



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8931**

**SEPTEMBER 9, 2002**

EA-00-022  
EA-01-310

Carolina Power & Light Company  
ATTN: Mr. James Scarola  
Vice President - Harris Plant  
Shearon Harris Nuclear Power Plant  
P. O. Box 165, Mail Code: Zone 1  
New Hill, NC 27562-0165

**SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT - NRC SUPPLEMENTAL  
INSPECTION REPORT 50-400/02-08**

Dear Mr. Scarola:

On May 31, 2002, the Nuclear Regulatory Commission (NRC) completed the onsite portion of a supplemental inspection at your Shearon Harris Nuclear Power Plant. A preliminary exit was held with you and other members of your staff on May 31, 2002, to discuss the results of that effort. Following completion of additional review in the Region II office, a final exit was held with Mr. J. Caves on September 6, 2002. The enclosed report documents our findings from this inspection.

This supplemental inspection was an examination of your problem identification, root cause evaluation, extent of condition determination, and corrective actions associated with a White finding identified in the mitigating systems cornerstone. The White finding involved a violation of your fire protection program resulting from a Thermo-Lag fire barrier assembly (wall) which had an indeterminate fire resistance rating.

Based on the results of this inspection, the NRC determined that portions of your actions to resolve this issue were appropriate. However, the NRC noted that your planned corrective actions included the use of local manual actions as opposed to one of the protection methods identified in NRC Position C.5.b.(2) of Branch Technical Position (BTP) CMEB 9.5-1. Therefore, the White finding will remain open pending further NRC review of your planned corrective actions and the development of internal NRC inspection guidance in this area.

For administrative purposes, the White finding and a Severity Level III violation associated with the Thermo-Lag fire barrier assembly between the B train switchgear room/auxiliary control panel room and the A train cable spreading room which were previously identified in NRC's letter dated April 16, 2002, are included in the enclosed report.

No findings of significance were identified during the inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Charles R. Ogle, Chief  
Engineering Branch 1  
Division of Reactor Safety

Docket No.: 50-400  
License No.: NPF-63

Enclosure: NRC Inspection Report No. 50-400/02-08  
w/Attachment

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No: 50-400

License No: NPF-63

Report No: 50-400/2002-08

Licensee: Carolina Power & Light (CP&L)

Facility: Shearon Harris Nuclear Power Plant, Unit 1

Location: 5413 Shearon Harris Road  
New Hill, NC 27562

Dates: May 29 - September 6, 2002

Inspector: J. Lenahan, Senior Reactor Inspector

Approved By: Charles R. Ogle, Chief  
Engineering Branch 1  
Division of Reactor Safety

Enclosure

## SUMMARY OF FINDINGS

IR 05000400-02-08; Carolina Power and Light Company; on 5/29 - 9/6/02; Shearon Harris Nuclear Plant, Unit 1; Supplemental inspection of Thermo-Lag fire barrier with indeterminate fire resistance rating.

This inspection was conducted by a regional inspector. A White finding, which was previously dispositioned in an NRC letter dated April 16, 2002, is identified in this report for administrative purposes. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be "Green" or be assigned a severity level after management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July, 2000.

### **Cornerstone: Mitigating Systems**

The NRC performed this supplemental inspection to assess the licensee's corrective actions associated with the Thermo-Lag fire barrier separating Train A and Train B safety related cables in the Auxiliary Control Panel (ACP) room. The Thermo-Lag barrier provided a fire resistance less than the minimum three-hour fire resistance rating required by the licensee's approved fire protection program. [Approved methods for achieving the required separation in the ACP room are specified by NRC Branch Technical position (BTP) CMEB 9.5-1.] This performance issue was previously documented in NRC Inspection Report 50-400/99-13 and later characterized as having low to moderate risk significance (White) in an NRC letter dated April 16, 2002.

During this supplemental inspection, performed in accordance with Inspection Procedure 95001, the inspector determined that the licensee's problem identification, root cause and extent of condition evaluation were adequate. The licensee's corrective actions to resolve the issues were ongoing. However, the inspector identified that the licensee intended to use local manual operator actions in lieu of one of the methods identified in NRC Position C.5.b.(2) of Branch Technical Position (BTP) CMEB 9.5-1. The licensee entered this issue into their corrective action program and resolution is pending.

As a result, the White issue associated with the Thermo-Lag fire barrier will not be closed at this time. The issue will remain open pending further NRC review of the licensee's corrective actions and the development of NRC inspection guidance on the use of local manual actions.

- White. A violation of the fire protection program required by 10 CFR 50.48 and License Condition 2.F was identified in an NRC letter dated April 16, 2002. The violation was for failure to implement the NRC approved fire protection program safe shutdown system separation requirements by maintaining a three-hour fire rated area separation barrier between the B Train switchgear room/auxiliary control panel room and the A Train cable spreading room. The existing Thermo-Lag barrier had an indeterminate fire resistance rating.

## Report Details

### 01 INSPECTION SCOPE

The NRC performed this supplemental inspection to assess the licensee's corrective actions associated with a degraded Thermo-Lag fire barrier separating Train A and Train B safety related cables in the Auxiliary Control Panel (ACP) room. The Thermo-Lag barrier provided a fire resistance rating less than the minimum three-hour fire resistance rating required by the approved fire protection program. This performance issue was previously documented in NRC Inspection Report 50-400/99-13 and later characterized as having low to moderate risk significance (White) in an NRC letter dated April 16, 2002.

The inspector assessed problem identification, the licensee's root cause and extent of condition evaluation, and the licensee's corrective actions to resolve the White finding in their fire protection program. The inspector reviewed design change documents, including design inputs, assumptions, and design evaluations; licensee self assessments; and changes to operating procedures, fire protection procedures, and the safe shutdown analysis. The inspector also examined in process plant modifications being performed on fire barriers.

### 02 EVALUATION OF INSPECTION REQUIREMENTS

#### 02.01 Problem Identification

- a. Determination of who identified the issue and under what conditions.

During a fire protection inspection, conducted from November 1 - 5, 1999, and documented in NRC Inspection Report 50-400/99-13, two unresolved items (URIs) were identified by NRC inspectors. One of the URIs concerned the adequacy of a Thermo-Lag wall which was designated as a three-hour fire barrier between the Train B switchgear room and Train A safety related cables routed in the Auxiliary Control Panel (ACP) room. The potential problem of using Thermo-Lag as a fire barrier material was identified to the industry by the NRC in 1992 in Generic Letter (GL) 92-08 and NRC Bulletin 92-01. In response to NRC Bulletin 92-01 and GL 92-08, the licensee conducted testing on a mock-up of this Thermo-Lag wall. This testing showed the barrier failed the fire endurance test acceptance criteria at 1 hour and 48 minutes. The licensee then performed an engineering evaluation which concluded that the as-constructed Thermo-Lag wall provided sufficient protection for the area. The NRC did not agree with this determination. Hence, this issue was identified by NRC. The licensee initiated Problem Evaluation Report (PER) 99-006863 to document and disposition the URI identified during the original fire protection inspection.

- b. Determination of how long the issue existed, and prior opportunities for identification.

The degraded fire barrier was installed during original plant construction. In response to NRC Bulletin 92-01 and GL 92-08, the licensee identified that the Thermo-Lag barrier in the ACP room did not have a 3-hour fire rating. However, licensee actions to address this issue resulted in the acceptance of an inadequate Thermo-Lag fire barrier in 1997 (ESR 95-00620, "Thermo-lag Fire Protection Issues Resolution," Revision 1).

Opportunities to identify this included a 1998 triennial fire protection Nuclear Assessment Section audit and self-assessments of the fire protection program performed after 1997.

- c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issue.

The degraded fire barrier was evaluated for a postulated fire in the B switchgear room that could cause the Thermo-Lag fire barrier wall in the ACP area of the B switchgear room fire area to fail. Failure of this wall exposed Train A cables, located within the enclosed barrier area, to the postulated fire. The Train A cables behind the Thermo-Lag wall affected the Train A auxiliary feedwater function and the steam generator A pressure operated relief valve functions. The NRC assessment concluded that this event was in the increased regulatory response (White) band. The results of the NRC's final significance determination for the degraded fire barrier were documented in an NRC letter to CP&L dated April 16, 2002, Subject: Final Significance Determination For a White Finding and Notice of Violation (Shearon Harris Nuclear Power Plant - NRC Inspection Report 50-400/00-09).

#### 02.02 Root Cause and Extent of Condition Evaluation

- a. Evaluation of methods used to identify root causes and contributing causes.

The licensee initiated a Significant Adverse Condition Report, Action Request Number 53063, to evaluate and correct the problem associated with the Thermo-Lag wall. The evaluation was performed using the systematic methods specified in the licensee's corrective action program as contained in CP&L procedure CAP-NGGC-0200. The licensee concluded that the root cause of the White finding was the inappropriate use of an analysis to accept changes to the NRC approved fire protection program. Contributing causes were inadequate testing of installed fire barriers, too much reliance on engineering evaluations, and failure to address design requirements.

- b. Level of detail of the root cause evaluation.

The inspector determined that the root cause evaluation was sufficiently detailed to support the identified root and contributing causes. However, the root cause analysis did not specifically identify why the inadequate fire testing of the installed fire barrier occurred (root cause), or why there was too much reliance on GL 86-10 engineering evaluations (contributing cause), or why there was a failure to adequately address design requirements (contributing cause).

- c. Consideration of prior occurrences of the problem and knowledge of prior operating experience.

The licensee's investigation identified 218 matches from the INPO database including GLs, NRC Bulletins and Information Notices, and LERs related to similar Thermo-Lag issues at various nuclear power plants. The root cause evaluation found that the method of resolution at HNP was unique from the others identified.



- d. Consideration of potential common causes and extent of condition of the problem.

In late 2000, the NRC identified additional Thermo-Lag fire barriers in the cable spreading rooms which did not meet the requirements for three-hour fire barriers. Because fire suppression systems (sprinklers) existed in most of these areas, the licensee was able to downgrade the barriers to a one-hour fire rating and comply with the approved fire protection program requirements. However, some areas did not have sufficient spatial coverage by these sprinklers. The licensee also did not have sufficient test data/documentation to adequately demonstrate that some as-built Thermo-Lag barrier configurations in the cable spreading room provided a one-hour barrier. As a result, the licensee has initiated a program to evaluate existing sprinkler coverage, install new sprinklers as required, and test the existing barrier configurations to show they will meet the one-hour requirement. These corrective actions are scheduled to be completed by December 2002. The licensee performed a detailed self-assessment to examine the overall fire protection program and compare it to applicable regulatory requirements. The evaluation portion of the assessment has been completed. Numerous findings were identified. Examples of findings include: illegible UFSAR drawings, typographical errors in the UFSAR, unclear statements in the UFSAR and SERs, factual errors in the UFSAR (e.g., location of hose stations), and lack of test documentation to demonstrate the mullions, door frames, and transoms over fire doors meet the fire protection program requirements.

#### 02.03 Corrective Actions

- a. Appropriateness of corrective actions.

The inspector determined that portions of the licensee's corrective actions were adequate to resolve the issue. Corrective action included modifying the ACP fire area by upgrading an existing concrete wall to a three-hour fire barrier. This reduced the potential for fires starting in the Train B switchgear room from spreading to the ACP room. In addition, design procedures were revised to emphasize the requirement that adequate qualification testing be performed prior to changing the approved fire protection program. However, the inspector identified that the licensee intended to use local manual operator actions in lieu of protecting Train A and Train B cables in the new ACP room fire area using a protection method specified in NRC Position C.5.b.(2) of Branch Technical Position (BTP) CMEB 9.5-1. The licensee entered this issue into its corrective action program as NCR 20020823, "Fire Protection Manual Action Discrepancies."

As a result, the White issue associated with the Thermo-Lag fire barrier will not be closed at this time. The issue will remain open pending further NRC review of the licensee's corrective actions and the development of internal NRC inspection guidance in this area.

- b. Prioritization of corrective actions.

The inspector concluded that the licensee's corrective actions were properly prioritized to address the risk. The changes to the ACP fire area were being worked concurrent with completion of the engineering change. The inspector reviewed Engineering Change (EC) 48802 to upgrade an existing concrete wall between Switchgear Room B and the ACP room to a three-hour rated fire barrier. This work included sealing the existing

penetrations in the wall. The above actions transformed the ACP room into a new fire area. The licensee has revised its fire plan (AOP-036, Safe Shutdown Following a Fire) to address the newly created area. However, as discussed above, this plan includes the use of local manual operator actions to achieve safe shutdown for some fire scenarios in the new ACP room fire area as discussed above.

- c. Establishment of schedule for implementing and completing the corrective actions.

The inspector verified that the licensee's corrective action program identified assigned individuals, completion dates, and reference numbers in the licensee's corrective action tracking program to ensure that corrective actions would be completed in accordance with their priority. Procedure changes to ensure that review criteria exist so that fire barrier modifications do not invalidate test results in the future was complete. Although the EC for the ACP room had not been issued, the field work had been performed at risk and was essentially completed prior to completion of the EC. Reviews of other fire barriers by the licensee were in progress, and initial walk downs were complete. Resolution of other fire protection issues was in progress and was being prioritized based on risk.

- d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence.

The effectiveness of these measures will be determined by the licensee through direct observation of the completed modifications and changes to the fire protection program. The licensee has scheduled an effectiveness review for July 2003.

The inspector performed plant walk downs and conducted document reviews in determining that the extent of condition for the Thermo-Lag wall issue included all Thermo-Lag usage in the plant. Thermo-Lag usage in the plant included various transoms and mullions on the 216', 236', 261', and 305' elevations of the reactor auxiliary building and control building; and Thermo-Lag wall and tunnel assemblies in the A and B cable spreading rooms, the B switchgear room and the ACP area. The problem with the Thermo-Lag issue was related to the use of engineering evaluations for determining the applicability of fire test results to qualify plant features as rated fire barriers. In the case of the Thermo-Lag, a failed three-hour qualification fire test was used to accept Thermo-Lag features by engineering evaluation as adequate for the hazard. The use of failed tests for fire rating determination appears specific to the resolution of this Thermo-Lag issue. In other cases, hardware modifications were made to reconcile the configurations to the test configurations that passed rating tests. Upgrading the concrete wall between the B switchgear room and the ACP room to a three-hour barrier decreases the risk of damaging the A train cables in the ACP room as a result of a fire in the B switchgear room.

### 03 OTHER ACTIVITIES

#### 03.01 Other

(Closed) AV 50-400/00-09-01: Failure to Maintain the Fire Area Separation Barrier Between The B Train Switchgear Room/Auxiliary Control Panel Room and the A Train Cable Spreading Room as a 3-hour Rated Barrier

This apparent violation was identified to the licensee in a letter dated December 18, 2001, Subject: NRC Inspection Report 50-400/00-09; Preliminary White Finding. The apparent violation concerned the Thermo-Lag fire barrier assembly which separated the B train switchgear room and the A train cable spreading room. The results of testing performed by the licensee in 1994 and 1995 showed that the fire barrier did not have the required three-hour fire resistance rating. After reviewing the test results, the licensee changed the fire protection program by revising the rating of the fire barrier from three hours to that suitable for the hazard. This issue had been initially identified by NRC as Unresolved Item 50-400/99-13-01. In a letter dated April 16, 2002, Subject: Final Significance Determination For a White Finding and Notice of Violation (Shearon Harris Nuclear Power Plant - NRC Inspection Report 50-400/00-09), the licensee was informed that NRC had determined that this issue was a violation of License Condition 2F of the Harris Operating License. A Notice of Violation, Severity Level III, was included as an Enclosure to the April 16, 2002 letter. For tracking purposes, this Severity Level III violation is identified as Violation (VIO) 50-400/02-08-01: Failure to Implement and Maintain NRC Approved Fire Protection Program Safe Shutdown System Separation Requirements. Apparent Violation 50-400/00-09-01 is closed.

(Closed) AV 50-400/00-09-02: Failure to Obtain NRC Approval Prior to Implementing a Change to the Approved Fire Protection Program

This apparent violation was also identified to the licensee in a letter dated December 18, 2001, Subject: NRC Inspection Report 50-400/00-09; Preliminary White Finding. This apparent violation concerned the fact that the licensee made changes to the approved fire protection program by accepting the degraded fire barrier, through an engineering evaluation, without prior Commission approval. This issue had been initially identified by NRC as Unresolved Item 50-400/99-13-02. In a letter dated April 16, 2002, Subject: Final Significance Determination For a White Finding and Notice of Violation (Shearon Harris Nuclear Power Plant - NRC Inspection Report 50-400/00-09), the licensee was informed that NRC had determined that it was appropriate to cite this issue as part of Violation (VIO) 50-400/02-08-01: Failure to Implement and Maintain NRC Approved Fire Protection Program Safe Shutdown System Separation Requirements. Apparent Violation 50-400/00-09-02 is closed.

**04 MANAGEMENT MEETINGS**Exit Meeting Summary

The inspector presented interim results of the inspection to Mr. J. Scarola and other members of his staff at the conclusion of the inspection on May 31, 2002. A final exit meeting was held via telephone with Mr. J. Caves and other members of the licensee's staff on September 6, 2002, to present the final results of the inspection. The licensee acknowledged the findings presented. Proprietary information is not included in the inspection report.

**SUPPLEMENTAL INFORMATION****PARTIAL LIST OF PERSONS CONTACTED**Licensee

D. Alexander, Manager, Nuclear Assessment Section  
 J. Caves, Supervisor, Licensing  
 M. Fletcher, Fire Protection System Engineer  
 C. Georgeson, Electrical Engineer  
 J. Holt, Site Support Services Manager  
 A. Khanpour, Superintendent of Design, Harris Engineering Support Services (HESS)  
 D. McAfee, Fire Protection Program Manager  
 E. McCartney, Superintendent Of Technical Services, HESS  
 J. Scarola, Harris Plant Vice President  
 M. Wallace, Senior Analyst, Licensing

NRC

J. Brady, Senior Resident Inspector

**ITEMS OPENED, CLOSED AND DISCUSSED**Opened

50-400/02-08-01	VIO	Failure to Implement and Maintain NRC Approved Fire Protection Program Safe Shutdown System Separation Requirements (Section 03.01)
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Closed

50-400/00-09-01	AV	Failure to Maintain the Fire Area Separation Barrier Between The B Train Switchgear Room/Auxiliary Control Panel Room and the A Train Cable Spreading Room as a 3-hour Rated Barrier (Section 03.01)
50-400/00-09-02	AV	Failure to Obtain NRC Approval Prior to Implementing a Change to the Approved Fire Protection Program(Section 03.01)

## **LIST OF BASELINE INSPECTIONS PERFORMED**

The following procedure was used to perform the inspection during the report period. Documented findings are contained in the body of the report.

IP 95001      Supplemental Inspection For One Or Two White Inputs In A Strategic Performance Area.

## **LIST OF DOCUMENTS REVIEWED**

CP&L Procedure CAP-NGGC-200, Corrective Action Program, Rev. 4

Engineering Service Request 99-0180, Evaluation of Low Density Silicone Elastomer (LDSE) Seals, Rev. 0, 6/16/99

Engineering Change 48802, Make ACP Room Separate Fire Area, Revision 0, 7/17/02

Calculation E-5525, Safe Shutdown Analysis in Case of Fire, Rev. 5, 5/7/02, and pending changes resulting from EC 48802

Calculation E-5524, Safe Shutdown Analysis Changes to the Cable Function Report and Essential Cable Analysis, Rev. 5, 6/2/02

Abnormal Operating Procedure AOP-036, Safe Shutdown Following A Fire, Rev. 19, and pending revisions resulting from EC 48802

Drawing Numbers SK-48802-C-1000, ACP Door Transom Detail, Sheets 1 and 2

Drawing Number SK-48802-C-1000, ACP Wall Penetrations, Sheet 1

Work Orders 233062 01 and 233062 02, Make ACP Room Separate Fire Area