



ENTERGY

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R. F. Burski
Director
Nuclear Safety
Waterford 3

W3F1-94-0102
A4.05
PR

February 11, 1994

Mr. S.A. Varga
Acting, Associate Director for Projects
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Response To NRC Letter Requesting Additional Information
Regarding Generic Letter 92-08, "Thermo-Lag 330-1 Fire
Barriers," Pursuant To 10 CFR 50.54(f)

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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W3F1-94-0102

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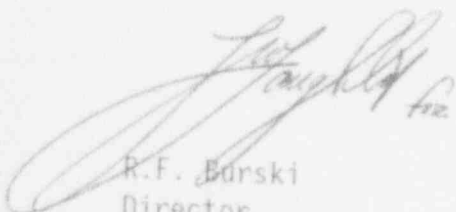
February 11, 1994

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 Waterford 3 Steam Electric Station in Attachment 2.

In response to NRC Information Bulletin 92-01, Supplement 1, Entergy Operations committed to provide plans and a schedule for corrective action within 30 days of the completion of the NUMARC industry program. Responses contained within this letter which address schedules in resolving Thermo-Lag issues supersede previous commitments to provide plans and schedules for corrective action.

As requested, this information is being submitted under affirmation in accordance with 10 CFR 50.54(f) (Attachment 1). Please contact Oscar Pipkins at (504) 739-6707 should you have any questions, or require additional information regarding this matter.

Very truly yours,



R.F. Burski
Director
Nuclear Safety

RFR/OPP/ssf
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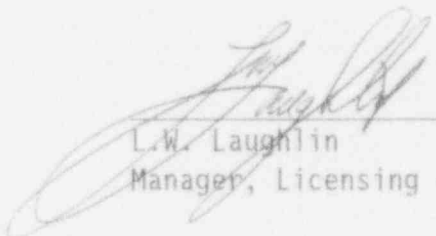
L.J. Callan (NRC Region IV), NRC, Document Control Desk,
D.L. Wigginton (NRC-NRR), NRC Resident Inspectors Office,
R.B. McGehee, N.S. Reynolds, B. Bradley (NUMARC)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of)
)
Entergy Operations, Incorporated) Docket No. 50-382
Waterford 3 Steam Electric Station)

AFFIDAVIT


L.W. Laughlin, being duly sworn, hereby deposes and says that he is Manager, Licensing - Waterford 3 of Entergy Operations, Incorporated; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the attached Request for Additional Information Regarding NRC Generic Letter 92-08; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.



L.W. Laughlin
Manager, Licensing - Waterford 3

STATE OF LOUISIANA)
) ss
PARISH OF ST. CHARLES)

Subscribed and sworn to before me, a Notary Public in and for the Parish and State above named this 14TH day of FEBRUARY, 1994.



Notary Public

My Commission expires WITH LIFE.

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

As previously stated in response to NRC Generic Letter 92-08, Waterford 3 utilizes Thermo-Lag fire barriers to satisfy licensing commitments. The Waterford 3 Thermo-Lag installations are associated with seven HVAC fire dampers that are located adjacent to their respective 3 hour wall/floor penetrations. Since these fire dampers are not located within the fire barrier penetration, Thermo-Lag is used to protect the HVAC ductwork between the barrier penetration and the fire damper. A more detailed description of these Thermo-Lag installations follows:

- Fire Damper 76 is located in Diesel Generator Room B on RAB +21 Elevation. Fire Damper 76 is a 92" x 92" 3-hour damper and Thermo-Lag is used to protect the associated ductwork for a distance of approximately 2'-4".
- Fire Damper 77 is located in Diesel Generator Room A on RAB +21 Elevation. Fire Damper 77 is a 92"x 92" 3-hour damper and Thermo-Lag is used to protect the associated ductwork for a distance of approximately 2'-4".

- Fire Damper 177 is located above the door to the Boric Acid Concentrator Room A on RAB -4 Elevation. Fire Damper 177 is a 12"x 12" 3-hour damper and Thermo-Lag is used to protect the associated ductwork for a distance of approximately 3'-3".
- Fire Damper 178 is located above the door to the Boric Acid Concentrator Room B on RAB -4 Elevation. Fire Damper 178 is a 12"x 12" 3-hour damper and Thermo-Lag is used to protect the associated ductwork for a distance of approximately 2'-0".
- Fire Damper 179 is located above the door to the Waste Concentrator Room on RAB -4 Elevation. Fire Damper 179 is a 12"x 12" 3-hour damper and Thermo-Lag is used to protect the associated ductwork for a distance of approximately 3'-3".
- Fire Damper 3HV-B217B is located on Wing Area +21 Elevation. Fire Damper 3HV-B217B is a 42" diameter 3-hour damper and Thermo-Lag is used to protect the associated ductwork for a distance of approximately 3'-6".
- Fire Damper 3HV-B218A is located on Wing Area -4 Elevation. Fire Damper 3HV-B218A is a 42" diameter 3-hour damper and Thermo-Lag is used to protect the associated ductwork for a distance of approximately 5'-0".

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.
 - 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. Waterford 3 has no Thermo-Lag installed on cable trays.
- b. Waterford 3 has no Thermo-Lag installed on conduits.
- c. Waterford 3 does not utilize 1-hour Thermo-Lag. The approximate total quantity of 3-hour Thermo-Lag utilized at Waterford 3 is as follows:

70 sq. ft. (FD-76)
70 sq. ft. (FD-77)
13 sq. ft. (FD-177)
8 sq. ft. (FD-178)
16 sq. ft. (FD-179)
50 sq. ft. (FD-3HV-B217B)
60 sq. ft. (FD-3HV-B218A)
287 sq. ft. (TOTAL)
- d. Waterford 3 does not use Thermo-Lag in Regulatory Guide 1.75 applications or as radiant energy shields.

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

Response

Plant records associated with the seven fire dampers described above do not reference Thermal Science Inc. Technical Note 20684 (Thermo-lag 330 Fire Barrier System Installation Procedures Manual, Power Generating Plant Specification). Results of non-destructive examination and installation drawings do indicate that the Thermo-lag was installed on the dampers in a manner consistent with the guidance provided in the Thermal Science technical note.

Currently, the Thermo-Lag fire barriers at Waterford 3 provide some undetermined measure of fire protection. Destructive examination has been delayed in order to avoid further degradation of these fire barriers until necessary to support NUMARC or site specific testing. The parameters that have not been field verified through destructive examination are as follows:

- baseline fire barrier panel thickness
- unsupported spans
- stress skin orientation (inside or outside)
- stress skin over joints or no stress skin over joints
- stress skin ties or no stress skin ties
- dry-fit, post-buttered joints or prebuttered joints
- joint gap width
- butt joints or grooved and scored joints
- steel bands or tie wires
- band/wire spacing
- band/wire distance to joints
- no additional trowel material over sections and joints or additional trowel material applied
- no edge guards or edge guards

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 in order to identify any necessary parameters in support of fire testing, implement barrier upgrades, and/or support 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.

Response

As discussed in response to item II.B.1. above, certain parameters associated with the Waterford 3 Thermo-Lag configurations have not been identified. Waterford 3 is committed to a thorough resolution of Thermo-Lag performance concerns while minimizing the duration of further degradation as a result of destructive examination. Waterford 3 will take necessary actions to identify important parameters in support of fire testing and/or establishing the bases for assumptions utilized in plant specific evaluations.

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 some of the proposed testing may have limited applicability to our ductwork applications, the Phase I and II NUMARC testing can not be said to bound any of the Waterford 3 configurations at this time. Destructive examination of the Waterford 3 assemblies is being coordinated to roughly coincide with decisions regarding the final scope of the generic testing program and will provide the remaining information necessary for comparing tested to installed configurations. Additionally, Entergy Operations is proposing to NUMARC that testing in addition to Phase II is necessary and should include non-raceway applications. 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.

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, destructive examinations will be performed on the in-plant barriers to identify all necessary parameters for comparing tested to installed configurations. Our present objective is to implement reasonable upgrades, based on successful fire testing, to ensure the performance of the existing barriers. In the event that 3-hour performance can not be demonstrated for the in-plant assemblies, Waterford 3 will pursue development of an exemption which demonstrates the ability of these 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. A brief discussion of the hazard area characteristics associated with each Thermo-Lag barrier follows:

Fire Damper 76 is located in fire area RAB 15 which has a postulated fire severity of 90 minutes. Adjacent to this fire area is fire area RAB 2, which has a fire severity of 40 minutes. RAB 2 is partially protected with detection and suppression systems. In the vicinity of where the duct penetrates the floor of RAB 2, detection and suppression is provided. RAB 15 has thermal detectors and a preaction suppression system to insure early detection of a fire along with automatic suppression. Additionally, the Thermo-Lag is encapsulated within 10 gauge sheet metal. Preliminary evaluations indicate that the existing 10 gauge sheet metal may provide the necessary means to keep the Thermo-Lag intact to provide a fire barrier that is sufficient to insure safe shutdown of the plant.

Fire Damper 77 is located in fire area RAB 16 which has a postulated fire severity of 84 minutes. Adjacent to this fire area is fire area RAB 2, which has a fire severity of 40 minutes. RAB 2 is partially protected with detection and suppression systems. In the vicinity of where the duct penetrates the floor of RAB 2, detection and suppression is provided. RAB 16 has thermal detectors and a preaction suppression system to insure early detection of a fire along with automatic suppression. Fire damper 77 has 10 gauge sheet metal encapsulating the Thermo-Lag in a similar manner to Fire Damper 76 discussed above.

Fire Damper 177 is located in fire area RAB 31 which has a postulated fire severity of 53 minutes. Fire Damper 177 separates RAB 31 from RAB 23 which has a postulated fire severity of 36 minutes. RAB 31 is partially protected with detection and suppression systems. In the area of Fire Damper 177 detection and suppression is provided. RAB 23 is not provided with detection or suppression. Fire Damper 177 is located in a wall directly above the entry door for the Boric Acid Concentrator Room A. Therefore, combustible loading near the fire damper in both fire areas is negligible.

Fire Damper 178 is located in fire area RAB 31 which has a postulated fire severity of 53 minutes. Fire Damper 178 separates RAB 31 from RAB 23 which has a postulated fire severity of 36 minutes. RAB 31 is partially protected with detection and suppression systems. In the area of Fire Damper 178 detection and suppression is provided. RAB 23 is not provided with detection or suppression. Fire Damper 178 is located in a wall directly above the entry door for the Boric Acid Concentrator Room B. Therefore, combustible loading near the fire damper in both fire areas is negligible.

Fire Damper 179 is located in fire area RAB 31 which has a postulated fire severity of 53 minutes. Fire Damper 179 separates RAB 31 from RAB 23 which has a postulated fire severity of 36 minutes. RAB 31 is partially protected with detection and suppression systems. In the area of Fire Damper 179 detection and suppression is provided. RAB 23 is not provided with detection or suppression. Fire Damper 179 is located in a wall directly above the entry door for the Waste Concentrator Room. Therefore, combustible loading near the fire damper in both fire areas is negligible.

Fire Damper 3HV-B217B is located in fire area RAB 25 which has a postulated fire severity of 47 minutes. Fire Damper 3HV-B217B separates RAB 25 from RAB 32 which has a postulated fire severity of 13 minutes. Both RAB 25 and RAB 32 are provided with complete coverage by automatic detection. Fire Damper 3HV-B217-B is located approximately 4' above the floor in RAB 25. The ductwork from the fire damper to the floor is encapsulated with Thermo-Lag. For a fire to propagate from RAB 25 to RAB 32, it would have to propagate through the Thermo-Lag/ductwork barrier located on Fire Damper 3-HV-B217B and back through the Thermo-Lag/ductwork barrier located on Fire Damper 3HV-B218A.

Fire Damper 3HV-B218A is located in fire area RAB 32 which has a postulated fire severity of 13 minutes. Fire Damper 3HV-B218A separates RAB 32 from RAB 25 which has a postulated fire severity of 47 minutes. Both RAB 32 and RAB 25 are provided complete coverage by automatic detection. Fire Damper 3HV-B218A is located approximately 4' below the ceiling in RAB 32. The ductwork from the fire damper to the ceiling is encapsulated with Thermo-Lag. For a fire to propagate from RAB 32 to RAB 25, it would have to propagate through the Thermo-Lag/ductwork barrier located on Fire Damper 3-HV-B218A and back through the Thermo-Lag/ductwork barrier located on fire damper 3HV-B217B.

Required Information

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

- a. In the event that site specific testing is required, the anticipated test specimen would be a metal enclosure of comparable size and configuration to the Waterford 3 ductwork applications, protected with 3-hour Thermo-Lag materials installed in a manner consistent with that of the in-plant barriers.

- b. Waterford 3 does not utilize Thermo-Lag for protection of electrical raceways or components; consequently, cable functionality is not applicable. The acceptance criteria to be used in qualifying Waterford 3 installations would follow guidelines found in Underwriter's Laboratories test standard UL 555 "Fire Dampers."

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.
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

Waterford 3 does not use Thermo-Lag for the protection of electrical raceways including cable trays and conduits; therefore, ampacity concerns and the NUMARC ampacity testing program are not applicable to Waterford 3.

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

Energy Operations is committed to a comprehensive evaluation to effectively resolve Thermo-Lag performance issues. Corrective action will be the result of a flexible 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 effecting fire barrier performance and/or determining the viability of various 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 as to determine barrier performance limitations

- limitations 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 and the NUMARC Application Guidelines.

For Thermo-Lag applications not involving electrical raceway, Entergy Operations plans to weigh acceptability of testing based on the protocols applicable to the specific application (i.e., UL 555 for fire dampers). 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. Furthermore, Entergy Operations expects NUMARC to perform additional testing to bound an even broader cross-section of the industry configurations which should also be considered before undertaking site specific testing. The NUMARC Application Guidelines are necessary for Entergy Operations to weigh the generic applicability of tested configurations to Entergy Operations' assemblies.

Upon review of all the pertinent criteria, Entergy Operations expects to utilize any one or combination of the following: 1) reevaluation of the safe shutdown analyses listing of components requiring protection under Appendix R, 2) Thermo-Lag upgrades, 3) exemptions to Appendix R in cases where it can be demonstrated that sufficient protection can be provided to achieve and maintain cold shutdown, 4) product substitution, 5) component relocation, and 6) 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

Although Phases I and II of the NUMARC testing focused on electrical raceway applications, we believe this testing may have limited applicability to the Waterford 3 Thermo-Lag applications. In the event that Entergy Operations concludes that NUMARC testing is applicable to the Waterford 3 Thermo-Lag assemblies, corrective actions will be implemented within 18 months from receipt of the necessary documentation. The documents necessary for Waterford 3 to implement corrective actions are the applicable fire tests and the NUMARC Application Guidelines, which are scheduled to be issued April 15, 1994.

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 30 days of receipt of this information, Waterford 3 will provide a description of the selected corrective action(s) and a schedule for implementation. Although completion of corrective action implementation is dependent upon the method selected, Entergy estimates that implementation will be complete within 18 months of receipt of necessary documentation. This will 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.

Response

The accuracy and validity of the information provided in this response was confirmed in accordance with Waterford 3 information certification/verification procedures. The following is a list of reference material used to prepare this correspondence:

- 10CFR50 Appendix R
- FSAR 9.5.1 Fire Area and Associated Figure
- Waterford 3 Associated Circuits Analysis
- Combustible Load Calculations EC-F-91-015, EC-F-91-017, C-F-91-025, EC-F-91-028, EC-F-91-031, and EC-F-91-032
- Licensing Documents Research System (Commitments Management)
- FSAR Amendments (Pre-Startup)
- CI/WA-267716/99003134 - DCP 3134 Fireproofing of HVAC Ducts & Partial Height Barriers
- W3F1-93-0027
- W3P84-0709
- W3P84-1560
- SSER 9.5, Supp. #1

Drawings/Details

B-316 S5A	G-322-S10	ME-003-009
G-252-S07	G-858-S01	DCN-NY-HV-323
G-252-S10	G-859-S02	DCN-NY-HV-257R1
G-252-S15	G-863-S01	DCN-NY-HV-272R1
G-252-S20	G-864-S01	NOCP-300
G-252-S23	G-869-S02	FP-001-015
G-252-S27	ME-003-006	