

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

ATLANTA, GEORGIA  
400 Chestnut Street Tower II

82 FEB 19 ~~February~~ 17, 1982



U.S. Nuclear Regulatory Commission  
Region II  
Attn: Mr. James P. O'Reilly, Regional Administrator  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - EXCESSIVE OUTPUT FLUCTUATIONS OF  
FOXBORO INSTRUMENTS - NCR'S 1778R AND 1779R - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector  
M. Gouge on August 28, 1979. Interim reports were submitted on  
September 22, 1979, January 30 and August 8, 1980, and February 10,  
March 26, July 2, and November 9, 1981. TVA considers 10 CFR 21  
applicable to these nonconformances. 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 Regulation and Safety

Enclosure

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

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## ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
EXCESSIVE OUTPUT FLUCTUATIONS OF FOXBORO INSTRUMENTS  
NCR'S 1778R AND 1779R  
10 CFR 50.55(e)  
FINAL REPORT

### Description of Condition

Personnel at Watts Bar Nuclear Plant have noted erroneous output signals coming from Foxboro equipment containing magnetic amplifiers (current/current repeaters and square root converters). This instrumentation was supplied by Westinghouse on the NSSS contract. The equipment is not performing according to the specifications in the Foxboro Equipment Manual which specifies this equipment to have an accuracy of  $\pm 1/2$  percent with input voltage variations of  $\pm 10$  percent. Tests have shown that 1.5- and 4.5-percent input variation resulted in a 5.0- and 15.5-percent output current change. These excessive output variations have caused spurious operations of plant equipment by producing erroneous safety injection signals. Some of the Foxboro units are used to actuate safeguards equipment and to initiate reactor trip signals. There are approximately 250 modules per unit at Watts Bar Nuclear Plant.

### Safety Implications

These Foxboro instruments are a part of essential safety-related circuits. Erroneous safety injection signals and spurious operation of safety-related equipment are degrading to these safety systems and could adversely affect the safe operation of the plant during certain operational modes.

### Corrective Action

Westinghouse, at TVA's request, has designed, manufactured, and bench-tested improvement kits for both the square root converters and the current repeaters. The kits will be installed and field-tested according to Westinghouse's instructions before fuel loading.

The magnetic amplifier with its line voltage compensation circuitry is an inherently slow device. The compensation circuit can correct for line voltage deviations only if the voltage fluctuation is very slow. The modules cannot correct for the type of voltage transients and fluctuations that are known to occur in the line voltage. Westinghouse no longer uses Foxboro magnetic amplifier equipment in their NSSS process control system design, and no other TVA plants (except Sequoyah, as previously reported) use the Foxboro equipment.