



November 4, 1994

L-94-275  
10 CFR 50.4  
10 CFR 50.54 (f)

Mr. Roy P. Zimmerman  
Associate Director for Projects  
U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D. C. 20555

RE: St. Lucie Units 1 and 2  
Docket No. 50-335 and 50-389  
Request for Additional Information  
Generic Letter 92-08 Response

Dear Mr. Zimmerman:


The additional information you requested from Florida Power and Light Company (FPL) on the St. Lucie responses to Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," is attached. The original St. Lucie response was submitted by FPL letter, L-93-96, on April 16, 1993, and supplemented in response to your request for additional information (RAI) dated December 20, 1993, by FPL letter, L-94-33 dated February 11, 1994.

Your letter to J. H. Goldberg, dated August 9, 1994, requested additional information on the configurations of Thermo-Lag fire barriers installed at St. Lucie Plant. In addition, your letter requested plans and schedules for resolving the technical issues identified in GL 92-08 for those configurations that are outside the scope of the NEI (NUMARC) test program or for those configurations that FPL deems impractical to upgrade. The information was requested to be provided within 90 days of August 9, 1994, the date of the NRC request. This letter replaces previous schedules and plans for the resolution of the Thermo-Lag fire barrier issues based on the use of the *NEI Application Guide for Evaluation of Thermo-Lag 330 Fire Barrier Systems* issued July 7, 1994, and plant specific fire barrier testing.

The attached information is provided pursuant to the requirements of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f).

Please contact us if there are any questions about this submittal.

Very truly yours,

  
D. A. Sager  
Vice President  
St. Lucie Plant

DAS/GRM

cc: Stewart D. Ebnetter, Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, St. Lucie Plant

A029  
11

080059

an FPL Group company

9411080193 941104  
PDR ADCK 05000335  
P PDR


L-94-275  
St. Lucie Units 1 and 2  
Docket No. 50-335 and 50-389

STATE OF FLORIDA     )  
                                  )  
COUNTY OF ST. LUCIE )     ss.

D. A. Sager being first duly sworn, deposes and says:

That he is Vice President, St. Lucie Plant for the Nuclear Division of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information and belief, and that he is authorized to execute the document on behalf of said Licensee.

  
\_\_\_\_\_  
D. A. Sager

STATE OF FLORIDA  
COUNTY OF ST. LUCIE

The foregoing instrument was acknowledged before me this 4<sup>th</sup> day of NOVEMBER, 19 94 by D. A. Sager, who is personally known to me and who did take an oath.

  
\_\_\_\_\_

KAREN WEST  
Name of Notary Public

My Commission expires 4-18-98

Commission No. CC359926

### ATTACHMENT

In an effort to resolve the issues raised by NRC Bulletin 92-01 and Generic Letter (GL) 92-08, and to conform to NRC policy issues addressed in SECY-94-127, FPL has revised its approach to resolve Thermo-Lag fire barrier technical issues at St. Lucie Units 1 and 2. Pursuant to NRC letter dated August 11, 1994 FPL will no longer pursue a performance based fire barrier evaluation to resolve Thermo-Lag technical issues. The new approach consists of the following;

- A. Reviewing circuits protected by Thermo-Lag to confirm that they are required for safe shutdown,
- B. Performing an assessment of fire barrier capability for protected circuits that are required for safe shutdown using the NEI application guide, and
- C. Assessing the protective features for each fire area to determine compliance with Appendix R of 10 CFR 50.

For any identified deficiencies, FPL will pursue the various options which include:

- 1) Re-evaluating existing licensing commitments that may exceed regulatory requirements,
- 2) Re-evaluating circuits and components protected by fire barriers to verify if they are needed for safe shutdown and Regulatory Guide 1.75,
- 3) Rerouting circuits or relocating components to eliminate the need for fire barriers,
- 4) Upgrading existing fire barriers or suppression systems,
- 5) Replacing existing fire barriers with qualified fire barriers, and,
- 6) Preparing exemptions for fire barrier configurations that use traditional methods as the basis.

Based on assessment of current and anticipated future initiatives and the NRC policy issues addressed in SECY-94-127, the approach provided above is a sound basis for resolving the issues associated with NRC Bulletin 92-01 and Generic Letter 92-08. The approach outlined above is an amendment to the FPL response (L-94-33 dated February 11, 1994) to the NRC's Request for Additional Information (RAI) dated December 20, 1993.

Using the above options, FPL anticipates that there will be changes in the quantity and specific uses of fire barrier materials at St. Lucie Plant. These changes will be documented via future FPL correspondence to the NRC which will specifically address RAI items I.B.1 and I.B.2, and other items as appropriate.

L-94-275  
St. Lucie Units 1 and 2  
Docket No. 50-335 and 50-389

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.

FPL Response (II.B.1.)

As reported in FPL's response to NRC's RAI dated December 20, 1993, an effort was undertaken to review plant records and obtain information to verify the performance parameters contained in the NEI application guide. The review included an examination of plant documents such as vendor installation instructions, engineering drawings, quality control reports and plant change modification packages. These records show that Thermo-Lag was installed consistent with the requirements of Appendix B to 10 CFR 50, however, they do not contain sufficient detail to verify certain performance parameters (e.g., pre-buttering) as delineated in the NEI application guide for each Thermo-Lag barrier protecting conduits, conduit supports and pull/junction boxes at St. Lucie Plant. Each of these Thermo-Lag installations would require disassembly to obtain and verify these parameters, which in most cases would result in destruction of the barrier. Therefore, an alternate approach involving destructive examination of a representative sample of Thermo-Lag installations is being utilized. (See response to II.B.2)

Thermo-Lag 330-1 material is used in walls, floors, ceilings and radiant heat shields in certain applications to provide fire protection. These wall-type configurations are currently not included in the NEI (formerly NUMARC) testing program. However, performance parameters have been obtained as part of FPL sponsored testing for wall-type configurations. (See response to III.B.2)

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.

FPL Response (II.B.2.)

Destructive examination has been performed of a representative sample of Thermo-Lag installations for conduits and box type configurations including pull, junction and conduit support. The results of these examinations are being used to verify certain performance parameters that are not verifiable using plant records. In conjunction with the NEI testing, the results from destructive examination will be used to determine the fire rating for each of these installations. The results of the examinations are summarized below:

<b>UNIT 1: Cylindrical Type Configurations for Straight Conduit</b>					
No. Inspected	Pre-Buttered	Joint Gap	Thickness	Band/Wire <sup>1</sup>	Skin <sup>2</sup>
5	All Joints	<< .25"	> 1.25"	SS < 8.5"	In / Out

<b>UNIT 1: Box Type Configurations for Elect. Boxes &amp; Conduit Angles/Supports</b>					
No. Inspected	Pre-Buttered	Joint Gap	Thickness	Band/Wire	Skin
5	All Joints	<< .25"	> 1.25"	SS < 7.5"	In / Out

<b>UNIT 2: Cylindrical Type Barriers for Straight Conduit</b>					
No. Inspected	Pre-Buttered	Joint Gap	Thickness	Band/Wire	Skin
5	5	<< .25"	> .625"	SS < 10"	In (2)

<b>UNIT 2: Box Type Barriers for Elect. Boxes &amp; Conduit Angles/Supports</b>					
No. Inspected	Pre-Buttered <sup>3</sup>	Joint Gap	Thickness	Band/Wire	Skin
2	2	<< .25"	> .625"	SS < 6"	In
6	0	Not Buttered	> .625"	Not Used	In (2)

The destructive examination results demonstrate that the Thermo-Lag was properly installed for Unit 1 and Unit 2 conduits, and Unit 1 box type configurations. The results from Unit 2 show some of the box type configurations were not installed to minimum standards and consequently are not considered qualified installations. (e.g., Some contained nails and others lacked pre-buttering of panels). Options for upgrade and/or replacement of the fire barrier material for Unit 2 box type configurations are currently being explored. After upgrade/replacement, the barriers are expected to be within the scope of the NEI testing program.

- <sup>1</sup> "Band/Wire" indicates space between fasteners
- <sup>2</sup> "Skin" indicates location of the Stress Skin
- <sup>3</sup> Cylindrical sections abutting box type enclosures were not always pre-buttered.

L-94-275

St. Lucie Units 1 and 2

Docket No. 50-335 and 50-389

Plant records indicate that Thermo-Lag was initially installed at St. Lucie Plant on Unit 2 prior to initial start-up in the spring of 1983. During the summer of 1984, prior to the initial installation of Thermo-Lag on Unit 1, plant records show that changes were implemented to the methods for installation. These changes were brought about by the following:

- 1) Thermal Science, Inc (TSI) provided a revision to the installation instructions for Thermo-Lag which contained more detail on installation.<sup>4</sup>
- 2) FPL Engineering identified various deficiencies during a walkdown of Thermo-Lag conduit and wall installations and provided an action plan to improve the quality of installations.<sup>5</sup>
- 3) Craft personnel installing Thermo-Lag received four days of formal training from TSI representatives.<sup>6</sup>

These actions incorporated the lessons learned and experience gained from the initial Unit 2 installation which resulted in improved methods for installing Thermo-Lag on Unit 1 and all subsequent installations on Unit 2.

#### 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.

#### FPL Response (II.B.3.)

See response to II.B.2

#### 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.

---

<sup>4</sup> Letter # P-M-SL-84-2259, Ebasco to Mr. C.S. Kent, June 11, 1984

<sup>5</sup> FPL Telephone Conference Memorandum, Mr. C. L. Fisher to Mr. J. Antiguano, June 21, 1984

<sup>6</sup> TSI Training Certification Lists, June 22, 1984, and July 23, 1984.

FPL Response (III.B.1.)

Thermo-Lag 330-1 material is used in walls, floors, ceilings and radiant heat shields in certain applications to provide fire protection. These wall-type configurations are currently not included in the NEI (formerly NUMARC) testing program. Estimates of the amount of Thermo-Lag in these configurations are tabulated in the response to I.B.2 contained in FPL letter L-94-33 dated February 11, 1994.

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 the tests being considered to resolve the fire barrier issues identified in GL 92-08 and to demonstrate the adequacy of existing in-plant barriers.

FPL Response (III.B.2.)

During review of Thermo-Lag applications at St. Lucie Plant, wall-type configurations (i.e., walls, floors, ceilings and radiant heat shields) were determined to be outside of the NEI testing envelope. FPL conducted its own wall testing for wall configurations not covered by the NEI application guide. For the test a wall specimen was constructed using conservative design data from St. Lucie Plant applications and other non-FPL applications of similar design. The test specimen was constructed with the intent of bounding the wall-type configurations at St. Lucie Plant.

On September 14, 1994, a fire endurance test of a wall specimen constructed using two 1/2 inch thick boards was conducted for one hour followed by a hose stream test. The average thermocouple reading on the cold side of the test specimen panel was 180°F which is 102°F above the starting temperature and within the 250°F temperature rise limit. The hose stream test was completed satisfactorily using 30 psi water pressure and a 2.5" diameter standard play pipe with a 1.125" tip placed 20 ft from the test specimen.

Following the test a destructive examination was conducted on the wall specimen. The 1/2" board on the cold side showed no damage. A consistent 3/16" thickness of material on the exposed board was not affected by charring. The board on the exposed side was intact and there was no apparent degradation of board material behind the structural steel framing. Trowel grade material used on the structural steel was depleted to approximately the same degree as the boards.

The complete test results, which are currently being analyzed, are expected to be used in engineering evaluations to determine the fire rating of each wall-type configuration. Note that although not anticipated these evaluations may identify the need for further testing.

L-94-275  
St. Lucie Units 1 and 2  
Docket No. 50-335 and 50-389

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.

FPL Response (III.B.3.)

The test specimen used was a wall-type configuration of Thermo-Lag material that is representative of the walls, floors, ceilings and radiant heat shields at St. Lucie Plant. The test methodology and acceptance criteria were in accordance with ASTM E-119-88. Cable functionality was not applicable to this test.

The test specimen frame consists of a 10' by 10' assembly designed to hold Thermo-Lag panels. Each panel consists of two one-hour rated boards with a minimum thickness of 1/2 inch, placed back to back with the stress skin out, and bolted to 3"x 3"x 3/8" angles that make up the structural steel framing (see Figure 1). A 1/2" gap was installed along the edge of one panel, and a 1/4" gap was installed along another panel, to emulate a worst case field installation. At the conclusion of the testing a report will be issued and available at FPL engineering offices for review.

FPL is also following manufacturer's qualification tests of new products (i.e., Darmatt & Thermo-Lag 330-770-1) which may be used in lieu of existing Thermo-Lag 330-1 or in addition to existing fire barrier applications.

NRC REQUEST (V.B.)

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.



L-94-275  
St. Lucie Units 1 and 2  
Docket No. 50-335 and 50-389

FPL Response (V.B.)

The following alternatives are being explored by FPL for the protected components listed:

**Conduits and boxes:**

- 1) Upgrading/replacement of barrier material with other types of fire barrier material such as imbedded concrete.
- 2) Adding or upgrading suppression.
- 3) Rerouting or relocating circuits to eliminate the need for barriers, and,
- 4) Simple modifications to safe shutdown and/or Reg Guide 1.75 equipment to eliminate the need for barriers.

**Walls, floors, ceilings and radiant heat shields:**

- 1) Use the results of testing to qualify wall-type configurations.
- 2) Replacing Thermo-Lag walls with concrete block materials.

NRC REQUEST (VI.B.)

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 barrier outside the scope of the NUMARC program.

FPL Response (VI.B.)

The schedules in this letter supersede and replace the schedules and activities provided in FPL letters L-93-96 dated April 16, 1993, L-94-33 dated February 11, 1994 and L-94-104 dated April 29, 1994. The new FPL activities and their approximate schedules are listed below:

- #1 Analysis is being performed to identify those applications of Thermo-Lag that are required to satisfy NRC fire protection rules and Regulatory Guide 1.75. These efforts are expected to be completed by April 28, 1995.

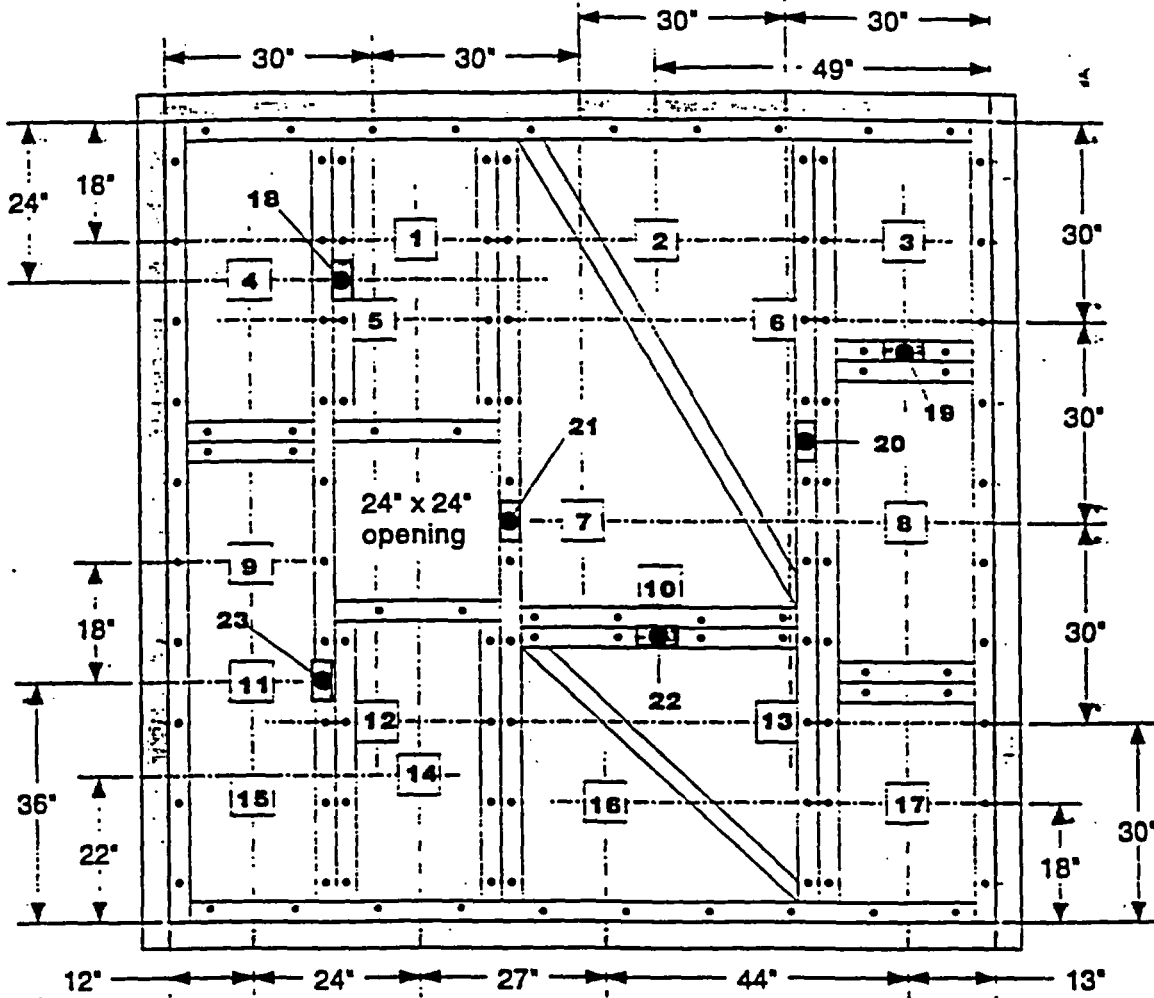
L-94-275

St. Lucie Units 1 and 2

Docket No. 50-335 and 50-389

- #2 Analysis is being performed to verify barrier parameters and rate fire barriers for required Thermo-Lag applications. These efforts are expected to be completed by April 28, 1995.
- #3 Analysis is being performed for the one hour test of wall-type configurations. These efforts are expected to be completed by January 27, 1995.
- #4 Evaluations and/or exemptions are expected to be prepared to support revision to the Safe Shutdown Analysis in accordance with either 10 CFR 50.59, or with 10 CFR 50.12, as appropriate, based on the results of activities #1 & #2 and #3. These efforts are expected to begin in the second quarter of 1995 and be completed by October 27, 1995.
- #5 An updated response to RAI questions I.B.1 and I.B.2 will be provided by January 26, 1996.
- #6 Plant change modification packages are expected to be prepared based on the results of activity #4. These efforts are expected to begin during the third quarter of 1995 and be completed to support the 1996 refueling outage for Unit 1 and the 1997 refueling outage for Unit 2.
- #7 Plant change modification packages are expected to be implemented based on the results of activity #6. Implementation is expected no later than the Spring 1996 refueling outage for Unit 1 and no later than the Spring 1997 refueling outage for Unit 2.

### THERMO-LAG TEST SPECIMEN



**ELEVATION VIEW  
 FROM UNEXPOSED SIDE**

**NOTE:**  
 Thermocouple Nos. 1 through 17 were placed directly on the unexposed surface of the Thermo-Lag and covered with the 6" x 6" felted mineral fiber pads specified by the E119 standard. Thermocouple Nos. 18 through 23 were placed on the Thermo-Lag covering the steel angle and covered with mineral pads cut to 6" x 2-1/2", and are considered "engineering," or information-only thermocouples. These will not be used in assessing performance, but are for engineering purposes only.

OMEGA POINT LABORATORIES, INC. Project No. 14980-97261	
Florida Power & Light	
Fig. 8 Thermocouple Placements	
Drwn by: D.N. Priest	Date: 8/2/94
App'd by:	Date:
Vectra	
Approval:	Date:

Scale: 1/2"=1'

**FIGURE 1**