

September 20, 2006

Mr. John S. Keenan  
Senior Vice President and CNO  
Pacific Gas and Electric Company  
Diablo Canyon Power Plant  
P.O. Box 770000  
San Francisco, CA 94177-0001

SUBJECT: DIABLO CANYON POWER PLANT, UNIT 1 - RELIEF REQUEST FOR RELIEF  
NDE-SLH (TAC NO. MC9474)

Dear Mr. Keenan:

By letter dated December 22, 2005, as supplemented June 9, 2006, Pacific Gas and Electric Company (the licensee) requested relief from certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, inspection requirements for the reactor pressure vessels welds at the Diablo Canyon Power Plant, Unit 1. The licensee submitted the Relief Request NDE-SLH, requesting relief from the inspection requirements of the ASME Boiler and Pressure Vessel Code pursuant to paragraph 50.55a(g)(5)(iii) of Title 10 of the *Code of Federal Regulations* (10 CFR).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and based on the information provided it has concluded that compliance with the ASME Code requirements are impractical and that the volumetric examinations performed provide reasonable assurance of structural integrity of weld number 10-442. Therefore, the NRC staff concludes that granting relief to the licensee's request for the second 10-year inservice inspection interval pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

All work under TAC No. MC9474 is complete. If you have any questions or comments regarding the evaluation, please contact Alan Wang at (301) 415-1445.

Sincerely,

/RA/

David Terao, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-275

Enclosure: Safety Evaluation

cc w/encl: See next page

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**NRR-028**

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SECOND 10-YEAR INTERVAL INSERVICE INSPECTION

REQUEST FOR RELIEF NO. NDE-SLH

DIABLO CANYON POWER PLANT, UNIT 1

PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NUMBER NO. 50-275

1.0 INTRODUCTION

By letter dated December 22, 2005 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML060100481), Pacific Gas and Electric Company (the licensee) proposed Request for Relief NDE-SLH for Diablo Canyon Power Plant, Unit 1 (DCPP1) for its Second 10-Year Interval Inservice Inspection Program Plan. The licensee provided additional information by letter dated June 9, 2006 (ADAMS Accession No. ML061710357).

2.0 REGULATORY REQUIREMENTS

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g), except where specific relief has been granted by the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). Paragraph 50.55a(a)(3) of 10 CFR states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if: (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ASME Code of record for the DCPP1 second 10-year ISI program, which ended on December 31, 2005, is the 1989 Edition of Section XI of the ASME Code, with no addenda. As required by 10 CFR 50.55a(g)(6)(ii)(C)(2), the licensee is using the 1995 Edition of Section XI of the ASME Code through the 1996 Addenda for the volumetric examinations of the reactor pressure vessel (RPV) welds.

### 3.0 EVALUATION

#### Request for Relief No. NDE-SLH

#### Component Identification

RPV lower shell-to-bottom head circumferential weld 10-422

#### ASME Code Requirements

The ASME Code, Section XI, Table IWB-2500-1, Category B-A, Item B1.11 requires that the DCCP1 RPV shell-to-bottom head weld number 10-442 be volumetrically examined essentially 100 percent of the weld length each 10-year ISI interval as shown in Figure IWB-2500-1.

#### Licensee's Basis for Relief Request

Relief is requested from performing a portion of the volumetric examination where access is restricted by core support lugs and the bottom head taper.

The design of the vessel shell-to-bottom head weld precludes a portion of the required examination due to the presence of the six core barrel support lug locations. The support lugs and bottom head taper limited the access of the vendor's reactor vessel examination tool to only a portion of the required examination volume. All areas of the weld (75.36 percent) accessible for ASME Code volumetric examination were examined as required.

A portion of the weld is physically inaccessible due to the core support lug design and the bottom head taper. All areas accessible to the vendor's examination tool have been examined as required. In addition to the volumetric examination, visual examination of the vessel interior is performed per ASME Code, Section XI, Category B-N-1, and VT-2 visual examination is conducted during pressure test per ASME Code, Section XI, Category B-P. The partial volumetric examinations combined with the visual examinations provide continued assurance of weld integrity.

Consideration was also given to examining the weld from the vessel outside diameter. The bottom head and shell insulation in this area is not designed to be removable and the close proximity of the insulated vessel to the concrete shield wall prohibits access. As stated above, providing access at this location would require redesign of the building concrete structure and the vessel insulation, and is impractical.

The inspection of the lower shell-to-bottom head circumferential weld was conducted using a procedure and techniques qualified by demonstration to the Electric Power Research Institute (EPRI) performance demonstration initiative (PDI) for the 1995 edition with the 1996 addenda of ASME Code, Section XI, Appendix VIII, Supplements 4 and 6. The examination used a combination of 45 degree angle search units with shear and longitudinal wave propagation and 30 mm or greater focal depths. The sound beams from these transducers were directed in four orthogonal directions parallel and perpendicular to the weld in as close proximity to the six core

support lugs as the inspection device and transducer sled would allow. The drawings<sup>1</sup> depict the scanning limitations for parallel and perpendicular scans below the lugs and in between the lugs.

The physical size of the transducer sled limited the approach to the core support lugs without hazarding the assembly and causing damage and loose parts concerns. Careful calculation of the weld and volume coverage afforded by each set of transducers by the automated data analysts resulted in a combined coverage of 75.36 percent.<sup>1</sup> Note that this coverage is within one percent of the coverage as detailed by the Surry Power Station Relief Request PRT-02. Surry Power Station only has four core support lugs, as opposed to DCP's six lugs.

#### Additional Information

In its letter dated June 9, 2006, the licensee provide the following information:

The inspection of [DCPP1] vessel lower shell-to-bottom head circumferential weld (Weld No. 10-442) during [DCPP1] Refueling Outage 13 (1R13) was conducted using a procedure and techniques qualified by demonstration for 1995 edition/1996 Addenda ASME Section XI Appendix VIII examinations in accordance with Supplements 4 and 6. The examination used a combination of 45 degree angle search units with shear and longitudinal wave propagation and 30 mm or greater focal depths. The sound beams from these transducers were directed in four orthogonal directions parallel and perpendicular to the weld in as close proximity to the six core support lugs as the inspection device and transducer sled would allow. Figures 1<sup>2</sup>, 2<sup>1</sup>, and 3<sup>1</sup> depict the location of this weld in the reactor vessel, the scanning limitations for parallel and perpendicular scans below the core support lugs, and in between the lugs respectively.

The physical size of the transducer sled limited the approach to the core support lugs without hazarding the assembly and causing damage and loose parts concerns. Calculation of the weld and volume coverage afforded by each set of transducers by the data analysts resulted in a combined coverage of 75.36 percent. Table 1<sup>3</sup> provides a breakdown of percent coverage of the required examination volume by scan direction and transducers.

#### Licensee's Proposed Alternative Examination

All accessible areas (75.36 percent of the ASME Code-required volume) have been examined as required.

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1. The drawings that depict the scanning limitations for parallel and perpendicular scans below the lugs and in between the lugs are not included in this safety evaluation (SE) and may be found in the licensee's submittal dated December 22, 2005.
  2. Figures 1, 2, and 3 are not included in this SE and may be found in the licensee's submittal dated June 8, 2006.
  3. Table 1 is not included in this SE and may be found in the licensee's submittal dated June 8, 2006.

### Staff's Evaluation

The ASME Code, Section XI, Table IWB-2500-1, Category B-A, Item B1.11 requires that the DCCP1 RPV shell-to-bottom head weld number 10-442 be volumetrically examined for essentially 100 percent of the weld length each 10-year ISI interval as shown in ASME Code, Section XI, Figure IWB-2500-1. The licensee is requesting relief from the ASME Code requirements as it was unable to obtain essentially 100 percent coverage of the weld length due to restrictions by the core support lugs and the bottom head taper. The licensee noted that the design of the RPV shell-to-bottom head weld precludes a portion of the required examination due to the presence of the six core barrel support lug locations. Furthermore, in addition to the support lugs, the bottom head taper limits access of the vendor's RPV examination tool to a portion of ASME Code-required examination weld length. The licensee performed the examinations from inside of the RPV and found that the physical size of the transducer sled limited the approach to the core support lugs without causing possible damage to the examination tool, which could cause loose parts to fall into the RPV. The licensee also considered examining the subject weld from the RPV outside diameter; however, in this area the insulation is not designed to be removable and the close proximity of the insulated vessel to the concrete shield wall prohibits the licensee access to perform the examination. Therefore, the staff determined that based on the RPV drawings<sup>4</sup> and the licensee's description of the RPV examination area the ASME Code-required examinations are impractical. To require the licensee to perform the ASME Code-required examinations would be a burden because the RPV, associated attachments, and insulation would have to be redesigned and replaced.

The licensee conducted the ASME Code-required examinations using techniques qualified by PDI as required in the 1995 Edition through the 1996 Addenda of the ASME Code, Section XI, Appendix VIII, Supplements 4 and 6. The licensee noted that the examination used a combination of 45 degree angle search units with shear and longitudinal wave propagation and 30 mm or greater focal depths. The sound beams from these transducers were directed in four orthogonal directions parallel and perpendicular to the weld in as close proximity to the six core support lugs as the inspection device and transducer sled would allow.

The licensee obtained a significant combined volumetric coverage of 75.36 percent of the RPV shell-to-bottom head weld number 10-442. The NRC staff concludes that the volumetric coverage obtained for the reactor vessel shell-to-bottom head weld by the licensee represents a significant portion of the ASME Code-required volume. The licensee did not find any indications during its examinations. The NRC staff determined that these examinations would have detected any significant patterns of degradation. The NRC staff also determined that the examinations performed on reactor vessel shell-to-bottom head weld number 10-442 and VT-2 visual examination of the bottom of the reactor vessel performed every refueling outage provides reasonable assurance of structural integrity of the subject weld.

### 4.0 CONCLUSION:

For Request for Relief NDE-SLH, the NRC staff has reviewed the licensee's submittal and, based on the information provided, has concluded that compliance with the ASME Code requirements

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4. The drawings of the RPV are not included in this SE and can be found in the licensee's submittal dated June 8, 2006.

are impractical and that the volumetric examinations performed provide reasonable assurance of structural integrity of weld number 10-442. Therefore, the NRC staff concludes that the licensee's request for relief may be granted pursuant to 10 CFR 50.55a(g)(6)(i) for the second 10-year ISI interval.

The NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. All other requirements of the ASME Code, Sections III and XI, for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: T. McLellan

Date: September 20, 2006



Diablo Canyon Power Plant, Units 1 and 2

cc:

NRC Resident Inspector  
Diablo Canyon Power Plant  
c/o U.S. Nuclear Regulatory Commission  
P.O. Box 369  
Avila Beach, CA 93424

Sierra Club San Lucia Chapter  
ATTN: Andrew Christie  
P.O. Box 15755  
San Luis Obispo, CA 93406

Ms. Nancy Culver  
San Luis Obispo  
Mothers for Peace  
P.O. Box 164  
Pismo Beach, CA 93448

Chairman  
San Luis Obispo County  
Board of Supervisors  
1055 Monterey Street, Suite D430  
San Luis Obispo, CA 93408

Mr. Truman Burns  
Mr. Robert Kinoshian  
California Public Utilities Commission  
505 Van Ness, Room 4102  
San Francisco, CA 94102

Diablo Canyon Independent Safety  
Committee  
ATTN: Robert R. Wellington, Esq.  
Legal Counsel  
857 Cass Street, Suite D  
Monterey, CA 93940

Regional Administrator, Region IV  
U.S. Nuclear Regulatory Commission  
Harris Tower & Pavillion  
611 Ryan Plaza Drive, Suite 400  
Arlington, TX 76011-8064

Richard F. Locke, Esq.  
Pacific Gas & Electric Company  
P.O. Box 7442  
San Francisco, CA 94120

City Editor  
The Tribune  
3825 South Higuera Street  
P.O. Box 112  
San Luis Obispo, CA 93406-0112

Director, Radiologic Health Branch  
State Department of Health Services  
P.O. Box 997414, MS 7610  
Sacramento, CA 95899-7414

Mr. James D. Boyd, Commissioner  
California Energy Commission  
1516 Ninth Street (MS 31)  
Sacramento, CA 95814

Mr. James R. Becker, Vice President  
Diablo Canyon Operations  
and Station Director  
Diablo Canyon Power Plant  
P.O. Box 56  
Avila Beach, CA 93424

Jennifer Tang  
Field Representative  
United States Senator Barbara Boxer  
1700 Montgomery Street, Suite 240  
San Francisco, CA 94111

March 2006