

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

July 21, 2014

Mr. Edward D. Halpin Senior Vice President 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, UNIT NO. 2 – REQUEST FOR ADDITIONAL INFORMATION RE: RELIEF REQUEST SWOL-REP-1 U2, ALTERNATIVE ACCEPTANCE CRITERIA FOR FLAWS IN PRESSURIZER NOZZLE WELDS (TAC NO. MF3891)

Dear Mr. Halpin:

By letter dated April 7, 2014 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML14101A245), supplemented by letter dated June 11, 2014 (ADAMS Package Accession No. ML14171A236), Pacific Gas and Electric Company (PG&E, the licensee), submitted a proposed alternative for Diablo Canyon Power Plant, Unit No. 2. The request proposes an alternative to certain requirements of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI, 2001 Edition including Addenda through 2003, Paragraph IWA-4611. Specifically, PG&E proposes alternate criteria, determined by technical analysis, to allow lack of bond/interbead non-fusion indications relating to certain previously applied structural weld overlays to remain in service without repair, in lieu of meeting the repair requirements of the ASME Code, Section XI, IWA-4611.1(a).

The U.S. Nuclear Regulatory Commission staff has been reviewing the submittal and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). The questions were discussed, in draft form, in a teleconference with your staff on July 16, 2014. It was agreed that a response to this RAI would be submitted within 30 days from the date of this letter. During the teleconference, the licensee and their vendor representatives also confirmed that no proprietary information was contained in the RAI.

E. Halpin

If you have any questions, please contact me at 301-415-2833 or via e-mail at <u>Peter.Bamford@nrc.gov</u>.

Sincerely,

Piter Bamford

Peter J. Bamford, Project Manager Plant Licensing Branch IV-1 Division of Operating Reactor Licensing Office of Nuclear Reactor Regulation

Docket No. 50-323

Enclosure: Request for Additional Information

cc w/encl: Distribution via Listserv

# **REQUEST FOR ADDITIONAL INFORMATION**

### RELIEF REQUEST SWOL-REP-1 U2

# ALTERNATIVE ACCEPTANCE CRITERIA FOR FLAWS IN PRESSURIZER NOZZLE WELDS

### PACIFIC GAS AND ELECTRIC COMPANY

# **DIABLO CANYON POWER PLANT, UNIT NO. 2**

### DOCKET NO. 50-323

By letter dated April 7, 2014 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML14101A245), supplemented by letter dated June 11, 2014 (ADAMS Package Accession No. ML14171A236), Pacific Gas and Electric Company (PG&E), submitted a proposed alternative for Diablo Canyon Power Plant, Unit No. 2. The request proposes an alternative to certain requirements of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI, 2001 Edition including Addenda through 2003, Paragraph IWA-4611. Specifically, PG&E proposes alternate criteria, determined by technical analysis, to allow lack of bond/interbead non-fusion indications relating to certain previously applied structural weld overlays (SWOL) to remain in service without repair, in lieu of meeting the repair requirements of the ASME Code, Section XI, IWA-4611.1(a). In order for the U.S. Nuclear Regulatory Commission (NRC) staff to complete its review of the proposed alternative, a response to the following request for additional information is requested.

- 1. Attachment 1 to the letter dated April 7, 2014, contains a root cause summary for the missed flaws. The submitted information focuses on the deficiency of ultrasonic testing and not the deficiency in the welding of the overlay. Please discuss the cause of fabrication defects in the weld overlays of the pressurizer nozzles.
- 2. Section 5.3 (page 18) of the Enclosure to letter dated April 7, 2014, states that the initial planar flaw depth is 0.08 inches. This flaw depth is about 5 percent of the wall thickness. The NRC staff requests the following information regarding this small flaw depth: (a) please discuss how 0.08 inches was obtained, and (2) discuss the accuracy of the measurement of this flaw.
- 3. Section 7.0 of the Enclosure to letter dated April 7, 2014, states, in part, that "The alternate examination qualification requirements will be applied until the end of the SWOL subsequent examination schedule." It is not clear to the NRC staff what is meant by applying the alternate examination qualification requirements until the end of the SWOL subsequent examination schedule. Please explain the above statement in detail. In particular, include the following: (a) an explanation of why PG&E proposes to wait until at the end of three successive examinations to apply the alternate examination qualification requirements, and (2) a description of the alternate examination qualification requirements. Also,

Enclosure

please discuss the future examination schedule and technique that will be used after the three successive examinations are completed.

- 4. Please provide the beginning and end dates of the third inservice inspection interval.
- 5. Section 4.4 of Attachment 2 (Calculation No. 32-9215965-001, "Diablo Canyon Unit 2 Pressurizer Safety/Relief Nozzles Laminar/Planar Flaw Analysis") to the letter dated April 7, 2014 (Attachment 2 is proprietary, a non-proprietary version available as Attachment 9), states that the number of reactor coolant system transients is "... established for 60 years of design life"; however, it is not clear whether this statement applies to Table 4-4. Please confirm whether the design transient cycles shown in Table 4-4 of Calculation No. 32-9215965-001 are for 60 years of plant life.
- 6. Attachment 5 to the letter dated April 7, 2014, Calculation 32-9049062-004, "Diablo Canyon Unit 2 Pressurizer Safety/Relief Nozzle Weld Overlay Residual Stress Analysis" (a non-proprietary version of Attachment 5 is available as Attachment 12), indicates that the safety/relief nozzle weld overlay residual stress analysis simulated a weld repair as result of a fabrication defect during construction. Please discuss the flaw depth as a percent of the wall thickness that the weld repair was simulated. Also, please justify the flaw depth used in the simulation (e.g., was the flaw depth simulated based on records showing the actual depth of the weld repair during construction?)
- 7. Attachment 5 to the letter dated April 7, 2014, Calculation 32-9049062-004, "Diablo Canyon Unit 2 Pressurizer Safety/Relief Nozzle Weld Overlay Residual Stress Analysis," Table C-1, presents bounding radial and shear stresses for interfacial path lines. However, the bounding radial and shear stresses in Table C-1 are different from the bounding radial and shear stresses in Table B-1 in Calculation No. 32-9215965-002 in the June 11, 2014, supplement. Please clarify why the stresses in these two tables are not the same.
- 8. Attachment 4 to the letter dated April 7, 2014, Calculation No. 32-9049114-003, "Diablo Canyon Unit 2 Pressurizer Safety/Relief Nozzle Weld Overlay Structural Analysis," page 11 (a non-proprietary version of Attachment 4 is available as Attachment 11), states, in part, that the barrier layer "is not modeled in detail in this analysis and is covered by the weld overlay filler material. The effect on the results is negligible..." The impact of the barrier layer on the original weld and weld overlay may result in fabrication defects in the overlaid weld, thermal stresses due to differences in thermal expansion of different weld materials, and weld shrinkage. Please explain why the effect of the barrier layer on the barrier layer.
- 9. Attachment 4 to the letter dated April 7, 2014, Calculation No. 32-9049114-003, Section 4.5, page 18, states, in part, that "External forces and moments are evaluated by hand calculation and added to the results from the finite element analysis." Please clarify whether the external forces and moments as shown in

Tables 8 and 9 refer to the forces and moments from the pipe that exert onto the nozzle. Also, please discuss why pressure is not an applied load in Tables 8 and 9.

- 10. Attachment 3 to the letter dated April 7, 2014, Calculation No. 32-9213780-001, "Diablo Canyon Unit 2 Pressurizer Spray Nozzle Laminar Flaw Analysis," Section 3.3, page 15 (a non-proprietary version of Attachment 3 is available as Attachment 10), states, in part, that "Multiple laminar flaws in Reference [1] are combined into larger, bounding flaws and extended to include a complete 360° arc length for crack growth calculations." Tables 7-5 and 7-6 provide initial flaw length and flaw width. Please discuss how the laminar flaws are combined into the bounding flaws.
- 11. Table 4-2 of Attachment 3, Calculation No. 32-9213780-001, shows the bounding flaws for laminar indications numbers 1 through 4. Note 5 to Table 4-2 explains how the short indications were combined into two groups of bounding flaws. In Table 1 (page 34) of the April 7, 2014 submittal, Indication 4 has a length of 20.1 inches. However, the length of 20.1 inches is not considered in Table 4-2 of Calculation No. 32-9213780-001 and appears to be not considered in the analysis. Please explain why the 20.1-inch length is not considered in the flaw analysis.

The following questions relate to the supplement dated June 11, 2014.

- 12. Attachment 1, Calculation No. 32-9215965-002, "Diablo Canyon Unit 2 Pressurizer Safety/Relief Nozzles Laminar/Planar Flaw Analysis," Table C-2, (a non-proprietary version of Attachment 1 is available as Attachment 4), indicates that the measurement uncertainty was added to the flaw width. Please discuss why the measurement uncertainty was not added to the flaw length. Also, the measurement uncertainty was added to the laminar flaw lengths, but not to the planar flaw lengths. Discuss why the planar flaw lengths were not added with the measurement uncertainty and analyzed for crack growth.
- 13. Attachment 1, Calculation No. 32-9215965-002, Table C-2, shows that the flaw in safety nozzle A exceeded the allowable flaw area limit. The submittal states that flaw acceptance by analytical evaluation is permitted by the ASME Code, Section XI, IWB-3132.3 when acceptance standards are exceeded. IWB-3132.3 requires that the analytical evaluation be performed in accordance with IWB-3600. However, the submittal states that it used the design rules of the ASME Code, Section XI, IWB-3600 was not used to accept the flaw in safety nozzle A when it exceeded the allowable limit of IWB-3514.6. This question also applies to Indications 1 and 4 in Table A-2 of Calculation No. 32-9213780-002, "Pressurizer Spray Nozzle Laminar Flaw Analysis" (Attachment 2 to the letter dated June 11, 2014, with a non-proprietary version available as Attachment 5).

E. Halpin

If you have any questions, please contact me at 301-415-2833 or via e-mail at <u>Peter.Bamford@nrc.gov</u>.

Sincerely,

/RA/

Peter J. Bamford, Project Manager Plant Licensing Branch IV-1 Division of Operating Reactor Licensing Office of Nuclear Reactor Regulation

Docket No. 50-323

Enclosure: Request for Additional Information

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