Station Support Department
10 CFR 50.54(f)

PECO ENERGY

PECO Energy Company
Nuclear Group Headquarters
965 Chesterbrook Boulevard
Wayne, PA 19087-5691

December 19, 1994

Docket Nos. 50-277
50-278
50-352
50-353
License Nos. DPR-44
DPR-56
NPF-39
NPF-85

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

Dear Sirs:

The subject Request for Additional Information (RAI) regarding Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," dated September 20, 1994, requested PECO Energy Company, (PECO Energy) to 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) and December 29, 1993 (reference letter 2) and February 4, 1994 (reference letter 3) to this GL. Attachment I to this letter includes our response to the RAI. This response is being submitted under oath or affirmation as requested in the RAI.

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

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COMMONWEALTH OF PENNSYLVANIA :

: ss.

COUNTY OF CHESTER :

W. H. Smith, III being first duly sworn, deposes and says:

That he is Vice President of PECO Energy Company; the Applicant herein; that he has read the attached response to the Request for Additional Information regarding Generic Letter 92-08 for Peach Bottom Facility Operating Licenses DPR-44 and DPR-56, and Limerick Facility Operating Licenses NPF-39 and NPF-85, and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, information and belief.

Vice President

Subscribed and sworn to
before me this 19th day
of December 1994.

Notary Public

Notarial Seal
Erica A. Santori, Notary Public
Tredyffrin Twp., Chester County
My Commission Expires July 10, 1995

Introduction

The Request for Additional Information (RAI) regarding Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," dated September 20, 1994, requested that PECO Energy respond within 90 days with additional information regarding Thermo-Lag 330-1 fire barrier systems. The RAI requested that PECO Energy submit the information specified in the 10 CFR 50.54(f) letter (NRC to PECO Energy, dated Dec. 22, 1993) for those areas in which our response (PECO Energy to NRC, dated February 4, 1994) was incomplete or wherever we stated that we were relying on the results of the Nuclear Energy Institute (NEI) program. Each of the requested items is restated below along with our updated response.

PECO Energy's fire protection programs at Peach Bottom Atomic Power (PBAPS) and Limerick Generating Station (LGS) are designed to prevent fires from starting, to detect rapidly, to control and to extinguish promptly those fires that do occur, and to provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by fire suppression activities will not prevent the safe shutdown of the plant. Thermo-Lag 330-1 fire barrier systems have been used at both PBAPS and LGS to protect electrical power and control cables for systems and components used for achieving and maintaining safe shutdown conditions.

NRC Bulletin 92-01 and its Supplement identified deficiencies in the performance of Thermo-Lag 330-1 fire barriers. Subsequently, PECO Energy declared Thermo-Lag fire barriers at PBAPS and LGS to be inoperable and established compensatory actions. These compensatory actions will remain in effect until the Thermo-Lag deficiencies are resolved.

These fire barriers were installed to provide either 1 hour of protection in areas that have fire detection and suppression systems or 3 hours of protection in areas without suppression systems. Tests conducted to date by NEI have shown that Thermo-Lag 330-1 fire barrier performance is highly dependent on configuration and construction parameters, and that some configurations do not provide protection for a full hour or a full 3 hours. NEI Phase II testing was completed in March, 1994 and the NEI Application Guide was issued in July 1994. Many of PECO Energy's Thermo-Lag assemblies are comparable in size and type to those that are in the NEI test program; however, some of PECO Energy's assemblies' configurations and construction parameters differ from the test program configurations.

Because of the large extent of Thermo-Lag used at PECO Energy, (over 4,400 linear feet of Thermo-Lag at each station) an integrated analysis program was initiated in 1993, which is designed to reduce the need for Thermo-Lag at PBAPS and LGS. The first element of this integrated analysis program consists of the following three parts: 1) A deterministic safe shutdown re-analysis, which assumes a concurrent Loss of Offsite Power (LOOP), has been performed to identify additional plant systems which can be relied upon to perform safe shutdown functions. By increasing the number of systems and components, which in accordance with existing regulations can be relied upon to achieve post-fire, safe shutdown, the minimum set of cables requiring protection can be identified. 2) For those cables identified in the reanalysis as supporting post-fire, safe shutdown, alternative means of protection or compliance will be considered. 3) For those areas where cable protection is determined to be the most cost-effective means of achieving compliance, each cable will be reviewed to determine the most effective means of providing protection.

The preliminary results of the post-fire, safe shutdown reanalysis at LGS, which takes credit for additional systems, has identified roughly one third of the Thermo-Lag assemblies as not required. Additional Thermo-Lag assemblies may be identified as not being required as a result of not assuming a concurrent LOOP in our reanalysis. Detailed work on the remaining assemblies has begun by identifying cost-effective, plant modifications or operator actions to eliminate the requirement for cable protection.

At PBAPS, eliminating the assumption of a concurrent LOOP is being considered. In addition, plant modifications installed in support of Station Blackout (SBO) are being considered to determine if additional systems or components can be credited in the post-fire, safe shutdown. The addition of systems or components and revising the licensing basis of the post-fire safe shut down will result in a significant reduction in Thermo-Lag assemblies.

The second element of our integrated analysis program is the Individual Plant Examination for External Events (IPEEE), fire risk analysis, which is being performed in accordance with the EPRI Fire Induced Vulnerability Evaluation (FIVE) methodology, with certain enhancements. The fire risk analysis will identify the plant areas requiring the most demanding fire protection. The fire risk analysis will be used to prioritize Thermo-Lag upgrade analysis and construction parameter identification efforts, as well as ensure that Thermo-Lag reduction efforts and exemption requests do not create new vulnerabilities to fire. In addition, the FIVE methodology provides a technical basis for determining fire hazards. The deterministic values may be used to support exemption requests needed to bring certain fire areas into compliance, especially those areas with a low vulnerability to fire.

The third element of our integrated analysis program is identifying details of Thermo-Lag configurations using the NEI Application Guide. Once the first two elements of our program have identified cables requiring protection, commodity and barrier construction parameters of these required Thermo-Lag assemblies will be determined and evaluated against tested Thermo-Lag configurations.

The fourth element of our integrated analysis program is developing a methodology to best utilize the industry Thermo-Lag test program data to determine failure mechanisms of the required, existing Thermo-lag assemblies. This methodology will be used to develop upgrades for required assemblies, and/or develop information to support exemption requests.

Itemized Response to Request for Additional Information

I. Thermo-Lag Fire Barrier Configurations and Amounts

B. Required Information

1. Describe the Thermo-Lag 330-1 barriers installed in the plant to:

   a. meet 10 CFR 50.48 or Appendix R to 10 CFR Part 50,
   b. support an exemption from Appendix R,
   c. achieve physical independence of electrical systems,
   d. meet a condition of the plant operating license,
   e. satisfy licensing commitments.

   The description should include the following information: the intended purpose and fire rating of the barrier (for example, 3-hour fire barrier, 1-hour fire barrier, radiant energy heat shield), and the type and dimension of the barrier (for example, 8-ft by 10-ft wall, 4-ft by 3-ft by 2-ft equipment enclosure, 36- inch-wide cable tray, or 3-inch diameter conduit)

2. For the total population of Thermo-Lag fire barriers described under Item I.B.1, submit an approximation of:

   a. For cable tray barriers: the total linear feet and square feet of 1-hour barriers and the total linear feet and square feet of 3-hour barriers.

   b. For conduit barriers: the total linear feet of 1 hour barriers and the total linear feet of 3-hour barriers.

c. For all other fire barriers: the total square feet of 1-hour barriers and the total square feet of 3-hour barriers.

d. For all other barriers and radiant energy heat shield: the total linear or square feet of 1-hour barriers and the total linear or square feet of 3-hour barriers, as appropriate for the barrier configuration or type.

Response

1. The attached Appendix 1 was provided in our February 4, 1994 submittal and includes the requested information for PBAPS and LGS. During the review of our installed Thermo-Lag assemblies at LGS, we recognized that Thermo-Lag previously thought to have been installed to protect cables, was installed to isolate combustible material in combustible free zones. Appendix 1 has been amended to clarify the purposes for installed Thermo-Lag; but, the total linear feet of Thermo-Lag installed at LGS remains as presented in our February 4, 1994 submittal.

1.a PBAPS must comply with the requirements of 10 CFR 50.48 and 10 CFR 50 Appendix R. The description of our use of Thermo-Lag in order to comply with those requirements is provided in the PBAPS "Fire Protection Program" of the Updated Final Safety Analysis Report (UFSAR).

LGS must comply only with the requirements of 10 CFR 50.48. Our use of Thermo-Lag in order to comply with 10 CFR 50.48 is described in our commitment to NRC Branch Technical Position (BTP) CMEB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," dated July 1981. The details are provided in Appendix 9A, "Fire Protection Evaluation Report," of the LGS UFSAR.

1.b For both PBAPS and LGS, Thermo-Lag fire barrier material was not installed to support an exemption from 10 CFR 50 Appendix R.

1.c For both PBAPS and LGS, Thermo-Lag fire barrier material was not specifically installed to achieve physical independence of electrical systems; however, at LGS, our cable tray installation specification allowed the use of installed Thermo-Lag in place of metal tray covers when minimum separation distances could not be maintained.

1.d For both LGS and PBAPS, Thermo-Lag fire barrier material was not installed to satisfy a condition of the plant operating licenses.

1.e. As discussed in response to 1.a, both LGS and PBAPS use installed Thermo-Lag fire barrier material to satisfy licensing commitments.

2. The attached Appendix 1 includes the requested information for PBAPS and LGS.

At both PBAPS and LGS, Thermo-Lag was not used as a radiant energy heat shield, or as a fire rated wall.

II. Important Barrier Parameters

B. Required Information

1. State whether or not you have obtained and verified each of the 24 parameters listed in the RAI for each Thermo-Lag barrier installed in the plant. If not, discuss the parameters you have not obtained or verified. Retain detailed information on site for NRC audit where the aforementioned parameters are known.

2. For any parameter that is not known or has not been verified describe how you will evaluate the in-plant barrier for acceptability.

3. To evaluate NEI's application guidance, an understanding of the types and extent of the unknown parameters is needed. Describe the type and extent of the unknown parameter at your plant in this context.

Response

1. The attached Appendix 2 was provided in our February 4, 1994 submittal and includes a listing of all of the requested parameters. These parameters have been identified through review of design documentation and/or observation. They have not been verified for each Thermo-Lag assembly at PBAPS and LGS. As discussed in the Introduction, the identification of Thermo-Lag configurations is an element of our integrated program; however, resources needed to complete this element will be expended after the preceding elements are completed, so that only the minimum number of required assemblies will be examined in detail.

   These parameters were obtained to identify those Thermo-Lag assemblies with configurations and construction parameters that are outside the configurations and construction parameters tested in the NEI test program. These outlying assemblies will be targeted for elimination through safe shutdown reanalysis.

   At PBAPS, the Thermo-Lag was installed as a modification that included design documentation, installation procedures and Quality Assurance verification. To confirm the accuracy of this documentation, a walkdown of accessible Thermo-Lag assemblies was completed and all observable parameters have been verified. These walkdowns provided us with high confidence that parameters that are not directly observable are in accordance with the design details.

   At LGS, style walkdowns of accessible Thermo-Lag assemblies have been completed. These style walkdowns allow PECO Energy to categorize the Thermo-Lag assemblies, so that they can be compared to the NEI Application Guide. These styles walkdowns also identified that 31 different styles were used to construct the conduit assemblies, 11 different styles were used to construct cable tray assemblies, and 9 different styles were used to construct gutter assemblies at LGS. The Thermo-Lag reduction element of our integrated analysis program has targeted for elimination those assembly styles that are not easily bounded by the NEI testing program. In addition, the style walkdown identified those Thermo-Lag assemblies where such factors as physical interference, location, or ALARA practices make upgrades or replacement impracticable. The Thermo-Lag reduction element of the program will also target for elimination these difficult assemblies.

   For those Thermo-Lag assemblies identified in the post-fire, safe shutdown reanalysis, as required to support operation of post-fire safe shutdown equipment, detailed parameter walkdowns will be completed as required. A sampling program, including destructive examination, is being considered. This sampling program will examine those Thermo-Lag assemblies determined not to be required to support post-fire safe shutdown, compare this information with information obtained from interviews with the personnel who installed the Thermo-Lag, and then apply this information to similarly constructed assemblies. This sampling program will allow PECO Energy to fully understand the design and construction techniques used in installing the Thermo-Lag assemblies. The design documentation for LGS Thermo-Lag configurations is lacking sufficient detail to verify all of the required parameters; as such, some of the parameters can only be verified through destructive examinations.

2. For those areas where encapsulation is determined to be the appropriate alternative, conservative analyses will be performed to ensure that acceptable encapsulations are installed. The sampling program to determine the design and construction techniques will be used to conservatively determine those barrier parameters that can not be verified by walkdowns and design documents.

3. Review of the NEI Application Guide has led to the development of a systematic approach to evaluate Thermo-Lag assemblies. PECO Energy is a leader in developing an approach to use the NEI Application Guide, and is a volunteer in the pilot program to review and apply the NEI Application Guide. These efforts lead us to believe that the majority of the required Thermo-Lag assemblies at PBAPS and LGS will be able to be qualified after some upgrades; however, until the integrated analysis program identifies the minimum number of required Thermo-Lag assemblies, upgrades will not be initiated. Our preliminary analysis shows that, while some specific assemblies are not bounded, the NEI Application Guide can be the basis for analyzing the majority of PECO Energy Thermo-Lag assemblies. The remaining assemblies are being specifically targeted for elimination in the Thermo-Lag reduction element of the program.

III. Thermo-Lag Fire Barriers Outside the Scope of the NUMARC Program

B. Required Information

1. Describe the barriers discussed under Item I.B.1 that you have determined will not be bounded by the NEI test program.

2. Describe the plant-specific corrective action program or plan you expect to use to evaluate the fire barrier configurations particular to the plant. This description should include a discussion of the evaluations and tests being considered to resolve the fire barrier issues identified in GL 92-08 and to demonstrate the adequacy of existing in-plant barriers.

3. If a plant-specific fire endurance test program is anticipated, describe the following:

   a. anticipated test specimens.
   b. Test methodology and acceptance criteria including cable functionality.

Response

The fourth element of our integrated analysis program is utilizing the NEI test program.

1. The majority of the assemblies at PBAPS are comparable to those in the NEI test program; however, external V-rib orientations are not in the NEI test program.

   LGS used a significant amount of preshaped conduit forms and cable tray encapsulations which are comparable to the NEI test configurations. LGS cable gutters, i.e., wire ways, and unique boxes are not specifically tested in the NEI program; however, by using engineering principles, the LGS specific configurations may be analyzed to be bounded by the NEI program. PECO Energy has developed a systematic approach to accomplish this and has shared this information with other utilities and NEI. This approach is time consuming and labor intensive, and accordingly, will only be used after PECO Energy has minimized the number of cables requiring protection and considered options for those areas where protection is required.

2. Our integrated analysis program will determine where cable protection is required. For those areas at either PBAPS or LGS where encapsulation is determined to be the preferred means of cable protection, a case by case analysis will be performed using the NEI Application Guide. Where the NEI test data are not applicable, PECO Energy will select the most cost effective means of achieving regulatory compliance after examining all available remedies.

3. Until our integrated analysis program is completed, no plant specific fire test specimens can be identified; however, PECO Energy has begun to investigate plant specific fire tests either on our own or in conjunction with other utilities or NEI to bound more Thermo-Lag configurations at PBAPS and LGS.

IV. Ampacity Derating

B. Required Information

1. For the barriers described under Item I.B.1, describe those that you have determined will fall within the scope of the NUMARC program for ampacity derating, those that will not be bounded by the NUMARC program, and those for which ampacity derating does not apply.

2. For the barriers you have determined fall within the scope of the NUMARC program, describe what additional testing or evaluation you will need to perform to derive valid ampacity derating factors.

3. For the barrier configurations that you have determined will not be bounded by the NUMARC test program, describe your plan for evaluating whether or not the ampacity derating tests relied upon for the ampacity derating factors used for those electrical components protected by Thermo-Lag 330-1 (for protecting the safe-shutdown capability from fire or to achieve physical independence of electrical systems) are correct and applicable to the plant design. Describe all corrective actions needed and submit the schedule for completing such actions.

4. In the event that the NUMARC fire barrier tests indicate the need to upgrade existing in-plant barriers or to replace existing Thermo-Lag barriers with another fire barrier system, describe the alternative actions you will take (and the schedule for performing those actions) to confirm that the ampacity derating factors were derived by valid tests and are applicable to the modified plant design.

Response

PECO Energy endorses NEI's position that ampacity issues should be resolved separately from fire endurance issues. This position was taken because it has become obvious that timely resolution of ampacity derating issues cannot occur, and, if addressed concurrently, would further delay resolution of fire barrier endurance concerns. The immediate resolution of ampacity derating is not necessary because it is a long term cable life issue, and significant margin exists due to conservative design assumptions, such as continuously energized circuits, actual loads, and operation at cable rating temperatures.

V. Alternatives

B. Required Information

Describe the specific alternatives available to you for achieving compliance with NRC fire protection requirements in plant areas that contain Thermo-Lag fire barriers. Examples of possible alternatives to Thermo-Lag based upgrades include the following:

1. Upgrade existing in-plant barriers using other materials.

2. Replace Thermo-Lag barriers with other fire barrier materials or systems.

3. Reroute cables or relocate other protected components.

4. Qualify 3-hour barriers as 1-hour barriers and install detection and suppression systems to satisfy NRC fire protection requirements.

Response

The charter of our integrated analysis program is to cost effectively resolve the Thermo-Lag issue, ensure plant safety, and maintain regulatory compliance. To achieve this goal, PECO Energy will reduce its reliance on Thermo-Lag. PECO Energy will consider all alternatives that maintain fire safety, and will select on a case-by-case basis the most cost beneficial alternative. We will consider all alternatives, including: reevaluating the post-fire safe shutdown analysis, re-routing cable, installing suppression, requesting exemptions from regulations and, as required, upgrading or replacing some Thermo-Lag assemblies.

VI. Schedules

B. Required Information

Submit an integrated schedule that addresses the overall corrective action schedule for the plant. At a minimum, the schedule should address the following aspects for the plant:

1. Implementation and completion of corrective actions and fire barrier upgrades for fire barrier configurations within the scope of the NEI program,

2. Implementation and completion of plant-specific analyses, testing, or alternative actions for fire barriers outside the scope of the NEI program.

Response

The revised post-fire, safe shutdown analysis element of the integrated analysis program will be finished by June 1995 for LGS, and by November 1995 for PBAPS. This revised post-fire, safe shutdown analysis will minimize reliance on Thermo-Lag by identifying modifications and procedure enhancements. After this analysis is complete, a schedule to implement any modifications and/or procedure enhancements will be developed.

In addition, the integrated analysis program will identify what Thermo-Lag assemblies are required by June 1995, for LGS, and November 1995 for PBAPS. The resultant work, (i.e., plant specific testing, Thermo-Lag upgrades, cable reroutes, etc.) could take an additional two to three years depending on outage schedules.

VII. Sources and Correctness of Information

Describe the source of the information provided in response to this request for information (for example, from plant drawings, quality assurance documentation, walk downs or inspections) and how the accuracy and validity of the information was verified.

Response

At PBAPS, a physical walkdown of the accessible Thermo-Lag assemblies was recently completed. The walkdown verified that externally visible parameters matched design documentation; therefore, the design documentation is considered to be acceptable to provide the internal parameters as well as external parameters.

At LGS, scoping and style walkdowns of accessible Thermo-Lag assemblies have been completed. The information supplied in this response was gathered from the limited design documentation and the scoping walkdown; therefore, only external parameters have been identified.

APPENDIX 1

Peach Bottom Atomic Power Station - Thermo-Lag			
Description		1 Hour Fire Barrier	3 Hour Fire Barrier
Size	Type	Raceway Length	Raceway Length
1"	Conduit	None	165′
1½"	Conduit	None	278′
2"	Conduit	None	390′
2½"	Conduit	None	147′
3"	Conduit	None	2,046′
3½"	Conduit	None	263′
4"	Conduit	None	156′
5"	Conduit	None	650′
6"	Conduit	None	335′

Notes:

- At PBAPS, no cable trays were encapsulated. All PBAPS Thermo-Lag fire barriers protecting conduit are constructed with prefabricated panels forming a box design.
- PBAPS Thermo-Lag fire barriers protecting junction boxes are bolted to the junction box. There are 52 junction boxes encapsulated. The largest assembly measures approximately 62" by 50" by 14" and the smallest assembly measures approximately 14" by 14" by 10".
- PBAPS Thermo-Lag fire barriers protect two manhole covers measuring approximately 6′ x 4′ each.
- 3 Thermo-Lag Fire barriers protect safety related cable(s) in conduit in stairwells in lieu of smoke detectors.
- Several Thermo-Lag fire barriers protect multiple conduits. The total length of conduit protected is approximately 4,430 feet while the total linear feet of prefabricated panels protecting conduit is approximately 2,665 feet.
- The approximate total square footage of Thermo-Lag protecting conduits and junction boxes at PBAPS is 8,766 ft^2 with 8,063 ft^2 protecting conduits and 703 ft^2 protecting junction boxes.

APPENDIX 1

Limerick Generating Station - Thermo-Lag			
Description		1 Hour Fire Barrier	3 Hour Fire Barrier
Size	Type	Barrier Length	Barrier Length
6" x 6"	Gutter	48'	225'
8" x 8"	Gutter	323'	357'
24"	Tray	822'	219'
30"	Tray	150'	None
2"	Flex	None	12'
3/4"	Conduit	None	17'
1"	Conduit	7'	13'
1-1/2"	Conduit	87'	211'
2"	Conduit	250'	317'
3"	Conduit	192'	622'
4"	Conduit	168'	172'
5"	Conduit	113'	402'
6"	Conduit	13'	17'

Notes:

- The square footage of Thermo-Lag in box assemblies on gutters is approximately 1,200 ft^2 on 1 hour barriers and approximately 1,800 ft^2 on 3 hour barriers
- The square footage of Thermo-Lag in box assemblies on trays is approximately 5,500 ft^2 on 1 hour barriers and approximately 1,200 ft^2 on 3 hour barriers.
- Approximately 300 linear feet of the total Thermo-Lag installed at LGS, isolates combustible material in combustible free zones.

APPENDIX 2

Peach Bottom Atomic Power Station - Verified Barrier Parameters	
1. Raceway orientation (horizontal, vertical, radial bends)	Y
2. Conduit	Y
3. Junction boxes and lateral bends	Y
4. Ladder-back cable tray with single layer cable fill	N/A See Note
5. Cable tray with T-Section	N/A See Note
6. Raceway material (aluminum, steel)	Y
7. Support protection, thermal shorts (penetrating elements)	Y
8. Air drops	N/A See Note
9. Baseline fire barrier panel thickness	Y
10. Preformed conduit panels (shapes)	N/A See Note
11. Panel rib orientation (parallel or perpendicular to the raceway)	Y
12. Unsupported spans	Y
13. Stress skin orientation (inside or outside)	Y
14. Stress skin over joints or no stress skin over joints.	Y
15. Stress skin ties or no stress skin ties	N/A See Note
16. Dry-fit, post-buttered joints or prebuttered joints	Y-Pre-Buttered
17. Joint gap width	N
18. Butt joints or grooved and scored joints	Y
19. Steel bands or tie wires	Y-Bands
20. Band/wire spacing	Y
21. Band/wire distance to joints	Y
22. No internal bands in trays	N/A See Note
23. No additional trowel material over sections and joints or additional trowel material applied	Y
24. No edge guards or edge guards	N/A See Note

Note: These parameters are not applicable to the PBAPS Thermo-Lag Encapsulations.

APPENDIX 2

Peach Bottom Atomic Power Station - Verified Cable Parameters	
1. Cable size and type (power, control, or instrumentation).	Y
2. Cable jacket type (thermoplastic, thermoset) and materials.	Y
3. Cable conductor insulation type (thermoplastic, thermoset plastic) and materials.	Y
4. Cable fill and distribution of cables within the protected conduit or cable tray.	Y
5. Proximity of cables to the unexposed (inside) surfaces of the fire barrier.	N/A
6. Presence of materials between the cables and the unexposed side of the fire barrier material (for example, Sealtemp cloth, which is used in the NUMARC test specimens).	N/A
7. Cable operating temperature.	Y
8. Temperatures at which the cables can no longer perform their intended function when energized at rated voltage and current.	See Note

Note: If temperature criteria are exceeded during fire tests, one optional approach to resolution, as provided in the NRC draft test and acceptance criteria, would be to evaluate cable functionality at the elevated temperatures. In this case, determination of cable performance at elevated temperature (requested item 8) would be necessary, using cable performance test data or information for specific installed cable types (items 1, 2, 3, and 7). However, the NRC has yet to finalize requirements for cable functionality evaluation, and test results which clearly indicate the scope of such evaluations are not yet available. The degree and conservatism of cable functionality evaluation requirements implied by the NRC listing of cable parameters, and discussed in proposed Supplement 1 to GL 86-10, significantly exceed the original requirements of GL 86-10.

APPENDIX 2

Limerick Generating Station - Verified Barrier Parameters		
1.	Raceway orientation (horizontal, vertical, radial bends)	Y
2.	Conduit	Y
3.	Junction boxes and lateral bends	Y
4.	Ladder-back cable tray with single layer cable fill	Y
5.	Cable tray with T-Section	N
6.	Raceway material (aluminum, steel)	Y
7.	Support protection, thermal shorts (penetrating elements)	N
8.	Air drops	N
9.	Baseline fire barrier panel thickness	N
10.	Preformed conduit panels (shapes)	Y
11.	Panel rib orientation (parallel or perpendicular to the raceway)	N
12.	Unsupported spans	N
13.	Stress skin orientation (inside or outside)	N
14.	Stress skin over joints or no stress skin over joints.	N
15.	Stress skin ties or no stress skin ties	N
16.	Dry-fit, post-buttered joints or prebuttered joints	N
17.	Joint gap width	N
18.	Butt joints or grooved and scored joints	N
19.	Steel bands or tie wires	Y - See Note
20.	Band/wire spacing	N
21.	Band/wire distance to joints	N
22.	No internal bands in trays	N
23.	No additional trowel material over sections and joints or additional trowel material applied	Y
24.	No edge guards or edge guards	N

Note: Not all bands or wires observable because of Trowel Grade Material.

APPENDIX 2

Limerick Generating Station - Verified Cable Parameters	
1. Cable size and type (power, control, or instrumentation).	Y
2. Cable jacket type (thermoplastic, thermoset) and materials.	Y
3. Cable conductor insulation type (thermoplastic, thermoset plastic) and materials.	Y
4. Cable fill and distribution of cables within the protected conduit or cable tray.	Y - See Note
5. Proximity of cables to the unexposed (inside) surfaces of the fire barrier.	See Note
6. Presence of materials between the cables and the unexposed side of the fire barrier material (for example, Sealtemp cloth, which is used in the NUMARC test specimens).	See Note
7. Cable operating temperature.	Y
8. Temperatures at which the cables can no longer perform their intended function when energized at rated voltage and current.	See Note

Note: The parameters proximity of the cables to the inside surface of the fire barrier, and the presence of material between the cables and the inside of the fire barrier material, (items 5, and 6) will not be gathered until the scope of functionality verification becomes clear.

If temperature criteria are exceeded during fire tests, one optional approach to resolution, as provided in the NRC draft test and acceptance criteria, would be to evaluate cable functionality at the elevated temperatures. In this case, determination of cable performance at elevated temperature (requested item 8) would be necessary, using cable performance test data or information for specific installed cable types (items 1, 2, 3, and 7). However, the NRC has yet to finalize requirements for cable functionality evaluation, and test results which clearly indicate the scope of such evaluations are not yet available. The degree and conservatism of cable functionality evaluation requirements implied by the NRC listing of cable parameters, and discussed in proposed Supplement 1 to GL 86-10, significantly exceed the original requirements of GL 86-10.

For cable trays parameters 4, 5, and 6 address issues relative to potential cable/barrier contact. This is an unresolved issue at this time, and barrier inspection in this regard would be difficult or impossible. Cable contact with the barrier is most likely to occur in situations of large cable fills. However, the large cable fills also provide significant thermal mass that could improve the barrier system performance and mitigate the effect of cables in contact with the barrier. NEI has agreed to provide additional thermocouples below the cable tray rungs in the Phase 2 cable tray tests to provide information to address the NRC concerns relative to potential contact of cables with the cold side of the fire barriers. Further, note that a small piece of Sealtemp cloth (item 6) was used only in NUMARC test number 1-4 (24" steel cable tray with air drop, three hour test) and did not impact the performance or useability of the test.