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PG&E Letter DCL-06-069

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

Docket No. 50-323, OL-DPR-82
Diablo Canyon Power Plant Unit 2
Residual Heat Removal Weld RB-119-11 - Flaw Analytical Evaluation Results

Dear Commissioners and Staff:

In accordance with ASME Code 1989 Edition, Section XI, paragraph IWC-3125(b), "Review by Authorities," enclosed are the results of the analytical evaluation of a flaw detected at Diablo Canyon Power Plant Unit 2 in Class 2 residual heat removal (RHR) Weld RB-119-11. The weld is in RHR Line 119, the outlet line for RHR Heat Exchanger 2-2. ASME Code, Section XI, paragraph IWC-3122.4, allows analytical evaluation in lieu of repair or replacement of flaws that do not meet the acceptance requirements of ASME Code, Section XI, Table IWC-3410-1. Pacific Gas and Electric Company (PG&E) performed the analytical evaluation in accordance with ASME Code, Section XI, Class 1 criteria of paragraph IWB-3600, and verified that the flaw meets the acceptance criteria of ASME Code, Section XI, IWB-3640, for continued service for austenitic stainless steel welds.

As a result of the indication found in Weld RB-119-11, additional examinations were performed in accordance with IWC-2430. No additional indications were found.

PG&E makes no regulatory commitments or revisions to regulatory commitments in this letter.

If you have any questions or require additional information, please contact Stan Ketelsen at (805) 545-4720.

Sincerely,


Donna Jacobs

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jer/3664
Enclosure

cc: Terry W. Jackson
Bruce S. Mallett
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cc/enc: Alan B. Wang

Residual Heat Removal Weld RB-119-11 - Flaw Analytical Evaluation Results

System and Component Description

During a routine inservice inspection on April 12, 2006, Pacific Gas and Electric Company (PG&E) identified a circumferential flaw in Weld RB-119-11 in Diablo Canyon Power Plant (DCPP) Unit 2 Residual Heat Removal (RHR) Line 119. Weld RB-119-11 does not meet the acceptance requirements of ASME Code, Section XI, Table IWB-3514-2, and thus does not meet Table IWC-3410-1 requirements. Additional examinations, as required by IWC-2430, were performed with no additional indications found.

RHR Line 119, the outlet line for RHR Heat Exchanger 2-2, is an ASME Class 2, 8 inch Schedule 40S pipe fabricated from ASTM A312 Type 304 stainless steel. Its nominal outer diameter is 8.625 inches and its nominal wall thickness is 0.322 inches. Weld RB-119-11 was fabricated using the gas tungsten arc welding process. The flaw was determined to be 0.832 inches long and 0.090 inches deep using ultrasonic examination procedures, personnel, and equipment qualified to Section XI, Appendix VIII, in accordance with the Performance Demonstration Initiative. The flaw is characterized as resulting from lack of fusion in the weld that occurred during original fabrication and is not service induced.

The design and operating conditions for RHR Line 119 are as follows:

- Design Temperature = 400°F
- Design Pressure = 700 pounds per square inch (psi)
- Maximum Operating Temperature = 350°F
- Maximum Operating Pressure = 700 psi

ASME Code Section XI Requirements

The applicable edition of Section XI of the ASME Code for the DCPP Unit 2 Second Ten Year Inservice Inspection Interval is the 1989 Edition without Addenda. Section XI specifies the inservice inspection acceptance requirements applicable to Class 2 piping and is applicable to RHR Line 119. Since acceptance criteria for Class 2 pipe welds are "in course of preparation" in the 1989 edition, applicable rules for Class 1 piping are used in accordance with IWC-3514.

An evaluation performed by PG&E indicates that Weld RB-119-11 does not meet the acceptance requirements of ASME Code, Section XI, Table IWB-3514-2. Paragraph IWC-3122.4, "Acceptance by Analytical Evaluation," specifies the conditions for accepting flaws based on analytical evaluation. The acceptance criteria for analytical evaluation are specified in IWB-3600, and specifically IWB-3640, for austenitic stainless steel welds.

IWC-3122.4(b) states that where the acceptance criteria of IWB-3600 are satisfied, the area containing the flaw shall be subsequently reexamined in accordance with IWC-2420(b) and (c).

IWC-3125(b) states that analytical evaluation of examination results, as required by IWC-3122.4, shall be submitted to the regulatory authority having jurisdiction at the plant site.

Alternatives

ASME Code, Section XI, IWC-3122, specifies that flaws may be accepted by repair, replacement, or evaluation.

Weld repair or replacement would require draining the RHR system for flaw removal, followed by welding, inspection, and pressure testing of the system. The repair activities would provide no increase in plant or public safety, as the result would be a system equally able to perform all design functions as that presently installed.

Based upon acceptable results of the fracture mechanics analysis performed, PG&E has concluded that the defective condition, as allowed by IWC-3122.4, is acceptable for continued operation.

Justification for Acceptance

A conservative fatigue crack growth evaluation was performed to determine the adequacy of continued operation of the DCP Unit 2 RHR Line 119. The flaw evaluation was performed based on the guidelines of ASME Code, Section XI, IWB-3640, to calculate the allowable flaw size for the RHR pipe weld, specifically using the procedures and acceptance criteria of IWB-3641. Maximum stresses due to pressure, deadweight, seismic loadings, and thermal expansion were used in the evaluation. The stress intensity factors at the flaw were determined and a fatigue crack growth analysis was performed to compare end-of-evaluation period flaw size to the calculated allowable flaw size.

The service life for Weld RB-119-11 was assumed to be 40 years from the date of the evaluation (20 years of life remaining under the current DCP Unit 2 40-year operating license plus 20 years for license extension). The evaluation conservatively assumed that the flaw will experience 500 cycles of plant startup and shutdown during the service life (i.e., approximately one startup and shutdown per month for the remaining service life).

The evaluation results show that DCP Unit 2 RHR system Line 119, Weld RB-119-11, is acceptable for continued operation based on the requirements of ASME Code, Section XI, IWB-3640. The allowable flaw depth for the observed flaw length is 75 percent of pipe wall thickness. Even if a conservative 360° circumferential flaw is

assumed, the allowable flaw depth is 72 percent of wall thickness. A fatigue crack growth analysis performed using a conservative fracture mechanics model and 500 plant startup-shutdown cycles shows that crack propagation by fatigue is not a concern as the total flaw growth is less than 0.001 inches. This indicates that the allowable flaw depth will not be reached during the next 40 years of plant operation.

Because the DCPD Unit 2 RHR Line 119 flaw has been shown to be acceptable for continued operation per ASME Code Section XI, IWB-3600, IWC-3122.4(b) requires that, in accordance with IWC-2420(b) and (c), the area containing the flaw to be reexamined during the next inspection period listed in the schedule of inspection programs of IWC-2410.

Implementation Schedule

The analytical method of acceptance specified in ASME Code 1989 Edition, Section XI, IWC-3122.4, has been implemented by PG&E for DCPD Unit 2 RHR Line 119, including scheduling the additional inspection required by IWC-2420(b) and (c).

The results of the analytical evaluation performed to accept the flaw identified in DCPD Unit 2 RHR Line 119 are provided by this letter for NRC review in accordance with ASME Code 1989 Edition, Section XI, IWC-3125(b).