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SUBJECT: Forwards "Auxiliary Feedwater Sys Availability Including Effects of Steam Supply Line Rupture," per util 821029 & 1109 commitments, Sys would not be significantly degraded in event of pipe break. Design change not warranted.

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January 11, 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
Units 2 and 3

By letters dated October 29, 1982, and November 9, 1982, SCE committed to provide a detailed cost/benefit analysis for potential hardware modifications of the auxiliary feedwater (AFW) motor driven pumps. The purpose of this letter is to fulfill that commitment.

SCE has analyzed the AFW system unavailability resulting from pipe break events inside the AFW pump room. The conclusions of the analysis as further described in the enclosed report are:

1. The contribution of a pipe break to the AFW system unavailability per demand is less than 10 percent of the system unavailability per demand from all other causes. These other causes for system unavailability are dominated by component failure.

2. The AFW unavailibility per demand for the existing system, with babbitt bearings installed, is 3.4×10^{-5}, which meets Standard Review Plan 10.4.9 and Branch Technical Position ASB 10-1 acceptance criteria.

Because the reliability of the existing design of the AFW system is not significantly degraded by the pipe break, SCE considers that a design change is not warranted.

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Pursuant to SCE's letter of October 29, 1982, two options designed to increase the AFW system reliability were examined. These options are: (1) addition of a forced, cooled lube oil system to the electric-driven AFW pump motor bearings and (2) implementation of an enhanced steam piping inspection program.

Installation of the forced, cooled lube oil system would provide cooled lubrication to the pump motor bearings under steam line break conditions. The active components (pump and heat exchangers) would be located outside the AFW pump room. The oil lines in the room would be shrouded to prevent oil from spraying on and presenting a fire hazard to the motors. Implementation of this system would environmentally qualifiy the AFW pump motor bearings.

The cost required to install the lube oil system including engineering, material and construction is $950,000 per unit. The difference in this cost and the cost reported in previous letters ($2,500,000) for this system is due to an attempt to identify a non-seismic, non-safety grade system which will perform its required function during a pipe break event. The forced, cooled lube oil system is further described in the enclosed report.

The second option considered to improve AFW system reliability is the implementation of an enhanced steam pipe inspection program. This inspection program would reduce the probability of a pipe break using ultrasonic (UT) examinations in 5 year intervals. To develop an acceptable baseline and allow access to all welds for the UT inspections, the steam supply piping inside the AFW room must be rerouted. The initial inspection baseline would reduce the contribution of a pipe break to AFW system unavailability from less than 10% to less than 2%. The periodic inspections would further reduce the probability. The cost for the baseline inspection program including the cost required to reroute the piping and conduct an ultrasonic examination of all 25 welds is $300,000 per unit. Periodic inspections over the 40 year life of the plant would cost an additional $450,000 per unit. The costs for the periodic inspection is in current dollars. The addition of acoustical monitoring devices attached to the steam line was considered and determined to be too costly for the small benefit gained. The enhanced steam piping inspection program is further described in the enclosed report. This program could be implemented during the first refueling outage for each unit unit.

SCE cannot justify the large additional expense of the proposed forced, cooled lube oil system or of an enhanced steam piping inspection program. As discussed previously, the existing AFW system meets the NRC acceptance criteria for unavailability per demand, including effects resulting from the postulated steam line break event. The contribution to AFW system unavailability was shown to be less than 10 percent of the system unavailability per demand from all sources. Hence, the benefits derived from implementation of any hardware modification would only improve a statistically insignificant effect on the overall system reliability.

The following information is provided in response to the NRC staff's request for additional information as documented in SCE's letter of November 9, 1982:

1. The expected life of the AFW pump motor bearings in a steam environment assuming a double ended guillotine break in the high energy line feeding the steam driven AFW pump is 12 minutes.

2. The maximum steam line break that can be tolerated by the motor bearings is 1 square inch.

3. The duration between the occurrence of a double ended guillotine break and actuation of the AFW system assuming the AFW pump motors are not running initially depends upon the power level and the availability of the equipment. Below 92 percent power the main feedwater system can continue to meet the increased steam flow and prevent the steam generators from reaching the low level trip. Operator action to isolate the steam line break is assumed to occur 30 minutes after the break. Further information, assuming the reactor is at full power, will be supplied by Feburary 1, 1983.

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

Very truly yours,

M. O. Medford for KPB

Enclosure

cc: Mr. R. H. Engelken
Regional Administrator, Region V,
Office of Inspection and Enforcement

Mr. H. Rood, Project Manager,
Licensing Branch No. 3