



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 28 TO FACILITY OPERATING LICENSE NO. DPR-80
AND AMENDMENT NO. 27 TO FACILITY OPERATING LICENSE NO. DPR-82
PACIFIC GAS AND ELECTRIC COMPANY
DIABLO CANYON NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

By letter dated January 22, 1988 and supplemented by letter dated March 25, 1988, Pacific Gas and Electric Company (PG&E or the licensee) requested amendments to the Technical Specifications appended to Facility Operating License Nos. DPR-80 and DPR-82 for the Diablo Canyon Nuclear Power Plant, (DCNPP) Unit Nos. 1 and 2. The proposed amendments would change the DCNPP Combined Technical Specifications to allow reduced Residual Heat Removal (RHR) system flow during Mode 6 operation. Specifically, the proposed change would amend TS 4.9.8.1, "Residual Heat Removal and Coolant Circulation High Water Level," and TS 4.9.8.2, "Residual Heat Removal and Coolant Circulation Low Water Level," to allow the minimum RHR system flow rate to be reduced from 3000 gpm to 1300 gpm after the reactor has been subcritical for 57 hours or more. Also, the bases for TS 3/4.9.8 will be modified to state that the reduced RHR flow rate can provide adequate decay heat removal as well as increased margin to vortexing in the RHR system. Also, TS 3.4.1.4.2, "Cold Shutdown - Loops not Filled," which is applicable to Mode 5 partial drain operations, will be revised to prohibit deenergization of the RHR pump unless the RCS water level is above the reactor vessel flange.

The licensee states that it is proposing these changes to provide a greater margin to vortexing and to preclude an inadvertent loss of decay heat removal capability due to air entrainment and cavitation of the RHR pumps when the RCS water level is lowered to the mid-level of the hot leg piping.

2.0 EVALUATION

The NRC staff has evaluated the proposed changes and has concluded that they are acceptable. The staff's evaluation is given below.

Technical Specifications 4.9.8.1 and 4.9.8.2 currently require that the licensee verify at least once per 12 hours that at least one shutdown cooling train is in operation and circulating reactor coolant at a flow rate of greater than or equal to 3000 gpm during refueling operations. The objective of having a minimum RHR flow requirement is to assure that adequate flow is available to (1) remove decay heat, (2) minimize the effects of a boron dilution accident, and (3) prevent boron stratification. On the other hand, vortexing has been observed in the suction of the RHR pumps when the water level in the RCS was reduced to mid-loop. See NUREG-1269, "Loss of Residual Heat Removal System at Diablo Canyon Unit 2," April 10, 1987. As noted in NUREG-1269, the likelihood of vortexing is reduced as the flow rate is reduced.

In support of its requested TS change, the licensee has provided an analysis of the effects of reduced RHR flow, WCAP-11688, "Westinghouse Engineering Services Report for Diablo Canyon Power Plant Units 1 and 2 Concerning a RHR Minimum Flow Rate Reduction While in Mid-Loop Operation."

(a) Decay Heat Removal

The licensee has provided an analysis (WCAP-11688) which shows that the RHR flow rate may be reduced to 1300 gpm at 57 hours after reactor shutdown and still provide adequate heat removal capability, based on conservative analysis methods and assumptions. Further, by letter dated March 25, 1988, the licensee stated that the Diablo Canyon Operating Procedures require that during part-loop operation the RCS temperature be maintained less than 160 degrees F. This procedure provides additional assurance that adequate heat removal will be maintained during operation at 1300 gpm. Based on the above, the NRC staff finds decay heat removal capability at the proposed reduced RHR flow rate to be acceptable.

(b) Boron Dilution

The licensee states that the Boron Dilution Accident analyses in the FSAR are independent of RHR flow rate, but do depend on RCS water volume. Thus, the boron dilution accident is not affected by the proposed reduction in RHR flow rate. However, the licensee's January 22, 1988 submittal notes that the reduced volume of water during mid-loop operation results in a reduced time to dilute to criticality, from 41 minutes when the RCS is full, to 27 minutes when operating at mid-loop. This is slightly below the 30 minutes recommended by the Standard Review Plan, NUREG-0800, Section 15.4.6. By letter dated March 25, 1988, the licensee addressed this issue. The licensee states that the analysis that resulted in the 27 minutes time to criticality includes a number of conservatisms, such as not taking credit for the volume of RCS water beyond the RHR suction and injection points. The licensee states that on a best estimate basis, taking into account actual

RCS water volumes that would be involved, it believes the time to criticality would be greater than the 30 minute time recommended by the SRP. Further, the licensee notes that a number of procedures, indications, and alarms are in place that would quickly alert the plant operators in the event that inadvertent boron dilution occurred. Based on the above, the staff finds the boron dilution accident analyses for Diablo Canyon to be acceptable.

(c) Boron Stratification

The potential for boron stratification was evaluated in WCAP-11688, wherein it was shown that at flow rates greater than 1000 gpm, adequate mixing takes place within the RCS so that no significant amount of coolant with a boron content different from that in the core can accumulate in the coolant loops. Based on this analysis, the staff concludes that an RHR flow rate of 1300 gpm is acceptable from the standpoint of boron stratification.

In summary, the NRC staff has reviewed the proposed changes to TS 3/4.9.8 for Diablo Canyon Nuclear Power Plant Units 1 and 2, and the supporting analyses by Pacific Gas and Electric Company and by Westinghouse. The proposed changes would reduce the minimum flow requirement for operation of the Residual Heat Removal System during refueling operations from 3000 gpm to 1300 gpm, provided that the reactor has been shut down for more than 57 hours. As discussed in the preceding paragraphs, we find that the proposed changes are acceptable, and meet the applicable regulatory requirements.

3.0 ENVIRONMENTAL CONCLUSION

These amendments involve changes in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. We have 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. Accordingly, these amendments 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 these amendments.