DESCRIPTION OF PROPOSED CHANGE NO. 120 AND SAFETY ANALYSIS

This is a request to revise Section 3.6, "Containment Systems" and Section 3.8, "Fuel Loading and Refueling" of Appendix A Technical Specifications for San Onofre Nuclear Generating Station, Unit 1.

Description

Technical Specification 3.6.1.B(3) prohibits positive reactivity changes using boron dilution whenever the containment integrity is not intact. This specification is unique to San Onofre Unit 1. During extended shutdown periods when the RCS is at midloop, compliance with this specification will result in boron concentrations far in excess of the level necessary to maintain the required shutdown margin. The increased concentration is due to weekly Boric Acid Flow Verification Tests and evaporation of coolant when blowers are being used to ventilate the steam generators' channel heads without the nozzle plugs in place. According to our present Technical Specification, the increased concentration must then be maintained until the containment integrity has been established. When the coolant system is eventually diluted for reactor startup approximately 20,000 - 30,000 gallons of liquid waste will be generated.

Proposed Change No. 120 would revise Technical Specification 3.6.1.B(3) in order to allow relief from the definitive limitations imposed by this specification and still maintain restrictions that ensure an adequate shutdown margin. In conjunction with this modification, it is desirable to maintain consistency within our Technical Specifications. For this reason, Technical Specification 3.8.A.4, and the appropriate basis, are being revised in order to reflect this consistency.

Existing Technical Specifications

Technical Specification 3.6.1.B(3) currently reads as follows:

"3.6.1.B(3) Positive reactivity changes shall not be made by rod drive motion or boron dilution whenever the containment integrity is not intact."

Technical Specification 3.8.A.4 currently reads as follows:

"3.8.A.4 During reactor vessel head removal and while loading and unloading fuel from the reactor, a minimum boron concentration of 2900 ppm shall be maintained in the primary coolant system."

The first paragraph of the basis for Technical Specification 3.8 currently reads as follows:

"Basis: During refueling the reactor refueling cavity is filled with approximately 240,000 gallons of borated water of 2900 ppm boron concentration. This boron concentration is sufficient to maintain the reactor subcritical approximately by 10% Δ K/K with all rods inserted, and will also maintain the core subcritical even if no control rods were inserted into the reactor. [1] Operation of the residual heat removal pump is provided to assure continous mixing flow of refueling water through the reactor vessel during the refueling period. [2] Borated water injection capability is provided as per Specification 3.2 Part A in the unlikely event there is any need during the refueling period."

Proposed Technical Specifications

Technical Specification 3.6.1.B(3) would be revised to read as follows:

"3.6.1.B(3). Positive reactivity changes shall not be made by rod drive motion whenever the containment integrity is not intact. Boron dilution (resulting in positive reactivity) may be made when the containment integrity is not intact if a shutdown margin greater than 5% Δ K/K is maintained."

Technical Specification 3.8.A.4 would be revised to read as follows:

"3.8.A.4. During reactor vessel head removal and while loading and unloading fuel from the reactor, a shutdown margin greater than 5% Δ K/K shall be maintained."

The first paragraph of the basis for Technical Specification 3.8 would be revised to read as follows:

"Basis: During refueling the reactor refueling cavity is filled with approximately 240,000 gallons of borated water whose concentration is sufficient to maintain the reactor subcritical by greater than 5% Δ K/K with all rods inserted, and will also maintain the core subcritical even if no control rods were inserted into the reactor.[1] Operation of one method of decay heat removal is provided to assure continuous mixing flow of refueling water through the reactor vessel during the refueling period.[2] Borated water injection capability is provided as per Specification 3.2 Part A in the unlikely event there is any need during the refueling period."

Safety Analysis

The proposed change discussed above is deemed not to involve a significant hazards consideration based on the determination that the change will result in a small increase to the probability or consequences of a previously analyzed accident and will reduce a safety margin, but, as discussed below, the results of the change are clearly within the acceptable criteria for boron dilution transients stated in the Standard Review Plan (Section 15.4.6).

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

Accident scenarios for boron dilution transients during cold shutdown and refueling have been evaluated in the San Onofre Unit 1 Final Safety Analysis and subsequently in the Systematic Evaluation Program (SEP) Topic XV-10. These analyses have shown that during cold shutdown and refueling the operator has sufficient time to analyze and take appropriate action to compensate for boron dilution events. However, as discussed below, the results of these analyses are based on conservative assumptions regarding injection rates of demineralized water. The times required for the reactor to reach criticality using the various charging flows are based on the assumption that the path by which the demineralized water is injected into the reactor coolant system (RCS) is connected to an infinite source of water which is capable of supplying water at the specified charging flow for the duration of the event. For the lower charging flows (i.e., 45 and 90 gpm) this is a valid assumption. However, the volume control tank (VCT) which would be the source of demineralized water during the boron dilution event, contains a limited volume of water which is not sufficient to sustain higher charging flows for prolonged periods of time.

The VCT contains approximately 1530 gallons of demineralized water. The Primary Plant Makeup pumps, which take suction from the Primary Plant Makeup tanks, provide the only source of demineralized water to the VCT. These pumps are capable of supplying water at approximately 70 gpm, assuming no flow resistance to the VCT.

Based on these considerations, the actual worst case scenario would be supplying demineralized water to the RCS at the maximum charging flows (i.e., 195 gpm for one charging pump and 225 gpm for both charging pumps) until the VCT is dry and continuing to dilute using only the Primary Plant Makeup pumps (e.g., 70 gpm). For this reason, the cold shutdown and refueling mode boron dilution transients have been reanalyzed in order to more accurately illustrate the consequences of the transients. The results of this reanalysis are explained below and are provided in Table 1.

The cold shutdown mode analysis has shown that under the most extreme conditions the operator would have more than 220 minutes to take action from the time the dilution started at which time he would receive the first audible alarms (pump start). This amount of time is well within the criteria stated in the Standard Review Plan (i.e., 15 minutes) and is therefore deemed to be acceptable. Also, given the initial conditions assumed in the analysis, more than 17,000 gallons of demineralized water would need to be added to the Reactor Coolant System (RCS) in order to dilute to a critical condition. The results of the analysis have been reiterated in Table 1.

During the refueling mode, the analysis performed by the SEP topic assumed an initial boron concentration of 2500 ppm. This boron concentration is sufficient to maintain the reactor subcritical by approximately 10% with all control rods inserted. Under these initial conditions and assuming the worst case scenario, the operator would have more than 110 minutes to take action from the time the dilution started at which time he would receive the first audible alarms. Because the existing technical specification requires a minimum 2900 ppm boron concentration during refueling, the analysis has incorporated a large degree of conservatism in determining the time required for operator action. This amendment proposes to decrease the boron concentration to a level which would ensure the reactor to remain at least 5% shutdown with all control rods inserted. During refueling, the shutdown margin required by mode definition is 5%. The transient analysis during the refueling mode assuming a 5% shutdown margin has been evaluated and the results are reiterated in Table 1. The analysis has shown that, under the most extreme conditions, the operator will have in excess of 50 minutes to analyze the transient and take corrective action. This period of time is well within the acceptable criteria stated in the SRP (i.e., 30 minutes). The analysis is essentially the same as the analysis performed for the cold shutdown mode except that the reactor coolant system volume is less and the most reactive control rod is not assumed to be stuck in the full out position. The various charging flows and the various indications available to the operator are explained in the SEP topic evaluation.

The table below illustrates the times required for the reactor to reach criticality while in the refueling and cold shutdown modes using various charging flows. The effect of decreasing the initial boron concentration from 10% to 5% can be seen by the decrease in the duration of event for the various charging flows.

TABLE 1

Plant Condition	Initial Boron Conc. (ppm)	Final Boron Conc. (ppm)	Duration of Event for Various Charging Flows (min) 45gpm	90gpm	195/70 gpm (1)	225/70 gpm (1)
Refueling, All Rods In, K=0.90	2500	1240	209.6	104.8	112.8	112.8
Refueling, All Rods In, K=0.95	1840	1240	119	59.3	53.8	53.8
Cold Shutdown, All Rods In	1749	1240	383.5	224.7	224.5	224.5

(1) As discussed in the text of Response (1), these maximum charging flows will deplete the contents of the Volume Control Tank in a relatively short period of time (i.e., approximately 10 minutes). Subsequent to exhausting this supply the remaining duration of the dilution event will involve an injection rate bounded by the maximum capability of the Primary Plant Make-up Pumps (i.e., 70 gpm).

Under the most extreme conditions during refueling, the operator would have approximately 53 minutes to evaluate and take corrective action to maintain the reactor subcritical. Also, during cold shutdown the operator would have more than 220 minutes to take corrective action. These periods of time are well within the acceptable criteria stated in the Standard Review Plan. Therefore, it is concluded that this proposed change will not cause a significant increase in the probability or consequences of an accident previously evaluated.

2. Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The effect of this proposed change will be to reduce the initial boron concentration in the refueling mode analysis from 10% to 5%. The implications of this reduction are limited to the probability or consequences of an accident previously evaluated, and will in no way create the possibility of a new or different kind of accident from any accident previously evaluated. As discussed in the response to Question 1, these implications have been evaluated and found to be clearly within the criteria stated in the Standard Review Plan.

3. Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?

   Response: No

   For the boron dilution transient, the margin of safety is defined by the time before operator action would be required in order to maintain the reactor subcritical. As explained in the response to Question 1, this proposed change will result in a decrease in the time before which the reactor would reach criticality without operator action. However, this decrease will result in durations which are still clearly within the acceptable criteria stated in the Standard Review Plan. Therefore, it is concluded that this proposed change will not result in a significant reduction in a margin of safety.

Safety and Significant Hazards Consideration Determination

Based on the Safety Evaluation, it is concluded that: (1) the proposed change does not involve a significant hazards consideration as defined by 10 CFR 50.92; and (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and (3) this action will not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Environmental Statement.

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