UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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ATLANTA, GEORGIA 30303-8931

January 31, 2003

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 INSPECTION REPORT 50-400/02-11

Dear Mr. Scarola:

On December 20, 2002, the U.S. Nuclear Regulatory Commission (NRC) completed a triennial fire protection inspection at your Shearon Harris Nuclear Power Plant. The enclosed 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 nine findings that collectively have a potential safety significance of greater than very low significance; however, a safety significance determination has not yet been completed. These issues could have presented a potential immediate safety concern. However, the issues are entered into your corrective action program and compensatory measures are in place while long-term corrective measures are being implemented. Please be advised that the characterization and number of these findings could potentially change with further NRC review. In addition, since some 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.

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 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 50-400/02-11
w/Attachments: 1. Supplemental Information
2. Operator Actions
3. Emergency Lighting

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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 Power 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) 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:	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 05000400/2002-011; Carolina Power & Light; 10/21/2002 - 12/20/2002; Shearon Harris Nuclear Power Plant, Triennial Baseline Inspection of the Fire Protection Program.

The inspection was conducted by a team of regional inspectors and the Shearon Harris resident inspector. Nine findings were identified that collectively have a potential safety significance of greater than very low significance; however, a safety significance determination has not yet been completed. 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 and Self-Revealing Findings

Cornerstones: Mitigating Systems and Initiating Events

- TBD. Physical and procedural protection for equipment that was relied on for safe shutdown (SSD) during a fire in safe shutdown analysis (SSA) areas 1-A-BAL-B1, 1-A-BAL-B2, and 1-A-EPA of the reactor auxiliary building were inadequate. Motor-operated valve 1CS-165, volume control tank outlet to charging/safety injection pumps was not protected physically or procedurally from maloperation due to a fire. Consequently, a fire in one of the three SSA areas could result in a reactor coolant pump seal loss of coolant accident (LOCA) with no high pressure safety injection available.

  A violation of Operating License Condition 2.F, the Fire Protection Program, and Technical Specification (TS) 6.8.1 was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could result in a loss of equipment that was relied upon for SSD from a fire and could initiate a LOCA event. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.03.b.1)

- TBD. Physical and procedural protection for equipment that was relied on for SSD during a fire in SSA area 1-A-BAL-B-B5 of the reactor auxiliary building were inadequate. Motor-operated valves 1CS-169, charging/safety injection pump (CSIP) suction cross-connect; 1CS-214, CSIP mini-flow isolation; 1CS-218, CSIP discharge cross-connect; and 1CS-219, CSIP discharge cross-connect; were not protected physically or procedurally from maloperation due to a fire. Consequently, a fire in SSA area 1-A-BAL-B-B5 could result in a loss of all charging and high pressure safety injection.

  A violation of Operating License Condition 2.F, the Fire Protection Program, and TS 6.8.1 was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could result in a loss of equipment that was relied upon for SSD from a fire. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.03.b.2)

- TBD. Physical and procedural protection for equipment that was relied on for SSD during a fire in SSA area 1-A-BAL-B-B4 of the reactor auxiliary building were inadequate. Motor operated valves 1CS-166, volume control tank outlet to CSIPs; and 1CS-168, CSIP suction cross-connect; were not protected physically or procedurally from maloperation due to a fire. Consequently, a fire in SSA area 1-A-BAL-B-B4 could result in a loss of all charging and high pressure safety injection.

  A violation of Operating License Condition 2.F, the Fire Protection Program, and TS 6.8.1 was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could result in a loss of equipment that was relied upon for SSD from a fire. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.03.b.3)

- TBD. Physical and procedural protection for equipment that was relied on for SSD during a fire in SSA area 1-A-BAL-C of the reactor auxiliary building were inadequate. Motor operated valves 1CC-208, component cooling water (CC) supply to reactor coolant pump (RCP) seals; and 1CC-251, CC return from RCP seals; were not protected physically or procedurally from maloperation due to a fire. Consequently, a fire in SSA area 1-A-BAL-C could potentially result in an RCP seal LOCA.

  A violation of Operating License Condition 2.F, the Fire Protection Program, and TS 6.8.1 was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could result in a loss of equipment that was relied upon for SSD from a fire and could initiate a LOCA event. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.03.b.4)

- TBD. Many local manual operator actions were used in place of the required physical protection of cables for equipment relied on for SSD during a fire, without obtaining NRC approval for these deviations from the approved fire protection program. This condition applied to all areas that were inspected, including the new auxiliary control panel fire area that had been recently created as corrective action for previous Violation 50-400/02-08-01. This reliance on large numbers of local manual actions, in place of the required physical protection of cables, could potentially result in an increased risk of loss of equipment that was relied upon for SSD from a fire.

  A violation of Operating License Condition 2.F and the Fire Protection Program was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could potentially result in an increased risk of loss of equipment that was relied upon for SSD from a fire. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.04.b.1)

- TBD. Procedure steps for safe shutdown (SSD) from a fire and related corrective action for previous Violation 50-400/02-08-01 were inadequate. For a fire in the new auxiliary control panel fire area, certain cables were not physically protected from the fire and certain SSD procedure steps, that were used in place of physical protection of cables, involved excessive challenges to operators. Consequently, a fire in the ACP fire area could result in a loss of all auxiliary feedwater.

A violation of Operating License Condition 2.F, the Fire Protection Program, and TS 6.8.1 was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could result in a loss of equipment that was relied upon for SSD from a fire. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.04.b.2)

- TBD. A procedure for SSD from a fire and related corrective action for previous Violation 50-400/02-08-01 were inadequate. For a fire in certain safe shutdown analysis areas of the reactor auxiliary building, including the new auxiliary control pane fire area, there were too many SSD procedure contingency actions to respond to potential spurious actuations for the one designated SSD non-licensed operator to perform. Consequently, equipment that was relied on for SSD may not be available.

  A violation of Operating License Condition 2.F, the Fire Protection Program, and TS 6.8.1 was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could result in a loss of equipment that was relied upon for SSD from a fire. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.04.b.3)

- TBD. A procedure for SSD from a fire was inadequate. For a fire in safe shutdown analysis areas near the boric acid tank (BAT) in the reactor auxiliary building, the SSD procedure directed operators to take CSIP suction from the BAT even if BAT level indication were lost. However, the charging volume needed for reactor coolant system cooldown would have emptied the BAT and damaged the CSIP.

  A violation of Operating License Condition 2.F, the Fire Protection Program, and TS 6.8.1 was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could result in a loss of equipment that was relied upon for SSD from a fire. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.04.b.4)

- TBD. Required battery-backed emergency lights were not provided in locations where operators were required to perform actions for SSD from a fire. This condition affected SSD during fires in all of the areas inspected in the reactor auxiliary building, including the new auxiliary control panel fire area that was created as corrective action for previous Violation 50-400/02-08-01. The lack of required lighting could result in an increased risk of operators failing to perform the SSD actions in a timely and accurate manner.

  A violation of Operating License Condition 2.F, the Fire Protection Program, was identified. However, this finding is unresolved pending completion of a significance determination. The finding is greater than minor because it could result in an increased risk of operators failing to perform the SSD actions in a timely and accurate manner.

Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. (Section 1R05.06.b)

B. Licensee-Identified Violations

None

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, Operating License Condition (OLC) 2.F, FPP; Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1 (NUREG-0800), July 1981; related NRC Safety Evaluation Reports (SERs) in NUREG 1038, and plant TSs. 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 reactor auxiliary building (RAB). It was further subdivided in the licensee's SSA into SSA areas **1-A-BAL-B-B1** [including the 'A' chiller and motor-driven auxiliary feedwater (AFW) pump flow control valves (FCVs)] and **1-A-BAL-B-B2** [including the 'B' chiller and turbine-driven AFW 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 RAB. It was further subdivided in the licensee's SSA into SSA areas **1-A-BAL-B-B4** [including 480V motor control center (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 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 RAB. 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 RAB. 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, system flow diagrams, and the Fire Hazards Analysis (FHA) 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 Attachment 1.

b. Findings

The team found that the licensee's SSA method had identified cables that were required for control room operation of SSD equipment during fires in certain areas but were not physically protected from those fires. For these cables, the SSA method relied generally on operator manual actions to either prevent or mitigate damage resulting from a fire (e.g., locally open the breaker to an MOV and locally operate the MOV using the handwheel), rather than on features which physically protect the cables. Using this method, the licensee generally chose to physically protect these cables only if no reasonable operator action could be identified to prevent or mitigate the fire damage. Consequently, the licensee had identified and relied on more than 100 local manual operator actions to achieve and maintain hot shutdown conditions during fires. The licensee had not requested deviation approvals from the NRC for these operator actions, and had not verified or validated the operator actions to the extent that would have been involved in NRC reviews of deviation requests. This SSD methodology contributed to the findings and unresolved items (URIs) that are described in the following sections.

.02 Fire Protection of SSD Capability

a. Inspection Scope

The team reviewed UFSAR Section 9.5.1, Appendix 9.5A, FHA; the FPP manual; and the plant administrative procedures used to prevent fires and control combustible hazards and ignition sources. 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’ train 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 Limiting Condition for Operation (LCO) requirements for loss of ventilation in the ‘B’ train 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 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’s self-contained breathing apparatus (SCBAs) was reviewed as was 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-foot elevation reactor auxiliary building floor and equipment drain system to verify that those actions required for SSD 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, and 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 the selected fire areas/zones. On a sample basis, the team reviewed the SSA and 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 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 fire barrier wraps) to barriers indicated on the drawings. Circuit and cable routings were reviewed for the following equipment:

- 1CS-165, volume control tank (VCT) outlet MOV;
- 1CS-166, VCT outlet MOV;
- 1CS-168, CSIP suction cross connect MOV;
- 1CS-169, 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-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-249, CC return from RCP seals MOV;
- 1CC-251, CC return from RCP seals MOV;
- 1CC-252, 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
- the turbine-driven AFW pump.

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

b. Findings

(1) SSA Areas 1-A-BAL-B-B1, 1-A-BAL-B-B2, and 1-A-EPA of the RAB

Introduction

The team identified an unresolved item (URI) involving failure to follow the FPP and TS 6.8.1. The URI involved failure to protect equipment that was relied on for SSD during a fire in SSA areas 1-A-BAL-B1, 1-A-BAL-B2, and 1-A-EPA of the RAB from fire damage. MOV 1CS-165, volume control tank outlet to CSIPs, was not protected physically or procedurally from maloperation due to a fire. Consequently, a fire in one of the three SSA areas could result in a reactor coolant pump seal loss of coolant accident (LOCA) with no high pressure safety injection available.

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. As a result, the control power cable for the MOV was vulnerable to fire-induced hot shorts which could result in spurious valve operation. The lack of a required fire barrier was not recognized in the SSA and no procedural guidance was included in Abnormal Operating Procedure (AOP)-36, Safe Shutdown Following a Fire, Rev. 21, for operators to prevent maloperation of 1CS-165 prior to damage occurring to SSD equipment. Consequently, a fire in one of the three SSA areas could cause 1CS-165 to spuriously close, isolate all CSIP suction flowpaths, and immediately damage the operating SSD CSIP.

For fires in SSA areas 1-A-BAL-B-B1, 1-A-BAL-B-B2, or 1-A-EPA the SSD analysis relied on SSD Division 2 equipment to achieve and maintain hot shutdown. This included reliance on CSIP ‘B’ for RCS makeup water, RCP seal cooling, reactivity control by boration, and high pressure safety injection. The SSA assumed that 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 SSA areas, CC flow 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 routed through the same three SSA areas in the same cable tray with the control power cable to 1CS-165. AOP-36 included no operator action to prevent spurious operation of MOV 1CC-207. 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 SSA areas could be an RCP seal LOCA with no charging or high pressure injection.

Also, the team found that the control power cables for MOVs 1CC-252, CC return from RCP seals, and 1CC-249, CC return from RCP seals, were 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 MOV 1CC-252 on MCC 1E12. However, the SSD NLO would likely not be able to safely do that action during a fire in SSA area 1-A-BAL-B-B2 because MCC 1E12 was located in that SSA area. AOP-36 included no operator action for 1CC-249. Spurious closure of 1CC-252 or 1CC-249 would stop all CC flow to the RCP seals. The team noted that, while the operator action for 1CC-252 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 where there was a fire) could delay the SSD NLO from performing other procedure actions that were required to achieve SSD.

In addition, the team found that modification ESR 01-00087, which was installed in 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 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 CSIP 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 objectives of the Mitigating Systems and Initiating Events Cornerstones of Reactor Safety. 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. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

OLC 2.F required that the licensee implement and maintain in effect all provisions of the approved FPP as described in the Final Safety Analysis Report. The UFSAR, Section 9.5.1, FPP, 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 of the redundant divisions must be ensured to be free of fire damage. Section 9.5.1 further stated 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 received no NRC approvals for deviating from these requirements.

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 proceduralized operator actions in place of physically protecting SSD equipment from fire damage (see Section 1R05.04.b.1). However, the licensee had failed to provide procedural guidance in AOP-36 for operators to prevent maloperation of MOV 1CS-165.

Contrary to the above requirements, the licensee failed to ensure that one of the redundant divisions (i.e., SSD Division 2, including MOV 1CS-165) would be free of fire damage. MOV 1CS-165 was not protected from fire damage, either by one of the physical methods described above or by procedures. The licensee entered the finding into the corrective action program as AR 76260.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as URI 50-400/02-11-01, Failure to Protect Charging System MOV 1CS-165, VCT Outlet to CSIPs, From Maloperation Due To a Fire.

(2) SSA Area 1-A-BAL-B-B5 of the RAB

Introduction

The team identified a URI involving failure to follow the FPP and TS 6.8.1. The URI involved failure to protect equipment that was relied on for SSD during a fire in SSA area 1-A-BAL-B-B5 from fire damage. 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; were not protected physically or procedurally from maloperation due to a fire. Consequently, a fire in SSA area 1-A-BAL-B-B5 could result in a loss of all charging and high pressure safety injection.

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 SSA 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. Licensee engineers stated that spurious actuations due to hot shorts in the control cables were not credible during a fire in or near the MCC because the power supply breaker to the MCC would trip first or electrical components within the breaker would be affected by the heat from the fire such that the spurious actuations would be precluded. However, the team found no testing or analysis proving that spurious actuations could not occur.

This lack of required fire barriers 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 1A35-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 in all scenarios because the required actions were in the area of the fire that could cause the spurious operation. AOP-36 directed operators to go to MCC 1B35-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 1A35-SA. The SSA had not identified a need for operator action to prevent maloperation of 1CS-219 and AOP-36 included no action steps for that valve.

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 Shift Supervisor, then shut down equipment and de-energize electrical busses located within the fire area." Operators stated that they would de-energize MCC 1A35-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 normally the fire brigade would not arrive and attack the fire until about 20 minutes after the control room sounded the fire alarm, and spurious actuations could occur well before that. By procedure, control room operators would respond to a single fire detector annunciator by sending an NLO 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 operators 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 NLO but instead would immediately sound the fire alarm and call out the fire brigade. So it was likely that the first visual report on a large fire would not be received in the control room until about 20 minutes after the fire alarm. By that time, the fire would have likely filled the room with smoke so that the fire brigade would not be able to immediately identify if the MCC was on fire.

The team concluded that it was unlikely that the control room would always de-energize MCC 1A35-SA before spurious actuations could occur. Consequently, a fire in this area, near or in 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 actions before CSIP damage occurred. However, closure of 1CS-169 would stop all suction to SSD CSIP 'B' and immediately damage the pump.

For a fire in SSA area 1-A-BAL-B-B5, the SSD analysis 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 1A35-SA could affect CSIP 'A' and CSIP 'C'. While the SSA did not assure that CC would be available, the team did not identify any vulnerabilities of CC to a fire in this area. Consequently, the team concluded that the potential consequences of a fire in SSA area 1-A-BAL-B5 included a loss of all charging and high pressure safety injection.

<u>Analysis</u>

This finding had more than minor safety significance because it affected the objectives of the Mitigating Systems Cornerstone. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

As described in Section 1R05.03.b.1 above, OLC 2.F required that one of the redundant divisions (i.e., SSD Division 2, including MOVs 1CS-169, 1CS-214, 1CS-218, and 1CS-219) would be free of fire damage. 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 assure that one of the redundant divisions (SSD Division 2, including MOVs 1CS-169, 1CS-214, 1CS-218, and 1CS-219) would be free of fire damage. MOVs 1CS-169, 1CS-214, 1CS-218, and 1CS-219 were not protected from fire damage, either by one of the physical methods described above or by procedures. The licensee entered the finding into the corrective action program as ARs 76260 and 80212.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as 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.

(3) SSA Area 1-A-BAL-B-B4 of the RAB

Introduction

The team identified a URI involving failure to follow the FPP and TS 6.8.1. The URI involved failure to protect equipment that was relied on for SSD during a fire in SSA area 1-A-BAL-B-4 from fire damage. MOVs 1CS-166, VCT Outlet to CSIPs; CS-168, CSIP Suction Cross-connect; and 1CS-217, CSIP Discharge Cross-connect; were not protected physically or procedurally from maloperation due to a fire. Consequently, a fire in SSA area 1-A-BAL-B-4 could result in a loss of all charging and high pressure safety injection.

Description

The team found that the control power cables for charging system MOVs 1CS-166, 1CS-168, and 1CS-217, which were relied upon to remain open for SSD during a fire in SSA 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 required fire barriers 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 or in 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’.

For a fire in SSD area 1-A-BAL-B-B4, the SSD analysis 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. Also, when all three CSIPs were available, the ‘C’ CSIP would be aligned to the ‘B’ train; and it would take licensee personnel several hours to align the ‘C’ CSIP to the ‘A’ train. 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 probably have time to diagnose and respond to the condition before the CSIP was damaged.

In addition, the team found that modification ESR 01-00087, which was installed in January 2002, had affected the significance of the lack of protection for 1CS-166. As described above for 1CS-168, ESR 01-00087 was a missed opportunity to identify and correct the lack of protection for 1CS-166.

Analysis

This finding had more than minor safety significance because it affected the objectives of the Mitigating Systems Cornerstone of Reactor Safety. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

As described in Section 1R05.03.b.1 above, OLC 2.F required that one of the redundant divisions (i.e., SSD Division 1, including MOVs 1CS-166, 1CS-168, and 1CS-217) would be free of fire damage. 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 assure that one of the redundant divisions (SSD Division 1, including MOVs 1CS-166, 1CS-168, and 1CS-217) would be free of fire damage. MOVs 1CS-166, 1CS-168, and 1CS-217 were not protected from fire damage, either by one of the physical methods described above or by procedures. The licensee entered the finding into the corrective action program as AR 76260.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as 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.

(4) SSA Area 1-A-BAL-C of the RAB

Introduction

The team identified a URI involving failure to follow the FPP and TS 6.8.1. The URI involved failure to protect equipment that was relied on for SSD during a fire in SSA area 1-A-BAL-C from fire damage. MOV 1CC-251, CC Return From RCP Seals; and MOV

1CC-208, CC Supply To RCP Seals, were not protected either physically or procedurally from maloperation due to a fire in SSA area 1-A-BAL-C. Consequently, a fire in that SSA area could potentially result in an RCP seal LOCA.

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 SSA area 1-A-BAL-C, were routed through that area and into MCC 1B31 in 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 required fire barriers and need for operator actions was recognized in the SSA but 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 flow to the RCP seals.

For a fire in area 1-A-BAL-C, the SSD analysis relied 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 potentially 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 objectives of the Initiating Events Cornerstone of Reactor Safety. The finding affected the likelihood of occurrence of initiating events that challenge critical safety functions. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

As described in Section 1R05.03.b.1 above, OLC 2.F required that one of the redundant divisions (i.e., SSD Division 1, including MOVs 1CC-251 and 1CC-208) would be free of fire damage. 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 assure that one of the redundant divisions (SSD Division 1, including MOVs 1CC-251 and 1CC-208) would be free of fire damage. MOVs 1CC-251 and 1CC-208 were not protected from fire damage, either by one of the physical methods described above or by procedures. The licensee entered the finding into the corrective action program as AR 80089.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as 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.

.04 Operational Implementation of SSD Capability

a. Inspection Scope

The team reviewed and walked down the local manual actions needed to achieve and maintain hot shutdown for fires in all of the selected areas/zones as described in Section 1R05.01.a. These manual actions were described in procedure AOP-036, Safe Shutdown Following a Fire, Rev. 21.

The team also followed up on open VIO 50-400/02-08-01, Failure to Implement and Maintain NRC Approved Fire Protection Program Safe Shutdown System Separation Requirements. That VIO and related White finding had been left open in IR 50-400/02-08. In a supplement to that IR dated October 4, 2002, the NRC had stated that licensee modifications had reduced the risk significance of the degraded Thermo-Lag barrier to that of a Green finding. However, VIO 50-400/02-08-01 was left open pending further NRC review of licensee corrective actions and the development of internal NRC inspection guidance, related to 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. During this inspection, the team reviewed and walked down the local manual actions, needed to achieve and maintain hot shutdown, that were proceduralized by the licensee during this inspection in AOP-36, Rev. 24, for the new ACP room fire area.

The team reviewed and walked down the manual actions described above to verify that:

- The procedures used for SSD were available to the appropriate staff.
- The procedures used for SSD were consistent with the SSA methodology and assumptions and also were consistent with fire pre-plan procedures.
- The actions were described in the fire-protection-related licensing-basis documents.
- The procedures were written so that operator actions could be correctly performed within the times assumed in the SSA.
- Personnel required to achieve and maintain the plant in hot shutdown condition from the MCR could be provided from normal onsite staff, exclusive of the fire brigade.
- Operator and fire brigade staffing would be adequate to complete the required manual actions.
- Operators had sufficient access to the equipment to perform the required actions.
- Access to remote shutdown equipment and operator manual actions would not be inhibited by smoke migration from one area to adjacent plant areas used to accomplish SSD.

- The training program for operators included appropriate lesson plans and job performance measures (JPMs) for SSD activities.

b. Findings

(1) Reliance on Manual Actions In Place of Required Physical Separation or Protection

Introduction

The team identified a URI involving failure to follow the FPP. The URI was related to the licensee's reliance on many manual actions in place of the required physical separation or protection.

Description

The team found that the licensee used many local manual operator actions to achieve and maintain hot shutdown in place of the required physical separation or protection of cables and equipment. Further, the licensee had not obtained NRC approval for these deviations from the approved FPP. This condition applied to all areas inspected, including the new ACP fire area that had been recently created as corrective action for previous Violation 50-400/02-08-01. The local manual operator actions that were reviewed are listed in Attachment 2. The team assessed that during a fire, an SSD NLO would reasonably be able to perform each of the individual reviewed operator actions, except those that are identified below as other findings. However, reliance on all of these manual actions in place of physical separation or protection could increase the risk of failure of SSD equipment to operate during a fire. There could be a risk that the NLO would fail to perform every manual action in a timely and accurate manner, without encountering unforseen difficulties or making a mistake.

Analysis

This issue could have more than minor safety significance because it could affect the objectives of the Mitigating Systems Cornerstone of Reactor Safety. The issue could potentially affect the availability and reliability of sytems that mitigate initiating events to prevent undesirable consequences. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

As described in Section 1R05.03.b.1 above, OLC 2.F required that one of the redundant divisions would be free of fire damage. Further, if both divisions were located in the same area, then one of the divisions was to be physically protected from fire damage by one of three specified methods. The licensee's approved FPP did not provide for reliance on operator actions in place of physical separation or protection of SSD equipment. In addition, OLC 2.F and the UFSAR, Section 9.5.1, FPP, included quality assurance requirements for fire protection. The FPP stated that a QA program was being used to identify and rectify any possible deficiencies in design, construction, and operation of the fire protection systems.

Contrary to the above requirements, the licensee failed to assure that one of the redundant divisions would be free of fire damage by using one of the specified methods. of physical protection. The licensee had not obtained NRC approval for reliance on the operator actions listed in Attachment 2 in place of the required physical separation or protection. In addition, those operator actions in Attachment 2 that are in place of physical protection of cables in the new ACP fire area represent inadequate corrective action for previous Violation 50-400/02-08-01. The licensee had entered this issue into their corrective action program as AR 69721.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as URI 50-400/02-11-05, Reliance on Manual Actions in Place of Required Physical Separation or Protection.

(2) Fire SSD Operator Actions With Excessive Challenges

Introduction

The team identified a URI involving failure to follow the FPP and TS 6.8.1. The URI was related to certain procedure steps for SSD from a fire and for related corrective action for previous VIO 50-400/02-08-01, associated with an inadequate Thermo-Lag fire barrier assembly between the 'B' train switchgear room/ACP room and the 'A' train cable spreading room. For the new ACP room fire area, certain cables were not physically protected from the fire and certain SSD procedure steps, that were used in place of physical protection of cables, involved excessive challenges to operators. Consequently, a fire in the ACP fire area could result in a loss of all auxiliary feedwater.

Description

For a fire in Fire Area 1-A-ACP, AOP-36 steps 2.c and 14.a required the NLO to remove fuses from transfer panel 1B. Completing these steps would include the following challenges:

- The subject transfer panel was physically located approximately 20 feet from the ACP room door. With a fire in the ACP room, the area around the transfer panel could become uninhabitable before the NLO could complete these steps, because some smoke from the fire could enter the transfer panel area from around the door while the door was closed, and because smoke would certainly enter the transfer panel area when the door was opened by the fire brigade to attack the fire.

- To physically reach the subject fuses, the NLO would need to place his or her entire body inside a cabinet with an opening that was approximately 15 inches wide. Also, the inside of the cabinet included energized electrical components on each side of the cabinet, with about 15 inches of width between them. The licensee had not ensured that all NLOs were physically capable of safely entering that cabinet - the team noted that some NLOs were more than 15 inches wide.

- Because the subject fuses were located on a panel inside the cabinet and approximately seven feet above floor level, all but the tallest NLOs would need to use a narrow, custom-made wooden step-stool inside the cabinet to be able to reach the fuses. The team noted that the location of the step-stool was not controlled.

- Because the subject fuses were also located behind a plexiglass fuse cover that was held in place by small metal screws, the NLO would need to raise his or her hands above the level of his or her head and use a metal screwdriver to remove the fuse cover. The licensee had not ensured that all NLOs were physically capable of completing this activity. Furthermore, because this activity involved manipulating a metal screwdriver inside an energized electrical cabinet, the team considered the activity to involve a personnel safety hazard.

- To identify the correct fuses to be pulled, the NLO must first identify the cabinet in which the fuses are located, and then identify the fuses themselves, within that cabinet. The team observed that the subject cabinet was physically adjacent to four identical cabinets, that these cabinets were not labeled on the side from which the NLO would enter, and that the instructions in AOP-036 did not identify the subject cabinet. Furthermore, the team observed that the labels which uniquely identified the subject fuses within the cabinet were difficult to see - they were partially obscured by cables which had been landed on adjacent terminal blocks.

The team considered that these challenges were excessive and that there was not reasonable assurance that all NLOs would be able to perform the actions during a fire. Consequently, operators would not able to start the turbine-driven AFW pump and the AFW system could become unavailable. The team concluded that these procedure steps were inadequate and that consequently they represented inadequate corrective action for VIO 50-400/02-08-01.

Analysis

This finding had more than minor significance because it affected the objectives of the Mitigating Systems Cornerstone of Reactor Safety. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

As described in Section 1R05.03.b.1 above, OLC 2.F required that one of the redundant divisions would be free of fire damage. Further, if both divisions were located in the same area, then one of the divisions was to be physically protected from fire damage by one of three specified methods. The licensee's approved FPP did not provide for reliance on operator actions in place of physical separation or protection of SSD equipment. Also, TS 6.8.1 required procedures for implementing the fire protection program and for combating fires. In addition, OLC 2.F and the UFSAR, Section 9.5.1, FPP, included quality assurance requirements for fire protection. The FPP stated that a QA program was being used to identify and rectify any possible deficiencies in design, construction, and operation of the fire protection systems.

Contrary to the above requirements, the licensee failed to protect the turbine-driven AFW pump from effects of a fire where it was relied on for SSD. In addition, the licensee's corrective actions for a previous VIO 50-400/02-08-01 were inadequate because they failed to rectify deficiencies in design, construction, and operation related to SSD from a fire in the area of the ACP room. The licensee entered the finding into the corrective action program as AR 80214.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as URI 50-400/02-11-06, Fire SSD Operator Actions With Excessive Challenges.

(3) Too Many SSD Actions for Operators to Perform

Introduction

The team identified a URI involving failure to follow the FPP and TS 6.8.1. The URI was related to an inadequate procedure for SSD from a fire and for inadequate corrective action for VIO 50-400/02-08-01. For a fire in certain SSA areas of the RAB (including the new ACP fire area), AOP-36 included too many SSD contingency actions to respond to potential spurious actuations for the one designated SSD NLO to perform all of the actions. Consequently, equipment that was relied on for SSD may not be available.

Description

The team found that for each fire SSA area inspected, AOP-036 required operators to complete a relatively large number of manual actions outside the main control room. The team determined that the normal shift operating crew included four NLOs; three were assigned to the fire brigade and one was assigned to be the SSD NLO. The local manual operator actions required to achieve and maintain hot shutdown for each of the fire areas inspected are listed in Attachment 2 to this report. The most demanding fire areas were fire area 1-A-ACP, which included about 55 such actions, and fire area 1-A-BAL-B, which included about 39 such actions.

Also, since the SSA did not ensure that offsite power would not be lost due to a fire in any of the SSA areas inspected, operators were expected to be able to respond to a loss of offsite power (LOOP) and reactor trip while performing the fire SSD actions. The team noted that a LOOP or reactor trip could place even more demands on the one NLO who was not fighting the fire.

The team found that while most of the manual actions in these SSA areas involved one-time actions (like opening a breaker), others could require the NLO to monitor plant conditions and make system adjustments over an extended period of time. The manual actions which could require dedicated NLO attention, and thus possibly detract from the successful and timely performance of subsequent required local manual operator actions, included the following:

- In Section 3.0 of AOP-036, which was to be performed for a fire in any of the SSA areas inspected, Step 13.b(3) required the NLO to establish continuous communications with the MCR, locally shut 1CS-228 to isolate the normal charging flow control valve (FCV) and then to locally control charging flow by throttling the bypass valve, 1CS-227. Both valves were in close proximity and located in the scalloped area of the 248-ft level in the RAB. This area was located in the radiation-controlled area (RCA) and radiation levels at these valves were elevated but within 10 CFR 20 limits. A sound powered phone with a long extension cord was located in the area to allow the NLO to wait in low dose areas between valve manipulations if the NLO's radio was not functional. However, local manual operator actions subsequent to this step could be adversely impacted [e.g., Section 3.0, Step 14.b for locally responding to a failed open steam generator power operated relief valve (PORV)].

- In Attachment 1 of AOP-036, Step 13.c for fire area 1-A-ACP required the NLO to locally operate a PORV on the C steam generator, to obtain and maintain the desired RCS temperature. AOP-36 requires operators to trip the reactor if the fire is not contained in the ACP panel or involves any electrical cable tray. Consequently, during a large fire in the ACP room the unit would not be at steady state when this action was undertaken, and because a fire in this area may complicate operator efforts to stabilize the plant, the NLO who undertakes this action may be required to monitor RCS temperature and make appropriate adjustments to the PORV position almost continuously and for some time, until the plant is reasonably stable.

- In Attachment 1 of AOP-036, Step 14.b for fire area 1-A-ACP required the NLO to throttle 1AF-149 to maintain level in the C steam generator. For the same reasons as described above, the NLO who undertakes this action may be required to continue to monitor steam-generator level and make appropriate adjustments to the position of 1AF-149 almost continuously and for some time, until the plant is reasonably stable.

The team found that some of the required manual actions would be completed inside the radiologically controlled area (RCA), while others would be completed outside the RCA. The team also observed that completing the manual actions in AOP-036, in the order in which they are described in that procedure, would require the SSD NLO to enter and exit the RCA several times. The team noted that:

- some manual actions involved valves identified as potentially contaminated or located in contamination areas,

- radioactive radon gas can become associated with anyone who passes through the RCA,

- hand or foot contamination as well as radon gas can cause a portal monitor to alarm, and

- anyone who is in a portal monitor when it alarms must wait at the exit point for health physics (HP) technicians to complete a detailed survey to determine the true cause of the alarm, before proceeding.

The team noted that the licensee had no emergency dosimeters or rapid ingress/egress procedures in place for use during plant emergency situations. The team therefore considered that every time the SSD NLO exited the RCA, that NLO may experience a portal-monitor alarm, and may therefore be forced to wait for HP technicians to arrive at the exit and complete a detailed survey before proceeding. The team received a portal monitor alarm on many occasions during this inspection. Operators stated that, if they received such an alarm during a fire, they would wait for an HP technician before proceeding to perform SSD actions.

The team considered that the manual actions in AOP-036 could not reasonably be completed by the available staff, because:

- the SSD NLO may be required to complete as many as 55 manual actions,

- several manual actions required dedicated operator attention,

- some of the manual actions could require a considerable amount of time to complete,

- some manual actions could be delayed by RCA portal-monitor alarms, and

- only one NLO would have been available to complete all SSD manual actions.

The team concluded that the SSD NLO may not be able to accomplish some required manual actions in a timely manner. Consequently, some equipment relied on for SSD may not be available. For example, the SSD NLO may not be able to respond to a failed open steam generator PORV, locally throttle a steam generator PORV, or throttle AFW. The team therefore considered AOP-36 to be inadequate.

<u>Analysis</u>

This finding had more than minor significance because it affected the objectives of the Mitigating Systems Cornerstone of Reactor Safety. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

As described in Section 1R05.03.b.1 above, OLC 2.F required that one of the redundant divisions would be free of fire damage. Further, if both divisions were located in the same area, then one of the divisions was to be physically protected from fire damage by one of three specified methods. Also, TS 6.8.1 required procedures for implementing the fire protection program and for combating fires. In addition, OLC 2.F and the UFSAR, Section 9.5.1, FPP, included quality assurance requirements for fire protection. The FPP stated that a QA program was being used to identify and rectify any possible deficiencies in design, construction, and operation of the fire protection systems.

Contrary to the above requirements, 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. In addition, the licensee's corrective actions for previous VIO 50-400/02-08-01 were inadequate because they failed to rectify deficiencies in design, construction, and operation related to SSD from a fire in the area of the ACP room. The licensee entered the finding into the corrective action program as AR 80215.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as URI 50-400/02-11-07, Too Many SSD Actions for Operators to Perform.

(4) Using the BAT Without Level Indication

Introduction

The team identified a URI involving failure to follow the FPP and TS 6.8.1. The URI was related to an inadequate procedure for SSD from a fire. For a fire in SSA area 1-A-BAL-B, the SSD procedure directed operators to take CSIP suction from the BAT even if BAT level indication were lost. However, the charging volume needed for RCS cooldown would have emptied the BAT and damaged the SSD CSIP.

Description

The team found that, for a fire in SSA area 1-A-BAL-B-B2 or -B3, near the BAT, AOP-36 directed operators to use the BAT as a suction source for the CSIPs even if the BAT level indication was lost due to the fire. This alignment was to be used in preparation for and during a cooldown of the RCS. However, the team analyzed that the charging volume needed for RCS cooldown would have emptied the BAT and damaged the SSD CSIP.

The SSA stated that, if BAT level indication was lost due to a fire, then the RWST was to be used as a suction source for the CSIPs. However, this analysis was not implemented in AOP-36. AOP-36 was inadequate because it failed to recognize that the charging volume needed for RCS cooldown would have emptied the BAT and damaged the SSD CSIP.

Analysis

This finding had more than minor significance because it affected the objectives of the Mitigating Systems Cornerstone of Reactor Safety. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

As described in Section 1R05.03.b.1 above, OLC 2.F required that one of the redundant divisions would be free of fire damage. Further, if both divisions were located in the same area, then one of the divisions was to be physically protected from fire damage by one of three specified methods. 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 the BAT level indication from effects of a fire where it was relied on for SSD, and the AOP-36 reliance on using the BAT without level indication was inadequate. The licensee entered the finding into the corrective action program as AR 75065.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as URI 50-400/02-11-08, Using the Boric Acid Tank Without Level Indication.

.05 Emergency Communications

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 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 the manufacturer's information and the licensee's licensee periodic maintenance tests to verify that the ELUs were properly designed and were being maintained in an operable manner.

b. Findings

Introduction

The team identified a URI involving failure to provide fixed, self-contained lighting with individual eight-hour-minimum battery power supplies in areas that must be manned for safe shutdown and for inadequate corrective action for previous VIO 50-400/02-08-01.

Description

In the SSA areas in which the team walked down safe shutdown manual actions, the team identified that the locations for local manual operator actions listed in Attachment 3 to this report would not be illuminated by fixed, self-contained lighting with individual eight-hour-minimum battery power supplies. Some of these local manual operator actions that were lacking required illumination had been added as corrective action for previous VIO 50-400/02-08-01.

The team observed that about 17 of the locations for local manual operator actions had no emergency lighting, as identified in Attachment 3. [The team also observed that many more locations for local manual operator actions had fluorescent lights, that would be powered by the safety-related emergency diesel generators, that could provide emergency illumination. However, these lights did not meet the requirements for lights with eight-hour batteries. These locations are separately identified in Attachment 3. Also, the team noted that the licensee had not requested NRC exemptions from the requirement to provide lights with eight-hour batteries.]

The team also observed that all NLOs routinely carried flashlights and had access to more flashlights that were stored in the auxiliary building. The team assessed that, by using a flashlight, the SSD NLO would be able to perform the required actions but that those actions would take more time to perform when relying on illumination by a flashlight and could be less reliable.

Analysis

This finding had more than minor significance because it affected the objectives of the Mitigating Systems Cornerstone of Reactor Safety. The finding affected the availability and reliability of systems that mitigate initiating events to prevent undesirable consequences. Also, when assessed in combination with other findings identified in this report, the significance could be greater than very low significance. However, the finding remains unresolved pending completion of a significance determination.

Enforcement

OLC 2. F. and UFSAR Section 9.5.1 stated that BTP 9.5-1 was used in the design of the fire protection program 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), required 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, OLC 2.F and the UFSAR, Section 9.5.1, FPP, included quality assurance requirements for fire protection. The FPP stated that a QA program was being used to identify and rectify any possible deficiencies in design, construction, and operation of the fire protection systems.

Contrary to the above requirements, the licensee failed to provide fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual eight-hour-minimum battery power supplies in the location of the manual actions identified above and listed in Attachment 3. In addition, the licensee’s corrective actions for previous VIO 50-400/02-08-01 were inadequate because they failed to rectify deficiencies in design, construction, and operation related to SSD from a fire in the area of the ACP room. The licensee entered this finding into the corrective action program as AR 79047.

This finding and related violation are unresolved pending completion of a significance determination, in combination with the other fire protection issues identified in this report. This finding is identified as URI 50-400/02-11-09, Failure to Provide Required Emergency Lighting for SSD Operator Actions.

.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 identified 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

As discussed in Sections 1R05.04.b.1, 1R05.04.b.2, 1R05.04.b.3, and1R05.06.b, the team found that licensee corrective actions for VIO 50-400/02-08-01 regarding an inadequate fire barrier wall were inadequate, in that the licensee's corrective actions for that violation contributed to four of the findings described above.

The team found that licensee audits and self-assessments in the area of SSD were weak. The audits and self-assessments 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.

The team noted that the licensee's initial corrective actions to the findings described in this report were timely and responsive. The licensee revised SSD procedures three times during the inspection, made a 10 CFR 50.72 report to the NRC, and stationed an additional SSD NLO.

4OA5 Other Activities

As discussed in Section 4OA2.b above, the team found that licensee corrective actions for VIO 50-400/02-08-01 regarding an inadequate fire barrier wall were inadequate. Since the new findings are unresolved pending completion of the significance determination, VIO 50-400/02-08-01 will remain open.

4OA6 Meetings

Exit Meeting Summary

The team presented the inspection results to Mr. J. Scarola and members of his staff at the conclusion of the inspection on December 20, 2002, and also by telephone on January 31, 2003. The licensee 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. Gurganious, 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	URI	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	URI	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.2)
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 1R05.03.b.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 1R05.03.b.4)

50-400/02-11-05	URI	Reliance on Manual Actions in Place of Required Physical Separation or Protection From a Fire (Section 1R05.04.b.1)
50-400/02-11-06	URI	Fire SSD Operator Actions With Excessive Challenges (Section 1R05.04.b.2)
50-400/02-11-07	URI	Too Many Fire SSD Actions for Operators to Perform (Section 1R05.04.b.3)
50-400/02-11-08	URI	Using the Boric Acid Tank Without Level Indication (Section 1R05.04.b.4)
50-400/02-11-09	URI	Failure to Provide Required Emergency Lighting for SSD Operator Actions (Section 1R05.06.b)

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 40A5)

List of Inspection Documents Reviewed

PROCEDURES

AOP-036, Safe Shutdown Following a Fire, Rev. 21 and Rev. 24
AOP-038, Rapid Downpower, Rev. 2
AP-301, Seasonal Weather Preparations and Monitoring, Rev. 34
EOP-EPP-004, Reactor Trip Response, Rev. 10
EOP-Guide-1, Path 1 Guide, Rev. 14
FIR-NGGC-0003, Hot Work Permit, Rev. 0
FPP-001, Fire Protection Program Manual, Rev. 22
FPP-002, Fire Emergency, Rev. 22
FPP-003, Fire Investigation Report, Rev. 7
FPP-004, Transient Combustible Control, Rev. 12
FPP-005, Duties of a Fire Watch, Rev. 15
FPP-007, Control of Flammable and CombustibleFPP-013, Fire Protection - Minimum Requirements and Mitigating Actions, Rev. 30
FPP-014, Fire Protection Surveillance Requirements, Rev. 12
FPT-3002, Fire Main Valve Position Verification, Rev. 15
FPT-3006, Fire Main Flow Test, Rev. 6

FPT-3101, Fire Hose Rack Inspection: Auxiliary Building, Rev. 11
FPT-3120, Fire Hose Valve Operability Test: Auxiliary Building, Rev. 4
FPT-3151, Fire Extinguisher Inspection: Auxiliary Building, Rev. 0
FPT-3425, Fire Damper Inspection: Reactor Auxiliary Building, 286 Elevation, Rev. 9
FPT-3550, Fire Penetration Seal Visual Inspection, Rev. 10
MPT-E0030, Self Contained DC Emergency Lighting System Test/Inspection, Rev. 16
MPT-E0032, Self Contained DC Emergency Lighting System Eight Hour Life Test, Rev. 14
MST-I0277, Electrical Power Feed Switchover for RHR Inlet Isolation Valve 1RH-1 (1RH-V502SB-1)
OP-110, Section 8.3, Venting the SI Accumulators, Rev. 18
OP-172, Reactor Auxiliary Building HVAC System, Rev. 25
RTP-006, Maintaing Floor Drain Loop Seals, Rev. 7
TPP-219, Emergency Services Training Program, Rev. 9

DESIGN CRITERIA AND DESIGN BASIS DOCUMENTS

DBD-315, Fire Detection System, Rev. 1
DBD-316, Fire Barrier System, Rev. 1
DBD-317, Water-Based Fire Suppression System, Rev. 0
SD-149, System Description Fire Protection/Detection Systems, Rev. 16

ENGINEERING CALCULATIONS AND EVALUATIONS

4-RMB, High Resistance Grounding Calculation - 6.9 kV System, Rev. 5, dated 2/19/93
E-5506, Appendix R Coordination Study, Rev. 7, dated 5/17/02
HNP-M/BMRK-002, Code Compliance Evaluation NFPA 72 D -Fire Detection Systems, Rev. 0
HNP-M/BMRK-003, Code Compliance Evaluation NFPA 80 -Standard for Fire Doors and Windows, Rev. 0
HNP-M/BMRK-005, Code Compliance Evaluation NFPA 10 - Portable Fire Extinguishers, Rev. 0
HNP-M/BMRK-006, Code Compliance Evaluation NFPA 14 -Standpipe and Hose Systems, Rev. 0
HNP-M/BMRK-008, Code Compliance Evaluation NFPA 20 -Standard for Outside Protection, Rev. 0
HNP-M/BMRK-009, Code Compliance Evaluation NFPA 13 - Sprinkler Systems, Rev. 0
HNP-9-RAB-6B, SWGR RM. “B” Ventilation System Served by AH-13, Rev. 2

COMPLETED MAINTENANCE AND SURVEILLANCE TEST PROCEDURES/RECORDS

Periodic Maintenance Checklist Tables CL-E-0013, -0038, -0053, Safe Shutdown Testing for PA Amplifiers and Sound Powered Phone Circuits, dated November 4, 2002
Work Order Package 00192587, Perform MPT-E0030, dated March 1, 2002
Work Order Package 00125222, Perform MPT-E0032, dated December 11, 2001
Work Order Package 00132600, Perform MPT-E0032, dated January 21, 2002
FPT-3120, Fire Hose Valve Operability Test: Auxiliary Building, dated March 8, 2002
FPT-3205, Fire Detector Functional Test: Local Fire Detector Control Panel 5, dated October 2, 2002

FPT-3206, Fire Detector Functional Test: Local Fire Detector Control Panel 6, dated July 30, 2002
FPT-3302, Main Drain Test Auxiliary Building, dated May 18, 2001
FPT-3550, Fire Penetration Seal Visual Inspection, E385A, dated February 28, 1998
FPT-3550, Fire Penetration Seal Visual Inspection, E374, dated April 20, 1991
FPT-3550, Fire Penetration Seal Visual Inspection, P839, dated February 2, 1998

DRAWINGS

84-60823A-01, Sheets 1 and 2, I-T-E/Gould Motor Control Center Layout for MCC 1A35-SA, Rev 6
84-60823A-01, Sheet 1, MCC 1A35-SA, Rev. 7
84-60823A-01, Sheet 2, MCC 1A35-SA, Rev. 7
84-60823A-05, Sheet 1, MCC 1B35-SB, Rev. 2
84-60823A-06, Sheet 2, MCC 1B35-SB, Rev. 4
1364-93040, EC-1 through EC-6 Internal Conduit Fire Seals, Rev 3
1364-93049, EL-1 and EL-2 Wall/Floor Electrical Fire Seals, Rev 3
CAR-2165-G-197S01, Fire Protection Piping Reactor Auxiliary Building, Sht. 1, Rev. 15
CAR-2166-341, Reactor Auxiliary Building Lighting, Sht. 1, Rev. 5
CAR-2166-342, Reactor Auxiliary Building Lighting, Sht. 2, Rev. 6
CAR-2166-345, Reactor Auxiliary Building Lighting, Sht. 1, Rev. 9
CAR-2166-401/2581, Control Wiring Diagram, Motor Driven Fire Pump, Rev. 9
CAR-2166-401/2583, Control Wiring Diagram, Diesel Driven Fire Pump, Rev. 6
CAR-2166 B-401, Sheet 160, Pressurizer Power Relief Isolation Valve 1-8000A, Rev. 20
CAR-2166 B-401, Sheet 161, Pressurizer Power Relief Isolation Valve 1-8000B, Rev. 19
CAR-2166 B-401, Sheet 1922, Auxiliary Feedwater Pump 1B-SB (MD), Rev. 11
CAR-2166 B-401, Sheet 1921, Auxiliary Feedwater Pump 1A-SA (MD), Rev. 10
CAR-2166 B-401, Sheet 1978, Auxiliary Feedwater Turbine Governor System 1X-SB, Rev. 7
CAR-2166 B-401, Sheet 419, Containment Sump to RHR 1-8812B (1SI-311), Rev. 22
CAR-2166 B-401, Sheet 418, Containment Sump to RHR 1-8812A (1SI-310), Rev. 20
CAR-2166 SK-E-542S08, Sheet 1, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.2
CAR-2166 SK-E-542S09, Sheet 2, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.3
CAR-2166 SK-E-542S10, Sheet 3, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], El 236.0', REV.2
CAR-2166 SK-E-S11, Sheet 4, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.2
CAR-2166 SK-E-542S12, Sheet 1, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.4
CAR-2166 SK-E-542S13, Sheet 2, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.3
CAR-2166 SK-E-542S14, Sheet 3, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.3
CAR-2166 SK-E-542S15, Sheet 4, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.3

CAR-2166 SK-E-542S16, Sheet 1, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.4
CAR-2166 SK-E-542S18A, Sheet 1, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.4
CAR-2166 SK-E-542S18B, Sheet 1, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.4
CAR-2166 SK-E-542S23, Sheet 1, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.3
CAR-2166 SK-E-542S16, Sheet 1, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.2
CAR-2166 SK-E-542S17, Sheet 2, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.5
CAR-2166 SK-E-542S18A, Sheet 3A, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.5
CAR-2166 SK-E-542S18B, Sheet 3B, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.3
CAR-2166 SK-E-542S20, Sheet 1, Reactor Auxiliary Building SSD Analysis [Tray and Conduit Plan], Unit 1, REV.3
CAR-2166 B-401, Sheet 959, RCP Thermal Barrier Containment Isolation Valve 1 –9483 (1CC-249), Rev. 18
CAR-2166 B-401, Sheet 962, RCP Thermal Barrier Containment Isolation Valve 1 –9484 (1CC-251), Rev. 16
CAR-2166 B-401, Sheet 947, RCP Thermal Barrier Isolation Valve 1 FCV-685 (1CC-252), Rev. 14
CAR-2166 B-401, Sheet 956, RCP Component Cooling Water Supply Isolation Valve 1 –9480B (1CC-208), Rev. 15
CAR-2166 B-401, Sheet 955, RCP Component Cooling Water Supply Isolation Valve 1 –9480A (1CC-169), Rev. 14
CAR-2166 B-401, Sheet 245, Volume Control Tank Outlet Isolation Valve 1-LCV-115E (1CS-166), Rev. 21
CAR-2166 B-401, Sheet 243, Volume Control Tank Outlet Isolation Valve 1-LCV-115C (1CS-165), Rev. 20
CAR-2166 B-401, Sheet 297, Charging/Safety Injection Pump Discharge Header Isolation Valve 1-8132A (1CS-219), Rev. 19
CAR-2166 B-401, Sheet 294, Charging/Safety Injection Pump Suction Header Isolation Valve 1-8130B (1CS-168), Rev. 18
CAR-2166 B-401, Sheet 299, Charging/Safety Injection Pump Discharge Header Isolation Valve 1-8133A (1CS-218), Rev. 19
CAR-2166 B-401, Sheet 295, Charging/Safety Injection Pump Suction Header Isolation Valve 1-8131A (1CS-169), Rev. 19
CAR-2166 B-401, Sheet 270, Charging/Safety Injection Pumps Miniflow Isolation Valve 1-8106 (1CS-214) , Rev. 17
CAR-2166-G-037S01, One Line Wiring Diagram Bus 1-4A, Rev. 11
CAR-2168-G-506S01, HVAC - Reactor Auxiliary Building, Plan El. 261, Rev. 12
CAR-2168-G-506S01, HVAC - Reactor Auxiliary Building, Plan El. 286, Rev. 12
CAR-2168-G-517SO5, Air Flow Diagram, Rev. 17
CAR-2168-G-611, Plumbing and Drainage, Rev. 13

CAR-2168-G-614SO1, Riser Diagram, Plumbing and Drainage, Rev. 4
CAR-SH-E-10B, Ebasco Specification 210-73, Motor Control Centers for Use in Central Power Station- Class 1E, Rev. 13
CAR-SH-IN-24, Fire Protection Multi-cycle Deluge Valve System Logic, Rev. 10
CPL-2165-G1000S12, Sheet 2, SSD Flow Diagram Safety Injection System, Rev. 0
CPL-2165-G1000S13, Sheet 3, SSD Flow Diagram Safety Injection System, Rev. 0
CPL-2165-G1000S21, Sheet 3, SSD Component Cooling Water System, Rev. 0
CPL-2165-S - 1365, Simplified Flow Diagram for CVCS System, Rev. 17
CPL-2165-G1000S23, SSD HVAC Essential Services Chilled Water Condenser Flow Diagram Unit, 1-SA, Div 1, Rev. 1
CPL-2165-G1000S26, SSD HVAC Essential Services Chilled Water Condenser Flow Diagram Unit, 1-SB, Div 2, Rev. 1
CPL-2165-G1000S16, Sheet 3, SSD HVAC Essential Services Chilled Water Condenser Flow Diagram Unit, 1-SA, Div 1, Rev. 1
FD-CAR-1.10(L) 3, Detector Locations - Reactor Auxiliary Building, Plan El. 261, Rev. 5
FD-CAR-1.10(L) 4, Detector Locations - Reactor Auxiliary Building, Plan El. 286, Rev. 6

APPLICABLE CODES AND STANDARDS

NFPA 10, Standard for the Installation of Portable Extinguishers, 1978 Edition
NFPA 13, Standard for the Installation of Sprinkler Systems, 1978 Edition
NFPA 14, Standard for the Installation of Standpipe and Hose Systems, 1976 Edition
NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection, 1978 Edition.
NFPA 20, Standard for the Installation of Centrifugal Fire Pumps, 1972 Edition
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AR 76623, Evaluate Transient Combustible Load Allowance For Fire Zones Not Surrounded By Fire Barriers
AR 76626, Evaluate Loss Of PA, Radio Communications, and Fire Detection Systems In The Communications Room
AR 76632, NRC FP Walkdown Observations - No Battery-Backed Lighting for 1CS-214 Manual Actions and Three of Four Normal Lights Out; also the SSD AO is Not Assigned a Portable Radio for Communications Use in the Event of a Fire
AR 76993, Review NLO Training on AOP-36
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AR 79047, Additional Lighting Required for Performance of SSD Tasks
AR 79567, AOP-36 Walkthrough Validation Concern for MCC 1E12 Operator Actions that are In the Fire Area
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AR 80045, Component Cooling Valves that Provide Seal Protection for Reactor Coolant Pumps have Incorrect SSD Division Designator in the SSA (Calculation E-5524)
AR 80089, Valve 1CC-251, CCW to RCP Thermal Barriers, is powered from MCC 1B31-SB, Which is Located in Fire Area 1-A-EPB and Unprotected From a Fire in That Area.
Consequently, the SSD Credited RCP Thermal Barrier Cooling Could Be Lost During a Fire in 1-A-EPB.
AR 80144, Need to Reword Steps in AOP-36
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LOCAL MANUAL OPERATOR ACTION STEPS
REVIEWED FOR ACHIEVING HOT STANDBY

Summary of Number of Local Manual Action Steps to be Performed Outside of the Control Room to Achieve and Maintain Hot Standby

	Number of Manual Action Steps		
Fire Area / Zone	Generic Steps in AOP-36 for All Fire Areas	Area Specific Steps in AOP-036 and Other Procedures Referenced by AOP-36	Total Steps by Fire Area/Zone
1-A-BAL-B	10	29	39
1-A-BATB	10	14	24
1-A-EPA	10	14	24
1-A-ACP	10	45	55

Listing of AOP-036 Manual Action Steps Reviewed for Safe Shutdown Following a Fire

AOP-36 Section 3.0 Actions (Generic Steps for All Fire Areas/Zones):	
Step 12.c RNO	**MONITOR** AFW pump suction pressure indicators as an alternative to CST level indication: (Refer to Attachment 4, AFW Suction Pressure vs. CST level) • PI-2271 (at TDAFW Pump)
Step 13.b(3)	**Locally PERFORM** the following (248' RAB): (a) **SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve. (b) **THROTTLE** 1CS-227, Normal Charging FCV Bypass, as necessary to control charging flow.
Step 13.c RNO	**ESTABLISH** flow through the Hi Head SI Line, as follows: (1).....*(MCR action)* (2).....*(MCR action)* (3) **OPEN** ONE of the following breakers: • 1B31-SB 4C, 1SI-3 BIT Outlet • 1A31-SA 4C, 1SI-4 BIT Outlet (4) **WHEN** directed by MCR, **THEN locally THROTTLE** the de-energized valve to maintain PRZ level:

	• 1SI-3, BIT Outlet Isolation • 1SI-4, BIT Outlet Isolation
Step14.b	**UNLOCK and SHUT** the affected manual block valve(s): (Steam Tunnel Platform El. 280) • 1MS-59, SG A PORV Manual Block • 1MS-61, SG B PORV Manual Block • 1MS-63, SG C PORV Manual Block

AOP-36 Attachment 1 (Area Specific) Actions For Fire Area 1-A-BATB:	
Step 1	**IF** RHR suction valves spuriously open resulting in RWST drain down, **THEN PERFORM** the following recommended actions, as required:
Step 1.a	**ISOLATE** the Containment Recirc Sumps from the RWST, as follows: (1) **SHUT** the following valves: • 1SI-322, RWST To RHR Pump A-SA (RAB 286) • 1SI-323, RWST To RHR Pump B-SB (RAB 286) (2) **DE-ENERGIZE** the following valves: • 1SI-322 at breaker 1A31-SA-6E (RAB 286) • 1SI-323 at breaker 1B31-SB-6E (RAB 286)
Step 1.b	**REFILL** the RWST with A RHR Pump, as follows: (1) **SHUT** 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol Vlv. (2) **OPEN** the following valves to align RHR HX outlet flow to the RWST: • 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv • 1SI-331, Low Head SI Recirc to RWST Isol Vlv (3) **USE** the RHR Pump as needed.
Step 1.d	**WHEN** RHR Pumps are no longer required to fill the RWST, **THEN**: (1) **SHUT** the following valves to isolate RHR HX outlet flow from the RWST: • 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv • 1SI-331, Low Head SI Recirc to RWST Isol Vlv (2) **OPEN** 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol Vlv.
Step 2	**PERFORM** the following to prevent spurious valve opening:

Step 2.a	**VERIFY** the following valves are SHUT: • 1SI-301, CV Sump 1B To RHR Pmp 1B-SB CIV (RAB 286) • 1SI-311, CV Sump 1B To RHR Pmp 1B-SB Downstrm Iso Vlv (RAB 286)
Step 2.b	**DE-ENERGIZE** the following valves: • 1SI-301 at breaker 1B21-SB-11B (RAB 286) • 1SI-311 at breaker 1B21-SB-7A (RAB 286)

AOP-36 Attachment 1 (Area Specific) Actions For Fire Area 1-A-EPA:	
Step 7	**IF** RHR suction valves spuriously open resulting in RWST drain down, **THEN PERFORM** the following recommended actions, as required:
Step 7.a	**ISOLATE** the Containment Recirc Sumps from the RWST, as follows: (1) **SHUT** the following valves: • 1SI-322, RWST To RHR Pump A-SA (RAB 286) • 1SI-323, RWST To RHR Pump B-SB (RAB 286) (2) **DE-ENERGIZE** the following valves: • 1SI-322 at breaker 1A31-SA-6E (RAB 286) • 1SI-323 at breaker 1B31-SB-6E (RAB 286)
Step 7.b	**REFILL** the RWST with B RHR Pump, as follows: (1) **SHUT** 1SI-326, Low Head SI Train A to Hot Leg Cross-over Isol Vlv. (2) **OPEN** the following valves to align RHR HX outlet flow to the RWST: • 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv • 1SI-331, Low Head SI Recirc to RWST Isol Vlv (3) **USE** the RHR Pump as needed.
Step 7.c	**IF** charging is required in the interim, **THEN USE** the Boric Acid Tanks.
Step 7.d	**WHEN** RHR Pumps are no longer required to fill the RWST, **THEN**: (1) **SHUT** the following valves to isolate RHR HX outlet flow from the RWST: • 1SI-448, Low Head SI Recirc to RWST Root Isol Vlv • 1SI-331, Low Head SI Recirc to RWST Isol Vlv (2) **OPEN** 1SI-326, Low Head SI Train A to Hot Leg Cross-over Isol Vlv.

Step 8	**PERFORM** the following to prevent spurious valve opening:
Step 8.a	**VERIFY** the following valves are SHUT: • 1SI-300, CV Sump 1A To RHR Pmp 1A-SA CIV (RAB 286) • 1SI-310, CV Sump 1A To RHR Pmp 1A-SA Downstrm Iso Vlv (RAB 286)
Step 8.b	**DE-ENERGIZE** the following valves: • 1SI-300 at breaker 1A21-SA-7C (RAB 286) • 1SI-310 at breaker 1A21-SA-9B (RAB 286)

AOP-36 Attachment 1 (Area Specific) Actions for Fire Area 1-A-BAL:	
Step 1	**PERFORM** the following to prevent spurious valve operations:
Step 1.a	**VERIFY** the following valves are OPEN • 1CS-214, Charging/SI Pumps Miniflow Isol (RAB 236 near Boric Acid Pumps) • 1CS-169, CSIP Suction Header Xconn (RAB 247 above CSIPs) • 1CS-218, CSIP Discharge Header Xconn (RAB 247 above CSIPs) • 1CC-252, CCW From RCP Thermal Barrier FCV (RAB 236 Scalloped Area)
Step 1.b	**DE-ENERGIZE** the following valves: • 1CS-214 at breaker 1A35-SA-4C (RAB 261) • 1CS-169 at breaker 1A35-SA-4B (RAB 261) • 1CS-218 at breaker 1B35-SB-14D (RAB 261) • 1CC-252 at breaker 1E12-6B (RAB 261)
Step 5	**CAUTION** • The following step will inhibit all automatic and manual safeguards functions since a fire in this area could cause spurious actuations as well as disable controls for resetting SI. • Removal of Output Relay Power Fuses from both trains of SSPS will generate a Reactor Trip signal. The Reactor should be shut down prior to performing the following step.

	OBTAIN SSPS Key 96 AND **DEFEAT** both trains of SSPS by removing the listed fuses in the front of the listed SSPS Output Cabinets: • Train A, Output Cabinet No. 1, Output Relay Power fuses • Train A, Output Cabinet No. 2, fuses 61 and 62 • Train B, Output Cabinet No. 1, Output Relay Power fuses • Train B, Output Cabinet No. 2, fuses 61 and 62
Step 20	**IF** the following valves cannot be shut due to fire damage to their control cables, • 1CS-165, VCT Outlet/Dilution FCV (1-LCV-115C) • 1CS-166, VCT Outlet (1-LCV-115E) **THEN**:
Step 20.a	**STOP** ALL CSIPs.
Step 20.b	**SHUT** EITHER of the following valves: • 1CS-170, A CSIP Suction X-conn • 1CS-168, C CSIP Suction X-conn with A CSIP
Step 20.c	**SHUT** EITHER of the following valves: • 1CS-169, C CSIP Suction X-conn with B CSIP • 1CS-171, B CSIP Suction X-conn
Step 20.d	**VERIFY SHUT** 1CS-214, Charging/SI Pumps Miniflow Isol.
Step 21	**IF** BOTH of the following occur due to fire damage to their control cables: • 1SW-270, ESW Header A Return to Aux Reservoir, spuriously SHUTS • 1SW-276, ESW to NSW Discharge HDR, spuriously OPENS **THEN ALIGN** flow to the cooling tower, as follows:
Step 21.a	**VERIFY OPEN** 1SW-275, ESW Return Header A to NSW.
Step 21.b	**WHEN** time permits, **THEN**: **(1) DE-ENERGIZE** 1SW-270, ESW Header A Return to Aux Reservoir, at breaker 1A35-SA-9C (RAB 261). **(2) OPEN** 1SW-270 locally (RAB 261). **(3) WHEN** 1SW-270 is open, **THEN SHUT** 1SW-276, ESW to NSW Discharge Hdr.

Step 22	**IF** BOTH 1SW-270 AND 1SW-276 shut, **THEN CROSS-CONNECT** ESW Discharge Headers as follows:
Step 22.a	**VERIFY OPEN** 1SW-274, ESW Return Header B to NSW.
Step 22.b	**VERIFY OPEN** 1SW-275, ESW Return Header A to NSW.
Step 22.c	**VERIFY OPEN** 1SW-271, ESW Header B Return to Aux Reservoir.
Step 22.d	**WHEN** time permits, **THEN**: **(1) DE-ENERGIZE** 1SW-270, ESW Header A Return to Aux Reservoir, at breaker 1A35-SA-9C (RAB 261). **(2) OPEN** 1SW-270 locally (RAB 261). **(3) WHEN** 1SW-270 has been opened, **THEN SHUT** 1SW-274, ESW Return Header B to NSW.

AOP-36 Attachment 1 (Area Specific) Actions for Fire Area 1-A-ACP:		
Step 1b	SECURE Rod Drive MG sets using OP-104, Rod Control System	
	OP-104 Step Number	Description
	7.3.2.02	Place GENERATOR CIRCUIT BREAKER CONTROL switch 1A to TRIP
	7.3.2.03	Place MOTOR CIRCUIT BREAKER CONTROL switch 1A to TRIP
	7.3.2.04	Open Reactor Trip Breakers, if not already open.
	7.3.2.05	Place GENERATOR CIRCUIT BREAKER CONTROL switch 1B to TRIP
		Place MOTOR CIRCUIT BREAKER CONTROL switch 1B to TRIP
Step 2	If BOTH MDAFW pumps are disabled, THEN:	

Step 2c	Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker)...	
	... and de-energize the TDAFW Pump Trip and Throttle Valve by removing fuses 1A-11/1976 and 1A-12/1976	
Step 2d	De-energize 1MS-70 by opening disconnect switch on DP-1A2-SA-2B.	
Step 2f	IF TDAFW Pump is NOT operating properly, THEN locally...	
	...VERIFY OPEN TDAFW Pump Trip and Throttle Valve	
	...VERIFY OPEN 1MS-70, Main Steam B to Aux FW Turbine	
Step 2g	IF MCB CST level indication is NOT available,	
	THEN locally monitor AFW pump suction pressure using Attachment 4.	
Step 4	REMOVE the fuse for 1BD-30 SA at panel ARP-19A	
	REMOVE the fuse for 1BD-49 SA at panel ARP-19A	
Step 6	OPEN the power supply breaker for 1CS-235 at breaker 1B31-SB-10A	
Step 7	ISOLATE AND VENT IA to 1CH-279	
Step 7a	SHUT “1IA-871-I1"	
Step 7b	OPEN air filter drain petcocks on Instrument Air Filter	
Step 7c	CHECK 1CH-279, AH-12 1ASA valve OPEN	
Step 8	OPEN the power supply breaker for 1CS-171 at breaker 1B35-SB-4D	
Step 9	Locally VERIFY OPEN 1CS-171, B CSIP Suction X-Conn valve	
	Locally VERIFY OPEN 1CS-235, Charging Line Isolation valve	
Step 10	Locally verify shut 1BD-30, SG 1B Blowdown Isolation valve	
	Locally verify shut 1BD-49, SG 1C Blowdown Isolation valve	
Step 13	IF SG C PORV cycles erroneously, THEN:	
Step 13c	IF SG C PORV manual/automatic station does <u>not</u> function properly,	
	THEN locally OPERATE SG C PORV using OP-126 for desired cooldown rate.	
	OP-126 <u>Step Number</u>	<u>Description</u>
	8.2.1.2.01	Obtain pliers, flashlight, head set, extension cord

	8.2.1.2.02	Open Servo Valve Solenoid feeder breaker PP-1A312-SA-3
		Open Servo Valve Solenoid feeder breaker PP-1B312-SB-3
		Open Servo Valve Solenoid feeder breaker IDP-1A-SIII-11
	8.2.1.2.03	Remove the cover from the side of the PORV
	8.2.1.2.04	Establish communications with the Control Room
	8.2.1.2.07	To throttle open the PORV,
	8.2.1.2.07a	Rotate Solenoid B manual override approximately 3/4 turn in the clockwise direction
	8.2.1.2.07b	As directed by the Control Room, slowly rotate Solenoid A manual override approximately 3/4 turn in the clockwise direction
	8.2.1.2.07c	When the PORV is at its desired position, place Solenoid A manual override back to its original position
	8.2.1.2.08	To partially shut the PORV,
	8.2.1.2.08a	Check Solenoid A manual override in the fully counterclockwise position.
	8.2.1.2.08b	As directed by the Control Room slowly rotate Solenoid B manual override to its original position by rotating it approximately 3/4 turn in the counterclockwise direction, until the PORV starts to shut.
	8.2.1.2.08c	When the PORV is at the desired position, rotate Solenoid B manual override approximately 3/4 turn in the clockwise direction.
Step 14	IF FCV-2071C, Aux FW C Regulator 1AF-131, spuriously CLOSES, THEN	
Step 14a	REMOVE fuse 1A-5/1952 at Transfer Panel 1B	
Step 14b	THROTTLE 1AF-149, Stm Turb Aux FW C Isolation, to maintain SG C level	

AOP-36 Attachment 2 Actions For SSD 1 Equipment Powered by SSD 2:	
Step 2	**IF** control power is lost to 1CS-231, Charging Flow controller, **THEN PERFORM** the following locally:

Step 2.a	**SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve.
Step 2.b	**MAINTAIN** 25% to 60% PRZ level (charging flow) using 1CS-227, Normal Charging FCV Bypass.

AOP-36 Attachment 3 Actions For SSD 2 Equipment Powered by SSD 1:	
	This attachment was reviewed but contained no hot standby local manual operator actions.

LOCAL MANUAL OPERATOR ACTION STEPS
REVIEWED FOR ACHIEVING <u>COLD SHUTDOWN</u>

AOP-36 Attachment 1 (Area Specific) Actions for Fire Area 1-A-EPA:	
Step 4.b	**WHEN** manpower is available, **THEN**: **(1) DE-ENERGIZE** the following valves: • 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C • 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D

Attachment 2, SSD 1 Equipment Powered by SSD 2:	
Step 6	**IF** 1RH-30, RHR Heat Xchg A Out Flow Cont, **OR** 1RH-20, RHR Hx Xchg A Byp Flow Cont, cannot be controlled due to loss of control power, **THEN**:
Step 6.a	**ISOLATE** 1RH-20 air supply, 1IA-128-I2, to cause it to fail closed.
Step 6.d	**VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods: • *.....(MCR action)* • Local temperature indication TI-5551A (RHR Heat Exchanger Outlet)

MANUAL ACTIONS DESCRIBED IN AOP-036
WITHOUT REQUIRED EMERGENCY LIGHTING

AOP-36, Section 3.0, for All Fire Areas

Step #	Description
13.a(7)	Open 1CS-526, BA Tk Supply to CSIP Isol. Vlv.

AOP-36, Attachment 1, for Fire Area 1-A-ACP

Step #	Description
1.b	Secure Rod Drive MG sets using OP-104, Rod Control System
2.c	Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker) and de-energize the TDAFW Pump Trip and Throttle Valve by removing 2 fuses
2.d	De-energize 1MS-70 by opening disconnect switch on DP-1A2-SA-2B.
2.f	Locally verify open TDAFW Pump Trip and Throttle Valve and 1MS-70, Main Steam B to Aux FW Turbine
2.g	Locally monitor AFW pump suction pressure
4	Remove the fuses for 1BD-30 SA and 1BD-49 SA at panel ARP-19A
6	Open the power supply breaker for 1CS-235 at breaker 1B31-SB-10A
9	Locally verify open 1CS-235
14.a	Remove fuse 1A-5/1952 at Transfer Panel 1B

AOP-36, Attachment 1, for Fire Area 1-A-BATB

Step #	Description
1.b(1)	Shut 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol. Vlv.
1.d(2)	Open 1SI-327, Low Head SI Train B to Hot Leg Crossover Isol. Vlv.

AOP-36, Attachment 1, for Fire Area 1-A-EPA

Step #	Description
7.b(1)	Shut 1SI-326, Low Head SI Train A to Hot Leg Crossover Isol. Vlv.
7.d(2)	Open 1SI-326, Low Head SI Train A to Hot Leg Crossover Isol. Vlv.

AOP-36, Attachment 1, for Fire Area 1-A-BAL SSA Area 1-A-BAL-B

Step #	Description
21.b(2)	Open 1SW-270 locally (RAB 261).
22.c	Verify open 1SW-271, ESW Header B Return to Aux. Reservoir.
22.d(2)	Open 1SW-270 locally (RAB 261). (Same as step 21.b(2) above but for different plant conditions.)

MANUAL ACTIONS DESCRIBED IN AOP-036
WITHOUT REQUIRED BATTERY-BACKED EMERGENCY LIGHTING
BUT WITH DIESEL-POWERED FLOURESCENT LIGHTING

AOP-36, Section 3.0, for All Fire Areas

Step #	Description
12.c RNO	Monitor AFW pump suction pressure indicators as an alternative to CST level indication: (Refer to Attachment 4, AFW Suction Pressure vs. CST level) • PI-2271 (at TDAFW Pump)
13.b(3)	(a) Shut 1CS-228, Normal Charging FCV Inlet Isolation Valve. (b) Throttle 1CS-227, Normal Charging FCV Bypass, as necessary to control charging flow.
13.c RNO	(3) Open one of the following breakers: • 1B31-SB-4C, 1SI-3 BIT Outlet • 1A31-SA-4C, 1SI-4 BIT Outlet
13.c RNO	When directed by MCR, then locally throttle the de-energized valve to maintain PRZ level: • 1SI-3, BIT Outlet Isolation • 1SI-4, BIT Outlet Isolation

AOP-36, Attachment 1, for Fire Area 1-A-ACP

Step #	Description
1.b	Secure rod drive MG sets using OP-104
2.c	Obtain a transfer panel key 33, 34, 35, 36, 99 or 106 (MCR or ACP key locker) and de-energize the TDAFW Pump Trip and Throttle Valve by removing 2 fuses

2.f	Locally verify open TDAFW pump trip and throttle valve & 1MS-70
2.g	Locally monitor AFW pump suction pressure
4	Remove the fuses for 1BD-30 SA and 1BD-49 SA at panel ARP-19A

AOP-36, Attachment 1, for Fire Area 1-A-BATB

Step #	Description
1.a(2)	**(2) DE-ENERGIZE** the following valves: • 1SI-322 at breaker 1A31-SA-6E (RAB 286) • 1SI-323 at breaker 1B31-SB-6E (RAB 286)
1.b(2)	**(2) OPEN** the following valves to align RHR HX outlet flow to the RWST: • 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv • 1SI-331, Low Head SI Recirc to RWST Isol. Vlv
1.d(1)	**(1) SHUT** the following valves to isolate RHR HX outlet flow from the RWST: • 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv • 1SI-331, Low Head SI Recirc to RWST Isol. Vlv

AOP-36, Attachment 1, for Fire Area 1-A-EPA

Step #	Description
4.b(1)	**DE-ENERGIZE** the following valves: • 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C • 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D
7.a(2)	**(2) DE-ENERGIZE** the following valves: • 1SI-322 at breaker 1A31-SA-6E (RAB 286) • 1SI-323 at breaker 1B31-SB-6E (RAB 286)
7.b(2)	**(2) OPEN** the following valves to align RHR HX outlet flow to the RWST: • 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv • 1SI-331, Low Head SI Recirc to RWST Isol. Vlv
7.d(1)	**(1) SHUT** the following valves to isolate RHR HX outlet flow from the RWST: • 1SI-448, Low Head SI Recirc to RWST Root Isol. Vlv • 1SI-331, Low Head SI Recirc to RWST Isol. Vlv

AOP-36, Attachment 1, for Fire Area 1-A-BAL-B

Step #	Description
1.a	**VERIFY** the following valves are OPEN • 1CS-214, Charging/SI Pumps Miniflow Isol. (RAB 236 near Boric Acid Pumps) • 1CS-169, CSIP Suction Header Xconn (RAB 247 above CSIPs) • 1CS-218, CSIP Discharge Header Xconn (RAB 247 above CSIPs)
5	**OBTAIN** SSPS Key 96 AND **DEFEAT** both trains of SSPS by removing the listed fuses in the front of the listed SSPS Output Cabinets: • Train A, Output Cabinet No. 1, Output Relay Power fuses • Train A, Output Cabinet No. 2, fuses 61 and 62 • Train B, Output Cabinet No. 1, Output Relay Power fuses • Train B, Output Cabinet No. 2, fuses 61 and 62
16.b(1)	**DE-ENERGIZE** the following valves: • 1SI-246, SI Accumulator A Discharge, at breaker 1A21-SA-5C (RAB 286) • 1SI-247, SI Accumulator B Discharge, at breaker 1B21-SB-5C (RAB 286) • 1SI-248, SI Accumulator C Discharge, at breaker 1A21-SA-3D (RAB 286)
22.a	**VERIFY OPEN** 1SW-274, ESW Return Header B to NSW.
22.d(3)	**WHEN** 1SW-270 has been opened, **THEN SHUT** 1SW-274, ESW Return Header B to NSW.

AOP-36, Attachment 2, Safe Shutdown 1 Equipment Powered by Safe Shutdown 2

Step #	Description
2	**IF** control power is lost to 1CS-231, Charging Flow controller, **THEN PERFORM** the following locally: **a. SHUT** 1CS-228, Normal Charging FCV Inlet Isolation Valve. **b. MAINTAIN** 25% to 60% PRZ level (charging flow) using 1CS-227, Normal Charging FCV Bypass.
6.a	**ISOLATE** 1RH-20 air supply, 1IA-128-I2, to cause it to fail closed.
6.d	**VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods: • Local temperature indication TI-5551A (RHR Heat Exchanger Outlet)

AOP-36, Attachment 3, Safe Shutdown 2 Equipment Powered by Safe Shutdown 1

Step #	Description
4.b	**(1) OPEN** feeder breaker 1A21-SA-5C, Accum 1A-SA Disch Iso (RAB 286). **(2) OPEN** feeder breaker 1A21-SA-3D, Accum 1C-SA Disch Iso (RAB 286).
6.d	**VERIFY** RHR is cooling the RCS by trending temperature using ONE of the following methods: • Local temperature indication TI-5551A (RHR Heat Exchanger Outlet)