

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street, Tower II

April 13, 1982

WBRD-50-390/81-13

WBRD-50-391/81-12

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 - FAILURE OF THE GENERATOR SYSTEM TO SUPPLY ADEQUATE VOLTAGE TO THE SAFETY-RELATED BOARDS - WBRD-50-390/81-13, WBRD-50-391/81-12 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector M. Thomas on January 5, 1981 in accordance with 10 CFR 50.55(e) as NCR WBN EEB 8009. Interim reports were submitted on February 4, April 13, July 7, October 19, and November 24, 1981. Enclosed is our final report.

If you have any questions, please get in touch with R. E. Snell at FTS 858-2686.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

A handwritten signature in cursive script that reads "L. M. Mills".

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 FAILURE OF THE GENERATOR SYSTEM TO SUPPLY ADEQUATE VOLTAGE TO THE SAFETY-RELATED BOARDS

NCR WBN FEB 8009

WBRD-50-390/81-13, WBRD-50-391/81-12

10 CFR 50.55(e)

FINAL REPORT

Description of Deficiency

When a reactor is tripped automatically for reasons other than an electrical fault or generator bearing failure, the main generator is not tripped for 30 seconds. During this time, the turbine stop valves are closed, and the generator is driven as a synchronous motor. The transfer of the safety boards to the preferred offsite supply is also delayed for 30 seconds. If the generator voltage regulator system failed to operate within its specified range during this delay period, inadequate voltage could be supplied to the 6900-volt shutdown boards following the unit trip. If this occurred, both trains of essential safety-related equipment supplied by the 6900-volt shutdown boards would be unable to meet the required response times stated in the safety analysis report.

Safety Implications

Investigation of this deficiency has led to the determination that this nonconformance is not a condition adverse to quality and would not adversely affect the safe operation of the plant.

Corrective Action

At the present time, TVA has not identified an event which would produce the failure condition as identified in the NCR which is:

A failure of the generator exciter that produces a sufficiently under- or over-excited condition that causes the generator voltage to fall below its required minimum to ensure adequate voltage on the safety buses.

This is because of the following reasons:

1. A failure of the generator exciter that produces a sufficiently over-excited condition will cause a generator trip within two seconds through operation of a volts/hertz protective relay.
2. A failure of the generator exciter that produces a sufficiently under-excited condition will cause a generator trip within 20 cycles through operation of a generator backup relay.

In addition to this, the generator exciter is constructed with redundant systems which give it a very low probability of failure. Compounding this low probability with the probability of an undefined failure occurring during the 30-second interval following turbine trip results in a probability of occurrence of the event that is, in our judgement, insignificant and, therefore, no corrective action is required because of this NCR.

In addition, part of the corrective action for nonconformance report (NCR) WBN EEB 8006 (Auxiliary Power System - Transmission Grid Interface) completely eliminates the probability of this event occurring. This corrective action involves control circuit modifications necessary to force the safety-related 6900-volt shutdown boards to fast transfer to the new common station service transformers for unit trips (see NCR WBN EEB 8006 Final Report). This modification eliminates the 30-second delayed transfer of the safety-related 6900-volt shutdown boards to the preferred offsite power supply and prevents the possibility of the generator voltage regulator system causing both trains of essential safety-related equipment, supplied by the 6900-volt shutdown boards, from failing simultaneously because of inadequate voltage. The modifications identified because of NCR WBN EEB 8006 will be completed before unit 1 fuel loading.

Also, as a result of NCR WBN EEB 8006, the development of a system of design guides and design standards has been scheduled for completion by December 1982. Issuing the guides and standards, along with a TVA Division of Engineering Design Engineering Procedure that invokes and defines their use should prevent the recurrence of the condition identified by this NCR.

An evaluation of other TVA nuclear plants has identified that this condition does not exist at any other nuclear plant except Sequoyah. This was reported under 10 CFR 50.55(e) as Sequoyah NCR SQN EEB 8054.