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 FACIL: 50-275 Diablo Canyon Nuclear Power Plant, Unit 1, Pacific Gas 05000275  
 50-323 Diablo Canyon Nuclear Power Plant, Unit 2, Pacific Gas 05000323

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 MIRAGLIA, F.J. Licensing Branch 3

SUBJECT: Responds to Generic Ltr 81-21 re natural circulation  
 cooldown during reactor vessel voiding, Westinghouse owners  
 group study demonstrated that cooldown rate of 25 F should  
 be maintained to prevent reactor vessel voiding.

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December 7, 1981

Mr. Frank J. Miraglia, Jr., Chief  
Licensing Branch No. 3  
Division of Licensing  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555



Re: Docket No. 50-275  
Docket No. 50-323  
Diablo Canyon Units 1 and 2  
Natural Circulation Cooldown - Voiding

Dear Mr. Miraglia:

With reference to Generic Letter 81-21 dated May 5, 1981 we have reviewed our current plant operations in relation to possible reactor vessel voiding as a result of natural circulation cooldown. Our findings are as follows:

### STAFF POSITION 1

A demonstration (e.g., analysis and/or test) that controlled natural circulation cooldown from operating conditions to cold shutdown conditions, conducted in accordance with your procedure, should not result in reactor vessel voiding.

### PGandE Response

In response to the St. Lucie 1 cooldown event report, the Westinghouse Owners Group undertook a study with Westinghouse. A summary report was forwarded to the NRC via Owners Group Letter OG-57 dated April 20, 1981. This study demonstrated that a void should not form in the reactor vessel if a cooldown rate of 25 degrees Fahrenheit per hour and the specified sub-cooling margin are maintained.

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Diablo Canyon's operating procedures will be revised to specify a cooldown rate of 25 degrees Fahrenheit per hour and a sub-cooling margin sufficient to prevent reactor vessel voiding. Diablo Canyon's procedure for Natural Circulation will be tested during the Special Low Power Test Program.

#### STAFF POSITION 2

Verification that supplies of condensate-grade auxiliary feedwater are sufficient to support your cooldown method.

#### PGandE Response

Diablo Canyon Technical Specifications require that a minimum of 178,000 gallons of water be maintained in the Condensate Storage Tank and 270,000 gallons of water be maintained in the Fire Water Storage Tank as an additional source of auxiliary feedwater. A total of 448,000 gallons are thus available while only 222,600 gallons are required to cooldown from hot-standby to 350 degrees Fahrenheit assuming the following conservative conditions:

1. Reactor trip from 102 percent rated power (blackout);
2. Initial water masses in the steam generators are 10 percent less than low-low water masses;
3. Auxiliary feedwater temperature of 100 degrees Fahrenheit;
4. Reactor trip delay of 2 full power seconds;
5. Stored fuel heat of 5 full power seconds;
6. Stored clad heat of 5 full power seconds;
7. Water in steam generators restored to programmed no load levels;
8. Decay heat curve is a composite curve consisting of the Westinghouse Residual Decay Heat Standard with 3 region core (0-1200 seconds) and Westinghouse Plutonium Recycle Decay Heat Standard. This composite is the most conservative decay heat curve;
9. A cooldown rate of 25 degrees Fahrenheit per hour; and,
10. A hot shutdown time of one hour prior to the cooldown. An adequate supply of auxiliary feedwater is therefore available for cooldown.



STAFF POSITION 3

A description of your training program and the provisions of your procedures (e.g., limited cooldown rate, response to rapid change in pressurizer level) that deal with prevention or mitigation of reactor vessel voiding.

PGandE REsponse

The St. Lucie, Unit No. 1 event was presented in the Licensed Operator Requalification Training Program. The primary emphasis during these training sessions was on methods available to the operators to prevent voiding in the reactor vessel, symptoms available to recognize voiding, and ways to control the reactor plant in case that voiding occurred in the reactor vessel.

During the Special Low Power Test Program, five tests pertaining to Natural Circulation will be conducted:

1. Natural Circulation Test;
2. Natural Circulation with simulated loss of offsite AC power;
3. Natural Circulation with loss of pressurizer heaters;
4. Effect of steam generator isolation (secondary side) on natural circulation;
5. Natural Circulation at reduced pressure.

These tests will be performed utilizing both the special test procedures and Diablo Canyon's operating procedures.

Prior to the performance of the tests, each licensed operator will receive training on Diablo Canyon's Operating Procedures for Natural Circulation and on the Special Test Procedures. Each licensed operator will participate in at least one of the Natural Circulation Tests and observe two others.

The procedures for natural circulation will specify that pressurizer level and subcooling margin be monitored as the primary indications of the formation of a void in the reactor vessel. They will also provide guidance on the actions to be taken by the operator if a void is indicated, i.e.:

1. stop the cooldown;
2. verify proper subcooling margin;
3. repressurize the Reactor Coolant System; and, if necessary,
4. vent the Reactor Vessel Head.



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Mr. Frank J. Miraglia, Jr.

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December 7, 1981

We believe that the above will provide the necessary assurance to alleviate concerns about being able to either avoid reactor vessel voiding, recognize it when, and if, it occurs and take the proper steps during controlled natural circulation cooldown.

Sincerely,

Philip A. Gross, 

cc: Service List

