TENNESSEE VALLEY AUTHORITY

CHATTANOOGA. TENNESSEE 37401 5N 157B Lookout Place May 23, 1986

WBRD-50-390/86-24 WBRD-50-391/86-20

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U.S. Nuclear Regulatory Commission Region II Attention: 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 - QUESTIONABLE USE OF THOMAS AND BETTS CONNECTORS IN 6.9 KV CIRCUITS - WBRD-50-390/86-24, WBRD-50-391/86-20 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector Bob Carroll on January 14, 1986 in accordance with 10 CFR 50.55(e) as NCR WBN 6536. Our interim report was submitted on February 13, 1986. Enclosed is our final report.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. L. Guilley, us

R. L. Gridley, Director Nuclear Safety and Licensing

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 QUESTIONABLE USE OF THOMAS AND BETTS CONNECTORS IN 6.9 KV CIRCUITS WBRD-50-390/86-24, WBRD-50-391/86-20 NCR WBN 6536 10 CFR 50.55(e) FINAL REPORT

Description of Deficiency

Quality Control Procedure (QCP) 3.06-4 R4, attachment B, for Watts Bar Nuclear Plant (WBN) specifies the use of Thomas and Betts 54500 series 2-way connectors for use on 6.9 kV cable types (TVA mark number) WNB through WNG-1. However, these connectors are only rated for use in 600V (or less) applications.

The cause of this problem is the ambiguity of vendor data from Thomas and Betts as well as General Construction Specification G-38. Neither document is clear on what materials/components are rated for medium voltage (600V to 15 kV) service.

Safety Implications

The potential exists for cable damage (due to improper use of these connectors) and subsequent degradation of essential safety-related systems, thereby resulting in a condition that could adversely affect the safety of operations of the plant.

Corrective Action

TVA is in the process of identifying all safety-related 6.9 kV splices and, once all are identified, will begin an inspection program to determine their acceptability. Inspections will initially be on one of the three splices for cable at a specific location and will involve the removal of all sleeving, tape, etc., and exposing the butt splice connector (with 6.9 kV circuits one cable number is used for the three single conductor cables that make up the 3-phase circuit). After the butt splice connector is exposed, the Thomas and Betts butt splice connector and Thomas and Betts die which were used will be identified and the acceptability of the splice will be determined using the acceptance criteria listed below which was provided by Thomas and Betts.

- The cable was stripped adequately to allow full insertion of the conductor to the center stops in the wire barrel of the connector.
- 2. The prescribed hydraulic hex die set was used.
- 3. The prescribed number of compressions as shown on Thomas and Betts stuffer sheets were made.

- Each compression was fully cycled by an electric or a manual pump with a minimum 9700 lb/in² output.
- All sharp edges ("flash") produced by the compressions were removed leaving smooth hex corners.

If these conditions are met for the connector inspected, then all three conductor splices at that location are deemed acceptable and the exposed conductor butt splice connector will be insulated per TVA Standard Drawing SD-E12.5.3

If the inspected splice does not meet the acceptance criteria, then the other two splices must be inspected and any unacceptable conditions for the three splices must be corrected. If correction cannot be made, the connector(s) will be replaced using one of the following:

- Thomas and Betts copper 2-way splicers (butt splice connectors) catalog No. 54010 for 2/0 awg conductors, die No. 15CA45R or catalog No. 54012 for 4/0 awg, die No. 15CA54R (required installation tool for these dies is Thomas and Betts TBM15).
- Thomas and Betts 2-way connectors long barrel-type (butt splice connectors) catalog No. 54810 for 2/0 awg conductor, die No. 11738 or catalog No. 54812 for 4/0 awg conductor, die No. 11740 (required installation tool is Thomas and Betts 13642 hydraulic head, 12 ton).
- 3. Thomas and Betts cast copper 2-way connectors (butt splice connectors) catalog No. 53510 for 2/0 awg conductor, die No. 11409 or catalog No. 53512 for 4/0 awg conductor, die No. 11409 (required installation tool is Thomas and Betts 21940 hydraulic head, 40 ton, or Thomas and Betts 13642 hydraulic head, 12 ton).

These inspections and necessary rework will be completed by fuel load of each unit.

To prevent recurrence of this problem, General Construction Specification G-38 will be revised by July 15, 1986, to define the proper connectors for medium voltage applications. Once G-38 is revised, applicable site procedures will be revised, by October 15, 1986, to specify the proper connectors, tools, and dies for butt splices.

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