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 RUSSELL, W.T. Office of Nuclear Reactor Regulation, Director (Post 870411

SUBJECT: Responds to NRC follow-up ltr, dtd 940923, requesting suppl
 info to util 940204 response re GL 92-08, "Thermo-Lag 330-1
 Fire Barriers."

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AEP:NRG:0692DA

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
RESPONSE TO FOLLOW-UP LETTER TO THE REQUEST FOR ADDITIONAL
INFORMATION (RAI) REGARDING GENERIC LETTER (GL) 92-08,
"THERMO-LAG 330-1 FIRE BARRIERS"

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Attn: W. T. Russell

December 21, 1994

Dear Mr. Russell:

This correspondence responds to an NRC follow-up letter dated September 23, 1994, which requests supplemental information to our letter AEP:NRG:0692CV, dated February 4, 1994. Specifically, the attachment to this correspondence provides information to address GL 92-08, RAI Section II, "Important Barrier Parameters," Section III, "Thermo-Lag Fire Barriers Outside the Scope of the NUMARC Program," Section IV, "Ampacity Derating," Section V, "Alternatives," and Section VI, "Schedules." Also, information under GL 92-08, RAI Section I, "Thermo-Lag Fire Barrier Configuration and Amounts," has been revised.

Our response to the follow-up letter, dated September 23, 1994, was requested to be made under oath or affirmation according to the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). As such, an oath statement is attached.

Sincerely,


E. E. Fitzpatrick
Vice President

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Mr. W. T. Russell

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AEP:NRC:0692DA

cad

Attachments

cc: A. A. Blind
G. Charnoff
J. B. Martin
NFEM Section Chief
NRC Resident Inspector - Bridgman
J. R. Padgett

Mr. W. T. Russell

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AEP:NRC:0692DA

bc: S. J. Brewer/D. H. Malin/K. J. Toth
J. B. Hickman, NRC - Washington, D.C. - w/attach.
J. A. Kobyra/S. H. Steinhart
B. R. Signet
J. S. Wiebe - Bridgman
PRONET - w/attach.
DC-N-6015.1

STATE OF OHIO)
COUNTY OF FRANKLIN)

E. E. Fitzpatrick, being duly sworn, deposes and says that he is the Vice President of licensee Indiana Michigan Power Company, that he has read the foregoing RESPONSE TO FOLLOW-UP LETTER TO REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING GENERIC LETTER (GL) 92-08, "THERMO-LAG 330-1 FIRE BARRIERS" and knows the contents thereof, and that said contents are true to the best of his knowledge and belief.

E. E. Fitzpatrick

Subscribed and sworn to before me this 21st
day of December, 19 94.

Lisa D. Hill

NOTARY PUBLIC

RITA D. HILL

NOTARY PUBLIC, STATE OF OHIO

MY COMMISSION EXPIRES 6-28-99

ATTACHMENT TO AEP:0692DA

Response to NRC Follow-up Questions on the Request for
Additional Information (RAI) Regarding Generic Letter 92-08
Pursuant to 10 CFR 50.54(f) - Donald C. Cook Nuclear Plant,
Units 1 and 2

The numbered responses provided below correspond to the associated numbered reporting requirement in the NRC's request for additional information letter dated December 20, 1993.

"I. Thermo-Lag Fire Barrier Configuration 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.
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

1. See initial response provided in AEP:NRC:0692CV.
2. One of the alternative approaches for resolving the Thermo-Lag issue discussed in our initial response, AEP:NRC:0692CV, was to use engineering analysis to provide a basis for reduction in scope of protected circuits and their associated barriers. We are presently in the process of conducting a detailed re-evaluation of the safe shutdown analysis for Cook Nuclear Plant. Based on the preliminary results of this re-evaluation, a significant reduction in the number of required Thermo-Lag fire barriers will result. The basis for reduction of Thermo-Lag fire barriers will be documented in a revision of the Safe Shutdown Capability Assessment (SSCA).

In some cases, exemption requests and technical evaluations previously submitted to the NRC along with the SSCA will require revision to reflect the reduced reliance on Thermo-Lag fire barriers for compliance with 10 CFR 50 Appendix R. Revisions to the SSCA and technical evaluations will be reviewed under the provisions of 10 CFR 50.59. Any revisions to existing exemptions will be submitted to the NRC.

Although our safe shutdown re-evaluation is still in progress, it is currently estimated that the amount of Thermo-Lag fire barrier material that will continue to be relied upon for fire protection is as follows:

a. Cable tray barriers:

one hour barriers - 28 linear feet

- 142 square feet

three hour barriers - 0 linear feet

b. Conduit barriers:

one hour barriers - 160 linear feet

three hour barriers - 100 linear feet

c. Other fire barriers:

one hour barriers - 75 square feet

three hour barriers - 526 square feet

d. Other barriers and radiant energy shields:

(Cable trays protected with Thermo-Lag for the purpose of creating a 20 foot separation zone with no intervening combustibles and two non-Appendix R radiant energy shields located outside of containment)

total square footage - 923 square feet

"II. Important Barrier Parameters

B. 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.
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 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

1. Our initial response to Item II.B.1, AEP:NRG:0692CV, stated that we would determine if additional parameter identification efforts would be necessary once the content of the NUMARC Application Guide was finalized. Based on the Application Guide issued by NEI in July 1994, we do not believe additional parameter identification efforts will be necessary beyond that described in our initial response for parameter #9 (baseline fire barrier panel thickness) and parameter #18 (butt joints or scored and grooved joints).
2. The above two parameters will be evaluated using one or more of the following options:
 - a. Assume limiting conditions, e.g., pre-buttered butt joints versus score and fold joints.
 - b. Review of contractor work practices and procedures through documentation or testimony.

- c. Review receipt inspection and installation documentation.
 - d. Destructive examination of barriers on a sample basis to obtain information on construction techniques or material thickness.
 - e. Visual observations where appropriate.
3. The December 20, 1993, RAI described other parameters which may be unique to particular barriers, such as interferences between Thermo-Lag materials and other fire barrier materials or building features (walls, etc.) and internal supports. It also addressed questions about the uniformity of Thermo-Lag fire barrier materials produced over time.

Parameters relating to interferences between Thermo-Lag materials and other fire barrier materials or building features have been identified and verified for the Thermo-Lag fire barriers which are projected to remain following completion of our safe shutdown analysis revalidation. Material testing performed for NEI has indicated no appreciable difference among Thermo-Lag samples drawn from utility stock. We are not aware of any other unknown parameters beyond those discussed above.

"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 NUMARC 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

1. Our initial response to this item in AEP:NRC:0692CV indicated that a number of installed configurations could be outside the scope of the NUMARC program. With the reduction in required Thermo-Lag barriers made possible by our safe shutdown analysis re-evaluation, we believe the remaining configurations will be bounded by the NUMARC program with the exception of the Thermo-Lag barriers described below.
 - a. Thermo-Lag panels were used to construct three-hour fire barriers around several pilasters in the Diesel Generator Rooms (Fire Zones 15 and 19). The pilasters are of concrete construction and are physically a part of the Diesel Generator room walls. Each pilaster contains several conduits which have been embedded below approximately 2 inches of concrete. Two layers of nominal 1/2 inch thick Thermo-Lag panels were attached to the outside of each pilaster.

- b. The three hour rated Thermo-Lag fire barrier presently installed between the Unit 1 and Unit 2 component cooling water (CCW) pumps consists of two nominal 1/2 inch thick Thermo-Lag panels separated by a 11/16 inch thick expanded metal stiffener. The barrier forms a wall which is approximately 36 feet long and 78 inches high. The Thermo-Lag panels were attached to the metal studs and framework which were also protected with Thermo-Lag material.
- c. The hot shutdown (HSD) panels were originally installed to comply with the requirements of 10 CFR 50, Appendix A, GDC 19 and are used to provide shutdown capability from outside the control room for design basis considerations other than Appendix R fires. The Unit 1 HSD panel is in the Unit 2 control room and the Unit 2 HSD panel is in the Unit 1 control room. The HSD panels are steel enclosures approximately 12 ft 6 in. wide, 5 ft deep and 8 ft high. A 3-hour fire barrier was constructed around the HSD panels to ensure that fires external to the panels do not damage internal wiring and fires internal to the panel do not spread outside. The walls were constructed of concrete block and steel columns protected with Thermo-Lag materials. The roof was constructed in a manner similar to the CCW pump room wall in that two nominal 1/2 inch thick Thermo-Lag panels, separated and stiffened by expanded metal, were mounted on steel beams anchored to the top of the block wall. The steel structure and beams were also protected with Thermo-Lag material. Access to the face of each panel is via a steel roll-up fire door mounted across the front of the enclosure.

2&3. The three Thermo-Lag fire barrier configurations described above will be addressed as follows:

- a. The three-hour rated fire barriers protecting embedded conduits located in the diesel generator rooms pilasters will be downgraded to one hour barriers. Downgrading is possible because fire detection and automatic suppression systems already exist in the diesel generator rooms.

The protection provided to the embedded conduits by the two inches of concrete cover plus the one inch thick Thermo-Lag fire barrier conservatively exceed the required one-hour rating. A technical evaluation documenting the basis for this conclusion will be developed. The results of a one-hour wall test performed for Florida Power & Light (FP&L) will be included in this evaluation.

The FP&L wall test was conducted at Omega Point Laboratories, of San Antonio, Texas, on September 14, 1994, and was witnessed by AEPSC and NRC personnel. The test was conducted for one hour, and was followed by a hose stream test in accordance with ASTM-E119. The test assembly consisted of a 10 foot by 10 foot steel frame to which two 1/2 inch thick Thermo-Lag panels placed back to back were attached. This test assembly was intended to replicate a Thermo-Lag fire barrier originally installed by FP&L as a three-hour barrier. The test assembly successfully passed both the one-hour fire endurance test and the hose stream test.

- b. The three hour rated Thermo-Lag fire barrier installed between the Unit 1 and Unit 2 CCW pumps will either be replaced with a barrier made of an alternate material such as gypsum board or will be justified through additional testing which is planned for the hot shutdown panel enclosures (see part c. below). Since both barrier assemblies consist of two 1/2 inch thick Thermo-Lag panels separated by 11/16 inch thick expanded metal, a successful three hour test of the hot shutdown panel enclosure ceiling assembly could be used in conjunction with additional technical evaluation to justify the CCW pump wall. A decision on which alternative will be selected will be dependant upon the test results.
- c. Additional testing is planned for the ceiling assembly which is a part of the three hour fire barrier enclosure for the hot shutdown panels. If the planned test does not achieve a full three hour rating, an exemption request will be submitted from the three hour requirement for this barrier. The exemption request would be based upon factors such as the very low combustible loading in the area, the presence of a smoke detection system within the control room providing detection both inside and outside the hot shutdown panel, and the fact that the hot shutdown panels are located in the Unit 1 and Unit 2 control rooms which are constantly manned.

AEP has entered into a joint test program with IES Utilities (IES) and Carolina Power & Light (CP&L) to conduct fire endurance testing of two site specific Thermo-Lag ceiling assemblies and several structural beams protected with Thermo-Lag. One of the site specific ceiling assemblies to be tested will be the ceiling assembly installed

for the hot shutdown panel enclosures at Cook Nuclear Plant Units 1 and 2 . The test assembly will be comprised of W6 x 12 and C8 x 11.5 structural steel with two layers of 1/2 inch thick Thermo-Lag 330-1 panels mounted on top. An expanded steel reinforcement panel separates the Thermo-Lag panels. The W6 x 12 and C8 x 11.5 structural steel will be protected with Thermo-Lag 330-1 material.

The assemblies will be tested as three hour barriers in accordance with ASTM E-119. ASTM E-119 is referenced as the required standard per generic letter 86-10 supplement 1.

VECTRA Technologies Inc. has been contracted for overall test program management. VECTRA has subcontracted Peak Seals Inc. to install Thermo-Lag materials and provide Quality Control services, and Omega Point Laboratories to perform the fire testing. The testing is scheduled to occur in January 1995. .

"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

- 1-4. Our initial response to the RAI, AEP:NRC:0692CV, provided a description of the ampacity derating program applied to the Thermo-Lag installations at Cook Nuclear Plant. This program adequately addressed the ampacity derating issue for current Thermo-Lag installations. This program did not rely on any derating information provided by TSI.

Our initial response to the RAI also stated that we would review the NUMARC program for ampacity derating when it is made available and that we would inform the NRC of the ampacity program to be used for fire barrier upgrades or replacements within 90 days

following receipt of the NUMARC Ampacity Test Report. NEI has not developed an ampacity derating program at this time and has not issued a schedule for the development of such a program.

Upgrades for those Thermo-Lag fire barriers that will remain in place following completion of the safe shutdown analysis re-evaluation can be accomplished without invalidating our original ampacity derating calculations. This is because those upgrades will involve the use of additional Thermo-Lag materials mainly at barrier seams and joints. Upgrades which might be used for the protection of small conduits might require a complete overlay of the barrier with an additional layer of Thermo-Lag material. However, these conduits carry instrument or control cables, as opposed to power cables that are associated with ampacity concerns.

In the event that replacement of Thermo-Lag fire barriers with another fire barrier system is selected, we will ensure that ampacity derating is adequately addressed for the alternate fire barrier material. In this situation, the ampacity derating program to be used might be developed independently by AEPSC or in conjunction with the fire barrier supplier or other utilities which choose to utilize the alternate fire barrier material.

In the NRC's September 23, 1994, letter to AEP, the NRC states, "There are unresolved technical issues regarding ampacity derating. However, it is the staff's view that these issues can be resolved independently of the fire endurance issues." In meetings between NEI and NRC, the NRC noted that immediate resolution of ampacity derating is not necessary because it is a long term cable life issue, and because significant margin exists due to conservative design assumptions, such as continuously energized circuits, actual loads, and operation at cable rating temperatures.

In light of the above information, we will respond to that portion of the information request concerning ampacity derating for replacement fire barrier systems when technical issues with respect to ampacity derating factors have been resolved and if we decide to replace the Thermo-Lag fire barriers with another fire barrier system.

"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 barrier as 1-hour barriers and install detection and suppression systems to satisfy NRC fire protection requirements."

RESPONSE

The specific alternatives available for achieving compliance with NRC fire protection requirements in plant areas that will continue to require fire barriers following our safe shutdown analysis re-evaluation will include the following:

1. Upgrade existing in-plant barriers with additional Thermo-Lag material or other fire barrier materials.

2. Replace Thermo-Lag barriers with other fire barrier materials or systems. Gypsum board is a likely alternative for the CCW pump wall replacement. The Darmatt KMI Fire Protection System provided by Darchem Engineering Inc. is also presently being considered as a possible alternative to Thermo-Lag in some applications.
3. Reroute cables or relocate other protected components.
4. Qualify 3-hour barriers as 1-hour barriers and take credit for installed detection and suppression systems to satisfy NRC fire protection requirements.
5. Conduct additional fire endurance testing for some barriers.
6. Submit exemption requests based upon the use of baseline (non-upgraded) test results along with other engineering analysis which would demonstrate adequate protection for the installed hazard.

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

RESPONSE

1&2. An integrated schedule of activities necessary for the resolution of the Thermo-Lag issue for Cook Nuclear Plant is presented below. AEPSC will modify this schedule as necessary in order to make the most efficient and cost effective use of resources necessary for implementation of the scheduled activities. However, the NRC will be informed of any change to the final Thermo-Lag resolution date listed below.

ActivityCompletion Date

Determine if CCW pump wall can be qualified based upon testing or if it is to be replaced with alternate materials.	February 27, 1995
Complete re-evaluation of the safe shutdown analysis for fire areas containing Thermo-Lag.	March 31, 1995
Complete evaluation for downgrading Thermo-Lag fire barriers in diesel generator rooms from 3-hour to 1-hour.	April 31, 1995
Determine which raceway fire barriers will be upgraded with Thermo-Lag or replaced with alternate fire barrier materials. Complete NEI application guide evaluation for barriers to be upgraded.	May 31, 1995
Receive fire endurance test report for hot shutdown panel fire barrier. Determine if exemption request is required.	June 30, 1995
Submit exemption request for hot shutdown panels fire barriers (if required)	September 30, 1995
Replace CCW pump wall (if required)	December 30, 1995
Complete upgrading/replacement of Thermo-Lag barriers for raceway.	December 30, 1996
Final resolution of Thermo-Lag 330-1 installations.	December 30, 1996