

April 11, 2002

Mr. Gregory M. Rueger
Senior Vice President, Generation and
Chief Nuclear Officer
Pacific Gas and Electric Company
Diablo Canyon Nuclear Power Plant
P. O. Box 3
Avila Beach, CA 94177

SUBJECT: DIABLO CANYON NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2 - APPROVAL
OF INSERVICE INSPECTION RELIEF REQUEST – USE OF ASME CODE CASE
N-597 AS AN ALTERNATIVE ANALYTICAL EVALUATION OF WALL-THINNING
(TAC NOS. MB1693 AND MB1694)

Dear Mr. Rueger:

By letter dated March 28, 2001, as supplemented by letter dated February 13, 2002, Pacific Gas and Electric Company (PG&E) submitted a request for relief from the requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) Code, Section XI, Article IWA-3000, "Standards for Examination Evaluation," which provides the methodology for the evaluation of flaws detected during inservice examination. PG&E proposed an alternative to use the provisions of ASME Code Case N-597, "Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1," for evaluation of Class 2 and 3, carbon and low-alloy steel piping components subject to wall thinning as a result of flow-accelerated corrosion or other corrosion phenomena at the Diablo Canyon Nuclear Power Plant, Units 1 and 2.

The staff's evaluation of the relief request is enclosed. Based on the evaluation, the staff has concluded that the proposed alternative provides an acceptable level of quality and safety, and therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the use of Code Case N-597 is authorized for the Diablo Canyon Nuclear Power Plant, Units 1 and 2 for the second 10-year inspection interval, or until such time as this Code Case is incorporated into Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," or 10 CFR Part 50. At

G. M. Rueger

-2-

that time, if PG&E intends to continue use of Code Case N-597, it would need to implement all the provisions of the Code Case, with limitations, if any.

Sincerely,

/RA/

Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-275
and 50-323

Enclosure: Safety Evaluation

cc w/encl: See next page

G. M. Rueger

- 2 -

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Diablo Canyon Power Plant, Units 1 and 2

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE REQUEST FOR RELIEF FOR THE USE OF ASME CODE CASE N-597
PACIFIC GAS AND ELECTRIC COMPANY
DIABLO CANYON NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

By letter dated March 28, 2001, as supplemented by letter dated February 13, 2002, Pacific Gas and Electric Company (PG&E or the licensee) submitted a request for relief from the requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) Code, Section XI, Article IWA-3000, "Standards for Examination Evaluation," which provides the methodology for evaluation of flaws detected during inservice examination. PG&E proposed an alternative to use the provisions of the ASME Code Case N-597, "Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1," for evaluation of Class 2 and 3, carbon and low-alloy steel piping components subject to wall thinning as a result of flow-accelerated corrosion or other corrosion phenomena at the Diablo Canyon Nuclear Power Plant, Units 1 and 2 (DCPP).

2.0 BACKGROUND

Inservice inspection of the ASME Code Class 1, 2 and 3 components is to be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) of Title 10 of the Code of the *Federal Regulations* states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the Nuclear Regulatory Commission (NRC), if the applicant demonstrates that (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 preservice 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 ten-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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable ASME Section XI

Code for DCPD for the second 10-year inservice inspection (ISI) interval is the 1989 Edition. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

2.1 System/Component for Which Relief is Requested

Relief is requested for Class 2 and 3 carbon and low-alloy steel piping items (e.g., piping and fittings) with internal or external wall-thinning as a result of corrosion phenomena, including flow-accelerated corrosion, where the section thickness has been reduced below the design wall thickness. PG&E does not utilize carbon and low-alloy steel piping in Class 1 applications; therefore, this relief is limited to Class 2 and 3 piping items.

2.2 ASME Section XI Code Requirement

1989 Edition, Article IWA-3000, "Standards for Examination Evaluation."

2.3 Code Requirement from Which Relief is Requested

IWA-3000 provides the process for assessing a piping component for continued service after a defect has been identified. This provision stipulates that where the wall thickness has been reduced below the minimum design thickness, the component shall be repaired. As an alternative, the component may be evaluated and accepted in accordance with the design rules of either the construction Code or Section III.

2.4 Basis for Relief Request

The ASME Code Committee approved Code Case N-597, "Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1," on March 2, 1998. Code Case N-597 is not currently approved for use in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." However, footnote 6 to 10 CFR 50.55a(a)(3) provides for the use of other Code Cases upon request, if approved by the Director of the Office of Nuclear Reactor Regulation pursuant to 10 CFR 50.55a(a)(3). The use of the analytical evaluation criteria specified in Code Case N-597 to evaluate wall-thinning applicable to nonplanar flaws will provide a level of quality and safety consistent with the requirements of Section XI, IWA-3000, in accordance with 10 CFR 50.55a(a)(3)(i).

2.5 Proposed Alternative

The requirements of ASME Code Case N-597 may be used for the analytical evaluation of Class 2 and 3 carbon and low-alloy steel piping components (e.g., piping and fittings) subject to wall-thinning as a result of flow-accelerated corrosion or other corrosion phenomena where the thickness has been reduced below the minimum design thickness, instead of the requirements of Section III or the construction code.

3.0 EVALUATION

The ASME Code Section XI, Article IWA-3000 requires that a component whose flaws exceed the acceptance standards, such as minimum wall thickness, shall be evaluated to determine appropriate disposition. As an alternative to the Code requirements, to either repair the component or to evaluate the acceptability in accordance with the design rules of the construction code or Section III, the licensee has proposed to use Code Case N-597, "Requirements for Analytical Evaluation of Pipe Wall Thinning," Section XI, Division 1 for Class 2 and 3 carbon and low-alloy steel piping items at DCP. The staff has previously reviewed this Code Case in preparing its position for incorporation into 10 CFR Part 50 and determined that it is conditionally acceptable. Since the Code Case does not address inspection requirements and wall-thinning rates, the staff determined that use of the Code Case needs to be reviewed and approved on a plant-specific basis prior to its use.

Code Case N-597 provides an acceptable approach for determining the structural integrity of components degraded by wall thinning as a result of flow-accelerated corrosion or other corrosion phenomena. The methodology specified in the Code Case is sufficiently conservative, and thus provides an adequate margin of safety for evaluating a component's structural integrity. However, the NRC staff has determined that the use of Code Case N-597 needs to be supplemented by licensees to address the methodology for determining the rate of wall thickness loss and for conducting component inspections. For the staff to find the use of this Code Case acceptable, the licensee's program must include procedures to calculate wear rates, forecast remaining life, and conduct inspections.

The licensee stated that its procedures are based on the Electric Power Research Institute (EPRI) document NSAC-202L, "Recommendations for an Effective Flow Accelerated Corrosion Program." The staff has reviewed NSAC-202L and has found implementation of the guidance for calculating wear rates, determining remaining life, predicting wall thickness, and conducting inspections contained in NSAC-202L to be acceptable, provided that the recommendations characterized by the use of the word "should" are, in fact, performed. The licensee, through its implementing procedures, has eliminated the ambiguities in NSAC-202L; in particular, the licensee clarified its use of the following definitions contained in its procedures governing the flow-accelerated corrosion program:

The word "shall" denotes a requirement, regardless of whether the requirement is the result of a commitment, a higher level document, or a management directive.

The word "should" denotes a management expectation which shall be implemented unless justified by particular circumstances. In these cases, supervisors may authorize alternate actions satisfying the intent of the expectation. In rare cases, supervisors may determine that not implementing the expectation is the best alternative.

The above was provided as supplemental information regarding implementation of ASME Code Case N-597 in the licensee's letter dated February 13, 2002.

The staff notes that acceptance of this Code Case does not affect the requirement in the licensee's ASME Code of record that components to which Code Case N-597 is applied are to be repaired or replaced in accordance with the construction code of record and owners' requirements, or a later approved edition of the ASME Code, Section III. Therefore, the staff finds that the licensee's alternative to the use of Code Case N-597, as supplemented by the implementation of NEI document NSAC-202L, with clarifications of the application of "shall" and "should" in the document, provides an acceptable level of quality and safety.

4.0 CONCLUSION

Based on its review, the staff finds that the proposed alternative to use Code Case N-597 as an alternative evaluation method for determining the structural integrity of components degraded by wall thinning as a result of flow-accelerated corrosion or other corrosion phenomena for Class 2 and 3 carbon and low-alloy steel piping items, as supplemented by the implementation of NSAC-202L as discussed above, provides an acceptable level of quality and safety, and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for DCP, for the second 10-year inspection interval, or until such time as this Code Case is incorporated into Regulatory Guide 1.147 or 10 CFR Part 50. At that time, if PG&E intends to continue to implement Code Case N-597, it would need to follow all the provisions of the code case, with limitations, if any. Furthermore, code components must be repaired or replaced in accordance with the construction code of record and the owners' requirements, or a later approved edition of ASME Section III, prior to exceeding the allowable minimum wall thickness, as specified in this code case.

Principal Contributor: P. Patnaik

Date: April 11, 2002