



Pacific Gas and  
Electric Company®

Barry S. Allen  
Vice President, Nuclear Services

Diablo Canyon Power Plant  
Mail Code 104/6  
P. O. Box 56  
Avila Beach, CA 93424

805.545.4888  
Internal: 691.4888  
Fax: 805.545.6445

August 6, 2015

PG&E Letter DCL-15-093

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

10 CFR 50.46

Docket No. 50-275, OL-DPR-80  
Docket No. 50-323, OL-DPR-82  
Diablo Canyon Units 1 and 2  
10 CFR 50.46 Annual Report of Emergency Core Cooling System Evaluation  
Model Changes for Peak Cladding Temperature for 2014

Dear Commissioners and Staff:

Pursuant to 10 CFR 50.46, "Acceptance criteria for emergency core systems for light-water nuclear power reactors," the enclosure to this letter is the annual report of changes in the Westinghouse emergency core cooling system evaluation models that affect peak cladding temperature (PCT) calculations for Pacific Gas and Electric Company's (PG&E's) Diablo Canyon Power Plant, Units 1 and 2. The attachments to the enclosure provide a summary of the PCT margin allocations and their bases.

PG&E will complete a reanalysis for both Units 1 and 2 using the Westinghouse FULL SPECTRUM™ loss-of-coolant accident (FSLOCA™) methodology and provide the updated PCT results to the NRC by December 2018. This is a change to a previous regulatory commitment (as defined in NEI 99-04) made in PG&E Letter DCL-13-111, "Thirty-Day Notification Report of Significant Emergency Core Cooling System Evaluation Model Changes That Affect Peak Cladding Temperature," dated November 14, 2013, in which PG&E committed to complete the best estimate large break loss-of-coolant accident reanalysis for Units 1 and 2 and provide the updated PCT results to the NRC by December 2016. The reason for the change in commitment date is the current schedule for NRC approval of the methodology required to address fuel thermal conductivity degradation.

If you have questions regarding this submittal please contact Mr. Mark Sharp at 805-545-3031.

Sincerely,

Barry S. Allen



Document Control Desk  
August 6, 2015  
Page 2

PG&E Letter DCL-15-093

dqmg/6192/50795995

Enclosure

cc/enc: Marc L. Dapas, NRC Region IV Administrator  
Siva P. Lingam, NRR Project Manager  
John P. Reynoso, Acting NRC Senior Resident Inspector  
Diablo Distribution

**ANNUAL REPORT OF EMERGENCY CORE COOLING SYSTEM EVALUATION  
MODEL CHANGES FOR PEAK CLADDING TEMPERATURE**

Pursuant to 10 CFR 50.46, this enclosure provides an annual report of changes in the Westinghouse emergency core cooling system (ECCS) evaluation models that affect peak cladding temperature (PCT) calculations for Pacific Gas and Electric Company's (PG&E's) Diablo Canyon Power Plant (DCPP), Units 1 and 2. This report is based on changes described in Westinghouse Letter LTR-LIS-15-42, "Diablo Canyon Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2014," dated February 19, 2015.

Attachment A contains Unit 1 small-break loss-of-coolant accident (SBLOCA) and best-estimate, large-break loss-of-coolant accident (BELOCA) PCT Margin Utilization sheets. Attachment B contains the corresponding Unit 2 data. There have been no changes in the SBLOCA PCT or BELOCA PCT results for either Units 1 or 2 since the last annual update. The last annual update was provided in PG&E Letter DCL-14-070, "10 CFR 50.46 Annual Report of Emergency Core Cooling System Evaluation Model Changes for Peak Cladding Temperature for 2013," dated August 7, 2014.

The net PCT values are listed below for each unit. Two PCT values are reported for the Unit 1 BELOCA results. The two BELOCA PCT values are labeled Reflood 1 and Reflood 2, as they represent the two distinctive PCT peaks that occur during the reflood phase for the Unit 1 BELOCA code qualification document methodology. The Unit 2 BELOCA reports only one PCT value consistent with the BELOCA ASTRUM methodology.

**SBLOCA**

**BELOCA**

**Reflood 1**

**Reflood 2**

Unit 1: 1391°F (no change)	2049°F (no change)	2124°F (no change)
Unit 2: 1288°F (no change)		2125°F (no change)

The PCT values remain within the 2200°F limit specified in 10 CFR 50.46. However, because Units 1 and 2 BELOCA have a total PCT margin allocation that is currently greater than 50°F, PG&E had proposed to complete a BELOCA reanalysis and provide the updated PCT results for both Units 1 and 2 to the NRC by December 2016, as stated in PG&E Letter DCL-13-111, "Thirty-Day Notification Report of Significant Emergency Core Cooling System Evaluation Model Changes That Affect Peak Cladding Temperature," dated November 14, 2013. However, in order to schedule compliance with methodology changes to address fuel Thermal Conductivity Degradation, PG&E will complete a reanalysis of both Units 1 and 2 using the Westinghouse FULL SPECTRUM™ loss-of-coolant accident (FSLOCA™) methodology and provide the updated PCT results to the NRC by December 2018.



# DCPP UNIT 1 PEAK CLADDING TEMPERATURE MARGIN UTILIZATION

## SMALL-BREAK LOCA

## PG&E Letter<sup>1</sup>

A.	ANALYSIS OF RECORD	PCT =	1391°F	DCL-09-057
B.	PRIOR 10 CFR 50.46 ECCS MODEL ASSESSMENTS <sup>2</sup>			
1.	None	$\Delta$ PCT =	0°F	
C.	10 CFR 50.46 ECCS MODEL ASSESSMENTS THIS YEAR			
1.	None	$\Delta$ PCT =	0°F	
D.	SUM OF 10 CFR 50.46 CHANGES			
1.	Net Sum of 10 CFR 50.46 PCT Changes	$\Delta$ PCT =	0°F	
2.	Absolute Sum of 10 CFR 50.46 PCT Changes	$\Delta$ PCT =	0°F	
E.	Analysis of Record PCT (Line A) + Line D.1 Net Sum of 10 CFR 50.46 PCT Changes		1391°F	

The sum of the PCT from the most recent analysis of record using an acceptable evaluation model and the estimates of the net PCT effect for changes and errors identified since this analysis remains less than 2200°F.

<sup>1</sup> For those issues that have been previously reported under 10 CFR 50.46, a PG&E letter number is listed.

<sup>2</sup> Only permanent assessments of PCT margin are included. Temporary PCT allocations that address current LOCA model issues are not considered with respect to 10 CFR 50.46 reporting requirements.

## DCPP UNIT 1 PEAK CLADDING TEMPERATURE MARGIN UTILIZATION

### BELOCA

### PG&E Letter<sup>1</sup>

	Reflood 1	Reflood 2	
A. ANALYSIS OF RECORD	1900°F	1860°F	DCL-05-146
	<u>ΔPCT</u>	<u>ΔPCT</u>	
B. PRIOR 10 CFR 50.46 ECCS MODEL ASSESSMENTS <sup>2</sup>			
1. Revised blowdown heatup uncertainty distribution.	5°F	5°F	DCL-05-086
2. HOTSPOT Fuel Relocation Error	10°F	0°F	DCL-07-071
3. Replacement Steam Generators	75°F	71°F	DCL-09-057
4. 230 kV Degraded Voltage Event	0°F	39°F	DCL-11-082
5. Performance and Design (PAD) 4.0 Implementation	-118°F	-118°F	DCL-12-102
6. Fuel Thermal Conductivity degradation (TCD) and Peaking Factor Burndown	133°F	238°F	DCL-12-102
7. Revised Heat Transfer Multiplier Distributions	5°F	-35°F	DCL-13-111
8. Changes to Grid Blockage and Porosity	24°F	24°F	DCL-13-111
C. 10 CFR 50.46 ECCS MODEL ASSESSMENTS THIS YEAR			
1. Error in Burst Strain Application	15°F	40°F	DCL-14-070
D. SUM OF 10 CFR 50.46 CHANGES			
1. Net Sum of PCT Changes	149°F	264°F	
2. Absolute Sum of PCT Changes	385°F	570°F	
E. Analysis of Record PCT (Line A) + Line D.1 Net Sum of 10 CFR 50.46 PCT Changes	2049°F	2124°F	

The sum of the PCT from the most recent analysis of record using an acceptable evaluation model and the estimates of the net PCT effect for changes and errors identified since this analysis remains less than 2200°F.

- <sup>1</sup> For those issues that have been previously reported under 10 CFR 50.46, a PG&E letter number is listed.
- <sup>2</sup> Only permanent assessments of PCT margin are included. Temporary PCT allocations that address current LOCA model issues are not considered with respect to 10 CFR 50.46 reporting requirements.

## DCPP UNIT 2 PEAK CLADDING TEMPERATURE MARGIN UTILIZATION

### SBLOCA

### PG&E Letter<sup>1</sup>

A.	ANALYSIS OF RECORD	PCT =	1288°F	DCL-08-061
B.	PRIOR 10 CFR 50.46 ECCS MODEL ASSESSMENTS <sup>2</sup>			
	1. None	$\Delta$ PCT =	0°F	
C.	10 CFR 50.46 ECCS MODEL ASSESSMENTS THIS YEAR			
	1. None	$\Delta$ PCT =	0°F	
D.	SUM OF 10 CFR 50.46 CHANGES			
	1. Net Sum of 10 CFR 50.46 PCT Changes	$\Delta$ PCT =	0°F	
	2. Absolute Sum of 10 CFR 50.46 PCT Changes	$\Delta$ PCT =	0°F	
E.	<b>Analysis of Record PCT (Line A) + Line D.1 Net Sum of 10 CFR 50.46 PCT Changes</b>		1288°F	

The sum of the PCT from the most recent analysis of record using an acceptable evaluation model and the estimates of the net PCT effect for changes and errors identified since this analysis remains less than 2200°F.

<sup>1</sup> For those issues that have been previously reported under 10 CFR 50.46, a PG&E Letter number is listed.

<sup>2</sup> Only permanent assessments of PCT margin are included. Temporary PCT allocations that address current LOCA model issues are not considered with respect to 10 CFR 50.46 reporting requirements.

## DCPP UNIT 2 PEAK CLADDING TEMPERATURE MARGIN UTILIZATION

### BELOCA

### PG&E Letter<sup>1</sup>

A.	ANALYSIS OF RECORD	PCT=	1872°F	DCL-07-071
B.	PRIOR 10 CFR 50.46 ECCS MODEL ASSESSMENTS <sup>2</sup>			
	1. HOTSPOT Fuel Relocation Error	$\Delta$ PCT=	0°F	DCL-07-071
	2. 230 kV Degraded Voltage Event	$\Delta$ PCT=	16°F	DCL-11-082
	3. Fuel TCD and Peaking factor Burndown	$\Delta$ PCT=	209°F	DCL-12-102
	4. Revised Heat Transfer Multiplier Distribution	$\Delta$ PCT=	-17°F	DCL-13-111
	5. Changes to Grid Blockage and Porosity	$\Delta$ PCT=	24°F	DCL-13-111
C.	10 CFR 50.46 ECCS MODEL ASSESSMENTS THIS YEAR			
	1. Error in Burst Strain Application	$\Delta$ PCT=	21°F	DCL-14-070
D.	SUM OF 10 CFR 50.46 CHANGES			
	1. Net Sum of 10 CFR 50.46 PCT Changes	$\Delta$ PCT=	253°F	
	2. Absolute Sum of 10 CFR 50.46 PCT Changes	$\Delta$ PCT=	287°F	
E.	Analysis of Record PCT (Line A) + Line D.1 Net Sum of 10 CFR 50.46 PCT Changes		2125°F	

The sum of the PCT from the most recent analysis of record using an acceptable evaluation model and the estimates of the net PCT effect for changes and errors identified since this analysis remains less than 2200°F.



- <sup>1</sup> For those issues that have been previously reported under 10 CFR 50.46, a PG&E letter number is listed.
- <sup>2</sup> Only permanent assessments of PCT margin are included. Temporary PCT allocations that address current LOCA model issues are not considered with respect to 10 CFR 50.46 reporting requirements.