TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
830 Power Building

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Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - POSSIBLE SHORTING OF FOXBORO TEMPERATURE INSTRUMENTATION - NCR 1262R - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector McKensie Thomas on October 23, 1978. Enclosed is our final report.

If you have any questions concerning this matter, please get in touch with M. R. Wisenburg at FTS 854-2581.

Very truly yours,

J E Gilleland

J. E. Gilleland
Assistant Manager of Power

Enclosure
cc: Mr. John G. Davis, Acting Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

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REGION II
ATLANTA, GEORGIA

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WATTS BAR NUCLEAR PLANT - UNITS 1 AND 2
MALFUNCTION OF FOXBORO TEMPERATURE
INSTRUMENTATION
NCR 1262R
FINAL REPORT

Description of Deficiency

The deficiency involves favorable conditions for shorting of four safety grade temperature transmitters (two per unit) and corresponding bistables on the Boric Acid Tank (BAT) heater banks. For each BAT, there is a pair of heater banks with a trained transmitter for each bank. The original design of the components contained a fuse in the circuit line between the instrument and its respective power source. In a subsequent design modification, a second fuse was added in series with the first. The second fuse was attached to the instrument by means of a rivet to the instrument case. The resulting spacing between the instrument case, which is electrically grounded, and the rivets was small enough such that an irregular movement of the instrument case would cause contact between the two, thereby causing an electrical short. The result of shorting a single transmitter would be the loss of control function to the associated heater bank.

Safety Implications

The shorting condition would produce a probable loss of control function. The resulting effect would be the loss of the transmitter function to transmit signals to the BAT heater banks to switch them on and off. These heater banks are used to maintain the temperature of the boron solution in the BAT at a level high enough to prevent the boron from precipitating out of solution.

During normal operation, the solution in the BAT is continually recirculated through the Boron Injection Tank (BIT) in the Safety Injection System to maintain the boron solution thoroughly mixed and at a temperature greater than the Tech Spec limit of 145° F. A safety injection actuation signal (SIAS), initiated as a result of an accident, will terminate this recirculation, isolate the BAT from the ECCS, and inject the contents of the BIT to the reactor coolant system. This injection is for chemical poison control of any potential reactivity excursion in the core as a result of the accident.

If both BAT heater banks for one unit, were lost as a result of shorting of the temperature transmitters, a slow cooldown of the boron solution would occur. If the temperature fell to a sufficiently low level, boron could begin to precipitate out thereby lowering the amount of boron in solution for injection from the BIT.

However, sufficient means are available to assure that the temperature will not drop to an unacceptable level undetected. These means are as follows:

1. The BIT has two heater control circuits for maintaining boron temperature at acceptable levels. One circuit is qualified and one is non-qualified.

2. The BIT has a non-qualified temperature indication in the Main Control Room.

3. The BIT has a non-qualified low temperature alarm in the Main Control Room.

4. The connecting piping in the recirculation loop is heated with redundant non-divisional heat tracing which energizes at a low temperature setpoint.

5. The heat tracing has redundant, nondivisional low temperature alarms in the Main Control Room.

If any of these indications demonstrate the boron solution is below tech spec requirements, action is taken to restore the temperature to its required level in a specified time period. If this cannot be done, the plant must be shut down until the problem is corrected. A third non-unitized BAT is available and can be manually placed into service to meet these tech spec requirements.

Thus in order for the deficiency to affect plant safety, failure (shorting) of both trains of the safety grade temperature sensors in addition to an undetected failure of several levels of temperature indication and alarms in combination with a major accident must occur. This combination of events is considered to be such a highly unlikely event that plant safety could not reasonably be assumed to be jeopardized.

Corrective Action

A suitable insulator (such as mica), commensurate with the design and environment of the instruments, will be placed and secured between the fuse clip rivet and the case of the instrument. This will insulate the instrument from future shorts. This nonconformance was found only on the instruments identified in this report. Corrective action will be completed before fuel loading of unit 1.