June 3, 2003

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 93424

SUBJECT: DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 2 - ISSUANCE OF AMENDMENT – ALTERNATE METHOD OF DETERMINING PROBABILITY OF DETECTION FOR STEAM GENERATOR TUBES (TAC NO. MB7875)

Dear Mr. Rueger:

The Commission has issued the enclosed Amendment No. 158 to Facility Operating License No. DPR-82 for the Diablo Canyon Nuclear Power Plant (DCPP), Unit No. 2. The amendment is in response to your application dated March 3, 2003 (DCL-03-026), and its supplement dated March 5, 2003 (DCL-03-027). A meeting with your staff was held on March 4, 2003, at the NRC Headquarters to discuss the application.

The amendment authorizes revisions to the Final Safety Analysis Report Update to incorporate the NRC approval of a probability of detection of 1.0 to one bobbin indication, contained in a DCPP Unit 2 steam generator 4 tube at row 44, column 45 at the second tube support plate on the hot leg side (R44C45-2H), for the beginning of cycle voltage distribution for the DCPP Unit 2 Cycle 12 operational assessment.

A copy of the related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's next regular biweekly *Federal Register* notice.

Sincerely,

/RA/

David H. Jaffe, Acting Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-323

Enclosures: 1. Amendment No. 158 to DPR-82
2. Safety Evaluation

cc w/encls: See next page

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PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-323

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 158
License No. DPR-82

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Pacific Gas and Electric Company (the licensee) dated March 3, 2003, and its supplement dated March 5, 2003, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, by Amendment No. 158, the license is amended to authorize revision of the Final Safety Analysis Report (FSAR) Update, as set forth in the application for amendment by Pacific Gas and Electric Company dated March 3, 2003, and supplement dated March 5, 2003. Pacific Gas and Electric Company shall update the FSAR Update to incorporate the description of the alternate method for determining the probability of detection as described in the amendment application of March 3, 2003, its supplement dated March 5, 2003, and the staff's Safety Evaluation attached to this amendment.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of the date of issuance. The implementation of the amendment includes the incorporation into the FSAR Update the changes discussed above, as described in the licensee's application dated March 3, 2003, its supplement dated March 5, 2003, and evaluated in the staff's Safety Evaluation attached to this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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

Date of Issuance: June 3, 2003

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 158 TO FACILITY OPERATING LICENSE NO. DPR-82

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON NUCLEAR POWER PLANT, UNIT 2

DOCKET NO. 50-323

1.0 INTRODUCTION

By application dated March 3, 2003, and its supplement dated March 5, 2003, Pacific Gas and Electric Company (the licensee) requested an amendment for the staff to authorize revisions to the Final Safety Analysis Report (FSAR) Update for Diablo Canyon Nuclear Power Plant (DCPP), Unit 2, to incorporate the NRC approval of a probability of detection (POD) of 1.0 to one bobbin indication for the beginning of cycle (BOC) voltage distribution for the DCPP Unit 2 Cycle 12 operational assessment.

The licensee stated that the alternate method of determining the POD would be applied to the 21.5 volt bobbin indication in steam generator (SG) 4 tube at row 44, column 45 (R44C45). This 21.5 volt indication was discovered during the current Unit 2 Refueling Outage, No. 11.

A meeting was held with the licensee on March 4, 2003, in which the licensee discussed the proposed amendment with the staff. The licensee stated that the material in the meeting handout provided additional information related to the proposed amendment (ADAMS Accession No. ML030640753).

The March 5, 2003, supplemental letter provided additional clarifying information, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination published in the *Federal Register* on April 15, 2003 (68 *FR* 18284).

2.0 REGULATORY EVALUATION

The licensee implements a voltage-based alternate repair criteria (ARC) for axial outside diameter stress corrosion cracking (ODSCC) located at tube-to-tube support plate intersections. The criteria for voltage-based plugging limits for axial ODSCC are contained in Generic Letter (GL) 95-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking," dated August 3, 1995. The NRC previously reviewed and approved the use of this ARC at DCPP Unit 2.

SG tube plugging/repair limits are specified in the DCPP Unit 2 technical specifications (TS). The current DCPP Unit 2 TS require that flawed tubes be removed from service by plugging if the depths of the flaws are greater than or equal to 40 percent through-wall, unless the

degradation can be dispositioned by one of the three ARC identified in the TS. One of these ARC is based on voltage (not depth) and can be implemented for axial ODSCC located at tube-to-tube support plate intersections. The associated TS plugging/repair limits and required analysis provide reasonable assurance that tubes remaining in service will retain adequate structural and leakage integrity during normal operating, transient, and postulated accident conditions, consistent with General Design Criteria 14, 15, 20, 31, and 32 of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A. Structural integrity refers to maintaining adequate margins against gross failure, rupture, and collapse of the SG tubing. Leakage integrity refers to limiting primary-to-secondary leakage to within acceptable limits (i.e., 10 CFR Part 100).

In order to ensure the structural and leakage integrity of a tube until the next scheduled inspection, GL 95-05 specifies a methodology to determine the conditional burst probability (i.e., ensure structural integrity) and the total primary-to-secondary leak rate (i.e., ensure leakage integrity) from an affected SG during a postulated main steam line break (MSLB) event. The calculation of conditional burst probability is, in part, a function of the POD and the resulting indication voltage distribution at the BOC. The indication voltage distribution at BOC is based on consideration of all previous bobbin indications (i.e., all indications that were detected at the BOC, including those that are plugged). The licensee currently assumes a POD of 0.6 for all BOC indications as required as part of implementation of the voltage-based repair criteria.

3.0 TECHNICAL EVALUATION

Based on the results of each SG inspection, the licensee is required to perform an analysis to determine the projected end-of-cycle (EOC) conditional burst probability and the total primary-to-secondary leak rate from an affected SG during a postulated MSLB event to ensure that these projections remain below acceptance limits (e.g., $1x10^{-2}$ for the conditional burst probability). These analyses utilize Monte Carlo statistical analysis techniques, and, in part, an indication voltage distribution at the BOC and a voltage growth rate distribution to project the EOC voltage distribution. The projected EOC voltage distribution is then used in conjunction with empirically derived correlations between the voltage (i.e., bobbin coil voltage) and tube burst pressure and leak rate to ensure the acceptance limits are met. The indication voltage distribution at BOC is based on consideration of all bobbin indications identified during that outage. The licensee assumes a POD of 0.6 for all BOC indications as stated in GL 95-05. This POD is used, in part, to account for missed indications (i.e., present but not detected).

During the DCPP Unit 2 Refueling Outage No. 11, a 21.5 volt bobbin indication was found in SG 4 in tube R44C45 at the second tube support plate on the hot leg side. The indication was left in service following DCPP Unit 2 Refueling Outage No. 10 in accordance with the ARC for axial ODSCC (i.e., it was 2.0 volts, which is below the plugging limit). During the DCPP Unit 2 Cycle 11, the indication grew from 2.0 to 21.5 volts. As a result of this indication, the probability of burst (POB) performance criterion limit of $1x10^{-2}$ was exceeded at the end of Cycle 11. In addition, the Cycle 12 POB projections using the currently approved POD of 0.6 will not permit startup of DCPP Unit 2 because the performance criterion limit of $1x10^{-2}$, identified in GL 95-05, would be exceeded.

The POB performance criterion is exceeded for Cycle 12 when the remaining fractional proportion of the 21.5 volt indication is included in the BOC 12 voltage distribution resulting from the application of a constant POD of 0.6 regardless of detected bobbin voltage. The licensee has requested approval to use a POD of 1.0 for the 21.5 volt indication in R44C45 for the BOC 12 indication voltage distribution to permit startup and operation of DCPP Unit 2.

The licensee stated that an indication of this size can be detected with 100 percent certainty and therefore, this indication should not be included in the DCPP Unit 2 BOC 12 voltage distribution for performing the operational assessment. The licensee's basis for this conclusion is industry and DCPP plant specific operating experience. The industry operating experience is documented in Section 7.0 of the Electric Power Research Institute Topical Report NP 7480-L, Addendum 5, "Steam Generator Tubing Outside Diameter Stress Corrosion Cracking at Tube Support Plates Database for Alternate Repair Limits, Update 2002," dated January 2003 for thirty-seven inspections in plants with 7/8" and 3/4" tubing, including four DCPP inspections (ADAMS Accession No. ML030570100). The licensee concluded that no new indications have been found by reanalysis to have a prior voltage greater than 3.2 volts (i.e., no indications greater than 3.2 bobbin volts were missed). In addition, for DCPP Units 1 and 2, no new indications were found by reanalysis to have a prior inspection voltage greater than 1.6 volts. Industry operating experience indicates that all large voltage indications found in ARC inspections can be traced to large voltage growth rates and not to missed indications.

Based on the licensee's evaluation of the proposal, industry operating experience, the staff's knowledge of axial ODSCC ARC inspection results, and the staff's knowledge of the bobbin probe capabilities, the staff agrees that it would be unlikely for the licensee to miss (i.e., not detect during the tube inspection) an indication as large as 21.5 volts. Accordingly, the staff concludes that the licensee's proposal to use a POD of 1.0 for the 21.5 volt indication found in tube R44C45 in SG 4 is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the California State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding (68 FR 18284). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Cheryl Khan
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Date: June 3, 2003

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