



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

GENERIC LETTER 92-08 AMPACITY DERATING ISSUES

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2 AND 3

DOCKET NOS. 50-259, 50-260 AND 50-296

1.0 BACKGROUND

By letter dated November 7, 1995, Tennessee Valley Authority (TVA or the licensee) made modifications to the existing Thermo-Lag fire barrier of one division of the Residual Heat Removal Service Water System cables which are located at the Browns Ferry Nuclear Plant (BFN) Intake Pumping Station.

The staff evaluation for BFN, which constitutes the review and approval of TVA's ampacity derating test or analyses for installed Thermo-Lag fire barrier configurations, follows.

2.0 EVALUATION

The licensee utilized Watts Bar Nuclear Plant (WBN) test data to derive the ampacity derating factors for the Thermo-Lag configuration installed at BFN. The licensee ampacity derating test methodology followed the guidance in draft Institute of Electrical and Electronics Engineers (IEEE) Standard P848, "Procedure for the Determination of the Ampacity Derating of Fire Protected Cables," Revisions 11, 12, and 14, dated April 6, 1992, February 24, 1993, and April 15, 1994, respectively, except for changes identified in individual test plans.

The licensee conducted extensive ampacity derating testing of various Thermo-Lag fire barrier configurations at the licensee's Central Laboratories Services Department (denoted "Phase I tests") in Chattanooga, Tennessee, from March 9 to April 6, 1993; April 30 to May 10, 1993; and June 1 to June 22, 1993; and at Omega Point Laboratories (denoted "Phase II tests") in San Antonio, Texas, from August 16 to 26, 1994; September 14 to October 6, 1994; November 15 to December 3, 1994; and January 4 to 23, 1995. Phase 3 and 4 ampacity tests, which involve the Thermo-Lag material 770-1, were also completed as part of the corporate test program.

The licensee provided adequate disposition of the following concerns, which were associated with the review of the WBN test program: (1) Effect of reduced Cure Time for the Thermo-Lag material; (2) Use of simultaneous testing of more than one test article at one time; (3) Presence of negative ampacity derating factor test results and (4) Extension of IEEE P848 methodology for non-standard configurations.

The table below lists the WBN ampacity derating factors:

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PDR ADOCK 05000259  
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Enclosure

Watts Bar Nuclear Plant Ampacity Derating Values

RACEWAY	REPORT NO.	AMPACITY DERATING FACTOR (%)
24" cable tray with 1/2" TSI configuration	TUE 12340-95169	31.5
Large air drop with 5/8" + 3/8" TSI configuration	TUE 12340-95168	31.7
1" conduit with 5/8" TSI configuration	TVA 93-0501	7.0
1" conduit with 5/8" + 3/8" TSI configuration	TVA 93-0501	8.0
4" conduit with 3/8" + 3/8" TSI configuration	TVA 93-0501	7.0
24" cable tray with solid steel cover, with 5/8" TSI configuration	TVA 11960-97332	40
3-24" trays in a common 5/8" TSI configuration	TVA 11960-97334	36
3-1" conduits in a single row in a common 5/8" TSI configuration	TVA 11960-97335	8
2 rows of 3-1" conduits in a common 5/8" TSI configuration	TVA 11960-97336	26
1" conduit in a 5/8" TSI configuration mounted on a small Unistrut frame	TVA 11960-97768	12
1" conduit in a 5/8" TSI configuration mounted on a large Unistrut frame	TVA 11960-97769	6
2 rows of 3-1" conduits in a common 5/8" TSI configuration mounted on a large Unistrut frame	TVA 11960-97770	9

Note: TSI - Thermal Sciences Incorporated

Application of Ampacity Derating Methodology

Question 4 from the NRC staff request for additional information dated August 29, 1996 for WBN posed the following query:

Given the completion of the ampacity derating tests (Phases I, II, III) for the Thermo-Lag fire barriers that are installed at WBN Unit 1, the licensee should confirm that the existing ampacity design margins are adequate and sufficient

for each installed fire barrier configuration. The licensee should delineate the minimum excess ampacity derating margins for the various electrical distribution circuits (e.g., 4 kV, 480 V) enclosed by the Thermo-Lag fire barrier material at the Watts Bar Nuclear Plant.

In its submittal of October 24, 1996 for WBN, the licensee stated that upon completion of the ampacity test program, its Corporate Engineering organization evaluated the results and established conservative ampacity correction factors for the various Thermo-Lag fire barrier enclosed electrical raceway configurations. In its submittal of March 22, 1995 for BFN, the licensee made the following assertions: (1) the licensee will rely on its own quality assurance and Thermo-Lag qualification test programs to qualify future Thermo-Lag installations; and (2) the licensee will remove the existing Thermo-Lag material in the BFN Intake Pumping Station and replace this material with new qualified material. The licensee confirmed the subject material replacement by letter dated November 7, 1995. Although the licensee's response did not provide the minimum excess ampacity margins data, this information is available for onsite review. The confirmation that the ampacity derating margins are adequate and sufficient for each fire barrier adequately resolves the objectives of the subject evaluation.

### 3.0 CONCLUSIONS

Given that the staff has reviewed and approved of the ampacity derating test program results for WBN as specified in References 1 and 2 and the BFN Thermo-Lag fire barrier configuration is representative of the applicable WBN tested configuration, the staff finds that the licensee has provided adequate information to resolve the ampacity-related points of concern raised in Generic Letter 92-08 for BFN. Therefore, the staff finds that there are no outstanding safety concerns with respect to Generic Letter 92-08 ampacity issues for Browns Ferry Nuclear Plant, Units 1, 2, and 3.

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Date: July 16, 1999

4.0 REFERENCES

1. NRC Letter from R. E. Martin to O. J. Zeringue dated January 6, 1998, "Supplementary Safety Evaluation Report on Ampacity Issues Related to Thermo-Lag Fire Barriers at Watts Bar Nuclear Plant (TAC NO. 85622)."
2. U.S. Nuclear Regulatory Commission NUREG-0847, "Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2," Supplement 18, issued October 1995.