



→ Jack R. →
EA

Entergy Operations, Inc.
River Bend Station
PO. Box 220
St. Francisville, LA 70775

February 9, 1994

Associate Director for Projects
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop M12-G-18
Washington, D.C. 20555

Attention: S.A. Varga

Subject: River Bend Station
Docket No. 50-458
License No. NPF-47
Response to NRC Letter Requesting Additional Information Regarding
Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers," Pursuant To CFR
50.54(f)

File Number: G9.5, G9.33.4

RBG-40047

Dear Mr. Varga:

In your letter dated December 21, 1993, you requested additional information on the configurations and amounts of Thermo-Lag fire barriers installed in the plant and the cable loadings within particular Thermo-Lag configurations. You indicated that this information is necessary for the Staff's review of the NUMARC guidance for applying the test results to plant-specific barrier configurations and to identify configurations that are outside the scope of NUMARC's test program. Furthermore, you requested plans and schedules for resolving technical issues associated with Thermo-Lag configurations which are outside the scope of the NUMARC test program or found to be impractical to upgrade.

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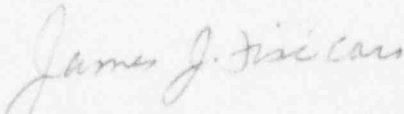
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The enclosure to your letter consisted of seven sections requiring a written response within 45 days from receipt of the letter. The responses to these sections are provided by Entergy Operations, Inc. for the River Bend Station in Attachment 2.

Responses contained within this letter, which address schedules in resolving Thermo-Lag issues, supersede previous commitments to provide an action plan commensurate with the NUMARC program.

As requested, this information is being submitted under affirmation in accordance with 10 CFR 50.54(f) (Attachment 1). Please contact John Maher at (504) 381-4243 should you have any questions, or require additional information regarding this matter.

Sincerely,



James J. Fisicaro
Manager - Safety Assessment
and Quality Verification

EGR/kvm

attachments: 1) Affirmation per 10 CFR 50.54(f)
2) Response to NRC Request For Additional Information

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cc:(w/a) Mr. Biff Bradley, NUMARC

U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

NRC Resident Inspector
P.O. Box 1051
St. Francisville, LA 70775

Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

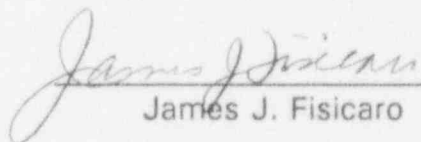
LICENSE NO. NPF-47

DOCKET NO. 50-458

IN THE MATTER OF
GULF STATES UTILITIES COMPANY
CAJUN ELECTRIC POWER COOPERATIVE AND
ENERGY OPERATIONS, INC.

AFFIRMATION

I, James J. Fisicaro, state that I am the Manager-Safety Assessment and Quality Verification of Entergy Operations, Inc., at River Bend Station; that on behalf of Entergy Operations, Inc. I am authorized by Entergy Operations, Inc. to sign and file with the Nuclear Regulatory Commission, this letter requesting additional information regarding Generic Letter 92-08 pursuant to CFR50.54f for River Bend Station; that I signed this request as Manager-Safety Assessment and Quality Verification at River Bend Station of Entergy Operations, Inc.; and that the statements made and the matters set forth therein are true and correct to the best of my knowledge, information, and belief.




James J. Fisicaro

STATE OF LOUISIANA
WEST FELICIANA PARISH

SUBSCRIBED AND SWORN TO before me, a Notary Public, in and for the Parish and State above named, this 9th day of February, 1994.

(SEAL)



Notary Public

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I.B. Thermo-Lag Fire Barrier Configurations and Amounts

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 descriptions 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).

Response

A description of the River Bend Thermo-Lag assemblies was provided to NUMARC by letter dated November 30, 1992. River Bend has performed walkdowns of Thermo-Lag fire barrier assemblies to confirm and supplement information contained in plant design documents. Most Thermo-Lag assemblies are utilized for the protection of electrical raceways containing safe shutdown circuits including one and three hour configurations. A more detailed description follows:

Both one and three hour Thermo-Lag materials are used to protect cable trays containing safe shutdown circuits. Trays are either 3" X 18" or 3" X 30" and the Thermo-Lag barriers may enclose a single tray or multiple trays. One hour material is installed on approximately 923 linear feet of cable trays while three hour material is installed on approximately 366 linear feet of cable trays. The following table provides the distribution of

tray sizes protected with Thermo-Lag and the approximate total length of each size tray protected.

Tray Sizes	One Hour	Three Hour
3" X 18"	923 ft.	221 ft.
3" X 30"	NONE	145 ft.

Both one hour and three hour Thermo-Lag materials are used to protect conduits containing safe shutdown circuits. One hour material is installed on approximately 3,260 feet of conduits while three hour material is used to protect approximately 1,063 feet of conduits. The following table provides the distribution of conduit sizes protected with Thermo-Lag and the approximate total length of each size conduit protected.

Conduit Diameters	One Hour	Three Hour
¾"	56 ft.	68 ft.
1"	NONE	116 ft.
1½"	561 ft.	229 ft.
2"	322 ft.	25 ft.
3"	1,054 ft.	284 ft.
4"	1,267 ft.	341 ft.
5"	NONE	NONE
6"	NONE	NONE

Thermo-Lag is also installed on all intervening components which could represent a thermal short to a raceway including supports, supplemental steel and/or other raceways. One hour barriers are required to have these items protected for at least 9 inches while three hour barriers have these items protected for at least 18 inches. Raceways protected with one or three hour Thermo-Lag have their supports protected to the point of attachment.

Other Thermo-Lag fire barriers are used to protect various articles including thirteen junction boxes, six instruments, one instrument rack, two motor

operated valves (MOV), one ceiling assembly, one steel beam which is part of a fire rated wall, one radiant energy shield, and miscellaneous other boxed components. The approximate total quantity of Thermo-Lag associated with these applications is 741 square feet of one hour material and 277 square feet of three hour material.

Junction box enclosures range from 5 square feet to 30 square feet with a total of 138 square feet of one hour material involved. Instrument enclosures range from 2 square feet to 9 square feet with a total of 28 square feet of three hour material involved. The instrument rack consists of 167 square feet of three hour Thermo-Lag. MOV enclosures consist of 60 and 85 square feet of one hour Thermo-Lag. The ceiling assembly consists of 142 square feet of one hour Thermo-Lag. The steel beam is protected with 40 square feet of three hour Thermo-Lag. The radiant energy shield consists of 12 square feet of material. Miscellaneous boxed enclosures are associated with electrical raceways and involve 316 square feet of one hour and 30 square feet of three hour Thermo-Lag.

Required Information

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.

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- d. For all other barriers and radiant energy heat shields: 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

- a. River Bend has approximately 923 linear feet of cable trays containing safe shutdown circuits protected with approximately 3,894 square feet of one hour Thermo-lag materials. Approximately 366 linear feet of cable trays containing safe shutdown circuits are protected with approximately 1,875 square feet of three hour Thermo-Lag materials.
- b. River Bend has approximately 3,260 linear feet of safe shutdown conduit protected with one hour Thermo-Lag materials. Approximately 1,063 linear feet of safe shutdown conduit is protected with three hour Thermo-Lag materials.
- c. Approximately 741 square feet of one hour and 265 square feet of three hour Thermo-Lag is utilized on the other fire barriers discussed in response to Item I.B.1. above.
- d. River Bend utilizes approximately 12 square feet of three hour Thermo-Lag materials for a radiant energy shield application. Thermo-lag materials are not used at River Bend for protection of electrical circuits in accordance with Regulator Guide 1.75.

II.B. Important Barrier Parameters

Required Information

1. State whether or not you have obtained and verified each of the aforementioned parameters for each Thermo-Lag barrier installed in the plant. If not, discuss the parameters you have not obtained or verified.

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Retain detailed information on site for NRC audit where the aforementioned parameters are known.

Response

The River Bend Thermo-Lag barriers were installed in accordance with plant standards, based on installation instructions and training provided by Thermal Science, Incorporated. The plant installation standards frequently allowed more than one option for certain attributes of the in-plant assemblies. However, current documentation does not identify which option was selected by the installers for use on a specific barrier. To better document the plant specific installation parameters, River Bend has conducted walkdowns of Thermo-Lag assemblies and documented those parameters which are capable of being determined without destructive examination.

Required Information

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

Response

Destructive examinations will be performed as necessary to identify any necessary parameters in support of fire testing, implementation of barrier upgrades, and/or plant specific evaluations.

Required Information

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

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Response

As mentioned in response to Item II.B.1. above, plant installation standards frequently prescribed options for certain parameters with final selection left to the discretion of the installers. For example, the type of joint to be used on a Thermo-Lag barrier could have been selected from specified alternatives. In some cases, existing design documents do not specify which option was chosen and the selected option may not be obvious without destructive examination.

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

Required Information

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

Response

Phases I and II of the NUMARC test program exclusively address electrical raceway applications. Although it is not possible at this time to identify with certainty the River Bend assemblies which will not be bounded by the NUMARC test program, some generalizations can be made. Based on the scope of Phases I and II, all non-raceway Thermo-lag applications described in response to Item I.B.1 above are not currently bounded by the NUMARC program. River Bend also has various boxed enclosures which have not been specifically address by NUMARC.

Entergy Operations is proposing to NUMARC that testing in addition to Phase 2 is necessary and should include non-raceway applications and more extensive testing of boxed enclosures. We anticipate a final decision from NUMARC with regard to the total scope of the test program by April 1, 1994. Concurrently, Entergy Operations is attempting to identify other utilities with similar configurations in order to perform joint testing in the

event that NUMARC does not expand the test program and site specific testing becomes necessary.

Required Information

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.

Response

Assuming the NUMARC Phase 2 testing does not identify unrecoverable deficiencies with the 3-hour Thermo-Lag materials, our present objective is to select corrective actions based on a broad range of options as discussed in response to Item V.B. In those cases where justification of Thermo-Lag barriers is pursued, we plan to implement reasonable upgrades when necessary, based on successful fire testing, to ensure the performance of the existing barriers. Acceptable performance will be ensured through demonstrating rated performance of the barriers or levels of performance sufficient to withstand anticipated fire hazards. In those cases where rated performance is not demonstrated but adequate protection is provided commensurate with respective fire hazards, River Bend will pursue development of an exemption which demonstrates the ability of those barriers to successfully withstand the effects of anticipated fire hazards. In this case the performance capability of each in-plant Thermo-Lag barrier will be weighed against the characteristics of its respective hazard area.

Required Information

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

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

Response

- a. Based on the approach discussed in response to Item V.B., and the status of NUMARC's test program, it is not possible at this time to accurately project the specific nature of possible test articles. In the event that site specific testing is required, the anticipated test specimens will be representative of the River Bend assemblies.
- b. For Thermo-Lag applications not involving electrical raceway, Entergy Operations plans to weigh acceptability of testing based on protocols appropriate to the specific application (i.e., ASTM E119 for wall/ceiling applications). Any fire testing of raceway applications should follow the acceptance criteria developed by NUMARC and accepted by the NRC.

IV. B. Ampacity Derating

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.

Response

Texas utilities performed ampacity derating tests on one hour Thermo-Lag assemblies using the methodology of IEEE P848 Draft 11, with some modifications. The testing performed by Texas Utilities provided preliminary ampacity derating factors of 32 percent for cable trays and 11

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percent for conduits, which are consistent with previously reported values. The NUMARC program proposes to incorporate the Texas Utility data for generic application to the industry and will perform ampacity testing of upgraded three hour Thermo-Lag assemblies. NUMARC also proposes to use the methodology of IEEE P848 for testing three hour assemblies. Based on NUMARC's proposed methodology, all of the River Bend raceway applications are expected to be bounded by the NUMARC program.

River Bend also has Thermo-Lag installed on components for which ampacity derating is not a concern including: 1) raceways which do not contain power cables, 2) raceways in which circuits are only intermittently loaded, 3) raceways with only localized applications of Thermo-Lag, and 4) all non-raceway Thermo-Lag applications.

Required Information

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.

Response

NUMARC proposes to incorporate the Texas Utility ampacity testing to establish generic derating factors for one hour Thermo-Lag assemblies and will perform new ampacity testing on three hour Thermo-Lag assemblies. The Texas Utility testing and the proposed NUMARC testing both follow the guidelines of IEEE P848. As stated in response to Item IV.B.1 above, the limiting derating factor will be applied to all combinations of raceway sizes and cable fills; consequently, we believe most if not all of the River Bend assemblies, subject to ampacity derating concerns, will be bounded by the NUMARC program. Based on this approach, River Bend does not anticipate additional testing to be necessary.

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The NUMARC tested configurations will be compared with the River Bend in-plant configurations to ensure applicability of the generic derating factors.

Required Information

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.

Response

As stated in response to Item IV.B.1. above, River Bend does not anticipate having configurations which are outside the scope of the NUMARC ampacity derating program.

Required Information

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

The NUMARC test program proposes to conduct ampacity testing of the upgraded configurations; consequently, the NUMARC program will

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validate the ampacity derating factors for the upgraded configurations. In the event the alternative materials are selected for use in place of Thermo-Lag, Entergy Operations will evaluate the ampacity testing performed on the selected product to determine acceptability of the testing protocol and applicability to the River Bend configurations. The schedules for implementation of corrective actions provided in response to Section VI.B. include any necessary activities to resolve ampacity derating issues.

V. B. Alternatives

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

Entergy Operations is committed to a comprehensive evaluation to effectively resolve Thermo-Lag performance issues. Corrective action will be the result of a manifold approach that considers a broad range of options weighed on a case-by-case basis. Essential to the conduct of this evaluation is compilation and evaluation of the important elements affecting fire

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barrier performance and/or determining the viability of fire protection alternatives. Elements important in the evaluation process include:

- confirmation and documentation of site specific barrier configurations
- test and acceptance criteria applicable to fire barrier materials
- test data of sufficient quantity and quality to determine barrier performance limitations
- guidelines for comparing tested to installed configurations
- conservatism of existing safe shutdown analyses
- area characteristics and respective fire hazards
- potential new hazards introduced by alternative fire protection measures

Much of this information has been compiled; however, important elements not yet available but necessary for identifying corrective actions include the NUMARC test data, test and acceptance criteria applicable to fire barrier materials protecting electrical raceways and the NUMARC Application Guidelines.

The results of the Phase 2 test program will provide information to facilitate an understanding of Thermo-Lag performance capabilities and will be evaluated before corrective actions are identified. The test and acceptance criteria, applicable to fire barrier materials protecting electrical raceways, is necessary to evaluate alternative fire barrier materials in the event that a product substitution is desired. The NUMARC Application Guidelines are necessary for Entergy Operations to weigh the generic applicability of tested configurations to Entergy Operations' Thermo-Lag assemblies. Furthermore, Entergy Operations expects NUMARC to perform additional testing to bound an even broader cross-section of the industry configurations which should be considered before undertaking site specific testing.

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The alternatives available to River Bend for accomplishing a prompt but affective solution to Thermo-Lag performance issues will depend on the results of various activities presently being driven by the NRC, NUMARC, and/or Entergy Operations. When these activities are completed, we generally expect to utilize any one or combination of the following:

1) reevaluation of the safe shutdown analysis listing of components requiring protection per Appendix R, 2) Probabilistic Safety Analysis, 3) Thermo-Lag upgrades, 4) exemptions to Appendix R in cases where it can be demonstrated that sufficient protection can be provided to achieve and maintain cold shutdown, 5) product substitution, 6) component relocation, and 7) alternative protection strategies which place less dependence on rated fire barriers.

VI. B. Schedules

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 NUMARC program,

Response

For those in-plant assemblies bounded by the NUMARC testing and determined feasible for continued utilization, River Bend will implement non-outage corrective actions within 24 months from receipt of the necessary documentation. The documents necessary to implement corrective actions are the applicable fire tests, the NUMARC Application Guidelines and the ampacity test reports. NUMARC estimates that the ampacity test reports will be issued in August, 1994.

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River Bend will consider the following to be corrective actions for these barriers: 1) completion of any evaluations and/or non-outage modifications which demonstrate the ability of in-plant Thermo-Lag assemblies to provide one or three hour rated performance, or 2) submittal of an exemption request that demonstrates sufficient capacity of the in-plant barriers to withstand anticipated fire hazards.

Required Information

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

Response

NUMARC plans to establish the final scope of the generic test program by April 1, 1994. Within 90 days of receipt of this information, River Bend will provide a description of the selected corrective action(s) and a schedule for implementation. This should afford Entergy Operations the benefit of incorporating information gained from the NUMARC tests into site specific testing and provide sufficient time to identify utilities with unbounded configurations of comparable design for the purpose of conducting joint testing.

VII. Sources and Correctness of Information

Required Information

Describe the sources 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.

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Response

The accuracy and validity of the information provided in this response was confirmed in accordance with River Bend information certification/verification procedures. The following is a list of reference material used to prepare this correspondence:

- Plant Thermo-Lag Walkdowns (VECTRA Technologies, Inc., Report No. 0103-00112-TR-01, Draft)
- Criterion 240.201A, "10CFR50, Appendix R Safe Shutdown Analysis, Rev. 1"
- Appendix R Raceway Fire Protection Details Drawings:
 - EE-34YA, Rev. 3
 - EE-34YB, Rev.3
 - EE-34YC, Rev. 3
 - EE-34YD, Rev. 3
 - EE-34YE, Rev. 1
 - EE-34YH, Rev. 1
- NUMARC letter to APOC dated January 14, 1994, "NRC 50.54(f) Letter On Thermo-Lag Fire Barriers"