

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

November 17, 1982

WBRD-50-390/82-07

WBRD-50-391/82-70

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 - CONTAINMENT PENETRATION PROTECTION -  
WBRD-50-390/82-07, WBRD-50-391/82-70 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. V. Crlenjak on December 7, 1981 in accordance with 10 CFR 50.55(e) as NCR WBN EEB 8111. Our first interim report covering unit 1 was submitted on January 26, 1982. TVA has expanded this deficiency to cover unit 2. A subsequent interim report covering both units was submitted on July 30, 1982. 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 Licensing

Enclosure

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

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
CONTAINMENT PENETRATION PROTECTION  
NCR WBN EEB 8111  
WBRD-50-390/82-07, WBRD-50-391/82-70  
10 CFR 50.55(e)  
FINAL REPORT

Description of Deficiency

In a design review to determine if the control power cable penetrations of the containment were adequately protected electrically against overloads and short circuits, it was found that some of the cable penetrations were not adequately protected.

The electrical penetration current ratings were determined from the qualification test report. The information used from the report is shown in Table 1.

Table 1

| <u>Penetration<br/>Size<br/>(AWG)</u> | <u>Nominal<br/>Capacity<br/>(Amps)</u> | <u>Maximum<sup>1</sup><br/>Capacity<br/>(Amps)</u> | <u>STOL<sup>2</sup><br/>Current<br/>(Amps)</u> | <u>Short<br/>Circuit<br/>(I<sup>2</sup>t)</u> |
|---------------------------------------|--|--|--|---|
| 12                                    | 6                                      | 9.39   | 44   | 2.23 X 10 <sup>5</sup>                        |
| 10                                    | 10                                     | 16.43  | 74   | 5.00 X 10 <sup>5</sup>                        |
| 8                                     | 18                                     | 23.49  | 133  | 1.39 X 10 <sup>6</sup>                        |

1. Maximum extrapolated current to raise cable temperature to 90°C.
2. Cable will withstand 10 seconds at the STOL rate.

All control power penetrations are being reviewed to ensure that the protective devices will interrupt power to the penetration before exceeding the maximum current rating for long-time overload, short-time overload (STOL), and short circuit conditions.

As noted in Table 2, 28 electrical penetration circuits have been identified as having inadequate protection for the long-time overload condition and five electrical penetration circuits were revised to provide redundant overcurrent protective devices for a short circuit.

The root cause of this deficiency was a design error resulting from inadequate design criteria. Although the design criteria included the requirements of RG 1.63 by reference, it did not adequately clarify and interpret these requirements into specific criteria for the design of Watts Bar Nuclear Plant.

Safety Implications

If primary containment seals were to melt, the containment isolation would be defeated, thus adversely affecting the safe operation of the plant.

Corrective Action

Design drawings have been issued by Engineering Change Notice No. 3307 to change the identified penetration conductor sizes and/or provide redundant overcurrent protective devices which give adequate penetration protection. Design documents have been completed and transmitted to TVA's Division of Construction (CONST) for installation and inspection.

Design Input Memorandum DIM-WB-DC-30-5-2 has been issued in order to clarify design criteria WB-DC-30-5 by interpreting the requirements of Regulatory Guide 1.63 to assure adequate and redundant penetration protection. Design reviews will be performed on all future changes involving electrical penetration conductor sizing and redundant overcurrent protection. This will prevent recurrence of the deficiency.

Actual changes to the penetrations will be performed in the field by CONST. These changes will be completed by June 15, 1983, and are listed in table 2 (attached).

This item is being reviewed for applicability to other plants. NCRs and design criteria changes will be issued as appropriate.

Table 2

a. The following penetration circuits were identified as having inadequate long-time overload protection:

| <u>Penetration &amp; AWG</u> | <u>Cable No.</u> | <u>Corrective Action</u>   |
|------------------------------|------------------|--|
| <u>Unit 1</u>                |                  |  |
| 10-12                        | P2547            | Change to 8 AWG penetration  |
| 10-12                        | P2587            | Change to 8 AWG penetration  |
| 36-12                        | 1PL4795B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 36-12                        | 1PL4843B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 36-12                        | 1PL4766B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 36-12                        | 1PL4825B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 46-12                        | P2590            | Parallel two 10 AWG penetrations   |
| 46-12                        | P2590            | Parallel two 10 AWG penetrations   |
| 48-12                        | 1PL4312          | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 48-12                        | P2570            | Change to 8 AWG penetration  |
| 48-12                        | P2610            | Change to 8 AWG penetration  |
| 51-12                        | 1M1750           | Replace 20 amp Shawmut fuse with 7 amp Shawmut fuse                                      |
| 52-12                        | 1PL4889B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 52-12                        | 1PL4791B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 52-12                        | 1PL4770B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 53-12                        | P2567            | Change to 8 AWG penetration  |
| 53-12                        | P2607            | Change to 8 AWG penetration  |
| 53-8                         | 1RM1             | Parallel two 8 AWG penetrations and replace 40 amp Shawmut fuse with 30 amp Shawmut fuse |
| <u>Unit 2</u>                |                  |  |
| 36-12                        | 2PL4795B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 36-12                        | 2PL4843B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 36-12                        | 2PL4766B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 44-12                        | 2PL4825B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 48-12                        | 2PL4612          | Replace 10 amp KWN fuse with 6 amp KWN fuse  |

| <u>Penetration &amp; AWG</u> | <u>Cable No.</u> | <u>Corrective Action</u>   |
|------------------------------|------------------|--|
| 51-12                        | 2M1750           | Replace 20 amp Shawmut fuse with 7 amp Shawmut fuse                                      |
| 52-12                        | 2PL4889B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 52-12                        | 2PL4791B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 52-12                        | 2PL4770B         | Replace 10 amp KWN fuse with 6 amp KWN fuse  |
| 53-8                         | 2RM1             | Parallel two 8 AWG penetrations and replace 40 amp Shawmut fuse with 30 amp Shawmut fuse |
| 10-12                        | P2627            | Change to 8 AWG penetration  |
| 10-12                        | P2667            | Change to 8 AWG penetration  |
| 46-12                        | P2670            | Change to 8 AWG penetration  |
| 46-12                        | P2630            | Change to 8 AWG penetration  |
| 48-12                        | P2650            | Change to 8 AWG penetration  |
| 48-12                        | P2690            | Change to 8 AWG penetration  |
| 53-12                        | P2647            | Change to 8 AWG penetration  |
| 53-12                        | P2687            | Change to 8 AWG penetration  |

b. The following penetration circuits were identified as having inadequate redundant overload and short circuit protection:

| <u>Penetration &amp; AWG</u> | <u>Cable No.</u> | <u>Corrective Action</u>                      |
|------------------------------|------------------|---|
| <u>Unit 1</u>                |                  |   |
| 36-8                         | Ltg Ckt          | Install 15 amp fuse, Shawmut AT-DE in hot leg |
| 36-8                         | Ltg Ckt          | Install 15 amp fuse, Shawmut AT-DE in hot leg |
| 36-8                         | Ltg Ckt          | Install 15 amp fuse, Shawmut AT-DE in hot leg |
| 52-12                        | 1PL4861B         | Install 6 amp KWN fuse in hot leg             |
| <u>Unit 2</u>                |                  |   |
| 36-8                         | Ltg Ckt          | Install 15 amp fuse, Shawmut AT-DE in hot leg |
| 36-8                         | Ltg Ckt          | Install 15 amp fuse, Shawmut AT-DE in hot leg |
| 36-8                         | Ltg Ckt          | Install 15 amp fuse, Shawmut AT-DE in hot leg |
| 52-12                        | 2PL4861B         | Install 6 amp KWN fuse in hot leg             |