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

SAFETY EVALUATION
DESIGN OF REDUNDANT
INSTRUMENT SENSING LINES
FOR REACTOR COOLANT FLOW
CRYSTAL RIVER UNIT 3

I. INTRODUCTION

The Licensee, Florida Power Corporation, in its submittal of March 29, 1979, has proposed certain modifications to the Reactor Protection System, (RPS), of Crystal River Unit 3 plant to correct a single failure deficiency which was identified as Condition 2.C.(7) to its operating license. The present RPS overpower trip based upon reactor coolant flow differential pressure and axial power imbalance utilizes a common set of instrument sensing lines for the four reactor protection channels (delta P transmitters) in each of the two reactor coolant loops. As stipulated in the condition to the operation license, this deficiency was to be corrected before the Crystal River Unit 3 plant returns to power following its first refueling shutdown.

In each primary loop, reactor coolant flow is detected by measuring delta P developed across a flow tube that is an integral part of the outlet piping of the loop. Each flow tube has a high pressure (HP) tap and a low pressure (LP) tap. Connections to the taps are made with 1-inch lines. The 1-inch lines are terminated at root valves located inside the secondary shield wall. From the root valves, 1/2-inch tubing runs through the secondary shield wall to HP and LP headers. Four delta P transmitters are connected between the two headers. Each of these transmitters provides flow information directly to one of the Reactor Protective System channels. The buffered signals of flow are utilized in the Non-Nuclear Instrumentation (NNI) System and are monitored by the plant computer. The operator is provided with flow indication and alarms at the control console to be alerted of trends or abnormal conditions.

II. EVALUATION

The licensee's proposed design includes the installation of a second set of instrument sensing lines from the differential pressure taps in each of the primary loops to the differential pressure transmitters.

The new design begins immediately downstream of existing pressure tap root valves located inside the secondary shield wall where a one inch tee will be welded in place. Downstream of the tee the pipes will be reduced to half inch and manual shutoff valves installed. The present tubing run will be attached to one of

these valves and the new redundant sensing line will be connected to the other new valve. This modification will be performed on both the high pressure and low pressure sensing taps. The redundant sensing lines will be routed in the opposite direction from the existing sensing lines to the new location for two of the differential pressure transmitters. The sensing lines will be stainless steel material and seismically mounted. The system will meet the seismic and separation requirements of the reactor protection system. The location for the two relocated transmitters is approximately 50 to 75 feet from the present location. The electrical circuits to these redundant transmitters will be seismically installed and the channel identity maintained in accordance with the requirements of the present reactor protection. We find this acceptable.

III. CONCLUSION

Based on our review of the licensee submittal we conclude the design of the installation of the redundant instrument sensing lines to measure flow in each of the primary loops satisfies the requirements for seismic qualification, and separation and isolation. We, therefore, conclude with the completion of the installation, the reactor coolant flow sensing system will satisfy our requirement for meeting the single failure criterion.

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