



PECO ENERGY

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March 29, 1995

Docket Nos. 50-277  
 50-278  
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 DPR-56  
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U. S. Nuclear Regulatory Commission  
 Attn: Document Control Desk  
 Washington, DC 20555

Subject Peach Bottom Atomic Power Station, Units 2 and 3,  
 Limerick Generating Station, Units 1 and 2,  
 Request for Additional Information Regarding  
 Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers"

- References
- 1) Letter from G. A. Hunger, Jr. to USNRC  
 Document Control Desk dated April 16, 1993
  - 2) Letter from G. A. Hunger, Jr. to USNRC  
 Document Control Desk dated December 29, 1993
  - 3) Letter from G. A. Hunger, Jr. to USNRC  
 Document Control Desk dated February 4, 1994
  - 4) Letter from G. A. Hunger, Jr. to USNRC  
 Document Control Desk dated December 19, 1994

Dear Sirs

The subject request for additional information (RAI) regarding Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," dated December 29, 1994, requested that PECO Energy Company, (PECO Energy), respond within 90 days with additional information regarding Thermo-Lag 330-1 fire barrier systems. PECO Energy had previously responded on April 16, 1993 (reference letter 1), December 29, 1993 (reference letter 2), February 4, 1994 (reference letter 3) and December 19, 1994 (reference letter 4) to this GL. Attachment I to this letter includes our response to the RAI. T's response is being submitted under oath or affirmation as requested in the RAI.

The industry has raised significant issues with regard to the actions requested by the 10 CFR 50.54(f) letter. These issues were detailed in a January 17, 1995 letter from William H. Rasin, NEI, to William T. Russell, NRC. PECO Energy concurs with the NEI position, and believes that the issues raised in this letter need to be resolved. PECO Energy acknowledges that it, as

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licensee should provide an appropriate level of assurance that the Thermo-Lag used in industry support tests is representative of the Thermo-Lag installed at Peach Bottom Atomic Power Station (PBAPS) and Umerick Generating Station (LGS); however, this assurance need not be to the level required by the PECO Energy Quality Assurance (QA) Program or 10 CFR 50 Appendix B

If you have any questions please feel free to contact us

Very truly yours,

*G. A. Hunger, Jr.*

G A Hunger, Jr.,  
Director - Licensing

cc T T Martin, Administrator, Region I, USNRC  
W L Schmidt, USNRC Senior Resident Inspector, PBAPS  
N S Perry, USNRC Senior Resident Inspector, LGS

Introduction

The request for additional information (RAI) regarding Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," dated December 29, 1994, requested that PECO Energy respond within 90 days with additional information regarding Thermo-Lag 330-1 fire barrier systems. Further clarification on the RAI was provided during a March 14, 1995 meeting between the NRC, PECO Energy and the other participants in the pilot program review of the Nuclear Energy Institute (NEI) Application Guide. Each of the requested items is restated below along with our response.

1. Thermo-Lag Materials

- a. Describe the specific tests and analyses that will be performed to verify that the Thermo-Lag fire barrier materials that are currently installed at Peach Bottom Atomic Power Station (PBAPS) and Limerick Generating Station (LGS), or that will be installed in the future, are representative of the materials that were used to address the technical issues associated with Thermo-Lag barriers and to construct the fire endurance and ampacity derating test specimens. The tests and analyses shall address the material properties and attributes that were determined or controlled by TSI during the manufacturing process and the quality assurance program. The tests and analyses shall also address the material properties and attributes that contribute to conclusions that the Thermo-Lag materials and barriers conform to NRC regulations. These include:
  - (1) Chemical composition
  - (2) material thickness
  - (3) material weight and density
  - (4) the presence of voids, cracks, and delaminations
  - (5) fire endurance capabilities
  - (6) combustibility
  - (7) flame spread rating
  - (8) ampacity derating
  - (9) mechanical properties such as tensile strength, compressive strength, shear strength, and flexural strength.
- b. Describe the methodology that will be used to determine the sample size and demonstrate that the sample size will be large enough to ensure that information and data obtained will be sufficient to assess the total population of in-plant Thermo-Lag barriers and the materials that will be installed in the future. In determining the sample size, consider the time of installation and manufacture of the various in-plant materials and barrier installation. Give the number and types (e.g., panels, conduit preshapes, or trowel-grade material, stress skin) of samples that will be tested or analyzed.
- c. Submit the schedule for verifying the Thermo-Lag materials.
- d. After the analyses and tests have been completed, submit a written supplemental report that confirms that this effort has been completed and provide the results of the tests and analyses. Describe any changes to previously submitted plans or schedules that result from the tests or analyses.

Response 1.a.

PECO Energy is participating in an industry sampling program designed to provide an appropriate level of assurance in the material's chemical composition; however, this effort need not be to the level required by the PECO Energy Quality Assurance (QA) Program or to 10 CFR 50 Appendix B.

(1) Chemical Composition

PECO Energy has provided samples of Thermo-Lag material from both PBAPS and LGS to be tested as part of the industry effort to evaluate chemical composition as a means of addressing product consistency. This effort addresses the concerns raised in the December 29, 1994 10 CFR 50.54(f) letter. Details of the industry test program were forwarded to the NRC in a letter dated February 21, 1995, William H. Rasch, NEI to William T. Russell, NRC.

A total of six PBAPS Thermo-Lag samples were provided to the independent laboratory. Samples of trowel grade material, panel material, and below surface material were provided from both PBAPS Unit 2 and Unit 3. PBAPS does not have pre-shaped forms or 1-hour fire barrier material. These six samples were taken from Thermo-Lag purchased and installed at PBAPS over several years; and therefore, from the different lots.

A total of 15 LGS Thermo-Lag samples were provided for independent testing. The samples selected from the control structure, Unit 1, and Unit 2 included trowel grade and 1 and 3 hour Thermo-Lag panels, and pre-shaped conduit. The control structure, Unit 1 and Unit 2 samples represent three vintages of Thermo-Lag installed at LGS.

PECO Energy believes these samples, combined with the samples from the industry test program provide an adequate population of Thermo-Lag to assure chemical composition is consistent.

(2) Material Thickness

At both LGS and PBAPS, material thickness was recognized as a critical parameter, and Thermo-lag material was inspected upon receipt or prior to installation for the appropriate thickness. This inspection was conducted independent of TSI. The acceptance criterion at PBAPS was 1.125 inches,  $\pm$  0.125 inches. The acceptance criteria at LGS were an average thickness (of all measurements) not to exceed 0.850 inches with a single point measurement minimum 0.530 inches, and a single point measure maximum of 0.750 inches for 1 hour applications, and an average thickness not to exceed 1.250 inches with a minimum of 1.060 inches and a maximum of 1.500 inches for 3 hour applications. PECO Energy believes these efforts were adequate to assure the proper Thermo-Lag thickness was received at both PBAPS and LGS.

(3) Material Weight and Density

TSI provided a density of "circa 78 lbs/ft<sup>3</sup>". PECO Energy did not independently or specifically confirm that the density of Thermo-Lag received was consistent with this value; however, the material was receipt inspected, and the shipping records are available for PBAPS and LGS. The shipping weight of both panels and trowel grade material was compared to the volume of material shipped, and the density of the Thermo-Lag received was determined to be about 78 lbs/ft<sup>3</sup>.

To further gain assurance of the density of Thermo-Lag installed at PBAPS and LGS, samples of Thermo-Lag material from both plants will be tested for density. An appropriate test and sampling methodology will be developed.

At both PBAPS and LGS, Thermo-Lag was installed over raceways that carry safety related cables. The supports for the encapsulated raceways were designed with conservative margins to the applicable seismic criteria. The weight of the Thermo-Lag installed on these raceways was considered when designing the raceway supports.

(4) Voids, Cracks, and Delaminations

At PBAPS, a review of the Thermo-Lag installation records showed that the prefabrication inspections included inspecting the assembly for voids. Based on these inspections, PECO Energy has a level of assurance that voids, indicative of a manufacturing defect, are not present at PBAPS.

For LGS as part of our Integrated project, PECO Energy is developing a destructive examination program of a sample of Thermo-Lag assemblies identified through analysis as no longer being required to protect safe shutdown equipment. This program will be used to identify construction parameters that are critical for fire barrier performance, and cannot be determined by performing a visual inspection of the exterior of the assembly. This destructive examination program will include a visual examination of Thermo-Lag for voids, cracks, and delaminations indicative of a defect in the manufacturing process. Including this parameter in the destructive examination program will provide the appropriate level of assurance for the Thermo-Lag installed at LGS.

The details of the PECO Energy destructive examination program will be available when the Thermo-Lag reduction effort has identified the minimum number of assemblies required for safe shutdown. Those Thermo-Lag assemblies no longer required to support safe shutdown will be compared to the population of required assemblies, to select an appropriate sampling population.

(5) Fire Endurance Capabilities

Determination that the chemical composition and density of the tested Thermo-Lag is representative of the installed Thermo-Lag will allow generic tests of fire endurance capabilities to be applied to PBAPS and LGS Thermo-Lag assemblies.

(6) Combustibility

Determination that the chemical composition and density of the tested Thermo-Lag is representative of the installed Thermo-Lag will allow generic tests of combustibility to be applied to PBAPS and LGS Thermo-Lag assemblies.

(7) Flame Spread Rating

Determination that the chemical composition and density of the tested Thermo-Lag is representative of the installed Thermo-Lag will allow generic tests of the flame spread rating to be applied to PBAPS and LGS Thermo-Lag assemblies.

(8) Ampacity Derating

Determination that the chemical composition and density of the tested Thermo-Lag is representative of the installed Thermo-Lag will allow generic tests of ampacity derating to be applied to PBAPS and LGS Thermo-Lag assemblies. Ampacity derating is a long term issue that affects aging of cables.

(9) Mechanical Properties

Thermo-Lag is not installed as a structural member in either PBAPS or LGS, and the mechanical properties of Thermo-Lag are not relied upon in any seismic analysis.

Response 1.b.

PECO Energy is participating in the NEI sponsored sampling program to evaluate chemical composition as a means of addressing product consistency. The details of the program have not been fully developed. PECO Energy has provided a total of 21 samples (6 from PBAPS and 15 from LGS) to the independent laboratory for analysis. The difference in the number of samples submitted for PBAPS and LGS is based on the difference in applications at PBAPS and LGS. LGS uses panels, trowel grade, and pre-shaped forms and both 1 hour and 3 hour applications. PBAPS does not use pre-shaped forms and has no 1 hour applications.

The industry sampling program will provide samples which are representative of the Thermo-Lag installed throughout the industry; and PECO Energy is providing samples from LGS and PBAPS which span the installed vintages of Thermo-Lag.

Response 1.c.

The schedule for verifying the Thermo-Lag materials will be developed when the industry sampling program is completed, and the integrated project identifies the cables required to achieve safe shutdown.

Response 1.d.

As part of the integrated project, the post fire safe shutdown re-analyses will identify the required equipment to assure safe shutdown. The method of protecting this equipment, and the subsequent implementation of protection are contingent upon many factors, such as, test results and outage schedules; however, PECO Energy commits to submitting a supplemental report after the means of protecting safe shutdown cables has been identified.

2. Important Barrier Parameters

- a. Describe the examinations and inspections that will be performed to obtain the important barrier parameters given in Section II of the RAI of December 1993 for the Thermo-Lag fire barrier configurations installed at PBAPS and LGS.
- b. Describe the methodology that will be applied to determine the number and type of representative in-plant fire barrier configurations that will be examined in detail and demonstrate that the sample size is adequate to ensure that the information and data that will be obtained are adequate to assess the total population of in-plant Thermo-Lag barriers. A large enough sample of the total population of configurations should be examined to provide a reasonable assurance that the materials and important barrier parameters used to construct the in-plant barriers and any future barrier installations or modifications are representative of the parameters used to construct the fire endurance test specimens.
- c. Submit the schedule for obtaining and verifying all of the important barrier parameters.
- d. After the information has been obtained and verified, submit a written supplemental report that confirms that this effort has been completed and provides the results of the examinations and inspections. Verify that the parameters for the in-plant configurations are representative for the parameters of the fire endurance test specimens. Describe any changes to previously submitted plans or schedules that result from the examinations.

Response 2.a.

As discussed in our previous responses to this GL, PECO Energy has developed a project that integrates 1) a Thermo-Lag Reduction effort, 2) an IPEEE risk analysis, 3) a barrier configuration program and 4) Industry programs.

When the Thermo-Lag reduction project identifies the assemblies that are required to achieve safe shutdown, a walkdown to determine critical parameters will be performed. Bounding assumptions about critical parameters will be made if a parameter cannot be identified by walkdown, or the parameter will be determined through a destructive examination of a sample of Thermo-Lag assemblies.

Response 2.b.

The ongoing Thermo-Lag reduction effort, which has been described in previous responses to this GL, has not yet identified all of the required assemblies. The identification of Thermo-Lag assemblies selected for destructive examination will be completed when we have determined the Thermo-Lag assemblies that are required, and the construction parameters that have yet to be identified; thus, the number and type of representative in-plant, fire barrier configurations that will be destructively examined are not yet known. A large enough sample will be selected in order to have confidence that there is consistency in important construction parameters.

Response 2.c.

As stated in response to 2.b., the integrated project has not yet identified the required assemblies. Once these are identified and the magnitude of the effort can be determined, a schedule for identifying the required Thermo-Lag parameters will be determined.

Response 2.d.

PECO Energy previously committed to submitting a report to the NRC when the cables required for safe shutdown, and the means of protecting these cables have been identified, and reaffirms that commitment herein.