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SUBJECT: Provides verification that original LTOP analysis by C-E still bounding for updated PT limits curves for Unit 3.

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November 6, 1989

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
Low Temperature Overpressurization (LTOP) Transient Analysis
San Onofre Nuclear Generating Station
Units 2 and 3

References: A) February 23, 1989 letter from F. R. Nandy (SCE) to Document Control Desk (NRC), Same Subject

B) June 12, 1989 letter from L. T. Papay (SCE) to Document Control Desk (NRC), Same Subject

In response to a request from Mr. Don Hickman, Project Manager, NRC Project Directorate V, this letter provides verification that the original LTOP analysis performed by Combustion Engineering for Units 2 and 3 is still bounding for the updated Pressure-Temperature (PT) Limit curves for Unit 3. This information is similar to the information previously provided for Unit 2 by Reference A. Reference A was sent to the NRC in support of proposed Technical Specification change 278 (PCN-278). PCN-278 was submitted to the NRC to update the Pressure-Temperature (PT) curves for San Onofre Unit 2. PCN-278 was approved by NRC letter dated April 11, 1989 and provides the current PT curves in use at San Onofre Unit 2.

The corresponding proposed Technical Specification change for Unit 3 is PCN-292 and was submitted to the NRC by Reference B. The Unit 3 PT curves were prepared in an identical manner as the NRC approved Unit 2 PT curves as is discussed below.

When preparing the original PT curves for San Onofre Unit 2 and Unit 3 (separate curves for each unit), Southern California Edison (SCE) was required to evaluate the limiting pressure transients for the shutdown cooling system (SDCS) to ensure that the PT curves would protect against these transients. The original LTOP analysis performed by Combustion Engineering (CE) indicated that there were two postulated transients that produce similar limiting SDCS pressure spikes: (1) mass addition transient (three charging pumps and 2 HPSIs) and (2) Reactor Coolant Pump (RCP) start energy addition transient.

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For the mass addition transient, the LTOP relief valve in the SDCS was sized by CE to accommodate this transient for shutdown cooling system temperatures from 120°F to 400°F (SDCS design temperature) and assuming a 417 psia* relief valve setpoint. For Unit 3, the LTOP alignment temperature for 0-4 effective full power years (EFPY) is 285°F for both RCS heatup and cooldown operations. PCN-292 would change the LTOP alignment temperature to 302°F for heatup and 267°F for cool down for plant operation from 4 EFPY to 8 EFPY. These new alignment temperatures are within the bounds of the original LTOP transient analysis performed by CE. Therefore, the original LTOP transient analysis is still bounding for the limiting postulated mass addition transient for the SDCS.

For the energy addition transient, the original CE LTOP analysis assumed that one RCP was started with a maximum allowed ΔT of 100°F between the primary and secondary systems. In this analysis, CE assumed that the energy addition transient occurred with the RCS at 120°F and the steam generators at 220°F. Changing the LTOP alignment temperature from 285°F for both heatup and cooldown to 267°F for cooldown and 302°F for plant heatup does not affect the energy addition transient. This 100°F ΔT can still occur but has already been included and evaluated as acceptable in the original CE analysis. Thus, changing LTOP alignment temperatures will not change the initial conditions assumed in the original CE LTOP analysis.

During SCE's review of the original CE LTOP analysis, SCE found that the 100°F ΔT energy addition transient had not been evaluated for all possible temperature combinations, e.g., the RCS at 250°F and the steam generators at 350°F (350°F is the maximum SDCS alignment temperature). However, because the energy addition transient is driven by the ΔT between the primary side and the secondary side rather than the RCS starting temperature, these higher temperature 100°F ΔT transients should not be more limiting than the 120°F RCS/220°F steam generator transient. Because it is unnecessary to perform this calculation for reasons stated below, SCE will not be formalizing this calculation. The basis for this determination is that it can be reasonably assumed that the plant will never be in a position to experience the 100°F ΔT energy addition transient (at any temperature) due to plant operating practices.

In order to be consistent with the assumptions in the original LTOP analysis, three conditions would have to exist in order for the transient to occur:

1. The RCS would need to be water solid;

2. There would need to be a 100°F ΔT between the primary side and the secondary side (with the secondary side hotter); and

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*The SDCS design pressure is 450 psia. The analysis assumed a lower pressure in the LTOP relief valve sizing calculation to be conservative. It is conservative because a lower system pressure than the maximum anticipated pressure would have a smaller relief capacity.

3. The RCPs could not be running.

The plant operating procedures prevent these conditions from occurring by the following:

1. The RCS is normally water solid only below 140°F during a plant cooldown or following RCS fill and vent during plant startup.

2. If the RCPs are not available for a normal plant cooldown, the maximum ΔT between the primary system (reactor coolant system cold leg temperature) and the secondary system (steam generators) is procedurally limited to 20°F before an RCP can be started.

3. A normal plant cooldown is performed using two RCPs until the primary side is at or below 140°F with the steam generators reverse cooled through the shutdown cooling system.

By comparing the plant conditions assumed in the original LTOP analysis with the actual plant operating practices, one can see the large conservatisms that exist between the actual and the analyzed conditions.

From the above discussion it can be concluded that changing the LTOP alignment temperature from 285°F for both plant heatup and cool down to 302°F for plant heatup and 267°F for plant cool down will not increase the maximum allowed energy addition pressure transient from that currently allowed. Procedurally, this transient is limited even further by restricting the maximum ΔT to 20°F and running 2 RCPs to reverse cool the steam generators during normal plant shutdowns.

SCE requests that the NRC complete their review of PCN-292 expeditiously. As indicated in SCE's original submittal of PCN-292, the current PT limit curves for Unit 3 will expire at 448 EFPD, which is projected to occur on December 17, 1989 (based on continued 100% full power operation). Accordingly, NRC approval of PCN-292 is required prior to this date.

If you have any additional questions, please let me know.

Very truly yours,

cc: J. B. Martin, Regional Administrator, NRC Region V
C. Caldwell, NRC Senior Resident Inspector, San Onofre Units 1, 2 and 3