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SUBJECT: Forwards addl info supporting 851009 proposed change RCN-200 to Licenses NPF-10 & NPF-15, reducing max boric acid concentrations stored in boric acid makeup tanks. Confirmatory info re change will be submitted on 860415.

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March 4, 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

Southern California Edison Company's (SCE) letter dated October 9, 1985 submitted a proposed change to the San Onofre Nuclear Generating Station (SONGS) Units 2 and 3 Technical Specifications. The proposed change, NPF-10/15-200 (PCN-200), would revise borated water source requirements for SONGS 2 and 3. Specifically, the proposed change would reduce the maximum concentration of boric acid to be stored in the boric acid makeup tanks.

SCE's letters dated February 11, 1986 and February 19, 1986 transmitted additional background information and responded to NRC Staff questions relating to PCN-200. In subsequent conversations, the Staff raised an additional question, the response to which is included as Enclosure 1. Additionally, Enclosure 2 contains information, which was informally provided to the Staff by SCE on January 17, 1986, but was inadvertently omitted from SCE's February 11, 1986 letter.

The Staff has also requested that SCE commit to provide on the docket certain confirmatory information relating to PCN-200. This information is to include: 1) SCE's assessment of the impact of PCN-200 on the FSAR Chapter 15 Transient and Accident Analysis; 2) supporting analysis to address the effect of boric acid makeup tank concentration reduction on the steamline break analysis; and 3) supporting analysis to address the effect of the proposed Unit 3 Cycle 2 safety injection tank concentration reduction on the LOCA analysis. SCE has verbally addressed these issues and understands that PCN-200 will be approved without prior submittal of this confirmatory information. The requested information will be provided April 15, 1986.

A001
1/1

If you have any questions regarding the enclosed information, please call me.

Very truly yours,

M O Medford / DJC

Enclosures

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

ENCLOSURE 1

QUESTION 6: Demonstrate that there is sufficient conservatism in the CEN-316 analytical methods used to generate Figure 2-5 to account for a RCS mixing delay of 30 minutes.

RESPONSE: SCE's response to Question 5 (included in SCE's letter dated February 19, 1986) demonstrated that there is sufficient conservatism in the CEN-316 analytical methods to account for RCS mixing delays for a more rapid cooldown scenario where the effects of RCS mixing would be more important. A similar argument can be made for the 12.5°F/hr cooldown scenario illustrated in Figure 2-5 of CEN-316. In order to demonstrate this conservatism, reference will be made to Table 2-6 on Page 2-25 of CEN-316 and Case I on Page 2 of 6 of Appendix 6 to CEN-316.

Consider the 52-hour point where the closest approach is made by the actual predicted RCS concentration to the required RCS concentration. From Case I of Appendix 6 at 52 hours, the required boron concentration (i.e., the lower curve of Figure 2-5) is 715 ppm. This includes a 50 ppm measurement uncertainty, which per our discussion, is an additional, but not required conservatism.

Subtracting this 50 ppm, the required concentration at 52 hours after shutdown then could be 665 ppm. Refer now to Table 2-6 of CEN-316 (data for upper curve of Figure 2-5). The final concentration column of Table 2-6 predicts RCS boron concentration would be 670.2 ppm at the end of the cooldown segment between 335 and 322.5°F. At a 12.5°F per hour cooldown rate, and assuming the 26 hour delay after shutdown before cooldown is commenced, this would occur at 45 hours into the scenario. This concentration is based on the CEN-316 methodology which does not explicitly account for RCS mixing delays. Assuming a 1/2 hour mixing delay, as discussed in our response to Question 2, then an RCS concentration of 670.2 ppm would occur at 45.5 hours after shutdown versus 45 hours. (From Case I of Appendix 6, the required concentration at 45 hours is 596 ppm after the 50 ppm conservatism is subtracted.) However, the required concentration at 52 hours is 665 ppm as discussed above, thus the required concentration for the closest approach between actual and required concentration, illustrated on Figure 2-5, would be reached approximately 6 1/2 hours before it is needed. Thus, at the point of closest approach on

Figure 2-5, there is approximately 7 hours in total to account for RCS mixing, taking credit for the 50 ppm measurement uncertainty. A similar argument can be made for every point on Figure 2-5 utilizing the information provided in Table 2-6 and Case I of Appendix 6.

ENCLOSURE 2

3.2 Steam Line Break Boration Requirements

This subsection discusses the results of the steam line break (SLB) analyses performed in support of the proposed change to the Technical Specification 4.5.1b for San Onofre Units 2 and 3. The results have indicated that the boron concentration in the Safety Injection Tank (SIT) does not affect the SLB consequences when analyzed with the initial conditions assumed in the San Onofre Units 2-3 Updated Final Safety Analyses Report (FSAR).

All the SLB events have been reviewed to determine the limiting cases. The limiting cases were analyzed using CESEC III with a new model to better simulate reactor coolant system (RCS) pressure following steam generator dryout. The analyses were performed to assess the impact of the boron concentration in the SIT on the SLB events by determining the minimum boron concentration in the SIT for which acceptable SLB consequences can be obtained. The analyses used appropriate data for Cycle 2.

Two limiting cases were analyzed: hot full power with a loss of AC power and hot zero power with a loss of AC power. The results from these two cases are summarized as follows:

(1) For Hot Full Power Case -

With loss AC power at time zero, the core return-to-power peaks around 110 seconds. There is no SIT fluid discharged into the system as RCS pressure remains above the SIT pressure.

(2) For Hot Zero Power Case -

With loss AC power at time zero, the core return-to-power peaks around 170 seconds. The SIT discharge will not be initiated at this time as RCS pressure remains above the SIT pressure. When SIT discharge does occur, sufficient negative reactivity has already been provided by the high pressure safety injection pump which takes suction from the refueling water storage tank.

In addition, the non-limiting cases, namely SLB events with AC power available, were reviewed. It was determined from the review that the RCS pressure would remain above the SIT pressure throughout the transient and borated water in the SIT was not required to prevent a return to power.

In summary, using current licensing methodolgy, the boron concentration in the SIT does not affect the SLB consequences when any SLB event is analyzed using CESEC III with a model which conservatively simulates RCS repressurization after steam generator dryout.

3.3 LOCA Boration Requirements

This subsection discusses the evaluation of boration during a LOCA in support of the proposed change to the Technical Specification 4.5.1b for San Onofre Units 2 and 3. The result of this evaluation is that for Cycle 2, the SIT boron concentration should not be permitted to fall below 1420 ppm during plant operation in Modes 1, 2, and 3 (with RCS pressure greater than or equal to 715 psia).

As noted in the BACKGROUND section of this report, the safety injection system fluid must contain sufficient neutron absorbers to maintain the core subcritical for the duration of a LOCA. The SITs discharge during a large LOCA to refill the reactor vessel downcomer and reflood the core. Prior to the completion of reflood, voiding prevents core return to power. To ensure that the fluid which is discharged by the SITs and refloods the core contains sufficient neutron absorbers to maintain the core subcritical, the minimum boron concentration of the SIT solution should provide, in Combustion Engineering's judgement, a minimal shutdown margin of 1%.

An analysis of the SIT boron concentration necessary to provide 1% shutdown margin during conservative LOCA conditions has been made for Cycle 2. The boration requirement in the first few minutes after a LOCA requires the SIT solution concentration not to decrease below 1420 ppm during plant operation when the SITs are needed for standby safety injection. Following core reflood in the event of a LOCA, borated water from the refueling water storage tank (RWST) at the refueling boron concentration is supplied by the high and low pressure safety injection pumps. This increases the shutdown margin and ensures that the core remains subcritical for the duration of the LOCA.

The 1420 ppm value is 300 ppm lower than the San Onofre Units 2 and 3 current cycle Technical Specifications minimum boron requirement for refueling: 1720 ppm. The lower ppm value means there is margin available for permitting the SIT solution boron concentration to periodically stray below the Technical Specification requirement based on refueling. This supports a relaxation of the surveillance requirement on SIT boron during Modes 1, 2, and 3.

The proposed permitted value of 1420 ppm is based on San Onofre Unit 2 Cycle 2 analysis. Extended cycles are projected to require a higher SIT boron concentration; however, there is high confidence that the SIT concentration can be permitted to decrease during normal plant power operations, as a result of safety injection check valve leakage, to 200 ppm below the minimum Technical Specification boron requirement for the RWST in future cycles. Thus, a relaxation of the surveillance requirement on SIT solution concentration based on the 200 ppm delta would be valid for future cycles. Using the results of the parametric on SIT boron concentration from subsection 3.1, the surveillance requirement can be relaxed with an allowance for higher minimum boron requirements of future cycles.

Figure 5.2-1

Simplified P&ID of SONGS 2 and 3 Charging System

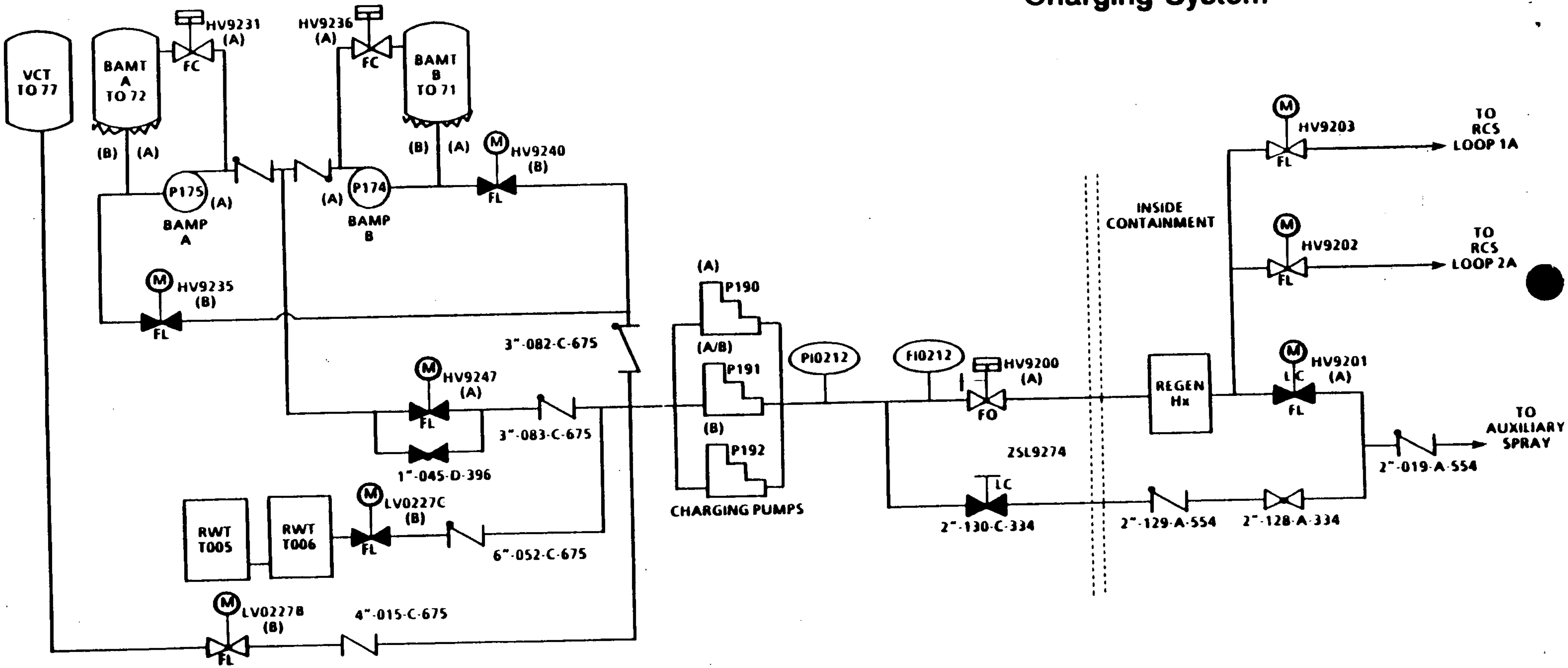

Table 5.3-1

Initial Inventory Requirements for
Safe Shutdown

1.	Coolant contraction@	2,361 gal
2.	RCS leakage*	990 gal
3.	Auxiliary spray	800 gal
	Total	4,151 gal

@ - Assumes a 30 degree plant cooldown from an average temperature of 560 degrees to 530 degrees at 2,200 psia and a BAMT temperature of 70 degrees. In addition, no credit was taken for pressurizer outsurge during cooldown.

* - Assumes 11 gpm leakage for 1.5 hours as follows: 0.5 hours from plant trip to initiation of thirty degree cooldown, 0.5 hours to perform 30 degree cooldown, 0.5 hours to depressurize plant to 1300 psia.