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KINGHTON, G. W. PWR Project Directorate 7

SUBJECT: Application for amends to Licenses NPF-10 & NPF-15, deleting Tech Specs re sodiem hydroxide iodine removal sys & adding space requirements for trisodium Phosphate to be used as long-term sump PH control.

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May 9, 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 February 7, 1986 transmitted Proposed Change NPF-10/15-210 (PCN-210) to the Units 2 and 3 Technical Specifications. PCN-210 deletes technical specifications related to the sodium hydroxide iodine removal system and adds new requirements for trisodium phosphate to be used as long-term sump pH control. SCE's letter dated March 10, 1986 transmitted a Westinghouse Topical Report WCAP-10975 "Spray Additive Tank Deletion Analysis for the San Onofre Nuclear Generating Station Units 2 and 3." This topical report contains supporting analysis for PCN-210.

At approximately the same time that SCE transmitted WCAP-10975, the NRC Staff transmitted three questions relating to PCN-210 to SCE. WCAP-10975 provides the answer to one of the three questions. The response to the other two questions are attached.

During our review of supporting information related to PCN-210, in considering these responses, SCE discovered a small error in the proposed surveillance requirement 4.6.2.1. The proposed surveillance requirement required that less than 3.03 grams of TSP be used in the pH test. The correct value should be less than 3.00 grams of TSP. Accordingly, SCE requests that this correction be included as part of PCN-210. The revised page is attached.

A001
1/1

If you have any further questions, please call me.

Very truly yours,

M. D. Medford

Attachment

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

RESPONSES TO NRC QUESTIONS REGARDING PCN-210

1. Provide additional details of the analysis (including all assumptions) used to calculate the iodine dose rates which were reported in your submittal of February 7, 1986.

   In calculating these dose rates, no credit was taken for the capability of containment spray to remove elemental iodine. However, the calculated thyroid dose rate at the Exclusion Area Boundary was lower than the previously calculated dose with sodium hydroxide spray additive present. We would like to verify these results.

Response

WCAP-10975, which was transmitted to the NRC on March 10, 1986, provides the additional details requested.

2. Describe the locations of the storage racks containing trisodium phosphate. Show that there will be enough mixing in the containment sump to form a uniform solution of trisodium phosphate.

Response

The final locations of the TSP storage tanks have not yet been determined. They will be located in areas of containment which are flooded post accident and where possible in sprayed areas of the containment. Experiments have shown that TSP is highly soluble in water/boric acid solutions. The solubility is such that it is expected that the prescribed quantity of TSP will completely dissolve within four hours. Additionally, the specified quantity of TSP includes conservatism such that, even if it does not completely dissolve, a pH of greater than 7.0 in the containment sump solution will exist. The surveillance requirement is intended to verify continued solubility of TSP inside containment and that a minimum pH of 7.0 will be achieved within a four hour period. The quantity of TSP and volume of water specified in the surveillance are based on the quantities and volumes expected inside containment following a LOCA. As discussed above, the storage racks are expected to be located in sprayed areas of containment which are flooded post LOCA. In the long-term cooling phase, the minimum flow due to one containment spray pump and one high pressure safety injection (HPSI) pump is approximately 2,400 gpm. With this flow, assuming that 610,000 gallons are spilled in containment, complete turnover will occur approximately 5.6 times per day. The 1750 gpm minimum containment spray flow (greater than 70% of the 2,400 gpm

total assumed flow) is evenly distributed throughout the containment area. This assures that there should not be significant localized flow in areas of the containment floor. The provisions to assure good spray coverage are discussed in FSAR Section 6.2.1.2.2.B. The high solubility of TSP containment spray area coverage, and long-term sump flow provide for sufficient mixing to ensure a uniform solution of TSP for pH control.

3. Provide a description of the details of the procedure used for periodic verification of the weight of trisodium phosphate in the storage racks.

Response

The proposed Technical Specification is designed to ensure that an adequate amount of trisodium phosphate (with 12 hydrates) (TSP) is stored in storage racks in containment to adjust the post accident recirculation flow pH greater than 7.0. The Surveillance Requirement ensures that: 1) sufficient chemical is present in the containment storage racks; and, 2) that the TSP in the storage racks is capable of performing its design safety function. The pH adjustment is required to prevent chloride stress corrosion cracking in the austenitic stainless steel recirculation piping. Westinghouse Report WCAP-10975, "Spray Additive Tank Deletion Analysis for the San Onofre Nuclear Generating Station Units 2 & 3" states that the recirculation sump water pH will be adjusted to a value greater than 7.0 within 24 hours. The report also states that 10,622 pounds of TSP w/12 hydrates is required to mix with the maximum post accident borated water inventory injected into the containment to raise the recirculation water pH to a minimum of 7.0. The Technical Specification required minimum value of 15,400 pounds was selected for conservatism. The Surveillance Requirements of the proposed Technical Specification are designed to verify that: 1) The required amount of chemical is stored in the racks; and, 2) that the TSP in the racks is sufficient to provide adequate post-LOCA long-term pH adjustment.

The nominal density of solid TSP w/12 hydrates is 1.62 gm./cc or about 101.15 lb./cu.ft.(Reference the Chemical Rubber Company Handbook of Chemistry and Physics). The nominal density of the bulk granulated TSP w/12 hydrates that will be stored in the racks is 60.5 lbs./cu.ft.(Per telephone conversations with Monsanto and FMC Corporation). The final design of the storage racks has not been completed. The racks will be clearly scribed such that the total volume below the scribed mark will be 256 cu.ft.

The weight of all TSP added to the racks will be recorded and retained.

Surveillance Requirement 4.6.2.2 of the proposed Technical Specification states that each refueling outage that it will be verified that "the TSP storage racks have maintained their integrity and the TSP containers contain a minimum of 15,400 lbs. (256 cu.ft.) of TSP (w/12 hydrates) or equivalent." Missing TSP will be replaced and an evaluation will be performed to prevent recurrence.

The Surveillance Requirement 4.6.2.1 demonstrates the purity of the TSP in the racks by "Verifying that when a sample of less than 3.00 grams of trisodium phosphate (w/12 hydrates or equivalent, selected at random from one of the storage racks inside of containment, is submerged, without agitation, in at least 1 litre of 120 $\pm$ 10 degrees F demineralized water borated to at least 2482 ppm boron, allowed to stand 4 hours, then decanted and mixed, pH of the solution is greater than or equal to 7.0." The basis of the values selected for the surveillance is described below.

The San Onofre Nuclear Generating Station Units 2 & 3 Updated FSAR, Section 6.3.3.4.3 states that 5,090,271 lbs. of borated water mass are available for the post-LOCA long term cooling (LTC) plan. The ratio of TSP mass to borated water mass is given by:

$$\frac{\text{15,400 lbsm. TSP}}{\text{5,090,271 lbsm. Borated water}} = 3.025 \text{ E } -3$$

The recirculation solution will have a boron concentration of 2482 ppm as calculated by WCAP-10974. The boric acid weight per cent of 2482 ppm boric acid solution is 1.42 % weight (From CEN-316(S)). The specific gravity of 1.42 % weight solution of 120 degrees F is 0.9925. The amount of TSP to be dissolved in 1 litre of borated water solution (m(TSP)) was determined by the equation:

$$\frac{m(TSP)}{1000 \text{ cm}^3 \times 0.9925 \times 1.0 \text{ gm/cm}^3} = 3.025 \text{ E } -3$$

$$m(TSP) = 3.00 \text{ gm}$$

The mass of TSP that is specified in the proposed Surveillance Requirement 5.6.2.1 was based on a specific gravity of 1.0 for the borated water test solution. 10/15-210 will be revised with the test mass of TSP changed to 3.00 grams.

The details of the test are given below:

1. Prepare boric acid solution.

   Heat 2.02 ± 0.01 litres of nuclear service water to 120 ± 10 degrees F. Dissolve 28.8 ± 0.02 grams of nuclear grade boric acid (H_3BO_4) in the water.

   Measure the boron concentration using the boron titrator ensuring that the solution is at least 2482 ppm boron. Measure 1.01 ± 0.01 litres of the boron solution to use for the test.

2. Sample Trisodium Phosphate (TSP)

   Obtain a sample of TSP from one of the storage racks in containment. The rack sampled each refueling will be rotated such that all TSP racks are periodically tested.

   Using a clean spatula or equivalent, scrape away the top layer to get a sample which does not include surface contaminants. The sample volume should be about 5 to 10 cubic centimeters TSP.

3. Weigh out 2.89 ± 0.1 grams of TSP from the sample.

4. Add the TSP to the heated boron solution. DO NOT AGITATE. Note and record time of addition and the total volume of the solution.

5. Allow four hours dissolution time.

   During this period, maintain the solution temperature at 120 ± 10 degrees F. Periodically add nuclear service water to maintain the initial volume. When four hours have elapsed, verify correct solution volume and decant.

6. Cool the solution to 77 degrees F. Mix the solution and measure the pH. Acceptance criteria is that the solution pH shall be greater than 7.0 If the pH is less than 7.0, an engineering evaluation will be performed and the appropriate corrective action will be taken.