TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

83 SEP 30 A9:17

September 27, 1983

WBRD-50-390/83-08
WBRD-50-391/83-07

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - TRANSFER SWITCHES TO AUXILIARY FEEDWATER HAVE NONDIVISIONAL POWER -WBRD-50-390/83-08, WBRD-50-391/83-07 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector A. K. Hardin on February 2, 1983 in accordance with 10 CFR 50.55(e) as NCR GEN NEB 8301. Interim reports were submitted on March 2 and June 27, 1983. Enclosed is our final report.

If you have any questions concerning this matter, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Enclosure
cc: Mr. Richard C. DeYoung, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Records Center (Enclosure)
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

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ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
TRANSFER SWITCHES AUXILIARY FEEDWATER HAVE NONDIVISIONAL POWER
NCR GEN NEB 8301
10 CFR 50.55(e)
WBRD-50-390/83-08, WBRD-50-391/83-07
FINAL REPORT

Description of Deficiency

During design review of the auxiliary feedwater (AFW) system, it was discovered that pressure switches PS-3-121A, -121B, and -121D are shown on drawing number 47W610-3-3 as receiving nondivisional power whereas WBN FSAR section 10.4.9.1 states that backup to the condensate storage tank is from the fully qualified seismic category I essential raw cooling water (ERCW) system and that the controls associated with the fully qualified ERCW transfer valves meet the requirements of IEEE-279. Furthermore, Westinghouse Steam System Design Manual, Section III-2 (R2), states that "the whole of the auxiliary feedwater system (water supply, piping, pumps, power sources, etc.) must be 'safety class' design standard."

This deficiency occurred because TVA design engineers failed to comply with IEEE-279, Sections 4.6 and 4.22, which require that a single failure shall not prevent proper protective action at the system level when required; therefore, the channels that provide signals for the same protective function shall be independent and physically separated. TVA considers this to be a design oversight.

Safety Implications

Pressure switches PS-3-121A, -121B and -121D sense suction pressure to the turbine-driven auxiliary feedwater (TDAFW) pump and send control signals to automatically open valves FCV-3-136A and -136B or FCV-3-179A and -179B to admit essential raw cooling water (ERCW) if low pressure is sensed. This assures a continuous supply of steam generator makeup and prevents cavitation damage to the TDAFW pump if the normal makeup from the nonqualified condensate storage tanks (CSTs) should be lost. Therefore, loss of function of the pressure switches would jeopardize safe operation under the following combination of events:

1. Loss of main feedwater.

2. Loss of one of the two motor-driven AFW pumps (active failure).

3. A feedwater pipe rupture such that much of the flow from the second motor-driven AFW pump discharges into the break and does not reach the steam generator.

4. Loss of the CST supply to the TDAFW pump, possibly due to earthquake or tornado.

Corrective Action

TVA has issued engineering change notices (ECNs) 3951 and 3952 for units 1 and 2, respectively. The changes identified by the ECNs will provide redundant circuits (components and cables) identical to the existing ones for each unit. These redundant circuits will be identified as train "A" and "B" and will be aligned with the train "A" and "B" valves in the automatic transfer scheme.

All drawing revisions required by the ECNs will be completed by September 30, 1983, for unit 1, and by December 1, 1983, for unit 2. Construction work will be completed by December 31, 1983, and December 1, 1984, for units 1 and 2 respectively.

TVA believes that, in the future, design deficiencies of this type will be identified in the checking and review process as required by TVA Engineering Design (EN DES) Engineering Procedure (EP) 1.28. EP 1.28 was issued in November 1978. It was revised in December 1982 to require that the design of all safety-related plant features be additionally reviewed, beyond the normal checking process, by an independent reviewer (not the preparer). EP 1.28 further states that this independent reviewer will be an engineer or architect, with necessary technical knowledge, who has no design input to the particular design and who has no technical or administrative supervision over the designer. The review of this "independent reviewer" should prevent recurrence of design oversights as discussed herein.