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SUBJECT: Responds to NRC request re applicability of Palo Verde RCS anomalies to facility.Difficulties experienced during Palo Verde startup testing not believed to be applicable to facilities.

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September 12, 1983

Director, Office of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Branch Chief
Licensing Branch No. 3
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

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

The purpose of this letter is to respond to the NRC's request regarding the applicability, if any, of the Palo Verde Nuclear Generating Station, Unit 1 (PVNGS) reactor coolant system anomalies to SONGS, Unit 2 and 3. SCE has evaluated the SONGS Units 2 and 3 reactor coolant system design and testing in light of the PVNGS anomalies. SCE concludes that due to substantial design differences between PVNGS and SONGS (especially with regard to the Reactor Coolant Pumps) and the successful completion of SONGS post-core hot functional startup testing, the problems encountered by PVNGS are not applicable to SONGS. Neither SONGS 2 nor 3 has encountered any problems of this nature. Also, SCE understands C-E has not identified any problems applicable to other non-System 80 C-E reactors as a result of PVNGS's problems.

SCE's comparison corresponds to the four topics discussed in the APS presentation to the NRC staff on August 17, 1983 in Bethesda, Maryland, as follows:

1. Resistance Temperature Detector (RTD) Thermowell

Several RTD thermowells in the Reactor Coolant System (RCS) cold legs were damaged at PVNGS. The failure mechanism has been identified as high cycle fatigue which is believed to have been caused by flow induced vibration. The System 80 NSSS employs the highest design RCS velocity of any C-E NSSS, 15 ft./sec. higher than the SONGS velocity. The thermowell failures at PVNGS were detected by high RCS leakage during pre-core hot functional tests. No such failures have been detected at SONGS 2 and 3 or at any other C-E designed reactor plant. The SONGS RTD thermowells were designed by Rosemont and extensive field experience at similar installations has not indicated failure of the type observed at PVNGS.



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2. Safety Injection Pipe Thermal Liner

One safety injection nozzle thermal sleeve at PVNGS was dislodged from the nozzle (came to rest in the bottom of the reactor vessel) and another was found out of position. C-E is still investigating the cause of the loose thermal sleeves. Although the design is similar to that used on most C-E NSSS's, there have been no other reports of loose sleeves. In any event, there appears to be no immediate significant safety concern. Even if a sleeve loosens during plant operation, the sleeve cannot move into any position that would block safety injection flow. The thermal usage factor for the safety injection nozzle would only slowly increase over a period of years and, in fact, would probably be acceptable over the life of the plant, even with no thermal sleeve. A loose sleeve would be trapped at the bottom of the reactor vessel by the flow skirt attached to the bottom of the core support barrel.

At PVNGS, the loose parts monitoring system was being calibrated during hot functional testing and was, therefore, not available to detect the sleeve that had been dislodged from the nozzle. The SONGS Unit 2 Vibration and Loose Parts Monitoring System (V&LPMS) has been tested and is in operation. The Unit 3 V&LPMS has been calibrated. Although the vibration channel alarm setpoints will not be determined until the end of power ascension testing, the loose parts channels are functional. To date, no loose parts have been detected. Should a thermal sleeve dislodge on SONGS, the loose parts monitoring system is designed to alarm. The SONGS 2 and 3 V&LPMS was supplied by Rockwell International.

3. CEA Shroud Inspection

APS has reported cracking in the CEA Shroud Assembly in the Upper Guide Structure. The PVNGS CEA shroud assembly is a new design, specific to System 80. The shroud assembly consists of an assemblage of large vertical tubes connected by vertical plates in a grid pattern. The SONGS 2 & 3 design consists of an assemblage of separate large vertical tubes constrained at the top and bottom by the upper guide structure plate and the fuel assembly alignment plate, respectively. The CEA Shroud cracks at PVNGS were adjacent to CEA shaft guide brackets that are welded to the tops of the tubes, On SONGS 2 & 3, and all other pre-System 80 C-E designs, the shroud tube is topped by a complete circumferential cone. While the cause of the cracking has not yet been determined, the major design differences (plus the substantial operating history of the pre-System 80 designs) should preclude similar cracking problems with the CEA shroud assembly at SONGS 2 & 3.

The precritical vibration monitoring program was performed on the SONGS 2&3 reactor vessel internals after completion of pre-core hot functional testing. Cracks were found in some welds between the in-core instrument thimbles and the Upper Guide Structure. The welds were repaired and no further problems have been encountered. The in-core instrumentation package is normally installed in the thimbles and is designed to dampen flow induced thimble vibrations. Prior to fuel load, this package was not installed and the resulting excessive thimble vibrations caused the weld cracks.

4. Reactor Coolant Pump Problems

APS has observed damage to the diffuser retaining hardware and to the impeller in the reactor coolant pumps. The PVNGS NSSS employs the C-E/KSB reactor coolant pump. SONGS 2 & 3 employ reactor coolant pumps designed and manufactured by Byron-Jackson. Extensive industry operating experience with the Byron-Jackson pumps has not resulted in any problems similar to those experienced at PVNGS. Accelerometers are attached to the SONGS reactor coolant pumps as part of the V&LPMS. No loose parts have been detected.

SCE has completed the pre-operational, pre-core and post-core hot functional tests on the SONGS reactor coolant pumps. All tests were satisfactorily completed and no loose parts were found. Any vibrations (shaft movement) observed are within vibration limits set by Byron-Jackson.

In summary, SCE does not believe that the recent difficulties experienced during PVNGS startup testing are applicable to SONGS 2&3. The damage incurred at PVNGS has been attributed to the effects of flow induced vibrations from the C-E/KSB reactor coolant pumps which have significantly higher design flow velocity and pump head than the Byron-Jackson pumps installed on SONGS 2&3.

If you have any questions or comments, please contact me.

Very truly yours,

M. O. Medford

M. O. Medford
Supervising Engineer
San Onofre Units 2 & 3 Licensing

cc: M. H. Rood, Project Manager
Licensing Branch No. 3