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PG&E Letter DCL-13-038

10 CFR 50.55a

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

Docket No. 50-275, OL-DPR-80  
Diablo Canyon Power Plant (DCPP) Unit 1  
ASME Section XI Inservice Inspection Program Relief Request NDE-RCS-SE-1R18  
to Allow Use of Alternative Depth Sizing Criteria

Dear Commissioners and Staff:

Pursuant to 10 CFR 50.55a(g)(5)(iii), Pacific Gas and Electric Company (PG&E) hereby requests NRC approval of Inservice Inspection (ISI) Relief Request (RR) NDE-RCS-SE-1R18 for the Diablo Canyon Power Plant Unit 1 third ISI interval. The details of the request are enclosed.

This request is associated with the use of alternatives to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Appendix VIII, Supplements 2 and 10 as modified by Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds," and Code Case N-696, "Qualification Requirements for Appendix VIII Piping Examinations Conducted From the Inside Surface."

To support the examinations to be performed in the upcoming Unit 1 eighteenth refueling outage scheduled for February 2014, PG&E requests approval of this RR by January 15, 2014.

This communication contains new commitments to be implemented following NRC approval of this RR. The commitments are contained in Attachment 1 of the Enclosure.

If you have any questions regarding the information enclosed, or other ISI program activities, please contact Mr. Tom Baldwin at (805) 545-4720.

Sincerely,

Barry S. Allen

A member of the STARS (Strategic Teaming and Resource Sharing) Alliance

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rntt/4231/SAPN 50033145-62

Enclosure

cc: Diablo Distribution  
cc/encl: Arthur T. Howell, III, NRC Region IV  
Thomas R. Hipschman, NRC Senior Resident Inspector  
James T. Polickoski, NRR Project Manager  
State of California, Pressure Vessel Unit

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**10 CFR 50.55a Relief Request NDE-RCS-SE-1R18**

**Relief Request  
in Accordance with 10 CFR 50.55a(g)(5)(iii)**

--Inservice Inspection Impracticality--

1. ASME Code Components Affected

The American Society of Mechanical Engineers (ASME) Section XI Class 1 Diablo Canyon Power Plant (DCPP) Unit 1 Reactor vessel nozzle to safe-end and safe-end to piping welds are listed below. See Figure 1 for safe-end general configuration and materials.

Code Cat./ Item No. *	Description	Weld Number *	Line Size/ Nominal Wall
N-770-1, A-2	Loop 1 outlet nozzle to safe-end	WIB-RC-1-1(SE)	29 in./2.5 in.
R-A, R1.20	Loop 1 outlet safe-end to pipe	WIB-RC-1-1	29 in./2.5 in.
R-A, R1.20	Loop 1 inlet elbow to safe-end	WIB-RC-1-18	27.5 in./2.38 in.
N-770-1, B	Loop 1 inlet safe-end to nozzle	WIB-RC-1-18(SE)	27.5 in./2.38 in.
N-770-1, A-2	Loop 2 outlet nozzle to safe-end	WIB-RC-2-1(SE)	29 in./2.5 in.
R-A, R1.20	Loop 2 outlet safe-end to pipe	WIB-RC-2-1	29 in./2.5 in.
R-A, R1.20	Loop 2 inlet elbow to safe-end	WIB-RC-2-20	27.5 in./2.38 in.
N-770-1, B	Loop 2 inlet safe-end to nozzle	WIB-RC-2-20(SE)	27.5 in./2.38 in.
N-770-1, A-2	Loop 3 outlet nozzle to safe-end	WIB-RC-3-1(SE)	29 in./2.5 in.
R-A, R1.20	Loop 3 outlet safe-end to pipe	WIB-RC-3-1	29 in./2.5 in.
R-A, R1.20	Loop 3 inlet elbow to safe-end	WIB-RC-3-18	27.5 in./2.38 in.
N-770-1, B	Loop 3 inlet safe-end to nozzle	WIB-RC-3-18(SE)	27.5 in./2.38 in.
N-770-1, A-2	Loop 4 outlet nozzle to safe-end	WIB-RC-4-1(SE)	29 in./2.5 in.
R-A, R1.20	Loop 4 outlet safe-end to pipe	WIB-RC-4-1	29 in./2.5 in.
R-A, R1.20	Loop 4 inlet elbow to safe-end	WIB-RC-4-18	27.5 in./2.38 in.
N-770-1, B	Loop 4 inlet safe-end to nozzle	WIB-RC-4-18(SE)	27.5 in./2.38 in.

\*Safe-end welds with SE suffix are dissimilar metal welds fabricated with Alloy 182 weld material and are examined in accordance with ASME Code Case N-770-1.

2. Applicable Code Edition and Addenda

The DCPP third Inservice Inspection Interval Program Plan (ISIPP) is based on the ASME Boiler and Pressure Vessel Code, Section XI, 2001 Edition with Addenda through 2003. Appendix VIII ultrasonic piping examinations are performed in accordance with the Section XI, 2001 Edition without Addenda.

The ISIPP is augmented with the requirements of ASME Code Case N-770-1 as modified by 10 CFR 50.55a for the examination of dissimilar metal vessel nozzle butt welds containing Alloy 82/182 material. These requirements apply to the dissimilar metal welds connecting the reactor nozzles to the reactor coolant system (RCS) piping.

The DCPP ISIPP references Code Cases N-695 and N-696 which are unconditionally approved for use in NRC Regulatory Guide 1.147, Revision 16.

The DCPP Unit 1 third inspection interval commenced on January 1, 2006, and is nominally scheduled to end on May 6, 2015.

3. Applicable Code Requirement

ASME Code Case N-770-1 stipulates ultrasonic examination of dissimilar metal welds fabricated from Alloy 82/182 material. These requirements apply to the DCPP reactor nozzle to safe-end welds.

DCPP Risk Informed ISIPP examination Category R-A, Item R.120 (formerly Code Category B-F, B5.10 in the 2001 Edition through 2003 Addenda) specifies volumetric examination for the associated RCS safe-end to piping welds that are fabricated with 308 stainless steel weld material.

All of the specified ultrasonic examinations are to be conducted per Appendix VIII Supplements 2 (wrought austenitic welds) and 10 (dissimilar metal welds) with the exception of the cast side of the cold leg elbow to safe-end welds. The cast elbow sides of these welds are to be examined per Appendix III as modified by Supplement 1.

ASME Code Cases N-695 and N-696 provide alternatives to Appendix VIII Supplements 10 and 2 and include requirements for depth sizing accuracy; Code Case N-695 3.3(c) states, "... are qualified for depth sizing when the RMS error of the flaw depth measurements, as compared to the true flaw depths, do not exceed 0.125 in. (3 mm)," while Code Case N-696 3.3(d) states, "... qualified for depth sizing when the flaw depths estimated by ultrasonics, as compared with the true depths, do not exceed 0.125 in. (3 mm) RMS, when they are combined with a successful Supplement 10 qualification."

4. Impracticality of Compliance

Relief is requested from the 0.125 in. root mean square error (RMSE) depth sizing accuracy requirement of Code Cases N-695 and N-696.

To date, although examination vendors have qualified for detection and length sizing in accordance with the Appendix VIII requirements for examinations from the inside diameter (ID), the vendors have not met the established RMSE of 0.125 in. for depth sizing despite numerous attempts.

Consequently, relief from the Code Case specified 0.125 in. RMSE depth sizing accuracy requirement is necessary to support evaluation of findings from examinations when conducted from the inside surface.

Additionally, relief is requested from implementing the requirements of ASME Appendix III as modified by Supplement 1 for the examination of the cast stainless steel side of the cold leg elbow to safe-end welds. Specific examination requirements for cast stainless steel materials are not yet addressed in Section XI. Examinations using the Appendix III, Supplement 1 process rather than the Appendix VIII Supplement 2 requirements used on the wrought side of the weld would result in additional burden without benefit. The Appendix III examinations would require separate procedures, calibration blocks, calibrations and possibly completely separate examinations.

5. Proposed Alternative and Basis for Use

PG&E proposes to use a vendor qualified for ID detection and length sizing per Appendix VIII as applicable to the welds included in this request. Indications requiring depth sizing will be treated as detailed in the following paragraphs. Since PG&E is in the vendor selection process at the time of this submittal, references to vendor depth sizing RMSE values are generic.

The Appendix VIII examination process will also be used to examine the cast stainless steel side of the cold leg elbow to safe-end welds in lieu of Appendix III and Supplement 1 requirements. All ID examinations will be augmented with inside surface profilometry and eddy current examination.

If a reportable flaw is detected and determined to be ID surface connected during examination of the welds that are included in Relief Request NDE-RCS-SE-1R18, PG&E will provide a flaw evaluation including the measured flaw size as determined by ultrasonic testing (UT) for review by NRC. Eddy current testing will be used to determine if flaws are surface connected. Additional data including details of the surrounding ID surface contour in the region of the flaw and percentage of the exam area where UT probe lift-off is evident, if any, will be included.

In the event that any flaw(s) requiring depth sizing is detected during examination of the welds that are included in Relief Request NDE-RCS-SE-1R18, the following criteria shall be implemented:

- ID connected flaws detected and measured as less than 50 percent through-wall in depth shall be adjusted by adding a correction factor to the flaw depth such that the adjusted flaw depth is equal to the measured flaw depth plus (contractor RMSE minus 0.125 in.), prior to comparison to the applicable acceptance criteria;
- If ID connected flaw(s) are detected and measured as 50 percent through-wall depth or greater and to remain in service without mitigation or repair, PG&E shall submit flaw evaluation(s) for review and approval by NRC prior to reactor startup. The flaw evaluation shall include:
  - Information concerning the mechanism that caused the flaw
  - Information concerning the inside surface roughness/profile of the region surrounding the flaw
  - Information concerning areas where UT probe lift-off is observed

All welds included in this request have been previously examined from the ID with an Appendix VIII qualified detection process and length sizing in the thirteenth refueling outage. The ultrasonic examinations were supplemented by surface profilometry and eddy current testing. Greater than 90 percent coverage of the required exam areas was achieved in all cases. This inspection history confirms that the inside surface profiles of the welds included in this request are suitable for ultrasonic examination from the ID in accordance with the referenced requirements as modified by the proposed alternative sizing requirements.

In the event the proposed alternate examination process grossly mischaracterizes a significant planar flaw, the potential resulting failure of one of the RCS loop outlet/inlet welds could result in a loss of coolant accident (LOCA). Depending on the size of the postulated break, the specific consequences will vary. At the smallest end of the break size spectrum, the charging system would be capable of maintaining RCS pressure through normal makeup. Larger break sizes would result in depressurization of the RCS, reactor trip and a safety injection. The worst case consequence would occur if one of the nozzle to pipe welds were to suffer 360 degree circumferential cracking. In this case, the break size is bounded by the line ID which is less than the break size used in the large break LOCA design basis analysis.

NRC review of vendor performance demonstration initiative qualification test results concluded that for flaw depths less than 50 percent wall thickness, reasonable assurance that a flaw will be appropriately depth sized may be

obtained by adding a correction factor to the flaw depth such that the adjusted flaw depth is equal to the measured flaw depth+(contractor RMSE-0.125 in.). Therefore, the proposed alternative for correcting measured flaw depths for flaws less than 50 percent wall thickness and performing and submitting a flaw specific analysis for flaws equal to or greater than 50 percent wall thickness will have little effect on the likelihood of gross flaw mischaracterization and any potential for resulting component failure.

For the cast stainless steel side of cold leg elbow to safe-end welds, the proposed Appendix VIII ID exam supplemented with surface profilometry and eddy current is better suited for detection of ID connected flaws than the Code specified Appendix III, Supplement 1 process.

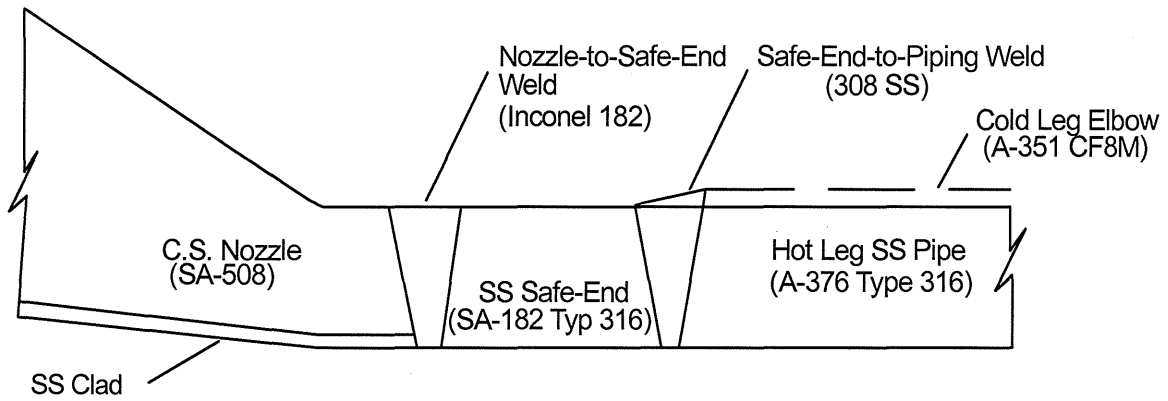
The DCPD Unit 1 reactor coolant nozzle to safe-end and safe-end to piping welds will be examined from the ID using personnel, procedures and equipment qualified by demonstration in all aspects except depth sizing. The proposed method of addressing depth sizing RMSE values will compensate for the potential through-wall sizing variation and provides reasonable assurance of structural integrity in accordance with 10 CFR 50.55a(g)(5)(iii).

6. Duration of Proposed Alternative

The duration of the proposed alternative is for the remainder of the DCPD Unit 1 third ISI interval, nominally scheduled to end on May 6, 2015.

7. Precedent

The proposed alternative method of addressing the difference between the demonstrated and required RMSE values was approved for McGuire Nuclear Station Unit 2 by NRC letter dated September 24, 2012 (ADAMS Accession No. ML12258A363).



DCCP Unit 1 Sketch of Hot Leg and Cold Leg  
Safe-End General Configuration

Figure 1



## List of Regulatory Commitments

### Commitment 1

If a reportable flaw is detected and determined to be ID surface connected during examination of the welds that are included in Relief Request NDE-RCS-SE-1R18, PG&E will provide a flaw evaluation including the measured flaw size as determined by UT for review by NRC. Eddy current testing will be used to determine if flaws are surface connected. Additional data including details of the surrounding ID surface contour in the region of the flaw and percentage of the exam area where UT probe lift-off is evident, if any, will be included.

### Commitment 2

In the event that any flaw(s) requiring depth sizing is detected during examination of the welds that are included in Relief Request NDE-RCS-SE-1R18, the following criteria shall be implemented:

- ID connected flaws detected and measured as less than 50 percent through-wall in depth shall be adjusted by adding a correction factor to the flaw depth such that the adjusted flaw depth is equal to the measured flaw depth plus (contractor RMSE minus 0.125 in.), prior to comparison to the applicable acceptance criteria;
- If ID connected flaw(s) are detected and measured as 50 percent through-wall depth or greater and to remain in service without mitigation or repair, PG&E shall submit flaw evaluation(s) for review and approval by NRC prior to reactor startup. The flaw evaluation shall include:
  - Information concerning the mechanism that caused the flaw
  - Information concerning the inside surface roughness/profile of the region surrounding the flaw
  - Information concerning areas where UT probe lift-off is observed