

Docket No. 50-323

March 3, 1986

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Mr. J. D. Shiffer, Vice President  
 Nuclear Power Generation  
 c/o Nuclear Power Generation, Licensing  
 Pacific Gas and Electric Company  
 77 Beale Street, Room 1451  
 San Francisco, California 94106

Dear Mr. Shiffer:

SUBJECT: EXEMPTION FROM REQUIREMENT OF 10 CFR 50, SECTION 50.46

The Commission has issued an exemption for the Diablo Canyon Nuclear Power Plant, Unit 2 regarding a requirement in Section 50.46 of 10 CFR Part 50 in response to your letter dated February 21, 1986. The Exemption pertains to the requirement for a plant specific calculated ECCS cooling performance with an approved model.

Your letter of February 21, 1986 requested an exemption for temporary relief from the above requirement in order to perform the required calculations for Diablo Canyon Unit 2. The Commission has granted the Exemption on the conditions that:

1. Heat flux hot channel factor,  $F_q$ , shall not exceed 2.30.
2. All other operating conditions shall conform with the requirements of License No. DPR-82 and the associated Technical Specifications.
3. The licensee shall complete a revised plant specific ECCS analysis for Diablo Canyon Unit 2, in accordance with the schedule stated in its letter of February 21, 1986 and shall submit the results of such analysis no later than August 20, 1986.

The Commission grants this Exemption on a one-time basis only. The bases for this action are included in the enclosed Exemption.

The Exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

/s/HSchierling

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Hans E. Schierling, Senior Project Manager  
 PWR Project Directorate No. 3  
 Division of PWR Licensing-A

Enclosure:  
 As stated

cc w/enclosure:

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Dear Mr. Shiffer:

SUBJECT: EXEMPTION FROM REQUIREMENT OF 10 CFR 50, SECTION 50.46

The Commission has issued an exemption for the Diablo Canyon Nuclear Power Plant, Unit 2 regarding a requirement in Section 50.46 of 10 CFR Part 50 in response to your letter dated February 21, 1986. The Exemption pertains to the requirement for a plant specific calculated ECCS cooling performance with an approved model.

Your letter of February 21, 1986 requested an exemption for temporary relief from the above requirement in order to perform the required calculations for Diablo Canyon Unit 2 to demonstrate that the calculated peak cladding temperature for the design basis loss of coolant accident is less than 2200°F as specified in 10 CFR 50.46(b). The Commission has granted the exemption until you complete the required calculations in accordance with the schedule stated in your letter.

The Commission grants this Exemption on a one-time basis only. The bases for this action are included in the enclosed Exemption.

The Exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Hans E. Schierling, Senior Project Manager  
PWR Project Directorate No. 3  
Division of PWR Licensing-A

Enclosure:  
As stated

cc w/enclosure:  
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Diablo Canyon

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UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
PACIFIC GAS AND ELECTRIC COMPANY	)	
(Diablo Canyon Nuclear Power	)	Docket No. 50-323
Plant, Unit 2)	)	

## EXEMPTION

## I.

Pacific Gas and Electric Company (the licensee) holds Facility Operating License No. DPR-82, which authorizes operation of the Diablo Canyon Nuclear Power Plant, Unit No. 2 (the facility or Diablo Canyon 2) at power levels not in excess of 3411 megawatts thermal. This license provides, among other things, that the facility is subject to all rules, regulations, and Orders of the Nuclear Regulatory Commission (the Commission) now or hereafter in effect.

The facility is a pressurized water reactor located on the licensee's site in San Luis Obispo County, California.

## II.

Section 50.46(a)(1) to 10 CFR Part 50 requires, in part, that for a reactor its ECCS cooling performance shall be calculated in accordance with an acceptable evaluation model. Furthermore, Section 50.46 to 10 CFR Part 50 requires that the calculated maximum fuel element cladding temperature or peak cladding temperature (PCT) shall not exceed 2200°F.

## III.

By letter dated February 21, 1986 the licensee requested an Exemption from the requirement of 10 CFR 50.46(a)(1) identified in II above for a temporary relief to complete the ECCS cooling performance calculations for

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Diablo Canyon 2 using plant specific data and actual operating conditions with an approved ECCS evaluation model in order to verify that the calculated peak cladding temperature (PCT) for Diablo Canyon 2 does not exceed the criterion of 2200°F specified in 10 CFR 50.46(b). In an earlier letter dated February 14, 1986 the licensee had informed the staff that the calculated ECCS cooling performance for Diablo Canyon 2, as discussed in the Final Safety Analysis Report (FSAR), is not based on the actual operating conditions for the facility. The letter provided substantial information demonstrating the safe operation of Diablo Canyon 2 under those conditions as discussed below.

The large break ECCS analysis for Diablo Canyon 2, as documented in FSAR Section 15.4.1, was performed with the Westinghouse 1978 Evaluation Model. It resulted in a peak cladding temperature of 2187°F. The analysis was based on the nominal average reactor coolant temperature,  $T_{avg}$ , of 577.6°F, a heat flux hot channel factor,  $F_q$ , of 2.32, and a discharge coefficient,  $C_d$ , of 0.8. The Diablo Canyon 2 startup testing has shown that there is little or no steam generator heat transfer fouling. Consequently the licensee has projected that the reactor coolant system (RCS) will operate more efficiently at a  $T_{avg}$  of 572°F. Westinghouse sensitivity studies using the approved 1978 Westinghouse ECCS Evaluation Model show that operation at a  $T_{avg}$  of 572°F could result in a PCT increase of 20°F, causing the peak cladding temperature to exceed the 2200°F limit specified in 10 CFR 50.46(b) by as much as 7°F.

The change in the PCT with a variation in  $T_{avg}$  was the subject of many discussions between the staff and Westinghouse in mid-1977. It was found that a decrease in  $T_{avg}$  could result in either an increase or decrease of

PCT. Therefore, the staff concluded that plant specific analyses should be performed for the nominal  $T_{avg}$  for the plant under evaluation.

Since the staff approval of the 1978 Westinghouse Evaluation Model, the staff has approved a new Westinghouse analytical method, called BART, for reflooding calculations. This model describes the LOCA phenomena in a more mechanistic way. The 1978 Evaluation Model uses empirical correlations to calculate reflooding heat transfer. The BART method models the heat transfer and fluid flow processes during reflood, including entrainment and deentrainment of droplets, the heat transfer at the quench front and, as an option, the effect of spacer grids. Because BART is more mechanistic, calculations made with an evaluation model including BART show increased margin to the peak cladding temperature limit.

Westinghouse has informed the licensee that a reanalysis of the PCT for Diablo Canyon 2 using the BART Model is expected to result in a decrease in peak clad temperature of 70°F or more. This is supported by analyses done for other Westinghouse four-loop plants designed and operated similarly to Diablo Canyon 2. While the magnitude of this margin differs from plant to plant, the staff agrees that an analysis of the large break LOCA for Diablo Canyon 2 using the BART model would demonstrate sufficient margin to accommodate the 7°F by which the 1978 analysis would exceed the 10 CFR 50.46(b) peak cladding temperature limit using actual plant operating conditions. In addition, there is no reason to expect that the other criteria of 10 CFR 50.46 in terms of cladding oxidation and long term cooling would not continue to be met.

To provide further assurance that Diablo Canyon 2 will continue to meet the PCT criterion of 10 CFR 50.46(b), the licensee has limited the heat flux hot channel factor,  $F_q$ , by administrative control to a value of 2.30, which

is a reduction of 0.02 in Fq units from the value of 2.32 used in Technical Specification 3.2.2. The licensee has revised the applicable operating procedures for Diablo Canyon 2 which implement the Technical Specifications to ensure that the appropriate action statements in Technical Specification 3.2.2 will be implemented if Fq has a value of 2.30 or greater. Diablo Canyon 2 currently is operating with a measured Fq of less than 2.00. The licensee has stated that using the 1978 Evaluation Model, this decrease of 0.02 in Fq would result in a reduction of the calculated PCT of approximately 20°F. These results are based upon sensitivity studies performed by Westinghouse with the 1978 Model and are consistent with previous analyses reviewed by the staff for other facilities.

Based on the above discussion, the licensee's proposed reanalysis of the calculated ECCS cooling performance with the more recent BART Model and using actual plant operating conditions, in conjunction with the interim reduction of the heat flux hot channel factor, Fq, to a value of 2.30 under administrative control is acceptable. This is a one-time only exemption for temporary relief from the requirement of 10 CFR 50, Section 50.46(a)(1) regarding the plant specific ECCS cooling performance calculated with an approved model. The staff also finds acceptable the schedule proposed by the licensee in the February 21, 1986 letter to complete the reanalysis by July 25, 1986 and to submit the results to the staff no later than August 19, 1986.

#### IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, this exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense

and security. The Commission further determines that special circumstances, as provided in 10 CFR 50.12(a)(2)(ii), are present justifying the exemption, namely that application of the regulation in the particular circumstance for the short period involved is not necessary to achieve the underlying purpose of the regulation-to assure the integrity of the fuel cladding in the event of a postulated design basis LOCA by requiring that the peak cladding temperature as calculated with an approved model and using appropriate plant conditions does not exceed the 2200°F limit specified in 10 CFR 50.46(b). Specifically, based on the discussion above and on its experience with the BART Model as applied to similarly designed and operating four-loop Westinghouse plants, the staff concludes that requiring the shutdown of the facility solely to perform a reanalysis confirming these results on a plant specific basis for Diablo Canyon Unit 2 is not necessary for this temporary period. The licensee has demonstrated a good faith effort to achieve compliance by: promptly informing the staff upon notification by Westinghouse of the discrepancy between system performance and the model assumption; by immediately directing Westinghouse to perform necessary studies to assess the safety significance of this difference; and by requesting Westinghouse to provide as promptly as possible a revised plant specific analysis using an improved Westinghouse ECCS evaluation model.

Accordingly, the Commission hereby grants an exemption as described in Section III above from 10 CFR 50.46(a)(1), provided:

1. Heat flux hot channel factor,  $F_q$ , shall not exceed 2.30.
2. All other operating conditions shall conform with the requirements of License No. DPR-82 and the associated Technical Specifications.
3. The licensee shall complete a revised plant specific ECCS analysis for Diablo Canyon Unit 2, in accordance with the schedule stated

in its letter of February 21, 1986 and shall submit the results of such analysis no later than August 20, 1986.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this Exemption will have no significant impact on the environment (February 28, 1986, 51 FR 7160).

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Thomas M. Novak, Acting Director  
Division of PWR Licensing-A

Dated at Bethesda, Maryland  
this 3rd day of March 1986.