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PG&E Letter DCL-11-122

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

10 CFR 50, App. H

Docket No. 50-275, OL-DPR-80  
Diablo Canyon Unit 1  
Revision to the Unit 1 Reactor Vessel Material Surveillance Program Withdrawal  
Schedule

Dear Commissioners and Staff:

Pursuant to 10 CFR 50, Appendix H, Section III.B.3, Pacific Gas and Electric Company (PG&E) hereby requests approval for a revision to the Unit 1 reactor vessel material surveillance program withdrawal schedule.

The Unit 1 reactor material surveillance program withdrawal schedule is provided in the Diablo Canyon Power Plant (DCPP) Final Safety Analysis Report Update (FSARU) Table 5.2-22 and in the DCPP License Renewal Application (LRA), Appendix B2.1.15, Reactor Vessel Surveillance Aging Management Program. The NRC approved withdrawal schedule for Capsule B is during the Unit 1 Seventeenth Refueling Outage (1R17) and is cited in the Safety Evaluation Report Related to the License Renewal of Diablo Canyon Nuclear Power Plant. DCPP is currently operating in Cycle 17 and 1R17 is scheduled for May 2012.

EPRI MRP-326, Draft E, "Materials Reliability Program: Coordinated PWR Reactor Vessel Surveillance Program, (CRVSP)", has recommended that Diablo Canyon Unit 1 delay the removal and testing of Capsule B until approximately twice the 60-year fluence. This is estimated to occur during the Unit 1 Twenty Third Refueling Outage (1R23), which is scheduled for May 2022. The recommended delay has been proposed to support data acquisition for the EPRI CRVSP.

Therefore, PG&E requests revision to the Unit 1 reactor vessel material surveillance program withdrawal schedule to allow withdrawal of Capsule B during 1R23.

DCPP has withdrawn and tested three capsules from Unit 1 that meet the three recommendations of ASTM E 185-70 and the approved supplemental surveillance capsule withdrawal changes listed in NRC staff Safety Evaluation dated September 4, 1992. The withdrawal and testing of Capsule V during the Unit 1 Eleventh Refueling Outage fulfilled the third and final recommendation of



ASTM E 185-70 for the current DCPD Unit 1 operating license. Therefore, the proposed delayed removal of Capsule B does not deviate from DCPD's current reactor vessel materials surveillance program requirements. DCPD installed the Unit 1 Capsule B in the vessel in the Unit 1 Fifth Refueling Outage at a vessel exposure of 5.86 effective full power years (EFPY). The change in withdrawal schedule allows Capsule B to be withdrawn at a fluence of approximately 93.9 EFPY for the reactor pressure vessel. This will provide reactor pressure vessel fluence data for the period of extended operation for license renewal.

Enclosure 1 provides a description and assessment of the proposed change to the reactor vessel material surveillance program withdrawal schedule. Enclosure 2 provides a mark-up of the affected DCPD FSARU page. If the request to defer is approved, the DCPD LRA will be updated in the 2012 annual update, in accordance with 10 CFR 54.21(b).

To support implementation of the revised withdrawal schedule, PG&E requests approval of this proposed change by December 31, 2011. The request for fast turnaround is to assure that PG&E will have adequate time to mobilize the required special resources and to secure support for machining, repair, and replacement of the stuck cap on the Unit 1 surveillance coupon "B" if the request to defer is denied.

PG&E makes commitments to revise DCPD FSARU Table 5.2-22 to incorporate the change within 60 days of the NRC approval and update the DCPD LRA in the 2012 annual update upon staff approval of this deferral.

If you have any questions, please contact Mr. Tom Baldwin at (805) 545-4720.

Sincerely,

James R. Becker  
*Site Vice President*

rnrt/4231

Enclosures

cc:

Diablo Distribution

cc/enc:

Elmo E. Collins, NRC Regional Administrator, Region IV

Nathanial B. Ferrer, NRC Project Manager, License Renewal

Michael S. Peck, NRC Senior Resident Inspector

Alan B. Wang, NRC Project Manager, Nuclear Reactor Regulation

## DESCRIPTION AND ASSESSMENT

### 1.0 BACKGROUND

Appendix H to 10 CFR 50 requires a material surveillance program to monitor changes in the fracture toughness properties of ferritic material in the reactor vessel beltline region that result from exposure of these materials to neutron irradiation and the thermal environment. Under this program, fracture toughness test data are obtained and analyzed from material specimens exposed in surveillance capsules that are withdrawn periodically from the reactor vessel. Test results must be reported to the NRC within one year of the date of the capsule withdrawal. In addition, Section III.B.3 of Appendix H to 10 CFR 50 requires the NRC to approve the capsule withdrawal schedule prior to implementation.

The design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of ASTM E 185 that is current on the issue date of the ASME Code to which the reactor vessel was purchased. The ASTM E 185 version of record for Diablo Canyon Power Plant (DCPP) Unit 1 is ASTM E 185-70. A Unit 1 supplemental reactor vessel surveillance capsule program schedule was requested by DCPP in Pacific Gas and Electric Company (PG&E) Letter DCL-92-072, dated March 31, 1992. The NRC approved this program in a letter to PG&E dated September 4, 1992, "Evaluation of Diablo Canyon Unit 1 Supplemental Reactor Vessel Radiation Surveillance Program (TAC No. M83285)."

The schedule to withdraw Capsule B during the Unit 1 Seventeenth Refueling Outage (1R17) was requested by DCPP in PG&E Letter DCL-10-141, dated October 25, 2010. The NRC approved this schedule revision by letter to PG&E dated October 29, 2010, "Diablo Canyon Power Plant, Unit No. 1 – Approval of Proposed Reactor Vessel Material Surveillance Program Withdrawal Schedule (TAC No. ME4924)." However, PG&E requests approval to defer this schedule to the Unit 1 Twenty Third Refueling Outage (1R23) as recommended in EPRI MRP-326, Draft E, "Materials Reliability Program: Coordinated PWR Reactor Vessel Surveillance Program, (CRVSP)." The objective of the CRVSP is to manage the withdrawal schedules of remaining pressurized water reactor (PWR) surveillance capsules to increase the fluence levels of the capsules at withdrawal and to fill the high fluence irradiated Charpy data gaps in the PWR surveillance capsule database that is used to develop embrittlement correlations.

## 2.0 DESCRIPTION OF CHANGES TO THE REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM WITHDRAWAL SCHEDULE

The Unit 1 Reactor Material Surveillance Program withdrawal schedule is located in the DCCP Final Safety Analysis Report Update (FSARU). The proposed change revises the schedule to change the removal time for Capsule B from 23.2 effective full power years (EFPY) to 33 EFPY.

Unit 1 Capsule B was installed in the vessel in the Unit 1 Fifth Refueling Outage at a vessel exposure of 5.86 EFPY per FSARU Table 5.2-22. The lead factor for Capsule B at the 40 degree location is 3.46 per FSARU Table 5.2-22. The equivalent exposure on Capsule B at its withdrawal during 1R23 is projected to be  $(33 - 5.86) \times 3.46 = 93.9$  EFPY.

## 3.0 ANALYSIS

### 10 CFR Part 50

The staff approved the revised capsule withdrawal schedule of 1R17 in its safety evaluation dated October 29, 2010. The staff concluded that removing Surveillance Capsule B during the seventeenth refueling outage will meet the expectations of NUREG-1801 and the requirements of 10 CFR Part 50, Appendix H. PG&E is requesting approval to defer this surveillance until 1R23 to support data acquisition for the EPRI CRVSP.

### 10 CFR Part 54

PG&E submitted its License Renewal Application for DCCP Unit 1 and 2 in PG&E Letter DCL-09-079, dated November 23, 2009. In the Safety Evaluation Report (SER) Related to the License Renewal of Diablo Canyon Nuclear Power Plant, June 2, 2011, the staff reviewed the DCCP aging management programs using the expectations of NUREG-1801, Revision 1. The staff concluded the Reactor Vessel Surveillance Program demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

The SER concluded the equivalent EFPY value is just over one times the end of license extended (EOLE) reactor vessel fluence (54 EFPY), this meets the expectations of NUREG-1801, Revision 1, XI.M31, Criterion 6. The proposed equivalent exposure on Capsule B is projected to be 93.9 EFPY, exceeding the 60-year fluence of NUREG-1801, Revision 1, XI.M31, Criterion 6. Criterion 7 allows the use of alternative dosimetry to monitor neutron fluence as part of the aging management program for

reactor vessel neutron embrittlement. Unit 1 and Unit 2 are equipped with ex-vessel dosimetry to monitor neutron fluence. Therefore, the exposure of 93.9 EFPY is consistent with the expectations of NUREG-1801, Revision 1.

A removal time of 33 EFPY for Capsule B, corresponding to 93.9 EFPY will also continue to satisfy the expectations of NUREG-1801, Revision 2, which is to have a capsule with fluence exposure between one and two times the peak reactor vessel wall neutron fluence at the end of the period of license extension fluence (93.9 EFPY fluence).

The DCP Unit 2 surveillance capsule withdrawal program currently meets the expectations of NUREG-1801; therefore, no changes in the DCP Unit 2 surveillance capsule withdrawal program are needed.

#### 4.0 REFERENCES

1. Code of Federal Regulations, Title 10, Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."
2. American Society of Testing and Materials, "Standard Recommended Practice for Surveillance Tests for Nuclear Reactor Vessels," ASTM E 185-70.
3. Diablo Canyon Final Safety Analysis Report Update (FSARU), Revision 19, May 2010.
4. NUREG-1801, "Generic Aging Lessons Learned (GALL)," Revision 1, 2005.
5. NUREG-1801, "Generic Aging Lessons Learned (GALL)." Revision 2, 2010.
6. PG&E Letter DCL-09-079, "License Renewal Application," dated November 23, 2009.
7. EPRI MRP-326, "Materials Reliability Program: Coordinated PWR Reactor Vessel Surveillance Program (CRVSP)," Draft E, dated October 2011.
8. "Safety Evaluation Report Related to the License Renewal of Diablo Canyon Nuclear Power Plant, Units 1 and 2," dated June 2, 2011.



MARK-UP of FSARU TABLE 5.2-22

REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM  
WITHDRAWAL SCHEDULE

UNIT 1			
<u>Capsule<sup>(f)(g)</sup></u>	<u>Location</u>	<u>Lead Factor<sup>(d)</sup></u>	<u>Removal Time (EFPY)<sup>(a)</sup></u>
S	320°	3.46	1.25 (Tested, 1R1)
Y	40°	3.44	5.86 (Tested, 1R5)
T	140°	3.44	5.86 (Removed, 1R5)
Z	220°	3.44	5.86 (Removed, 1R5)
V	320°	2.26	14.3 (Tested 1R11)
C <sup>(b)</sup>	140°	3.46	15.9 (Removed 1R12)
D <sup>(b)</sup>	220°	3.46	15.9 (Removed 1R12)
B <sup>(b)</sup>	40°	3.46	<del>23.2</del> 33 (1R23)
A <sup>(b)</sup>	184°	1.31	Standby
U	356°	1.28	Standby
X	176°	1.28	Standby
W	4°	1.28	Standby
UNIT 2			
<u>Capsule</u>	<u>Location</u>	<u>Lead Factor<sup>(d)</sup></u>	<u>Removal Time (EFPY)<sup>(a)</sup></u>
U	56°	5.15	1.02 (Tested, 2R1)
X	236°	5.40	3.16 (Tested, 2R3)
Y	238.5°	4.58	7.08 (Tested, 2R6)
W <sup>(e)</sup>	124°	5.26	11.49 (Removed, 2R9)
V <sup>(e)</sup>	58.5°	4.58	11.49 (Tested, 2R9)
Z <sup>(e)</sup>	304°	5.26	11.49 (Removed, 2R9)

- (a) Approximate full power years from plant startup  
 (b) Four supplemental capsules installed at 5.86 EFPY (EOC5)  
 (c) Deleted in Revision 16  
 (d) Approximate lead factors taken from WCAP-15958 (Rev. 0) and WCAP-15423 (Rev. 0) for Units 1 and 2, respectively  
 (e) EFPY for Unit 2 capsules removed in 2R9; W = 60.4, V = 52.6, and Z = 60.4  
 (f) Unit 1 capsules T, U, W, X, and Z are Type 1 (base metal only)  
 (g) Unit 1 capsules S, V, and Y are Type 2 (base metal and weld)