Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

John H. Garrity
Vice President, Watts Bar Nuclear Plant

DEC 16 1991

WBRD-50-390/91-36
WBRD-50-391/91-36

10 CFR 50.55(e)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of the Application of )
Tennessee Valley Authority )

Docket Nos. 50-390
50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - POTENTIAL COMMON MODE FAILURE OF VITAL CONTROL POWER SYSTEM SUPPLIES - WBRD-50-390/91-36 AND WBRD-50-391/91-36 - FINAL REPORT

The subject deficiency was initially reported to Region II on August 29, 1991, in accordance with 10 CFR 50.55(e) as Significant Corrective Action Report (SCAR) WBSCA 910246. TVA submitted an interim report to NRC on September 27, 1991. Enclosure 1 is TVA's final report on this subject.

The commitments made in this report are provided in Enclosure 2.

If there are any questions, please telephone P. L. Pace at (615) 365-1824.

Sincerely,

John H. Garrity

Enclosures
cc: See page 2

U.S. Nuclear Regulatory Commission

DEC 16 1991

cc (Enclosures):
INPO Record Center
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

NRC Resident Inspector
Watts Bar Nuclear Plant
P.O. Box 700
Spring City, Tennessee 37381

Mr. P. S. Tam, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. B. A. Wilson, Project Chief
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN)
POTENTIAL COMMON MODE FAILURE OF VITAL
CONTROL POWER SYSTEM SUPPLIES
SIGNIFICANT CORRECTIVE ACTION REPORT
(SCAR) WBSCA 910246
WBRD-50-390/91-36 AND WBRD-50-391/91-36
FINAL REPORT

DESCRIPTION OF DEFICIENCY

TVA has determined that a single failure of the Unit 1 Train B Heating, Ventilating, and Air Conditioning (HVAC) System will result in a loss of cooling to the Unit 1 and Unit 2 Channel I and II Vital Control Power System inverters and battery chargers. Likewise, a single failure of the Unit 2 Train B HVAC System will result in a loss of cooling to the Unit 1 and Unit 2 Channel III and IV Vital Control Power System inverters and battery chargers.

The Vital Control Power System for each nuclear unit has four identical power channels (designated as Channels I, II, III, and IV), with the equipment of each channel being electrically and physically independent from the equipment of other channels. Each channel consists of a battery, a battery charger, an inverter and distribution panels which facilitate load grouping and provide circuit protection. Loads are assigned to each channel according to its divisional separation requirement. Those loads requiring four divisions of separation are assigned to the four channels. In general, those loads requiring two divisions of separation are assigned to Channels I and II (Trains A and B, respectively) for Unit 1 and Channels III and IV (Trains A and B, respectively) for Unit 2.

Four normal battery chargers, two spare battery chargers and the eight inverters are located in the Auxiliary Building at elevation 772. The Channel I and II battery chargers, a spare battery charger, and the Channel I and II inverters for Units 1 and 2 are located in the Unit 1 area (480 Volt board room 1B). The Channel III and IV battery chargers, a spare battery charger, and the Channel III and IV inverters for Units 1 and 2 are located in the Unit 2 area (480 Volt board room 2B).

SAFETY IMPLICATIONS

The vital battery chargers supply normal steady state demand on the vital battery boards and maintain the battery in a fully charged state. Safety-related loads supplied by the vital batteries include shutdown board control circuits, relay panels, solenoid valves, inverters and emergency lighting.

The inverters provide power to the instrumentation and control circuits of safety-related equipment required to safely shut down the plant after a Design Basis Event. Each inverter consists of three major subassemblies: a dc power supply, an auctioneering circuit, and an inverter circuit. The dc power supply converts the 480V ac normal inverter input to direct current. The auctioneering circuit accepts the dc power supply (normal supply) and battery

(emergency supply) inputs and permits a bumpless bidirectional transfer between them in the event of 480V ac supply failure and restoration. The dc output of the auctioneering circuit is converted to ac by the inverter circuit.

The qualified temperature range for the inverter is from 32 to 122 degrees Fahrenheit (F). The qualified temperature range for the battery charger is from 32 to 113 degrees F. Upon loss of cooling to the areas containing the inverters and battery chargers, electrical equipment in those areas will continue to generate heat. When the ambient temperature exceeds the individual component maximum rating, the battery chargers/inverters may go out of regulation and subsequently fail to provide adequate power to the control circuits of safety-related equipment. If left uncorrected, this condition could adversely affect the safety of plant operations.

Temperature monitoring in the areas containing the Vital Control Power System inverters is nonsafety-related. Upon reaching a predetermined ambient temperature, an alarm is received in the Main Control Room. However, operator action to restore cooling and the maximum time allowed to take such corrective action before ambient temperatures exceed 113 degrees F have not been established.

CAUSE

The cause for the deficiency is unclear train assignments depicted on equipment drawings. During the early stages of design at WBN, the 47W200-series equipment drawings were commonly used to identify the train assignments for safety-related equipment. These drawings were not clear with respect to correlating Vital Control Power System inverter and battery charger channel designations (I, II, III, and IV) to a Train A or Train B identifier.

CORRECTIVE ACTIONS

1. A review of plant areas was completed which identified one additional area having mixed Train A and Train B safety-related equipment that is cooled by only one train of HVAC equipment. The 480 Volt board room 1A area contains the fifth vital battery room charger. The fifth vital battery may serve as a temporary replacement for either vital battery I, II, III, or IV. This area is cooled by Train A HVAC equipment only.

2. The 47W200-series equipment drawings will be revised so that the train assignment for each compartment is readily identifiable. This action will be completed by May 4, 1992.

3. TVA currently plans to install supply and return ducting from the 1/2A-A 480 Volt board rooms to the 1/2B-B 480 Volt board rooms. This modification should provide sufficient cooling to ensure that Vital Control Power System components located in these areas will not fail because of excessive ambient temperature. This action will be completed by System 31 completion.

ENCLOSURE 2

LIST OF COMMITMENTS

1. The 47W200-series equipment drawings will be revised so that the train assignment for each compartment is readily identifiable. This action will be completed by May 4, 1992.

2. TVA currently plans to install supply and return ducting from the 1/2A-A 480 Volt board rooms to the 1/2B-B 480 Volt board rooms. This modification should provide sufficient cooling to ensure that Vital Control Power System components located in these areas will not fail because of excessive ambient temperature. This action will be completed by System 31 completion.