

May 7, 2001

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  
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SUBJECT: DIABLO CANYON NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2 -  
ISSUANCE OF AMENDMENT RE: REVISION OF TECHNICAL  
SPECIFICATIONS (TSs) SECTION 3.5.5, "EMERGENCY CORE COOLING  
SYSTEMS (ECCS) - SEAL INJECTION FLOW" (TAC NOS. MA9160 AND  
MA9161)

Dear Mr. Rueger:

The Commission has issued the enclosed Amendment No. 148 to Facility Operating License No. DPR-80 and Amendment No. 148 to Facility Operating License No. DPR-82 for the Diablo Canyon Nuclear Power Plant (DCPP), Unit Nos. 1 and 2, respectively. The amendments are in response to your application dated June 8, 2000, as supplemented by your letter dated January 4, 2001.

The amendments revise TS Section 3.5.5, "Emergency Core Cooling Systems - Seal Injection Flow," to replace the description of the seal injection flow with a description consistent with the method used to establish and verify reactor coolant pump (RCP) seal injection flow limits and the method used to calculate the seal injection flow in the safety analyses for DCPP.

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/**

Girija S. Shukla, Project Manager, Section 2  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-275  
and 50-323

Enclosures: 1. Amendment No. 148 to DPR-80  
2. Amendment No. 148 to DPR-82  
3. Safety Evaluation

cc w/encls: See next page

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cc w/encls: See next page

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Diablo Canyon Power Plant, Units 1 and 2

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Regional Administrator, Region IV

PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-275

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 148  
License No. DPR-80

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Pacific Gas and Electric Company (the licensee) dated June 8, 2000, as supplemented by letter dated January 4, 2001, 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, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-80 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 148, are hereby incorporated in the license. Pacific Gas and Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

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

Attachment: Changes to the Technical  
Specifications

Date of Issuance: May 7, 2001

PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-323

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 148  
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 June 8, 2000, as supplemented by letter dated January 4, 2001, 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, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-82 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 148, are hereby incorporated in the license. Pacific Gas and Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of its date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

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

Attachment: Changes to the Technical  
Specifications

Date of Issuance: May 7, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 148

TO FACILITY OPERATING LICENSE NO. DPR-80

AND AMENDMENT NO. 148 TO FACILITY OPERATING LICENSE NO. DPR-82

DOCKET NOS. 50-275 AND 50-323

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE

3.5-8

INSERT

3.5-8

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 148 TO FACILITY OPERATING LICENSE NO. DPR-80  
AND AMENDMENT NO. 148 TO FACILITY OPERATING LICENSE NO. DPR-82  
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 June 8, 2000, as supplemented by letter dated January 4, 2001, Pacific and Gas Electric Company (PG&E) requested changes to the Technical Specifications (Appendix A to Facility Operating License Nos. DPR-80 and DPR-82) for the Diablo Canyon Power Plant (DCPP), Unit Nos. 1 and 2, respectively. The proposed changes revise Technical Specification (TS) Section 3.5.5, "Emergency Core Cooling Systems - Seal Injection Flow," and associated Bases to replace the description of the seal injection flow with a description consistent with the method used to establish and verify reactor coolant pump (RCP) seal injection flow limits and the method used to calculate the seal injection flow in the safety analyses for DCPP.

These amendments make the following specific changes:

1. Revise Limiting Condition for Operation (LCO) 3.5.5 by replacing "...flow shall be  $\leq 40$  gpm with [Reactor Coolant System] RCS pressure  $\geq 2215$  psig and  $\leq 2255$  psig and the charging flow control valve full open" with "...flow resistance shall be  $\geq 0.2117$  ft/gpm<sup>2</sup>".
2. Revise TS 3.5.5, ACTIONS, Condition A from "Seal injection flow not within limit" to "Seal injection flow *resistance* not within limit."
3. Revise TS 3.5.5, ACTIONS, Required Action A.1 from "Adjust manual seal injection throttle valves to give a flow within limit..." to "Adjust manual seal injection throttle valves to give a flow *resistance* within limit" and deleting the remainder of the text in this required action.
4. Revise Surveillance Requirement (SR) 3.5.5.1 from "Verify manual seal injection throttle valves are adjusted to give a flow within limits with RCS pressure  $\geq 2215$  psig and  $\leq 2255$  psig and the charging flow control valve full open" to "Verify manual seal injection throttle valves are adjusted to give a flow resistance  $\geq 0.2117$  ft/gpm<sup>2</sup>."

These changes were requested in order to: (1) preclude misunderstandings related to compliance with the Improved Technical Specifications (ITS) when variations in seal injection flow occur during plant operations, and (2) make the ITS consistent with the method used to establish and verify reactor coolant pump (RCP) seal injection flow limits and the method used to calculate the seal injection flow in the safety analyses for the plant.

## 2.0 BACKGROUND

RCP seal injection is provided by the centrifugal charging pumps (CCPs). In addition to providing seal injection flow, the CCPs at Diablo Canyon also play an important role in several accident/transient analyses. For example, for events that result in a decrease in reactor coolant inventory (e.g., loss-of-coolant accidents (LOCAs)), they are relied upon to provide emergency makeup to the core for core cooling. For events that result in an increase in reactor coolant inventory (e.g., inadvertent safety injection) they provide a makeup source that must be analyzed to ensure that the analyses bound plant operation. Other transient analyses rely on these pumps to either makeup to the RCS to ensure that sufficient inventory is maintained to keep the core cooled or deliver borate water to ensure that the core is kept subcritical. Analysts must consider the limiting configurations of the CCPs and associated flow paths for each individual analysis with respect to the concern being addressed by the analysis (e.g., overpressure, core cooling, reactivity control). In some cases, the limiting configuration is the one that provides minimum makeup or flow rate to the RCS (e.g., LOCA where the CCPs are relied on to provide a makeup source for core cooling). In other cases, the limiting configuration is the one that provides a maximum makeup or flow rate to the RCS (e.g., inadvertent safety injection analysis where the CCPs provide injection that causes the RCS to pressurize). However, for both cases, using a higher seal injection flow rate in the analyses is bounding. This is because the Diablo Canyon analyses do not include the seal injection flow when the analysis is limited by a minimum flow assumption but they do include the seal injection flow when the analysis is limited by maximum flow assumptions. Maximizing seal injection flow for the first case maximizes the amount of flow by which CCP injection is reduced and therefore minimizes the resulting makeup. Maximizing seal injection flow rate for the second case maximizes the total flow rate into the RCS.

ITS 3.5.5 establishes criteria that, when met, limit the amount of flow that can be achieved through the seal injection flow path. Compliance with this ITS ensures that the plant is operated consistent with the assumptions used in the analyses.

## 3.0 EVALUATION

The changes proposed by the licensee are described in Section 1.0 above. These changes, in effect, would include a hydraulic flow resistance criterion in the ITS instead of a flow rate criterion. Use of a flow resistance criterion is consistent with the way that flow profiles for these injection paths are calculated in the safety analyses. In the analyses, flow profiles are calculated using flow network models which rely on input of the hydraulic flow resistance. In addition, use of a flow resistance criterion is also consistent with the method used in performing the surveillance procedure. The surveillance procedure confirms that plant operation is consistent with the accident/transient analyses by obtaining plant parameters and calculating hydraulic flow resistance of the seal injection flow path. Although system pressures and flow

rates are used in this procedure, the actual parameter being verified (i.e., the acceptance criteria) is the hydraulic flow resistance.

Hydraulic flow resistance is related to systems pressures and flow rates by the following formula:

$$R_{\text{seal}} = (P_{\text{ccp header}} - P_{\text{RCP}}) / (\rho \times Q^2)$$

where:

$R_{\text{seal}}$	= Hydraulic flow resistance
$P_{\text{ccp header}}$	= CCP discharge header pressure
$P_{\text{RCP}}$	= RCP balance chamber pressure
$\rho$	= Density of seal injection water
$Q$	= Seal injection path flow rate

This formula shows that, from an engineering standpoint, establishing a maximum limit on the seal injection flow rate at fixed system pressures is essentially the same as establishing a minimum limit on the hydraulic flow resistance of the flow path. Therefore, the proposal to use a hydraulic flow resistance criterion instead of a flow rate criterion is acceptable. Furthermore, because the safety analyses for the plant use the hydraulic flow resistance as an input in the calculations and because the surveillance procedures used to confirm correct flow path alignment do this by confirming that the flow path resistance is consistent with that assumed in the accident/transient analyses, the proposed use of hydraulic flow resistance in place of flow rate is appropriate.

The staff reviewed the method by which the licensee determined the value of 0.2117 ft/gpm<sup>2</sup> for hydraulic flow resistance. The licensee calculated this value based on a minimum allowable CCP discharge header pressure of 2,400 psi, a maximum RCP balance chamber pressure of 2,253.4 psi, and a maximum flow rate of 40 gpm. The CCP discharge header pressure used is the minimum Final Safety Analysis Report (FSAR) Update allowable pressure. The RCP balance chamber pressure is calculated using the pressurizer pressure which is measured via surveillance test procedure for Surveillance Requirement 3.5.5.1 and the pressure differentials that result from frictional losses due to RCS piping and the steam generator, the developed head in the RCP balancing chamber, and the elevation or static head from the pressurizer water level to the RCP balancing chamber. The maximum flow rate is the same as that in the current ITS. Applying minimum and maximum values as stated here provides a conservatively low value for hydraulic flow resistance. The use of low hydraulic flow resistance inputs in the flow network models is conservative because it results in higher seal injection flow rates. As stated earlier, higher seal injection flow rates are bounding for analyses of both maximum and minimum CCP flow rates. Based on the above, the staff finds the method used to calculate the value of 0.2117 ft/gpm<sup>2</sup> for hydraulic flow resistance acceptable.

The surveillance procedure used to confirm that the plant configuration is consistent with that assumed in the accident/transient analyses includes three measured values. These are pressurizer pressure, CCP discharge pressure, and seal injection flow rate. In order to ensure that uncertainties in the surveillance procedure do not result in the plant being operated outside of the assumptions used in the accident/transient analyses, the licensee accounts for the instrumentation uncertainties by including them in the acceptance criterion of the surveillance procedure. In addition, the seal injection flow path includes in it the charging flow control valve (Valve FCV-128). During normal operation, this valve cycles to maintain a programmed

pressurizer level. However, in accident/transient analyses this valve is assumed to fail to the full open position. Because the charging flow control valve is assumed to fail fully open in the accident/transient analyses, the licensee measures the CCP discharge header pressure downstream of this valve. This ensures that the surveillance procedure is not affected by the additional flow resistance that would result from the normally throttled position of this valve. This approach ensures that the surveillance procedure is conservatively measuring the minimum flow resistance as is required in order to confirm that the plant configuration is consistent with the accident/transient analyses. The staff has reviewed the licensee's discussion of the surveillance procedure and, based on the above, finds it acceptable.

Therefore, in conclusion, the staff has reviewed the licensee's proposal to modify TS Section 3.5.5 as described in Section 1.0 above, and based on the review described in Sections 2.0 and 3.0 above, the staff finds that this amendment request 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 amendments. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

These amendments change 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 and change a surveillance requirement. The NRC staff has determined that the amendments involve 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 the amendments involve no significant hazards consideration, and there has been no public comment on such finding (66 FR 17968). Accordingly, the amendments meet 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 amendments.

#### 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Mohammed A. Shuaibi

Date: May 7, 2001.