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May 8, 1984

Director, Office of Nuclear Reactor Regulation
Attention: D. M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket No. 50-206
Overpressure Mitigation System Technical Specifications
San Onofre Nuclear Generating Station
Unit 1

References: A. Amendment Application No. 76 submitted by letter from J. H. Drake, SCE, to H. R. Denton, NRC, dated October 20, 1978

B. Letter, Dennis M. Crutchfield, NRC, to R. Dietch, SCE, dated October 28, 1982

C. Letter, J. G. Haynes, SCE, to J. B. Martin, NRC, Region V, dated November 14, 1983

D. Letter, M. O. Medford, SCE, to D. M. Crutchfield, NRC, dated March 1, 1984

Reference A provided the NRC with proposed Technical Specification changes regarding operation of the Overpressure Mitigation System (OMS). Since those changes were proposed in 1978, correspondence with the NRC staff has continued regarding operation of the system. The ongoing review resulted in the NRC staff's evaluation of the San Onofre Unit 1 overpressure mitigation system being transmitted by Reference B. The results of the evaluation include two recommendations for revisions to the proposed Technical Specifications.

The first change recommended in the NRC evaluation is the revision of the testing program on the low pressure setpoint of the PORV's to include a channel test prior to going water solid during normal cooldown to Mode 5. As indicated in the enclosure, the testing program previously proposed should be modified to include channel testing of the low pressure PORV setpoint within 31 days prior to placing the OMS into operation on cooldown. This testing program assures low pressure PORV operability whenever the plant is to be in a water solid condition.

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The second change recommended in the NRC evaluation is a revision of the reactor coolant pump start criteria when water solid. As indicated in the enclosure, the criteria previously proposed should be modified to be more specific regarding the evaluation of "potential system temperature gradients." This statement should be replaced with one specifically indicating a 50°F temperature differential between the secondary and primary system. The specification originally proposed was numbered 3.1.2(E). Since there is now existing a specification with this number, the proposed specification should be numbered 3.1.2(G).

In addition, the recent event involving the OMS (reported in LER 83-005 and described in the Reference C letter) revealed that the pressurizer PORV low pressure setpoint was non-conservative. A recalculation was performed to determine a revised setpoint and submitted with the Reference D letter. The new setpoint of 500 psig should replace the 522 psig number of proposed specification 3.15.A(1). The revised calculation of the setpoint is based on the current heatup and cooldown curves for 16 EFPY of operation. Because the calculation is based on the 16 EFPY curves, it will be necessary to evaluate the need for setpoint readjustment whenever the curves are revised. As discussed in the enclosure, a statement should be added indicating the need for reevaluation of the OMS setpoint should the heatup and cooldown curves be changed.

If you have any questions on this matter or require additional information, please let me know.

Very truly yours,

M. O. Medford

Enclosure

cc: J. O. Ward, Chief, Radiation Control Unit
California Department of Health

Enclosure

CLARIFICATION OF PROPOSED CHANGE NO. 71
PORV Low Pressure Setpoint Testing,
Reactor Coolant Pump Restart Criteria and Setpoint Readjustment

I. Introduction

The low temperature Overpressure Mitigation System (OMS) has been installed and is available to mitigate overpressure events at San Onofre Unit 1. Proposed Technical Specifications on the operation and surveillance of this system were included in Proposed Change No. 71 submitted to the NRC as part of Amendment Application No. 76 by letter dated October 20, 1978. Correspondence between SCE and the NRC continued culminating in the NRC's evaluation being provided by letter dated October 28, 1982.

The NRC evaluation noted that the system as installed by SCE was acceptable contingent on two modifications to the proposed Technical Specifications as follows:

"1. A channel functional test be performed prior to entering Mode 5 on cooldown and to require that operability of the system be tested prior to returning to the water solid condition following a cold shutdown with the reactor coolant system depressurized, and

2. If the water level in the pressurizer is greater than 80%, or if the initial reactor coolant system pressure is less than 400 psig, the temperature gradient between the secondary side of the steam generator and the reactor coolant system are to be verified to be no greater than 50°F before a reactor coolant pump is started."

In addition, due to the pressurization event at San Onofre Unit 1 on November 10, 1983, SCE submitted by letter dated March 1, 1984 our determination that the system setpoint should be revised from 522 to 500 psig. Since the calculation is based on the 16 EFPY heatup and cooldown curves, it will be necessary to reevaluate the setpoint for continued acceptability at any time the heatup and cooldown curves are updated. A note should be added to the Technical Specifications indicating the need to reevaluate the setpoint analysis.

II. Incorporation of Channel Functional Testing Requirements

The proposed Technical Specification included in Proposed Change No. 71 would require that each PORV be demonstrated operable by the following:

"(1) Adjusting the pressure control bistable setpoint such that the PORV's are actuated and the annunciators alarm within 31 days prior to returning to a water-solid condition following a cold shutdown with the RCS depressurized.

(2) Performance of a channel calibration on the PORV actuation channel at least once per 18 months.

(3) Verifying that position indications on the PORV isolation valves indicate that the valves are open at least once per week when the PORV's are being used for overpressure protection."

In the NRC's evaluation of the system it was determined that a channel function test should be performed prior to entering Mode 5 on cooldown and that the operability of the system be tested prior to returning to a "water solid" condition following a cold shutdown with the RCS depressurized.

Number 1 of the testing program described in Proposed Change No. 71 includes a provision for testing prior to returning to a water-solid condition following a cold shutdown with the RCS depressurized. Therefore, the only remaining testing requirement is to test the system prior to putting the system into operation on cooldown. This provision can be included by specifically stating that the PORV low pressure setpoint should have a channel test performed within 31 days prior to placing the OMS into operation on cooldown.

The specification on testing should be revised as follows to incorporate the additional functional testing by renumbering the specifications currently numbered 2 and 3 as 3 and 4 respectively and including a new specification number 2 as follows:

"(2) Performance of a channel test within 31 days prior to enabling the low pressure overpressure mitigation setting of the pressurizer PORV's on cooldown."

III. Clarification of Reactor Coolant Pump Restart Criteria

The heat input case assumed for determining the low temperature overpressure PORV setpoint is based on an inadvertent startup of a reactor coolant pump with a secondary to primary temperature differential of 50°F with the plant in a water-solid condition. The objective of the technical specification on starting a reactor coolant pump is to ensure that either the 50°F temperature differential does not exist, or that if there is a possibility that it does, that a cushion is established in the pressurizer.

The NRR review of the proposed technical specification on reactor coolant pump start resulted in a request to clarify the pump start criteria to indicate the 50°F temperature differential.

The statement in Proposed Change No. 71 regarding temperature gradients is as follows:

"A reactor coolant pump shall not be started with the RCS pressure ≤ 400 psig unless:

(1) the pressurizer water level is less than 80%, or

(2) the potential for having developed reactor coolant system temperature gradients has been evaluated."

The basis for this specification does not specifically indicate that a 50°F temperature differential is what is referred to as "system temperature gradients."

The basis indicated in Proposed Change No. 71 is as follows:

"The limitation on reactor coolant pump operation with the RCS pressure ≤ 400 psig ensures that the RCS will be protected from pressure transients which could exceed the limits of Appendix G to 10 CFR Part 50[2]. A pressurizer water level of less than 80% ensures that the start of a reactor coolant pump, with a temperature differential of 100°F will not result in 10 CFR Part 50 Appendix G limits being exceeded.

[2] Letter to A. Schwencer from K. Baskin dated October 12, 1977."

The basis does not specifically indicate that the differential temperature gradient should be limited to 50°F with the primary system in a water solid condition prior to pump start. However, the reference specified in the basis for the Technical Specification (letter to A. Schwencer from K. Baskin dated October 12, 1977) specifically uses a 50°F temperature difference as the basis for determining the OMS setpoint for the heatup transient. Therefore, the statement "system temperature gradients" is equivalent to "a 50°F temperature differential between the secondary and primary systems". This statement can be included in the Proposed Change without changing the intent of the specification. It should be noted that the change as proposed in Amendment Application No. 76 was designated 3.1.2(E). Since there is now existing a specification with this designation, the revised specification should be numbered 3.1.2(G). In order to clarify the means by which the existence of a > 50°F temperature gradient may be determined, the basis for the Proposed Change should be modified by the addition of the following:

"There are several means available for determining that there is not a temperature differential of > 50°F between the secondary and primary systems with ≤ 400 psig primary system pressure. These methods may include but are not necessarily limited to the following:

1) Converting steam line pressure indication into maximum temperature of steam generator fluid.

2) Tagging RCP switches with shutoff temperatures.

3) Assuring adequate time for temperature gradients to dissipate.

4) Filling steam generators with water of known temperature."

A discussion of these methods follows:

Converting Steam Line Pressure Indication into Equivalent Temperature: The maximum temperature of the fluid in the steam generator can be converted from the steamline pressure. For example, if steamline pressure is ambient, it must be assumed that the temperature of the fluid in the steam generator is 212°F unless another method would support a lower temperature. For higher pressures, the temperature must be assumed to be equal to the saturation temperature at that pressure. This is one method that allows a quick conservative determination to be made regarding the acceptability of starting an RCP.

Tagging Reactor Coolant Pump Switches with Shutoff Temperatures: During cooldown to cold shutdown, the reactor coolant pumps are normally kept running until the RCS and steam generator metal temperatures have had time to equalize after reaching the desired cooldown temperature. Once this condition has been established (about 1 hour*), yellow caution tags with final RCS temperature are placed at each switch. This is an indication of steam generator temperature when the pumps were last run. The only way for a > 50°F temperature gradient to develop under these conditions is to heat the RCS to a higher temperature (which could also heat the steam generators), or to cool the RCS > 50°F below the temperature at which the pumps were stopped. Before starting an RCP, the operator would merely check the tagged temperature on the RCP switch and determine whether any recent RCS temperature excursions exceeded the tagged temperature by > 50°F, or if the current RCS temperature is more than 50°F lower than the tagged temperature. By doing this it can be assured that the differential temperature is < 50°F and a pump can be safely started.

Assuring Adequate Time for Temperature Gradients to Dissipate: During extended periods (on the order of at least one week*) of shutdown without any temperature transient in the primary and secondary, the RCS and the secondary side temperatures will equalize. Under these circumstances of extended periods with no temperature transients, an RCP can be safely started. It should also be noted that an RCP can be stopped at any time under water solid conditions and restarted within a short period of time if the cooldown rate has not been too rapid to create a > 50°F temperature differential. For example, when going onto RHR, the RCP's are stopped when an RHR pump is started. If the cooldown rate at this time is 50°F per hour, then the pumps could be restarted within one hour without the possibility of having developed temperature gradients. If more than an hour elapsed since the pumps were secured then an alternate means would be required to determine the maximum temperature gradient.

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* These time periods are not based on an anaysis done to determine RCS and steam generator metal temperatures, rather the time periods are based on conservative engineering judgment.

Fill Steam Generators with Water of Known Temperature: By completely draining and refilling the steam generators with water of a known temperature, the secondary side temperature will be known and can be determined to be less than 50°F above the primary side temperature. This will assure that the RCP's can be started without the potential for excessive temperature gradients.

IV. Revision of Low Temperature Overpressure PORV Setpoint

The RCS pressure transient experienced at San Onofre Unit 1 on November 10, 1983 led to a reanalysis of the design basis for the low temperature PORV setpoint. The results of the analysis submitted by letter from M. O. Medford, SCE, to D. M. Crutchfield, NRC, dated March 1, 1984 indicated that the PORV setpoint should be revised from 522 psig to 500 psig.

Proposed Change No. 71 specifically identifies the PORV low temperature setpoint as 522 psig. As dictated by the results of the setpoint analysis, specification 3.15.A(1) of Proposed Change No. 71 should be revised to include the new setpoint. In addition, as the new setpoint is based on the heatup and cooldown curves for 16 EFPY, a note should be added indicating the need for reevaluation at any time the curves are changed. The specification should be revised to read as follows:

"(1) Two power operated relief valves (PORV's) with a lift setting of 500 psig*, or

* The 500 psig setpoint is based on the current heatup and cooldown curves for 16 EFPY. The setpoint requires reevaluation for acceptability any time the curves are changed."

V. Conclusion

The Proposed Change No. 71 to the Technical Specifications should be clarified to add an additional PORV channel test, be more specific regarding "system temperature gradients," and change the PORV low pressure setpoint.

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