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H. W. HABERMEYER, JR.
Vice President
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FEB 14 1994

SERIAL: NL&RAS-94-013

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-63

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62

REQUEST FOR ADDITIONAL INFORMATION REGARDING GENERIC LETTER 92-08, "THERMO-LAG 330-1 FIRE BARRIERS," PURSUANT TO 10 CFR 50.54(f) - BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2, AND SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 (TAC NOS. M85526, M85527, AND M85556)

Gentlemen:

The purpose of this letter is to provide the NRC with information requested in the December 22, 1993, request for additional information regarding Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," pursuant to 10 CFR 50.54(f) for Carolina Power & Light Company's (CP&L) Brunswick Steam Electric Plant, Units 1 and 2 (BSEP) and Shearon Harris Nuclear Power Plant, Unit 1 (SHNPP).

The NRC issued GL 92-08 on December 17, 1992. By letter dated April 16, 1993, CP&L provided a response to that GL. On December 22, 1993, the NRC requested additional information regarding the April 16, 1993, submittal. Enclosed is CP&L's response to the December 22, 1993, letter. The response format follows the request format to facilitate NRC review.

Should you have any questions, please call Mr. R. E. Rogan at (919) 546-6901.

Sincerely,

H. W. Habermeyer, Jr.

DBB/jbw

Enclosure

cc: Mr. Dayne H. Brown
Mr. S. D. Ebneter
Mr. N. B. Le
Mr. P. D. Milano
Mr. R. L. Prevatte
Mr. J. E. Tedrow

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(2166GR1)

H. W. Habermeyer, Jr., having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, contractors, and agents of Carolina Power & Light Company.

Eleanor C. Chappell
Notary (Seal)

My commission expires: 2/6/96

CP&L Response Summary

CP&L has developed a three phase Thermo-Lag Action Plan to resolve the Thermo-Lag concerns. The Phases are structured as follows:

Phase 1 Options Development -	This phase will re-evaluate compliance options identified from the original BNP and HNP Safe Shutdown Analysis along with options to test and/or upgrade Thermo-Lag configurations. This evaluation process will ensure the most appropriate corrective action has been identified.
Phase 2 Test Plan -	In parallel with the Options Development Phase, CP&L will develop a Test Plan to address those raceway configurations currently identified as not being within the proposed NUMARC Test Program.
Phase 3 Implementation -	This phase will develop and implement the selected options and test results identified from Phases 1 & 2.

Several variables are still outstanding which affect implementation of the overall CP&L Thermo-Lag Action Plan. These items are outlined as follows:

A. Completion of the NUMARC Testing Program.

B. Issuance of an NRC approved NUMARC Application Guideline.

C. Issuance of the NRC Fire Test Acceptance Criteria (final version).

As identified in the following detailed response and presented on the Thermo-Lag Action Plan flow chart in Figure 1, CP&L will continue to implement this Action Plan while NUMARC completes the Testing Program. A follow-up response will be provided 90 days after completion of the NUMARC Testing Program providing an integrated schedule along with CP&L's fire test criteria and the approach for addressing cable ampacity derating.

I. Thermo-Lag Barrier Configurations and Amounts

NRC REQUEST

I.B.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).

CP&L RESPONSE

I.B.1.

Brunswick Nuclear Plant

A listing of raceways and other enclosures where Thermo-Lag 330-1 is used for meeting Appendix R or supporting an exemption is given in Table 1. This listing provides the raceway or equipment protected, the type of enclosure, the nominal size of the raceway, the approximate length (if applicable), the barrier rating, whether or not the barrier is covered under the present NUMARC testing scope (See item III), and the approximate area of enclosure (if applicable).

In addition to the information in Table 1, Thermo-Lag 330-1 has been used in the following specialized applications:

1) Three-hour rated panels were used in conjunction with fire dampers to protect door transoms above seven doorways in the Diesel Generator Building. The approximate sizes are as follows:

   Five - 42"x56" panels
   Two - 30"x40" panels

2) Thermo-Lag 330-1 was used as a component in approximately 60 fire barrier penetration seals.

I.B.1. (cont.)

Harris Nuclear Plant

A listing of raceways and other enclosures where Thermo-Lag 330-1 is used for meeting NUREG-0800 or supporting a deviation request is given in Table 2. This listing provides the raceway or equipment protected, the type of enclosure, the nominal size of the raceway, the approximate length (if applicable), the barrier rating, whether or not the barrier is covered under the present NUMARC testing scope (See item III), and the approximate area of enclosure (if applicable).

In addition to the information in Table 2, Trowel grade 330-1 has been used in the following specialized applications:

1) Applied to both faces of 4 door transoms and mullions of fire door assemblies (Transoms are approximately 12'x8' and the mullions are approximately 2'x10').

2) Applied to 2 door transoms only (transoms are approximately 4'x7').

3) Applied to 6 door mullions only (mullions are approximately 2'x10').

NRC REQUEST

I.B.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.

CP&L RESPONSE

I.B.2

CP&L Thermo-Lag 330-1 quantities are as follows:

BNP THERMO-LAG 330-1 QUANTITIES				
Type	Fire Rating	Approx. Linear Feet	Approx. Square Feet	Comment
Cable Trays	1	40	600	2- 20' Sections
	3	0	0	No Application
Conduits	1	1050		
	3	1410	30	One enclosure = 30ft^2
Junction Boxes	1		130	
	3		300	
Equip. Enclosures	3		820	
Door Transoms	3		100	
Penetration Seals	3			Total of 60 seals

HNP THERMO-LAG 330-1 QUANTITIES				
Type	Fire Rating	Approx. Linear Feet	Approx. Square Feet	Comment
Cable Trays	1 & 3	0		No Application
Conduits	1	32		
	3	0		No Application
Area Enclosure	3		1770	
Partial Height Wall	1		200	
Door Fireproofing	3		1300	

II. Important Barrier Parameters

NRC REQUEST

II.B.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.

CP&L RESPONSE

II.B.1.

In general, the parameters considered will fall into one of two categories:

1) NUMARC tests qualify the most limiting configuration, therefore all configurations are bounded.

2) NUMARC tests establish boundary conditions (i.e. minimum, maximum or both).

Of the following parameters, many of the criteria are "known", (e.g., band spacing required by installation details) but have not been "verified" at this time (either through quality control documentation reviews or field walkdowns).

NRC Parameter Listing	Response
Raceway orientation	NUMARC tests both; all orientations bounded.
Conduit	Conduit number and sizes known.
Junction Boxes and Lateral Bends	Junction box number and sizes known.
Ladder back cable tray with single layer cable fill	NUMARC tests bound both ladder and solid back tray; Cable fills known.
Cable Tray with T-section	No Thermo-Lag is installed in this orientation.
Raceway Material (aluminum, steel)	NUMARC tests bound both aluminum and steel.
Support protection, thermal shorts	NUMARC tests establish bounding conditions. Installation criteria known.
Air drops	Location of air drops known.

NRC Parameter Listing	Response
Baseline fire barrier panel thickness	NUMARC tests minimum (1/2" for one-hour, 1" for three-hour). CP&L assumes worst case.
Preformed conduit panels	Conduit wrap configurations known.
Panel rib orientation	NUMARC tests worst case; all configurations bounded.
Unsupported spans	NUMARC tests establish bounding conditions. Installation criteria known.
Stress skin orientation	NUMARC tests establish bounding conditions. Configuration not known at this time.
Stress skin over joints or no stress skin over joints	NUMARC tests worst case; both configurations bounded.
Stress skin ties or no stress skin ties	NUMARC tests worst case; both configurations bounded.
Dry-fit, post-buttered joints or prebuttered joints	NUMARC tests worst case; both configurations bounded.
Joint gap width	NUMARC tests establish bounding conditions. Configuration not known at this time.
Butt joints or grooved and scored joints	NUMARC tests worst case; both configurations bounded.
Steel bands or tie wires	NUMARC tests worst case; both configurations bounded.
Band/wire spacing	NUMARC tests establish bounding conditions. Installation criteria known.
Band/wire distance to joints	NUMARC tests establish bounding conditions. Configuration not known at this time.
No internal bands in trays	NUMARC tests worst case; both configurations bounded.
No additional trowel material over sections and joints or additional trowel material applied	NUMARC tests worst case; both configurations bounded.
No edge guards or edge guards	NUMARC tests worst case; both configurations bounded.

CP&L RESPONSE

II.B.1. (Cont.)

With regards to the NRC parameters pertaining to installed cables shown below, none with the exception of cable fill in cable trays are known. Consideration of the remaining parameters is only required if the fire tests exceed the temperature rise.

1. Cable size and type (power, control, or instrumentation).
2. Cable jacket type (thermoplastic, thermoset) and materials.
3. Cable conductor insulation type (thermoplastic, thermoset plastic) and materials
4. Cable fill and distribution of cables within the protected conduit or cable tray.
5. Proximity of cables to the unexposed (inside) surfaces of the fire barrier.
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).
7. Cable operating temperature.
8. Temperatures at which the cables can no longer perform their intended function when energized at rated voltage and current.

If fire tests demonstrate excessive cold side temperatures, 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 (item 8) would be necessary, using cable performance test data or information for specific installed cable types (items 1,2,3, and 7 of the NRC listing). However, NRC has yet to finalize requirements for cable functionality evaluation, nor are test results yet available that would clearly indicate the scope of such evaluations. The degree and conservatism of cable functionality evaluation requirements implied by the NRC listing of cable parameters, and discussed in proposed Supplement 1 to Generic Letter 86-10, significantly exceeds the original requirements of Generic Letter 86-10.

Items 4, 5, and 6 of the NRC listing address issues relative to potential cable/barrier contact for cable trays. This is an unresolved issue at this time, and barrier inspection in this regard would be difficult or impossible. Barrier contact would be most likely to occur in situations of large

cable fills. However, the large cable fills also provide significant thermal mass that could improve barrier system performance and mitigate the effect of cables in contact with the barrier. NUMARC has agreed to provide additional thermocouples below the cable tray rungs in the Phase 2 cable tray tests to provide information to address 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 (NRC item 6) was used only in NUMARC test Number 1-4 (24" steel cable tray with an air drop, three hour test) and did not impact performance or useability of the test.

Other unique parameters which are identified for a particular barrier will need to be addressed on a case-by-case basis. Chemical testing performed by NUMARC on a wide variety of aged samples has not revealed significant variations in chemical composition. NUMARC has identified that these test results will be distributed to the industry along with the Phase I test reports. Phase 2 testing will include barrier materials of various ages, as well as additional chemical testing. Unless unexpected results are encountered, CP&L does not believe plant unique chemical evaluations should be necessary.

NRC REQUEST

II.B.2.

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

CP&L RESPONSE

II.B.2.

It is anticipated that the NUMARC Application Guide will contain the necessary guidance on the parameters of importance. Once these parameters are known and the bounding conditions set, CP&L will perform the necessary steps to verify this information. These steps could involve such items as :

1) Assumption of 'worst case' conditions;

2) Review of quality control documentation from the original installation packages;

3) Verification walkdowns of the barriers; or

4) Destructive examination of barriers on a statistical sampling basis to obtain information on construction techniques.

NRC REQUEST

II.B.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.

CP&L RESPONSE

II.B.3.

Those parameters that are established as bounding conditions through the NUMARC Application Guide are expected to require verification. Of those shown above, the majority are easily verifiable through either documentation reviews or field walkdowns. The remainder (i.e. joint gap width, orientation of stress skin on 1-hour wrap) may require destructive examination for verification.

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

NRC REQUEST

III.B.1.

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

CP&L RESPONSE

III.B.1.

The specific components identified in the response to I.B.1 which have been determined not to fall within the scope of the NUMARC testing program are summarized as follows:

Brunswick Nuclear Plant

1) Raceway Protection

1-hour Rating

30"x30"x12" junction boxes with Thermo-Lag directly applied.

3-hour Rating

Junction boxes of the following sizes with Thermo-Lag directly applied:

24"x24"x24"
24"x20"x24"
24"x16"x8"
6"x48"x6"

Junction box enclosures of the following sizes with Thermo-Lag applied to unistrut framing:

11'-0"x11'-0"x3'-0"
5'-6"x3'-6"x2'-0"

2) Intervening Combustible Protection

Cable tray installations with percent fill < 15%.

3) Barrier Protection

3-hour Rating

The Thermo-Lag applied to door transoms and fire barrier penetration seals.

Harris Nuclear Plant

1) Raceway Protection

3-hour Rating

Enclosure assembly consisting of 1" nominal thick panels mounted to structural steel framing.

2) Barrier Protection

1-hour Rating

Partial height wall assembly consisting of 0.5" nominal thick panels mounted to structural steel framing.

3-hour Rating

Thermo-Lag applied to door transoms and mullions.

NRC REQUEST

III.B.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.

CP&L RESPONSE

III.B.2.

CP&L is developing an Options Development Evaluation in conjunction with a Test Plan for Thermo-Lag wrapped raceways to determine the best approach to dispositioning Thermo-Lag configurations. (See response to Item VI).

It is desirable to use the test results from the NUMARC testing in order to take advantage of lessons learned. Due to the costs associated with conducting fire tests, CP&L would not want to proceed with testing a baseline configuration if a planned NUMARC test indicated a high probability of failure. Conversely, it would not be desirable to develop an upgrade process which would pass a fire test, but be costly and difficult to implement in the field, if the NUMARC test results suggest a simpler and more efficient approach.

NRC REQUEST

III.B.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.

CP&L RESPONSE

III.B.3.

It is anticipated that the area enclosure at HNP will require fire testing, which may envelope some of the large junction box enclosures at BNP. The test specimens for any required testing are still under consideration.

For testing cable raceway fire barriers, CP&L expects to use the test and acceptance criteria in the final version of Supplement 1 to Generic Letter 86-10. This criteria, when final, would be required for establishing test methodology for qualification of cable raceway fire barriers used for protection of safe shutdown functions in accordance with Appendix R/NUREG-0800. For non-cable raceway fire barriers, test methodology and acceptance criteria will be developed taking into account the acceptance criteria issued in Supplement 1 to Generic Letter 86-10 and standard test methods such as NFPA-251. Test methodology and acceptance criteria will be provided with the integrated schedule (See response to item VI).

IV. Ampacity Derating

NRC REQUEST

IV.B.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.

CP&L RESPONSE

IV.B.1.

Ampacity derating is an issue that applies only to cable raceways containing power cables which are continuously energized. Ampacity derating factors determined for upgraded configurations can be conservatively applied to baseline configurations. The NUMARC program for ampacity derating evaluation contains the following elements.

For upgraded one hour cable trays and conduits, NUMARC is reviewing the generic applicability of ampacity derating factors derived by Texas Utility Electric Corporation (TUEC) using the methodology of IEEE P848 Draft 11. The IEEE P848 test methodology has been extensively discussed with the NRC by NUMARC and TUEC. However, the NRC acceptance of the methodology is still pending. The NRC has informed NUMARC that they will issue a request for further information to TUEC regarding the submitted ampacity test report. The TUEC testing provided preliminary ampacity derating factors of 32% for cable trays and 11% for conduits, which are within the range of previously reported values.

NUMARC will conduct ampacity testing of upgraded three hour barriers to the requirements of IEEE P848 following determination of appropriate barrier upgrades for three hour installations and agreement with NRC on ampacity test methodology. It is expected that this testing would be conducted in the second quarter of 1994, at the earliest. To the extent that successful upgrades using alternative materials are identified, ampacity testing of these upgrades would be considered as well.

The IEEE P848 approach provides for testing of a single cable tray, and small and large conduits. The limiting conduit derating factor (of the two sizes tested) is applied to the range of conduit sizes, cable fills, etc. For cable trays, the single cable tray derating factor is applied to all sizes of cable trays, cable fills, etc. Thus ampacity testing can be performed generically with broad applicability, unlike fire testing where many

performance parameters must be considered. The NUMARC program is expected to provide ampacity derating factors for one and three hour barriers, for cable trays and conduits. Assuming NRC agreement with the IEEE P848 approach, few if any installations are expected to fall outside the generic scope.

NRC REQUEST

IV.B.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.

CP&L RESPONSE

IV.B.2.

As described in our response to GL 92-08, CP&L has performed a review of the derating percentages identified in that document and determined that design margin was still available. Any additional testing or evaluation required will not be known until NRC approved test results are received from NUMARC.

NRC REQUEST

IV.B.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.

CP&L RESPONSE

IV.B.3.

As stated above, few if any installations are expected to fall outside the generic scope. Should any configurations be identified as being outside the final NUMARC guidance, CP&L will identify the appropriate corrective action to ensure an adequate design margin is maintained.

NRC REQUEST

IV.B.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.

Your response to Section IV.B may depend on unknown specifics of the NUMARC ampacity derating test program (for example, the final barrier upgrades). However, your response should be as complete as possible. In addition, your response should be updated as additional information becomes available on the NUMARC program.

CP&L RESPONSE

IV.B.4.

Effects on ampacity derating are one of the factors that must be considered before the decision to apply more Thermo-Lag or use an alternate material is finalized. As part of CP&L's design control process, adequate design margin will be maintained for ampacity before any design resolution is implemented.

The schedules to address ampacity will be considered as part of the overall integrated schedule to resolve the Thermo-Lag issue. Submittal of this integrated schedule is addressed in the response to Item VI.

V. Alternatives

NRC REQUEST

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.

CP&L RESPONSE

Options currently being considered for Thermo-Lag resolution are given in the Action Plan provided in the response to Item VI. The alternative chosen for each specific case will be based on that which provides the required level of safety in the most cost-effective manner, while minimizing the impact to plant operation. Some of these alternatives may be exercised before the decision to physically upgrade using Thermo-Lag.

VI. Schedules

NRC REQUEST

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.

CP&L RESPONSE

In order to develop an integrated schedule, some of the following factors will need to be completed:

1. Test and acceptance criteria have not been finalized and issued by NRC. Proposed draft criteria contain new conservatisms in fire test methods and acceptance criteria that could affect the scope and complexity of upgrades to installed barriers. The content of the final criteria, and the resulting impact on our specific action plan will be determined when the final criteria is issued by the NRC.

2. Complete NUMARC Phase 2 test results will not be known until the mid-March time frame. Results of baseline and upgraded test configurations must be considered to determine the appropriate action plans to address specific configurations. Moreover, further generic testing may be undertaken following Phase 2.

3. The NUMARC Application Guide, scheduled for issuance by mid-April, will include a matrix of important performance parameters and bounding conditions. Discussion with NRC will be necessary to reach agreement on the selection of comparison parameters and bounding conditions. The results of these NRC interactions will define the final content and would directly impact the generic applicability of a given test to an installed configuration.

CP&L intends to implement the Action Plan as presented in Attachment 1 and shown graphically in the flowchart presented in Figure 1. CP&L will submit an integrated schedule 90 days after completion of the NUMARC testing program.

VII. Sources and Correctness of Information

NRC REQUEST

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.

CP&L RESPONSE

The following sources of information were used:

A) Design Drawings
B) Installation documents (modifications, design change notices, etc.)
C) Preliminary engineering walkdowns
D) Cable Raceway Reports

The information presented herein was developed by engineering personnel familiar with the Thermo-Lag design. However, as stated in the response to Item II, some of the information has not been "verified" as to its accuracy.

CP&L ACTION PLAN

I. Option Development Phase

Perform an Options Development Evaluation which considers all available options to resolve the Thermo-Lag issue. This Evaluation will address the configurations bounded by the results of Phase I NUMARC Testing along with other alternatives such as those identified below. The Evaluation will integrate the results of other tests as these are received.

A) Available Alternatives for each Configuration

The following are some of the available alternatives for resolution of the Thermo-Lag issue (not necessarily presented in order of preference). The alternative chosen for each specific case will be based on that which provides the required level of safety in the most cost-effective manner, while minimizing the impact to plant operation.

1) Re-evaluation of Safe Shutdown Methodology to provide basis for reduction in scope of protected circuits and their associated barriers.
2) Reroute circuit.
3) Replace with other fire barrier materials or upgrade with Thermo-Lag/Alternate materials. This option requires implementation of the NUMARC Application Guideline.
4) Evaluate other methods for achieving Appendix R/NUREG-0800 compliance (e.g., sprinklers, detection and/or exemptions/deviations, G.L. 86-10 evaluations of non raceway barriers).

Should other alternatives be identified during the Options Development Phase, these will also be considered.

B) Upgrade considerations

Before an upgrade design is finalized, the following attributes must be considered:

1) Implementation of NUMARC Application Guideline.
2) Feasibility of installation (e.g., potential field interferences).
3) Effects on structural supports.
4) Effects on cable ampacity derating.
5) Combustibility
6) Other potential impacts (e.g., equipment qualification).

II. Test Program Phase

Develop a CP&L Test Plan for those configurations currently identified as not being within the proposed NUMARC Test Program. This Test Plan must consider the following attributes:

A) NRC approved acceptance criteria (expected in Supplement 1 to Generic Letter 86-10)
B) Test Results from NUMARC Phase II and any additional future NUMARC testing.
C) Identify potential for shared testing with other utilities which have similar configurations.
D) Availability of test labs and Thermo-Lag material.
E) Obtaining NRC approval of enveloping test configurations/methodology, including acceptance criteria.

III. Implementation Phase

Development and implementation of the results from the Option Development and the Test Program Phases will require the following actions:

A) Development and implementation of plant modifications. Implementation of modifications such as circuit/raceway rerouting, barrier upgrades, etc. will need to consider the following:

1) Plant Outages

Much of the work will involve safety related components. It is anticipated that the majority of modification implementation will need to be scheduled during plant outages.

2) Material Availability

Once the type of viable upgrades are known, material will have to be ordered. Due to the large number of utilities which may also require upgrades, material availability remains an uncertain factor at this time.

3) Labor Qualification

Regardless of the type of upgrade material used, plant personnel will need to be trained in the proper installation criteria.

4) ALARA

Some of the Thermo-Lag is installed in high

radiation areas. Work in these areas will need to be scheduled to maintain the plants' commitments to ALARA.

B) Engineering Evaluation/Safe Shutdown Methodology Changes.

C) Submittal of Plant Specific Exemption Request or Deviation as appropriate.

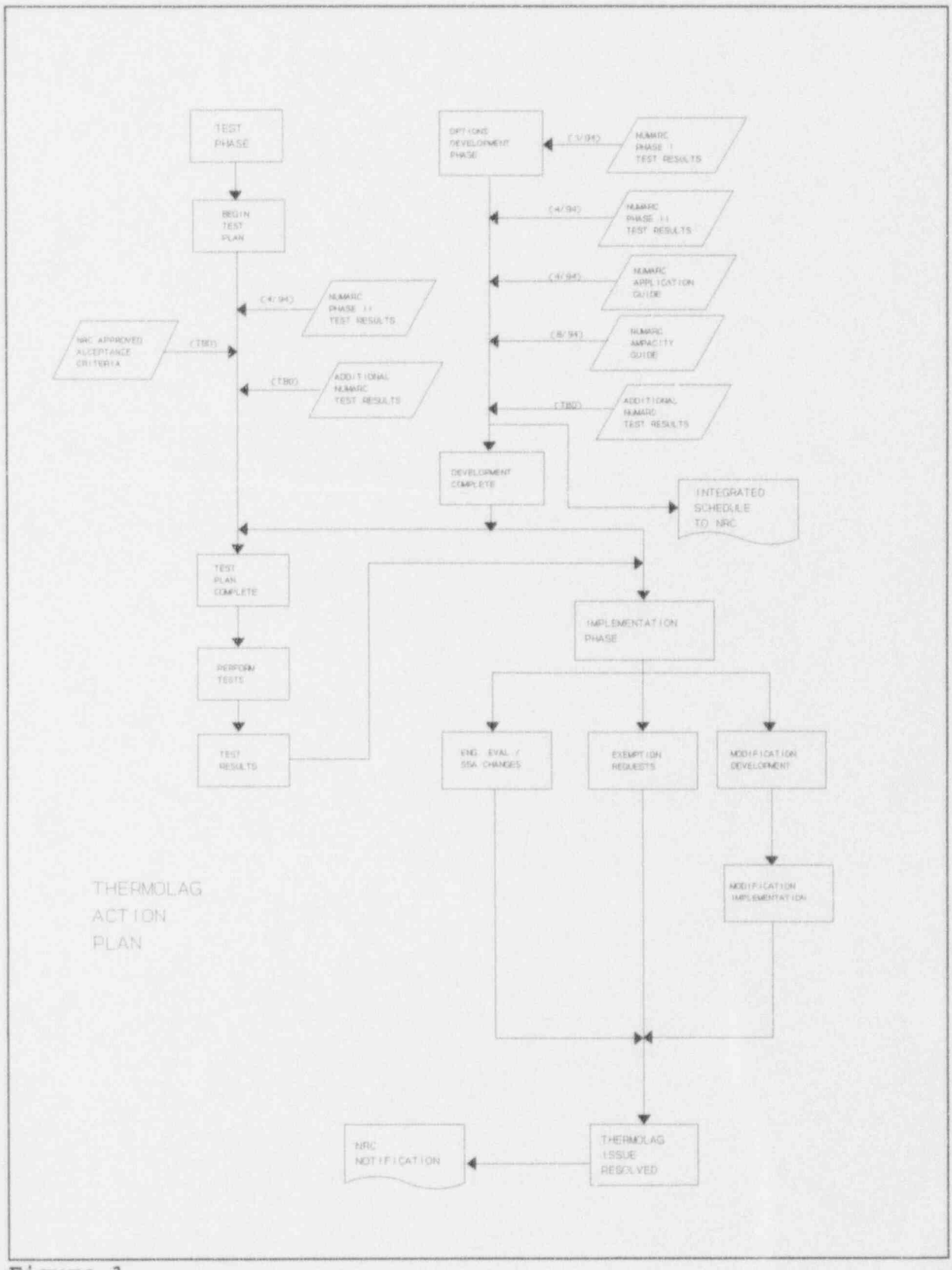
TEST PHASE
BEGIN TEST PLAN
NRC APPROVED ACCEPTANCE CRITERIA
(TBD)
(4/94)
NUMARC PHASE II TEST RESULTS
(TBD)
ADDITIONAL NUMARC TEST RESULTS
TEST PLAN COMPLETE
PERFORM TESTS
TEST RESULTS
OPTIONS DEVELOPMENT PHASE
(3/94)
NUMARC PHASE I TEST RESULTS
(4/94)
NUMARC PHASE II TEST RESULTS
(4/94)
NUMARC APPLICATION GUIDE
(8/94)
NUMARC AMPACITY GUIDE
(TBD)
ADDITIONAL NUMARC TEST RESULTS
DEVELOPMENT COMPLETE
INTEGRATED SCHEDULE TO NRC
IMPLEMENTATION PHASE
ENG. EVAL. / SSA CHANGES
EXEMPTION REQUESTS
MODIFICATION DEVELOPMENT
MODIFICATION IMPLEMENTATION
THERMOLAG ISSUE RESOLVED
NRC NOTIFICATION
THERMOLAG ACTION PLAN

Figure 1

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING UNIT 1 REACTOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
3CF1/CA	CONDUIT	5"	10		1	YES	
3CF2/CA	CONDUIT	5"	10		1	YES	
3HS1/CB	CONDUIT	1.5"	30		3	YES	
3HS2/CB	CONDUIT	2"	30		3	YES	
3HW1/CB	CONDUIT	3"	25		1	YES	
3YN1/CB	CONDUIT	1.5"	10		1	YES	
3YN2/CB	CONDUIT	1.5"	10		1	YES	
3YN3/BB	CONDUIT	1.5"	25		1	YES	
45S/BA	TRAY	3"X24"	20	SEE NOTE	1	NO	TRAYS WRAPPED TO ENCLOSE COMBUSTIBLES IN SEPARATION ZONE. TOTAL AREA OF ENCLOSURE IS 300 FT^2.
45S/CA	TRAY	4"X24"	20		1	NO	
45S/DA	TRAY	4"X24"	20		1	NO	
47R/BA	TRAY	3"X24"	20		1	NO	
47R/CA	TRAY	4"X24"	20		1	NO	
48R/CA	TRAY	4"X24"	20		1	NO	
4YF1/CB	CONDUIT	3"	20		1	YES	
4YF2/CB	CONDUIT	3"	20		1	YES	
5MT1/CA	CONDUIT	1.5"	55		1	YES	

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING UNIT 1 REACTOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
8ZR1/CB	CONDUIT	3"	38		3	YES	
AAH1/BB	CONDUIT	3"	14		3	YES	
AAI1/BB	CONDUIT	3"	12		3	YES	
ALZ1/CB	CONDUIT	3"	20		1	YES	
HDS1/BB	CONDUIT	2"	32		1	YES	
HDS1/BB	CONDUIT	2"	38		3	YES	
HDT1/BB	CONDUIT	2"	15		1	YES	
HDU1/BB	CONDUIT	2"	15		1	YES	
HFB1/BB	CONDUIT	3"	62		3	YES	
HFC1/BB	CONDUIT	3"	61		3	YES	
TRANSFER CONTACTOR ENCLOSURE	ENCLOSURE	11'X11'X 3'	N/A	341	3	NO	ENCLOSURE AREA = 341 FT^2. ENCLOSURE CONTAINS NINE ELECTRICAL BOXES.
TRANSFER CONTACTOR ENCLOSURE	ENCLOSURE	5.5'X3.5 'X2'	N/A	67	3	NO	ENCLOSURE AREA = 67 FT^2. CONTAINS BOX L6C
LAM1/CB	CONDUIT	0.75"	115		3	YES	
LBB1/CB	CONDUIT	1"	15		1	YES	
LBC1/CA	CONDUIT	3"	30		1	YES	

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING UNIT 1 REACTOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
LBC1/CA	CONDUIT	3"	92		3	YES	
LBD1/CA	CONDUIT	1"	25		1	YES	
LBF1/CB	CONDUIT	1.5"	12		1	YES	
LBF1/CB	CONDUIT	1.5"	200		3	YES	
LBG1/CB	CONDUIT	3"	30		1	YES	
LBH1/CA	CONDUIT	3"	12		1	YES	
LBI1/CB	CONDUIT	3"	30		1	YES	
LBJ1/CA	CONDUIT	3"	20		1	YES	
LBQ1/CA	CONDUIT	2"	18		3	YES	
LBR1/CA	CONDUIT	1.5"	25		3	YES	
LBS1/CA	CONDUIT	1.5"	70		3	YES	
QA6	BOX	24"X24"X 24"	N/A	27	3	NO	
QB3	BOX	24"X24"X 24"	N/A	27	3	NO	
QB4	BOX	24"X24"X 24"	N/A	27	3	NO	
QC3	BOX	24"X24"X 24"	N/A	27	3	NO	

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING UNIT 1 REACTOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
QD4	BOX	24"X20"X 24"	N/A	25	3	NO	
S1Y	BOX	6"X48"X6 "	N/A	9	3	NO	
S1Z	BOX	6"X48"X6 "	N/A	9	3	NO	
W28	BOX	30"X30" X12"	N/A	23	1	NO	
W63	BOX	18"X12"X 6"	N/A	6	1	YES	
X8U	BOX	24"X16"X 8"	N/A	10	3	NO	
XQ4	BOX	30"X30"X 12"	N/A	23	1	NO	
YAD1/CB	CONDUIT	1.5	15		1	YES	
YAD2/CB	CONDUIT	1.5	15		1	YES	
YAI1/CA	CONDUIT	1.5	20		1	YES	
YAI2/CA	CONDUIT	1.5	20		1	YES	
YAI3/CA	CONDUIT	1.5	20		1	YES	

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING UNIT 2 REACTOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
3CF1/CA	CONDUIT	5"	10		1	YES	
3CF2/C	CONDUIT	5"	10		1	YES	
3HW1/CB	CONDUIT	3	35		1	YES	
3HY2/CB	CONDUIT	1.5"	15		1	YES	
3HY3/CB	CONDUIT	1.5	15		1	YES	
3HZ1/CB	CONDUIT	1.5"	20		1	YES	
3HZ2/CB	CONDUIT	1.5"	20		1	YES	
45G/BA	TRAY	3"X24"	20	SEE NOTE	1	NO	TOTAL ENCLOSURE AREA = 300 FT^2. TRAYS WRAPPED TO ENCLOSE COMBUSTIBLES IN SEPARATION ZONE.
45G/CA	TRAY	4"X24"	20		1	NO	
45G/DA	TRAY	4"X24"	20		1	NO	
47G/BA	TRAY	3"X24"	20		1	NO	
47G/CA	TRAY	4"X24"	20		1	NO	
48G/CA	TRAY	4"X24"	20		1	NO	
5MT1/CA	CONDUIT	1.5"	55		1	YES	
ALZ1/CB	CONDUIT	3"	20		1	YES	
HDS1/BB	CONDUIT	2"	28		1	YES	
HDS1/BB	CONDUIT	2"	42		3	YES	

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING UNIT 2 REACTOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
HDT1/BB	CONDUIT	2"	15		1	YES	
HDU1/BB	CONDUIT	2"	22		1	YES	
TRANSFER CONTACTOR ENCLOSURE	ENCLOSURE	11'X11'X 3'	N/A	341	3	NO	ENCLOSURE AREA = 341 FT^2. ENCLOSURE CONTAINS NINE ELECTRICAL BOXES
TRANSFER CONTACTOR ENCLOSURE	ENCLOSURE	5.5'X3.5 'X2'	N/A	67	3	NO	ENCLOSURE AREA = 67 FT^2. CONTAINS BOX L6C.
LAM1/CB	CONDUIT	0.75"	115		3	YES	
LAM1/CB	CONDUIT	0.75"	20		1	YES	
LBB1/CB	CONDUIT	1"	15		1	YES	
LBC1/CA	CONDUIT	3"	48		1	YES	
LBC1/CA	CONDUIT	3"	102		3	YES	
LBD1/CA	CONDUIT	1"	25		1	YES	
LBF1/CB	CONDUIT	1.5"	15		1	YES	
LBF1/CB	CONDUIT	1.5"	203		3	YES	
LBG1/CB	CONDUIT	3"	30		1	YES	
LBH1/CA	CONDUIT	3"	12		1	YES	

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING UNIT 2 REACTOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
LBI1/CB	CONDUIT	3"	38		1	YES	
LBJ1/CA	CONDUIT	3"	20		1	YES	
LBQ1/CA	CONDUIT	2"	18		3	YES	
LBR1/CA	CONDUIT	1.5"	25		3	YES	
LBS1/CA	CONDUIT	1.5"	70		3	YES	
QA6	BOX	24"X24"X 24"	N/A	27	3	NO	
QB3	BOX	24"X24"X 24"	N/A	27	3	NO	
QB4	BOX	24"X24"X 24"	N/A	27	3	NO	
QC3	BOX	24"X24"X 24"	N/A	27	3	NO	
QD4	BOX	24"X20"X 24"	N/A	25	3	NO	
WL9	BOX	18"X12"X 8"	N/A	6	1	YES	
X8B	BOX	24"X16"X 8"	N/A	10	3	NO	

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING UNIT 2 REACTOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
XLO	BOX	30"X30"X 12"	N/A	23	1	NO	
XQ3	BOX	30"X30"X 12"	N/A	23	1	NO	
XQ4	BOX	30"X30"X 12"	N/A	23	1	NO	

TABLE 1
BRUNSWICK NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING DIESEL GENERATOR BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
9NI1/BA	CONDUIT	1.5"	3		3	YES	
9NQ1/BB	CONDUIT	1.5"	3		3	YES	
DJZ1/BB	CONDUIT	2"	3		3	YES	
9MH1/BA	CONDUIT	1"	SEE NOTE	SEE NOTE	3	YES	THESE ELEMENTS ARE IN THE SAME ENCLOSURE. ENCLOSURE AREA = 30 FT^2.
9MV3/BB	CONDUIT	1.5"			3	YES	
W14	BOX	12"X12"X 8"			3	YES	

BUILDING SERVICE WATER INTAKE STRUCTURE

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
MAW1/DB	CONDUIT	1"	15		1	YES	
XN3	BOX	12"X12"X 12"	N/A	5	1	YES	

TABLE 2
HARRIS NUCLEAR PLANT
THERMO-LAG 330-1 WRAP SUMMARY

BUILDING REACTOR AUXILIARY BUILDING

ELEMENT	TYPE	SIZE	APPROX LENGTH (FEET)	APPROX SQUARE FEET	RATING (HOURS)	NUMARC'S CURRENT SCOPE	NOTES
16020Q-SR2	CONDUIT	2"	6		1	YES	
16020T-SR4	CONDUIT	2"	6		1	YES	
16247A-SA	CONDUIT	2"	8		1	YES	
17144P-S2	CONDUIT	2"	6		1	YES	
17144Q-S2	CONDUIT	2"	6		1	YES	
AREA ENCLOSURE	ENCLOSURE	SEE NOTE	N/A	1770	3	NO	AREA ENCLOSURE SEPARATES CABLE SPREADING ROOM AREA INTO SEPARATE FIRE AREAS. TOTAL ENCLOSURE AREA = 1770 FT^2.
PARTIAL HEIGHT WALL	WALL	10' X 20'	N/A	200	1	NO	A PARTIAL HEIGHT 10' X 20' WALL CONSISTING OF ONE-HOUR PANELS MOUNTED ON STEEL FRAMING WAS ERECTED TO SUPPORT A DEVIATION REQUEST. TOTAL AREA = 200 FT^2