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

May 18, 1983

WBRD-50-390/81-41
WBRD-50-391/81-40

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 - INADEQUATE FREEZE PROTECTION - WBRD-50-390/81-41 AND WBRD-50-391/81-40 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. V. Crlenjak on April 13, 1981, in accordance with 10 CFR 50.55(e) as NCR WBN MEB 8104. Interim reports were submitted on May 13, September 3, October 30, and December 11, 1981 and March 16, May 28, and September 7, 1982. Enclosed is our final report.

If you have any questions, 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
INADEQUATE FREEZE PROTECTION
NCR WBN MEB 8104
WBRD-50-390/81-41, WBRD-50-391/81-40
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency

This deficiency was discovered during a routine NRC-OIE site inspection and subsequently identified as Level IV Violation 390,391/81-03-01. The inspector noted that the ERCW pump motor bearing cooling water line freeze protection system was outside the TVA Quality Assurance (QA) program, whereas the ERCW pumps were safety-related. Subsequent investigation by TVA indicated a further discrepancy in that TVA drawing No. 37W206-51 required Class 1E electrical heat tracing in this region, while drawing No. 47W760-230 showed that neither the power supply nor the annunciators for this heat tracing are Class 1E. Furthermore, Construction Specification N3G-881 did not specify QC installation requirements applicable to Class 1E circuits. At this point, TVA initiated the subject nonconformance report.

Construction Specification N3G-881 was originally issued in August 1977 and did specify QA requirements for the heat trace system. However, revision 1 to this specification was issued in March 1978, and removed all QA requirements. The TVA evaluation before issuance of revision 1 of N3G-881 assumed that at least two ERCW pumps per train would be operating at all times, thereby precluding freezing in the operating pumps. Since two pumps on one train were sufficient to safely shutdown the two units or control an accident, freezing in the standby pumps would not have jeopardized safety. However, the system operating instructions did not actually require two pumps to be operating on each train, thereby invalidating this evaluation.

Drawing No. 37W206-51 was originally issued in September 1978, and did specify Class 1E heat tracing in certain areas of the intake pumping station. However, this drawing was used solely to define the amount of required heat tracing for procurement purposes. Since this drawing showed primarily mechanical features, it was not coordinated with the electrical group responsible for heat trace design. Drawing No. 45W760-234 was originally issued in December 1979. Since this drawing showed only electrical features, it was not coordinated with the mechanical group.

Subsequent TVA investigations into freeze protection for other systems have identified one group of safety-related equipment which may not be adequately protected. This equipment is feedwater flow element sensing lines in the main feedwater system. TVA was cited with a Severity Level IV violation (violation 390/82-05-01, 391/82-03-01) by letter dated August 26, 1982 for failure to provide adequate QA controls over the freeze protection aspects of the main feedwater sensing lines. (TVA subsequently denied the violation noting that philosophical differences exist between TVA and NRC on the application of QA requirements for heat tracing.)

Investigation has shown that the heat trace system was deleted from the QA program by an internal memorandum because a review of the heat trace system did not adequately identify areas where a heat trace failure could jeopardize plant safety.

Safety Implications

Under freezing ambient conditions with three of four ERCW pumps on standby (a credible situation) and the heat trace system inoperative, ice formation in the motor bearing cooling water lines could render the standby pumps inoperative. Two of four pumps on one train are required to perform a safe shutdown of the two units. Therefore, a single failure in the opposite train during a design basis accident under the above postulated conditions could jeopardize plant safety. After reviewing the concern about the freeze protection on the main feedwater flow element sensing lines it was found that current surveillance procedures are considered adequate to assure the safety function of the flow switches.

Corrective Action

TVA has redesigned the piping to the ERCW pump motor cooler to be self-draining by revising drawings 37W2061 and 37W2068. Also, the 1E heat trace requirement on drawing 37W206-51 has been deleted, as it is neither required nor available. A study (potential ice formation in discharge piping) was performed on the potential ice formation in the main ERCW headers and concluded that ice formation would not be a problem. The problem with the lack of coordination (between the electrical and mechanical groups) on the heat trace design is being addressed in NCR M81-13 (WBRD-50-390/82-05, WBRD-50-391/82-05) deficiency 5, generic deficiency in design review.

To prevent recurrence procedure SWP-EP 43.18, "Insulation/Heat Tracing Drawings for Safety-Related Systems" has been issued to control drawings depicting heat tracing and insulation on safety-related systems. Design Guide DG-E17.6.2, "Lighting and Heating-Electric Piping Heating System," has been issued and defines the requirements of heat tracing on safety-related systems. Construction work on the piping will be completed under engineering change notice 2756 by November 1, 1983.