UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 16, 2017

Mr. Edward D. Halpin
Senior Vice President, Generation
and Chief Nuclear Officer
Pacific Gas and Electric Company
Diablo Canyon Power Plant
P.O. Box 56, Mail Code 104/6
Avila Beach, CA 93424

SUBJECT: DIABLO CANYON POWER PLANT, UNITS 1 AND 2 – CORRECTION LETTER REGARDING AMENDMENT NOS. 230 AND 232 TO ADOPT ALTERNATIVE SOURCE TERM (CAC NOS. MF6399 AND MF6400)

Dear Mr. Halpin:

By letter dated April 27, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17012A246), the U.S. Nuclear Regulatory Commission (NRC, the Commission), issued Amendment No. 230 to Facility Operating License (FOL) No. DPR-80 and Amendment No. 232 to FOL No. DPR-82 for Diablo Canyon Power Plant (DCPP), Units 1 and 2, respectively. The amendments revised the licensing bases to adopt alternative source term as allowed by Title 10 of the *Code of Federal Regulations* Section 50.67, "Accident source term," and approved the methodology for evaluating radiological consequences of design-basis accidents as described in Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000 (ADAMS Accession No. ML003716792).

By e-mail dated May 3, 2017, Mr. Michael Richardson of Pacific Gas and Electric Company identified the following typographical errors in Tables 3.3-1 and 3.3-4 on pages 63 and 65 of the safety evaluation (SE) (Enclosure 3 to the letter dated April 27, 2017).

- Typographical error in Table 3.3-1 in the value of the total effective dose equivalent for a loss-of-coolant accident and associated footnote.
- Typographical errors in Table 3.3-4 in the values for average internal weighted gas space venting rate to atmosphere from 7,200 to 183,289 seconds.

During the review, the NRC staff identified the following additional errors on pages 65, 87, and 89 of the SE:

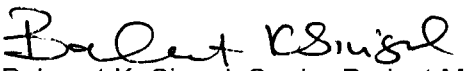
- On page 65, footnotes 8 and 9 inadvertently got deleted in the final version of the SE.
- Footnotes 10 and 11 on pages 87 and 89 got renumbered as a result of deletion of footnotes 8 and 9.

The NRC staff determined that the errors were inadvertently introduced during the preparation of the license amendments and are entirely typographical in nature. The corrections do not change any of the conclusions in the SE associated with the amendments and do not affect the associated notice to the public.

Enclosure to this letter contains corrected SE pages 63, 65, 87, and 89. Please use these pages to replace corresponding pages issued by Amendment Nos. 230 and 232 for DCPP, Units 1 and 2.

If you have any questions, please contact me at 301-415-3016 or via e-mail at Balwant.Singal@nrc.gov.

Sincerely,



Balwant K. Singal, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-275 and 50-323

Enclosure:
Corrected SE pages 63, 65, 87, and 89

cc w/encl: Distribution via Listserv

SUBJECT: DIABLO CANYON POWER PLANT, UNITS 1 AND 2 – CORRECTION LETTER REGARDING AMENDMENT NOS. 230 AND 232 TO ADOPT ALTERNATIVE SOURCE TERM (CAC NOS. MF6399 AND MF6400) DATED MAY 16, 2017

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ENCLOSURE

CORRECTED SAFETY EVALUATION PAGES FOR AMENDMENT NOS. 230 AND 232 TO FACILITY OPERATING LICENSE NOS. DPR-80 AND DPR-82 DATED APRIL 27, 2017

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-275 AND 50-323

Table 3.3-1 Total Effective Dose Equivalent per Accident in Roentgen Equivalent Man (rem)					
Accident	**EAB**	**LPZ**	**SRP 15.0.1 and RG 1.183 Limit**	**Control Room**	**10 CFR 50.67 and GDC 19, 1999 Limit**
Loss-of-Coolant Accident	5.6	1	25	3.7[3]	5
Fuel Handling Accident in Fuel Handling Building	1.0	0.1	6.3	1.0	5
Fuel Handling Accident in Containment	1.0	0.1	6.3	4.3	5
Locked Rotor Accident	0.5	0.1	2.5	1.7	5
Control Rod Ejection Accident Containment Release Secondary Release	 0.7 0.7	 0.3 0.2	 6.3 6.3	 3.4 0.5	 5 5
Main Steam Line Break Pre-incident Iodine Spike Accident Initiated Iodine Spike	 0.1 0.7	 <0.1 0.2	 25 2.5	 2.0 4.1	 5 5
Steam Generator Tube Rupture Pre-incident Iodine Spike Accident Initiated Iodine Spike	 1.3 0.7	 0.1 <0.1	 25 2.5	 0.6 0.3	 5 5
Loss of Load Pre-incident Iodine Spike Accident Initiated Iodine Spike	 <0.1 <0.1	 <0.1 <0.1	 2.5 2.5	 <0.1 <0.1	 5 5

[3] The total control room dose due to occupancy is 3.7 rem, which includes the dose due to direct shine of 0.7 rem, and dose due to ingress/egress to control room of 0.037 rem

Table 3.3-4 LOCA MEDT Iodine Release Fraction and Gas Venting Rate to Atmosphere			
From Time	To Time	Iodine Release Fraction to Atmosphere	Average Interval Weighted Gas Space Venting Rate to Atmosphere
Seconds	Seconds	Fraction $I_{released}/I_{entering}$[6]	Fraction V_{MEDT}/ day[7]
829	7,200	4.521E-07	5.024E+00
7,200	28,800	1.386E-08	3.024E-02
28,800	86,400	2.362E-07	3.324E-01
86,400	183,289	3.950E-07	6.497E-00
183,289	345,600	1.236E-02[8]	Foot Note[9]
345,600	752,400	2.028E-02[8]	Foot Note[9]
752,400	1,530,000	2.390E-02[8]	Foot Note[9]
1,530,000	2,592,000	2.166E-02[8]	Foot Note[9]

Table 3.3-5 LOCA Assumptions	
Parameter	**Value**
Core power level (105% of rated power of 3411 MWt)	3580 MWt
Fuel release fractions	Per RG 1.183
Fuel release timing	Gap Onset: 30 seconds Gap Duration: 0.5 hours Early in Vessel Onset: 0.5 hours Early in Vessel Duration: 1.3 hours
Chemical form of Iodine released from fuel to containment atmosphere	4.85% Elemental 95% Particulate 0.15% Organic
Chemical form of Iodine released from RCS and sump water	97% Elemental 3% Organic
Containment Vacuum/Pressure Relief Parameters	
Minimum containment free volume	2.550E+06 ft^3
Chemical form of iodine released	97% Elemental 3% Organic
Maximum RCS flash fraction after LOCA	Noble Gases 100% Halogens 40%
Maximum Containment Pressure Relief Line Air Flow Rate	218 actual cfs
Maximum duration of release via containment pressure relief line	13 seconds

[6] $I_{released}$ is the total iodine mass released to atmosphere during the specified time interval in grams. $I_{entering}$ is the total iodine mass entering the MEDT during the specified time interval in grams.

[7] Fraction V_{MEDT} is the rate of fractional MEDT gas volume vented during the specified time interval.

[8] The iodine release fractions after spillover assume instantaneous release of iodine to the environment without holdup in the room.

[9] After the MEDT overflows at 183,289 seconds, the gas venting rates are 2640 cfm from the equipment drain receiver tank room and 1760 cfm from the Unit 1/Unit 2 pipe tunnels.

Section 1 of the Enclosure to letter dated June 17, 2015 provides the following description of the revised source terms.

> The AST methodology as established in Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000, [Reference 3 of the letter] is used to calculate the offsite and Control Room radiological consequences for DCPP Units 1 and 2. Attachment 4 [to the Enclosure of letter dated June 17, 2015] contains a summary of the analyses and results for the following events that are expected to produce the most limiting dose consequences. Conformance to RG 1.183 is provided in Attachment 5 [to the Enclosure of letter dated June 17, 2015].
>
> - Loss of Coolant Accident (LOCA)
> - FHA in the Containment
> - FHA in the FHB
> - Locked Rotor Accident (LRA)
> - Control Rod Ejection Accident (CREA)
> - Main Steam Line Break (MSLB)
> - Steam Generator Tube Rupture (SGTR)
> - Loss-of-Load (LOL) Event

During the audit, the NRC staff reviewed Westinghouse Electric Company LLC (WEC) topical report WCAP-16638-P, Revision 1, "Diablo Canyon Units 1 and 2 Replacement Steam Generator Program NSSS [Nuclear Steam Supply System] Licensing Report," dated January 2008[10] and WCAP-16985, Revision 2, "Diablo Canyon Units 1 and 2 T_{avg} and T_{feed} Ranges Program NSSS Engineering Report," dated April 2009[10] to gain a detailed understanding of the design parameters used for the thermal analysis for the AST. WCAP-16638-P documents the technical basis for the SG replacements for Unit 1 prior to Cycle 16 and Unit 2 prior to Cycle 15. WCAP-16638P, for the SG replacement was implemented under the 10 CFR 50.59 process. WCAP-16638P and WCAP-16985, for the SG replacement, provided a frame of reference for the changes to the assumed parameters for the thermal hydraulics of the AST. The assumptions and bases that were employed for the SG replacement analysis were reviewed during the regulatory audit (Regulatory Audit Report dated March 14, 2016; ADAMS Accession No. ML16063A170).

The NRC staff reviewed the FSARU Chapter 15 accident analyses contained in WCAP-16638P, which includes Large-Break LOCA, Small-Break LOCA, LOL, MSLB, LRA, and SGTR. The NRC staff reviewed these Chapter 15 accident analyses to determine the computer codes used for each analysis.

The NRC staff reviewed various calculation notes for different Chapter 15 events, such as MSLB, SGTR, LOL, LRA, and CREA. Various thermal hydraulic parameters were of interest for each event, and are listed below.

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[10] Document reviewed during the audit from January 12-14, 2016, is a plant specific document and is not publicly available.

Steam Releases and Thermal Hydraulic Input Parameters (MSLB/SGTR)[11]. The notes on why the change occurred are captured in the MSLB section.

The initial SG liquid mass changed for both the intact and faulted SG. The intact changed from 118,500 lbm to 89,707 lbm and the faulted changed from 106,000lbm to 89,707 lbm. The changes are captured in the specific calculational note. For the ruptured opened power operated relief valve phase, the average was taken from the RETRAN outputs and rounded down to increase the Iodine inventory in the SG liquid.

The steam flow rate to condenser from the ruptured SG and intact SG before trip did not change as the value is from the nominal full power steam flow rate (63,000 lbm/min).

The steam releases from ruptured SG and intact SGs vary over break time. The values change over the break time however there was no change from the CLB to the AST values.

The post-accident minimum SG liquid mass changed for the ruptured SG and intact SG. For the ruptured SG, the liquid mass went from 106,000 lbm to 89,707 lbm. The CLB for ruptured SGs is an average of initial mass and initial stuck open ADV phase. The smaller mass is conservative to increase the iodine activity for the dose consequences. The intact SGs changed from 118,500 lbm/SG to 89,707 lbm/SG. These changes were found in the appropriate calculational notes that were reviewed during the audit. The minimum mass is the initial mass of the SG following the reactor trip.

The tube leakage rate is the same as the MSLB.

The break flow from the RCS into ruptured SG values are similar to the steam releases from the ruptured SG and intact SG. The results of the analysis were consistent between the calculational notes and license amendment.

The NRC staff has reviewed the calculational notes pertaining to the SGTR analysis. The NRC staff determined that the changes made to the SGTR analysis based on the proposed AST to be conservative, and thus acceptable.

3.7.2.2.3 Loss-of-Load

The thermal hydraulic parameters of interest for LOL are the RCS mass, primary to secondary SG tube leakage, initial and minimum SG liquid mass, and steam releases.

The RCS mass changed from 499,500 lbm to 446,486 lbm and the change was documented in the calculational note. The notes are captured in the MSLB notes.

The tube leakage rate is the same as the MSLB.

The intact SGs change from 81,500 lbm/SG to 92,301 lbm/SG. The faulted SG was captured in the calculational notes. The mass of the SGs are rounded up and an uncertainty was added based on WEC assumptions to add conservatisms. For the intact SGs, the masses were

[11] Document reviewed during the audit from January 12-14, 2016.