830 Power Building

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

IE FILE COPY

MAY 24 1976

296

Mr. Norman C. Moseley, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 818
230 Peachtree Street, NW.
Atlanta, Georgia 30303

Dear Mr. Moseley:

BROWNS FERRY NUCLEAR PLANT UNIT 3 - REPORTABLE DEFICIENCY - POTENTIAL FOR RHR PUMP OPERATION IN EXCESS OF DESIGN RUNOUT - IE CONTROL NO. H01172F2

Initial report of the subject reportable deficiency was made to H. C. Dance, NRC-OIE, Region II, on February 3, 1976, and was followed by our March 4, 1976, letter, J. E. Gilleland to Donald F. Knuth. Enclosed is our final report concerning this deficiency (Enclosure 1) and a copy of TVA's analysis (Enclosure 2) relating to this deficiency.

Very truly yours,

J. E. Gilleland
Assistant Manager of Power

Enclosures
CC (Enclosures):
Dr. E. Volgenau, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

60567

ENCLOSURE 1

BROWNS FERRY NUCLEAR PLANT UNIT 3

POTENTIAL FOR RHR PUMP OPERATION
IN EXCESS OF DESIGN RUNOUT

DDR 224

FINAL REPORT

On February 3, 1976, an initial report was made by telephone to NRC-OIE Region II Inspector, H. C. Dance, by C. Michelson, T. W. Barkalow, and R. D. Bradley in compliance with 10CFR50.55(e). Subsequently, a written interim report on this deficiency was submitted to Dr. Donald F. Knuth (NRC-OIE) from J. E. Gilleland (TVA) on March 4, 1976. This is a final report on this deficiency.

Description of Deficiency

For a "Description of the Deficiency," refer to section 2.0 of the report, "RHR Pump Protection Against Operating In Excess of Design Runout," Enclosure 2.

Cause of Deficiency

For the "Cause of the Deficiency," refer to section 2.1 of Enclosure 2.

Safety Implications

During a loss of coolant accident, the low pressure coolant injection (LPCI) logic for the RHR System calls for the injection of water from four RHR pumps through an unbroken recirculation loop to the reactor vessel. A single active component failure in this logic could result in incorrect loop selection and direct all four RHR pumps to flow to the break. A break in the recirculation loop discharge line is the limiting situation. A significant increase in total system flow above the design condition will result due to the loss of recirculation loop jet pump flow resistance. The resulting flow has been shown by calculations to exceed the runout capacity of the pumps, as determined from the pump manufacturer's test data. A single failure in the logic could also result in four RHR pumps injecting into both recirculation loops simultaneously, with one loop broken. This is the limiting case.

Another single failure that was considered, and found to be less limiting was the case where the loop selection was performed correctly for a recirculation line break, but the recirculation pump discharge valve in the unbroken loop fails to close. This results in an additional flow path through the recirculation pump to the reactor vessel. This path is in parallel with the normal one through the jet pumps, but has a much lower flow resistance. This could also result in RHR pump operation in excess of design runout, but it is not the limiting case.

The RHR injection mode is not needed for short-term core cooling for either of the two cases as discussed above. However, the operation of the RHR pumps in excess of design runout presents a potential challenge to the availability of the pumps since they are needed for long-term containment cooling. A minimum of two RHR pumps and associated heat exchangers must be operable to meet the long-term containment cooling requirements.

Description of Corrective Action

For the "Description of Corrective Action," refer to sections 3.0 and 3.1 of Enclosure 2.

Means Taken to Prevent a Recurrence

For the "Means Taken to Prevent a Recurrence," refer to sections 3.2, 3.3, and 3.4 of Enclosure 2.