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 PLANT - NRC INSPECTION REPORT 50-400/02-11

Dear Mr. Scarola:

On December 20, 2002, the Nuclear Regulatory Commission (NRC) completed a triennial fire protection inspection at your Shearon Harris Nuclear Plant. The enclosed integrated inspection report documents the inspection findings which were discussed on that date, with you and other members of your staff.

The inspection examined the effectiveness of activities conducted under your license relating to implementation of your NRC-approved fire protection program. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the inspectors identified eight issues of very low safety significance (Green). Each of these issues was determined to involve a violation of NRC requirements. However, because of their very low safety significance and because they have been entered into your corrective action program, the NRC is treating these issues as Non-Cited Violations (NCVs), in accordance with Section VI.A.1 of the NRC's Enforcement Policy. In addition, since two of these findings are related to your corrective action for the previous 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, that violation will remain open. If you deny any NCV in this report, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator, Region II; Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Shearon Harris Nuclear Plant.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be publicly available in the NRC Public Document Room or from the Publicly

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Sincerely,

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

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

Enclosure: NRC Inspection Report 50-400/02-11
w/Attachment

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-400
License No.:	NPF-63
Report No.:	50-400/02-11
Licensee:	Carolina Power & Light (CP&L)
Facility:	Shearon Harris Nuclear Plant
Location:	5413 Shearon Harris Road New Hill, NC 27562
Dates:	October 21 - 25, 2002 (Week 1) November 4 - 8, 2002 (Week 2) December 16 - 20, 2002 (Week 3)
Inspectors:	P. Fillion, Reactor Inspector, Region II R. Hagar, Resident Inspector, Shearon Harris (Week 3 only) D. C. Payne, Fire Protection Team Leader, Region II (Week 3 only) R. Schin, Senior Reactor Inspector, Region II (Lead Inspector) S. Walker, Reactor Inspector (Week 3 only) G. Wiseman, Senior Fire Protection Inspector, Region II (Weeks 1 & 2)
Accompanying Personnel:	H. Christensen, Deputy Director, Division of Reactor Safety, Region II (Week 3 only) C. Ogle, Chief, Engineering Branch 1, Division of Reactor Safety, Region II N. Staples, Inspector Trainee, Region II (Weeks 1 & 2)
Approved by:	Charles R. Ogle, Chief Engineering Branch 1 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000400-02-11; Carolina Power & Light; on 10/21/2002 - 12/20/2002, Shearon Harris Nuclear Plant, Triennial Baseline Inspection of the Fire Protection Program.

The inspection was conducted by a team of regional engineering inspectors and the Shearon Harris resident inspector. Nine 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.

Inspection Identified Findings

Cornerstones: Mitigating Systems and Initiating Events

- Green. An NCV of Shearon Harris Operating License Condition (OLC) 2.F, Fire Protection Program; and Technical Specification (TS) 6.8.1, Procedures and Programs, was identified for failing to protect equipment [motor-operated valve (MOV) 1CS-165, volume control tank (VCT) outlet to charging pumps (CSIPs)] from maloperation due to a fire. Consequently, a fire in any of three different plant areas could result in a reactor coolant pump (RCP) seal loss of coolant accident (LOCA) with no operable CSIP.

  This finding had a credible impact on safety because it could result in a loss of equipment that was relied upon for safe shutdown from a fire and could initiate a LOCA event. However, the finding was of very low safety significance because of the low fire initiation frequency and probability of spurious actuations, and the effectiveness of automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green (Section 1R05.__).

- Green. An NCV of OLC 2.F and TS 6.8.1 was identified for failing to protect equipment (MOVs 1CC-208, CC supply to RCP seals; and 1CC-251, CC return from RCP seals) from maloperation due to a fire. Consequently, a fire in one plant area could potentially result in an RCP seal LOCA.

  This finding had a credible impact on safety because it could result in a loss of equipment that was relied upon for safe shutdown from a fire and could potentially initiate a LOCA event. However, the finding was of very low safety significance because of the low fire initiation frequency and probability of spurious actuations, and the effectiveness of automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green (Section 1R05.__).

- Green. An NCV of OLC 2.F and TS 6.8.1 was identified for failing to provide a fire barrier to protect equipment [MOVs 1CS-166, VCT outlet to CSIPs and 1CS-168, CSIP

suction cross-connect] from maloperation due to a fire. Consequently, a fire in one plant area could result in a loss of all charging and high pressure safety injection.

This finding had a credible impact on safety because it could result in a loss of equipment that was relied upon for safe shutdown from a fire. However, the finding was of very low safety significance because of the low fire initiation frequency and probability of spurious actuations, and the effectiveness of automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green (Section 1R05.__).

- Green. An NCV of OLC 2.F and TS 6.8.1 was identified for failing to provide a fire barrier to protect equipment [MOVs 1CS-169, CSIP suction cross-connect; 1CS-214, CSIP mini-flow isolation; 1CS-218, CSIP discharge cross-connect; and 1CS-219, CSIP discharge cross-connect] from maloperation due to a fire. Consequently, a fire in one plant area could result in a loss of all charging and high pressure safety injection.

  This finding had a credible impact on safety because it could result in a loss of equipment that was relied upon for safe shutdown from a fire. However, the finding was of very low safety significance because of the low fire initiation frequency and probability of spurious actuations, and the effectiveness of automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green (Section 1R05.__).

- Green. An NCV of TS 6.8.1 was identified for inadequate procedural steps. For a fire in fire area 1-A-ACP, AOP-36 steps 2.C and 14.A (which involved removing fuses from transfer panel 1B near the door to the fire area) involved excessive challenges to operators. Challenges included exposure to smoke that would leak past the door and to the fire brigade who would be opening the door, entering a narrow energized electrical cabinet, and using a metal screwdriver inside the cabinet and seven feet above the floor with poor visibility and poor labeling. There was not reasonable assurance that all auxiliary operators (AOs) could perform the steps during a fire. Consequently, operators may not be able to manually start the auxiliary feedwater pump that was relied upon for SSD.

  This finding had a credible impact on safety because it could result in inability to operate equipment that was relied upon for SSD from a fire. However, the finding was of very low safety significance because of the low fire initiation frequency, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green (Section 1R05.__).

- Green. An NCV of TS 6.8.1 was identified for an inadequate procedure for SSD from a fire. For a fire in areas 1-A-BAL-B or 1-A-ACP, there too many AOP-36 contingency actions, to respond to potential spurious actuations, for the one available SSD AO to perform. Examples included continuously locally manually throttling the charging system flow control valve bypass valve while at the same time locally manually closing a steam generator power operated relief valve that could stick open in a different area of

the plant; or at the same time locally manually controlling auxiliary feedwater flow in another area of the plant. Consequently, a main steam line break event may not be stopped or auxiliary feedwater may be lost.

This finding had a credible impact on safety because it could result in inability to prevent an initiating event or to operate equipment that was relied upon for SSD from a fire. However, the finding was of very low safety significance because of the low fire initiation frequency, automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green (Section 1R05__).

- Green. An NCV of TS 6.8.1 was identified for an inadequate procedure for SSD from a fire. For a fire in area 1-A-BAL-B, AOP-36 directed operators to take CSIP suction from the boric acid tank (BAT) even if BAT level indication were lost. However, the charging volume needed for reactor coolant system (RCS) cooldown would have emptied the BAT and damaged the CSIP.

  This finding had a credible impact on safety because it could result in loss of equipment that was relied upon for SSD from a fire. However, the finding was of very low safety significance because of the low fire initiation frequency, automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green (Section 1R05__).

- Green. An NCV of OLC 2.F and TS 6.8.1 was identified for failing to provide battery-backed emergency lights for operators to perform actions for SSD from a fire. For a fire in 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, 1-A-BATB, or 1-A-ACP; many operator actions had no adequate battery-backed emergency lights. Some of those actions had no emergency lights at all. However, some had fluorescent lights that would be powered by the emergency diesel generators during a LOOP, but those lights had not been approved by the NRC as an exemption from the requirement for battery-backed emergency lights.

- This finding has a credible impact on safety because it could result in operators failing to perform SSD actions in an accurate and timely manner. However, the finding was of very low safety significance because operators had flashlights available which would have enabled them to perform the actions. Therefore, this finding is characterized as Green (Section 1R05__).

Report Details

1. REACTOR SAFETY

Cornerstones: Initiating Events and Mitigating Systems

1R05 FIRE PROTECTION

.01 Systems Required To Achieve and Maintain Post-Fire SSD Circuit Analysis

a. Inspection Scope

The team evaluated the licensee's approved fire protection program (FPP) against applicable requirements, including Operating License NFP-63, License Condition 2.F, Fire Protection Program (FPP); Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1 (NUREG-0800), July 1981; related NUREG 1038, NRC Safety Evaluation Reports (SERs); and plant Technical Specifications (TS). The team evaluated all areas of this inspection, as documented below, against these requirements.

The team used the licensee's Individual Plant Examination for External Events (IPEEE) and in-plant tours to select four risk significant fire areas/zones for inspection. The four fire areas/zones selected were:

- **Fire Zone 1-A-4-CHLR; part of Fire Area 1-A-BAL-B:**

  This fire zone was located on the 261 foot level (ground level) of the auxiliary building. It was further subdivided in the licensee's SSA into SSA areas **1-A-BAL-B-B1** [including the "A" chiller and motor-driven AFW pumps flow control valves (FCVs)] and SSA area **1-A-BAL-B-B2** (including the "B" chiller and turbine-driven TDAFW pump FCVs). A significant fire in either of these areas would require shutdown of the unit from the main control room (MCR) and additional manual operator actions in various areas of the plant.

- **Fire Zone 1-A-4-COM-E; part of Fire Area 1-A-BAL-B:**

  This fire zone was located on the 261 foot level (ground level) of the auxiliary building. It was further subdivided in the licensee's SSA into SSA areas **1-A-BAL-B-B4** (including 480V MCC 1B35-SB) and **1-A-BAL-B-B5** (including 480V MCC 1A35-SA). A significant fire in either of these areas would require shutdown of the unit from the main control room (MCR) and additional manual operator actions in various areas of the plant.

- **Fire Area 1-A-EPA:**

  This fire zone was located on the 261 foot level (ground level) of the auxiliary building. It included electrical penetration room 'A'. A significant fire in this area would require shutdown of the unit from the MCR and additional manual operator actions in various areas of the plant.

- **Fire Area 1-A-BATB:**

  This fire zone was located on the 286 foot level (above ground level) of the auxiliary building. It included the 'B' electrical battery room. A significant fire in this area would require shutdown of the unit from the MCR and additional manual operator actions in various areas of the plant.

The team reviewed the post-fire SSD capability and the fire protection features to verify that at least one post-fire safe shutdown success path would be maintained free of fire damage during a fire in any of the selected fire areas/zones. The team reviewed the licensee's fire protection program, including the SSA and supporting calculations, to determine the systems required to achieve post-fire SSD. The team also reviewed the safe shutdown equipment list (SSEL), system flow diagrams, and the fire area hazards analysis in the Updated Final Safety Analysis Report (UFSAR) for each of the selected fire areas to evaluate the completeness and adequacy of the SSD analysis and the systems relied upon to mitigate fires in the selected fire areas. Specific licensee documents and drawings reviewed during the inspection are listed in the Attachment.

b. Findings

The team found that the licensee's SSA method for dealing with problem cables, that were required for control room operation of safe shutdown equipment during a fire in a certain area but were not physically protected from that fire, was primarily to rely on operator manual actions (e.g., locally open the breaker to an MOV and locally operate the MOV using the handwheel.) Only if no operator action could be found would Harris physically protect the cables. Consequently, the licensee had over 100 local manual operator actions that they relied on for hot shutdown. The licensee did not request deviations from the NRC for these operator actions. This SSD methodology contributed to the findings that are described in the following sections of this report.

.02 Fire Protection of SSD Capability

a. Inspection Scope

The team reviewed UFSAR Section 9.5.1, Appendix 9.5A, Fire Hazards Analysis (FHA); the FPP manual; and plant administrative fire prevention/combustible hazards-ignition source control procedures. This review was to verify that the objectives established by the NRC-approved FPP were satisfied. The team also toured the selected plant fire areas observing the licensee's implementation of these procedures. The team also reviewed the FPP transient combustible permit logs, and fire emergency/incident investigation reports, for the years 2000-2002. Corrective action program Action Requests (ARs) resulting from fire, smoke, sparks, arcing, and equipment overheating incidents for the same period were also reviewed to assess the effectiveness of the fire prevention program and to identify any maintenance or material condition problems related to fire incidents.

The team reviewed flow diagrams and engineering calculations associated with the B' battery room heating ventilation and air conditioning (HVAC) systems. This review was done to verify that systems used to accomplish safe shutdown would not be inhibited by a potential hydrogen gas fire in the 'B' battery room due to inoperable ventilation supply and exhaust fans. The team also reviewed the TS LCO requirements for loss of ventilation in the 'B' battery room to verify that appropriate timely actions were specified to ensure that hydrogen gas concentrations generated by the station batteries remained below explosive limits.

The team also toured the plant's primary fire brigade staging and dress-out areas to assess the condition of fire fighting and smoke control equipment. Fire brigade personal protective equipment located in brigade staging area lockers was reviewed to evaluate equipment accessibility and functionality. Additionally, the team examined whether backup emergency lighting was provided for access pathways to and within the fire brigade staging and dress-out areas in support of fire brigade operations should a power failure occur during the fire emergency. The team also observed whether emergency exit lighting was provided for personnel evacuation pathways to the outside exits as identified in the National Fire Protection Association (NFPA) 101, Life Safety Code and Occupational Safety and Health Administration (OSHA) Part 1910, Occupational Safety and Health Standards. The adequacy of the fire brigade self-contained breathing apparatus (SCBAs) was reviewed as well as the availability of supplemental breathing air tanks. Team members also toured the selected fire areas and compared the associated fire pre-plans with as-built plant conditions. This was done to verify that they were consistent with the fire protection features and potential fire conditions described in the UFSAR. Additionally, the team reviewed drawings and engineering flood analysis associated with the 261' elevation reactor auxiliary building floor and equipment drain system to verify that those actions required for ASD would not be inhibited by fire suppression activities or leakage from fire suppression systems.

The team reviewed the fire brigade response procedure, fire brigade organization, training and drill program administration procedures. Fire drill critiques of operating shifts for the period of March 2001 through October 2002 were reviewed to verify that fire brigade drills had been conducted in high fire risk plant areas. Fire brigade training/drill records for 2002 were also reviewed to verify that the fire brigade personnel qualifications, brigade drill response time, and brigade performance met the requirements of the licensee's approved FPP. Additionally, the team observed a fire drill to verify the licensee's implementation of the fire brigade organization, training, and drill program administration procedures. The team observed the actions of the site fire brigade, offsite fire department, and fire drill monitors; and attended the drill critique.

b. Findings

No findings of significance were identified.

.03 Post-Fire SSD Circuit Analysis

a. Inspection Scope

The team reviewed the adequacy of separation and fire barriers provided for the power and control cabling of equipment relied on for SSD during a fire in any of the selected fire areas/zones. On a sample basis, the team reviewed the electrical schematics for power and control circuits of SSD components and looked for the potential effects of open circuits, shorts to ground, and hot shorts. This review focused on the cabling of selected components for the charging/safety injection system, AFW system, and component cooling water (CC) system. The team traced the routing of cables by using the cable schedule and conduit and tray drawings. Walkdowns were performed to compare 1-hour and 3-hour barriers (conduit and tray wraps) to barriers indicated on the drawings. Circuits and cabling routings were reviewed for the following equipment: 1CS-169,

charging/safety injection pump (CSIP) suction cross connect MOV; 1CS-168, CSIP suction cross connect MOV; 1CS-214, CSIP minimum flow MOV; 1CS-217, CSIP discharge cross connect MOV; 1CS-218, CSIP discharge cross connect MOV; 1CS-219, CSIP discharge cross connect MOV; 1CS-165, volume control tank (VCT) outlet MOV; 1CS-166, VCT outlet MOV; 1CS-278, boric acid tank (BAT) to CSIP MOV; BAT level instrumentation; 1CC-207, CC supply to RCP seals MOV; 1CC-208, CC supply to RCP seals MOV; 1CC-252, CC return from RCP seals MOV; 1CC-251, CC return from RCP seals MOV; 1CC-249, CC return from RCP seals MOV; 1RC-117, pressurizer power-operated relief valve (PORV) block valve; 1SI-310, containment sump to 'A' RHR pump MOV; 1SI-311, containment sump to 'B' RHR pump MOV; motor-driven AFW pump 1A; motor-driven AFW pump 1B; and turbine-driven AFW pump.

The team also reviewed studies of overcurrent protection on both AC and DC systems to check whether fire induced faults could result in defeating the safe shutdown functions.

b. Findings

(1) MOV 1CS-165, VCT Outlet to CSIPs

Introduction

The team identified an NCV of OLC 2.F, Fire Protection Program; and Technical Specification (TS) 6.8.1, Procedures and Programs; for failing to provide a fire barrier to protect equipment (MOV 1CS-165), that was relied upon for safe shutdown (SSD), from maloperation due to a fire; and for failing to provide procedural guidance for operators to prevent or mitigate the maloperation.

Description

The team found that the control power cable for charging system MOV 1CS-165, which was relied upon to remain open for SSD during a fire in SSA areas 1-A-BAL-B-B1 and 1-A-BAL-B-B2, and in fire area 1-A-EPA, was routed through those areas with no fire barrier. This lack of a required fire barrier was not recognized in the SSA and no procedural guidance was included in AOP-36, Safe Shutdown Following a Fire, Rev. 21, for operators to prevent or mitigate maloperation of 1CS-165 prior to damage occurring to SSD equipment. Consequently, a fire in one of the three areas could cause 1CS-165 to spuriously close, stop all CSIP suction, and immediately damage the operating SSD CSIP.

The SSD analysis for a fire in areas 1-A-BAL-B-B1, 1-A-BAL-B2, or 1-A-EPA was to rely on SSD division 2 equipment. This included reliance on CSIP 'B' for RCS makeup water, RCP seal cooling, reactivity control by boration, and high pressure safety injection. CSIP 'A' was not assured to be unaffected by the fire and CSIP 'C' was not assured to be available. Consequently, a failure of CSIP 'B' could result in a loss of all charging and high pressure safety injection. Also, for a fire in any of these three areas, CC to the RCP seals was not protected. The team found that the control power cable to MOV 1CC-207, CC flow to RCP seals, was also routed through the same three areas and in the same cable tray with the control power cable to 1CS-165. Spurious closure of MOV 1CC-207 would stop all CC flow to the seals of all three RCPs. Thus the potential consequences

of a fire in any of the three areas could be an RCP seal LOCA with no operable CSIP.

In addition, the team found that the control power cable for MOV 1CC-252, CC return from RCP seals, was routed through SSA area 1-A-BAL-B-B2 and could be affected by a fire in that area. AOP-36 included an operator action to prevent spurious actuation of 1CC-252 for a fire in SSA area 1-A-BAL-B-B2. That action included opening the breaker to the MOV on MCC 1E12. However, the SSD AO would likely not be able to safely do that during a fire in SSA area 1-A-BAL-B-B2 because MCC 1E12 was located in that area. Spurious closure of 1CC-252 would stop all CC to the RCP seals. The team noted that, while this operator action may not be needed for a fire in SSA area 1-A-BAL-B-B2 because the charging system was supposed to provide RCP seal cooling, this inappropriate procedural action (sending an operator into an area on fire) could delay the SSD AO from performing other actions that were needed.

The team found that modification ESR 01-00087, which was installed in about January 2002, had affected this condition and missed an opportunity to correct it. ESR 01-00087 changed the CSIP mini-flow path so that it would go to the VCT instead of bypassing the VCT and going directly to the CSIP suction. Prior to the ESR, if 1CS-165 spuriously closed, the running CSIP would still have some suction although probably not enough to prevent pump damage. After the ESR, if 1CS-165 spuriously closed, the running CSIP would have no suction and its failure would be more certain and more immediate. ESR 01-00087 failed to recognize this effect and missed an opportunity to identify and correct the condition.

Analysis

This finding had more than minor safety significance because it affected the Mitigating Systems and Initiating Events objectives of the Reactor Safety Cornerstone. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. It also affected the likelihood of occurrence of initiating events that challenge critical safety functions. However, the finding was of very low safety significance because of the low fire initiation frequency and probability of spurious actuations, and the effectiveness of automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green.

Enforcement

OLC F. required that the licensee implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report. The UFSAR, Section 9.5.1, Fire Protection Program, stated 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 the redundant divisions must be ensured to be free of fire damage. Section 9.5.1 further stated that one division is to be 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.

TS 6.8.1 required procedures as recommended by Regulatory Guide (RG) 1.33 and procedures for fire protection program implementation. RG 1.33 recommended procedures for combating emergencies, including fires. The licensee's interpretation of their fire protection program was that they could and would rely on operator actions in place of physical protection of SSD equipment (see Section _____). However, the licensee had failed to provide procedural guidance in AOP-36 for operators to prevent the maloperation of MOV 1CS-165.

Contrary to the above requirements, the licensee failed to protect MOV 1CS-165 from maloperation due to a fire where it was relied on for SSD. Because the licensee entered the finding into the corrective action program as AR76260, this item is being treated as an NCV in accordance with Section VI.A.1 of the NRC's Enforcement Policy. This item is identified as NCV 50-400/02-11-01, Failure to Protect MOV 1CS-165, VCT Outlet to CSIPs, From Maloperation Due To a Fire.

(2) MOV 1CC-251, CC Return From RCP Seals; and MOV 1CC-208, CC Supply To RCP Seals

Introduction

The team identified an NCV of OLC 2.F and TS 6.8.1 for failing to provide a fire barrier to protect equipment (MOV 1CC-251 and MOV 1CC-208) that was relied upon for SSD from maloperation due to a fire, and for failing to provide procedural guidance for operators to prevent or mitigate the maloperation.

Description

The team found that the control power cables for CC system MOVs 1CC-251 and 1CC-208, which were relied upon to remain open for SSD during a fire in area 1-A-BAL-C, were routed through that area with no fire barrier. Fire area 1-A-BAL-C was located on the 286 foot level of the auxiliary building, above electrical penetration room 'B'. This lack of a required fire barrier was not recognized in the SSA and no procedural guidance was included in AOP-36 for operators to prevent or mitigate maloperation of these valves. Consequently, a fire in this area could cause 1CC-251 or 1CC-208 to spuriously close, which would stop all CC to the RCP seals.

The SSD analysis for a fire in area 1-A-BAL-C was to rely on SSD division 1 equipment. This included reliance on CC to cool the RCP seals. CSIP supply to the RCP seals was not assured to be unaffected by the fire. Consequently, a loss of CC to the RCP seals could result in a loss of all RCP seal cooling which could in turn result in an RCP seal failure and a LOCA.

Analysis

This finding had more than minor safety significance because it affected the Initiating Events objective of the Reactor Safety Cornerstone. The finding affected the likelihood of occurrence of initiating events that challenge critical safety functions. However, the

finding was of very low safety significance because of the low fire initiation frequency and probability of spurious actuations, and the effectiveness of automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green.

Enforcement

As described in Section .03.b.1 above, OLC F. required equipment relied upon for SSD be physically protected against maloperation due to the fire. Also, TS 6.8.1 required procedures for implementing the fire protection program and for combating fires.

Contrary to the above requirements, the licensee failed to protect MOV 1CS-165 from maloperation due to a fire where it was relied on for SSD. Because the licensee entered the finding into the corrective action program as AR 80089, this item is being treated as an NCV in accordance with Section VI.A.1 of the NRC's Enforcement Policy. This item is identified as NCV 50-400/02-11-02, Failure to Protect MOVs 1CC-251 and 1CC-208, CC for RCP Seals, From Maloperation Due To a Fire.

(3) MOV 1CS-169, CSIP Suction Cross-connect; MOV 1CS-214, CSIP Mini-flow Isolation; MOV 1CS-218, CSIP Discharge Cross-connect; and MOV 1CS-219, CSIP Discharge Cross-connect

Introduction

The team identified an NCV of OLC 2.F and TS 6.8.1 for failing to provide a fire barrier to protect equipment (MOVs 1CS-169, 1CS-214, 1CS-218, and 1CS-219) that was relied upon for SSD from maloperation due to a fire, and for failing to provide procedural guidance for operators to prevent or mitigate the maloperation.

Description

The team found that the control power cables for charging system MOVs 1CS-169, 1CS-214,1CS-218, and 1CS-219, which were relied upon to remain open for SSD during a fire in area 1-A-BAL-B-B5, were routed through that area with incomplete fire barriers. The control cables were unprotected for about one foot above MCC 1-A35-SA and inside the MCC.

This lack of a required fire barrier was recognized in the SSA for 1CS-169, 1CS-214, and 1CS-218, and procedural guidance was included in AOP-36 for operators to prevent maloperation of these valves. However, the procedural guidance was not adequate. AOP-36 directed operators to go to MCC 1-A35-SA and open the breakers for 1CS-169 and 1CS-214 to prevent spurious operation. However, operators would not be able to safely do that because the actions were in the area of the fire that could cause the spurious operation. AOP-36 directed operators to go to MCC 1-B35-SB, in another room, to open the breaker for 1CS-218. However, operators would not be able to do that because the breaker for 1CS-218 was actually located on MCC 1-A35-SA. AOP-36 included no operator guidance for 1CS-219.

AOP-36 did include the following guideline for operators: "Monitor for spurious valve and

pump operation which may result in equipment damage (for example, CSIP suction valves.)" The team noted that closure of a CSIP suction valve could result in pump damage within seconds; before operators could respond to an annunciator, analyze the condition, and take action to prevent pump damage. Another AOP-36 guideline was: "When directed by the Unit SCO, then shut down equipment and de-energize electrical busses located within the fire area." Operators stated that they would de-energize MCC 1-A35-SA if the fire brigade team leader or another operator told them that the MCC was on fire or if they observed spurious actuations that could be initiating from the MCC. However, the team noted that the fire brigade would not arrive at the fire until about 22 minutes after the control room sounded the fire alarm, and spurious actuations could well occur before that. By procedure, control room operators would respond to a single fire detector annunciator by sending an AO to verify that there was a fire and that the fire was large enough to warrant sounding the fire alarm and calling out the fire brigade. However, if the control room received annunciation from two or more fire detectors, which would be very likely in the event of fire large enough to present an operational safety concern, then they would not send an AO but instead would immediately sound the fire alarm and call out the fire brigade. So it was likely that the first visual report on the fire would not be received in the control room until about 22 minutes after the fire alarm. By that time, the fire would likely have filled the room with smoke so that the fire brigade may not be able to see if the MCC was on fire.

The team concluded that it was unlikely that the control room would de-energize MCC 1-A35-SA before spurious actuations could occur. Consequently, a fire in this area, near MCC 1A35-SA, could cause any of the four MOVs to spuriously close. Closure of 1CS-214 would stop all mini-flow from all CSIPs. Closure of 1CS-218 or 1CS-219 would stop charging flow from SSD CSIP 'B'. If such a loss of charging flow or CSIP mini-flow occurred, operators would receive an alarm in the control room and would probably have time to diagnose the condition and initiate recovery action. However, closure of 1CS-169 would stop all suction to SSD CSIP 'B' and immediately damage the pump.

The SSD analysis for a fire in area 1-A-BAL-B-B5 was to rely on SSD division 2 equipment. This included reliance on CSIP 'B' for RCS makeup water, RCP seal cooling, reactivity control by boration, and high pressure safety injection. CSIP 'A' was not assured to be unaffected by the fire and CSIP 'C' was not assured to be available. The team noted that MOVs powered from MCC 1-A35-SA could affect CSIP 'A' and CSIP 'C". Consequently, a failure of CSIP 'B' could result in a loss of all charging, RCP seal cooling, and high pressure safety injection. Thus the potential consequences of a fire in SSA area 1-A-BAL-B5 could be an RCP seal LOCA with no operable CSIP.

Analysis

This finding had more than minor safety significance because it affected the Mitigating Systems and Initiating Events objectives of the Reactor Safety Cornerstone. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. It also affected the likelihood of occurrence of initiating events that challenge critical safety functions. However, the finding was of very low safety significance because of the low fire initiation frequency and probability of spurious actuations, and the effectiveness of automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor.

Therefore, this finding is characterized as Green.

Enforcement

As described in Section .03.b.1 above, OLC F. required equipment relied upon for SSD be physically protected against maloperation due to the fire. Also, TS 6.8.1 required procedures for implementing the fire protection program and for combating fires.

Contrary to the above requirements, the licensee failed to protect MOVs 1CS-169,1CS-214,1CS-218, and 1CS-219 from maloperation due to a fire where they were relied on for SSD. Because the licensee entered the finding into the corrective action program as ARs 76260 and 80212, this item is being treated as an NCV in accordance with Section VI.A.1 of the NRC's Enforcement Policy. This item is identified as NCV 50-400/02-11-03, Failure to Protect Charging System MOVs 1CS-169, 1CS-214, 1CS-218, and 1CS-219 From Maloperation Due To a Fire.

(4) MOV 1CS-166, VCT Outlet to CSIPs; MOV 1CS-168, CSIP Suction Cross-connect; and MOV 1CS-217, CSIP Discharge Cross-connect

Introduction

The team identified an NCV of OLC 2.F and TS 6.8.1 for failing to provide a fire barrier to protect equipment (MOVs 1CS-166, 1CS-168, and 1CS-217) that was relied upon for SSD from maloperation due to a fire, and for failing to provide procedural guidance for operators to prevent or mitigate the maloperation.

Description

The team found that the control power cables forcharging system MOVs 1CS-166, 1CS-168, and 1CS-217, which were relied upon to remain open for SSD during a fire in area 1-A-BAL-B-B4, were routed through that area with incomplete fire barriers. The control cable for MOV 1CS-166 was unprotected for about one foot above MCC 1B35-SB and inside the MCC. The control power cables for MOVs 1CS-168 and 1CS-217 were unprotected inside MCC 1B35-SB. This lack of a required fire barrier was not recognized in the SSA and no procedural guidance was included in AOP-36 for operators to prevent or mitigate maloperation of these valves. Consequently, a fire in this area, near MCC 1B35-SB, could cause 1CS-166 or 1CS-168 to spuriously close, which would stop all suction to SSD CSIP 'A', and immediately damage the pump. If CSIP 'C' were aligned to be used in place of CSIP 'A', then the fire could cause spurious closure of 1CS-217 and stop charging flow from CSIP C.

The SSD analysis for a fire in area 1-A-BAL-B-B4 was to rely on SSD division 1 equipment. This included reliance on CSIP 'A' for RCS makeup water, reactivity control by boration, and high pressure safety injection. CSIP 'B' was not assured to be unaffected by the fire and CSIP 'C' was not assured to be available. Consequently, a failure of CSIP 'A' could result in a loss of all charging and high pressure safety injection. If CSIP 'C' were aligned to be operating in place of CSIP 'A', and a maloperation of 1CS-217 caused a loss of charging flow, operators would receive a loss of charging flow alarm and would have time to diagnose and recover from the loss of charging flow.

Analysis

This finding had more than minor safety significance because it affected the Mitigating Systems objectives of the Reactor Safety Cornerstone. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. However, the finding was of very low safety significance because of the low fire initiation frequency and probability of spurious actuations, and the effectiveness of automatic sprinklers, fire brigade, and remaining SSD equipment to limit the effects of a fire and to shut down the nuclear reactor. Therefore, this finding is characterized as Green.

Enforcement

As described in Section .03.b.1 above, OLC F. required equipment relied upon for SSD be physically protected against maloperation due to the fire. Also, TS 6.8.1 required procedures for implementing the fire protection program and for combating fires.

Contrary to the above requirements, the licensee failed to protect MOVs 1CS-166, 1CS-168, and 1CS-217 from maloperation due to a fire where they were relied on for SSD. Because the licensee entered the finding into the corrective action program as AR 76260, this item is being treated as an NCV in accordance with Section VI.A.1 of the NRC's Enforcement Policy. This item is identified as NCV 50-400/02-11-04, Failure to Protect Charging System MOVs 1CS-166, 1CS-168, and 1CS-217 From Maloperation Due To a Fire.

(5) Design of MCCs 1A35-SA and 1B35-SB

Introduction

The team identified an unresolved item (URI) regarding whether the design of MCCs 1A35-SA and 1B35-SB met the requirements for fire barriers to protect SSD components from maloperation.

Description

The team had observed that MCCs 1A35-SA and 1B35-SB included control and power cables and breakers for MOVs that were relied upon to remain open for SSD during a fire in the MCCs (See Sections .03.b.3 and .03.b.4 above.) These breakers were located in the MCCs next to breakers that were not relied upon for SSD during such a fire. Since there were no qualified fire barriers inside the MCCs, the team considered whether a fire starting inside the MCCs could credibly cause spurious actuation (i.e., maloperation) of SSD components.

The team noted that the licensee's IPEEE assumed that the most limiting condition resulting from a fire starting inside one of these MCCs was a loss of power to the MCC due to tripping of the power supply to the MCC. However, the team noted that a spurious actuation resulting in a loss of the charging system would be a more limiting condition that loss of power to the MCC. A licensee engineering manager considered that it was not credible that a fire starting inside an MCC could result in spurious actuations of

breakers in the MCC, because the power supply to the MCC would automatically trip before such spurious actuations could occur.

The team reviewed design drawings and descriptions of the MCCs. Each MCC contained breakers that were arranged in vertical columns. Each column was separated from the adjacent columns by solid sheets of steel. Each column included about four breaker cubicles and a vertical cable pathway. Each breaker cubicle was separated from the cubicles above and below it by solid sheets of steel, but each breaker cubicle had an opening to the vertical cable pathway. The power and control cables for the breakers in a column generally entered the MCC at the top, but some entered at the bottom. In some columns, all power and control cables for all breakers in the column were in close proximity near the top of the MCC, with essentially no physical separation or fire barrier.

Licensee engineers stated that the design of these MCCs, with SSD breakers co-located with non-SSD breakers, was common at Shearon Harris and at other nuclear power plants. This breaker arrangement resulted from the design requirements for internal events, where there were two separate trains of electrical power such that the plant could safely shut down with only one train being powered. Consequently, where two MOVs in series had a safety function to be able to close, each was powered from a different electrical train of power to ensure that at least one would be able to close. Two MOVs in series were used in many applications, including containment isolation, CSIP suction cross-connects, CSIP discharge cross-connects, and the VCT outlet to the CSIPs. Each of the two MOVs in series was powered from a different electrical train and a different MCC . However, for SSD during a fire, these same MOVs had a different safety function - to remain open. If either one spuriously closed, it would shut off a required SSD flowpath. Licensee engineers contended that they could not design the plant to preclude having breakers for MOVs in the same fire area for which they were relied upon to remain open for SSD.

Analysis

If a fire initiating in an MCC could credibly cause spurious actuations of SSD equipment in the MCC, the observed condition could have more than minor safety significance because it could affect the Mitigating Systems objectives of the Reactor Safety Cornerstone. The condition could affect the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. The condition could also have generic applicability.

Followup Action

URI 50-400/02-11-05, Credibility of a Fire Inside an MCC Causing Spurious Actuations, is opened for further NRC review of this design condition.

.04 Operational Implementation of SSD Capability

.05 Emergency Communications

The guidelines established by BTP CMEB 9.5-1, Section C.5.g, "Lighting and Communication," paragraph (4), required that a portable communications system should be provided for use by the fire brigade and other operations personnel required to achieve safe plant shutdown. This system should not interfere with the communications capabilities of the plant security force. Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage.

a. Inspection Scope

The team reviewed the adequacy of the communication systems relied upon to coordinate the shutdown of the unit and fire brigade duties, including the site paging (PA), portable radio, and sound-powered phone systems. The team reviewed the licensee's portable radio channel features to assess whether the system and its repeaters were protected from exposure fire damage. During walkdowns of sections of the post-fire SSD procedure, the team checked if adequate communications equipment would be available for the personnel performing the procedure. The team also reviewed the periodic testing of the site fire alarm and PA systems; maintenance checklists for the sound-powered phone circuits and amplifiers; and inventory surveillance of post-fire SSD operator equipment to assess whether the maintenance/surveillance test program for the communications systems was sufficient to verify proper operation of the systems.

b. Findings

No findings of significance were identified.

.06 Emergency Lighting

a. Inspection Scope

The team reviewed the design and operation of, and examined the manufacturer's information for the direct current (DC) emergency lighting system self-contained, battery powered emergency lighting units (ELUs) as described in UFSAR Sections 9.5.1.2.2.e and 9.5.3. During plant walk downs of selected areas where operators performed local manual actions defined in the post-fire SSD procedure, the team inspected area ELUs for operability and checked the aiming of lamp heads to determine if adequate illumination was available to correctly and safely perform the actions required by the procedures. The team inspected emergency lighting features along access and egress pathways used during SSD activities for adequacy and personnel safety. The locations and identification numbers on the ELUs were compared to design drawings to confirm the as-

built configuration. The team also checked if these battery power supplies were rated with at least an 8-hour capacity. In addition, the team reviewed licensee periodic maintenance tests to verify that the ELUs were being maintained in an operable manner.

b. Findings

No findings of significance were identified.

.07 Cold Shutdown Repairs

a. Inspection Scope

The team reviewed existing procedures and examined plant equipment to establish that the licensee had dedicated repair procedures, equipment, and materials to accomplish repairs of damaged components required for cold shutdown, that these components could be made operable, and that cold shutdown could be achieved within 72 hours. The team examined cold shutdown repair equipment and replacement electrical power and control cables for systems needed to take the plant to cold shutdown following a large fire. The team evaluated the estimated manpower and the time required to perform post-fire repairs for reasonableness.

b. Findings

No findings of significance were identified.

.08 Fire Barriers and Fire Area/Zone/Room Penetration Seals

a. Inspection Scope

The team walked down the selected fire zones/areas to evaluate the adequacy of the fire resistance of barrier enclosure walls, ceilings, floors, and cable protection. This evaluation also included fire barrier penetration seals, fire doors, fire dampers, cable tray fire stops, and fire barrier partitions to ensure that at least one train of SSD equipment would be maintained free of fire damage from a single fire. The team observed the material condition and configuration of the installed fire barrier features and also reviewed construction details and supporting fire endurance tests for the installed fire barrier features. The team compared the observed fire barrier penetration seal configurations to the design drawings and tested configurations. The team also compared the penetration seal ratings with the ratings of the barriers in which they were installed. In addition, the team reviewed licensing documentation, engineering evaluations of Generic Letter 86-10 fire barrier features, and NFPA code deviations to verify that the fire barrier installations met design requirements and license commitments.

b. Findings

No findings of significance were identified.

.09 Fire Protection Systems, Features, and Equipment

a. Inspection Scope

The team reviewed flow diagrams, electrical schematic diagrams, periodic test procedures, engineering technical evaluations for NFPA code deviations, operational valve lineup procedures, and cable routing data for the power and control circuits of the motor-driven fire pump, the diesel-driven fire pump, and the fire protection water supply system yard mains. The review evaluated whether the common fire protection water delivery and supply components could be damaged or inhibited by fire-induced failures of electrical power supplies or control circuits and subsequent possible loss of fire water supply to the plant. Additionally, team members walked down the fire protection water supply system in selected fire areas to assess the adequacy of the system material condition, consistency of the as-built configuration with engineering drawings, and operability of the system in accordance with applicable administrative procedures and NFPA standards.

The team examined the adequacy of installed fire protection features in accordance with the fire area and system spatial separation and design requirements in BTP CMEB 9.5-1. The team walked down accessible portions of the fire detection and alarm systems in the selected fire areas to evaluate the engineering design and operation of the installed configurations. The team also reviewed engineering drawings for fire detector spacing and locations in the four selected fire areas for consistency with the licensee's fire protection plan and the requirements in NFPA 72E.

The team also walked down the selected fire zones/areas with automatic sprinkler suppression systems installed to assure proper type, placement and spacing of the heads/nozzles and the lack of obstructions. The team examined vendor information, engineering evaluations for NFPA code deviations, and design calculations to verify that the required suppression system density for each protected area was available.

The team reviewed the adequacy of the design, installation and operation of the manual suppression standpipe and fire hose system for the selected fire areas. The team examined design calculations and evaluations to verify that the required fire hose water flow and sprinkler system density for each protected area were available. The team checked a sample of manual fire hose lengths to determine whether they would reach the SSD equipment. Additionally, the team observed placement of the fire hoses and extinguishers to assess consistency with the fire fighting pre-plan drawings.

b. Findings

No findings of significance were identified.

.10 Compensatory Measures

a. Inspection Scope

The team reviewed the licensee's Fire Protection System Engineering Status Reviews which identifies each fire protection system's performance problems and regulatory issues. The team also reviewed the Fire Protection Out of Service Log generated for the last 18 months and associated compensatory measures. The review was performed to

verify that the risk associated with removing fire protection and/or post-fire systems or components was properly assessed and adequate compensatory measures were implemented in accordance with the approved fire protection program.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES (OA)

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed the corrective action program procedures and a selected sample of condition reports associated with the Harris FPP to verify that the licensee had an appropriate threshold for identifying issues. The team also reviewed licensee audits and assessments of fire protection and safe shutdown. The team evaluated the effectiveness of the corrective actions for the identified issues.

b. Findings

The team found that licensee audits and self-assessments in the area of SSD were weak. They had not identified the types of findings that this inspection found. Contributing factors included a lack of attention to detail; for example, not tracing cable routings or walking down operator actions as was done in this inspection. In addition, the CP&L corporate Nuclear Assessment Section (NAS) audits of fire protection at Shearon Harris did not look at SSD. A Peer Report included in the November 2000 NAS audit of Shearon Harris fire protection stated: "Harris NAS Fire Protection Program Audits of recent past have not included fire events safe shutdown within the scope of the audits due to a reliance on engineering self-assessments. It is the opinion of the auditor that the scope of future Harris NAS Fire Protection assessments should include fire events safe shutdown related documentation and activities." However, the team noted that subsequent NAS audits of Harris fire protection did not audit SSD.

4OA6 Meetings

Exit Meeting Summary

The team presented the inspection results to you and members of your staff at the conclusion of the inspection on December 20, 2002. You acknowledged the findings presented. Proprietary information is not included in this inspection report.

SUPPLEMENTAL INFORMATION

Partial List of Persons Contacted

Licensee

D. Baksa, Supervisor, Equipment Perfromance
J. Caves, Licensing Supervisor
R. Duncan, Director of Site Operations
M. Fletcher, Manager, Fire Protection Program
P. Fulford, Superintendent, Design Engineering
C. Georgeson, Supervisor, EI&C Design
W. Gregory, Operations Fire Protection Specialist
W. Gurganion, Manager, NAS
T. Hobbs, Manager, Operations
A. Khanpour, Manager, Engineering
F. Lane, Jr., Senior Nuclear Work Management Specialist
J. Laque, Manager, Maintenance
T. Morton, Site Services Manager
J. Scarola, Site Vice President
B. Waldrep, Plant General Manager

NRC

J. Brady, Senior Resident Inspector, Shearon Harris
H. Christensen, Deputy Director, Division of Reactor Safety (DRS), Region II (RII)
C. Ogle, Chief, Engineering Branch 1, DRS, RII

Items Opened, Closed, and Discussed

Opened

50-400/02-11-01	NCV	Failure to Protect Charging System MOV 1CS-165, VCT Outlet to CSIPs, From Maloperation Due To a Fire (Section 1R05.03.b.1)
50-400/02-11-02	NCV	Failure to Protect Component Cooling MOVs 1CC-251 and 1CC-208, CC for RCP Seals, From Maloperation Due To a Fire (Section 1R05.03.b.2)
50-400/02-11-03	NCV	Failure to Protect Charging System MOVs 1CS-169, 1CS-214, 1CS-218, and 1CS-219 From Maloperation Due To a Fire (Section 1R05.03.b.3)
50-400/02-11-04	NCV	Failure to Protect Charging System MOVs 1CS-166, 1CS-168, and 1CS-217 From Maloperation Due To a Fire (Section 1R05.03.b.4)
50-400/02-11-05	URI	Credibility of a Fire Inside an MCC Causing Spurious

Actuations (Section 1R05.03.b.5)

50-400/02-11-06

50-400/02-11-07

50-400/02-11-08

50-400/02-11-09

50-400/02-11-10

Closed

None

Discussed

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