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

DEC 18 1995

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

Gentlemen:

In the Matter of ) Docket No. 50-390
Tennessee Valley Authority )

WATTS BAR NUCLEAR PLANT (WBN) - DECEMBER 23, 1994, REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING GENERIC LETTER (GL) 92-08, "THERMO-LAG 330-1 FIRE BARRIERS" (TAC M85622)

The purpose of this letter is to provide the results of the Thermo-Lag testing and to notify the NRC that work associated with Thermo-Lag has been completed for WBN Unit 1. In addition, this letter provides the results of the remaining actions discussed in TVA's response dated March 22, 1995, to the subject RAI.

Enclosure 1 is a summary of the activities associated with Thermo-Lag Chemical and Physical Properties Testing. The attachment to this report contains a listing of the source documents for this testing which are available for NRC review. Enclosure 2 of this letter provides the results of the remaining actions for GL 92-08 discussed above.

With the completion of the Thermo-Lag field work and the submittal of the information contained in this letter, WBN considers Generic Letter 92-08 complete for WBN Unit 1.

If you should have any questions, please contact P. L. Pace at (423) 365-1824.

Sincerely,

D. V. Kehoe
Nuclear Assurance
and Licensing Manager

Enclosures
cc: See page 2

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ENCLOSURE 1
WATTS BAR NUCLEAR PLANT (WBN)
THERMO-LAG
CHEMICAL AND PHYSICAL PROPERTIES SUMMARY REPORT

In response to the NRC December 22, 1994, request for additional information, regarding Generic Letter 92-08 issued pursuant to 10CFR50.54(f), TVA developed a program for verifying the acceptability of Thermo-Lag materials.

The TVA program was devised to be complete, comprehensive, and in accordance with recognized material testing standards. Based on: 1) discussions with Underwriters Laboratories (U.L.) regarding the testing involved with "Listing and Labeling" fire barrier materials, 2) the vendor, Thermal Science, Inc. (TSI), and 3) TVA expertise in the materials area. It was determined that the following analysis would be performed:

Thermogravimetric Analysis (TGA) - The TGA is a empirical test method which develops a controlled decomposition curve for materials. This analysis provides verification that samples possess equivalent ratios of compounds.

Infrared (IR) Spectroscopy - The IR is used to identify organic and inorganic compounds in a material. This analysis determines the distinct wave lengths as absorbed by specific compounds in the material.

Density - The density testing is used to determine the weight and consistency of the material.

Board Shear Strength - Board Shear Strength testing is used to provide additional assurance of reliable mechanical properties for seismic qualification.

The TVA chemical and physical materials properties testing program was divided into four phases. The phases were:

PHASE I

This phase involved testing the bulk of materials for WBN installation. This phase also established the acceptance criteria for Thermo-Lag 330-1 materials. Tests were performed on samples of material from 23 of the Phase I lots delivered to WBN which were used in the actual fire, ampacity, and seismic qualifying testing. TVA developed a strict material acceptance criteria from the results of this testing. This provides a direct correlation of the materials performance during testing and the material used in construction of WBN Electrical Raceway Fire Barrier Systems (ERFBS). Lot homogeneity was also established in this phase. Two lots of material were sampled in accordance with MIL-STD-105E to measure the variation in chemical composition within a lot, and thus demonstrating lot homogeneity.

PHASE II

This phase was initiated in an effort to use Thermo-Lag 330-1 materials previously procured by TVA and stored at the Hartsville warehouse. Prior to the use of this "New Old Stock" (NOS) material

the chemical and physical material properties were tested. In the process of this testing TVA discovered a discrepancy in some of the circa 1985 materials. The discrepancy was discovered while performing the TGA. Typically, the circa 1985 Thermo-Lag 330-1 material exhibited more residue at the end of the test. TVA officially informed the NRC of this discrepancy by a supplemental letter to the original 50.54(f) response on June 15, 1995.[1] NOS material lots that did not meet the strict chemical and materials acceptance criteria established in Phase I were isolated. They were not used at WBN.

PHASE III

During WBN installation, additional preformed material was procured. Each lot of this material was subjected to the same tests used in Phase I and met the strict acceptance criteria established in the phase prior to release for installation.

PHASE IV

This phase dealt exclusively with Thermo-Lag 770-1 material. During the WBN Appendix R analysis, a small population of raceways (<100 ft.) were identified that required rated three-hour ERFBS. Originally, WBN had planned to install rated one-hour ERFBS and submit formal Appendix R deviations for these areas since automatic suppression is not installed. However, based on the very successful three-hour upgrade design and tests qualified by TVA in December 1994/January 1995, WBN decided to install a rated three-hour ERFBS and retract the deviation requests. Samples of the 770-1 materials used in the fire and ampacity qualification testing were used to established the strict material acceptance criteria.[2] Materials installed in the plant were tested to demonstrate conformance to these criteria.

SUMMARY

The TVA Thermo-Lag program has clearly demonstrated the Thermo-Lag materials used in the required Appendix R ERFBS at WBN are acceptable and strictly bounded by material testing. Therefore, TVA concludes that Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers" can be closed for WBN Unit 1.

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[1]TVA Letter to NRC dated June 15, 1995

[2]Memorandum to R. L. Brannan from P. V. Guthrie, TVA Engineering, dated August 11, 1995.

ATTACHMENT

SUMMARY OF TVA REFERENCE DOCUMENTS RELATING
TO THE THERMO-LAG CHEMICAL AND PHYSICAL PROPERTIES TESTING

The following documents are identified for reference. These are the primary documents that comprise the Chemical and Physical properties test program for all Thermo-Lag installed at WBN.

PHASE I

1. Memorandum to J. M. Pleva, TVA Central Laboratories, E. A. Zarate, TVA environmental Research Center, and J. Hilliard, Singleton Laboratories (SL), from M. H. Salley, TVA Engineering, dated March 31, 1995.

   *(This memorandum identifies all the Phase I Lots of Thermo-Lag for testing. This memorandum also includes the Certificates of Conformance and the WBN Quality Control (QC) Inspection Report forms that verified the material for testing.)*

2. Memorandum to J. M. Pleva, TVA Central Laboratories, E. A. Zarate, TVA environmental Research Center, and J. Hilliard, Singleton Laboratories, from M. H. Salley, TVA Engineering, dated April 27, 1995.

   *(This memorandum provides additional instructions regarding the Lot Homogeneity Testing performed in Phase I.)*

3. Memorandum to Those listed from T. R. Woods, TVA Engineering, dated May 5, 1995.

   *(This memorandum provides the results and acceptance of the Phase I Thermogravimetric (TGA) and Infrared (IR) Spectroscopy testing.)*

4. Singleton Laboratories Test Report 93N3D-41791D, RD 1067403 "Watts Bar Nuclear Plant Phases I, II, III, and IV Shear Strength and Density Tests to Verify Acceptability of Thermo-Lag 330-1 and 770-1 Material Lots," SL Report 209-041-039C.

   *(This report documents Phases I, II, III, and IV Shear Strength and Density Testing Results.)*

PHASE II

5. Memorandum to J. M. Pleva, TVA Central Laboratories, E. A. Zarate, TVA Environmental Research Center, and J. Hilliard, Singleton Laboratories, from M. H. Salley, TVA Engineering dated April 11, 1995.

   *(This memorandum identifies all the Phase II Lots of Thermo-Lag for testing. This memorandum also includes the Certificates of Conformance and the WBN QC Inspection Report forms that verified the material for testing.)*

6. Memorandum to W. L. Elliott, WBN Engineering, from T. R. Woods, TVA Engineering, dated September 11, 1995.

*(This memorandum provides the results and acceptance of the Phase II TGA and IR testing. This memorandum identifies the circa 1985 Hartsville material that is outside the strict TVA acceptance criteria. This discrepancy was documented in TVA letter to the NRC dated June 15, 1995, "Sequoyah (SQN) and Watts Bar (WBN) Nuclear Plants - Update of TVA's March 22, 1995, Response to NRC Request for Additional Information Regarding Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers")*

PHASE III

7. Memorandum to J. M. Pleva, TVA Central Laboratories, E. A. Zarate, TVA Environmental Research Center, and J. Hilliard, Singleton Laboratories from M. H. Salley, TVA Engineering, dated May 4, 1995.

*(This memorandum establishes how Phases III and IV were tested and documented. TVA inspectors were at Thermal Science, Inc.'s facility at the time the materials were manufactured and were responsible for taking the samples and sending them back to WBN for independent TVA testing prior to release for installation.)*

8. Memorandum to M. H. Salley, TVA Engineering, from J. V. Hawkins, WBN Nuclear Assurance, dated September 1, 1995.

*(This memorandum provides the supporting documentation for Phases III and IV Thermo-Lag materials. This memorandum also contains the executive summary of Nuclear Utility Procurement Issues Committee (NUPIC) audit QAA-93-301.)*

9. Memorandum to Those listed from T. R. Woods, TVA Engineering, dated September 15, 1995

*(This memorandum provides the results and acceptance of the Phase III TGA and IR testing.)*

PHASE IV

10. Memorandum to R. L. Brannan from P. V. Guthrie, TVA Engineering, dated August 11, 1995.

*(TVA originally did not plan to install any three-hour ERFBS, and therefore, did not plan on performing any chemical analysis on the 770-1 materials. In order to have a tie back to the fire/ampacity qualification tests, samples from a back-up fire test deck were retrieved from Omega Point labs to establish the baseline materials chemical properties. This information documents that effort.)*

11. Memorandum to Those listed from T. R. Woods, TVA Engineering, dated November 16, 1995.

*(This memorandum provides the results and acceptance of the Phase IV TGA and IR testing.)*

TROWEL GRADE SHELF LIFE EXTENSION/OTHER TESTS

12. Memorandum to Those listed form M. H. Salley, TVA Engineering, dated June 10, 1995.

    *(This memorandum contains the procedures and results of the Thermo-Lag 330-1 Trowel Grade shelf life extension effort.)*

13. Memorandum to Those listed from T. R. Woods, TVA Engineering, dated November 16, 1995.

    *(This memorandum provides the results and acceptance of the chemical compatibility of Thermo-Lag 330-1 with austenitic stainless steel testing.)*

14. Memorandum to M. H. Salley, TVA Engineering, to K. D. Steckler, National Institute of Standards and Technology (NIST), dated June 12, 1995.

    *(This memorandum has NIST request for TVA Thermo-Lag for NRC testing.)*

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT (WBN) RESPONSE TO
REQUEST FOR ADDITIONAL INFORMATION REGARDING
GENERIC LETTER 92-08,
"THERMO-LAG 330-1 FIRE BARRIERS"
DATED MARCH 22, 1995

The following discussion provides the results of the remaining actions for GL 92-08:

**WBN Commitment 1 - "Procedures will be developed to implement the Thermo-Lag 330-1 material verification measures described in Enclosure 1 to this letter. The procedures will be completed by April 28, 1995 and made available for NRC review."**

WBN Response 1 - This commitment is complete. TVA developed Appendix 7.4, "Special Testing/Acceptance Requirements for Thermo-Lag Materials," to Revision 3 of General Engineering Specification G-98, "Installation, Modification, and Maintenance of Electrical Raceway Fire Barriers." This was reviewed and discussed with NRC/NRR personnel during the licensing process of WBN Unit 1. The NRC concurrence is documented in Safety Evaluation Report, NUREG 0847, Supplement No. 18, page 68.

**WBN Commitment 2 - "TVA will submit a supplemental report providing the information requested in Item 1d within 60 days after completing installation of Thermo-Lag in WBN Unit 1."**

WBN Response 2 - Enclosure 1 of this letter provides the supplemental report which summarizes the actions associated with the Thermo-Lag Chemical and Physical Properties. This summary approach was taken in light of the NRC letter to Nuclear Energy Institute and was previously discussed with members of the NRC/NRR staff on December 5 and 11, 1995. The attachment to this report provides a listing of the source documents for the testing. These documents are available onsite for NRC review.

**WBN Commitment 3 - "The test results to qualify Thermo-Lag 770-1 as a three-hour fire barrier will be submitted as they become available."**

WBN Response 3 - This commitment is complete. The three-hour fire tests were docketed under WBN letter dated March 29, 1995, and the three-hour ampacity derating tests were docketed under WBN letter dated September 14, 1995.

**WBN Commitment 4 - "Requirements and tests for the limited scope of Thermo-Lag 770-1 ERFBS to be used for there-hour fire barriers will be added to the design standard, installation drawings, and implementing procedures upon completion of the associated TVA tests. These requirements will ensure that the material control measures, qualifications requirements, and applicable important barrier parameters discussed in Enclosures 1 and 2 are met."**

WBN Response 4 - This commitment is complete. TVA qualified typical design information and parameters to the design standard, issued typical installation detail drawings, and developed special implementation/installation requirements for the installation of three-hour rated Thermo-Lag 770-1 ERFBS. TVA Design Standard DS-M17.2.2, "Electrical Raceway Fire Barrier Systems," Revisions 3 and 4 added the three-hour fire tests, typical designs, and other information necessary for installation. TVA Design Standard DS-E12.6.3, "Auxiliary and Control Power Cable Sizing, Up To 15,000 Volts," Revisions 6 and 7, incorporated the ampacity test results.

In addition, TVA General Engineering Specification G-98 "Installation, Modification, and Maintenance of Electrical Raceway Fire Barrier Systems," Revisions 2 and 3, added Appendix 7.2, "Special Requirements and Application of Thermo-Lag Three-Hour Rated Electrical Raceway Fire Barrier Systems." WBN Engineering issued drawings 47W243, Sheets 75 through 78 for field installation. The above listed documents ensured the three-hour Electrical Raceway Fire Barrier Systems were installed in a quality manner and are bounded by the TVA qualification testing.