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SUBJECT: Provides addl confirmatory info re Proposed Change PCN-200, revising borated water source requirements. PCN-200 reduces max concentration of boric acid to be stored in boric acid makeup tanks.

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APR 0 2 1986

Director, Office of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Director
PWR Project Directorate No. 7
Division of PWR Licensing - B
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station
Units 2 and 3

In our letter dated March 4, 1986, the Southern California Edison Company (SCE) committed to provide additional confirmatory information relating to PCN-200. Proposed Change PCN-200 was submitted by SCE's letter dated October 9, 1985 and would revise borated water source requirements for San Onofre Nuclear Generating Station (SONGS) Units 2 and 3. Specifically, PCN-200 would reduce the maximum concentration of boric acid to be stored in the boric acid makeup (BAMU) tanks.

The NRC Staff, during the course of their review of PCN-200, requested that SCE provide, as confirmatory information: 1) SCE's assessment of the impact of PCN-200 on the FSAR Chapter 15 Transient and Accident Analyses; 2) supporting analysis to address the effect of BAMU tank concentration reduction on the steam line break analysis; and 3) supporting analysis to address the effect of the proposed Unit 3 Cycle 2 Safety Injection Tank (SIT) concentration reduction on the LOCA analysis.

The Chapter 15 Transient and Accident Analyses were reviewed to identify those events which potentially could be affected by the proposed reduction in the stored boric acid concentration. The events which could be potentially affected by these changes are those for which credit is taken for safety injection system operation. Two classes of events were identified where the safety injection system is credited. These events include steam system piping failures and loss of coolant accident (LOCA). From the standpoint of the effects of the boric acid concentration reductions proposed for the BAMU tanks, only those events which take credit for the boric acid addition charging flow could potentially be affected, since the

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safety injection pumps take their suction directly from the refueling water storage tank (RWST). The charging pumps are actuated on a safety injection actuation signal (SIAS) and take their suction from the BAMU tanks following a SIAS.

The main steam line break accident, which is discussed in Section 15.1.3.1 of the FSAR, takes credit only for high pressure safety injection (HPSI) flow drawn from the RWST. No credit is taken for boron added by charging flow even though the charging pumps are actuated on SIAS. Since no credit is taken for charging flow from the BAMU tanks, the results of the steam line break accident analyses are unaffected by the boric acid concentration reduction. Reanalysis of the main steam line break accident is presented in both the Cycle 2 and Cycle 3 Reload Analysis Reports (RAR), which were submitted for NRC review by SCE's letters dated September 28, 1984 and September 5, 1985.

The other class of accidents covered by Chapter 15 which take credit for safety injection flow are the loss of coolant accidents (LOCA) which are discussed in FSAR Section 15.6.3. The limiting large break LOCA credits only HPSI and LPSI flow. No credit is taken for charging pump flow from the BAMU tanks; therefore, the boric acid concentration reductions do not affect the large break LOCA analyses presented in the FSAR and Cycle 2 and Cycle 3 RAR.

The small break LOCA, on the other hand, does take credit for the charging pump flow. During the course of the operating license review, the NRC Staff requested that SCE assess a spectrum of small breaks to determine which is most limiting. The 0.05 square foot small break LOCA was determined to be limiting. To obtain acceptable analyses results, it is necessary to take credit for the flow from one charging pump to maintain sufficient RCS inventory to meet the peak clad temperature and oxidation criteria set forth in 10 CFR 50.46 and Appendix K. The charging pumps, associated suction valves, and BAMU pumps receive a SIAS. The credit taken for charging flow is merely from an inventory standpoint. No credit is taken for the concentration of boric acid being injected. Since the concentration of boric acid was not a consideration in the small break LOCA, the proposed reduction in BAMU tank boric acid concentration does not affect the results of the small break LOCA presented in the FSAR.

No other Chapter 15 Transient and Accident Analyses take credit for safety injection; thus they are unaffected by the proposed boric acid concentration reductions. PCN-200 also revises the upper limits on allowed boric acid concentration in the RWST and SIT

The upper limits on concentration are specified to ensure that boric acid does not precipitate in the core during the long-term cooling phase following a loss of coolant accident. FSAR Section 6.3.3.4.3 identifies the maximum amount of boric acid which could be injected during a LOCA from the borated water sources. Although the upper limits for the RWST and SIT are increased to 2500 ppm, the upper concentration limit on the BAMU tanks decreases from 12 WT % to 3.5 WT %. This more than compensates for the increase in allowed RWST and SIT concentration. The long-term cooling analysis presented in FSAR Section 6.3.3.4.3 remains bounding since the total mass of boric acid injected would be lower than assumed in the analysis.

PCN-200 reduces the concentration assumed in the SIT for Unit 3 Cycle 2 from 1720 ppm to 1420 ppm. The two accidents, which credit safety injection, are the steam line breaks and LOCAs as discussed above. In the case of the steam line break, reactor coolant system pressure does not go below the SIT pressure at any point during the event. Consequently, no boron from the SIT is injected into the RCS. This is documented in the Cycle 2 RAR. As a result, the proposed reduction of SIT concentration has no affect on the main steam line break analysis presented in the Cycle 2 RAR.

In a large break LOCA, one of the functions of the SIT is to reflood the core and inject sufficient boron to maintain the reactor subcritical by at least 1%. Prior to the SIT concentration reduction effort, Combustion Engineering (CE) has shown, in bounding calculations, that setting the SIT concentration equal to that of the RWST will ensure that the reactor is at least 1% subcritical following a LOCA, with no credit being taken for CEA insertion. There is no specific criterion for the amount of shutdown margin required during a LOCA. CE has adopted this 1% criterion as a measure of safety consistent with other positive reactivity insertion events. To justify the SIT concentration reduction, CE performed a Cycle 2 specific volumetric calculation on the amount of boron which would be injected from the SIT during a large break LOCA to demonstrate that a 1420 ppm lower limit results in a post LOCA shutdown margin of greater than 1%. CE calculation 15683-PHR-064 dated January 25, 1985 documents this result.

The proposed SIT concentration reduction does not affect the mass of water assumed to be injected in the LOCA analysis. Since the mass and rate of injection remain the same, the peak clad temperature and cladding oxidation results presented for the large break LOCA in the Cycle 2 RAR are unaffected by the SIT concentration reduction.

SCE considers that this letter satisfies the commitments made by our March 4, 1986 letter. If you have any questions regarding this matter, please call me.

Very truly yours,

M. O. Medford

cc: Harry Rood, NRC Project Manager (to be opened by addressee only)
F. R. Huey, USNRC Senior Resident Inspector, Units 1, 2 and 3