TENNESSEE VALLEY AUTHORITY

CHATTANOOGA TENNESSEE 37401
400 Chestnut Street Tower II

March 19, 1985

WBRD-50-390/84-30
WBRD-50-391/84-27

U.S. Nuclear Regulatory Commission
Region II
Attn: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Dear Dr. Grace:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - ANTI-REVERSING RATCHET PINS DO NOT DISENGAGE ON ESSENTIAL RAW COOLING WATER PUMPS - WBRD-50-390/84-30 AND WBRD-50-391/84-27 - REVISED FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector P. E. Fredrickson on May 30, 1984 in accordance with 10 CFR 50.55(e) as NCR W-174-P. Our final report was submitted June 28, 1984. Enclosed is our revised final report. We consider 10 CFR Part 21 applicable to this deficiency.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. A. Kenner
for L. M. Mathis, Manager
Licensing and Regulations

Enclosure
cc: Mr. James Taylor, 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
ANTIREVERSING RATCHET PINS DO NOT DISENGAGE ON
ESSENTIAL RAW COOLING WATER PUMPS
WBRD-50-390/84-30 AND WBRD-50-391/84-27
NCR W-174-P
10 CFR 50.55(e)
REVISED FINAL REPORT

Description of Deficiency

The essential raw cooling water (ERCW) pumps' antireversing mechanism was the subject of a previous nonconformance report (NCR), W-136-P, which documented the failure of ratchet pins when the pump shaft attempted to turn backwards. The disposition of this NCR was to install larger ratchet pins and a harder ratchet plate.

W-174-P documents the failure of the antireversing mechanism to disengage at 97 r/min as intended. At 97 r/min, the ratchet pins should lift and no longer strike the ratchet plate ramp. However, due to the heavier pins installed to resolve NCR W-136-P and, according to Siemens-Allis (S-A), the pump manufacturer, the introduction of an oil mist from an adjacent bearing, the ratchet pins do not lift at 97 r/min. Consequently, the pins bounce on the ratchet plate causing excessive pin and plate wear.

S-A has acknowledged that an inadequate failure modes and effects analysis (FMEA) resulted in the condition documented on this NCR.

Safety Implications

Should the antireversing mechanism fail during a loss of offsite power, the ERCW motor could receive a restart signal, after onsite power is available, while the pump is rotating in a reverse direction. This would result in the motor tripping out on overcurrent, and the ERCW pump would not be available to perform its safety function, thus adversely affecting the safe operation of the plant.

Corrective Action

TVA has coordinated an investigation with S-A concerning the damage associated with the antireverse mechanism. S-A has recommended changes to the antireverse mechanism that include a completely different design from that discussed in our previous report. S-A is now proposing the use of an antireverse mechanism which is trade named "Formsprag." This mechanism has been used successfully on several reactor coolant pumps by S-A. The mechanism consists of inner and outer races with a number of sprag pieces between the two races. In the forward direction, the sprags uncleneh and, in the presence of reverse torque, the sprags tightly clench.

The change out of the first four antireverse mechanisms required for unit 1 operation was completed and tested as of March 15, 1985. The remaining four motor modifications for unit 2 will be completed by August 1, 1985.

S-A has initiated a department operating change to prevent future design problems. This change consists of an internal memorandum to all design engineers cautioning them of the need for complete and comprehensive FMEA.