ENCLOSURE

SEQUOYAH NUCLEAR PLANT UNIT 2 (SQN)
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 (WBN)
CVCS CENTRIFUGAL CHARGING PUMPS
10CFR50.55(e)
NCR'S SQN NEB 8017 AND WBN NEB 8008
FINAL REPORT

Description of Deficiency

A review of the Westinghouse Safety Injection (SI) Termination Criteria has revealed a potential for degradation of one or more chemical and volume control system (CVCS) centrifugal charging pumps (CCP's) before the SI termination criteria are satisfied and CCP operation is terminated. Following a secondary side high energy line rupture and associated reactor trip, safety injection is actuated and the CCP's start to increase RCS inventory. Reactor coolant system pressure and temperature will subsequently increase. The pressurizer power-operated relief valves (PORV's) are designed to limit RCS pressure to 2350 lb/in^2a. However, control air to these valves is isolated upon the containment isolation signal which is generated during this accident scenario. Therefore, the PORV's will not be available. As a result, the RCS pressure could rise to the pressurizer safety valve setpoint of 2500 lb/in^2a within approximately 200 seconds and remain at that pressure for up to 4200 seconds depending on operator action. During the initial portion of this accident, the SI termination criteria may not be satisfied. As a result, the RCS pressure can reach the pressurizer safety valve relief pressure before CCP operation is terminated. During this period, the minimum flow required for CCP operation must be satisfied by flow to the RCS because the CCP miniflow isolation valves are automatically closed on safety injection initiation. This would require that the CCP's be able to deliver their minimum required flow to the RCS at the safety valve setpoint pressure (2500 lb/in^2a). TVA has evaluated CCP performance and determined that, under these conditions, minimum flow requirements may not be met which would lead to pump degradation.

Safety Implications

Degradation of CCP's which are utilized as emergency core cooling system (ECCS) pumps is not permitted by design criteria and the FSAR. Such damage may adversely affect long term recovery operations for the initiating event and impair operator effectiveness in mitigating a transient.

Corrective Action

Design and plant emergency operating procedures will be modified as recommended by Westinghouse to alleviate the safety concern that presently exists. The modifications are:

1. Verify that CCP miniflow return is aligned directly to the CCP suction during normal operation with the alternate return path to the volume control tank isolated (lock closed).

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2. Remove the safety injection initiation automatic closure signal from the CCP miniflow isolation valves.

3. Modify plant emergency operating procedures to instruct the operator to:

   a. Close the CCP miniflow isolation valves when the actual RCS pressure drops to the calculated pressure for manual reactor coolant pump trip.

   b. Reopen the CCP miniflow isolation valves should the wide range RCS pressure subsequently rise to greater than 2000 lb/in^2g.

These modifications will prevent damage to the CCP's during the accident scenario described above. However, implementation of these modifications requires that component cooling water be supplied to the seal water heat exchanger following safety injection in order to provide cooling for the CCP miniflow. TVA has verified that this condition is already met at Sequoyah and Watts Bar.

These changes will be implemented until such time as Westinghouse can develop plan-specific design modifications.