



FPL

December 19, 2006

L-2006-272
10 CFR 50.4

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Supplemental Response to Generic Letter 2006-03
(TAC No. MD1626)

FPL provided the St. Lucie responses to Generic Letter 2006-03, "Potentially Nonconforming Hemyc and MT Fire Barrier Configurations" in letter L-2006-118 dated June 9, 2006 and supplemented by FPL letter L-2006-216 dated September 20, 2006.

On October 19, 2006 the NRC staff questioned differences between the licensing basis quoted in the FPL St. Lucie response to Generic Letter 2006-03 and statements in the Updated Final Safety Analysis Report regarding the design basis of the flame impingement shield material.

This letter provides the St. Lucie updated/revised response to Generic Letter 2006-03 which addresses the NRC staff questions received during the telecon with FPL staff members on October 19, 2006. Please contact Ken Frehafer at (772) 467-7748 if there are any questions regarding this submittal.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 19th day of December 2006.

Sincerely yours,

Gordon L. Johnston
Vice President
St. Lucie Plant

Attachment

Background

St. Lucie Fire Rated Assemblies – Barriers

As stated in Section 3.11 of the St. Lucie Unit 2 UFSAR:

“...St. Lucie Unit 2 provides separation for redundant essential components to ensure that safe shutdown capability is not impaired in the event of a single fire. The type of separation provided varies from area to area. The following are some of the methods utilized to meet the separation criteria:

- Fire Barriers (Walls, Floors and Ceilings)
- Conduit Fire Wrap
- Radiant Energy Shields
- Flame Impingement Shields

...”

Flame Impingement Shields are provided in Unit 2 Containment below the lowest tray in each stack of cable trays containing redundant safe shutdown cables when 20 foot horizontal separation is not met.

Statements pertaining to the flame impingement shields are included in the Unit 2 UFSAR, Section 3.11.2 identifies that the flame impingement shield must have a ½ hour fire rating, while section 3.11.3 identifies that the flame impingement shield is described in the Unit 2 UFSAR, Section 3.11.3 consists of 1 ½” insulating blanket and has been subjected to fire tests in accordance with ASTM E-119 fire exposure and ANI/MAERP Bulletin No. 5 (79) and achieved a fire resistance of 1-hour.

FPL Letter L-83-231, stated FPL’s position concerning the use of flame impingent shields inside containment for protection of cable trays. The letter states, “...The 1 ½” insulating blanket as manufactured by B&B Insulation, Inc. has been subjected to fire tests in accordance with ASTM E-119-80 and ANI/MAERP Bulletin No. 5 (79) and achieved a fire resistance of 1 hour. ...This exceeds the ½ hour rating required of radiant energy shields by NUREG 0800. ...The blankets will be employed in a 3’ width which is sufficient to cover the entire tray bottom (2’ width) with 6 inches on each side of the tray and will be strapped on such that it will remain in place after a DBE. ”

However, the flame impingement shields inside containment were confirmed by the NRC in a letter dated March, 27, 1984 to be constructed of 1-1/2 inch insulating blanket and that the blanket had been tested in accordance with ASTM E-119 and achieved a fire resistance of 1-hour when installed in a cocoon configuration.

IN 2005-07 provides test results for recent testing of Hemyc blanket material which was performed on both 12” and 36” cable trays, as well as other commodities. The test results cannot be directly compared or extrapolated for the configuration installed at St. Lucie Unit 2 due to differences in tray sizes (St. Lucie Unit 2 installations would have

been a minimum of 24" wide based on documentation), and the flame impingement shields are not installed in a cocoon configuration.

Therefore, based on a comparison of FPL correspondence, NRC correspondence, the test documentation described in IN 2005-07 and the installed configuration of the Hemyc in the containment of St. Lucie Unit 2, the configuration is outside of the original licensing basis commitment to provide a ½ hour fire rated barrier.

Non-Structural Barriers Including Flame Impingement Shields

Flame Impingement Shields are provided in Unit 2 Containment below the lowest tray in each stack of cable trays containing redundant safe shutdown cables when 20 foot horizontal separation is not met. Hemyc is a noncombustible, flexible, blanket like material credited inside containment as flame impingement shields. Specifically, Hemyc wrap is installed in widths sufficient to cover the entire cable tray bottom with a 6" overlap on each tray side rail of the lowest elevation tray in each stack. The wrap material is secured in place with ½" wide x 0.02" thick stainless steel banding to address seismic interaction concerns.

Hemyc wrap consists of a 1-½" thick layer of alumina-silica refractory material encased within a layer of silica dioxide fabric.

Cable trays inside the Unit 2 Containment are provided with solid bottoms that reduce the potential damage from a fire not located in the immediate vicinity of the tray. The design function of the Hemyc wrap is to provide thermal protection to the bottom surfaces of the cable trays at the lowest elevation, such that if a fire were to occur beneath the trays, they would be shielded from the initial radiant energy of flames and plume effects. Due to the large volume and high ceiling of the containment structure, a (credible) postulated fire will not produce a descending hot gas layer, and heat from such a fire would rapidly dissipate into the upper areas of containment.

In the installed configuration (as shown on plant drawing 2998-B-271, Sheet 4-7. Rev. 0) the Hemyc wrap material does not function as structural (i.e., wall) fire barriers or as electrical raceway fire barrier system (ERFBS) for which fire resistance ratings are determined via standard test methods, such as ASTM E-119 / NFPA 251 for nonbearing wall assemblies, or GL 86-10, Supplement 1 for ERFBS. As stated above, the Hemyc wrap material is provided to mitigate the [initial] radiative effects of a fire. It is not relied upon to ensure that protected cables remain "free of fire damage" for a specific "rated" duration as determined by exposure to standard fire tests (ASTM E-119) conditions. On this basis, a fire resistance rating can only be determined for Hemyc wrap *materials* when they are configured into applications (wall or ERFBS) to which standard test methods are intended to apply.

Based on the preceding, the following responses are provided as the St. Lucie-specific responses to GL 2006-03 requested information.

Revised response to Generic Letter 2006-03: Potentially Nonconforming Hemyc and MT Fire Barrier Configurations

1. **Within 60 days of the date of this GL, provide the following:**
 - a. **A statement on whether Hemyc or MT fire barrier material is used at their NPPs and whether it is relied upon for separation and/or safe shutdown purposes in accordance with the licensing basis, including whether Hemyc or MT is credited in other analyses (e.g., exemptions, license amendments, GL 86-10 analyses).**

FPL response:

St. Lucie uses Hemyc for raceway protection inside St. Lucie Unit 2 Containment. The Hemyc fire barrier material is employed as a Flame Impingement Shield to satisfy license basis requirements for separation of safe shutdown cables in the event of fire.

Neither Hemyc nor MT fire barrier material is relied upon for separation and/or safe shutdown purposes nor credited in any analyses for St. Lucie Unit 1.

Hemyc was originally installed ^{on St. Lucie Unit 2} as an alternative method to satisfy 10CFR50, Appendix R, Section III.G.2 (d), (e), and (f) requirements.

As documented in Section 9.5.1.6.C.6 of NUREG 0843, "Safety Evaluation Report related to the operation of St. Lucie Plant, Unit 2, docket No. 50-289," Supplement No. 3, dated April 1983, a deviation request was submitted from providing 20' separation, installing radiant energy shields, or automatic suppression. As an alternate, FPL proposed installing noncombustible radiant energy shields [flame impingement shields] beneath the lowest redundant Division A and Division B cable trays at each elevation.

NRC Letter dated March 27, 1984, states that the FPL's installation of noncombustible radiant energy shields [flame impingement shields] beneath certain cable trays inside containment was acceptable.

NRC Generic Letter (GL) 86-10 indicates that the staff has accepted radiant energy shield installations where:

- "...an applicant can justify that a proposed radiant energy shield can achieve an equivalent level of safety, we have been accepting shields that have not been tested against the acceptance criteria of ASTM E-119...."

- "...we have accepted non-fire-rated radiant energy shields that have been demonstrated by fire hazards analysis to provide an acceptable level of protection against the anticipated hazard of a localized fire within the containment..."

For the St. Lucie Unit 2 Containment the NRC accepted the following variation, as described on page 9-12 of NUREG 0843, Supplement No. 3:

"By letter dated October 28, 1982 the licensee committed to install noncombustible radiant energy shields beneath the lowest redundant Division A and Division B cable trays at each elevation and to enclose all safe shutdown cable installed in conduit that are not separated from the redundant cable trays by 20 ft, in a 1-hour fire-rated barrier.

Due to the restricted access to this area, an exposure fire from the accumulation of transient combustibles which could cause damage to redundant cables is unlikely. The noncombustible radiant energy shields installed beneath the lowest cable tray of each redundant division will divert the hot gas plume from the cable and the high ceiling will prevent stratification of hot gases. Therefore, there is reasonable assurance that one train of safe shutdown systems will be free from fire damage."

Based on the justifications provided, it is concluded that the flame impingement shields are not intended to ensure that protected cables remain free of fire damage for a specific rated duration, nor are they intended to limit the transfer of heat to the unexposed side to a predetermined level, but rather, are intended to deflect heat away from the protected cables so that it will dissipate into the voluminous containment atmosphere.

- b. A description of the controls that were used to ensure that other fire barrier types relied on for separation of redundant trains located in a single fire area are capable of providing the necessary level of protection. Addressees may reference their responses to GL 92-08 to the extent that the responses address this specific Issue.**

FPL response:

Electrical Raceway Fire Barrier Systems (ERFBS)

Design requirements for Thermo-Lag installations are established and maintained via Specification MN-3.21. The design configurations are qualified by direct testing, by Fire Protection Evaluation Records (FPERs) which document fire resistance equivalency pursuant to GL 86-10 guidance or by a combination of these. Materials used in Thermo-Lag

applications are Quality Related and procured to ensure that critical properties and characteristics of the procured material are within acceptance limits.

Radiant Energy Shields (RES)

Design requirements for the material and configurations used as radiant energy shield installations (stainless steel or Mecatiss) in containment are established and provided with engineering justification and evaluation in licensing correspondence, plant change modifications, FPERs or by a combination of these. The design configurations are qualified by direct testing or by evaluations which document fire resistance equivalency pursuant to GL 86-10 guidance. Because these are applications not utilized outside of containment, their configuration is considered more specific and as such, there are no general plant specifications to control their design configurations.

Materials used in flame impingement shields and radiant energy barrier applications are Quality Related and procured to ensure that critical properties and characteristics of the procured material are within acceptance limits.

Administrative Controls

Administrative controls including operability requirements, actions and inspection frequencies for the plant fire protection program are provided in St. Lucie Administrative Procedure AP1800022, *Fire Protection Plan*. This procedure describes Fixed Fire Protection Features – Controls and Compensatory Measures including Fire Barriers and Penetration Seals. Included in this procedure is the following statement: “Fire barrier descriptions and design basis information is included in UFSAR Appendix 9.5A, Section 3.11 for each unit.” AP1800022 further notes that fire barriers are a passive element in the facility fire protection program and are subject to periodic inspection. Specific fire barrier surveillance requirements and frequencies are provided in the implementing procedure for inspection of raceway protection installations - Fire Protection Surveillance procedure FPSP-15.01, *Fire Barrier Inspection*. The implementing procedure for inspection of raceway protection installations prescribes acceptance criteria and immediate compensatory actions if acceptance criteria are not met. Impairments and deviations are entered into and addressed through the station Corrective Action Program.

These controls assure that fire barrier installations relied on for separation of redundant trains at St. Lucie are capable of providing the necessary level of protection.

2. **Within 60 days of the date of this GL, for those addressees that have installed Hemyc or MT fire barrier materials, discuss the following:**
- a. **The extent of the installation (e.g. linear feet of wrap, areas installed, systems protected).**

FPL response:

The following describes the extent of material installation associated with this evaluation:

Linear feet of wrap:

Plant drawings 2298-G-365 and 2298-G-375 depict Hemyc coverage requirements as a Flame Impingement Shield (FIS). The total length of tray requiring FIS is approximately 110 feet. Drawing 2298-G-271, Sheet 4-7 depicts the installation of Hemyc on the cable trays. Additionally, FPL letter L-83-231, dated April 14, 1983 describes the material as follows:

The 1 1/2" insulating blanket as manufactured by B&B Insulation, Inc...
...The blankets will be employed in a 3' width which is sufficient to cover the entire tray bottom (2' width) with 6 inches on each side of the tray and will be strapped on such that it will remain in place after a Design Basis Event (DBE).

Areas installed:

Hemyc horizontal flame impingement shields are installed below the lowest tray in each stack of cable trays that contain redundant safe shutdown cables when 20 foot separation is not met on the 23' elevation of the Unit 2 Containment Building.

Systems protected:

Hemyc flame impingement shields are installed on cable trays L2211 (NA), L2212 (NB), and L2214 (SB). The following systems are protected by the presence of the flame impingement shields based on a review of the Essential Cables in the Safe Shutdown Analysis.

CVCS Chemical Volume Control System
HLP High Low Pressure Interface
HSP Hot Shutdown Panel
INST Instrumentation
MS Main Steam

SI Shutdown Cooling/Safety Injection
RCS Reactor Coolant System

- b. **Whether the Hemyc and/or MT installed in their plants is conforming with their licensing basis in light of recent findings, and if these findings do not apply, why not.**

FPL response:

The Hemyc Flame Impingement Shields installed at St. Lucie Unit 2 are not in conformance with the licensing basis.

Based on Appendix R guidelines describing separation of cables and equipment and associated non-safety circuits of redundant trains by a noncombustible radiant energy shield, FPL committed in Letter L-82-467, dated October 28, 1982 to install noncombustible radiant energy shields beneath the lowest redundant Division A and Division B cable trays at each elevation.

The application of the Hemyc material as an FIS and supporting fire test documentation supporting the application/configuration were documented in detail in FPL Letter L-83-231 to NRC dated April 14, 1983. This configuration was acknowledged and accepted by the NRC in NUREG 0843, Supplement 3 and in NRC Letter dated March 27, 1984.

The St. Lucie Unit 2 UFSAR related to fire rated barriers inside containment reads: "...All redundant cable trays containing safe shutdown cables are protected by horizontal flame impingement shields located below the lowest tray in each stack, when 20 foot separation is not met. These flame impingement shields consist of 1 ½" insulating blanket and have been subjected to fire tests in accordance with ASTM E-119 fire exposure and ANI/MAERP Bulletin No. 5 (79) and achieved a fire resistance of 1-hour or Mecatiss material, also tested per ASTM E-119. The blankets are employed in a width sufficient to cover the entire tray bottom (2' width) with a 6" overlap on each side of the tray and are strapped as such that it will remain in place after a DBE. ..." The St. Lucie Unit 2 FSAR as it pertains to the FIS installed using Hemyc materials correctly cites those passages used to communicate the configuration to the NRC in FPL Letter L-83-231, dated April 14, 1983.

FPL design drawing 2998-B-271, Sheet 4-7 depicts the same Hemyc configuration as described in the above mentioned licensing correspondence.

NRC Letter dated March 27, 1984 indicates that the NRC staff acknowledged FPL's commitment to install noncombustible radiant energy shields [flame impingement shields] beneath certain cable trays inside containment and the staff concluded that the installation of the 1 ½ inch insulating blanket for protection of the cable trays was acceptable based on the blanket being tested in accordance with ASTM E-119 and achieving a fire rating of one-hour when installed in a cocoon configuration. The NRC letter does not include any discussion of or acceptance of the configuration to be installed as described by FPL.

Based on the statements in NUREG 0843 and letter dated March 27, 1984 the utility was committed to providing noncombustible radiant energy shields [flame impingement shields] beneath certain cable trays in containment.

Therefore, based on a comparison of the NUREG 0843 Supplement 3, NRC letter dated March 27, 1984, the test documentation described in IN 2005-07 and the installed configuration of the Hemyc in the containment of St. Lucie Unit 2, the configuration as installed in St. Lucie Unit 2 is outside of the original licensing basis commitment to provide a ½ hour fire rated barrier.

- c. The compensatory measures that have been implemented to provide protection and maintain the safe shutdown function of affected areas of the plant in light of the recent findings associated with Hemyc and MT installations, including evaluations to support the addressees' conclusions.**

FPL response:

Further compensatory measures have not been implemented as a result of this configuration. The trays which are currently provided with protection on three sides (bottom and side rails) are solid bottom construction and in accordance with the plant installation drawings are also provided with covers over the trays on sections provided with Hemyc.

A similar configuration exists in St. Lucie Unit 1 containment with respect to a lack of separation for which there were no flame impingement or radiant energy shields provided. The fire hazard conditions are the same as those which were previously evaluated for St. Lucie Unit 1 Containment Exemption K1 which was approved in NRC letter dated December 24, 2003, *St. Lucie Plant, Unit No. 1 – Exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2 (TAC No. MB0300)*. The affected trays in each unit are similar in elevation and physical location within the annulus in each of the containments. Fire hazards within

vicinity adjacent to and below the trays are the same. St. Lucie Unit 1 was granted an exemption from providing any additional protection to the trays in question in NRC letter dated December 24, 2003 based on numerous factors including but not limited to:

- Redundant trays are at least 7 feet apart with no intervening combustibles
- Electrical cabinets near the redundant trains are enclosed with no ventilation openings
- Cables crossing redundant trays are in conduit and protected
- The bottom tray in each stack of cable trays is fully enclosed by a noncombustible cover
- Vertical tray covers have noncombustible covers
- Existing cables are covered with fire retardant coating
- New cables added will be IEEE 383 qualified and limited in number by the fire analysis.

The location of the affected trays in both St. Lucie Unit 1 and St. Lucie Unit 2 containments are very similar and subject to the same fire exposures. Based upon the analysis for corresponding St. Lucie Unit 1 cable trays, 7 feet of separation without a radiant energy shield installed was determined to be adequate. The St. Lucie Unit 2 configuration is less susceptible to fire than St. Lucie Unit 1 because the St. Lucie Unit 1 analysis was based upon non-IEEE-383 cable whereas Unit 2 has all IEEE-383 cables installed.

The affected trays in Unit 1 have been exempted from the provision for providing protection due to lack of 20' separation. Similarly, the affected trays in Unit 2 are exposed to the same fire threats and do not require further compensatory actions as they are not at risk of suffering damage from fire exposure based on the following factors:

- Trays are solid bottom.
- Hemyc blanket material is installed on the lowest tray in stacks of trays which are separated by no less than 7 feet horizontally and which contain redundant safe shutdown cables.
- Installation drawings indicate that all trays protected with Hemyc in St. Lucie Unit 2 are provided with cable tray covers.
- Lack of credible fire scenarios from beneath the trays.
- Early warning smoke detection is installed.
- Restricted access to area results in transient exposure fire to trays is unlikely.
- Hemyc material as installed will divert hot gas plume.
- High ceiling of containment will prevent stratification of hot gasses in the area of the affected cable trays.

- d. A description of, and implementation schedules for, corrective actions, including a description of any licensing actions or exemption requests needed to support changes to the plant licensing basis.**

FPL response:

The above information shows that the installation of Hemyc at St. Lucie Unit 2 is outside the original licensing basis therefore, corrective actions are required. FPL will examine any required corrective actions associated with the Hemyc installation in the St. Lucie Unit 2 containment as part of the St. Lucie transition to NFPA 805.

- 3. No later than December 1, 2007, addressees that identified in 1.a. Hemyc and/or MT configuration are requested to provide a description of actions taken to resolve the nonconforming conditions described in 2.d.**

FPL response:

Corrective actions identified in 2.d. above will be resolved as part of the St. Lucie transition to NFPA 805. The St. Lucie site has submitted its intent to transition to NFPA 805 as documented in FPL Letter 2005-262 dated December 22, 2005.