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October 4, 1979

Mr. Boyce H. Grier, Director
U. S. Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region 1
631 Park Avenue
King of Prussia, Pennsylvania 19406

Dear Mr. Grier:

MAXIMUM FLOW OF RHR PUMP DURING
POST-LOCA RECIRCULATION MODE
10CFR50.55(e) "SIGNIFICANT DEFICIENCY"
NO. 2 UNIT
SALEM GENERATING STATION

On August 30, 1979 a verbal report was made to Region 1, Office of Inspection and Enforcement representative Mr. B. Bateman, advising that a potential deficiency existed relative to the maximum flow of the RHR pumps during Post-LOCA recirculation mode (worst hydraulic configuration). This report was provided in accordance with the provisions of 10CFR50.55(e). The following supplemental information is hereby submitted pursuant to our initial report (and our request for extension on 9-28-79 to Mr. R. W. McGaughy) and in accordance with the requirements of 10CFR50.55(e):

1. Background Information

On July 13, 1979, Unit No. 2 RHR pumps were tested to establish the maximum flow for the worst hydraulic configuration and to evaluate the available NPSH based on that flow. The worst hydraulic configuration for NPSH evaluation (during recirculation mode) of the RHR pump is when one (1) RHR pump is feeding two (2) charging pumps, two (2) safety injection pumps and also feeding directly into the two (2) cold legs. The water source for the defined flow configuration was the Refueling Water Storage Tank. The results of this test were as follows:

Pump No.	Throttle Valve Position	Flow (GPM)
21	60%	4,132
22	60%	4,686

The test was stopped after the above results were reached because it was obvious that if the throttle valves were to be opened to 100% the pump would reach high runout conditions and the motor current readings would exceed that which is normally desired. The design runout flow for the RHR pump is 4500 gpm with the throttle valve full open.

Salem Unit No. 1 has an identical configuration and the reported deficiency and the corrective action on Unit 2 will be applicable to Unit No. 1.

2. Analysis of Safety Implications

The configuration to which the RHR pumps were tested is not a design basis for Salem Nuclear Power Plant. The Salem plant design for cold leg recirculation phase operation with only one RHR pump consists of aligning the RHR discharge such that the running RHR pump is supplying the suction of two charging pumps, two safety injection pumps and the containment spray headers. Therefore the configuration to which the RHR pump was tested is not representative of the plant design. The purpose of the test was to establish the maximum flow for the RHR pump, and the flow path represented the worst hydraulic configuration for the pumps.

The test result demonstrated that the system resistance was lower than desired and there is a possibility of the pump reaching runout conditions during other modes of operation. However, to be conservative it was decided to increase the system resistance and decrease the maximum flow.

3. Corrective Action

The system resistance on the discharge side of the RHR pumps was increased by changing the orifices on the flow elements that are located both upstream and downstream of the RHR heat exchangers.

The RHR pumps were retested with resized orifices in place, with the operating flow conditions described above. The test showed that with the throttle valve full open, the maximum flow was less than 4600 GPM. This test result is acceptable since the pump has adequate NPSH for flows up to 4800 GPM during recirculation phase. Westinghouse Electric Corporation evaluated the modified system for safety injection and concluded it to be above the reference performance contained in the Salem FSAR.

Salem Unit 1 RHR system will be modified to include the resized orifices before the plant returns to commercial operation.

Very truly yours,

cc: Mr. L. J. Norrholm
NRC, Hancocks Bridge