

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, North Carolina 27562-0165

**SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT - NRC FIRE PROTECTION  
INSPECTION REPORT NO. 05000400/2003007**

Dear Mr. Scarola:

On October 21, 2003, the U.S. Nuclear Regulatory Commission (NRC) completed an in-office review of the significance of the triennial fire protection inspection findings of inspection report 05000400/2002011 related to your Shearon Harris Nuclear Power Plant. The enclosed report documents the results of our significance determination, which was discussed on October 21, 2003, by telephone with Mr. R. Duncan and other members of your staff.

This report documents two NRC-identified findings of very low significance (Green). Both of these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these two findings as non-cited violations (NCVs) consistent with Section VI.A. of the NRC enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Shearon Harris Nuclear Power Plant.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) 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 Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

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

Docket No.: 50-400

T-6

CP&L

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License No.: NPF-63

Enclosure: Inspection Report 05000400/200307  
w/Attachments: 1. Supplemental Information  
2. Phase 3 SDP Analysis

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

**Docket No.:** 50-400

**License No.:** NPF-63

**Report No.:** 05000400/2003007

**Licensee:** Carolina Power & Light (CP&L)

**Facility:** Shearon Harris Nuclear Power Plant

**Location:** 5413 Shearon Harris Road  
New Hill, NC 27562

**Dates:** February 1, 2003 - October 21, 2003

**Inspectors:** W. Rogers, Senior Reactor Analyst, Region II  
R. Schin, Senior Reactor Inspector, Region II

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

**Enclosure**

## SUMMARY OF FINDINGS

IR 05000400/2003-007; 02/01/2003 - 10/21/2003; Shearon Harris Nuclear Power Plant; Significance Determination of Fire Protection Findings.

The in-office review was conducted by a regional inspector, a regional senior reactor analyst, and NRC Headquarters risk analysts. Two Green findings, each a non-cited violation (NCV), were identified. The significance of issues 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 NRC 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.

### A. Inspector Identified Findings

Cornerstones: Mitigating Systems and Initiating Events

- Green. The inspectors identified a non-cited violation of Operating License Condition 2.F, the Fire Protection Program, and Technical Specification 6.8.1, Procedures and Programs, for inadequate implementation of the fire protection program. Physical and procedural protection for equipment that was relied on for safe shutdown (SSD) during a fire in fire safe shutdown analysis (SSA) areas 1-A-BAL-B-B1, 1-A-BAL-B-B2, 1-A-BAL-B-B4, 1-A-BAL-B-B5, 1-A-EPA, and 1-A-BAL-C of the reactor auxiliary building was inadequate. Consequently, a fire in one of these SSA areas could result in a reactor coolant pump seal loss of coolant accident event, a main steam line break event, a loss of high pressure safety injection, and/or a loss of component cooling water to the reactor coolant pump seals. Licensee corrective action included assigning an additional operator to be available to perform post-fire SSD actions and performing a complete review of the SSA and related operating procedures.

This finding was greater than minor because it involved a lack of required fire barriers for equipment that was relied upon for safe hot shutdown following a fire. The finding also had more than minor safety significance because it affected the objectives of the Mitigating Systems and Initiating Events Cornerstones. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences and also affected the likelihood of occurrence of initiating events that challenge critical safety functions. The finding was of very low significance (Green) because of the low fire ignition frequencies, lack of combustible materials in critical locations, and the effectiveness of the fire protection features and the unaffected SSD equipment to mitigate a fire in each of the affected fire zones/areas. [Section 1R05.1.b.(1)]

- Green. The inspectors identified a non-cited violation of Operating License Condition 2.F, the Fire Protection Program, and Technical Specification 6.8.1, Procedures and Programs, for inadequate corrective action for previous Violation 50-400/02-08-01. Corrective action for that violation had included creating a new auxiliary control panel fire area (1-A-ACP) in 2002. However, that corrective action was not adequate because physical and procedural protection for equipment that was relied on for safe shutdown

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(SSD) during a fire in the new fire area was inadequate. Consequently, a fire in area 1-A-ACP could result in a loss of auxiliary feedwater and a main steam line break event. Licensee corrective actions in response to this finding included assigning an additional operator to be available to perform post-fire SSD actions and performing a complete review of the safe shutdown analysis and related operating procedures.

This finding was greater than minor because it involved inadequate fire barriers for equipment that was relied upon for safe hot shutdown following a fire. The finding also had more than minor safety significance because it affected the objectives of the Mitigating Systems Cornerstone and affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. The finding was of very low significance (Green) because of the very low ignition sources in the fire area, manual suppression capability, and the power conversion system not being affected by a fire in this fire area. [Section 1R05.1.b.(2)]

B. Licensee-Identified Violations

None

## REPORT DETAILS

### 1. REACTOR SAFETY

Cornerstones: Initiating Events and Mitigating Systems

### 1R05 FIRE PROTECTION

#### .1 Significance Determination for Triennial Fire Protection Inspection Findings

##### a. Inspection Scope

In inspection report (IR) 50-400/02-11, nine findings had been identified as unresolved items (URIs) pending completion of the NRC significance determination process (SDP). The nine URIs were as follows:

- URI 50-400/02-11-01, Failure to Protect Charging System MOV 1CS-165, VCT Outlet to CSIPs, From Maloperation Due To a Fire
- URI 50-400/02-11-02, Failure to Protect Charging System MOVs 1CS-169, 1CS-214, 1CS-218, and 1CS-219 From Maloperation Due To a Fire
- URI 50-400/02-11-03, Failure to Protect Charging System MOVs 1CS-166, 1CS-168, and 1CS-217 From Maloperation Due To a Fire
- URI 50-400/02-11-04, Failure to Protect Component Cooling MOVs 1CC-251 and 1CC-208, CC for RCP Seals, From Maloperation Due To a Fire
- URI 50-400/02-11-05, Reliance on Manual Actions in Place of Required Physical Separation or Protection From a Fire
- URI 50-400/02-11-06, Fire SSD Operator Actions With Excessive Challenges
- URI 50-400/02-11-07, Too Many Fire SSD Actions for Operators to Perform
- URI 50-400/02-11-08, Using the Boric Acid Tank Without Level Indication
- URI 50-400/02-11-09, Failure to Provide Required Emergency Lighting for SSD Operator Actions

This inspection report documents the results of the in-office completion of the NRC SDP with respect to the nine URIs. The significance determination was accomplished as described in NRC Inspection Manual Chapter (IMC) 0609, Signification Determination Process; IMC 0609A, Significance Determination of Reactor Inspection Findings for At-Power Situations; and IMC 0609F, Determining Potential Risk Significance of Fire Protection and Post-Fire Safe Shutdown Inspection Findings. This involved evaluating the significance of a potential fire in each of seven affected fire safe shutdown analysis

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(SSA) areas using the Phase 2 SDP, considering all examples of the findings that could be involved in each fire. To better assess the overall significance of all of the performance deficiencies, they were recharacterized as two overall findings: 1) Inadequate Implementation of the Fire Protection Program for Safe Shutdown; and 2) Inadequate Corrective Action for a Previous White Fire Protection Finding.

In addition, the performance deficiencies which could result in the loss of a safety function were evaluated by Office of Nuclear Reactor Regulation (NRR) analysts using the Phase 3 portion of the SDP. Inclusive in this evaluation were extensive walkdowns of the applicable fire SSA areas by two fire protection contractors to observe ignition sources and possible fire propagation from these ignition sources that could affect the unprotected cables of concern. Also, electrical circuit drawings and the latest information on cable hot short failure mechanisms and probabilities were used to develop cable failure probabilities that could cause a loss of function for the unprotected cables of concern.

b. Findings

(1) Inadequate Implementation of the Fire Protection Program for Safe Shutdown

Introduction: An overall finding was identified in that the implementation of the Fire Protection Program (FPP) was inadequate. Eight of the nine URIs described in IR 50-400/02-11 were considered to include performance deficiencies related to this overall finding. Based on evaluating those performance deficiencies for their effects during fires that could occur in each of six (of the seven total) affected fire SSA areas, this overall finding was determined to have a very low significance (Green).

Description: The licensee's implementation of the FPP for ensuring the ability to safely shut down the plant during a fire was inadequate, in that:

- The fire SSA failed to identify several cables that were relied upon for safe shutdown (SSD) during a fire. Consequently, those cables were not provided with the required protection from fire damage. A fire could cause hot shorts in the cables which would result in maloperation of equipment that was relied upon for SSD during that fire.
- The SSA identified many cables that were relied upon for SSD during a fire, for which the licensee generally failed to provide the required physical protection from fire damage. Instead, the SSA designated that operator actions would be taken to prevent or mitigate the effects of the fire damage. However, the licensee did not obtain NRC approval for these deviations from the approved fire protection program.
- Some of the operator actions that were designated by the SSA were not incorporated into operating procedures for SSD. Also, the operator actions in procedures differed in many respects from the operator actions that were

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analyzed in the SSA. For example, the operating procedures directed operators to use some different flowpaths than those analyzed in the SSA.

- Some operator actions in the SSD procedures would not work. They were too challenging, involved entering the area of the fire, were not adequately analyzed, or were too numerous for the available SSD non-licensed operator to perform.

Detailed examples related to this overall finding were included in the following eight URIs: 50-400/02-11-01, -02, -03, -04, -05, -07, -08, and -09.

**Analysis:** The inspectors and analysts evaluated the effects of the multiple examples of this overall finding during a fire that could occur in each of the six affected fire SSA areas of the reactor auxiliary building (RAB) using Phase 2 and Phase 3 of the SDP. Based on that analysis, the inspectors and analysts concluded that this finding had more than minor safety significance because it involved a lack of required fire barriers for equipment that was relied upon for safe hot shutdown following a fire. The finding also had more than minor safety significance because it affected the availability and reliability objectives and the equipment performance attribute of the Mitigating Systems Cornerstone. In addition, it affected the Initiating Events Cornerstone in that it affected the objective of limiting the likelihood of occurrence of initiating events that challenge critical safety functions and also affected the design control attribute. The overall finding did not have more than very low safety significance (Green) because of the low fire ignition frequencies that could impact the cables of interest, the lack of combustible materials in critical locations, and the effectiveness of the fire protection features and the unaffected SSD equipment to mitigate a fire in each of the affected fire zones/areas.

**Enforcement:** As described in IR 50-400/02-11, Operating License Condition (OLC) 2.F requires that the licensee implement and maintain in effect all provisions of the FPP as described in the Final Safety Analysis Report (FSAR). The Updated FSAR (UFSAR), Section 9.5.1, FPP, states that outside containment, where cables or equipment (including associated non-essential circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground) of redundant safe shutdown divisions of systems necessary to achieve and maintain cold shutdown conditions are located within the same fire area outside of primary containment, one of the redundant divisions must be ensured to be free of fire damage. Section 9.5.1 further states that if both divisions are located in the same fire area, then one division is to be physically protected from fire damage by one of three methods: 1) a three-hour fire barrier, 2) a one-hour fire barrier plus automatic detection and suppression, or 3) a 20-foot separation with no intervening combustibles and with automatic detection and suppression. The licensee had not received NRC approval for deviating from these requirements.

Also, OLC 2. F. and UFSAR Section 9.5.1 state that Branch Technical Position (BTP) 9.5-1 was used in the design of the FPP for safety-related systems and equipment and for other plant areas containing fire hazards that could adversely affect safety-related systems. BTP 9.5-1, Section C.5.g, "Lighting and Communication," paragraph (1),

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requires that fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual eight-hour-minimum battery power supplies should be provided in areas that must be manned for safe shutdown and for access and egress routes to and from all fire areas.

In addition, TS 6.8.1, Procedures and Programs, requires procedures as recommended by Regulatory Guide (RG) 1.33 and procedures for fire protection program implementation. RG 1.33 recommends procedures for combating emergencies, including fires. The licensee's interpretation of the FPP was that they could and would rely on proceduralized operator actions in place of physically protecting SSD equipment from fire damage.

Contrary to the above requirements, the licensee failed to adequately implement and maintain in effect all of the provisions of the approved FPP. The licensee failed to ensure that one of the redundant safe shutdown divisions of systems necessary to achieve and maintain cold shutdown conditions was protected from fire damage; failed to have adequate procedures for combating fire emergencies; and failed to provide the required emergency lighting in areas that must be manned for safe shutdown; as described above in the eight examples of this overall finding. Because the identified examples of this failure to adequately implement and maintain in effect all of the provisions of the approved FPP are of very low safety significance and have been entered into the corrective action program [Action Requests (ARs) 76260, 80212, 80089, 69721, 80215, 75065, and 79047], this violation is being treated as a non-cited violation (NCV), consistent with Section VI.A of the NRC Enforcement Policy: NCV 50-400/03-07-01; Inadequate Implementation of the Fire Protection Program for Safe Shutdown.

(2) Inadequate Corrective Action for a Previous White Fire Protection Finding

Introduction: In IR 50-400/02-08, the NRC had left VIO 50-400/02-08-01 open for further NRC review of the new manual operator actions that had been added for the new 1-A-ACP fire area, as part of the licensee's corrective action for the violation. In IR 50-400/02-11, the NRC had documented the review of those new manual operator actions and had identified that the licensee's corrective actions had contributed to four new findings. For this significance determination, those findings were grouped into one overall finding of inadequate corrective action for a previous White fire protection finding. Based on evaluating the multiple examples of this overall finding for their effects during a fire that could occur in the new 1-A-ACP fire area, this overall finding was determined to have a very low significance (Green).

Description: The licensee's corrective actions for a previous White fire protection finding (VIO 50-400/02-08-01), associated with a Thermo-Lag fire barrier assembly between the 'B' train switchgear room / auxiliary control panel and the 'A' train cable spreading room, were inadequate. The corrective actions were inadequate because they failed to rectify deficiencies in design, construction, and operation related to SSD from a fire in the new

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1-A-ACP fire area. The licensee's corrective actions contributed to four new findings that are now grouped into the overall finding of inadequate corrective action:

- The corrective actions created a new fire area (1-A-ACP) and many new manual operator actions for a fire in the new fire area instead of providing the required physical protection of cables. This finding was described in URI 50-400/02-11-05, *Reliance on Manual Actions in Place of Required Physical Separation or Protection From a Fire*.
- The corrective actions also created a manual operator action with excessive challenges such that there was not reasonable assurance that all non-licensed operators (NLOs) would be able to perform the action during a fire event. This finding was described in URI 50-400/02-11-06, *Fire SSD Operator Actions With Excessive Challenges*.
- In addition, the corrective actions created too many local manual operator actions for the new fire area for the one SSD NLO to perform. This finding was described in URI 50-400/02-11-07, *Too Many Fire SSD Actions for Operators to Perform*
- Further, the corrective actions failed to provide the required emergency lighting for the new manual actions. This finding was described in URI 50-400/02-11-09, *Failure to Provide Required Emergency Lighting for SSD Operator Actions*

**Analysis:** The inspectors and analysts evaluated the effects of the multiple examples of the overall finding of inadequate corrective action during a fire that could occur in the 1-A-ACP fire area of the RAB, using Phase 2 of the SDP. Based on that evaluation, the inspectors and analysts concluded that the overall finding had more than minor safety significance because it involved inadequate fire barriers for equipment that was relied upon for safe hot shutdown following a fire. The finding also had more than minor safety significance because it affected the availability and reliability objectives and the equipment performance attribute of the Mitigating Systems Cornerstone. The finding did not have more than very low safety significance (Green) because of the very low ignition sources in the fire area, manual suppression capability, and the power conversion system not being affected by a fire in this fire area. The Green significance determination was also confirmed by a walkdown of the fire area by two contractors.

**Enforcement:** OLC 2.F and the UFSAR, Section 9.5.1, FPP, includes quality assurance (QA) requirements for fire protection. The FPP states that a QA program is being used to identify and rectify any possible deficiencies in design, construction, and operation of the fire protection systems. OLC 2.F requires that one of the redundant divisions be free of fire damage. Further, if both divisions were located in the same area, OLC 2.F requires that one of the divisions be physically protected from fire damage by one of three specified methods. Also, OLC.2.F requires that battery-backed emergency lights be provided in locations where operators are required to perform actions for SSD from a

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fire. In addition, TS 6.8.1, Procedures and Programs, requires procedures for implementing the FPP and for combating fires.

Contrary to the above requirements, the licensee's corrective actions for previous VIO 50-400/02-08-01 were inadequate because the actions failed to rectify deficiencies in design, construction, and operation related to SSD from a fire in the area of the ACP room. The licensee failed to protect various equipment either physically or procedurally from the effects of a fire where that equipment was relied on for SSD. Because the identified examples of this inadequate corrective action are of very low safety significance and have been entered into the corrective action program (AR 80215), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 50-400/03-07-02; Inadequate Corrective Action for a Previous White Fire Protection Finding.

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

This VIO was closed with a new corrective action NCV opened as discussed in Section 1R05.1.b.(2).

**.3** (Closed) URIs 50-400/02-11-01, -02, -03, -04, -05, -06, -07, -08, and -09

These URIs were resolved to two new NVCs as discussed in Sections 1R05.1.b.(1) and (2). Consequently, these URIs are closed.

**4. OTHER ACTIVITIES**

**4OA3** Event Followup

(Closed) LER 50-400/02-04-00, Unanalyzed Condition Due to Inadequate Separation of Associated Circuits

This LER describes conditions that were previously identified by the NRC in IR 50-500/02-11 and that were evaluated and resolved to a new NCV in Section 1R05.1.b.(1) above. This LER was reviewed by the inspectors and no additional findings were identified. This LER is closed.

**4OA6** Meetings, including Exit

The team presented the inspection results to Mr. R. Duncan and other members of his staff at the conclusion of the inspection on October 21, 2003. The licensee acknowledged the findings presented. Proprietary information is not included in this inspection report.

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## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee personnel

J. Caves, Licensing Supervisor  
F. Diya, Acting Manager, Engineering  
R. Duncan, Director of Site Operations  
M. Fletcher, Manager, Fire Protection Program  
T. Morton, Manager, Support Services

#### NRC personnel

G. MacDonald, Senior Project Engineer  
R. Musser, Senior Resident Inspector, Shearon Harris  
P. O'Bryan, Resident Inspector, Shearon Harris  
C. Ogle, Chief, Engineering Branch 1 (EB1), Division of Reactor Safety (DRS), Region II (RII)

### LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened and Closed

50-400/03-07-01	NCV	Inadequate Implementation of the Fire Protection Program for Safe Shutdown [Section 1R05.1.b.(1)]
50-400/03-07-02	NCV	Inadequate Corrective Action for a Previous White Fire Protection Finding [Section 1R05.1.b.(2)]

#### Closed

50-400/02-08-01	VIO	Failure to Implement and Maintain NRC Approved Fire Protection Program Safe Shutdown System Separation Requirements (Section 1R05.2)
50-400/02-11-01	URI	Failure to Protect Charging System MOV 1CS-165, VCT Outlet to CSIPs, From Maloperation Due To a Fire (Section 1R05.3)
50-400/02-11-02	URI	Failure to Protect Charging System MOVs 1CS-169, 1CS-214, 1CS-218, and 1CS-219 From Maloperation Due To a Fire (Section 1R05.3)
50-400/02-11-03	URI	Failure to Protect Charging System MOVs 1CS-166, 1CS-168, and 1CS-217 From Maloperation Due To a Fire (Section 1R05.3)

50-400/02-11-04	URI	Failure to Protect Component Cooling MOVs 1CC-251 and 1CC-208, CC for RCP Seals, From Maloperation Due To a Fire (Section 1R05.3)
50-400/02-11-05	URI	Reliance on Manual Actions in Place of Required Physical Separation or Protection From a Fire (Section 1R05.3)
50-400/02-11-06	URI	Fire SSD Operator Actions With Excessive Challenges (Section 1R05.3)
50-400/02-11-07	URI	Too Many Fire SSD Actions for Operators to Perform (Section 1R05.3)
50-400/02-11-08	URI	Using the Boric Acid Tank Without Level Indication (Section 1R05.3)
50-400/02-11-09	URI	Failure to Provide Required Emergency Lighting for SSD Operator Actions (Section 1R05.3)
50-400/02-04-00	LER	Unanalyzed Condition Due to Inadequate Separation of Associated Circuits (Section 4OA3)