trenches EJ and WU and in the lower and more westerly parts of Trenches KL and NO.

The range in lithology of these deposits is considerable, and includes bouldery rubble, gravel composed of well-rounded fragments of shells and/or Monterey rocks, beach sand, loose accumulations of shells, pebbly silt, silty to clayey sand with abundant shell fragments, and soft clay derived from underlying tuffaceous rocks. Nearly all of the deposits are at least sparsely fossiliferous, and many of them contain little other than shell material. Vertebrate fossils, chiefly vertebral and rib materials representing large marine mammals, are present locally.

The trenches in and near the site of the reactor structure exposed a buried narrow ridge of hard bedrock that once projected westward as a bold promontory along an ancient sea coast, probably at a time when sea level corresponded approximately to the present 100 foot contour (refer to~~ee~~ Figure 2.5-11). Along the flanks of this promontory and the face of an adjoining buried sea cliff that extends southeastward through the area in which Trenches MV and NO intersected, the marine deposits intergrade and intertongue with thicker and coarser accumulations of poorly sorted debris. This rubbly material evidently is talus that was formed and deposited along the margins of the ancient shoreline cliff.

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Similar gradations of older marine deposits into older talus deposits were observable at higher levels in the easternmost parts of Trenches KL and NO, where the rubbly materials doubtless lie against a more ancient sea cliff that was formed when sea level corresponded to the present 140 foot contour. The cliff itself was not exposed, however, as it lies slightly beyond the limits of trenching.

In many places, the marine covers are overlain by younger nonmarine terrace sediments with a sharp break, but elsewhere the contact between these two kinds of deposits is a zone of dark colored material, a few inches to as much as 6 feet thick, that represents weathering and development of soils on the marine sections. Fragments of these soily materials are present here and there in the basal parts of the nonmarine section. Over large areas, the porous marine deposits have been discolored through infiltration by fine-grained materials derived from the overlying ancient soils.

The nonmarine accumulations, which form the predominant fraction of the entire terrace cover, consist mainly of slump, creep, and slope-wash debris that is characteristically loose, uncompacted, and internally chaotic. These relatively dark colored deposits are fine grained and clayey, but they contain sparse to very abundant fragments of Monterey rocks generally ranging from less than an inch to about 2 feet in maximum

dimension. Toward Diablo Canyon they overlie and, in places, intertongue with silty to clayey gravels that are ancient contributions from Diablo Creek when it flowed at levels much higher than its present one. These "dirty" alluvial deposits appeared only in the most northerly parts of the more recently trenched terrace area, and they are not distinguished from other parts of the nonmarine cover on the geologic sections (Figure 2.5-13).
All the terrace deposits are soft and unconsolidated, and hence are much less resistant to erosion than is the underlying bedrock. Those appearing along the walls of the exploratory trenches showed some tendency to wash and locally to rill when exposed to heavy rainfall, but little slumping and no gross failure were noted in the trenches.

6. Interface Between Bedrock and Surficial Deposits

As exposed continuously in the exploratory trenches, the contact between bedrock and overlying terrace deposits represents two wave-cut platforms and intervening slopes, all of Pleistocene age. The broadest surface of ancient marine erosion ranges in altitude from 80 to 105 feet, and its shoreward margin, at the base of an ancient sea cliff, lies uniformly within 5 feet of the 100 foot contour. A higher, older, and less extensive marine platform ranges in altitude from 130 to 145 feet, and most of it lies within the ranges of 135 to 140 feet. As noted previously, these are two of several wave-cut benches in this coastal area, each of which terminates eastward against a cliff or steep shoreline slope and westward at the upper rim of a similar but younger slope.

Available exposures indicate that the configurations of the erosional platforms are markedly similar, over a wide range of scales, to that of the platform now being cut approximately at sea level along the present coast. Grossly viewed, they slope very gently in a seaward (westerly) direction and are marked by broad, shallow channels and by upward projections that must have appeared as low spines and reefs when the benches were being formed. The most prominent reefs, which rise from a few inches to about 5 feet above neighboring parts of the bench surfaces, are composed of hard, thick-bedded sandstone that was relatively resistant to ancient wave erosion.
As shown in the geologic sections (Figure 2.5-13), the surfaces of the platforms are nearly planar in some places but elsewhere are highly irregular in detail. The small scale irregularities, generally 3 feet or less in vertical extent, include knob-, spine-, and rib-like projections and various wave-scoured pits, notches, crevices, and channels. Most of the upward projections closely correspond to relatively hard, resistant beds or parts of beds in the sandstone section. The depressions consistently mark the positions of relatively soft silty or shaley sandstone, of very soft tuffaceous rocks, or of extensively jointed rocks. The surface traces of most faults and some of the most prominent joints are in sharp depressions, some of them with overhanging walls. All these irregularities of detail have modern analogues that can be recognized on the bedrock bench now being cut along the margins of Diablo Cove.

The interface between bedrock and overlying surficial deposits provides information concerning the age of youngest fault movements within the bedrock section. This interface is nowhere offset by faults that were exposed in the trenches, but instead has

been developed irregularly across the faults after their latest movements. The consistency of this general relationship was established by highly detailed tracing and inspection of the contact as freshly exhumed by scaling of the trench walls. Gaps in exposure of the interface necessarily were developed at the intersections of trenches as in the exploration at the Unit 1 site. At such localities, the bedrock was carefully laid bare so that all joints and faults could be recognized and traced along the trench floors to points where their relationships with the exposed interface could be determined.

Corroborative evidence concerning the age of the most recent fault displacements stems from the marine deposits that overlie the bedrock bench and form a basal part of the terrace section. That these deposits rest without break across the traces of faults in the underlying bedrock was shown by the continuity of individual sedimentary beds and lenses that could be clearly recognized and traced. As in other parts of the site area, some of the faults are directly capped by individual boulders, cobbles, pebbles, shells, and fossil bones, none of which have been affected by fault movements. Thus, the most recent fault displacements in the plant site area occurred before marine planation of the bedrock and deposition of the overlying terrace sediments.

The age of the most recent faulting in this area is therefore at least 80,000 years. More probably, it is at least 120,000 years, the age most generally assigned to these terrace deposits along other parts of the California coastline. Evidence from the higher bench in the plant site area indicates a much older age, as the unfaulted marine deposits there are considerably older than those that occupy the lower bench corresponding to the 100 foot terrace. Moreover, it can be noted that ages thus determined for most recent fault displacements are minimal rather than absolute, as the latest faulting actually could have occurred millions of years ago.

During the Unit 2 exploratory trenching program, special attention was directed to those exposed parts of the wave-cut benches where no marine deposits are present, and hence where there are no overlying reference materials nearly as old as the benches themselves. At such places, the bedrock beneath each bench has been weathered to depths ranging from less than 1 inch to at least 10 feet, a feature that evidently corresponds to a lengthy period of surface exposure from the time when the bench was abandoned by the sea to the time when it was covered beneath encroaching nonmarine deposits derived from hillslopes to the east.

Stratification and other structural features are clearly recognizable in the weathered bedrock, and they obviously have exercised some degree of control over localization of the weathering. Moreover, in places where upward projections of bedrock have been gradually bent or rotationally draped in response to weathering and creep, their contained fractures and surfaces of movement have been correspondingly bent. Nowhere in such a section that has been disturbed by weathering have the materials been cut by younger fractures that would represent straight upward projections of breaks in the underlying fresh rocks. Nor have such fractures been observed in any of the overlying nonmarine terrace cover.

Thus, the minimum age of any fault movement in the plant site area is based on compatible evidence from undisplaced reference features of four kinds: (a) Pleistocene wave-cut benches developed on bedrock, (b) immediately overlying marine deposits that are very slightly younger, (c) zones of weathering that represent a considerable span of subsequent time, and (d) younger terrace deposits of nonmarine origin.

2.5.24.2.5.7 Bedrock Geology of the Plant Foundation Excavations

Edited for Clarity - Revised Section Number

Bedrock was continuously exposed in the foundation excavations for major structural components of Units 1 and 2. Outlines and invert elevations of these large openings, which ranged in depth from about 5 to nearly 90 feet below the original ground surface, are shown in Figures 2.5-15 and 2.5-16. The complex pattern of straight and curved walls with various positions and orientations provided an excellent three-dimensional representation of bedrock structure. These walls were photographed at large scales as construction progressed, and the photographs were used directly as a geologic mapping base. The largest excavations also were mapped in detail on a surveyed planimetric base.

Geologic mapping of the plant excavations confirmed the conclusions based on earlier investigations at the site. The exposed section of Monterey strata was found to correspond in lithology and structure to what had been predicted from exposures at the mouth of Diablo Canyon, along the sea cliffs in nearby Diablo Cove, and in the test trenches. Thus, the plant foundation is underlain by a moderately to steeply north-dipping sequence of thin to thick bedded sandy mudstone and fine-grained sandstone. The rocks at these levels are generally fresh and competent, as they lie below the zone of intense near-surface weathering.

Several thin interbeds of claystone were exposed in the southwestern part of the plant site in the excavations for the Unit 2 turbine-generator building, intake conduits, and outlet structure. These beds, which generally are less than 6 inches thick, are distinctly softer than the flanking sandstone. Some of them show evidence of internal shearing.

Layers of tuffaceous sandstone and sills, dikes, and irregular masses of tuff and tuff breccia are present in most parts of the foundation area. They tend to increase in abundance and thickness toward the south, where they are relatively near the large masses of Obispo Tuff exposed along the coast south of the plant site.

Some of the tuff bodies are conformable with the enclosing sandstone, but others are markedly discordant. Most are clearly intrusive. Individual masses, as exposed in the excavations, range in thickness from less than 1 inch to about 40 feet. The tuff breccia, which is less abundant than the tuff, consists typically of small fragments of older tuff, pumice, or Monterey rocks in a matrix of fresh to highly altered volcanic glass. At the levels of exposure in the excavations, both the tuff and tuff breccia are somewhat softer than the enclosing sandstone.

From: Satorius, Mark
Sent: Friday, October 31, 2014 4:12 PM
To: Peck, Michael
Cc: Pedersen, Renee
Subject: Re: RES: Follow Up From Diablo Canyon Seismic DPO Discussion

Thanks Michael. I was glad that we were able to talk last week. Thanks again for using the DPO process and further adding value by identifying several areas that the agency needs to focus on and improve.
Mark Satorius

From: Peck, Michael
Sent: Thursday, October 30, 2014 09:37 AM
To: Satorius, Mark
Cc: Pedersen, Renee
Subject: RES: Follow Up From Diablo Canyon Seismic DPO Discussion

Mr. Satorius,

Thank you for recognizing my contribution to the agency's Differing Professional Opinions (DPO) Program. I also appreciated the consolatory language used in your reply to my appeal and the opportunity to discuss the Diablo Canyon DPO issues with you in person.

During our meeting this past Friday and in late July, I understood you to say that the agency will focus forward rather than expending resources on past issues that have been corrected. After considering your feedback, I wanted to ensure that you understood that I view the issues identified in the DPO and Appeal as ongoing violations of NRC Rules and Diablo Canyon license requirements. I believe these uncorrected violations do have an impact on plant safety.

During 2013, Pacific Gas and Electric (PG&E) made changes to the Diablo Canyon FSARU. These changes were sufficient to lead the DPO Panel to conclude that the Hosgri Event was the/a facility safe shutdown earthquake for the facility. Since these changes would require an amendment to the Operating License, and no amendment was approved by the agency, PG&E's action represents an ongoing violation of 10 CFR 50.59 and should be promptly addressed in accordance with the NRC Enforcement Policy.

I realize enforcing the Diablo Canyon seismic design basis would result agency challenges. The most obvious corrective action would include agency approval of the Hosgri as the facility safe shutdown earthquake. However, this proposed action was previously considered and rejected by agency technical staff. Without a safe shutdown earthquake methodology that is both acceptable to the staff and can accommodate the new higher seismic loading results in ongoing violation of NRC 10 CFR 50, Appendix B, quality assurance requirements and should be promptly addressed in accordance with the NRC Enforcement Policy.

PG&E's failure to adequately demonstrate operability of important to safety SSCs also remains as an ongoing issue. ASME, Section III, Code acceptance limits are exceeded when the new seismic loads are summed with the required load combinations using the NRC approved safe shutdown earthquake methodology (considering the new maximum capable ground motion). The NRC requires that licensee satisfy Code acceptance limits for operability of reactor coolant pressure boundary components. PG&E's failure to demonstrate that Code requirements were met was not addressed in either the DPO Panel Report or your DPO Appeal response letter. The failure to meet Code acceptance limits represents an ongoing violation of 10 CFR 50.55a and the

facility Technical Specifications and should be promptly addressed in accordance with the NRC Enforcement Policy.

I appreciated the summary of the Diablo Canyon seismic licensing bases included in your September 9, 2014 memorandum. This summary acknowledged the original design bases as presented in the Preliminary Safety Analysis Report, NRC review of the Hosgri Evaluation provided in Supplemental Safety Evaluation Report 7, a description of the NRC review of Long Term Seismic Program provided in Supplemental Safety Evaluation Report 34, and requested actions associated with Recommendation 2.1 from the Near-Term Task Force Review of the Fukushima Accident. While this information provides insight into the Diablo Canyon seismic licensing bases and may be used to support future NRC licensing actions, none of this information may be used by the licensee as a bases to change the facility safe shutdown earthquake methodology without prior NRC approval. 10 CFR 50.59 and agency endorsed guidance established the threshold for facility changes that require an amendment to the Operating License. This threshold was based on the methodology described in the FSAR for meeting regulatory driven design bases requirements, such as General Design Criteria (GDC) 2 for protection against earthquakes. Prior to the 2013 changes, the Diablo Canyon FSARU clearly stated that the GDC 2 facility safe shutdown earthquake requirement was meet by the Double Design Earthquake safety analysis. The FSARU when on to explicitly state that the Hosgri Evaluation methodology did not satisfy NRC GDC 2 design bases requirements for the facility safe shutdown earthquake.

I would like to thank you again for your time and attention to the Diablo Canyon issues raised in DPO 2013-02. Please feel free to contact me if I can provide any additional information regarding ongoing compliance issues at Diablo Canyon.

Thank you,
Michael Peck, Ph.D.
Senior Reactor Technology Instructor
TTC, 423-855-6515

From: Peck, Michael
Sent: Wednesday, May 28, 2014 1:52 PM
To: Leeds, Eric
Cc: Case, Michael; Wertz, Trent; Thomas, Brian
Subject: ACTION REQUESTED: Disapprove DPO 2013-02 Panel Findings

Mr. Leeds,

Please take action to disapprove Differing Professional Opinion (DPO) Panel Report on Diablo Canyon Seismic Issues (DPO-2013-002, completed April 2014).

1. The Panel's conclusions appeared to be built on assumptions divergent from the current licensing bases (CLB) described in the Diablo Canyon Final Safety Analysis Report Update (FSARU). Resolution of the 10 CFR 50.71(e) and 10 CFR 50.59 DPO issues required a clear understanding *of the facility as described in the FSARU*. The Panel Report did not include an adequate the bases for the deviation from the CLB.

2. The Report did not provide sufficient detail to support the Panel's conclusion that the licensee's actions were consistent with agency statutory requirements. The DPO address specific examples of the agency's failure to enforce certain regulatory and statutory requirements. The Report responded to these specific examples with general statements that regulatory requirements were satisfied.

Incorrect Assumption Related To the Diablo Canyon Current Licensing Bases Requirements

The Panel Report stated:

> *"The plant meets NRC's seismic safety requirements through the DE (0.2 g) and DDE (0.4 g) and the Hosgri evaluation (0.75 g)"*
>
> *The seismic design basis for Diablo Canyon is both the Double Design Earthquake and Hosgri Evolution"*

The Panel used these statements to create a new "hybrid" ground motion relationship to represent the boundary of the seismic design basis. Functionally, the Panel compared the new seismic ground motions against the higher of either double design earthquake/safe shutdown earthquake (DDE/SSE) or Hosgri Evaluation (HE) as a function of frequency. The Panel used this comparison to conclude that all of the new ground motions were within the bounds of the exiting seismic design bases.

These statements were inconsistent with both the CLB and original licensing bases. As discussed in the DPO, General Design Criteria (GDC) 2 established the regulatory requirement for the seismic design basis. The Diablo Canyon CLB stated that DDE (SSE), with accompany safety analyses, established this design basis requirement. Consistent with 10 CFR 100, Appendix A, the SSE considered all faults 200 miles of the site. The CLB stated that a large earthquake the Hosgri fault was excluded from the GDC 2 design basis.

In contrast, the CLB stated that the HE was created to address a question raised during original plant licensing. Specifically, licensee was asked to evaluate affect that a 7.5 M earthquake on the Hosgri fault would have the ability to safety shutdown the plant. As stated in the CLB, the HE was not tied to implementing design bases requirements. The HE may be considered a "beyond design based event" because the CLB excluded 7.5 M Hosgri earthquake from the GDC 2 design bases and supporting FSARU seismic safety analysis (the DPO included a detailed discussion why the HE was not included in the design basis). The CLB included a commitment to maintain certain structures, systems, and components (SSCs) seismically qualified to the stress predicted by HE. However, the CLB also explicitly stated that the initial conditions, assumed

loading cases, and the set of SSCs qualified to the HE were different that those required for the GDC 2 design basis.

Understanding how the CLB treats these analyses was critical to answering the issues raised in the DPO. The Panel's comparison of the new ground motions to HE or the "hybrid ground motion curve" only showed that these ground motions were less than those used in the "beyond design basis" HE. This comparison failed to provide meaningful information relative to the new seismic information and the GDC 2 design basis.

Panel Report Failed To Address the Specific Regulatory and Statutory Requirements Cited in the Differing Professional Opinion

The DPO identified the regulatory framework and specific statutory requirements that agency failed to enforce. Many of these requirements were related to *the facility as described in the Final Safety Analysis Report Update (FSARU)*. The Panel Report did not include adequate detail for the reader to conclude that these requirements were satisfied.

The Panel Report stated that "...an FSARU change was likely not required at all, let alone, something that required a license amendment."

Title 10 CFR 50.71(e) required the FSARU to be updated:

> *"...FASR originally submitted as part of the application for the operating license, to assure that the information included in the FSAR contains the latest material developed."*
>
> *"The updated dated FSAR shall be revised to include the effects of all changes made in the facility or procedures as described in the FSAR; all safety evaluations performed by the licensee.. and all analysis of new safety issues performed..."*

Title 10 CFR 50.34(b) required the FSAR to include safety analysis demonstrating that the GDC 2 design basis was satisfied:

> *"The FSAR shall include information that described the facility, presented the design bases and limits on its operation, and presents the safety analyses of the SSCs and of the facility as a whole."*

The Diablo Canyon license application included a safety analysis that demonstrated the GDC 2 design basis was satisfied. This analysis included an evaluation of all earthquake faults within 200 miles of the site (with exception of the Hosgri fault). From this evaluation, this safety analysis developed a ground motion. The licensee used this ground motion as the *design bases controlling parameter* to determine the amount of seismic stress plant SSCs would be exposed following the SSE. The FSARU safety analysis continued with a description demonstrated that the functional requires of the SSE were met (see 10 CFR 100, App A, III(c) and 10 CFR 50.34(a)(3))

The licensee developed new seismic information concluding that the existing *design bases controlling parameter* (ground motion) described in the FSARU safety analysis could be exceeded. The FSARU was required to be updated because the new information challenged the existing safety analysis conclusion that the GDC 2 design basis was met. The new information raised the question if any SSE seismically qualified SSCs would failed at the higher ground motions, within the context of the existing safety analysis.

The HE was unaffected by the new information for two independent reasons:

1. The CLB (FSARU) stated that HE only applied to an earthquake on the Hosgri fault, and the new information was not related to the Hosgri fault, and

2. The HE was not used to establish the plant seismic design basis. The HE safety evaluation was not included in the FSARU. A 10 CFR 50.34 safety evaluation was not required to be included in the FSARU because the HE was not used to demonstrate that design bases requirement (GDC) was met.

Applicability of 10 CFR 50, Appendix B

> *Criterion III, Design Control, required that "applicable regulatory requirements and the design basis (50.2) and as specified in the license application, for those SSCs to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions."*
>
> *Criterion XVI, Corrective Actions, required that conditions adverse to quality, such as failures,...nonconformance's, are promptly identified and corrected."*

The new information resulted in the design basis (as specified in the license application for GDC 2) was no longer correctly translated in the specifications, drawings, procedures, and instructions. The new seismic information rendered the FSARU SSE safety analysis non-conforming with GDC 2. As described in NEI 98-03 (Section 5), 50.71(e) ensures that the fidelity is maintained between new information, the FSARU safety analysis and the GDC functional requirements.

FSARU Change Required a License Amendment

The Panel Report did not address the specific DPO issues related to the failure of the licensee to obtain an amendment to the license supporting the required 10 CFR 50.71(e) changes to the FSARU safety analysis. As an alternative, the Panel addressed the actual changes the licensee made to the FSARU, Revision 21. The Report stated: "Consequently, there was insufficient basis to conclude that a license amendment was required to address the 2011 Shoreline report, and the NRC staff's recommendation for an FSAR updated was reasonable."

Title 10 CFR 50.59 stated:

> *"A licensee shall obtain a license amendment pursuant to 50.90 prior to implementing a change, test or experiment if the change test or, experiment would:"*
>
> *" - Results in more than a minimal increase in the likelihood of occurrence of a malfunction of a SSC important to safety,"*
>
> *"- Results in a departure from a method of evaluation described in the FSAR used in establishing the design bases or in the safety analysis"*

The new seismic information directly affected the FSARU safety analysis demonstrating that the GDC 2 design basis was satisfied. The licensee considered two cases:

For the first case, the licensee may update the existing FSARU safety analysis with the higher ground motions. This update would result in the analyzed seismic stress to exceed ASME Code acceptance limits for reactor coolant system pressure boundary, major structures (reactor containment and auxiliary building), and established important to safety component qualification limits. NEI 96-07 (Section 4.3.2) stated that a change to *the facility as described in the FSARU* that results in exceeding limits for seismic qualification required prior NRC approval because of the increased likelihood of a malfunction of SSCs important to safety (during an earthquake).

For the second case, the licensee may use a different analytical method to demonstrate that the GDC 2 design basis was still satisfied given the increased ground motions. The licensee determined that HE methodology could be applied to the new ground motions without exceeding plant SSC seismic qualification limits. This action required prior NRC approval because the new or proposed method (the HE) yielded results that were non-conservative when compared to the FSARU method (NEI 96-07, Section 4.3.8). As required by 10 CFR 50.59, the licensee requested NRC approval to use the HE method (License Amendment Request, LAR 2011-05) to demonstrate that the design basis was satisfied at the higher ground motions. The NRC subsequently concluded that the HE method was not appropriate for the SSE design basis and requested that the licensee withdrawn the LAR.

Similarly, the licensee's action to revise the FSARU to include the Shoreline (and presumably the San Luis Bay and Los Osos) fault(s) as lessor case(s) of the HE also required prior NRC approval in the form of a license amendment. These faults are physically located within 200 miles of the site and are not associated with the Hosgri fault. As defined in the CLB (FSARU Section 2.5), deterministic ground motions that may produce by these faults are within the scope of the GDC 2 SSE safety analysis. To apply the HE methodology to these ground motions was change to *the facility as described in the FSARU.* The end result was to excluded the Shoreline, San Luis Bay, and Los Osos faults from the GDC 2 design basis requirements. This action also required prior NRC approval because the new or proposed method (the HE method) yielded results that were non-conservative when compared to the FSARU method (NEI 96-07, Section 4.3.8).

Technical Speciation Operability

The Panel Report stated:

> *"For situations without specific technical specification testing requirements, evaluations can be performed by the licensee to determine if the equipment can still perform its design function using appropriate evaluation methods. There is not a regulation that requires the methods used in the original design calculations must be used in these evaluations. Many times, engineering evaluation methods have changed since the original Construction Permit application was made. This is particularly true for seismic hazards. Modern methods are frequently used to show the equipment can still perform its function. Typical equipment installed at the facility had margin above the minimums that the design basis calculations required."*

The Panel concluded that NRC operability guidance (IMC 0326) allowed the licensee to use an alternative method for demonstrating that the SSC specified safety functions could still be met at the higher ground motions. The Panel Report stated the use of HE or the Long Term Seismic Program (LTSP) "is attractive because the methods used in the LTSP are improved over those of initial licensing."

The Panel Report did not address the specific issues raised in the DPO related to the licensee's use of these "alternative methods."

The DPO stated that licensee's use of the HE (or the LTSP) was inappropriate for operability because these methods over-predicted SSC performance when compared to the GDC 2 CLB analysis methods. The purpose of alternative methods (IMC 0326, Appendix C-04) was to provide latitude for complex operability evaluations. NRC operability criteria restricts use of alternative methods that result in creating greater margin than the design basis method. For the new seismic information, the licensee had already established that SSC acceptance limits were exceeded using the GDC 2 design basis method. At this point, the licensee should have declared these technical specification SSCs inoperable.

The licensee's alternative method (HE or LTSP) would always over-predict SSC performance when compared to the FSARU design base method (at a given ground motion). NRC operability criteria does not provided use of "alternate design bases" or alternate safety analysis when an evaluating non-conforming conditions. The licensee is not permitted to "shop" for a new method for the purpose of gaining margin over the existing design basis methodology. For example, if a licensee identified a reactor coolant flow anomaly that resulted in the exceeding the post LOCA calculated peak clad temperature limit (2,200 F), the NRC would not accept the "results of the realistic LOCA analysis" as a bases for operability. The realistic method would always over-predict the capability of plant SSCs over design basis case. The same is true with the new seismic information. The HE will always yield less stress when compared to the GDC design basis method. As a result, the licensee's use of HE for operability was inappropriate.

The DPO identified that the new ground motions resulted in the ASME Code limits to be exceeded. The Panel Report stated:

> *"The FSARU identifies both the DDE and the Hosgri as faulted conditions for use in the seismic stress levels for appropriate component and piping and demonstrates how it meets the appropriate ASME*

acceptance criteria. The use of both the DDE and the Hosgri in the evaluation is consistent with Panel's conclusion that both these limits are, at times, applicable as the limiting load."

However, the Panel did not address the specific ASME Code requirements. The CLB, the Code, and 10 CFR 50.55a required the licensee to demonstrate that combined accident and SSE seismic loading be maintained below acceptance limits. Calculating HE loading does not satisfy this requirement. The CLB clearly established the DDE as the SSE. The HE was not the SSE. The Code did not include provision to substitute the HE for the SSE. Also, at a given ground motion, the resulting Code stresses will always be less using the HE method when compared to the SSE design base case.

As described in the DPO, Code limits are exceeded when applying the new ground motions (*design bases controlling perimeter*) to the existing SSE Code calculations. Contrary to the Panel Report, IMC 0326, Appendix C.11, stated that a responsible expectation of operability cannot exist when Code requirements are not satisfied:

"ASME Class 1 components do not meet ASME Code or construction code acceptance standards, the requirements of an NRC endorsed ASME Code Case, or an NRC approved alternative, then an immediate operability determination cannot conclude a reasonable expectation of operability exists and the components are inoperable. Satisfaction of Code acceptance standards is the minimum necessary for operability of Class 1 pressure boundary components because of the importance of the safety function being performed."

The CLB stated that licensee demonstrated that Code limits were met for HE case. However, neither the Code nor 10 CFR 50.55a required the licensee to perform these calculations. These calculations were not tied to meeting design basis (GDC) or 50.34 safety analysis requirements.

Summary

I request you disapprove the DPO 2013-02 Panel Report. The conclusions in the Panel Report were based on incorrect assumptions related to the Diablo Canyon CLB requirements. The panel incorrectly assumed that the HE ground motions combined with the SSE established the seismic design basis. The DPO Panel propagated this error into their analysis of issues raised in the DPO. Also, in several cases, the Report failed to provide sufficient detail to support the Panel's conclusion that specific statutory requirements were met.

I request a meeting with Mr. Case and yourself to discuss the results of the DPO Panel Report and my feedback. I'm confident we can address these issues by referring to the Diablo Canyon CLB (FSARU) and NRC inspection guidance. My goal is to form a consensus with the Panel on the DPO issues.

I plan to follow up this e-mail with a formal request.

Thank you,
Michael Peck, Ph.D.
Senior Reactor Technology Instructor
TTC, 432-855-6515

From: Peck, Michael
Sent: Wednesday, May 21, 2014 11:30 AM
To: Case, Michael
Cc: Leeds, Eric; Wertz, Trent
Subject: RES: DPO 2013-02

Mike,

Thank you for your comments.

Sure, the licensee stated that the new ground motions were bound by the plant design bases. My understanding was that statement was based on their comparison of new spectrum with the Hosgri. But ground motion alone doesn't establish the boundaries of the design bases. The methods, assumptions, initial conditions, acceptance limits, and most importantly, the safety analysis, are all needed to demonstrate that design bases are satisfied. This is why I believe a discussion focused on Regulatory Guide 1.186, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases," and NEI 97.04, "Guidance and Examples for Identifying 10 CFR 50.2 Design Bases," would be beneficial.

"New information does not equal new SSE" – I completely agree with you. But let's talk about how PG&E met the Diablo Canyon GDC 2 design basis.

FSARU Section 2.5.2.10 developed the ground accelerations and response spectra from the maximum earthquake potential developed in FSARU Section 2.5.2.9 These response spectra were used as a "design bases controlling parameter" to establish the amount of vibratory motion for the seismic qualification of plant SSCs (FSARU Sections 3.7, 3.8, 3.9, & 3.10) and AMSE Code compliance (FSARU Section 5.2.1.3). These safety analysis work together (as required by 50.34) to demonstrated the seismic "design basis functions" were met at Diablo Canyon. These "design basis functions" were derived from the functional requirements of GDC 2. So, in other words, given the maximum earthquake, the ground under the plant will shake this amount (controlling parameter: pga 0.4 g, FSAR 2.5) resulting in each (RG 1.29) plant SSC to vibrate a given amount. Given this level of vibration (seismic induced stress) and the specific SSCs qualification (either by test or analysis), the safety analysis demonstrated that the required GDC 2 safety functions would be met. This safety analysis explicitly included all earthquake faults within 200 miles of the plant (with the Hosgri fault specifically excluded).

In 2011 PG&E came in and said that they found that an earthquake on three faults (all within 200 miles of the plant and not on the Hosgri fault) were "capable" of generating greater plant shaking (up to 0.7 g pga) than described in the FSARU SSE safety analysis. This new information called into question the "design bases controlling parameter" used in the 50.34 FSARU SSE (GDC 2) safety analysis. At this point, the existing safety analysis became non-compliant with the GDC 2 design basis (see App B, Criterion III). Also, an analyzed condition existed because the new seismic data concluded that a "capable" earthquake could occur resulting in greater seismic stress than bound by the GDC 2 safety analysis.

The SSE didn't change. The SSE remained as described in Part 100, App A: "..that earthquake which is based upon an evaluation of the maximum earthquake potential considering the regional and local geology and seismology and specific characteristics of local subsurface material. It is that earthquake which produces the maximum vibratory ground motion for which certain SSCs (RG 1.29) are designed to remain functional. These SSCs are those necessary to assure:"

(1) "The integrity of the reactor coolant pressure boundary,
(2) The capability to shut down the reactor and maintain it in a safe shutdown condition, or

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of this part."

With new information, the results of the previous "evaluation of the maximum earthquake potential," changed, not the SSE. This new information specifically affected a "design bases controlling parameter" used to demonstrate that the GDC 2 was satisfied.

The new ground motions were within the bounds of the Hosgri Evaluation. But as described in the FSARU, the Hosgri Evaluation was not included in the GDC 2 safety analysis or design bases.

PG&E first evaluated modifying the "design bases controlling parameter" sued in the existing safety analysis with the new seismic information. PG&E stated that this resulted in "exceedances." I believe "exceedances" was code for exceeding SSC seismic qualification and ASME Code acceptance limits. This was not surprising. I found that during modification inspections that the existing SSE safety analysis had almost no margin for Code allowable stress limits. Any increase in seismic stress would have likely resulted in "exceedances." Had PG&E been successful, this change could have been performed under 50.59 since the methods demonstrating that GDC 2 was met would not have changed.

PG&E then attempted to redefine the method of evaluation used for the GDC 2 design basis. They submitted LAR 11-05 to establish the Hosgri Evaluation as the new SSE safety analysis. This change required prior NRC approval under 50.59 (see earlier discussion below). After a year, the NRC concluded that the LAR did not meet the agency acceptance criteria to be accepted for review. At the NRC's request, PG&E withdrew the LAR. At this point, Mr. Sebrosky directed PG&E to place the new information in the FSARU "as a lessor case of the Hosgri." This action attached the same GDC 2 exception to the Shoreline (and presumably also to the Los Osos and San Luis Bay faults) as the Hosgri, bypassing the 50.90 process. Functionally, Mr. Sebrosky's action de-facto established the Hosgri the new SSE.

I haven't seen the "licensee analysis that shows that they are inside their design basis for all ten SSCs." I assumed this statement was based on their earlier comparison of SSE and Hosgri ground motions. If PG&E has generated new data, then I would like to review it.

I'm not sure I understand which ten SSCs are listed in the FSARU. FSARU Section 3.2.1, "Seismic Classification," stated that PG&E committed to maintain the seismic qualification of the all the SSCs listed in Safety Guide 29 (RG 1.29). I believe that Safety Guide 29 included almost all technical specification required systems and components and major structures (containment, aux building...). I included a list of the RG 1.29 SSCs in the DPO.

Thank you sir,
Michael

From: Case, Michael
Sent: Wednesday, May 21, 2014 7:15 AM
To: Peck, Michael
Cc: Leeds, Eric; Wertz, Trent
Subject: RE: DPO 2013-02

To simplify, the licensee analysis shows that they are not outside their design basis for all ten or so specific SSCs listed in the FSARU. Therefore no change is "required". New information does not equal new SSE.

From: Peck, Michael
Sent: Tuesday, May 20, 2014 2:51 PM
To: Case, Michael
Cc: Leeds, Eric; Wertz, Trent
Subject: RES: DPO 2013-02

Mike,

If I understand correctly, the DPO Panel concluded that it was appropriate for the agency to defer regulatory action because additional information was needed (Fukushima Recommendation 2.1 RFI) before a comparison can be performed between the new ground motion and the plant design bases.

My understanding was that new deterministic ground motion spectrums (submitted on the docket by PG&E) were sufficient to conclude that three local earthquakes are capable of exceeding the facility safety shutdown earthquake (SSE) by as much as 75%. Why is more information needed to determine if the current FSARU SSE safety analysis is non-compliant with GDC 2? In light of these spectrums, isn't the plant currently operating outside the bounds of the NRC approved SSE 50.34 safety analysis?

Your e-mail addressed timeliness: Reconciliation step with the FSARU and the "new information" - We couldn't find anything that indicated it had to be now.

I believe that 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires that conditions adverse to quality, including non-conformances, are promptly identified and corrected. Administrative Letter 98-10 provides guidance on "promptness" for correcting non-conforming conditions that involve licensing actions. The letter stated that licensees are subject to a Criterion XVI violation for delays of a year or more. It's been over three years since PG&E submitted the completed seismic update on the docket.

Enforcement action drives the licensee to resolve the non-conforming condition. Fukushima Recommendation 2.1 will provide seismic hazard and risk insights. However, I don't see how the new GMRS will address the current non-conforming 50.34 safety analysis. As I understanding it, Recommendation 2.1 includes agency review to determine if the current licensing basis (CLB) should be modified to accommodate new seismic hazards identified in the reevaluation. At Diablo Canyon, we already know there are new seismic hazards. Again, as I understanding it, one of the purposes of Recommendation 2.3 was to provide confidence that the plant can continue to operate safely during interim period while the reevaluation is completed. This confidence was gained by verifying that the facility is operating within the CLB. We already know that Diablo Canyon is operating outside the bounds of CLB.

To the best of my knowledge, PG&E doesn't consider the issues with the GDC 2 safety analysis as a non-conforming condition. As regulators, we enforce the statutory and license requirements. If the agency concludes these requirements are not appropriate, then we also have authority to waive or defer these requirements. For example, the agency included a "Justification for Continued Operation" with GL 2004-02 (GSI 191). As discussed in the DPO, the agency did not invoke these provisions or processes for Diablo Canyon.

Your e-mail you discussed Joe Sebrosky's direction to PG&E to place the new information in the FSARU. The new information was clearly outside of the bounds of the FSARU 50.34 safety evaluation. To consider the Shoreline a lesser case of the Hosgri directly affected the bounding conditions of the SSE as described in the FSARU safety analysis. To exclude the Shoreline from the SSE required an amendment to the Operating License because the method demonstrating GDC 2 design basis was affected. Did Mr. Sebrosky have authority to waive or defer enforcement of 50.71 or Part 50, Appendix B? The end result of Mr. Sebrosky's letter was tacit approval for Diablo Canyon's continued operation in an unanalyzed condition pending our review of the Recommendation 2.1 GRMS. Did the DPO Panel address if this deferment of enforcement was performed consistent with our regulatory framework and statutory requirements?

Once we agree that FSARU differentiates the Hosgri Evaluation from the GDC 2 safety analysis, then we can examine how this relationship applies to operability.

We require licensees to ensure that the 50.55a Code requirements are met for operating power reactors. The Code requires that the accident plus SSE loads be within acceptance limits. As stated in the DPO and FSARU, the Hosgri is not the SSE. If I apply the new seismic loads to the SSE Code calculations, the acceptance limits are clearly exceeded (inoperable). It's not adequate simply state the Code is satisfied

because the new ground motions are less than the Hosgri. The Hosgri Evaluation will always produce a much less conservative result than the SSE Code methods for a given ground motion. To say that SSE Code acceptance limits are met for new ground motions because the Hosgri met the Code would require the Hosgri to be the SSE. An amendment to the facility Operating License is required before the Hosgri can be used to satisfy the SSE Code loading requirements.

As regulators, we write violations: Bad operability evaluation - Licensee failed to adequately demonstrate that ASME Code limits were met for the GDC 2 design basis. The licensee then takes corrective actions. The licensee may present the argument in a relief request that the Hosgri could be considered a surrogate for the SSE. But these actions require NRC approval. The licensee must either demonstrate the Code is met, obtain relief from the NRC, or shutdown the reactors.

The same is true with the seismic qualification of plant SSCs. For a given ground motion, the Hosgri will always predict less seismic stress on facility SSCs than the SSE methods. By definition, this fact makes the Hosgri inappropriate as an alternative method for operability. The Hosgri will always over-predict SSC seismic performance when compared to the GDC 2 design basis method.

The DPO was written because agency decisions makers' responded to Diablo Canyon seismic issues outside of process, and in some cases, de-facto waived regulatory requirements. The DPO stated that the agency didn't enforce 50.71, 50.59, and the plant technical specification. The Panel Report included great insights on seismic response, the potential capability of plant SSCs, and a development of the ""hybrid design envelop." These insights can provide valuable prospective to aid the agency in licensing actions. But these insights do not provide justification for the failure to enforce statutory requirements.

I would very much like to reach consensus on the DPO issues. While Diablo Canyon seismic issues are complex, the outstanding DPO issues are not. As inspector, we frequently deal with FSARU, 50.59, and operability issues. We have formal inspection and industry guidance that amplifies these specific requirements and an agency Enforcement Policy that tells us how to disposition violations of these requirements.

Earlier in the DPO process, I recommend breaking the issue down into manageable steps. I used the steps listed below when writing the DPO. I wasn't able to find adequate bases in the Panel Report to suggest that I came to an incorrect conclusion on any of these points:

1. Applicability of 50.71(e) to the new information. If so, what is the threshold for enforcement?
2. How does the new information affect the 50.34 safety analysis (license application) for GDC-2.
3. Applicability of Appendix B (Criterion III & XVI)? If so, what is the threshold for enforcement?
4. Can the Hosgri be substituted for the SSE in 50.55a Code requirements? Is a relief request required? Would the relief request, if submitted, qualify for NRC approval?
5. Given that the Hosgri over-predicts SSC performance, is the evaluation suitable for as an alternative method for operability (IMC 0326).
6. If no, did Region IV fail to enforce plant Technical Specification requirements?

If I answer each question yes, then I work my way to the DPO conclusion. I looked to the DPO Panel to provide insights to flawed logic.

Thank you,
Michael

From: Case, Michael
Sent: Tuesday, May 20, 2014 8:12 AM
To: Peck, Michael
Cc: Leeds, Eric; Wertz, Trent
Subject: RE: QUESTION: DPO 2013-02

Thanks for that Mike. I think the panel agrees in principle with what you are saying (in essence, there needs to be a reconciliation step with the FSARU and the "new information" whether it's the Shoreline or from the Fukushima review. In my mind, it's just a question of when. The DPO asserts it has to be done now. We couldn't find anything that indicated it had to be now.

As a panelist, I was interested in what is the "footprint" to ensure that it will be resolved later. In the licensee sphere, they still retain an open item under the operability assessment to reconcile the FSAR (it's the same open item that caused them to send in the license amendment that they withdrew). On the regulatory side, in the Joe Sebrosky memo that told them to put the discussion of the Shoreline in the FSAR, we indicated that this is a preliminary assessment and that we would do follow up under the Fukushima 2.1 item. So I think there are footprints on both sides of the fence that will help to ensure that the FSAR methods issue is resolved (personally, I don't think a change is necessary).

One last thought. The panel recommended that we put in place some better guidance on what to do with "new information" in the context of Fukushima 2.2. If I had to "solve" it, my first step would involve assessing the information to see if it had "significant implication" per 50.9 or "adverse to quality" per Appendix B. In establishing significance, I would allow the use of current technical credible methods and allow valid comparisons to information such as the LTSP (or Fukushima 2.1 studies) that the staff has reviewed and accepted. If the licensee could demonstrate (as was ultimately the case with the DPO issue) that the info is not significant, I would stop there and stay out of this complicated maze of operability guidance, 50.59, SSEs, and legacy FSAR write-ups. Just my opinion...

Hope you have a good day today!

From: Peck, Michael
Sent: Monday, May 19, 2014 10:40 AM
To: Case, Michael
Subject: RES: QUESTION: DPO 2013-02

Mike,

Thank you for the discussion. I believe I understand the approach taken by the Panel. I agree that the Panel's use of the "hybrid design envelop" was technically justified as a predictor of SSC response.

However, I believe this answered a different question than raised in the DPO. As an inspector, I have written many 50.71 and 50.59 violations over the years. In each case I compared the FSARU statements with the Rules and NRC endorsed guidance (NEI 96-07, 97-04, & 98-03). For Diablo Canyon, the FSARU stated that the DDE met the GDC-2 SSE design bases. As an inspector, I knew that new seismic information was outside of the boundary of the FSARU GDC 2 safety analysis and the license application. The DPO provided a detailed bases for concluding 50.71 required PG&E to disposition the new information with regard to the GDC 2 safety analysis (tied back to 50.34 and the license application). From a 50.71 prospective, I don't believe it made any difference that the new information was bound by the Hosgri. 50.71 is tied specificity to the GDCs, which were tied to 50.34, which were tied to the SSE/DDE (remember, the Hosgri safety analysis wasn't even included in the FSARU). The new information (required to be addressed by 50.71) resulted in the 50.34 FSARU safety analysis to be non-conforming with the GDC 2 design basis. DPO stated that Part 50, Appendix B, required that the licensee correct the non-conforming safety analysis the in light of the new information.

The only viable licensee corrective action was to modify the GDC 2 safety analysis to accommodate the higher ground motions. The DPO stated than the required 50.71 actions "screen in" under 50.59 because the "safety analysis demonstrating the GDC 2 design basis was affected" (method of performing or controlling the design bases function or evaluation demonstrating that the intended design functions will be accomplished). Changing the "method of evaluation described in the UFSAR used in establishing the design

bases (GDC 2) or the in safety analysis (license application) required an amendment to the Operating License.

From the DPO Panel report, it appears the Panel started with the assumption that the "hybrid design envelop" satisfied the requires of 50.71 & 50.59. Based on this assumption, the Panel's conclusion seem reasonable. However, reading the Panel report, I didn't understand the bases for this assumption. I'm unable to reach the same conclusion applying of our Rules and endorsed guidance (NEI 96-07, 97-04, & 98-03).

I believe for the Panel's conclusion to be valid, then the basic underlying assumption concerning the applicability of 50.71 & 50.59 also needs to be valid. Since this issue has gained internal and external visibility, I would think resolving this basic question – Beyond a stated assumption, would be a worth wild endeavor.

My recommendation is to jointly compare both approaches/assumptions against the specific requirements of the FSARU, and 50.71 & 50.59, and implementing documents.

Michael

From: Case, Michael
Sent: Monday, May 19, 2014 7:53 AM
To: Peck, Michael
Subject: RE: QUESTION: DPO 2013-02

Thanks Mike. I think Eric is getting close to issuing his decision soon. I think the panel believed that the new ground motion (including Los Osos and San Luis Bay) needed to be bounded by the limiting design value from either the DDE analysis or the Hosgri analysis. In general, for most of the spectrum it was the Hosgri, but in the range of 7-11 Hz it was more likely to be the DDE analysis. We agreed with your insight that they needed to follow the FSAR description of how to analyze seismic performance.

So when they did those additional calculations for us, we specifically asked them to show us a single, most limiting curve (DDE or Hosgri) for each of the type of SSCs listed in Section 3.7.1.3 of the FSARU (they used rev 21). That way we weren't discussing things in general, we had the picture of the hybrid design envelope that was FSARU specific. Then they plotted the expected SSC response for each of the new ground motions (Shoreline, San Luis, Los Osos). Brit did some technical work with them to make sure that the seismic parameters being used were equivalent so that it was an apples to apples comparison. When you compare the expected response to the design parameters, we saw that it was less than what the design envelope was (that is true generally, we actually saw some exceedences in the higher frequencies as noted in our writeup)

When the licensee did the "expected SSC response" to the new ground motions, they did use one (technically justified) damping value for the whole spectrum. For example, for "mechanical components", they used a damping value of 3%. That is neither the DDE damping value 2%, nor the HE damping value of 4%. We considered that and believed it to be a reasonable value to use for an "expected SSC response". Generally, for the expected SSC response, we would accept any damping value less than that used in the latest staff position in the RG.

To say it at a very high level, what we saw was that for the new information, the expected shaking the SSCs would see was always less than the shaking level they were design for.

I'm sure this still sounds confusing, but I think we were able to use the best of your insights to get the licensee to show us in somewhat quantitative detail what they had asserted back in your day in a more qualitative way.

Have a good week!

From: Peck, Michael
Sent: Friday, May 16, 2014 1:49 PM
To: Case, Michael
Cc: Leeds, Eric
Subject: RES: QUESTION: DPO 2013-02

Thank you.

I am planning to be at the PDC June 6 – 13. I should generally be available to meet during afternoons.

I noticed that Mr. Leeds had requested another extension. I thought that you may be still working through the issues.

As I reflected on your report, I considered that how the Panel addressed the design bases question: DDE + Hosgri vs. DDE or Hosgri. How this question is answered fundamentality affects the path chosen to resolve the DPO issues. It was clear to me that the Panel concluded that new ground motion needed to be bound by either the DDE or Hosgri. Given this assumption, I would have to generally agree with the Panel's' conclusions. However, it wasn't clear to me from the report why the Panel made this conclusion.

I presented the case in the DPO and my response to the Panel report that our regulations (50.71(e), 50.59) are tied to "the facility as described in the FSARU." I view that the question, DDE and/or Hosgri, must be answered from the pages of the FSARU and in terms of the requirements of 50.34 safety analysis and GDC-2. This regulatory path lead me to the conclusions presented in the DPO.

I believe a discussion of how the Panel reached the conclusion, DDE or Hosgri, may lead to a consensus on the DPO issues. Specifically, how the Panel applied our agency regulatory framework to the Diablo Canyon FSARU. For example, the specific provisions 50.59 or NEI 96-07 that would allow the new information to be screen out.

Michael

From: Case, Michael
Sent: Friday, May 16, 2014 7:38 AM
To: Peck, Michael
Subject: RE: QUESTION: DPO 2013-02

I think I'm basically done (but still have a bagful of papers in the front seat of my car) I have no problems going over your comments.. Any chance you are going to be up here for something? It would be nice to have the discussion that way.

From: Peck, Michael
Sent: Thursday, May 15, 2014 3:34 PM
To: Case, Michael
Subject: QUESTION: DPO 2013-02

I hope you are doing well in your new position

Are you done with the DPO? I was wondering if we would have an opportunity to discuss my comments on the Panel's report?

Thank you,
Michael Peck, Ph.D.
Senior Reactor Technology Instructor
TTC, 432-855-6515

From: Niedzielski-Eichner, Phillip
Sent: Tuesday, December 02, 2014 10:09 PM
To: Dapas, Marc; Williamson, Edward
Cc: Johnson, Michael; Doane, Margaret; Itzkowitz, Marvin; Kennedy, Kriss; Dacus, Eugene; Uhle, Jennifer; Holian, Brian
Subject: RE: Draft Answer to SONGS Question on Whether an LA Should Have Been Required

Thanks Marc for putting this together. I forwarded the info to the Chairman earlier this evening. Best. Phil

From: Dapas, Marc
Sent: Tuesday, December 02, 2014 7:41 PM
To: Niedzielski-Eichner, Phillip; Williamson, Edward
Cc: Johnson, Michael; Doane, Margaret; Itzkowitz, Marvin; Kennedy, Kriss; Dacus, Eugene; Uhle, Jennifer; Holian, Brian
Subject: RE: Draft Answer to SONGS Question on Whether an LA Should Have Been Required

(b)(5)

From: Dapas, Marc
Sent: Tuesday, December 02, 2014 6:38 PM
To: Niedzielski-Eichner, Phillip; Williamson, Edward
Cc: Johnson, Michael; Doane, Margaret; Itzkowitz, Marvin; Kennedy, Kriss; Dacus, Eugene; Uhle, Jennifer; Holian, Brian
Subject: RE: Draft Answer to SONGS Question on Whether an LA Should Have Been Required

(b)(5)

(b)(5)

Non-Responsive Record

From: Niedzielski-Eichner, Phillip
Sent: Tuesday, December 02, 2014 5:46 PM
To: Dapas, Marc; Williamson, Edward
Cc: Johnson, Michael; Doane, Margaret; Itzkowitz, Marvin; Kennedy, Kriss; Dacus, Eugene; Uhle, Jennifer; Holian, Brian
Subject: RE: Draft Answer to SONGS Question on Whether an LA Should Have Been Required

(b)(5)

Non-Responsive Record

Best. Phil

From: Dapas, Marc
Sent: Tuesday, December 02, 2014 6:15 PM

To: Williamson, Edward
Cc: Johnson, Michael; Doane, Margaret; Itzkowitz, Marvin; Kennedy, Kriss; Niedzielski-Eichner, Phillip; Dacus, Eugene; Uhle, Jennifer; Holian, Brian
Subject: RE: Draft Answer to SONGS Question on Whether an LA Should Have Been Required

(b)(5)

From: Rihm, Roger
Sent: Monday, December 01, 2014 10:49 AM
To: Uhle, Jennifer
Subject: 5 one pagers as discussed
Attachments: Non-Responsive Record
Non-Responsive Record NRR_Diablo Canyon Seismic Studies.docx; Non-Responsive Record

Importance: High

Non-Responsive Record

Non-Responsive Record

Non-Responsive Record

Diablo Canyon Seismic Studies
(and Sewell Report on Tsunami Hazards)

Message: Seismic studies at Diablo Canyon Power Plant (DCPP) performed to comply with California implementation of federal coastal management law have been completed. The results of these studies have also been provided to the NRC. To date, these studies provide reasonable assurance that DCPP operation is consistent with the adequate protection of public health and safety.

1. On September 10, 2014, Pacific Gas & Electric (PG&E) submitted their Central Coastal California Seismic Imaging Project (CCCSIP) Report to the State of California and to the NRC. The report documented the results of advanced seismic studies performed by PG&E using state-of-the-art low- and high-energy, 2D and 3D, seismic reflection mapping to further document the characteristics of fault zones in the region surrounding Diablo Canyon. The results were provided to the NRC in accordance with a regulatory commitment documented in PG&E letter dated October 25, 2012. This commitment required that in the event new faults are discovered or information is learned that would suggest the Shoreline fault (discovered in 2008 and evaluated to be within the facility licensing basis) is more capable than currently believed, the licensee would provide the NRC with an interim evaluation that describes actions taken or planned to address the higher seismic hazard relative to the design basis, as appropriate, prior to completion of evaluations requested in the NRC Staff's March 12, 2012, request for information under 10 CFR 50.54(f) (i.e., NTTF Rec. 2.1 - seismic hazards re-evaluation). The licensee concluded that the results of the advanced seismic studies confirm previous analyses that the plant is designed to withstand a major seismic event. The NRC has independently assessed the new data and has confirmed that previous evaluations of ground motions for which the plant was evaluated and demonstrated to have a reasonable assurance of adequate protection remain bounding.

2. PG&E must respond to the NRC's March 12, 2012, request for information, under 10 CFR 50.54(f) by March 2015. To respond to the request for information, PG&E is expected to utilize the results of their recently completed advanced seismic studies to support the NRC-mandated seismic hazard risk assessment. The NRC staff continues to monitor PG&E's progress in assessing the information necessary to update the seismic hazard information for DCPP and notes that the new seismic information will be peer-reviewed via the NRC-mandated Senior Seismic Hazard Analysis Committee (SSHAC) process. The NRC staff understands that PG&E is on track to meet the March 2015 date for responding to the March 12, 2012 request for information. The seismic hazards re-evaluation scheduled to be submitted in March 2015 is expected to provide the most up-to-date and accurate assessment of seismic hazard risk for the Diablo Canyon Power Plant. The NRC will review PG&E's response along with other seismic hazard re-evaluation responses provided in accordance with the 10 CFR 50.54(f) letter.

Key Points:

- Seismic studies at DCPP have been ongoing since original licensing which resulted in three design basis earthquakes used to develop the seismic qualification basis for DCPP structures, systems, and components: Design Earthquake (DE)[0.2g], Double Design Earthquake (DDE)[0.4g], and the Hosgri Earthquake (HE)[0.75g]. The Unit 1 operating license, issued in 1984, contained a license condition for future deterministic and probabilistic seismic reevaluation resulting in PG&E's Long Term Seismic Program (LTSP) and an NRC staff evaluation in 1991 confirming the earlier conclusions. In continuation of

the LTSP seismic studies in November 2008, PG&E identified what later became known as the Shoreline fault. The Shoreline fault lies approximately 600 meters from the DCPP reactors and 300 meters offshore and was the subject of the NRC staff independent assessment discussed above. The Shoreline fault was evaluated by PG&E and it was determined that ground motions due to a seismic event along the Shoreline fault remains within the DCPP licensing basis. The NRC independently confirmed in its Research Information Letter (RIL 12-01) that the ground motions due to a seismic event along the newly discovered Shoreline fault were at or below the previously evaluated ground motions for the Hosgri earthquake.

- During NRC staff regulatory review related to DCPP license renewal, PG&E was required to obtain a coastal consistency certification for its federal operating license due to California's interpretation and implementation of the federal Coastal Zone Management Act (executed via the California Coastal Commission). To support the coastal consistency determination, PG&E agreed to perform state-of-the-art, 2D and 3D, onshore and offshore, low and high power seismic mapping techniques to explore the fault zones around DCPP and to identify potential seismic vulnerability not evident from previous technologies. The low-energy, onshore and offshore 2D and 3D seismic mapping have been completed along with high energy 3D seismic onshore mapping. This mapping supported the advanced seismic studies which were completed by PG&E in 2014.

- The advanced seismic studies undertaken by PG&E to implement requirements from the California Coastal Commission have been completed and the results of these studies were provided in a report to the State of California and to the NRC on September 10, 2014. These studies revealed that the Shoreline fault, which was evaluated previously by PG&E in their 2011 Shoreline Fault report, is longer and more capable than previously evaluated and also indicated that the soil properties found in the 2011 report have been updated based on the new information. The report also included new information relative to other faults in the area (e.g., Hosgri, San Simeon, Los Osos, and San Luis Bay). Although this new information indicated increases in certain fault lengths, changes in fault dip angles, potential fault connections, increased in magnitudes, and changes to soil characteristics and resultant energy attention, the new information was determined by the licensee to remain enveloped by the previous 1977 Hosgri earthquake evaluation and the Long Term Seismic Program. Operability assessments are the licensee's primary tools for assessing safety when new problems or conditions are identified. The licensee performed an operability assessment as a result of this new information and determined that the plant remained operable. NRC resident inspectors have reviewed the operability assessment and determined that it followed appropriate NRC processes and there were no indications that challenge the NRC staff's assessment of DCPP's reasonable assurance of safety. However, a more in-depth inspection is currently being performed with the support of Headquarters technical staff to review the information contained in the PG&E seismic report upon which the operability assessment is based.

- PG&E has conducted six workshops related to the seismic studies process to date, with five of six open to the public. All of the planned workshops are now complete. The NRC staff attended these meetings as observers and will continue to monitor the process. To date, no new issues have been identified that have challenged the NRC staff's assessment of DCPP's reasonable assurance of adequate protection.

Possible Questions

1. **Can the NRC provide absolute assurance that the new seismic information for Diablo Canyon recently provided in PG&E's seismic report to the State of California and to the NRC does not put the plant outside its design basis?**

   The NRC reviews plants against a different standard than absolute assurance. The NRC review is based on reasonable assurance of adequate protection. The recent seismic report from PG&E conclude that the maximum ground motions that could occur from the earthquake faults evaluated, including the Shoreline fault, remain within the current licensing basis that postulates 0.75g ground motion. Operability assessments are the licensee's primary tools for assessing safety when new problems or conditions are identified. The licensee performed an operability assessment as a result of this new information and determined that the plant remained operable. NRC resident inspectors have reviewed the operability assessment and determined that it followed appropriate NRC processes and there were no indications that challenge the NRC staff's assessment of DCPP's reasonable assurance of adequate protection. However, a more in-depth inspection is underway with the support of HQ technical staff to review the information contained in the PG&E seismic report upon which the operability assessment is based.

   Additionally, to ensure public health and safety, the DCPP units have an automatic seismic reactor trip set point of 0.35g. If the ground acceleration at the DCPP units from any earthquake that meets or exceeds this 0.35g set point, both reactors will automatically shut down.

2. **Based on concerns raised by the former NRC Senior Resident Inspector (SRI) and recent claims from other groups that the NRC has "changed the rules" to allow Diablo Canyon to continue to operate in light of new information that revealed increased seismic hazards to the plant why isn't NRC taking immediate action to require Diablo Canyon to demonstrate that it is still within its seismic design and licensing bases?**

   The former SRI at DCPP submitted non-concurrence papers (NCPs) in January 2011 and January 2012, followed by a Differing Professional Opinion (DPO) in July 2013 (DPO 2013-02) detailing a disagreement with the NRC about how new seismic information should be compared to the plant's current seismic license requirements. DPO 2013-02 restated the issues presented in NCP 2012-01 and added a concern that a license amendment was needed to incorporate the Shoreline fault into Diablo Canyon's FSAR as described in the RIL 12-01 cover letter. In accordance with MD 10.159, a DPO Ad Hoc Review Panel was established to review the DPO submittal, meet with the DPO submitter, and issue a DPO report including conclusions and recommendations regarding disposition of the issues presented in the DPO. The panel completed its report in May 2014 and a decision on the DPO was rendered in letter dated May 29, 2014, to the DPO submitter. The decision on the DPO was that there was not a safety concern over the seismic hazards considerations for Diablo Canyon. The DPO submitter appealed the decision to the EDO and the EDO completed his consideration of the DPO appeal on September 9, 2014, concluding that he was in agreement with the original decision that there is no safety concern and that the plant remains within its current licensing basis. Claims that the NRC has "changed the rules" to allow Diablo Canyon to continue to operate in light of new information that revealed increased seismic hazards to the plant are being handled by our Office of General Counsel. Notwithstanding, the licensee has concluded that the increased seismic hazards are still within the current licensing basis and has performed an operability assessment based on this new information that determined that important structures, systems, and components in the plant will remain operable following a seismic event. NRC resident inspectors have reviewed the operability assessment and determined that it followed appropriate NRC processes and there were no indications that challenge the NRC staff's assessment of

DCPP's reasonable assurance of adequate protection. However, a more in-depth inspection is underway with the support of HQ technical staff to review the information contained in the PG&E seismic report upon which the operability assessment is based.

3. **Given that it may take several months for the NRC to review PG&E's responses to the NRC's March 12, 2012, letter, why is the plant safe to operate during that time?**

The request for information process related to the March 12, 2012, letter, directs PG&E to provide interim evaluations to the NRC prior to the risk evaluations being performed (i.e., within 3 years). Further evaluations would be warranted should higher seismic hazards be revealed relative to the design basis. The responses to the March 12, 2012, letter are scheduled to be submitted in March 2015. Based on the information contained in the recent PG&E seismic report, the licensee concluded that the maximum ground motions that could occur from the earthquake faults evaluated, including the Shoreline fault, remain within the current licensing basis that postulates 0.75g ground motion. Operability assessments are the licensee's primary tools for assessing safety when new problems or conditions are identified. The licensee performed an operability assessment as a result of this new information and determined that the plant remained operable. NRC resident inspectors have reviewed the operability assessment and determined that it followed appropriate NRC processes and there were no indications that challenge the NRC staff's assessment of DCPP's reasonable assurance of safety. However, a more in-depth inspection is underway with the support of HQ technical staff to review the information contained in the PG&E seismic report upon which the operability assessment is based.

Additionally, to ensure public health and safety, the DCPP units have an automatic seismic reactor trip set point of 0.35g. If the ground acceleration at the DCPP units from any earthquake that meets or exceeds this 0.35g set point, both reactors will automatically shut down. Structures, systems, and components necessary to achieve and maintain safe shut down conditions were designed to the maximum ground motion of 0.75g. The responses due to the NRC in March 2015 will be supported by the new information contained in the PG&E seismic report that shows that the plant remains bounded by the current licensing basis. In addition, risk information associated with slip rates and recurrence of seismic events along the evaluated earthquake faults will be provided in the March 2015 timeframe to further inform the responses.

4. **Why was the PG&E license amendment associated with seismic issues allowed to be withdrawn and are there future plans for a license amendment?**

The October 20, 2011, PG&E license amendment requested approval to revise the current licensing basis, as described in the Updated Final Safety Analysis Report and Technical Specifications, to provide requirements for the actions, evaluations, and reports necessary when PG&E identifies new seismic information relevant to the design and operation of DCPP. In the October 12, 2012, letter from the NRC to PG&E, PG&E was informed of the issuance of the staff's independent assessment of the Shoreline Fault and the staff provided guidance on how new seismic information at Diablo Canyon should be evaluated.

Specifically the October 12, 2012, letter indicated that the NRC was aware of PG&Es efforts to obtain new seismic hazards information in support of the March 12, 2012, request for information, using advanced offshore and onshore 2D and 3D seismic reflection mapping and that this new seismic information should be evaluated in accordance with the process outlined in that March 12, 2012 letter. Therefore, the October 12, 2012, letter in conjunction with the March 12, 2012, request for information provides a process for assessing new

seismic information at Diablo Canyon and rendered the portion of the October 20, 2011, PG&E license amendment in this area unnecessary. In a letter dated October 25, 2012, PG&E provided the basis for withdrawing its October 20, 2011, license amendment request. The staff accepted the withdrawal of the license amendment in a letter dated October 31, 2012.

Since the licensee's withdrawal of the October 20, 2011, license amendment request, PG&E's advanced seismic studies have been completed and a report was provided to the State of California and to the NRC. Going forward the staff expects the licensee to follow the March 12, 2012, request for information, for assessing this new seismic information, and, in particular, to follow the peer-review SSHAC process. In addition to the request for additional information, by letter dated February 20, 2014, the Director of the NRC's Office of Nuclear Reactor Regulation provided supplemental information to all power reactor licensees and construction permit holders, including Diablo Canyon, regarding the performance of the seismic re-evaluations. Specifically, the February 20, 2014, letter reminded licensees, in part, that if an error is identified in the current design or licensing basis during performance of the seismic reevaluations, that the NRC staff expects licensees will evaluate affected structures, systems, and components for operability in accordance with the Corrective Action Program. As described in the March 12, 2012, request for information, the NRC staff will determine whether additional regulatory actions are necessary once the information becomes available for review. As discussed above, the staff continues to assess new seismic information as it becomes available (e.g., monitoring the Senior Seismic Hazard Analysis Committee (SSHAC) meetings). If new information suggests that the plant is not operating within its licensing basis or is not safe to continue operation the staff will immediately take the necessary regulatory actions to ensure the plant's licensing basis is changed, and if appropriate will require the plant to shutdown until it is demonstrated that it can be safely operated.

5. Why, if PG&E is completing seismic studies at DCPP, has the NRC staff already approved a final SER for license renewal?

The staff issued the final SER to preserve the staff's evaluation of the information that was available at the time. The staff plans to supplement the SER, as necessary, at a time closer to when a final decision on license renewal can be made after receipt of the coastal consistency certification and its accompanying seismic study information.

Regarding the license renewal environmental review, the Generic Environmental Impact Statement (GEIS) (NUREG-1437) is the generic EIS prepared to assess the environmental impacts of license renewal, identifying which environmental issues need to be addressed on a site-specific basis and which are best handled generically. Supplements to the GEIS are issued to address site-specific issues in the license renewal process. The NRC has not yet prepared or published a site-specific supplement to the GEIS for Diablo Canyon. When the licensee requests that the NRC restart the review, the environmental review will resume and the NRC staff will prepare a site-specific supplement related to the environmental impacts of Diablo Canyon.

6. Shouldn't seismic issues be addressed before license renewal is completed?

The NRC staff license renewal review schedule has been deferred at PG&E's request to reflect delays associated with the completion of seismic studies and the coastal consistency certification. While the pause in the NRC license renewal review schedule is not a stay or suspension of the license renewal process, the revised schedule will allow time to consider

information from the seismic studies, if appropriate, following PG&E's request for recommencement of review.

Sewell Report on Tsunami Hazards

Message: NRC guidance and criteria for reviewing tsunami hazards has been updated over the last several years to take into account new studies and information gathered from tsunami events worldwide by USGS, NOAA, and other research organizations and governmental agencies. The NRC has requested that all operating power reactors re-evaluate their flooding hazards, including tsunamis, per the March 12, 2012, 10 CFR 50.54(f) letter to determine if additional regulatory action is required to provide additional protection from updated hazards. To date, the NRC has no new information that would challenge its reasonable assurance conclusion that DCPP operation is consistent with the adequate protection of public health and safety.

1. Dr. Robert Sewell, a consultant for the Center for Nuclear Waste Regulatory Analysis (CNWRA), prepared a draft report during the technical review of the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI). CNWRA provided the draft report to the Nuclear Regulatory Commission (NRC) staff with an accompanying explanation that CNWRA did not formally review or accept the conclusions of the draft report. The NRC staff assessed the concerns identified in the draft report and concluded that the preliminary nature of the study precluded its use as a basis for any regulatory decisions. The NRC did not release the draft Diablo Canyon tsunami report at the time of its initial review for two reasons. First, although the staff considered the draft report during the licensing of the Diablo Canyon ISFSI, the draft report did not contribute to the NRC's decision making on that proceeding. Second, the NRC staff considered the report preliminary because its conclusions were based on limited data and methods. COMSECY-14-0033, dated October 10, 2014, requested Commission approval for the staff to publicly release the Sewell Report along with several other documents that were previously withheld that would put the report into appropriate context. The SRM is pending and the staff will proceed in accordance with the direction in the SRM when issued.

2. PG&E must respond to the NRC's March 12, 2012 request for information, under 10 CFR 50.54(f), regarding flooding hazards re-evaluation, including flooding resulting from a tsunami, by March 2015. To respond to the request for information, PG&E is expected to follow guidance provided by the NRC for performing a tsunami, surge, or seiche hazard assessment (JLD-ISG-2012-06) that was issued on January 4, 2013.

Key Points:

- In February 2006, the Office of Nuclear Reactor Regulation's (NRR's) Division of Engineering terminated further consideration of the Sewell Report, based on NRC participation in other cooperative government reviews of tsunami hazards under the President's Office of Science and Technology Policy (OTSP). NRR concluded that the OTSP effort would provide a more technically credible forum to broaden the NRC's understanding of tsunamis and inform efforts to reassess the tsunami design criteria in the Standard Review Plan. The design basis tsunami for DCPP considers distantly-generated tsunamis and locally-generated tsunamis. The design basis tsunami is the

greater of these tsunamis and is 34.6 feet. Additionally, DCPP sits atop a coastal bluff, 85 feet above sea level, decreasing its vulnerability to a tsunami hazard.

- As documented in a memorandum dated February 27, 2006, from Michael Mayfield, Director, Division of Engineering in NRC's Office of Nuclear Reactor, the staff received direction from the Commission that the report was not to be released, absent a thorough review by the staff and resolution of the staff comments. However, based on the limitations associated with the draft report, the NRC's Seismic Issues Technical Advisory Group assessment of the draft report, and the ongoing technically robust and broad review of tsunamis by the Office of Science and Technology Policy, the NRC staff made a decision to terminate any further consideration, or review, of the draft report.

- To place the draft Diablo Canyon tsunami report in the appropriate context, if the Commission approves release of the draft report, then the NRC staff plans to release these two related documents:

    - A memorandum dated March 17, 2004, from CNWRA, "Tsunami Hazard Study for the Diablo Canyon Site in Central California" (ADAMS Accession No. ML050450106). This memorandum forwards the report to the NRC and states that CNWRA has not formally reviewed the report nor does the CNWRA accept the report. The memorandum states in part that "the methodology is beyond state of the art, the uncertainties too large, and the results too speculative to be considered in current licensing decisions."

    - A memorandum dated November 17, 2005, from Andrew Murphy, Chairman Seismic Issues Technical Advisory Group in NRC's Office of Nuclear Regulatory Research, to Michele Evans, Branch Chief, Engineering Research Applications Branch in NRC's Office of Nuclear Regulatory Research and Eugene Imbro, Deputy Director, Division of Engineering, Office of Nuclear Reactor Regulation, "Transmittal of Seismic Issues Technical Advisory Group Evaluation of Tsunami Hazard Report and Tsunami Hazard Research Plan" (ADAMS Package Accession No. ML053210413). This memorandum provided the results of the Seismic Issues Technical Advisory Group (SITAG) review of the draft tsunami hazards report and provides its recommendation on the appropriate disposition of the draft report in a regulatory context.

- Recently, in response to FOIA request 2014-0222 (ADAMS Package Accession No. ML14170A719), the staff publicly released several documents associated with this draft Diablo Canyon tsunami report including: (1) a memorandum dated January 17, 2006, from Andrew Murphy, Chairman, Seismic Issues Technical Advisory Group, Office of Nuclear Regulatory Research, to Michele Evans, Branch Chief, Engineering Research Applications Branch, Office of Nuclear Regulatory Research, and Eugene Imbro, Deputy Director, Division of Engineering in NRC's Office of Nuclear Reactor Regulation, "Transmittal of Seismic Issues Technical Advisory Group Updated Evaluation of Tsunami Hazard Report" (ADAMS Package Accession No. ML060170138) – this memorandum provided an update to the SITAG's previous evaluation discussed above based on additional internal NRC interactions but with no resultant change in their recommendation; and (2) the memorandum dated February 27, 2006, from Michael Mayfield, Director, Division of Engineering, Office of Nuclear Reactor Regulation, to E. William Brach, Director, Spent Fuel Project Office, Office of Nuclear Material Safety and Safeguards, discussed above. If the Commission approves the requested release, all

four of these documents will be grouped in an ADAMS package with the draft Diablo Canyon tsunami report.

- The staff notes that the draft Diablo Canyon tsunami report has been withheld previously from public disclosure and is referenced as being withheld in the following documents:

    - In response to FOIA/PA-2011-0118, FOIA/PA-2011-0119, and FOIA/PA-2011-0120 (ADAMS Accession No. ML13183A466)

    - In an e-mail response dated June 12, 2014, to Mr. David Weisman of the Alliance for Nuclear Responsibility (ADAMS Accession No. ML14191A100)

    - In an August 8, 2014, letter to Senator Boxer from Eugene Dacus, Acting Director, NRC Office of Congressional Affairs, dated August 8, 2014 (ADAMS Package Accession No. ML14232A137)

Possible Questions

1. Why is the staff releasing the report now when it previously withheld the report?

The staff has recently reassessed its previous determination to withhold the November 22, 2003, draft report because the passage of time and subsequent NRC staff actions associated with tsunami hazard review guidance and criteria have made it unlikely that release of this report will result in any foreseeable harm and is therefore releasing it in response to a recent Freedom of Information Act (FOIA) request.

The NRC did not release the report previously for two reasons. First, although considered during the licensing of DCPP ISFSI, it did not form the basis for that licensing action. Second, the draft report was considered preliminary and its conclusions based on limited data and methods.

2. What has the NRC done to evaluate the report?

The NRC was assisted by experts from the Center for Nuclear Waste Regulatory Analyses (CNWRA) in performing a comprehensive safety and technical review of PG&E's license application for an ISFSI. The CNWRA, in turn, contracted the services of Dr. Robert Sewell specifically to assess PG&E's application with respect to tsunami hazards.

The NRC and CNWRA concluded that the probable maximum tsunami flooding at the proposed ISFSI was adequately addressed by PG&E, based on PG&E's assessment of more recent tsunami information in the area, and the much higher elevations of the ISFSI site and transporter route relative to the previously analyzed hazard for the power plant.

The CNWRA assessed the information in Dr. Sewell's report upon receiving it in November 2003. The report was forwarded for NRC's consideration in March 2004, after CNWRA had completed its review of the DCPP ISFSI application. Both the principal investigator for the CNWRA, an expert geologist and seismologist, and the NRC determined that the findings in the report were too speculative to be considered in current licensing decisions, but that they might warrant further review by the NRC. In

February 2005, the NRC staff initiated further review of the report, consistent with its efforts to assess the December 2004 tsunami in southeast Asia. In May 2005, the NRC directed that a special review of the report be performed by NRC seismic experts. That group reached its preliminary conclusions on Dr. Sewell's report in November 2005, and completed its evaluation in January 2006.

3. **Has NRC assessed the potential impact of a tsunami, as predicted by Dr. Sewell, on the DCPP and public safety?**

   The NRC's assessment of potential tsunami hazard is ongoing and the DCPP response to the 50.54(f) letter is due March 2015. However, the NRC has concluded that the tsunami scenarios described by Dr. Sewell in the report are based on preliminary data and analysis and should not be used as a basis for any licensing action. NRC continues to evaluate the potential tsunami hazard for coastal nuclear facilities to ensure the most up to date scientific information is assessed and properly considered.

Non-Responsive Record

Non-Responsive Record

Non-Responsive Record

Non-Responsive Record

From: Ross-Lee, MaryJane
Sent: Wednesday, November 26, 2014 11:04 AM
To: Markley, Michael; Oesterle, Eric; Walker, Wayne
Cc: Lubinski, John; Flanders, Scott; Kock, Andrea; Lingam, Siva; Pruett, Troy; Manoly, Kamal; Bowers, Anthony; Wilson, George; Karas, Rebecca; Li, Yong; Evans, Michele; Oesterle, Eric; Uhle, Jennifer
Subject: RE: Chairman request for NRO/RES personnel to meet re: DCPP

Mike, thanks for offing to be sure the seismic guys on the operating reactor side are in the loop on Diablo. We appreciate it!

Mary Jane Ross-Lee (MJ)
Deputy Director, Division of Engineering
Office of Nuclear Reactor Regulation
OWFN 9H1
US Nuclear Regulatory Commission
☎ Office: 301-415-3298
Mobile: (b)(6)
e-mail: maryjane.ross-lee@nrc.gov

From: Markley, Michael
Sent: Wednesday, November 26, 2014 10:04 AM
To: Oesterle, Eric; Walker, Wayne
Cc: Lubinski, John; Ross-Lee, MaryJane; Flanders, Scott; Kock, Andrea; Lingam, Siva; Pruett, Troy; Manoly, Kamal; Bowers, Anthony; Wilson, George; Karas, Rebecca; Li, Yong; Evans, Michele; Oesterle, Eric; Uhle, Jennifer
Subject: Chairman request for NRO/RES personnel to meet re: DCPP

All,

The purpose of this note is to keep you informed that the Chairman has asked to meet with Cliff Munson, Jon Ake, and Nilesh Choksi on December 1 or 2 regarding Diablo Canyon. It is not apparent what the details of this discussion will be, but the Chairman has had a long-standing and ongoing dialogue with these individuals regarding seismic at Diablo Canyon. My suspicion is that this may have some bearing on her preparation for the upcoming hearings and preparation materials that have been compiled. We will keep you informed of any issues or questions that may become apparent.

Mike

From: Ross-Lee, MaryJane
Sent: Thursday, November 06, 2014 4:20 PM
To: Uhle, Jennifer
Subject: RE: addressing manager's comments on DCPP Op Det

I just did -- didn't realize they were both in training. I asked them to come to you.

Mary Jane Ross-Lee (MJ)
Deputy Director, Division of Engineering
Office of Nuclear Reactor Regulation
OWFN 9H1
US Nuclear Regulatory Commission
☎ Office: 301-415-3298
Mobile: (b)(6)
e-mail: maryjane.ross-lee@nrc.gov

From: Uhle, Jennifer
Sent: Thursday, November 06, 2014 4:19 PM
To: Ross-Lee, MaryJane
Subject: RE: addressing manager's comments on DCPP Op Det

MJ, can you get an admin to track them down?

Thanks,

Jennifer

From: Ross-Lee, MaryJane
Sent: Thursday, November 06, 2014 3:26 PM
To: Li, Yong; Chokshi, Nilesh
Cc: Uhle, Jennifer
Subject: FW: addressing manager's comments on DCPP Op Det
Importance: High

Can the 2 of you please go up and see Jennifer?

Mary Jane Ross-Lee (MJ)
Deputy Director, Division of Engineering
Office of Nuclear Reactor Regulation
OWFN 9H1
US Nuclear Regulatory Commission
☎ Office: 301-415-3298
Mobile: (b)(6)
e-mail: maryjane.ross-lee@nrc.gov

From: Uhle, Jennifer
Sent: Thursday, November 06, 2014 3:24 PM
To: Ross-Lee, MaryJane; Dean, Bill; Holian, Brian

Cc: Pruett, Troy; Lubinski, John
Subject: RE: addressing manager's comments on DCPP Op Det

Hi guys I have questions on the second paragraph on page 2. It is not making sense to me. Can we chat today? J

From: Ross-Lee, MaryJane
Sent: Thursday, November 06, 2014 1:16 PM
To: Dean, Bill; Holian, Brian; Uhle, Jennifer
Cc: Pruett, Troy; Lubinski, John
Subject: FW: addressing manager's comments on DCPP Op Det

Bill/Jennifer/Brian,

Between NRR and NRO, we collectively addressed all the comments except the one below.

NRO believes that the original wording is better in describing the DDE loads.

The original reads,

"However, the DDE tends to control the SSCs with natural frequencies only in the lower range."

The comments reads,

"However, the DDE loads are the most severe loads on the SSCs with natural frequencies only in the lower range."

Therefore, it was not changed.

Mary Jane Ross-Lee (MJ)
Deputy Director, Division of Engineering
Office of Nuclear Reactor Regulation
OWFN 9H1
US Nuclear Regulatory Commission
☎ Office: 301-415-3298
Mobile: (b)(6)
e-mail: maryjane.ross-lee@nrc.gov

From: Li, Yong
Sent: Thursday, November 06, 2014 12:51 PM
To: Ross-Lee, MaryJane
Cc: Lubinski, John; Lupold, Timothy; Manoly, Kamal
Subject: addressing manager's comments

MJ,

We, between NRR and NRO, collectively addressed all the comments from the senior managers except the one below.

NRO believes that the original wording is better in describing the DDE loads.

The original reads,

"However, the DDE tends to control the SSCs with natural frequencies only in the lower range."

The comments reads,

"However, the DDE loads are the most severe loads on the SSCs with natural frequencies only in the lower range."

Therefore, it is not changed.

Thanks!

Yong

From: Ross-Lee, MaryJane
Sent: Thursday, November 06, 2014 7:48 PM
To: Uhle, Jennifer
Cc: Ross-Lee, MaryJane; Dean, Bill; Holian, Brian; Pruett, Troy; Lubinski, John; Chokshi, Nilesh; Kock, Andrea; Li, Yong
Subject: RE: addressing manager's comments on DCPP Op Det

Thanks. We will finalize and send to Region 4.

MJ Ross-Lee
Deputy Director, Division of Engineering, NRR.
Sent via My Workspace for iOS
(b)(6)

On Thursday, November 6, 2014 at 5:59:14 PM, "Uhle, Jennifer" <Jennifer.Uhle@nrc.gov> wrote:

Based on my discussion with Nilesh, Andrea and Yong, I modified it a bit and hopefully the final is attached. J

From: Ross-Lee, MaryJane
Sent: Thursday, November 06, 2014 1:16 PM
To: Dean, Bill; Holian, Brian; Uhle, Jennifer
Cc: Pruett, Troy; Lubinski, John
Subject: FW: addressing manager's comments on DCPP Op Det

Bill/Jennifer/Brian,

Between NRR and NRO, we collectively addressed all the comments except the one below.

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The comments reads,

"However, the DDE loads are the most severe loads on the SSCs with natural frequencies only in the lower range."

Therefore, it was not changed.

Mary Jane Ross-Lee (MJ)
Deputy Director, Division of Engineering
Office of Nuclear Reactor Regulation
OWFN 9H1
US Nuclear Regulatory Commission
☎ Office: 301-415-3298
✆ Mobile: (b)(6)

e-mail: maryjane.ross-lee@nrc.gov

From: Li, Yong
Sent: Thursday, November 06, 2014 12:51 PM
To: Ross-Lee, MaryJane
Cc: Lubinski, John; Lupold, Timothy; Manoly, Kamal
Subject: addressing manager's comments

MJ,

We, between NRR and NRO, collectively addressed all the comments from the senior managers except the one below.

NRO believes that the original wording is better in describing the DDE loads.

The original reads,

"However, the DDE tends to control the SSCs with natural frequencies only in the lower range."

The comments reads,

"However, the DDE loads are the most severe loads on the SSCs with natural frequencies only in the lower range."

Therefore, it is not changed.

Thanks!

Yong

From: Ross-Lee, MaryJane
Sent: Friday, November 07, 2014 10:09 AM
To: Pruett, Troy; Holian, Brian; Uhle, Jennifer; Dean, Bill
Cc: Lubinski, John; Kock, Andrea; Flanders, Scott
Subject: FW: RG IV Diablo Canyon Seismic Operability Inspection Report Input
Attachments: DCPP_operability_NRC.docx

After collaboration between NRO and NRR, the attached was transmitted to Region 4 today.

Mary Jane Ross-Lee (MJ)
Deputy Director, Division of Engineering
Office of Nuclear Reactor Regulation
OWFN 9H1
US Nuclear Regulatory Commission
☎ Office: 301-415-3298
Mobile: (b)(6)
e-mail: maryjane.ross-lee@nrc.gov

From: Lupold, Timothy
Sent: Friday, November 07, 2014 9:12 AM
To: Walker, Wayne; Alexander, Ryan; Hipschman, Thomas
Cc: Lubinski, John; Ross-Lee, MaryJane; Wilson, George; Ake, Jon; Manoly, Kamal; Markley, Michael; Karas, Rebecca; Li, Yong; Munson, Clifford; Oesterle, Eric
Subject: RG IV Diablo Canyon Seismic Operability Inspection Report Input

Attached is information provided by the Office of Nuclear Reactor Regulation, Division of Engineering relating to the Diablo Canyon Seismic Operability Inspection currently being conducted by Region IV. This information is provided for inclusion into the inspection report as you deem appropriate. This information has been vetted through personnel in the Office of New Reactors, Division of Site Safety and Environmental Analysis, Geoscience and Geotechnical Engineering Branch 1, Office of Nuclear Regulatory Research, Division of Engineering, and NRR, Division of Operating Reactor Licensing. If you have any questions, please contact me or Yong Li (301-415-4141).

Timothy R. Lupold
Chief, Mechanical & Civil Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation
Timothy.Lupold@nrc.gov
301-415-6448

NRC Assessment of Diablo Canyon Operability

In 2008 the California Energy Commission recommended that PG&E perform additional seismic studies using advanced technologies such as three-dimensional seismic-reflection mapping to supplement the original and ongoing seismic studies performed as part of the licensee's Long Term Seismic Program (LTSP) for the Diablo Canyon Power plant (DCPP) site. During 2011 through 2014, PG&E conducted the studies and data analysis, as recommended, and compiled the report entitled, "Central Coastal California Seismic Imaging Project" (CCCSIP) and provided this report to the NRC via a letter dated September 10, 2014.

PG&E described in CCCSIP that the Shoreline fault was found to potentially extend an additional 22 km to the south thereby increasing the fault length from 23 km used in the 2011 Shoreline Fault Zone Report to 45 km. With this increased length, the corresponding potential maximum magnitude of the Shoreline fault increased from 6.5 to 6.7. In addition, PG&E evaluated the potential for the Shoreline fault to cause a magnitude 7.3 earthquake by assuming that the Shoreline fault is linked to the Hosgri fault extending further north to include the San Simeon fault. For the San Luis Bay fault which provides the largest ground motion at the DCPP site in PG&E's 2011 Shoreline Fault Zone report, the CCCSIP study did not provide new information on the length or dip of the fault. Using the same length and dip from the 2011 Report leads to a potential maximum magnitude 6.4 earthquake for the San Luis Bay fault.

To determine DCPP operability, PG&E calculated response spectra for several deterministically-based (i.e., without considering their likelihood) earthquake scenarios occurring on local faults, including the Shoreline and Hosgri faults, for comparison with the 1977 Hosgri response spectrum (the response spectrum is an acceleration vs. frequency plot reflecting the maximum response of a series of oscillators with various natural frequencies to earthquake motions). Consistent with the approach used for the 2011 Shoreline fault report, PG&E developed the response spectra from these earthquake scenarios using the "single-station-sigma-correction" (SSSC) method, which directly incorporates the actual conditions at the DCPP into the evaluation rather than using more generic adjustment factors for differences in site properties. Based on the implementation of this method, PG&E calculated response spectra for the earthquake scenarios which resulted in spectra enveloped by the 1977 Hosgri response spectrum. However, the use of SSSC method is based on only two earthquake recordings (2003 San Simeon earthquake and 2004 Parkfield earthquake) at the DCPP. Therefore, similar to the approach used in 2012 for the Research Information Letter, the NRC staff developed response spectra for the various fault scenarios using the more traditional and widely used "Ergodic" approach. The Ergodic approach addresses the uncertainties utilizing mixed data from different regions of the world rather than using the limited site specific information available. In this case, the Ergodic approach provides a more conservative estimate of ground motion than the SSSC approach for the DCPP site. The response spectra for the various scenario earthquakes using the Ergodic approach fall below the 1977 Hosgri spectrum in the lower frequency range and slightly exceed it in the higher frequency range above 10 Hz.

The NRC staff notes that various alternative models may be considered to estimate the site response amplification at the DCPP site in order to develop response spectra. The staff considers the implementation of the Ergodic approach and SSSC method to likely encompass the range in site response behavior at the DCPP site and, as such, the response spectra for the deterministic scenario events are most likely somewhere between the spectra calculated by PG&E and the staff and will most likely fall below the 1977 Hosgri spectrum.

The staff notes that in addition to the Hosgri earthquake spectrum, the seismic design basis for DCPP also includes the Double Design Earthquake (DDE). Because of conservative assumptions used in the design calculations, the DDE represents higher calculated loads than the Hosgri scenarios for some structures, systems and components (SSCs). The DDE tends to pose the limiting loads on the SSCs with natural frequencies in the lower range, whereas the Hosgri earthquake spectrum poses the limiting loads on the SSCs with natural frequencies in the higher range. Therefore, the Hosgri earthquake spectrum is the appropriate spectrum for comparison with the response spectra calculated using either the Ergodic approach or the SSSC method because neither method indicated any exceedance for the lower frequency range, as discussed above.

DCPP safety related SSCs were evaluated against the Hosgri spectrum prior to licensing of the plant. In addition, the licensee conducted the LTSP and Individual Plant Examination of External Events in which the performance of SSCs was examined at and beyond design levels. This included plant equipment such as electrical relays and switches that may potentially be impacted at these higher frequencies. The evaluation was further expanded in licensee evaluation performed to support a License Amendment Request (LAR) that was submitted in 2011. Although the LAR was subsequently withdrawn the evaluation performed by the licensee remains pertinent. These past evaluations of the Hosgri spectrum indicate considerable design margin for functionality of SSCs, and satisfies the provisions for operability in NRC Inspection Manual Chapter 0326. On this basis, the staff has not identified any concerns with the reasonableness of PG&E's operability determination.

It should be recognized that PG&E is currently performing its seismic hazard reevaluation in conjunction with the NRC's 10 CFR 50.54(f) letter request (ML12053A340). This effort entails the use of the more comprehensive Probabilistic Seismic Hazard Approach (PSHA) in accordance with the current NRC guidance for developing a state-of-the-art estimate of seismic hazard. As part of its evaluation, PG&E will use a logic tree approach to incorporate alternative models and parameters to determine the local site amplification for the DCPP site. In addition, the PSHA will also develop hazard curves that factor in the activity rates of all potential earthquakes on each of the local faults, which are not considered for a deterministic analysis. PG&E is scheduled to complete its reevaluation in March 2015. The hazard curves from the PSHA can then be used to evaluate the plant risk, as needed.

From: Sebrosky, Joseph
To: Oesterle, Eric
Subject: FW: info and possible action: former senior resident article dated 9/15 appears to raise issues that should be turned over to the IG
Date: Monday, September 22, 2014 7:49:00 AM

FYI – per our discussion. I should have included you on the original. If you look at the bottom you will see the link to the former SRI's statements.

Joe

From: Case, Michael
Sent: Monday, September 22, 2014 6:56 AM
To: OKeefe, Neil; Sebrosky, Joseph
Cc: Markley, Michael; Walker, Wayne; Hipschman, Thomas; Balazik, Michael
Subject: RE: info and possible action: former senior resident article dated 9/15 appears to raise issues that should be turned over to the IG

Hi Joe. I agree with Neil. Although there are things in there that are not correct, I didn't see anything that is worthy of yet another round of examination.

From: OKeefe, Neil
Sent: Saturday, September 20, 2014 12:45 PM
To: Sebrosky, Joseph
Cc: Markley, Michael; Case, Michael; Walker, Wayne; Hipschman, Thomas; Balazik, Michael
Subject: RE: info and possible action: former senior resident article dated 9/15 appears to raise issues that should be turned over to the IG

All,

I read Peck's response to the DPO appeal answer, and I did not identify any new information.

It contains the same factual errors and misunderstandings that were presented and answered in his DPO and DPO appeal. It also contains the same kind of over-statements about what the regulations require and misstatements about what the NRC and licensee did, and why. I interpret this to mean that he has dismissed the official answers the NRC has provided to his DPO and DPO appeal.

I do not believe there are any statements of impropriety on any individuals, nor do I see any value to sending to the OIG; however, I always believe that if anyone feels it appropriate to do so, I will support them with the same energy I supported Peck's DPO. Knowing Michael, I interpret his writing as unusually patient and restrained with respect to his statements about the NRC.

Neil O'Keefe
Chief, Branch B
DRP, RIV
(817) 200-1141 (o)
(b)(6) (c)

From: Sebrosky, Joseph
Sent: Friday, September 19, 2014 11:44 AM
To: Markley, Michael; OKeefe, Neil; Case, Michael
Cc: Walker, Wayne; Hipschman, Thomas; Balazik, Michael
Subject: info and possible action: former senior resident article dated 9/15 appears to raise issues that should be turned over to the IG

To all,

The link below is to an article written by Michael Peck on 9/15/14. You can get to the article by following the link in the "NRC in the news today" summary of a San Luis Obispo new times piece. Anyway the article from the former senior resident inspector has very unflattering things to say about Region IV, me, and the DPO panel. Taking a step back it would appear to me that the whole thing needs to be turned over to the IG.

Let me know if I am missing something

Link to article in San Luis Obispo new times

http://www.newtimesslo.com/news/11442/solid-ground-two-reports-claim-diablo-canyon-is-safe-from-earthquakes/

Bottom of article has a link to the former senior resident inspector response to the release of the DPO information

http://issuu.com/ntmg/docs/summary_of_diablo_canyon_dpo_-__sep/0

From: Hiland, Patrick
To: Sebrosky, Joseph
Subject: RE: DPO panel members
Date: Monday, September 22, 2014 7:22:14 AM

---

thx

From: Sebrosky, Joseph
Sent: Friday, September 19, 2014 6:00 PM
To: Hiland, Patrick
Subject: FW: DPO panel members

Pat,

Page 3 of 164 provides who the DPO submitter wanted on the panel. The signature on the panel report indicates that it was an SRA from Region II that was on the panel at the submitter's request. The name of the individual is Rudy Bernard.

Joe

From: Sebrosky, Joseph
Sent: Thursday, September 18, 2014 9:34 AM
To: Hiland, Patrick
Cc: Ake, Jon; Li, Yong; Markley, Michael; Lupold, Timothy; Karas, Rebecca; Ross-Lee, MaryJane; Oesterle, Eric; Wilson, George; Walker, Wayne; OKeefe, Neil; Hipschman, Thomas; Munson, Clifford; Manoly, Kamal; Hill, Brittain
Subject: RE: Proposed Questions to PG&E

Pat,

The purpose of this email is to provide you with the reference documents that I discussed with you this morning that serves as the basis for why I believe it is important to understand PG&E's position on whether or not in-structure motions (different damping values and comparisons) have been done. Specifically I referenced information that is in the DPO. The DPO case file can be found at: ML14252A743

The case file is 164 pages long. The most important portion of the case file to me is the last 5 pages (i.e., 159 – 164) that documents the EDO's appeal decision. The 5 page document provides a concise history of the issue and also includes the following discussion on page 4:

> *Nevertheless, your questioning attitude and perseverance were key to ensuring that the licensee and staff fully evaluated the! implications of the Shoreline fault zone. You correctly*
> *noted that the seismic hazard should be evaluated for not only comparison of the ground motion response spectra, but also the plant"s design and construction to ensure continued safe operation.*

I understand that the in-structure motions calculations were not part of the basis for the operability determination that was made in the October 2012 time frame. Nevertheless it would appear to me that the EDO agrees that they should have been done. Based on the need to support the new operability determination I would like to understand PG&E's

position on the matter before we proceed. **No position will be provided to PG&E during the phone call - we are in listening mode.** I believe further robust internal discussion needs to take place and management may need to provide direction before a determination is made on what we need to do to support the review of PG&E's operability determination.

Please let me know if you have any questions, or if you think I am missing something.

Thanks,

Joe

From: Sebrosky, Joseph
Sent: Thursday, September 18, 2014 5:38 AM
To: Hill, Brittain; Manoly, Kamal; Munson, Clifford
Cc: Ake, Jon; Li, Yong; Markley, Michael; Lupold, Timothy; Karas, Rebecca; Ross-Lee, MaryJane; Hiland, Patrick; Oesterle, Eric; Wilson, George; Walker, Wayne; OKeefe, Neil; Hipschman, Thomas
Subject: RE: Proposed Questions to PG&E

To all,

The purpose of this email is to clearly state the purpose of two meetings today regarding Diablo given the concerns raised by DE and NRO in the email chain below. The first meeting follows the agenda below and there is a followon meeting right after the PG&E discussion that is for the staff only. The purpose of agenda item III in the first meeting is to get PG&E's perspective on the issue. No decisions are being made. From DORL's perspective I believe we need to understand PG&E's position (i.e., whether or not they performed the calculations and if not the basis they believe the calculations are not necessary to demonstrate operability) to inform the internal discussion after the meeting.

If there is a problem with the sequence of the calls please let me know now. The bottom line is I believe PG&E's perspective is important to understand in supporting headquarters input to the assessment of operability. If you want to have a meeting before the PG&E call (given that we are having a meeting right after the call) please let me know so that I can schedule it.

Thanks,

Joe

I. PG&E provide a hi-level discussion of changes between the 2011 shoreline fault report and the information in the 2014 State of California report
   a. During the discussion the staff would like PG&E to address the following
      i. Basis for selection of the magnitude scaling relationship used in the State of California report
      ii. The basis for the changes in the geometry of the faults
      iii. The impact of using NGA-West2 based ground motion prediction equation (GMPEs) in the State of California report versus NGA-West GMPEs used in the PG&E 2011 Shoreline fault report
         1. The report states the sensitivity analysis (Chapter 13)

compares results from the CA 1632 bill (new CCSIP report the NRC is reviewing) and the new GMPEs from PEER NGA West2 project. Later it states the 4 NGAs are equally weighted (pgs 9, 18) by 25%, but other places it references 5 NGA West2 models (pages 10 & 19). Please explain the apparent discrepancy

II. PG&E provide a discussion of the site-response approach used in the State of California report
   a. Staff believes this is embedded in a 2014 Technical Evaluation Report entitled "Site Conditions Evaluation," which is reference in Chapter 13 as: Technical Report GEO.DCPP.TR.14.06, June 2014

III. PG&E provide a discussion on whether or not in-structure motions (different damping values and comparisons) have been done

IV. Next steps

V. Wrapup

From: Hill, Brittain
Sent: Wednesday, September 17, 2014 5:32 PM
To: Manoly, Kamal; Munson, Clifford
Cc: Ake, Jon; Li, Yong; Markley, Michael; Lupold, Timothy; Karas, Rebecca; Ross-Lee, MaryJane; Hiland, Patrick; Oesterle, Eric; Sebrosky, Joseph
Subject: Re: Proposed Questions to PG&E

Without the clarification on damping, we end up with the same confusing issues as 2 non concurrences, a DPO, the 2014 union Conc sci report, and recent petition by FOE. If damping clarified, stops all this confusion in its tracks and gives clear basis for decisions. This is not a pure engineering exercise, and what you are portraying as "noise" is ano important consideration in clearly explaining why or why not we think DCPP is safe to operate. If there still are dissenting views, i suggest we discuss them at tomorrow's meeting before call.

Britt

Sent from Brittain Hill's PDA

(b)(6)

From: Manoly, Kamal
Sent: Wednesday, September 17, 2014 04:58 PM Eastern Standard Time
To: Hill, Brittain; Munson, Clifford
Cc: Ake, Jon; Li, Yong; Markley, Michael; Lupold, Timothy; Karas, Rebecca; Ross-Lee, MaryJane; Hiland, Patrick; Oesterle, Eric; Sebrosky, Joseph
Subject: RE: Proposed Questions to PG&E

I mentioned RG 1.61 to illustrate a point. I know from my involvement with Diablo since the mid-eighties that the plant was licensed to damping values that are different from RG 1.61. I also knew that some components are governed by DDE and others by Hosgri. From doing actual design of components in nuclear plants, designers know that some components may be governed by OBE and others by SSE. Still, the argument about damping should not be relevant to altering the evaluation done by PG&E in 2011 except for the change of ground motion (old shoreline line vs. new shoreline hazard). That is the only variable of significance. The rest is in the noise level from an engineering standpoint.

Kamal Manoly
Senior Level Technical Advisor for Structural Mechanics
Division of Engineering
Office of Nuclear Reactor Regulation
301-415-2765

From: Hill, Brittain
Sent: Wednesday, September 17, 2014 4:17 PM
To: Manoly, Kamal; Munson, Clifford
Cc: Ake, Jon; Li, Yong; Markley, Michael; Lupold, Timothy; Karas, Rebecca; Ross-Lee, MaryJane; Hiland, Patrick; Oesterle, Eric; Sebrosky, Joseph
Subject: Re: Proposed Questions to PG&E

Please read ch 2,3, and 5 in DCPP SAR to see that Hosgri is not limiting demand - can be either HE or DDE. PGE also didnt use RG 1.61 damping for all Cat1 SSCs. Please look at SAR for their mix. Unless they identify appropriate damping etc, we simply cannot state that new info is bounded by existing lic basis. If new Shoreline exceeds DDE, and DDE is the SSE and limiting GM (NOT Hosgri!) for some SSCs, we certainly need PGE to state what damping is appropriate for new info: DDE, HE, RG1.61, or something else.
Britt
Sent from Brittain Hill's PDA

(b)(6)

From: Manoly, Kamal
Sent: Wednesday, September 17, 2014 04:06 PM Eastern Standard Time
To: Munson, Clifford
Cc: Ake, Jon; Hill, Brittain; Li, Yong; Markley, Michael; Lupold, Timothy; Karas, Rebecca; Ross-Lee, MaryJane; Hiland, Patrick; Oesterle, Eric; Sebrosky, Joseph
Subject: Proposed Questions to PG&E

Cliff,

I see no relevance or value from asking PG&E question #5 about "In-structure motions (different damping values & appropriate comparisons)". The sole focus should be on confirming that PG&E new shoreline fault ground motion estimate is reasonable and acceptable to the staff. With such confirmation, then, the hazard from the shoreline fault would be bounded by the "Old" Hosgri. That should be the end point of our assessment of the CA report.

Introducing a question as to whether the damping values to be used for the 2014 hazard estimate of the shoreline fault may be different from that used in the 2011 evaluation would be pointless and shifting the focus to a totally unrelated issue. You will never find any documented reference that correlates slight change in hazard vs damping values for structural materials. Remember, in RG 1.61 we prescribe (for a specific structural material) a single damping value to be used by ALL plants in the US for OBEs and another for ALL SSEs regardless of the location. The reason is based on acceptable understanding that viscous structural damping would generally

be lower at lower deformation level. We know that ground motion estimates for OBEs and SSEs vary greatly from low seismic regions such as the Gulf States vs. high seismic regions such as CA. For this reasoning, asking the question about the effect of different damping values on in-structural response due to slight change in hazard would be worthless and totally distracting from the central issue in the CA report.

Kamal Manoly

Senior Level Technical Advisor for Structural Mechanics

Division of Engineering

Office of Nuclear Reactor Regulation

301-415-2765

From: Sebrosky, Joseph
To: Wilson, George
Subject: FW: info and possible action: former senior resident article dated 9/15 appears to raise issues that should be turned over to the IG
Date: Monday, September 22, 2014 5:11:00 AM

George,

The email chain below includes a link to Mr. Peck's response to the DPO appeal being published. My read of it was not the same as Neil's read on it.

Joe

From: OKeefe, Neil
Sent: Saturday, September 20, 2014 12:45 PM
To: Sebrosky, Joseph
Cc: Markley, Michael; Case, Michael; Walker, Wayne; Hipschman, Thomas; Balazik, Michael
Subject: RE: info and possible action: former senior resident article dated 9/15 appears to raise issues that should be turned over to the IG

All,

I read Peck's response to the DPO appeal answer, and I did not identify any new information.

It contains the same factual errors and misunderstandings that were presented and answered in his DPO and DPO appeal. It also contains the same kind of over-statements about what the regulations require and misstatements about what the NRC and licensee did, and why. I interpret this to mean that he has dismissed the official answers the NRC has provided to his DPO and DPO appeal.

I do not believe there are any statements of impropriety on any individuals, nor do I see any value to sending to the OIG; however, I always believe that if anyone feels it appropriate to do so, I will support them with the same energy I supported Peck's DPO. Knowing Michael, I interpret his writing as unusually patient and restrained with respect to his statements about the NRC.

Neil O'Keefe
Chief, Branch B
DRP, RIV
(817) 200-1141 (o)
(b)(6) (c)

From: Sebrosky, Joseph
Sent: Friday, September 19, 2014 11:44 AM
To: Markley, Michael; OKeefe, Neil; Case, Michael
Cc: Walker, Wayne; Hipschman, Thomas; Balazik, Michael
Subject: info and possible action: former senior resident article dated 9/15 appears to raise issues that should be turned over to the IG

The rest of this string may be found as document C/8 in FOIA/PA-2015-0071 (ML15181A428).

From:	Sebrosky, Joseph
To:	Bowers, Anthony; Dudek, Michael; Karas, Rebecca; Buchanan, Theresa; Walker, Wayne; Hipschman, Thomas; Manoly, Kamal; Li, Yong; Williams, Megan; Oesterle, Eric; Lupold, Timothy; Farnholtz, Thomas; Tom Hipschman; Lund, Louise; Pruett, Troy; Hay, Michael; Hiland, Patrick; Wilson, George; Kock, Andrea; Roth(OGC), David; Young, Mitzi; Harris, Brian; Kanatas, Catherine; Burnell, Scott
Cc:	Flanders, Scott
Subject:	internal meeting to discuss Diablo operability determination associated with new seismic information in the State of California report
Start:	Friday, September 19, 2014 1:00:00 PM
End:	Friday, September 19, 2014 2:00:00 PM
Location:	HQ-OWFN-09B06-12p
Attachments:	PGE spectral comparison.pptx

Bridge: 888-677-0690
Passcode (b)(6)

Purpose: internal meeting with SES managers to discuss process going forward for Diablo Canyon operability determination associated with new seismic information in the State of California report

Outcome: Decision made on how to proceed

Agenda:

Background – new information in report regarding the capabilities of several faults including the Hosgri-San Simeon, Shoreline, San Luis Bay and Los Osos (see table below)
Table below provides description of changes to various faults
Figure below is a plot of the new ground motion response spectrum for the various faults
PG&E operability determination based on comparison of new ground motion response spectrum to hosgri
Public released DPO and DPO appeal suggests in the 2012 time frame the licensee should have also compared the new hazards to the DDE
DPO decision documents the additional analysis that was done by the licensee
Other considerations
PG&E considering public outreach meeting in early October time frame
PG&E considering additional public SSHAC meeting at the end of October
Timing of letter back to licensee may need to consider the public SSHAC meeting

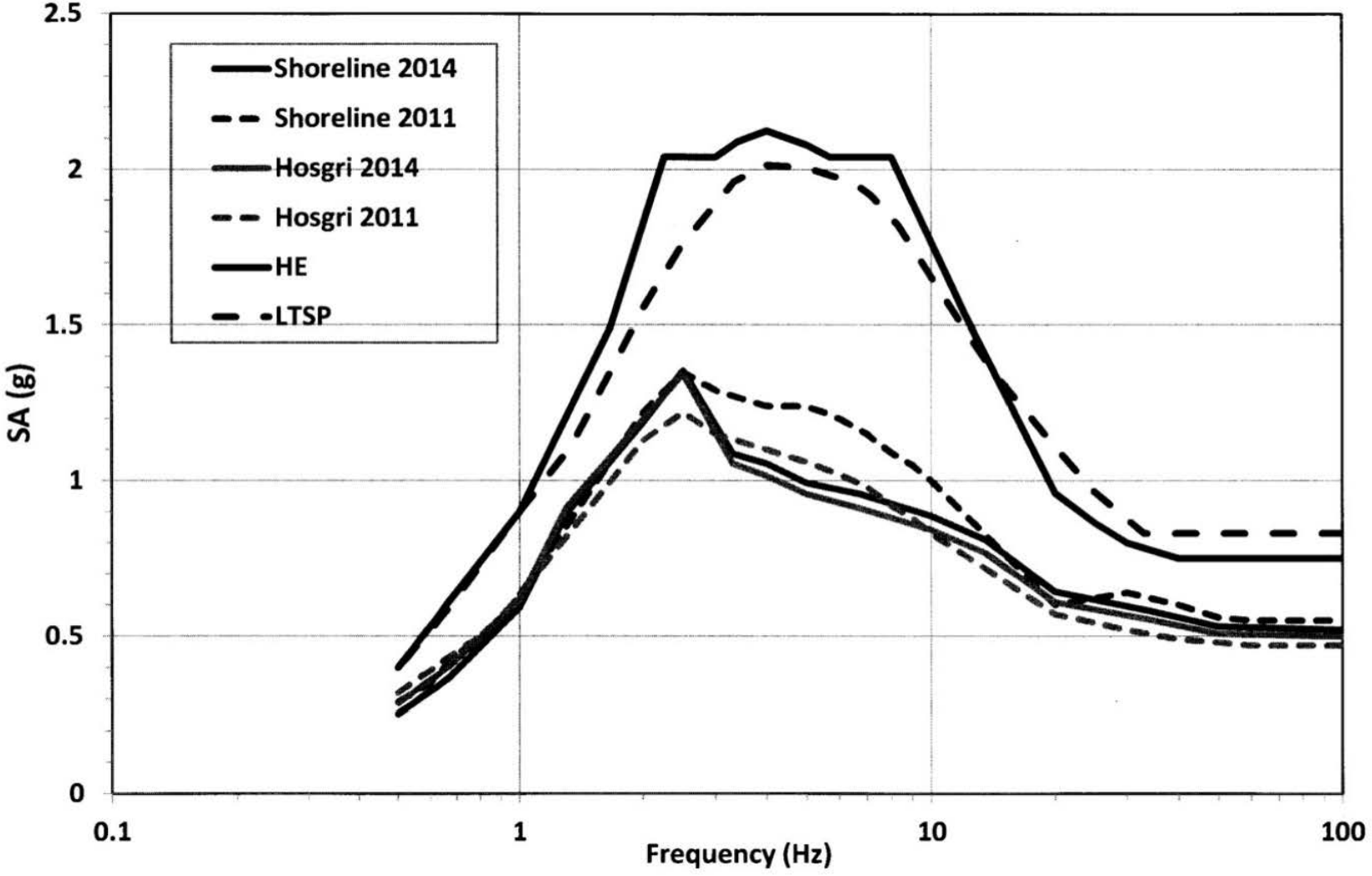
Issue – what is the NRC's position on the calcs that the licensee should do to verify operability
Position that no additional calcs are needed
Position that calcs or comparisons are needed based on precedence set in DPO
Possibility of doing a comparison between 2014 ground motion plots vs 2011 plots for San Luis Bay, Los Osos, and Shoreline
If 2014 plots bounded by 2011 plots no additional calcs are needed because the DDE plots would be bounded
Hosgri/san simeon no 2011 plots licensee would have to do some calcs for this scenario
NRO provided first gross cut at comparison (see plots below)

III. Recommendation
Not consensus within headquarters that additional operability determination information is needed – need a near term decision on whether or not PG&E needs to supplement operability determination
Appears to be general consensus that additional review of the State of California report should be done and the results of the independent assessment provided to management for their consideration

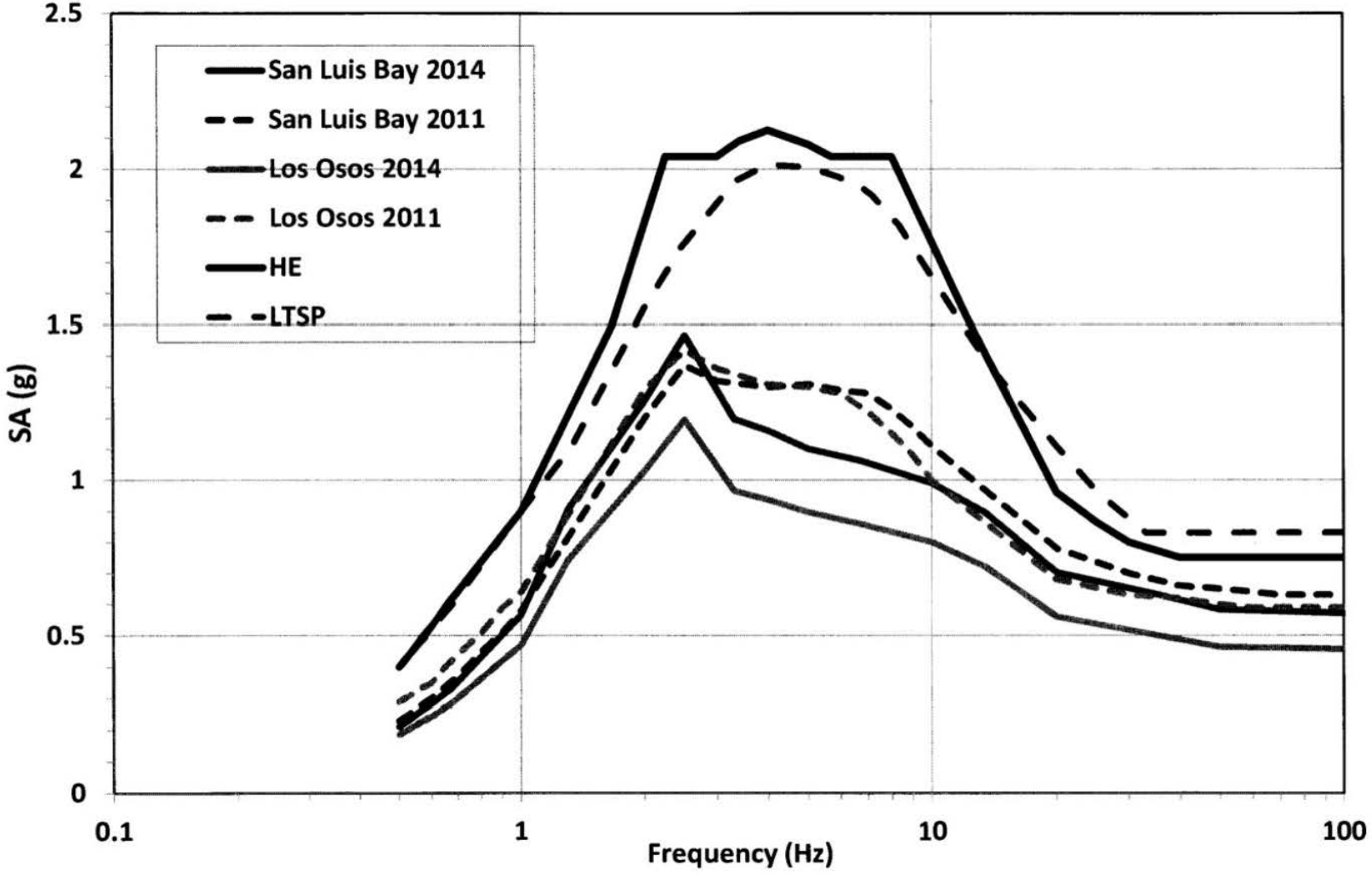
Next steps
Wrapup

Fault 2011 Shoreline Report Updated Parameters
Maximum Length (km) Minimum Dip (degrees) Mag. (90th fractile) Maximum Length (km) Minimum Dip (degrees) Mag.*
Shoreline 23 90 6.5 45 90 6.7
Hosgri 110 80 7.1 171 75 7.3
Los Osos 36 45 6.8 36 55 6.7
San Luis Bay 16 50 6.3 16 50 6.4

PG&E Results-Comparison of Hosgri and Shoreline Fault Spectra:
84th-Percentile-2011 vs 2014, Power Block Elevation



PG&E Results-Comparison of Los Osos and San Luis Bay Fault Spectra: 84th-percentile, 2011 vs 2014 Power Block Elevation



From: Sebrosky, Joseph
Sent: Tuesday, September 23, 2014 6:05 AM
To: Stovall, Scott; Munson, Clifford; Williams, Megan; Li, Yong; Hipschman, Thomas; Walker, Wayne; Oesterle, Eric; Singal, Balwant; Markley, Michael; Jackson, Diane; DiFrancesco, Nicholas; Whaley, Sheena; Uselding, Lara; Ake, Jon; Burnell, Scott; OKeefe, Neil; Farnholtz, Thomas; Kanatas, Catherine; Roth(OGC), David; Manoly, Kamal; Reynoso, John; Hill, Brittain; Dudek, Michael; John Stamatakos (jstam@swri.org); Stirewalt, Gerry; Buchanan, Theresa; Weaver, Thomas; Karas, Rebecca; Graizer, Vladimir; Hiland, Patrick; Ross-Lee, MaryJane; Lupold, Timothy; Wilson, George; Bowers, Anthony; Alexander, Ryan; Hay, Michael; Pruett, Troy; Kock, Andrea; Young, Mitzi; Harris, Brian
Subject: RE: info: status of diablo operability review 9-23-14

To all,

The purpose of this email is to provide you with the results of an inspection phone call with the licensee yesterday (9/22) regarding the Diablo Canyon operability review.

Yesterday (9/22) RIV led a call with the licensee to discuss information needs to support the Diablo Canyon operability review. The following two information needs were verbally discussed with the licensee:

1) *Provide, as available, the earthquake recordings (time histories and response spectrum ordinates) from the 2003 San Simeon, 2003 Deer Canyon, and 2004 Parkfield earthquakes as recorded at stations ESTA 27 and ESTA 28. These data should reflect the final processed values as used by PG&E in the CEC report.*
2) *Provide the Vs profiles for the power block and turbine building as well as stations ESTA 27 and ESTA 28 as described in the first paragraph of Section 3.2 of the technical report GEO.DCPP.TR.14.06, Rev. 0 (also Ch 11 of the AB1632 CEC Report). Each of the profiles should indicate the starting elevation point for the top of the profile.*

During the call PG&E provided the following information:

- PG&E will discuss the information needs internally and get back to Region IV when they have a schedule to provide the information. PG&E believes that the information is readily accessible but they need to check with some technical staff before they get back to the region with a schedule.

- Region IV asked whether or not PG&E had determined if it would have a public SSHAC meeting based on the information in the State of California report. PG&E indicated that it is no longer considering a public SSHAC meeting and it will let the NRC know if this position changes. PG&E indicated that it would still most likely proceed with a public outreach meeting on 10/2/14 and that there may be interactions with the State appointed independent peer review panel (IPRP), but a public SSHAC meeting is not considered necessary at this point to support the March 2015 seismic reevaluation submittal.

- PG&E indicated that based on a question from RIV last Friday (9/19) it was rerunning the calculations used to support the resolution of the DPO (see description in DPO case file pdf page 62 of 164 at ML14252A743 which discusses the scaling factors used in the March 2014 PG&E analysis). PG&E indicated that it did not believe that the analysis was needed to demonstrate operability. Nevertheless, PG&E was rerunning the analysis with the data from the 2014 State of California report and should have the results for the Region to review by the end of this week.

The project plan has been updated to reflect the information above. The latest version of the project plan can be found at:
View ADAMS P8 Properties ML14260A102
Open ADAMS P8 Document (Project Plan for NRC Staff Review of PG&E's Report to the State of California Regarding Seismic Faults Near the Diablo Canyon Power Plant.)

Please let me know if you have any questions.

Thanks,

Joe

From: Sebrosky, Joseph
Sent: Thursday, September 25, 2014 12:51 PM
To: Stovall, Scott; Munson, Clifford; Williams, Megan; Li, Yong; Hipschman, Thomas; Walker, Wayne; Oesterle, Eric; Singal, Balwant; Markley, Michael; Jackson, Diane; DiFrancesco, Nicholas; Whaley, Sheena; Uselding, Lara; Ake, Jon; Burnell, Scott; OKeefe, Neil; Farnholtz, Thomas; Manoly, Kamal; Reynoso, John; Hill, Brittain; Dudek, Michael; John Stamatakos (jstam@swri.org); Stirewalt, Gerry; Buchanan, Theresa; Weaver, Thomas; Karas, Rebecca; Graizer, Vladimir; Hiland, Patrick; Ross-Lee, MaryJane; Lupold, Timothy; Wilson, George; Bowers, Anthony; Alexander, Ryan; Hay, Michael; Pruett, Troy; Kock, Andrea; Harris, Brian; Vaidya, Bhalchandra; Klett, Audrey; Smith, Chris
Subject: info: status of diablo operability review 9-25-14

To all,

The purpose of this email is to provide you with updated status regarding the Diablo Canyon operability review. This email includes updates on the status of NRC inspection information requests and the assignment of additional headquarters PMs to help with the workload.

- Based on discussions RIV had with PG&E today, PG&E is targeting providing information that was requested on 9/22 either late today or sometime tomorrow to support the NRC's review of the operability determination. The information that RIV requested was in the following 3 areas:

  1) *Provide, as available, the earthquake recordings (time histories and response spectrum ordinates) from the 2003 San Simeon, 2003 Deer Canyon, and 2004 Parkfield earthquakes as recorded at stations ESTA 27 and ESTA 28. These data should reflect the final processed values as used by PG&E in the CEC report.*

  2) *Provide the Vs profiles for the power block and turbine building as well as stations ESTA 27 and ESTA 28 as described in the first paragraph of Section 3.2 of the technical report GEO.DCPP.TR.14.06, Rev. 0 (also Ch 11 of the AB1632 CEC Report). Each of the profiles should indicate the starting elevation point for the top of the profile.*

  3) *Provide the results of the calculations that were rerun based on the calculations used to support the resolution of the DPO (see description in DPO case file pdf page 62 of 164 at ML14252A743 which discusses the scaling factors used in the March 2014 PG&E analysis). PG&E indicated that it did not believe that the analysis was needed to demonstrate operability. Nevertheless, PG&E was rerunning the analysis with the data from the 2014 State of California report.*

  - Access to the information will be via certrec. The following individuals should have received emails yesterday explaining how to access the information (if you have not received an email please inform Ryan Alexander):

    NRC HQ
    Brittain Hill Brittain.Hill@nrc.gov
    Kamal Manoly Kamal.Manoly@nrc.gov
    Yong Li Yong.Li@nrc.gov
    Clifford Munson Clifford.Munson@nrc.gov
    Jon Ake Jon.Ake@nrc.gov

    NRC Region IV
    Megan Williams Megan.Williams@nrc.gov

Chris Smith	Chris.Smith@nrc.gov
Ryan Alexander	Ryan.Alexander@nrc.gov

- Lastly there are now 5 headquarters PMs helping with the Diablo workload. The PMs include me, Eric Oesterle (acting branch chief – future Diablo PM), Bhlachandra Vaidya, Audrey Klett and Brian Harris. Attached is the list of the PM assignments. Each activity has its own support needs so the attached list is not meant to include a list of the support from RIV, NRR/DE, NRO, and RES. The purpose of sharing this information is to ensure you are aware of the PMs that are new to the project so that in the event that they give you a call you will not be surprised.

diablo pm work assignment.doc...

In the near term Bhalchandra is helping with processing of a Friends of the Earth (FOE) FOIA and redacted portions of the Diablo FSAR for public release. Audrey is developing an outline for the technical evaluation input that will be provided as a feeder to the inspection report and the NRR letter, and Brian Harris is developing the communication plan to support the issuance of the inspection report and the NRR letter.

- As a gentle reminder the project plan has been updated. The latest version of the project plan can be found at: View ADAMS P8 Properties ML14260A102
  Open ADAMS P8 Document (Project Plan for NRC Staff Review of PG&E's Report to the State of California Regarding Seismic Faults Near the Diablo Canyon Power Plant.)

Please let me know if you have any questions.

Thanks,

Joe

Work assignment	PM(s)	Status – 9/25/14
Friends of the Earth (FOE) FOIA response	Eric Oesterle, Joe Sebrosky, Balwant Singal, Peter Bamford, and Bhalchandra Vaidya.	In process - staff collecting information
EPW congressional question response	Eric Oesterle and Joe Sebrosky	In process – target for providing draft to RIV 10/1/14
Continuing support of RIV operability determination	Eric Oesterle and Joe Sebrosky	In process (see project plan)
Development of communication plans for release of operability inspection report and NRR letter to licensee including identification of management briefings and possibility of Commissioners Assistant note	Brian Harris	In process – target for draft early week of 9/29
Development of format for TER to be referenced/included in inspection report and NRR letter to the licensee. NRR letter will also reference inspection report	Audrey Klett	In process – Audrey to work with Ryan Alexander, Rebecca Karas, and Tim Lupold
Public document room request to release portions of latest Diablo FSAR	Bhalchandra Vaidya	In process – expect release of portions of the FSAR week of 9/29
Support for response to FOE hearing request	Eric Oesterle, Joe Sebrosky	In process

Subject:	internal meeting to discuss assessment of diablo canyon operability information
Location:	HQ-OWFN-09B06-12p
Start:	Wed 10/01/2014 12:45 PM
End:	Wed 10/01/2014 1:45 PM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Sebrosky, Joseph
Required Attendees:	Munson, Clifford; Li, Yong; Hipschman, Thomas; Walker, Wayne; Oesterle, Eric; Markley, Michael; Karas, Rebecca; DiFrancesco, Nicholas; Farnholtz, Thomas; Smith, Chris; Manoly, Kamal; Reynoso, John; Hill, Brittain; Kock, Andrea; Vaidya, Bhalchandra; Klett, Audrey; Harris, Brian; Ake, Jon; Alexander, Ryan; Lupold, Timothy; Graizer, Vladimir; John Stamatakos (jstam@swri.org); Weaver, Thomas
Optional Attendees:	Stovall, Scott; Williams, Megan

Note: scheduler updated to include new information under item Agenda item II below. The new information is based on input from Cliff Munson

Bridge: 888-677-0690
Passcode: (b)(6)

Purpose: For Britt Hill, Kamal Manoly, Yong Li, Cliff Munson, Jon Ake, Chris Smith and Ryan Alexander to brief the diablo canyon operability review team on the preliminary assessment of the additional information PG&E provided via certrec and to determine the next steps in the process

Outcome: Clear understanding of staff's preliminary assessment and next steps identified (e.g., enough information to make a decision, more time needed, or more information needed)

Agenda:

I. Background – Information needs identified to PG&E

The information that RIV requested was in the following 3 areas:

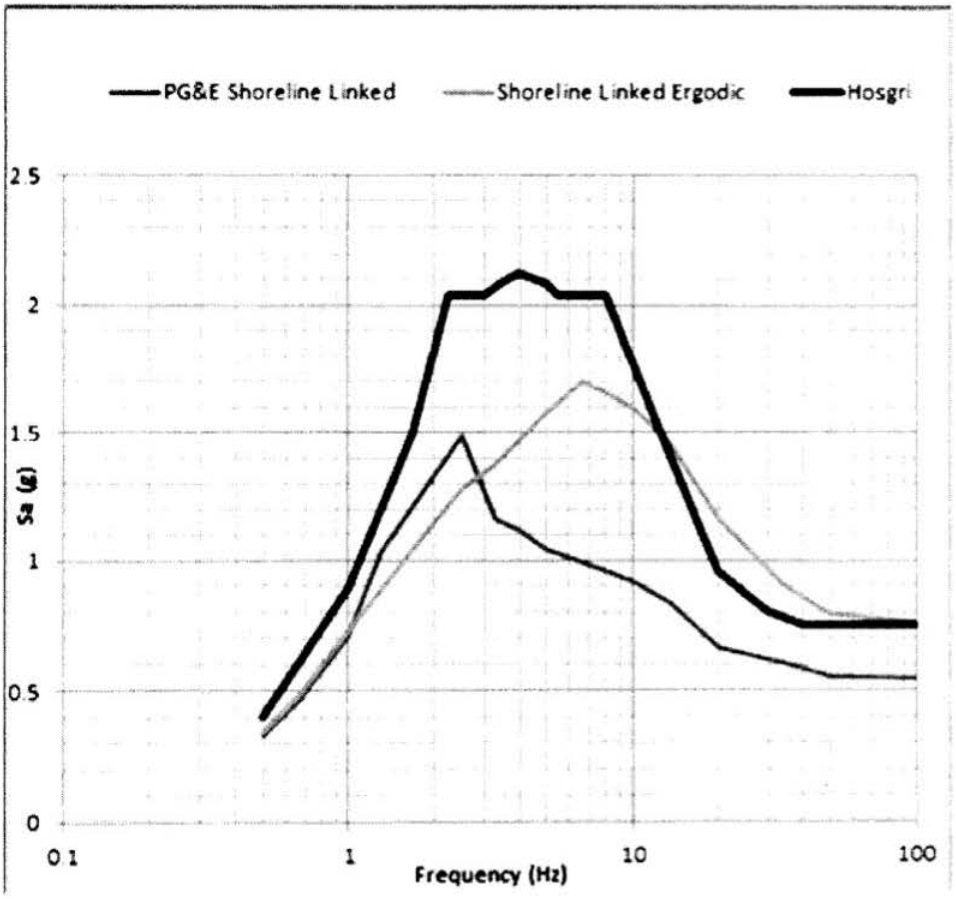
1) *Provide, as available, the earthquake recordings (time histories and response spectrum ordinates) from the 2003 San Simeon, 2003 Deer Canyon, and 2004 Parkfield earthquakes as recorded at stations ESTA 27 and ESTA 28. These data should reflect the final processed values as used by PG&E in the CEC report.*

2) *Provide the Vs profiles for the power block and turbine building as well as stations ESTA 27 and ESTA 28 as described in the first paragraph of Section 3.2 of the technical report GEO.DCPP.TR.14.06, Rev. 0 (also Ch 11 of the AB1632 CEC Report). Each of the profiles should indicate the starting elevation point for the top of the profile.*

3) *Provide the results of the calculations that were rerun based on the calculations used to support the resolution of the DPO (see description in DPO case file pdf page 62 of 164 at ML14252A743*

which discusses the scaling factors used in the March 2014 PG&E analysis). PG&E indicated that it did not believe that the analysis was needed to demonstrate operability. Nevertheless, PG&E was rerunning the analysis with the data from the 2014 State of California report.

II. Tech staff discussion of preliminary assessment of information provided via certrec
   a. Based on information supplied by licensee in response to staff questions above, the staff developed the plot below
      i. The plot is based on the staff back-calculating what the Ergodic curve would look like if PG&E had not applied the single station correction (PG&E Shoreline Linked curve in the plot)
   b. Issue
      i. In the 2011 Shoreline fault report both the Ergodic and the single station corrected curves were below the Hosgri curve for which the plant was analyzed
      ii. Based on the plot below (the staff only plotted one of the 4 scenarios in the 2014 State of California report) the ergodic curve is above the Hosgri curve in some frequencies. This would also likely be true for some of the other scenarios (e.g., Hosri-San Simeon linked fault, Los Osos, and San Luis Bay).
      iii. The single station correction that PG&E developed is based on two earthquakes (limited data) whose characteristics are different than those associated with the Hosgri-San Simeon, Shoreline, Los Osos and San Luis Bay faults discussed in the 2014 State of California report
   c. Next steps - options
      i. Request additional justification from PG&E on the use of the single station approach
      ii. Discussion of ergodic curves exceeding the Hosgri curve in the 12-60 Hz range and whether this presents operability concerns
      iii. Other



III. Next steps - options
   a. Have enough information to provide technical input to inspection report and NRR letter
      i. If so – what are the thoughts on what the tech input will say (e.g., operable or inoperable)
   b. Need more information
      i. If so – what information needs do we have
   c. Need more time to assess the information in the State of California report and supplemental information provided in certrec
   d. Other

IV. Recommendation on how to proceed

V. Communication plan
   a. Determine changes to communication plan

VI. Other assessments
   a. DPO update?
   b. Other tech evaluations

VII. Wrapup

From:	Oesterle, Eric
Sent:	Thursday, October 09, 2014 7:03 AM
To:	Stovall, Scott; Munson, Clifford; Williams, Megan; Li, Yong; Hipschman, Thomas; Walker, Wayne; Markley, Michael; George, Andrea; Jackson, Diane; DiFrancesco, Nicholas; Whaley, Sheena; Uselding, Lara; Ake, Jon; Burnell, Scott; OKeefe, Neil; Farnholtz, Thomas; Manoly, Kamal; Reynoso, John; Hill, Brittain; Harris, Brian; Klett, Audrey; Dudek, Michael; John Stamatakos; Stirewalt, Gerry; Buchanan, Theresa; Weaver, Thomas; Karas, Rebecca; Graizer, Vladimir; Hiland, Patrick; Ross-Lee, MaryJane; Lupold, Timothy; Wilson, George; Bowers, Anthony; Alexander, Ryan; Hay, Michael; Pruett, Troy; Kock, Andrea
Subject:	Status of Diablo Canyon Activities
Attachments:	Status Update on DCPP for Jennifer Uhle.docx

The purpose of this email is to provide a status on the multitude of Diablo Canyon activities that staff has been working on this week.

I. Status briefing provided to Jennifer Uhle on 10/6 (see attached agenda)
   a. Based on review of PG&E seismic report and licensee responses to staff questions, additional information was determined to be needed to more fully understand licensee's application of single station correction (SSTC) methodology
   b. Three additional questions were developed (total of 6 questions conveyed) and communicated to licensee on 10/3 – licensee understood questions 4 and 6 and indicated they can answer – question 5 required some rework and that will be communicated today or tomorrow
   c. Outcome of briefing was an understanding that staff should be able to develop technically defensible position based on review of PG&E seismic report and licensee responses to the 6 staff questions without further "research" or visit to site to fully explore additional details of licensee application of SSTC methodology
   d. Telecon held on 10/8 with Region IV and HQ technical staff to get alignment on path forward – NRO staff to develop writeup for technical evaluation report (TER) addressing adequacy of new PG&E seismic information to support operability determination – NRR to develop writeup for TER addressing ability of SSCs to withstand new seismic loading in high frequency ranges (i.e., approx. 12 – 100 Hz) where there are minor exceedances of Hosgri spectra based on NRC developed ergodic curves)
   e. Region IV concurred that above TER approach will provide adequate technical support for IR 2014-008 which addresses licensee's operability evaluation based on new seismic information
   f. Letter from NRC to licensee also being developed to refer to results of IR 2014-008 and to indicate that previously established path for seismic reevaluation per 50.54(f) response remains valid – timing of IR issuance and letter to licensee is critical and should be concurrent – goal for completion of TER, IR, and letter is near end of October
   g. Briefings will be provided to DEDOs together with NRR front office; Communications likely with individual Commissioners – to be reflected in Comm Plan that is under development and maintained current

II. FOIA Request for public release of Sewell Report
   a. Previous direction from Commission to not release Sewell Report was documented in Feb. 27, 2006, memo for M. Mayfield – because of this previous direction, new direction was needed from current Commission
   b. COMSECY has been developed which informs Commission of staff's intent to release Sewell Report along with several other documents which puts Sewell Report into appropriate context – COMSECY is currently being routed for comment/concurrence at Division Director level (NMSS, NRO/DSEA, NRR/DE, NRR/DORL) – **goal is to issue today (10/9/10)** - outreach on COMSECY performed with CNRWA, Region IV, OPA, OCA and other stakeholders

c. Comm Plan concurrently in development to support release of Sewell Report and associated documents – being coordinated with Region IV, OPA, and OCA
d. FOIA request completion targeted for 10/16 but prepared to request extension to support Commission action – discussed with FOIA Coordinator

III. Filings associated with Friends of the Earth (FOE) Hearing Request
a. NRC response to FOE hearing request filed 10/6
b. Additional filings also made by PG&E, NEI, and PG&E Senior Civil Engineer on 10/6
c. Next steps – FOE response within 7 days and, also within 10 days of the PG&E's answer and NEI's motion and brief, everybody else (NRC Staff included) can file a motion asking the Commission to take some action against the other filings (e.g. strike part of the answer) - review of the other 3 filings underway

IV. FOE FOIA request on timing of PG&E Seismic Report and DPO Appeal decision
a. Information from various offices received by FOIA coordinator – going through duplication review
b. Expected release of documents in packages – first one expected this week
c. Review of remaining packages for withholding to be performed to support releases expected week of 10/13.

V. EPW Questions – DORL staff continues to work with Region IV and NRR/DE on finalizing draft responses – coordinating with OCA – target issuance by 10/22

There continues to be a lot of activity associated with Diablo Canyon and I appreciate everyone's support. We are making good progress on these challenging issues and have completed some tasks associated with making portions of the DCPP UFSAR publicly available and getting two very important SSERs into the main ADAMS library. If I have missed something that you are particularly interesting in please don't hesitate to contact me. Thanks!

Eric R. Oesterle
NRC Project Manager
Diablo Canyon Power Plant
Cooper Nuclear Station
NRR/DORL/LPL4-1
301-415-1014

From: Sebrosky, Joseph
Sent: Monday, March 03, 2014 12:12 PM
To: Kim, James; Markley, Michael
Cc: Hipschman, Thomas; Walker, Wayne; Regner, Lisa; Wilson, George; Harris, Brian; OKeefe, Neil; Munson, Clifford; DiFrancesco, Nicholas; Hale, Jerry
Subject: RE: Request for phone call with DCPP to discuss guidance regarding seismic licensing basis relative to the 2/20/14 seismic eric leeds letter

Jim and Mike,

Philippe Soenen and Tom Baldwin gave me a call about the issue. I stated that I believe a phone call between, JLD, NRO, DORL, and Region IV was appropriate to discuss seismic reanalysis being done at Diablo Canyon. Based on the conversation with Diablo I would propose the following POP. If you agree that we should move down this path, I would propose that the POP be shared with the licensee to ensure that we understand the underlying issues. I believe the key folks on the call would be DORL (Mike Markley, Jim Kim, Joe Sebrosky, Nick DiFrancesco), JLD (George Wilson), NRO (Cliff Munson), and RIV (Wayne Walker, Christie Hale, and Tom Hipschman). I also recommend that OGC be briefed on the call both before and afterwards to determine if they should also participate.

Purpose: To discuss the Diablo Canyon seismic reanalysis that is being performed and expectations regarding the March 12, 2012, request for information, the October 12, 2012, NRC letter transmitting the NRC's assessment of the Shoreline Fault, and the February 20, 2014, seismic reevaluation guidance letter

Outcome: Clear understanding of the status of the Diablo Canyon seismic reanalysis and expectations regarding operability/reportability/interim actions when the reanalysis results begin to become available.

Agenda:

I. Background
   a. March 12, 2012, request for information
      i. Provided process for performing seismic reanalysis
      ii. Included timelines and expectations regarding what to do if the new ground motion response spectrum was above the safe shutdown earthquake (i.e., provide interim actions)
   b. October 12, 2012, letter (ML120730106) transmitting the results of the NRC's assessment of the shoreline fault
      i. Provided statement that the NRC staff considers the shoreline fault to be lesser included case of Hosgri
      ii. Provided expectations that the new ground motion response spectrum would be compared against the double design earthquake at Diablo Canyon
      iii. Provided expectation that if PG&E discovered the Shoreline Fault was more capable than what was assumed in the Shoreline Fault report then PG&E would inform the staff
   c. In response to March 12, 2012, request for information and October 12, 2012, letter, PGE withdrew license amendment request on how to assess new seismic information
      i. In withdrawal letter, PG&E provided the following commitment:
         1. If during the collection of the data, new faults are discovered or information is uncovered that would suggest the Shoreline fault is more capable than currently believed, the staff expects that the licensee will provide the NRC with an interim

evaluation that describes actions taken or planned to address the higher seismic hazard relative to the design basis, as appropriate, prior to completion of the evaluations requested in the NRC staff's March 12, 2012, request for information.

d. February 20, 2014, (ML14030A046) seismic reanalysis letter provided general guidance on operability, reportability, and interim actions when considering new seismic information developed as a result of the March 12, 2012, request for information

II. Issues
   a. SSHAC process combines various faults using probabilistic measures. Could some of the scenarios evaluated under SSHAC trip the criteria for suggesting the Shoreline fault is more capable than previously believed?
   b. What are the NRC's expectations regarding operability/reportability/interim actions if the seismic reevaluation ground motion response spectrum is above the DDE but below Hosgri response spectrums?
      i. What are the NRC's expectations if the new GMRS is above Hosgri response spectrum
   c. other

III. Discussion of Issues

IV. Next Steps
   a. Is additional guidance needed for Diablo Canyon (e.g., a modified October 12, 2012, letter placing the February 20, 2014, letter in context)?
   b. Face-to-face meeting needed?
   c. Other

V. Wrapup

From: Sebrosky, Joseph
Sent: Monday, March 03, 2014 8:13 AM
To: Kim, James; Markley, Michael
Cc: Hipschman, Thomas; Walker, Wayne; Regner, Lisa; Wilson, George; Harris, Brian; OKeefe, Neil; Munson, Clifford
Subject: RE: Request for phone call with DCPP to discuss guidance regarding seismic licensing basis relative to the 2/20/14 seismic eric leeds letter

Jim and Mike,

The purpose of this email is to suggest that we may need to get more people involved with PG&E's question regarding the recently issued February 20, 2014, (ML14030A046) seismic reanalysis guidance letter, and an October 12, 2012, letter (ML120730106) that we sent to the PG&E transmitting the results of our independent evaluation of the Shoreline Fault, and how the Shoreline Fault should be considered in context with the 50.54(f) letter. I think that you, Mike Markley and I can handle an initial call with the licensee to determine the exact nature of their question, but I believe the people that are copied on this email should be aware of the call so that if we need to get them involved with a subsequent interaction with the licensee that they are aware of the issue.

Background

I am not sure the exact nature of PG&E's question below but because of a license renewal contention in this area and an ongoing DPO, I am extremely sensitive to providing feedback on this issue. At the time of the October 12, 2012, letter, we were obviously aware of the March 12, 2012, request for information and also Diablo Canyon's unique licensing basis which includes:

- 3 seismic design basis response spectrum (Hosgri, Double Design Earthquake and Design Earthquake) instead of two response spectrum (Safe Shutdown Earthquake, and Operating Basis earthquake)

- A license condition on the unit 1 license that required PG&E to develop and implement a program to reevaluate the seismic design bases used for the Diablo Canyon Nuclear Power Plant. This license condition was subsequently removed in 1991 and resulted in the Long-Term Seismic Program response spectrum and a commitment by PG&E to continue to study seismic issues and to perform periodic seismic reviews of the DCPP. (See section 2 of the Research Information Letter 12-01 – Confirmation Analysis of Shoreline Fault (ML121230035) for more background on the unique licensing basis for Diablo Canyon).

In the October 12, 2012, letter we provided guidance to PG&E relative to the March12, 2012, request for additional information, because of Diablo Canyon's unique licensing basis. This included guidance that PG&E had to compare the new updated ground motion response spectrum to the Double Design Earthquake spectrum, and an additional statement that:

> ...the staff has concluded that the Shoreline scenario should be considered as a lesser included case under the Hosgri evaluation and the licensee should update the final safety analysis report (FSAR), as necessary, to include the Shoreline scenario in accordance with the requirements of 10 CFR 50.71(e).

As you can see from the above the licensing basis for Diablo is unique. I believe this is recognized in the February 20, 2014, letter that licensee's need to consider the information that they develop and its affect on operability and reportability on a case-by-case basis.

The bottom line is that I think the call can go forward initially with a small group from DORL but we may need to quickly engage the JLD and Region IV based on the results of the call.

Please let me know if you have any questions or if you think I am missing something.

Thanks,

Joe Sebrosky

From: Soenen, Philippe R [mailto:PNS3@pge.com]
Sent: Thursday, February 27, 2014 5:25 PM
To: Sebrosky, Joseph
Cc: Kim, James
Subject: Request for phone call with DCPP

Joe,

I was wondering if you could support a phone call with Tom Baldwin and myself regarding how the reporting guidance from the, "SUPPLEMENTAL INFORMATION RELATED TO REQUEST FOR INFORMATION PURSUANT TO TITLE 10 OF THE *CODE OF FEDERALREGULATIONS* 50.54(f) REGARDING SEISMIC HAZARD REEVALUATIONS FOR RECOMMENDATION 2.1 OF THE NEAR-TERM TASK FORCE REVIEW OF INSIGHTS FROM THE FUKUSHIMA DAI-ICHI ACCIDENT," dated February 20, 2014 relates to the reporting/notifying expectations from the RIL cover letter.

The supplemental information related to 50.54(f) states that following:

Operability and Reportability
The staff considers the seismic hazard reevaluations being performed pursuant to the 50.54(f) letter to be distinct from the current design or licensing basis of operating plants. Consequently,
the results of the analysis performed using present-day regulatory guidance, methodologies, and information would not generally be expected to call into question the operability or functionality of SSCs. Therefore, the results are not expected to be reportable pursuant to 10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors," and 10 CFR 50.73, "Licensee event report system."

However, as with any new information that may arise at a plant, licensees are responsible for evaluating and making determinations related to operability, and any associated reportability, on a case-by-case basis. Licensees should consider and disposition the information through their corrective action program or equivalent process. If an error is identified in the current design or licensing basis during the performance of the requested seismic hazard evaluation, the

staff expects that licensees would assess the operability of the affected SSC. Additionally, licensees would need to determine if the situation is reportable pursuant to 10 CFR 50.72 and 50.73. Licensees would also be expected to determine whether aspects of 10 CFR 50.9, concerning the requirement to provide complete and accurate information to the NRC, would be applicable.

Interim Actions (Requested Information, Item (6))
Consistent with the 10 CFR 50.54{f) letter dated March 12, 2012, licensees are expected to provide, as part of the Seismic Hazard Evaluation and Screening report, an interim evaluation or
interim actions taken or planned to address the reevaluated hazard (where it is not bounded by the current design basis). Licensees should describe the interim evaluations and actions in
sufficient detail to demonstrate that the proposed actions are commensurate with the hazard and will allow the NRC staff to assess their acceptability. The NRC staff will consider the appropriateness of the interim evaluations or actions in the context of a licensee's ability to demonstrate the seismic safety of the plant.

PG&E committed to the following with the issuance of the RIL, its cover letter, and the withdrawal of the associated LAR:

If during the collection of the data, new faults are discovered or information is uncovered that would suggest the Shoreline fault is more capable than currently believed, the staff expects that the licensee will provide the NRC with an interim evaluation that describes actions taken or planned to address the higher seismic hazard relative to the design basis, as appropriate, prior to completion of the evaluations requested in the NRC staff's March 12, 2012, request for information.

We are asking for your input because you were our project manager while this issue was being resolved. I have copied Jim Kim on this email for his awareness and if he would like to be involved.

Philippe Soenen

Supervisor, Licensing
Regulatory Services - DCPP
Office - 805.545.6984
Cell - (b)(6)

From: Kennedy, Kriss
Sent: Tuesday, July 23, 2013 9:20 AM
To: Fuller, Karla
Subject: Fw: ACTION REQUESTED: Attached DPO
Attachments: DPO Diablo Canyon Seismic Issues.pdf

Note: This attachment is publicly available as part of ML14252A743.

This email is being sent from an NRC Blackberry device.

From: Markley, Michael
To: Kennedy, Kriss; OKeefe, Neil
Sent: Mon Jul 22 13:18:15 2013
Subject: FW: ACTION REQUESTED: Attached DPO

FYI

From: Lund, Louise
Sent: Monday, July 22, 2013 8:18 AM
To: Markley, Michael; Policksoki, James; Sebrosky, Joseph
Subject: FW: ACTION REQUESTED: Attached DPO

From: Evans, Michele
Sent: Friday, July 19, 2013 3:27 PM
To: Lund, Louise
Cc: Monninger, John
Subject: FW: ACTION REQUESTED: Attached DPO

Louise,

I provided a copy to Jennifer and Dan. I have not read it.

Please provide copies to others as you see appropriate. Thanks.

Michele

From: Peck, Michael
Sent: Friday, July 19, 2013 2:42 PM
To: Pedersen, Renee; DifferingViews Resource
Cc: Howell, Art; Evans, Michele; Rutledge, Steven
Subject: ACTION REQUESTED: Attached DPO

Ms. Pedersen,

Please accept and process the attached DPO.

Thank you,
Michael Peck
423-855-6515

From: Holian, Brian
Sent: Wednesday, December 10, 2014 2:09 PM
To: OKeefe, Neil
Cc: Walker, Wayne; Pruett, Troy; Alexander, Ryan
Subject: Re: Seismic Design and Licensing Basis Question

Neil
Great email and summary. Sitting at the airport my "quick" answer is I expect licensees to update FSARs when they get the ser. You may be telling me they are not planning that.

I plan to discuss at nrr , with your email in frt of me... And will schedule a call to discuss.
Thx much
Good seeing all of you
-brian

From: OKeefe, Neil
Sent: Wednesday, December 10, 2014 10:42 AM Eastern Standard Time
To: Holian, Brian
Cc: Walker, Wayne; Pruett, Troy; Alexander, Ryan
Subject: Seismic Design and Licensing Basis Question

Brian,

I asked you a question during your talk at the Region IV inspector counterpart meeting today. I thought it worthwhile to follow that up with an email to describe the situation.

The basic question is: How will the results of post-Fukishima seismic (an potentially flooding) re-evaluations get captured and documented in the design and licensing basis so that it can be used to support future operability evaluations and plant modifications?

The process that is currently being used to address beyond design basis seismic and flooding hazards closely mirrors the process used to license the Hosgri fault at Diablo Canyon, which has been shown to have left some voids in the design and licensing basis.

The question stems from the DPO we recently resolved concerning new seismic information identified at Diablo Canyon. Diablo Canyon is currently unique in having an "extra" earthquake above the Safe Shutdown Earthquake in its licensing basis. During original licensing, the NRC recognized that the newly-discovered Hosgri fault could produce much larger ground accelerations than the SSE (but with a much lower frequency of occurrence than was used for picking the SSE values), so we had them show the plant was safe for the larger threat. The NRC wrote an SER approving the licensee's evaluations that showed an adequate level of protection for a key subset of the SSCs that had to withstand the SSE (but not the same protection or same set of SSCs required by regulation to withstand the SSE). We did not establish the criteria that formed the basis for approving the Hosgri evaluation, or ensure the legal design basis was updated to document this protection so that it would continue in effect through plant modifications and operability evaluations.

The DPO pointed out that the plant design basis did not include the Hosgri evaluation. Therefore, new seismic hazard information that exceeded the SSE should lead to a conclusion that some (or many) SSCs exceeded the design basis and may be inoperable.

More specifically, our operability guidance (currently MC 0326) requires that new information that may affect operability must be compared to the design **and** licensing basis as described in the UFSAR.

Diablo Canyon did not really describe the re-evaluations done for the Hosgri fault in the UFSAR or other documents normally used to document the design basis (per the 10 CFR 50.2 definition). This means that new seismic information has to be compared to the SSE. Diablo Canyon, and now a number of other plants, have seismic re-evaluations that show the seismic threat exceeds their design and licensing basis because it is above the SSE.

I understand the plan is for the NRC to evaluate the seismic re-evaluations and issue site-specific SERs approving those evaluations. This leaves us potentially in the same place as we were/are with Diablo Canyon – we will have established a regulatory footprint for a seismic (or flooding) hazard that exceeds the documented design basis hazard, will have issued an SER approving a licensee evaluation that is not tied to a specific enforceable regulatory standard, with no update to the formal design basis and no specific criteria established that becomes a "bounding case" or continued requirements.

With this void, future operability evaluations will be problematic, and future plant modifications may not maintain this level of protection.

MC 0326 specifically prohibits using PRA to assess operability. However, PRA is specifically being permitted to be used for the seismic re-evaluations (and for licensing new reactors for seismic hazards). This specific conflict sets up a separate but related problem.

NRR issued a letter describing how to address operability evaluations associated with these specific seismic re-evaluations, describing them as being beyond the design basis of the plant. I do not believe that this status will carry past the point where NRR issues SERs, so the temporary status needs to be addressed by a permanent fix that establishes the approved condition into the legal design basis and related documentation, and establishes the criteria that were and must continue to be met.

Sorry, this was probably a little heavy for a question in front of a large group.

I enjoyed your presentation, but missed most of the trivia questions.

Neil O'Keefe
Chief, Branch B
DRP, RIV
(817) 200-1141 (o)
(b)(6) (c)

Non-Concurrences & Differing Professional Opinions

Background

The former SRI at the Diablo Canyon Power Plant (DCPP) submitted non-concurrence papers (NCPs) in January 2011 and January 2012, followed by a Differing Professional Opinion (DPO) in July 2013 detailing a disagreement with the NRC about how new seismic information should be compared to the plant's current seismic license requirements. DPO 2013-02 restated the issues presented in NCP 2012-01 and added a concern that a license amendment was needed incorporate the Shoreline fault into Diablo Canyon's FSAR as described in the RIL 12-01 cover letter. The added concern was that the NRC did not review or take action on the Los Osos and San Luis Bay faults. In accordance with Management Directive 10.159, a DPO Ad Hoc Review Panel was established to review the DPO submittal, meet with DPO submitter, and issues a DPO report including conclusions and recommendations regarding disposition of the issues presented in the DPO. The panel completed its report in May 2014 and a decision on the DPO was rendered in letter dated May 29, 2014, to the DPO submitter. The DPO submitter appealed the decision to the EDO in accordance with the NRCs DPO process. The EDO completed his consideration of the DPO appeal on September 9, 2014, concluding that he was in agreement with the original decision.

The purpose of this communication plan is to provide key messages associated with the EDO's decision on the DPO appeal and public release of the DPO Case File.

Key Messages:

1. NRC strives to establish and maintain an environment that encourages all NRC employees and contractors to raise concerns and differing views promptly without fear of reprisal through various mechanisms. The free and open exchange of views or ideas conducted in a non-threatening environment provides the ideal forum where concerns and alternative views can be considered and addressed in an efficient and timely manner that improves decision making and supports the agency's safety and security mission.
2. The NRC appreciates members of the staff bring issues like this to its attention
3. The NRC encourages the use of non-concurrences and the Differing Professional Opinion (DPO) process
4. The NRC reviews all non-concurrences and DPOs thoroughly and in accordance with agency guidance (MD 10.158, MD 10.159) and believes that this is a healthy and necessary part the regulatory process
5. The NRC believes that, in the end, all of our regulatory decisions are better because of this process
6. The NRC does not tolerate retaliation against employees who engage in our processes for raising differing views (i.e., Open Door Policy, NCP, and DPO Program).
7. Persons serving on the DPO Panels are independent of the issues raised in the DPO
8. Upon disposition of the DPO via a Director's decision, the DPO submitter has appeal rights to the EDO
9. While the DPO is under review or appeal, NRC is prohibited from engaging in discussions with external stakeholders regarding the specifics of the of the DPO submittal

10. After the EDO's decision on the appeal, the DPO submitter can request that the DPO Case File be made public. Management performs a review consistent with agency policies to support discretionary release. Regarding the DPO for Diablo Canyon, the NRC has been and will continue to be as open and scrutable as possible while protecting the privacy rights of the individual
11. The NRC does not know the source of the public release of the Diablo Canyon DPO submittal prior to the EDO rendering a decision on the appeal
12. The NRC can, however, comment on a few aspects of the DPO appeal review
    - A Director's Decision has been made and the DPO appeal to the EDO has been finalized
    - The EDO and the DPO submitter have both agreed that the issues raised in the DPO do not present an immediate safety concern for Diablo Canyon
    - The NRC has sought permission from the DPO submitter to allow the DPO case file to be made publicly available and the DPO submitter has agreed
    - The DPO case file was made publicly available on September 10, 2014, following the EDO's appeal decision
13. Regarding the operational status of Diablo Canyon Power Plant, Units 1 and 2
    - The plant remains within its approved design and licensing basis
    - There are no current operability concerns resulting from the DPO
    - The recent earthquake in the Napa Valley did not reach Diablo Canyon – it was neither felt nor detected

Background Documents

[NON-PUBLIC] Non-concurrence NCP 2011-103, dated November 7, 2011

Non-concurrence NCP 2012-01, dated January 26, 2012 [publically available in ADAMS]

Differing Professional Opinion 2013-02, dated July 18, 2013
[Complete DPO Case File, dated September 9, 2014, is publically available in ADAMS - ML14252A743]

Non-concurrence and DPO Questions

Refer to "Communications Plan – Diablo Canyon Power Plant Topics of Interest Differing Professional Opinion and Appeal" for most current information.

NOTE: General FAQs on the DPO Program are included on the DPO Web site (look under Employee Resources—Employee Concerns.

1. Was the former DCPP SRI reassigned because he filed two non-concurrences?

No. The former DCPP SRI was not reassigned. He applied for an instructor position in his area of expertise at the NRC's technical training center in Chattanooga, TN, at about the time he submitted his non-concurrence in accordance with the Non-Concurrence Process described in MD 10.158. He was competitively selected for this sought-after position, and reported to his new assignment in September 2012. Resident inspector assignments are limited to 7 years to ensure objectivity. It is common for resident inspectors to apply for their next job when a desirable position comes open.

2. When were the non-concurrences filed?

Two non-concurrences were filed by the DCPP SRI.

11/7/11. The DCPP SRI submitted NCP 2011-103, on inspection report 05000275; 323/201104.

1/26/12. The DCPP SRI submitted NCP 2012-01, on inspection report 05000275; 323/201105.

3. What were the non-concurrences?

Both non-concurrences involve the same subject; regulatory actions in response to the discovery of the Shoreline Fault.

NCP 2011-103 was filed by the DCPP SRI on the basis that no violation was issued (as he had submitted in the draft report) related to operability evaluation of the Shoreline fault in Report 2011-04. NCP 2011-103 was dispositioned finalizing the violation in IR 2011-05 issued on 2/14/12. (The employee requested that the NCP be non-public.)

NCP 2012-01 was filed by the DCPP SRI because the SRI believed the violation in NRC IR 2011-05 should be for an inadequate operability evaluation of the Shoreline Fault rather than not doing an operability evaluation until June 2012. The SRI believed the facility should be shutdown or the license amended to reflect the Shoreline fault. NCP 2012-01was discussed with NRC stakeholders representing NRR/DE, NRR/DORL, RIV, and RES. NCP 2012-01 was dispositioned as a multi-office staff position which concluded that a violation for having no operability evaluation from January 2011 to June 2011 existed because the licensee completed the RIS 2005-020 immediate (interim) operability evaluation in June 2011. Additionally, the offices involved in NCP 2012-01 acknowledged that a final operability evaluation could not be completed by the licensee until the NRC decided what requirements and methods should be applied to new seismic information. At the time of Inspection Report 2011-05 issuance it was expected that the requirements and methods

would be addressed in a License Amendment Request that was under consideration. However, by 3Q/2012, enough progress had been made on RIL 2012-01 for NRR and RES to conclude that the LTSP method of analysis used in the immediate operability assessment was sufficient to evaluate the Shoreline fault and that the Shoreline Fault should be considered a lesser included case of the Hosgri event. (The employee supported public release of the NCP ADAMS ML121A173.)

4. When was the DPO filed?

July 18, 2013. The former DCPP SRI filed Differing Professional Opinion (DPO) 2013-02 associated with the regulatory response following the discovery of the Shoreline Fault.

NRC employees are encouraged to file a DPO if they believe an agency decision is in error. The DPO process is in keeping with the agency's open and collaborative working environment.

5. What is the DPO?

DPO 2013-02 restated the issues presented in NCP 2012-01 and added a concern that a license amendment was needed incorporate the shoreline fault into Diablo Canyon's FSAR as described in the RIL 12-01 cover letter. The added concern was that the NRC did not review or take action on the Los Osos and San Luis Bay faults.

6. What is the status of the DPO?

A decision on the DPO was issued by the Office Director for NRR on May 29, 2014 consistent with the NRC's process included in MD 10.159. The DPO submitter appealed this decision to the EDO on June 23, 2014, and the appeal was thoroughly evaluated by the EDO and decision on the appeal was rendered on September 9, 2014.

As part of the agency's open and collaborative work environment, the NRC has established the DPO program as a means for employees to have their concerns reviewed by high level managers. The DPO Program is a formal process that allows all employees and contractors to have their differing views on established, mission-related issues considered by the highest level managers in their organizations, i.e., Office Directors and Regional Administrators. The process also provides managers with an independent, three-person review of the issue (one person chosen by the employee). After a decision is issued to an employee, he or she may appeal the decision to the Executive Director for Operations (or the Chairman for those offices reporting to the Commission).

7. Will the decision regarding the DPO be made public?

The DPO Case File was made publicly available and is available in ADAMS (ML14252A743).

The NRC supports openness and will include a summary of the disposition of the DPO in the Commission's Weekly Information Report included on the NRC Web site (see Commission Documents under the Document Collections in the NRC Library). The DPO submitter was contacted regarding the EDO's decision on the DPO appeal and has

communicated support for the public release of the DPO Case File (with appropriate redactions). The DPO Case File was made publicly available after the EDO's DPO appeal decision (on September 9, 2014).

8. Was the SRI wrongfully reassigned after filing two non-concurrences and a DPO?

No. As noted in Q&A #1 above, the SRI applied for and was selected to a highly sought instructor position at the NRC's Technical Training Center. The NRC does not tolerate retaliation for engaging in the NCP or the DPO Program and both MDs reiterate this policy and direct employees to resources in the event they believe that they have been retaliated against.

9. Would the DPO panel's conclusions or the DPO appeal decision change based on the new seismic information found in the State of California report?

PG&E, the licensee for Diablo Canyon, is providing a report to the State of California that includes the results of its most recent evaluation of the seismic hazards for the Diablo Canyon facility. The report was provided to the State of California on September 10, 2014, and a copy was also provided to the NRC. Prior to performing a detailed review of this report, the NRC is not able to ascertain whether the new seismic information contained in the report would change the DPO panel's conclusions or the DPO appeal decision. The NRC understands that PG&E plans to incorporate the findings from this report into their ongoing probabilistic seismic hazards analysis required by the NRC Post-Fukushima task force recommendations that are due in March 2015. The NRC believes this more rigorous analysis will provide the most accurate assessment of faults affecting the DCPP. In addition, the NRC staff's review of the new seismic information in the report notes that PG&E's evaluation concludes that the ground motions resulting from the faults discussed in the report (i.e., Shoreline, Hosgri, San Simeon, Los Osos, and San Luis Bay) continue to be bounded by the Hosgri analysis that was used during licensing of the plant.

NRC Resident Inspectors and Region IV staff looked at the licensee's corrective action process assessment of new preliminary information concerning DCPP seismic and licensing bases. The licensee's information indicates reasonable assurance of public health and safety after a seismic event.

The NRC staff will review the new information provided in the report in accordance with the NRC's inspection process. The NRC will take additional regulatory action as appropriate if the new information associated with the Faults around DCPP cause NRC to question PG&E's conclusions.

10. Timeline of Events associated with the NCPs and DPO:

11/7/11	DCPP SRI submits Non-Concurrence NCP 2011-103. The SRI non-concurs on Inspection Report 05000275; 323/2011004 because the proposed violation involving the Shoreline Fault operability evaluation was not issued.
11/9/11	NCP 2011-103 is dispositioned by Region IV. The operability evaluation issue was documented as an Unresolved Item in Inspection Report

05000275; 323/2011002 and dispositioned as a violation in Inspection Report 05000275; 323/2011005.

4Q/2011 The DCPP SRI continues to question the enforcement action associated with the Shoreline Fault operability evaluation. Several meetings between multiple NRC offices are conducted to discuss the Shoreline Fault.

1/26/12 DCPP SRI submits NCP 2012-01, non-concurring on inspection report 05000275; 323/201105. The SRI believed the violation in NRC Report 2011-05 should be for an inadequate operability evaluation of the Shoreline Fault rather than not doing an operability evaluation until June 2012. The SRI believed the facility should be shutdown or the license amended to reflect the Shoreline fault. (ADAMS Accession Number ML12151A173).

Feb 2012 DCPP SRI applies for instructor position vacancy at the Technical Training Center (TTC).

Feb 13, 2012 Response to NCP 2012-01 issued. NCP 2012-01 was discussed with NRC stakeholders representing NRR/DE, NRR/DORL, RIV, and RES. NCP 2012-01 was dispositioned as a multi-office staff position which concluded that a violation for having no operability evaluation from January 2011 to June 2011 existed because the licensee completed the RIS 2005-020 immediate (interim) operability evaluation in June 2011. Additionally, the offices involved in NCP 2012-01 acknowledged that a final operability evaluation could not be completed by the licensee until the NRC decided what requirements and methods should be applied to new seismic information. At the time of Report 2011-05 issuance it was expected that the requirements and methods would be addressed in a License Amendment Request that was under consideration. However, by 3Q/2012, enough progress had been made on RIL 2012-01 for NRR and RES to conclude that the LTSP method of analysis used in the immediate operability assessment was sufficient to evaluate the Shoreline fault and that the Shoreline Fault should be considered a lesser included case of the Hosgri event. (ADAMS Accession Number ML12151A173).

02/12-07/13 RIV management frequently encourages the DCPP SRI to submit a Differing Professional Opinion (DPO) during several discussions involving seismic issues.

May 2012 DCPP SRI is selected for instructor position at the Technical Training Center (TTC).

Sept 2012 The (now former) DCPP SRI reports to the TTC as a training instructor.

7/18/13 Former SRI submits a DPO regarding the agency's regulatory actions associated with the Shoreline Fault.

8/2/13 DPO 2013-002 was assigned to NRR for an independent review.

9/3/13	Director, NRR establishes a DPO Ad Hoc Review Panel (DPO Panel) for DPO 2013-002 with three NRC staff members who have been independent of the initial concerns raised by the former DCPP SRI.
4/3/14	DPO Panel completes its review of DPO 2013-002 and submits its report to the Director, NRR.
5/29/14	Director, NRR issues his decision on DPO 2013-002 by memo to the former DCPP SRI.
6/23/14	Employee submits DPO appeal.
6/27/14	Director, NRR provided Statement of Views on contested issues in appeal.
7/7/14	DPO appeal package provided to EDO for disposition and decision.
8/25/14	Associated Press article released discussing the DPO.
9/9/14	EDO renders final decision regarding DPO. DPO submitter agrees to public release of DPO. DPO Case File made publicly available.

From: Hasan, Nasreen
Sent: Friday, August 02, 2013 3:01 PM
To: Leeds, Eric
Cc: Bergman, Thomas; Campbell, Andy; Campbell, Vivian; Fuller, Karla; Dorman, Dan; Uhle, Jennifer; Howell, Art; Evans, Michele; Markley, Michael; Wertz, Trent; Weber, Michael; Merzke, Daniel; Peck, Michael; Rutledge, Steven; OKeefe, Neil; Wittick, Brian; Sewell, Margaret; Pedersen, Renee; Solorio, Dave; Zimmerman, Roy; Johnson, Michael; Mitchell, Reggie
Subject: DPO-2013-002, Memo Forwarding Differing Professional Opinion Involving Diablo Canyon Seismic Issues

August 2, 2013

MEMORANDUM TO: Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

FROM: Renée M. Pedersen, Sr. Differing Views Program Manager ***/RA/***
Office of Enforcement

Please see the link below.

View ADAMS P8 Properties ML13213A248
Open ADAMS P8 Package (DPO 2013 002, Differing Professional Opinion Involving Diablo Canyon Seismic Issues)

ADAMS Package: ML13213A248
Memo: ML13213A249
DPO Submittal: ML13214A162
Milestones and Timeliness Goals: ML13213A259

Note: This document is limited to those on distribution only

Thank you,
Nasreen Hasan
Administrative Assistant
Office of Enforcement
Location / Mailstop: O-4A15A
Office #: (301)415-2741
Fax: (301)415-3431

From: Markley, Michael
Sent: Wednesday, March 19, 2014 9:26 AM
To: Walker, Wayne; Alexander, Ryan
Subject: FW: ACTION: Issue OEDO Ticket for Responses to Senate EPW QFRs
Attachments: RE: HELP!! DPO Response to Boxer

From: Pedersen, Renee
Sent: Monday, March 10, 2014 12:27 PM
To: Markley, Michael
Cc: Solorio, Dave; Sewell, Margaret
Subject: RE: ACTION: Issue OEDO Ticket for Responses to Senate EPW QFRs

Mike,

The DPO is not publicly available and has limited distribution within the NRC. Please see my email exchange with OPA. We will release to Boxer pending Commission approval.

Renée

From: Markley, Michael
Sent: Monday, March 10, 2014 12:21 PM
To: Pedersen, Renee
Subject: FW: ACTION: Issue OEDO Ticket for Responses to Senate EPW QFRs
Importance: High

Renee,

Please see Boxer's requested items 2 and 3. OE is tasked with responding to item 2, but we (NRR) are tasked with responding to item 3.

Question: Is the DPO and associated documents publicly available?

Mike

From: Orf, Tracy
Sent: Friday, March 07, 2014 7:52 AM
To: NRR_DORL_BCs Distribution
Cc: Evans, Michele; Monninger, John; Lantz, Ryan; Lund, Louise
Subject: FW: ACTION: Issue OEDO Ticket for Responses to Senate EPW QFRs
Importance: High

Heads up! Attached are questions that came out of the Commission's Senate EPW oversight hearing. Some of these questions will take a while to answer and resemble a FOIA. Others will require the PMs to check their tech specs and search ADAMS.

Looks like a major effort.

Thanks,

Trace

From: Wertz, Trent
Sent: Thursday, March 06, 2014 2:44 PM
To: Orf, Tracy; Anderson, Shaun; Moore, Ross; Jessup, William; Schmitt, Ronald; Lian, Jocelyn; Mahoney, Michael; Lyons, Sara
Subject: FW: ACTION: Issue OEDO Ticket for Responses to Senate EPW QFRs
Importance: High

Heads Up.

The ticket will be issued shortly with a due date of March 28. These will be due to me by COB March 26. I'll pass along the TAC as soon as I get it.

Here are the assignments. Let me know if you think something should be changed:

Chairman

Boxer 1,3,5 – DORL
Boxer 6 – DSS
Carper 1 – DIRS support NSIR as needed
Gillibrand 1 – DLR
Gillibrand 2 – DORL
Gillibrand 3 – JLD
Gillibrand 4 – DIRS
Vitter 1-12 – DLR/DORL/DE support NRO as needed
Vitter 14-26 – JLD
Vitter 36 – DORL
Vitter 37 – DE
Vitter 39, 41-45,53 – DPR
Vitter 55 – DORL/DIRS
Vitter 61,62 – DORL
Vitter 63-67 – DPR
Vitter 79-85 – DORL/DIRS support NRO as needed
Sessions 1 – DORL
Sessions 2b,c – DPR
Sessions 2d – JLD/DPR
Fischer 1 – DPR
Fischer 2 – DRA

For Comm Svinicki
Carper 2 – JLD
Sessions 2 – JLD

For Comm Ostendorff
Carper 1,2 – JLD
Sessions 2a - DIRS

Thanks,
Trent

From: Rihm, Roger
Sent: Thursday, March 06, 2014 2:04 PM
To: Jaegers, Cathy

Cc: Landau, Mindy; Wertz, Trent; Orf, Tracy; Hudson, Jody; Atack, Sabrina; Williams, Donna; Trocine, Leigh; Rini, Brett; Sun, Robert
Subject: ACTION: Issue OEDO Ticket for Responses to Senate EPW QFRs
Importance: High

Attached are ticket instructions, response template, and copy of QFRs with office assignments. If you need anything else, let me know.

From: Pedersen, Renee
Sent: Friday, March 07, 2014 1:10 PM
To: Powell, Amy
Cc: Rothschild, Trip; Shane, Raeann; Solorio, Dave; Campbell, Andy; Zimmerman, Roy; Sewell, Margaret
Subject: RE: HELP!! DPO Response to Boxer

Amy,

Thanks for the response. Just to be clear, the DPO submittal is 1 scanned NRC record (it may include several references or parts) from the employee.

We can provide the record if the Commission approves. There may be value in including some basic information on our process in the response, including that the DPO Program supports openness and transparency when the process is complete. Just a thought.

Please let us know the path forward and please provide guidance with respect to the document marking. (The DPO submittal is included on a form which doesn't have a big margin.)

Renée

From: Powell, Amy
Sent: Friday, March 07, 2014 12:11 PM
To: Pedersen, Renee
Cc: Rothschild, Trip; Shane, Raeann
Subject: RE: HELP!! DPO Response to Boxer

You ask a complicated question. I am cc'ing Trip in OGC as this wades into legal territory; I understand that you two have talked about this as well.

(b)(5)

We'll keep you in the loop as Commission conversations continue via the daily Chiefs of Staff meetings. I am on the Hill all afternoon but in Monday if you want to discuss.

Thanks,
Amy

Amy Powell
Acting Director
U. S. Nuclear Regulatory Commission
Office of Congressional Affairs

Phone: 301-415-1673

From: Pedersen, Renee
Sent: Friday, March 07, 2014 9:06 AM
To: Powell, Amy
Subject: FW: HELP!! DPO Response to Boxer
Importance: High

Amy,

Raeann is out. Can you tell me what our practice is with a Congressional request for a predecisional document?

From: Pedersen, Renee
Sent: Friday, March 07, 2014 8:56 AM
To: Shane, Raeann
Cc: Solorio, Dave; Sewell, Margaret
Subject: HELP!! DPO Response to Boxer
Importance: High

Raeann,

You are probably away of the letter we just got from Boxer.

> **2. Please provide me with a copy of the Differing Professional Opini Canyon Power Plant (DCPP) prepared by NRC's former Senior R (Dr. Michael Peck) that is currently pending before the Commissi**

We previously talked about this type of scenario. In particular, this DPO is still being processed within our DPO process. It is currently being evaluated by a DPO Panel. The DPO Panel issues a report and then the Director, NRR issues a DPO Decision to the individual. The individual has an opportunity to appeal to the EDO and then the EDO evaluates and issues a DPO Appeal Decision. At this point the process is considered closed and we ask the individual if he would like the DPO Case file public. If he says yes, NRR performs a releasability review and includes a link to the DPO Case File along with a summary of the case that is posted on the WIR. This could be several months.

The document is considered pre-decisional and not for public release. So, does this mean we can tell Congress, no? Premature release of the document could have a potentially negative impact on the DPO process.

Thoughts?

From: Alexander, Ryan
Sent: Tuesday, October 28, 2014 9:26 AM
To: Hipschman, Thomas; Reynoso, John; Walker, Wayne; Oesterle, Eric; Pruett, Troy; Kozal, Jason
Cc: OKeefe, Neil; Uselding, Lara
Subject: ADDITIONAL INFO: In federal court filing, PG&E and NRC accused of Diablo quake safety coverup

All:

Based on Lara's e-mail, I went to the FOE website and found their press release and link to the filing they indicated was submitted to the Court of Appeals this morning.

FOE Press Release: http://www.foe.org/news/news-releases/2014-10-in-federal-court-filing-pge-and-nuclear-regulator-said-to-collude-in-secret-diablo-canyon-decision

FOE Filing (as referenced in the Press Release): http://libcloud.s3.amazonaws.com/93/f4/7/4937/14-10-28_FoE_Petition_FSAR.pdf

In my quick read of the filing, it notes the following:

"[The Petitioner] hereby petitions the Court for review of the final order of the United States Nuclear Regulatory Commission ("NRC") approving Revision 21 to the Final Safety Analysis Report as Updated (FSARU) for Diablo Canyon Units 1 & 2 without the required license amendment proceeding, in violation of 42 U.S.C. § 2239. The NRC acted arbitrarily, abused its discretion, and violated the Atomic Energy Act, the Administrative Procedure Act, the Commission's policies and regulations, and other applicable laws and regulations in approving Revision 21."

As such, the filing appears to be directly based on the sections of the FSAR that were released as part of the PDR request and based on the release of information associated with the DPO.

-- Ryan

From: Uselding, Lara
Sent: Tuesday, October 28, 2014 9:07 AM
To: Dapas, Marc; Pruett, Troy; Kozal, Jason; OKeefe, Neil; Walker, Wayne; Alexander, Ryan; Sebrosky, Joseph; Oesterle, Eric; Markley, Michael; Burnell, Scott
Subject: Fw: In federal court filing, PG&E and NRC accused of Diablo quake safety coverup

Lara Uselding
NRC Region 4 Public Affairs
817-200-1519

From: Bill Walker [mailto:bw.deadline@gmail.com]
Sent: Tuesday, October 28, 2014 08:56 AM
Subject: In federal court filing, PG&E and NRC accused of Diablo quake safety coverup

For immediate release: October 28, 2014

Expert Contacts:

Damon Moglen, (202) 352-4223, dmoglen@foe.org

Communications Contacts:

Bill Walker, (510) 759-9911, bw.deadline@gmail.com (West Coast)
EA Dyson, (202) 222-0730, edyson@foe.org (East Coast)

In federal court filing, PG&E and nuclear regulator said to collude in secret decision to cover up Diablo Canyon's vulnerability to earthquakes

WASHINGTON, D.C. – Friends of the Earth has petitioned the U.S. Court of Appeals to overturn a secret decision by the Nuclear Regulatory Commission to illegally alter the operating license for the Diablo Canyon nuclear power plant allowing Pacific Gas and Electric to hide the fact that the reactors are vulnerable to earthquakes stronger than it was meant to withstand.

The secret revision of Diablo Canyon's license was revealed in NRC documents rejecting a dissent by the plant's former senior resident inspector. The inspector, Dr. Michael Peck, defied his superiors in saying that Diablo Canyon was operating in violation of its license and should be shut down unless and until new seismic information was addressed.

In a July 2013 formal dissent, which the NRC suppressed for more than a year, Dr. Peck argued that newly discovered faults could produce earthquakes far more destructive than the plant was designed, built and licensed to withstand. Last month, in rejecting the dissent, the NRC revealed that in September 2013 it had changed the way the risk of earthquakes at the plant are assessed – in effect, rewriting history and science to make the threat of more powerful earthquakes go away, without requiring any safety upgrades by PG&E.

The amendment was added in secret, unknown beyond the highest levels of PG&E and the NRC. Today Friends of the Earth petitioned the U.S. Court of Appeals for the D.C. circuit to review the amendment, overturn it and order a public license amendment proceeding as required by federal law.

"PG&E's new seismic study reveals that the earthquake threat at Diablo could be far greater than that for which the reactors were designed. So PG&E and the NRC secretly amended the license to relax the safety requirements," said David Freeman, former head of the Tennessee Valley Authority, Los Angeles Department of Water and Power and the Sacramento Municipal Utility District. "This is not only illegal, it's an outrage."

PG&E has enough trouble on its hands from the San Bruno explosion, where they had also claimed they had put safety first," said Freeman, senior advisor to Friends of the Earth. "This secret action shows they don't put safety first."

Under federal law and NRC regulations, changing the way seismic risk or reactor durability is assessed requires a public license amendment review. Instead, in consultation with PG&E, the NRC inserted a secret revision to the plant's license, which changed both the scientific calculations for assessing earthquake risks and retroactively declaring that the reactors were strong enough to withstand far greater seismic activity.

"At Diablo, it is now clear that these outdated 1960s-era reactors are not built to withstand the earthquake risks that surround the plant," said Damon Moglen of Friends of the Earth. "But instead of making them address these safety issues, the NRC worked with PG&E to chang the rules. It's a scandal of the first order, and frankly very scary."

A PG&E report released last month revealed that a newly discovered fault, located just 650 yards from the plant, is twice as long as the utility had maintained since 2011. The report also acknowledged one of Michael Peck's most troubling concerns; that the new fault is connected to two others and together the three are capable of producing much stronger shaking than the plant was designed and licensed to withstand.

In the aftermath of the Fukushima nuclear disaster, a 2011 NRC study indicated that Diablo Canyon is the nuclear power plant in the U.S. most likely to fail in response to an earthquake larger than it was designed to withstand.

Bill Walker
dba Deadline Now
Berkeley, CA
(510) 759-9911

Twitter: @deadlinenow
Facebook: DeadlineNow
Skype: deadlinenow
http://www.deadlinenow.com

From: Mullins, Charles
To: Oesterle, Eric; Alexander, Ryan; Markley, Michael
Cc: Walker, Wayne
Subject: RE: DCPP Communications Plan
Date: Tuesday, November 25, 2014 5:25:47 PM
Attachments: image001.png

(b)(5)

From: Oesterle, Eric
Sent: Tuesday, November 25, 2014 4:46 PM
To: Mullins, Charles; Alexander, Ryan; Markley, Michael
Cc: Walker, Wayne
Subject: RE: DCPP Communications Plan
Importance: High

Chuck,

(b)(5)

Hope that summary helps. You may want to consider using some of it in your response.

Eric R. Oesterle
NRC Project Manager
Diablo Canyon Power Plant
Cooper Nuclear Station
NRR/DORL/LPL4-1
301-415-1014

From: Mullins, Charles
Sent: Tuesday, November 25, 2014 4:15 PM
To: Alexander, Ryan; Markley, Michael
Cc: Oesterle, Eric; Walker, Wayne
Subject: RE: DCPP Communications Plan

Ryan;

Thanks. I think this will be quite helpful.

Chuck Mullins

From: Alexander, Ryan
Sent: Tuesday, November 25, 2014 3:46 PM
To: Markley, Michael; Mullins, Charles
Cc: Oesterle, Eric; Walker, Wayne
Subject: FW: DCPP Communications Plan

Mike:

The full internally available Diablo Canyon Comm Plan (Revision 0) is available at the OEDO Comm Plan SharePoint site at:

http://fusion.nrc.gov/edo/team/CPM/CommPlans/_layouts/listform.aspx?PageType=4&ListId={52972D7A-EEDC-4DE2-984B-6A8AAE78C74C}&ID=63&ContentTypeID=0x010043278097A1424145B8EF8AC452B10F19

However, attached is the current "working version" of the Diablo Canyon Comm Plan (i.e., Draft Revision 1). This draft revision includes updates regarding (1) Ocean PAR finding Q&A, (2) Sewell Report Release Decision, (3) Answers to Senate EPW Questions, & (4) AB-1632 Inspection Report.

The updated text in the attached is typically in red, or in the case of new sections there is a note in red text stating that the entire section was replaced/added. With the convergence of the issuance of the Ocean PAR finding inspection report and the AB-1632 inspection report in the next couple of weeks, we are planning to update the version on the OEDO SharePoint site in that period as well (i.e. within the next couple of weeks).

Hope this helps!

Ryan D. Alexander
Senior Project Engineer

NRC Region IV, Div. of Reactor Projects, Branch A
Office: (817) 200-1195
Cell: (b)(6)

Please consider the environment before printing this e-mail.

From: Walker, Wayne
Sent: Tuesday, November 25, 2014 2:22 PM
To: Alexander, Ryan
Subject: FW: DCPP Communications Plan

Ryan,

Can you send him the plan that is online and also the draft portions. Thanks.

Wayne

From: Markley, Michael
Sent: Tuesday, November 25, 2014 2:21 PM
To: Walker, Wayne
Cc: Mullins, Charles; Oesterle, Eric
Subject: DCPP Communications Plan

Wayne,

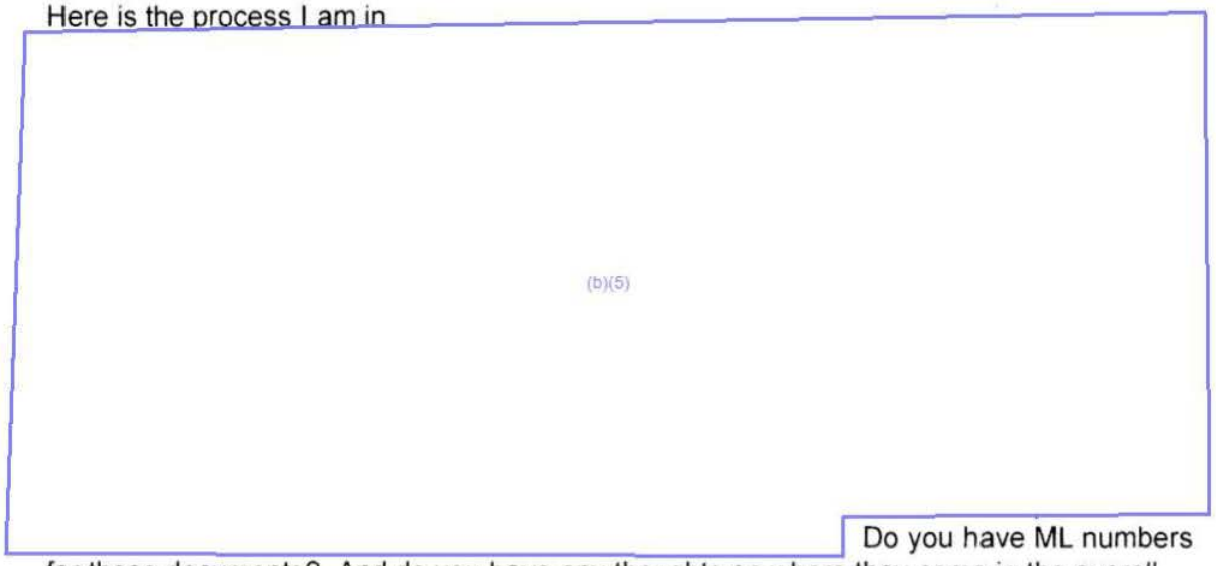
Can you send the latest version of the DCPP communications plan. He is addressing a lawsuit by FOE.

Mike

From: Mullins, Charles
To: Markley, Michael
Cc: Oesterle, Eric; Bamford, Peter; Lyon, Fred
Subject: RE: Documents for the lawsuit
Date: Monday, November 24, 2014 12:50:36 PM

Ok.

Here is the process I am in



Do you have ML numbers for these documents? And do you have any thoughts on where they came in the overall process?

I know you are busy today. I also know it is a holiday week and the contact in RIV is also out today. Is there anyone else who might be able to work with me?

(and yes, that is a CRAZY meeting schedule!!)

From: Markley, Michael
Sent: Monday, November 24, 2014 12:37 PM
To: Mullins, Charles
Cc: Oesterle, Eric; Bamford, Peter; Lyon, Fred
Subject: RE: Documents for the lawsuit

This is a holiday week. Sorry…

My availability is only before 1:00 pm. I am going to grab some lunch but will be back in a few minutes. I have meetings:

1-2:00pm
1:30-3:30pm
3:00-4:00pm

Have you checked with Rene Pedersen in OE? She was the DPO manager.

I am confused by the process we are in now. These documents are all in ADAMs, except

possibly e-mail. Are these official requests under "discovery"?

For the FSAR revision 21. You would need to check with Peter Bamford. Fred Lyon will be back tomorrow.

Mike

From: Mullins, Charles
Sent: Monday, November 24, 2014 12:22 PM
To: Markley, Michael
Subject: Documents for the lawsuit

Michael;

The petitioners want to include a list of documents in the record of the case. Do you have a few minutes this afternoon to discuss them?

Chuck

From: John Bernetich [mailto:bernetichj@ayreslawgroup.com]
Sent: Monday, November 24, 2014 12:01 PM
To: Mullins, Charles
Cc: Richard E. Ayres; Jessica Olson
Subject: Re: My current view of the Record

Chuck,

We intend to ask for the following documents:

1. Two inspection reports cited in the June 23, 2014 memo from Peter Bamford to Michael Markley (IR 2012004, IR 2011005)
2. A "change report" submitted by PG&E to accompany its submission of FSAR Revision 21 (in addition to the cover letter)
3. Documents cited by Dr. Peck in his appeal of the Panel Report issued in DPO-2013-002
4. Any documents related to a 50.59 review prepared for Revision 21, including emails between PG&E and NRC, and between NRC Staff members

In addition, we do not agree with your suggestion that the documents from the de facto licensing proceeding before the Commission should be included in the record for the Court of Appeals on the Revision 21 issue.

Thanks,
John

--

John Bernetich
Associate Attorney
Ayres Law Group LLP
Ph: (202) 452-9200

Dir: (202) 416-0241
www.ayreslawgroup.com

From: Markley, Michael
To: Mullins, Charles
Cc: Oesterle, Eric; Bamford, Peter; Lyon, Fred
Subject: RE: Documents for the lawsuit
Date: Monday, November 24, 2014 12:37:00 PM

This is a holiday week. Sorry…

My availability is only before 1:00 pm. I am going to grab some lunch but will be back in a few minutes. I have meetings:

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1:30-3:30pm
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For the FSAR revision 21. You would need to check with Peter Bamford. Fred Lyon will be back tomorrow.

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Subject: Documents for the lawsuit

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Sent: Monday, November 24, 2014 12:01 PM
To: Mullins, Charles
Cc: Richard E. Ayres; Jessica Olson
Subject: Re: My current view of the Record

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(in addition to the cover letter)
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In addition, we do not agree with your suggestion that the documents from the de facto licensing proceeding before the Commission should be included in the record for the Court of Appeals on the Revision 21 issue.

Thanks,
John

--

John Bernetich
Associate Attorney
Ayres Law Group LLP
Ph: (202) 452-9200
Dir: (202) 416-0241
www.ayreslawgroup.com

> On Nov 24, 2014, at 10:40 AM, Mullins, Charles <Charles.Mullins@nrc.gov> wrote:
>
> Ok. While we are at it, if you guys have anything to suggest for the Record, I would appreciate a head's up so I can take a look at it before we speak.
>
> **From:** John Bernetich [mailto:bernetichj@ayreslawgroup.com]
> **Sent:** Monday, November 24, 2014 10:38 AM
> **To:** Mullins, Charles
> **Subject:** Re: My current view of the Record
>
> Chuck: just to confirm, we'll await your call at 2pm this afternoon.
>
> Thanks,
> John
>
> --
>
> John Bernetich
> Associate Attorney
> Ayres Law Group LLP
> Ph: (202) 452-9200
> Dir: (202) 416-0241
> www.ayreslawgroup.com
>
> > On Nov 21, 2014, at 5:04 PM, Mullins, Charles <Charles.Mullins@nrc.gov> wrote:
> >
> > I will do my best to be available then. I will let you know if