UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO LICENSEE'S EVALUATION PURSUANT TO 10 CFR 50.59

REGARDING OPERATION OF COMPONENT COOLING WATER SYSTEM

WITH LESS FLOW THAN DESCRIBED IN FSAR

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

Consumers Power Company, the licensee, reported in LER 86-032 dated September 24, 1986, that a Component Cooling Water System (CCWS) flow deficiency existed at Palisades. During testing to rebalance flow distribution in the system, it was found that the total CCWS flow through the two shutdown cooling heat exchangers was 5800 gpm instead of 8000 gpm as stated in the Final Safety Analysis Report (FSAR). This condition has existed since 1971 when the CCWS heat exchanger valves were throttled to prevent vibration of the tubes. Some tubes in both CCWS heat exchangers had been damaged and plugged. Investigation of records revealed that the CCWS heat exchangers were underdesigned and could not pass 5700 gpm as specified without excessive tube vibration. The two vendor-supplied heat exchangers were designed for a maximum shell side flow rate of 2850 gpm each (i.e., 5700 gpm total rather than the specified 5700 gpm each).

2.0 DISCUSSION

The licensee submitted their evaluation, pursuant to 10 CFR 50.59, of operation with reduced CCWS flow by submittals dated December 1, 1986, January 28, 1987 and February 25, 1987. In these submittals, the licensee described their corrective measures, test results, and reanalyses that support their conclusion that operation with the adjusted flow less than that described in the FSAR is justified.

The licensee has determined from their previous operating experience that operation of the CCWS heat exchangers with up to 4500 gpm each produced no flow-induced failures of tubes. They also contracted a heat exchanger manufacturer to analyze and determine an acceptable flow rate for the heat exchangers. The manufacturer documented that 4500 gpm was an acceptable flow.

In the design basis accident (DBA) condition, CCWS flow is directed to the shutdown cooling heat exchangers, the charging pumps, and the engineered safeguard pumps. All other CCWS loads are isolated. The licensee balanced the CCWS for the DBA condition by throttling the appropriate valves to obtain

approximately 2600 gpm to each shutdown cooling heat exchanger, 50 gpm to charging pumps, and 100 gpm to engineered safeguards pumps with one CCWS pump running. With two pumps running, there would be greater than 6000 gpm total flow through both shutdown cooling heat exchangers. These valves were then locked in that position. Then, with two pumps running, the remainder of the normal shutdown cooling mode heat loads were valved into service. This reduced the CCWS flow to the shutdown heat exchangers to 5400 gpm.

3.0 EVALUATION

The safety significance of reduced CCWS flow must be assessed for its shutdown cooling function (i.e., normal shutdown when shutdown coolers are used to reduce primary coolant system temperature from 325°F to 210°F for cold shutdown) and for its post DBA function (i.e., when shutdown coolers are used to cool the containment sump water being recirculated for containment spray and safety injection).

3.1 Shutdown Cooling

The shutdown cooling function was reanalyzed using 4,000 gpm of CCWS flow. Note that the system was rebalanced with 5400 gpm flow. The reanalysis showed that the primary coolant system could be cooled to less than 210°F within 9 hours, well within the Technical Specification requirement of 24 hours. The FSAR also states that the primary coolant system can be cooled to 130°F within 24 hours. This is no longer true. The reanalysis with 4,000 gpm shows 53 hours. However, this is not critical because it has no safety significance once the temperature is below saturation for atmospheric pressure.

3.2 Post-DBA

The post-DBA function was reanalyzed using 5000 gpm of CCWS flow. The most limiting need for CCWS is when the three containment air coolers are not operable. Under this condition, the containment spray performs the containment pressure suppression and temperature reduction. However, under this condition there are also two CCWS pumps operable. Therefore, the rebalanced flow of greater than 6000 gpm is available. The CCWS flow for containment cooling comes into play only during the recirculation phase (at least 30 minutes after the accident). The peak pressure and temperature occur before recirculation starts. The post-recirculation containment pressure-temperature profile is slightly increased. The maximum post-recirculation pressure and temperature reported in the FSAR were approximately 22 psig and 230°F. The corresponding values with the reduced CCWS flow are approximately 27 psig and 237°F. As stated previously, the peak pressure and temperature in containment are reached prior to recirculation and are unaffected by the reduction in CCWS flow. The equipment qualification test profiles were compared

with the revised post-DBA profile. During a portion of the profile, the test temperature of the Trans America level elements (EQ-File Misc LE-1) was about 7°F below the 237°F post-DBA profile. The licensee's analysis, however, shows that the thermal degradation threshold of the equipment's materials is greater than this temperature. We, therefore, conclude that the seven degree difference in the test versus the actual plant profile should have no effect on the qualification of this equipment.

In addition, the criteria in the Standard Review Plan for long term cooling, that containment pressure be reduced to less than half of peak pressure within 24 hours, is met with wide margin. The pressure at 24 hours is less than 7 psig.

Finally, this analysis used both shutdown cooler heat exchangers and both CCWS heat exchangers. These components and their associated piping, valves, interlocks, etc., are required to be operable by existing Technical Specifications.

4.0 CONCLUSION

We concur in the licensee's conclusion that operation of the plant with the reduced CCWS flow produces no significant reduction in the margin of safety. We also conclude that this change produces no significant increase in the consequences of accidents previously analyzed because of the slight change in post-DBA containment pressure and temperature. We also could identify no new accidents not previously evaluated resulting from this change.

Date: March 20, 1987