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 AUTH. NAME AUTHOR AFFILIATION
 BYRAM, R.G. Pennsylvania Power & Light Co.
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SUBJECT: Forwards response to follow-up to RAI re GL 92-08, "Thermo-Lag Fire Barriers."

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Pennsylvania Power & Light Company

Two North Ninth Street • Allentown, PA 18101-1179 • 610/774-5151

Robert G. Byram
Senior Vice President—Nuclear
610/774-7502
Fax: 610/774-5019

MAR 27 1995

U.S. Nuclear Regulatory Commission.
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**SUSQUEHANNA STEAM ELECTRIC STATION
RESPONSE TO THE FOLLOW-UP TO THE REQUEST
FOR ADDITIONAL INFORMATION REGARDING GENERIC
LETTER 92-08 ISSUED PURSUANT TO 10CFR50.54(f)
SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 AND 2 (TAC NOS. M85613 AND M85614)
PLA-4286**

FILE R41-2

**Docket Nos. 50-387
and 50-388**

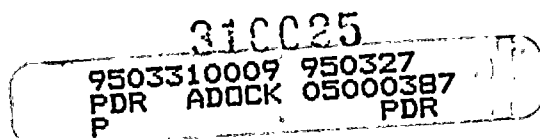
Dear Sir:

This letter is provided in response to your request for additional information regarding Generic Letter 92-08, "Thermo-Lag Fire Barriers" dated December 29, 1994. This letter supplements the information provided to you in our previous responses, PLA-4089, dated February 3, 1994, and, PLA-4236, dated December 22, 1994. Where the information changes or supersedes the information provided in our previous responses, the information in this letter governs.

Introduction:

In response to the issues raised by the NRC relative to the effectiveness of the Thermal Science Inc. Quality Assurance Program and other Industry concerns, PP&L has modified its Thermo-Lag Fire Barrier Resolution Plan to include chemical testing and destructive examination of installed Thermo-Lag materials to:

- (1) demonstrate the consistency of the Thermo-Lag materials used over time at Susquehanna, and
- (2) determine the as built details of construction for required raceway fire barriers.



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Based on the chemical testing already performed specifically for Susquehanna Thermo-Lag materials and the testing performed by NEI as a part of the industry fire endurance testing program, we expect that material consistency over time will be demonstrated. As a result, we have prepared our response with this outcome as an assumption.

PLA-4236, dated December 22, 1994, provided our commitment to perform destructive examinations to determine the actual details of construction for our installed raceway fire barriers. This letter reiterates that commitment and elaborates on the approach that will be used.

Finally, this response provides information for addressing only those Thermo-Lag barriers currently installed in the plant. It does not address future barriers that may be installed in the plant. Information on how future barriers will be addressed will be provided as a part of our final report on these issues when the viability of using Thermo-Lag as a fire barrier for future installations has been confirmed.

PP&L Responses to NRC Requests:

The format of our response follows that provided in our previous submittals. We have reiterated your request and then followed the specific request with our response.

1. Thermo-Lag Materials

NRC Request 1.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 Susquehanna, Units 1 and 2, 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 analysis 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 analysis shall also address the material properties and attributes that contribute to conclusions that the Thermo-Lag materials 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 capability
- (6) combustibility
- (7) flame spread rating

- (8) ampacity derating
- (9) mechanical properties such as tensile strength, compressive strength, shear strength, and flexural strength.

PP&L's Response:

- (1) Chemical testing of samples of Thermo-Lag materials representative of that installed at Susquehanna will be performed. Susquehanna specific chemical testing will be performed as a part of the generic industry chemical testing program being coordinated by NEI.

As discussed at the NRC/Industry meeting on March 14, 1995, the testing will be aimed at demonstrating the consistency of the Thermo-Lag materials used at Susquehanna over time and, also, the consistency of the Susquehanna material with the Thermo-Lag material used in the industry generic fire endurance testing program.

As requested by the NRC at the March 14, 1995 meeting, this testing will address both the organic and the inorganic components of the Thermo-Lag material.

Organic components will be determined using gas chromatography testing performed in accordance with ASTM D3452. It is our understanding that the testing method for determining inorganic components will be developed by the industry and incorporated into the industry generic chemical testing program.

It is our understanding that an approach for evaluating the results of this testing and addressing variances will be developed by the industry. Our intent is to use this approach to provide reasonable assurance that the material used at Susquehanna is consistent with that used at other nuclear facilities and with that used in the industry generic fire endurance testing program.

When we have demonstrated the consistency of the Thermo-Lag material used at Susquehanna and by the industry over time, PP&L will use independent generic industry testing to demonstrate the acceptability of the required raceway fire barriers installed at Susquehanna for the other material properties listed in the NRC question. A description of the approach to be used for each of the other material properties is provided below.

- (2) Material thickness is a key parameter in the ability of the Thermo-Lag material to perform its function as a fire barrier. This parameter will be confirmed as a part of the destructive examination program described in our response to NRC Request Number 2 provided below.

- (3) Material weight and density are parameters that are used in the seismic and weight calculations for raceway at Susquehanna. These parameters will be confirmed by performing weight and density measurements on materials removed from the plant.
- (4) The presence of voids, cracks and delaminations indicative of manufacturing defects will be investigated as part of the destructive examination program described in our response to NRC Request Number 2 provided below.
- (5) Fire endurance capability will be determined by evaluating the installed configurations using the NEI Industry Applications Guide. This evaluation will address the "Important Barrier Parameters" discussed in our response to NRC Request Number 2 provided below.
- (6) Combustibility properties will be based on the testing and results provided in the NUMARC (now NEI) Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide prepared by Stone & Webster Engineering Corporation.

Thermo-Lag combustibility will be evaluated for its effect on installations using Thermo-Lag 330-1 for applications as a radiant energy heat shield or to create combustible free zones.

- (7) Flame spread rating will be addressed by evaluating the material for combustibility as outlined in item (6) above.
- (8) Ampacity derating applies only to raceway containing power cables. As described in PLA-4236, PP&L has performed an evaluation of the Unit 1 and 2 fire protected raceway to determine the calculated maximum allowable ampacity derating for the cables contained in those raceway protected with Thermo-Lag 330-1.

Based on the maximum allowable values calculated for cable tray, 36.9%, and conduit, 28.9%, PP&L expects that any actual test values will be less than our maximum allowable values and no additional actions will be required.

PP&L expects to finalized this issue using generic industry test results once the criteria differences relative to ampacity testing are resolved.

- (9) Mechanical properties will be determined, as needed, by independent means to resolve technical issues.

NRC Request 1.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 the 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 installations. Give the number and types (e.g., panels, conduit preshapes, trowel-grade material, stress skin) of samples that will be tested or analyzed.

PP&L's Response:

- (1) The sample size for chemical testing will consist of approximately 15 samples. Samples from each of the four construction vintages used at Susquehanna will be tested. This approach will assure that samples from each of the time frames when significant quantities of Thermo-Lag was installed in the plant are included in the chemical testing program. The samples to be selected are described below:
 - a. 1-hour Sprayed on Thermo-Lag conduit. (1 specimen)
 - b. 1-hour Site Fabricated Thermo-Lag Panels. (1 specimen)
 - c. Trowel Grade material used with 1-hour Site fabricated Panels. (1 specimen)
 - d. 1-hour and 3-hour Thermo-Lag Panels installed prior to the 1985 Appendix R Reanalysis. (2 specimens)
 - e. 1-hour and 3-hour Thermo-Lag Pre-formed conduit sections installed prior to the 1985 Appendix R Reanalysis. (2 specimens)
 - f. Trowel Grade material from d. or e. above. (2 specimens)
 - g. 1-hour and 3-hour Thermo-Lag Panels installed after the 1985 Appendix R Reanalysis. (2 specimens)
 - h. 1-hour and 3-hour Thermo-Lag Pre-formed conduit sections installed after the 1985 Appendix R Reanalysis. (2 specimens)
 - i. Trowel grade material from g. or h. above. (2 specimens)

- (2) Material thickness will be measured during each destructive examination performed. Therefore, the sample size for material thickness will be the same as that for the destructive examinations discussed in our response to NRC Request Number 2.
- (3) The sample size for determining material weight and density will consist of specimens from each of the four construction vintages used at Susquehanna. This approach will assure that samples from each of the time frames when significant quantities of Thermo-Lag were installed in the plant are included in the sample. The specimens to be selected are described by items (1) a, b, d, e, g and h above.
- (4) The presence of voids, cracks and delaminations indicative of manufacturing defects will be included as an important barrier parameter for inspection during the destructive examinations. The sample size for this item will be the same as the sample size for the destructive examinations discussed in our response to NRC Request Number 2.
- (5) All fire barriers required at the completion of the revision to the Appendix R analysis will be qualified for use in the plant. This qualification will rely on the testing and methodology provided in the NEI Industry Applications Guide and may involve one or more of the following:
 - a. Deviation Requests which evaluate the actual fire hazard in the area or the actual fire endurance capability of the protected cables.
 - b. Modifications to upgrade the barrier to a qualified status.The important barrier parameters for this qualification evaluation will be obtained during the destructive examinations. Therefore, the sample size for this will be the sample size described for the destructive examinations discussed in our response to NRC Request Number 2.
- (6) All plant areas will be reviewed for the presence of Thermo-Lag materials that could impact the combustibility concerns described in 1.a.(6) above.
- (7) The work performed for item (6) above will bound the work required for this item.
- (8) The fire barrier factors affecting ampacity derating are a subset of those factors that are important barrier parameters for fire endurance rating. Therefore, the work performed for fire endurance rating will bound the work required to address this item.

- (9) No additional sampling is required for this property. The sampling performed in items 1 through 5 above will provide sufficient information to support any evaluations related to mechanical properties.

NRC Request 1.c:

Submit the schedule for verifying the Thermo-Lag materials.

PP&L's Response:

This work will be accomplished in accordance with the schedule provided to you in PLA-4236.

NRC Request 1.d:

After the analyses and tests have been completed, submit a written 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.

PP&L's Response:

Upon completion of the work described above, a report will be provided to the NRC confirming that the effort has been completed and providing the results of the tests and analysis and any changes from the previously submitted plans. This report will also outline our plans for the future use of Thermo-Lag and address the issues requested in your letter.

2. Important Barrier Parameters

NRC Request 2.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 Susquehanna, Units 1 and 2.

PP&L's Response:

Raceway fire barriers found to be required by the revision to our Appendix R analysis will be destructively examined on a sampling basis.

Destructive examination will be used to verify the correctness of the important barrier parameters assigned to each installation type.

NRC Request 2.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 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.

PP&L's Response:

As described above, barriers remaining at the completion of the revision to the Appendix R analysis will be destructively examined on a sampling basis to determine their actual details of construction.

A random sample of barriers representative of the population of required barriers will be selected. The sample will include conduit, cable tray and boxes for both 1-hour and 3-hour applications from each construction vintage.

The sample size will be sufficient to provide reasonable assurance that the materials and details of construction are representative of those used in the generic testing used to qualify the barriers.

NRC Request 2.c:

Submit the schedule for obtaining and verifying all of the important barrier parameters.

PP&L's Response

This work will be accomplished in accordance with our previous schedule provided to you in PLA-4236.

NRC Request 2.d:

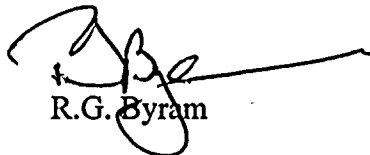
After the information has been obtained and verified, submit a written supplemental report that confirms that this effort has been completed and provides the results of the examinations and inspections. Verify that the parameters of the in-plant configurations are representative of the parameters of the fire endurance test specimens. Describe any changes to previously submitted plans or schedules that result from the examinations.

PP&L's Response:

Upon completion of the work described above, a report will be provided to the NRC confirming that the effort has been completed and providing the results of the examinations and inspections and any changes from the previously submitted plans. This report will also outline our plans for the future use of Thermo-Lag and address the issues requested in your letter.

Should you have any questions regarding this response, please call W.W. Williams at (610) 774-5610.

Very truly yours,



R.G. Byram

cc: NRC Region I
Mr. C. Poslusny, Jr., NRC Sr. Project Manager - OWFN
Ms. M. Banerjee, NRC Sr. Resident Inspector - SSES

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