TENNESSEE VALLEY AUTHORITY
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DEC 22 1989

WBRD-50-390/87-12
WBRD-50-391/87-13

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) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - POSSIBLE FAILURE OF RELAYS TO OPEN IN DIESEL GENERATOR CONTROL PANELS - WBRD-50-390/87-12 AND WBRD-50-391/87-13 - FINAL REPORT

The subject deficiency was initially reported to NRC Inspector Gordon Hunegs on April 24, 1987, in accordance with 10 CFR 50.55(e) as Significant Condition Report (SCR) WBN EEB 86108. This deficiency is considered reportable under 10 CFR 21, and Morrison-Knudsen report No. 10CFR21-0033 addresses this issue. Enclosed is our final report.

Becky Long was notified on December 15 and 19, 1989, of delays in submittal of this report.

Enclosure 2 identifies commitments made in this submittal.

If there are any questions, please telephone G. R. Ashley at (615) 365-8527.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

N J Ray

Manager, Nuclear Licensing
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Enclosures
cc: See page 2

U.S. Nuclear Regulatory Commission

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
POSSIBLE FAILURE OF RELAYS TO OPEN IN DIESEL
GENERATOR CONTROL PANELS
WBRD 50-390/87-12 AND WBRD 50-391/87-13
SCR WBN EEB 86108
10 CFR 50.55(e)

FINAL REPORT

Description of Deficiency

A condition has been identified whereby 13 continuously energized Square D direct current (DC) relays (Class 8501, type KPD-13) in each diesel generator (DG) control panel may fail to open upon loss of power. This condition was discovered when a continuously energized relay failed to open during testing at the Trojan Nuclear Plant. The DGs for both Trojan Nuclear Plant and Watts Bar Nuclear Plant are similar in design and were supplied by Morrison-Knudsen Company, Rocky Mount, North Carolina. The Watts Bar DGs were supplied by Morrison-Knudsen under contract 74C63-83090. The failure is the result of residual magnetism which builds up over an extended period of time (estimated three to five years) while the relay is held in the energized (closed) position. The relay at Trojan Nuclear Plant had been continuously energized for almost ten years. This residual magnetism was sufficient (at Trojan) to prevent the relay from opening when power was removed. When Watts Bar Nuclear Plant becomes operational, these same relays will also be constantly energized and susceptible to the same type of failure that occurred at Trojan Nuclear Plant.

Safety Implications

The DGs comprise a safety system required for safe shutdown of the plant. In the event of loss of nuclear unit power concurrent with loss of preferred (offsite) power, the DGs become the only source capable of supplying essential Class 1E alternating current (AC) power greater than 120 volts for safety-related equipment (this includes centrifugal charging pumps, safety injection pumps, residual heat removal pumps, essential raw cooling water pumps, component cooling water pumps, and others). This equipment is required for safe shutdown and maintaining the plant in a safe mode and/or mitigating the consequences of an accident.

The design function of relays in each DG board which could fail as a result of residual magnetism is as follows:

- three relays are required for automatic starting of the DG,
- nine relays are required to provide indication that fuses within the DG control panel have blown, and
- one relay is required to provide indication that there has been a loss of power to the logic controls of the DG panel.

Failure of these relays to open could create a condition whereby the DG would not be able to provide the required source of standby electrical AC power. Therefore, this condition could adversely affect the safety of operations for the plant when an onsite source of emergency AC power is needed.

Corrective Action

For the Square D KPD-13 relays used in the DG control circuits:

1. Operation of these relays will be verified during system tests before fuel load.

2. These relays will be replaced at each refueling outage (approximately 18-month intervals) until permanently replaced by a different type relay not subject to the same failure mode.

3. A determination of the need for permanent relay replacement will be made before fuel load of Unit 1. This decision will be based on a cost benefit analysis of periodic replacement versus redesign and permanent replacement.

The installed relays have been deenergized for extended periods due to the construction status of the plant, and residual magnetism is not considered to be a problem before startup of Unit 1.

TVA has determined that there are no other safety-related applications at WBN employing Square D KPD-13 relays.

ENCLOSURE 2

LIST OF COMMITMENTS

1. Operation of Square D KPD-13 relays used in the DG control circuits will be verified during system tests before fuel load of Unit 1.

2. These relays will be replaced at each refueling outage (approximately 18-month intervals) until permanently replaced by a different type relay not subject to the same failure mode.

3. A determination of the need for permanent relay replacement shall be made before fuel load of unit 1. This decision will be based on a cost benefit analysis of periodic replacement versus redesign and permanent replacement.