



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
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ATLANTA, GEORGIA 30303-8931

September 14, 2007

Duke Power Company, LLC
d/b/a Duke Energy Carolina, LLC
ATTN: Mr. J. R. Morris
Site Vice President
Catawba Nuclear Station
4800 Concord Road
York, SC 29745

SUBJECT: CATAWBA NUCLEAR STATION - NRC TRIENNIAL FIRE PROTECTION
INSPECTION REPORT 05000413/2007007 AND 05000414/2007007 AND
EXERCISE OF ENFORCEMENT DISCRETION

Dear Mr. Morris:

On August 3, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed a triennial fire protection inspection at your Catawba Nuclear Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on August 3, 2007, with Mr. Bill Pitesa and other members of your staff.

The inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents two NRC-identified findings of very low safety significance (Green) which were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001: with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Catawba facility.

In addition, the report documents five noncompliances involving postulated fire induced circuit problems that were identified during the inspection for which the NRC is exercising enforcement discretion. The NRC is not taking any enforcement action for these noncompliances because they meet the criteria of the NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)."

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In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS).

ADAMS is accessible from the NRC Web site at: <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

D. Charles Payne, Chief,
Engineering Branch 2
Division of Reactor Safety

Docket Nos.: 50-413, 50-414
License Nos.: NPF-35, NPF-52

Enclosure: Inspection Report 05000413/2007007 and 05000414/2007007
w/Attachment; Supplemental Information

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E-MAIL COPY?	YES NO	YES	YES	YES	YES NO	YES NO	YES NO

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 50-413, 50-414

License Nos.: NPF-35, NPF-52

Report Nos.: 05000413/2007007, 05000414/2007007

Licensee: Duke Power Company, LLC

Facility: Catawba Nuclear Station, Units 1 and 2

Location: York, South Carolina

Dates: July 16 - 20, 2007 (Week 1)
July 30 - August 3, 2007 (Week 2)

Inspectors: N. Merriweather, Senior Reactor Inspector (Lead Inspector)
R. Fanner, Reactor Inspector
D. Merzke, Reactor Inspector (Training)
R. Rodriguez, Reactor Inspector
G. Wiseman, Senior Reactor Inspector

Approved by: D. Charles Payne
Engineering Branch 2
Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000413/2007-007, 05000414/2007-007; 7/16 - 20/2007 and 7/30 - 8/3/2007; Catawba Nuclear Station, Units 1 and 2; Fire Protection.

This report covers an announced two-week triennial fire protection inspection by a team of five specialist inspectors (including one inspector in training), which were from the U. S. Nuclear Regulatory Commission's (NRC's) Region II office located in Atlanta, Georgia. Two Green findings (both of which were non-cited violations) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (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 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green: Inspectors identified a non-cited violation (NCV) of Unit 1 Operating License Condition 2.C.(5) for the licensee's failure to replace or reinstall a 3" x 3" section of fiberboard damming material on the outside surface of the silicone foam fire barrier penetration seal G-AX-365-W-001 located in the 3-hour fire rated wall separating the Unit 1 Motor Control Center room (Fire Area 11, Room 334) from the Unit 1 Cable Shaft (Fire Area 45, Room 350A). This NCV was entered into the licensee's corrective action program as Problem Investigation Process report C-07-03254.

The finding is greater than minor because it is associated with the protection against external factors attribute, i.e. fire, and it degraded the reactor safety Mitigating Systems cornerstone objective. The inspectors completed a Phase 1 screening of the finding in accordance with Inspection Manual Chapter 0609, Appendix F, Fire Protection Significance Determination Process Phase 1 Qualitative Screening Approach, Step 1.3, and concluded that the finding, given its low degradation rating, had very low safety significance (Green) and no further analysis was required. (Section 1R05.03.b)

- Green: Inspectors identified a non-cited violation (NCV) of Units 1 and 2 Operating License Condition 2.C.(5) for failure to follow the emergency battery lighting maintenance and testing procedure IP/0/B/3540/002, Emergency Battery Lighting Periodic Maintenance and Testing, Revision 33, during replacement of failed batteries. The licensee stated that the batteries were routinely tested prior to installation while in the maintenance shop; however, this bench test was neither required by the periodic maintenance and testing procedure nor documented in any test record. This NCV was entered into the licensee's corrective action program as Problem Investigation Process report C-07-2025.

This finding was more than minor because it was associated with the external

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factors attribute (i.e., fire) of the Mitigating Systems cornerstone and it affected the cornerstone objective. The finding involved systems or components (i.e., emergency lights) required for post-fire safe shutdown of the reactor. The inspectors completed a Phase 1 screening of the finding in accordance with Inspection Manual Chapter 0609, Appendix F, Fire Protection Significance Determination Process Phase 1 Qualitative Screening Approach, Step 1.3, and concluded that the finding, given its low degradation rating, had very low safety significance (Green) and no further analysis was required. The finding directly involved the cross-cutting area of Human Performance under the “procedural compliance” aspect of the “Work Practices” component, in that the licensee failed to effectively communicate expectations regarding procedure compliance for testing of replacement emergency lighting batteries (H.4.b). (Section 1R05.09.b)

B. Licensee-Identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R05 Fire Protection

This report presents the results of a triennial fire protection inspection for a plant in transition to National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition." This inspection was conducted in accordance with NRC Inspection Procedure (IP) 71111.05TTP, "Fire Protection-NFPA 805 Transition Period (Triennial)." The objective of the inspection was to review the Catawba Nuclear Station (CNS) fire protection program (FPP) for selected risk-significant fire areas. The team selected three fire areas for detailed review to examine the licensee's implementation of the FPP. The team also reviewed issues associated with numerous other fire areas that are discussed in this report. The original three fire areas chosen for review were selected based on risk insights from the licensee's Individual Plant Examination for External Events, information contained in FPP documents, results of prior NRC triennial fire protection inspections, and in-plant tours by the inspectors. Section 71111.05-05 of the IP specifies a minimum sample size of three fire areas. Detailed inspection of these three fire areas fulfills the procedure completion criteria. The three areas chosen were:

- Fire Area (FA) 2 - Unit 2 Motor Driven Auxiliary Feedwater (MDAFW) Pump Room, Auxiliary Building (AB), Elevation (EL) 543 foot (ft.), (Rooms 260, 265, and 266)
- FA 8 - Unit 1 Train "B" 4160 Volts Alternating Current (VAC) Essential Switchgear Room, AB EL 560 ft. (Rooms 372 and 373)
- FA 11 - AB General Area & Unit 1 Component Cooling Water (KC) Pump Area EL 560 ft. (Rooms 300 thru 334)

Other fire areas examined for specific issues were:

- FA 3 - Unit 1 MDAFW Pump Room, AB, EL 543 ft.
- FA 5 - Unit 2 Train B Electrical Penetration Room, AB, EL 560 ft.
- FA 7 - Unit 2 Train B 4160 VAC Essential Switchgear Room, AB, EL 560 ft.
- FA 12 - Unit 2 Train A Electrical Penetration Room, AB, EL 577 ft.
- FA 13 - Unit 1 Train A Electrical Penetration Room, AB, EL 577 ft.
- FA 33 - Unit 2 Train B Auxiliary Shutdown Panel Room, AB, EL 543 ft.

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- FA 36 - Unit 2 Turbine Driven Auxiliary Feedwater Pump (TDAFWP) Control Panel Room, AB, EL 543 ft.
- FA 37 - Unit 1 TDAFWP Control Panel Room, AB, EL 543 ft.

For each of the selected fire areas, the inspection team evaluated the licensee's FPP against the applicable NRC requirements. The specific documents reviewed by the team are listed in the attachment.

.01 Post-Fire Safe Shutdown From Main Control Room (Normal Shutdown)

a. Inspection Scope

Methodology

The team reviewed the Design Basis Specification for the Appendix R Safe Shutdown Analysis (SSA) CNS-1435.00-00-0002, abnormal operating procedures (APs), piping and instrumentation drawings (P&IDs), electrical drawings, the Updated Final Safety Analysis Report (UFSAR), and other supporting documents for postulated fires in FA 8. The review was performed to verify that hot and cold shutdown could be achieved and maintained from the main control room (MCR) for postulated fires in FA 8. This review also included verification that shutdown from the MCR could be performed both with and without the availability of offsite power. Plant walkdowns were also performed to verify that the plant configuration was consistent with that described in the fire hazards analysis (FHA) and SSA. These inspection activities focused on ensuring the adequacy of systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring instrumentation and support systems functions. The team reviewed the systems and components credited for use during this shutdown method to verify that they would remain free from fire damage.

Operational Implementation

The team reviewed the adequacy of procedures utilized for post-fire safe shutdown (SSD) and performed a walk through of procedure steps to ensure the implementation and human factors adequacy of the procedures. The team also reviewed selected operator actions to verify that the operators could reasonably be expected to perform the specific actions within the time required to maintain plant parameters within specified limits.

The team reviewed time critical actions including those for selected components to prevent fire-induced spurious operation for decay heat removal required components. The team reviewed and walked down applicable sections of fire response procedure AP/0/A/5500/45, "Plant Fire," for FA 8.

The team reviewed local operator manual actions to ensure that the actions could be implemented in accordance with plant procedures in the times necessary to support the SSD method for the applicable FA and to verify that those actions met the criteria in

Enclosure 2 of NRC IP 71111.05TTP. The team reviewed Problem Investigation Process (PIP) corrective action document C-05-06055, CNS Response to the NRC Proposal to Withdraw Operator Manual Action Rule, to verify that the licensee had identified operator manual actions for post-fire SSD in III.G.2 areas and had plans in place to keep PIP C-05-06055 open to assess and track resolution of the manual action issue as part of the plant-wide risk evaluation for transition to NFPA 805.

b. Findings

No findings of significance were identified.

.02 Protection of Safe Shutdown Capabilities

a. Inspection Scope

For the selected FAs, the team evaluated the potential for fires, the combustible fire load characteristics, and the potential exposure fire severity. The team reviewed the CNS FHA [documented in Part B of CNS-1465.00-00-0006, Design Basis Specification, Plant Fire Protection, Rev. 14]; UFSAR Section 9.5.1, Fire Protection System; Section 9.5.1, Fire Protection Program, of the CNS Safety Evaluation Reports (SERs) through Supplement 5; and plant administrative fire prevention and combustible fire hazards control procedures to determine if they satisfied the objectives established by the NRC-approved FPP. The team also reviewed selected licensee maintenance procedures, material condition evaluation reports, and general employee training covering control of ignition sources and transient combustibles. These reviews were conducted to assess their effectiveness in preventing fires and in controlling combustible loading within limits established in the FPP.

The team performed plant walkdowns to observe whether programmatic procedures for limiting fire hazards, waste collection, housekeeping practices, and cleanliness conditions were being implemented consistent with the UFSAR, administrative procedures, and other FPP procedures. The team also reviewed the design control procedure to verify that all changes would be adequately reviewed to assess the potential impact on the fire protection program, equipment and post-fire SSD procedures.

b. Findings

No findings of significance were identified.

.03 Passive Fire Protection

a. Inspection Scope

For the selected FAs, the team evaluated the adequacy of FA barrier walls, ceilings, floors, structural steel fireproofing, mechanical and electrical penetration seals, fire doors, and fire dampers. The team compared the as-installed configurations to the

approved construction details and supporting fire endurance test data which established the ratings of fire barriers. In addition, the team reviewed license documentation, such as NRC SERs, and deviations from NRC regulations to verify that passive fire protection features met license commitments.

The team walked down accessible portions of the selected FAs to observe material condition and the adequacy of design of FA boundaries to ensure they were appropriate for the fire hazards in the area. The team reviewed the installation, repair, and qualification records for a sample of penetration seals to ensure the seal material was of the appropriate fire rating and that the as-built configurations met the engineering design. The team also reviewed the deviations from standard industry practices to verify that they were either properly evaluated or qualified by appropriate fire endurance tests. In addition, a sample of completed surveillance and maintenance procedures for selected fire doors, fire dampers, and penetration seals in the selected FAs/zones was reviewed to ensure that these passive fire barrier features were properly inspected and maintained. The fire protection features included in the review are listed in the Attachment.

b. Findings

Degraded Penetration Seal

Introduction: The team identified a Green NCV of Unit 1 Operating License Condition 2.C.(5) for the licensee's failure to replace or reinstall a 3" x 3" section of fiberboard damming material on the outside surface of silicone foam fire barrier penetration seal G-AX-365-W-001 in the 3-hour fire rated wall separating the Unit 1 Motor Control Center (MCC) room (FA 11, Room 334) from the Unit 1 Cable Shaft (FA 45, Room 350A). The seal had been breached to install a new cable between FAs 11 and 45.

Description: The team identified missing damming material (permanent 1" damming board and tightly packed fiber material around the penetrating item) on one side of a penetration in the MCC room through which the silicone foam sealing material around a penetrating cable could be seen. The team determined that the damming material was missing from the 3-hour rated penetration seal G-AX-365-W-001. Seal G-AX-365-W-001 design is detail E-5 which requires a minimum of 8" depth of silicone foam seal with 1" thick damming material on each side. The missing damming material in the penetration seal was judged to be approximately 3" X 3" area portion on the east (MCC Room 334) side of the barrier. The penetration silicone foam seal was sealed around the penetrating cable and no air from the cable shaft room to the MCC room could be felt. The acceptance criteria for 3-hour penetration seals was established in FPP procedure PT/0/A/4200/048, Periodic Inspection of Fire Barriers and Related Structures (18 Months), Revision 22, Section 11.5.1 and Enclosure 13.5. The criteria stated, in part, that for silicone foam seals the permanent fiberboard damming shall be installed and secured in accordance with approved design detail and gaps between the fiberboard damming and penetrating items shall be filled with tightly packed 1" depth fiber bulk or fiber blanket. The licensee determined that this seal was not adequately restored after the penetration was breached and a new cable was installed during

implementation of Minor Modification CNCE-62078 in October 2003. Licensee personnel promptly evaluated the condition, declared the seal degraded, and initiated Work Request # 00928184 to repair the seal. The team verified that the licensee completed the permanent repair of the penetration seal [Work Order (WO) 0175904101] during the course of the inspection.

Analysis: The degraded penetration seal represented a licensee performance deficiency because the missing damming material would be expected to be identified and restored to the criteria contained in PT/0/A/4200/048. The finding adversely affected the fire confinement capability defense-in-depth (DID) element. The finding is greater than minor because it is associated with the protection against external factors attribute and degraded the reactor safety Mitigating Systems cornerstone objective.

Using IMC 0609, Appendix F, Fire Protection SDP, the team assessed the DID element of fire barrier degradation in the fire confinement category. Based on the finding being approximately 9 square inches of missing 1" thick damming material, the seal degradation level was categorized as Moderate A degradation per IMC 0609, Appendix F, Attachment 2, Table A.2.2. However, because the inspectors judged that the remaining seal depth of a minimum of 8" depth of silicone foam seal with 1" damming material on one side (a total seal depth of 9") provided at least 2-hours fire resistance, the degradation level was categorized as low in accordance with Task 1.3.2 of IMC 0609, Appendix F, Attachment 1. Consequently, the finding was determined to be of very low safety significance (Green).

Enforcement: Catawba Unit 1 Operating License Condition 2.C.(5), requires that the licensee implement and maintain in effect all provisions of the approved FPP as described in the UFSAR, as amended, for the facility and as approved in the Safety Evaluation Report through Supplement 5. Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1, which incorporated the guidance of Appendix A to BTP Auxiliary Systems Branch (ASB) 9.5-1 and the technical requirements of Appendix R to Title 10 of the Code of Federal Regulations (CFR) Part 50 (hereafter identified as 10 CFR 50), established the regulatory and licensing requirements for the FPP at CNS. The CNS FPP was reviewed against and approved for conformance with BTP CMEB 9.5-1 in the SER through Supplement 5. BTP CMEB 9.5-1, Item C.4.e, Test and Test Control, states in part that tests should be performed in accordance with written test procedures. UFSAR Section 9.5.1, states in part, that the CNS Fire Protection Review is documented and maintained in the Plant Design Basis Specification for Fire Protection (i.e., CNS-1465.00-00-0006, Rev. 14). Item A.1.3.e, Test and Test Control, states that "Nuclear System Directives, Engineering, and manufacturer's recommendations establish the required test programs and procedures for the station." PT/0/A/4200/048, Section 11.5.1 and Enclosure 13.5, established the acceptance criteria for 3-hour penetration seals. The acceptance criteria stated, in part, that for silicone foam seals the fiberboard, fiber bulk, or fiber blanket damming shall be installed and secured in accordance with approved design detail. Seal G-AX-365-W-001 design detail E-5 required a minimum of 8" depth of silicone foam seal with 1" damming boards on each side of the barrier seal and the gaps around penetrating items filled with tightly packed 1" depth fiber.

Contrary to the above, on June 27, 2007, the NRC team found that penetration seal G-AX-365-W-001 was missing approximately a 3" X 3" area of permanent 1" damming fiberboard, fiber bulk, or fiber blanket material on one side of a fire barrier penetration seal between FA 11 and FA 45. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program (CAP) as PIP C-07-03254, this violation is being treated as an NCV consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000413/2007007-01, Degraded Fire Barrier Penetration Seal.

.04 Active Fire Protection

a. Inspection Scope

The team reviewed flow diagrams, cable routing information, system operating instructions, operational valve lineup procedures, and vendor documentation associated with the fire pumps and AB motor-operated isolation valves. Using operating and valve alignment procedures, team members toured selected fire pumps and portions of the fire main piping system to evaluate material condition, consistency of as-built configurations with engineering drawings, and to verify correct system valve lineups. The common fire protection water delivery and supply components were reviewed to assess if they could be damaged or inhibited by fire-induced failures of electrical power supplies or control circuits. In addition, the team reviewed periodic surveillance and operability flow test data for the electric fire pumps, fire main loop and auxiliary building fire protection isolation valves to assess whether the test program was sufficient to validate proper operation of the fire protection water supply system in accordance with its design requirements.

The team reviewed the fire detection system protecting the FAs selected for review to assess the adequacy of the design and installation. This was accomplished by reviewing cable routing information, design drawings, ceiling beam location drawings, ceiling beam schedule drawings and NFPA 72E (code of record 1974 edition) for detector location requirements. The inspectors walked down the fire detection and alarm systems in the selected FAs to evaluate the appropriateness of detection methods for the category of fire hazards in the areas relative to the NFPA 72E location requirements. Additionally, the inspectors reviewed the surveillance test procedures for the detection and alarm systems to determine compliance with UFSAR Sections 9.5.1 and Selective Licensee Commitment 16.9, Fire Detection Instrumentation.

Through in-plant observation of systems, design document review and reference to the applicable NFPA codes and standards, the team evaluated the adequacy of the design and installation of the wet pipe fire suppression system protecting FA 2. This was accomplished by reviewing the engineering design drawings, suppression system hydraulic calculations, and the as-built system configuration for sprinkler system location requirements. Fire hose and standpipe systems were evaluated from source to discharge device including hydraulic calculations performed by the licensee to demonstrate adequate flow, pressure and water distribution. During plant tours, the team observed placement of the fire hoses and extinguishers to verify they were not

blocked and were consistent with the pre-fire plans and FPP documents.

The team reviewed the adequacy of the design and installation of the gaseous high-pressure automatic carbon dioxide (CO₂) fire suppression systems in FA 2 (open motor-driven auxiliary feedwater (AFW) pump pits) and FA 39 (enclosed turbine-driven AFW pump pit). This review included CO₂ fire suppression system controls to ensure accessibility and functionality of the system, as well as associated ventilation system fire/CO₂ isolation dampers. The team also examined licensee design calculations, vendor certifications, and pre-operational test data to verify the required quantity of CO₂ for the area was available. Review of recent surveillance testing of the suppression system and associated detection system was performed to verify that system functionality was being maintained.

The team reviewed the fire brigade staging and dress-out areas to assess the operational readiness of fire fighting and smoke control equipment. The fire brigade personal protective equipment, self-contained breathing apparatuses (SCBAs) and SCBA cylinder refill capability were reviewed for adequacy and functionality. The team also reviewed operator and fire brigade staffing, fire emergency brigade response reports, offsite fire department communications and staging procedures, fire fighting pre-plan strategies, fire brigade qualification training, and the fire brigade drill program procedures. Five fire brigade response-to-drill scenarios and associated brigade drill evaluations/critiques that transpired over the last 12 months were reviewed.

The team reviewed the fire pre-plan strategies for the selected FAs and fire response procedures to verify that pertinent information was provided to fire brigade members to identify potential effects to plant safety and personnel safety and to facilitate suppression of an exposure fire that could impact SSD capability. The team walked down the selected FAs to compare the associated fire pre-plan strategy drawings with as-built plant conditions and fire response procedures. This was done to verify that fire fighting pre-plan strategies and drawings were consistent with the fire protection features and potential fire conditions described in the FHA. The team also evaluated whether the fire response procedures and fire pre-plan strategies for the selected fire areas could be implemented as intended. Additionally, the team assessed the adequacy of the off-site fire fighting assistance including entry into the plant area, communications, emergency dosimetry, and fire equipment usage.

b. Findings

No findings of significance were identified.

.05 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

The team performed document reviews (e.g., heating, ventilation, and air conditioning (HVAC) system drawings, configuration drawings of electrical raceways and safe shutdown components, and building drain system drawings) and in-plant walkdowns to verify that redundant trains of systems required for hot shutdown, where located in the same FA, were not subject to damage from fire suppression activities or from the rupture, or inadvertent operation of, fire suppression systems. The team considered the effects of water, drainage, heat, hot gasses, and smoke that could potentially damage all redundant trains or inhibit access to alternate shutdown equipment or performance of alternate safe shutdown operator actions.

b. Findings

No findings of significance were identified.

.06 Post-Fire Safe Shutdown From Outside the Main Control Room (Alternative Shutdown)

a. Inspection Scope

Methodology

The team reviewed the licensee's FPP described in UFSAR Section 9.5.1, the SSA, APs, P&IDs, electrical drawings, and other supporting documents for postulated fires in FAs 2 and 11. The reviews focused on ensuring that the required functions for post-fire SSD and the corresponding equipment necessary to perform those functions were included in the procedures. The review included assessing whether hot and cold shutdown from outside the MCR could be implemented, and that transfer of control from the MCR to the standby shutdown facility (SSF) could be accomplished. This review also included verification that shutdown from outside the MCR could be performed both with and without the availability of offsite power.

Plant walkdowns were performed to verify that the plant configuration was consistent with that described in the SSA. These inspection activities focused on ensuring the adequacy of systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring instrumentation and support systems functions. The team reviewed the systems and components credited for use during this shutdown method to verify that they would remain free from fire damage.

Operational Implementation

The team reviewed the training lesson plans for licensed and non-licensed operators to verify that the training reinforced the shutdown methodology in the SSA and APs for the selected FAs. The team also reviewed shift turnover logs and shift manning to verify that personnel required for SSD using the alternative shutdown systems and procedures

were available onsite, exclusive of those assigned as fire brigade members.

The team reviewed the adequacy of procedures utilized for post-fire SSD and performed a walk through of procedure steps to ensure the implementation and human factors adequacy of the procedures. The team also reviewed selected operator actions to verify that the operators could reasonably be expected to perform the specific actions within the time required to maintain plant parameters within specified limits.

Time critical actions reviewed included electrical power distribution alignment, establishing control at the SSF, establishing reactor coolant makeup, and establishing decay heat removal. The team reviewed and walked down applicable sections of the following fire response procedures:

- AP/0/A/5500/045, Plant Fire
- AP/2/A/5500/017, Loss of Control Room
- OP/0/B/6100/013, SSF Operations

The team also reviewed the periodic test procedures and test records of the alternative shutdown transfer capability and instrumentation and control functions to ensure the tests were adequate to verify the functionality of the alternative shutdown capability. Electrical schematics were reviewed to verify that circuits for SSD equipment, which could be damaged due to fire, were isolated by disconnect switches and by swapping power supplies for selected MCCs. In addition, the team reviewed wiring diagrams for instrumentation located on the SSF to verify that necessary process monitoring was available as required by 10 CFR 50, Appendix R, Section III.L.

b. Findings

No findings of significance were identified.

.07 Circuit Analyses

a. Inspection Scope

This segment is suspended for plants in transition because a more detailed review of cable routing and circuit analysis will be conducted as part of the fire protection program transition to NFPA 805. However, a review of the licensee's preliminary cable routing information was used by the team to assess the adequacy of the licensee's fire response procedures in the selected fire areas. The routing information was based upon a list of safe shutdown components submitted by the inspectors.

b. Findings

No findings of significance were identified.

.08 Communications

a. Inspection Scope

The team reviewed the plant communications systems that would be relied upon to support fire event notification and fire brigade fire fighting activities. The team also reviewed selected fire brigade drill evaluation/critique reports to assess proper operation and effectiveness of the fire brigade command post portable radio communications during fire drills and identify any history of operational or performance problems with radio communications during fire drills. In addition, the team verified the radio battery usage ratings for the fire brigade radios stored and maintained on charging stations.

b. Findings

No findings of significance were identified.

.09 Emergency Lighting

a. Inspection Scope

The team reviewed the adequacy of the emergency lighting units (ELUs) used to support plant personnel during post-fire safe shutdown for the selected FAs. The team performed plant walkdowns and observed the placement and coverage area of fixed 8-hour battery pack emergency lights throughout the selected FAs to evaluate their adequacy for illuminating access and egress pathways and any equipment requiring local operation and/or instrumentation monitoring for post-fire SSD. The team reviewed completed test records of ELU battery 8-hour capacity tests to ensure that they were sized, tested, and maintained consistent with vendor guidance, license requirements, and licensee commitments. The specific documents reviewed are listed in the Attachment.

The team observed whether emergency exit lighting was provided for personnel evacuation pathways to the outside exits as identified in the NFPA 101, Life Safety Code, and the Occupational Safety and Health Administration (OSHA) Part 1910, Occupational Safety and Health Standards. This review also included examination of whether backup ELUs were provided for the primary and secondary fire emergency equipment storage locker locations and dress-out areas in support of fire brigade operations should power fail during a fire emergency.

b. Findings

ELU Replacement Batteries Not Tested After Installation

Introduction: The team identified a Green NCV of Catawba Units 1 and 2, Operating License Condition 2.C.(5), for failure to follow the emergency battery lighting periodic maintenance and testing procedure IP/0/B/3540/002, Emergency Battery Lighting Periodic Maintenance and Testing, Revision 33, during replacement of failed batteries.

The licensee stated that the batteries were routinely tested prior to installation while in the maintenance shop; however, this test was not directed by the periodic maintenance and testing procedure nor was there an evaluation that showed such a test was equivalent to that specified in the procedure. Additionally, successful completion of this alternative test was not documented in any record.

Description: The team reviewed test records for the ELU battery 8-hour capacity tests performed over the past 3 years. The periodic test program requires that the ELU batteries receive an 8-hour discharge test every 18 months. The team found numerous instances where battery failures occurred during the 8-hour discharge test, the battery subsequently replaced, and no post-installation retest or 8-hour discharge test was performed on the replacement battery as required by the periodic maintenance and testing procedure. The team concluded from review of the records that numerous new replacement batteries were not post-installation tested even though it was required by the periodic maintenance and testing procedure. The inspectors discussed this issue with the licensee and confirmed that post-installation discharge tests had not been performed in all cases where a new battery was installed to replace an old battery that had failed the discharge test. The licensee stated that a new replacement battery would normally receive a discharge test in the maintenance shop prior to installation; however, this bench test was neither required by the periodic maintenance and testing procedure nor documented in any test record. The inspectors also noted that a bench test on a new battery would not verify operability of the battery charger installed in the plant.

Analysis: This issue is a performance deficiency because the licensee did not properly test ELUs in accordance with established periodic maintenance and testing procedure IP/0/B/3540/002. This finding was more than minor because it was associated with the external factors attribute (i.e., fire) of the Mitigating Systems cornerstone and it affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding involved systems or components (i.e., emergency lights) required for post-fire safe shutdown of the reactor. The finding was assigned a low degradation rating given the facts that new replacement batteries were rated for 8-hours of capacity by the manufacturer and the operators had a high likelihood of completing the tasks using hand held flashlights. The inspectors completed a Phase 1 screening of the finding in accordance with IMC 0609, Appendix F, Fire Protection SDP Phase 1 Qualitative Screening Approach, Step 1.3, and concluded that the finding, given its low degradation rating, had very low safety significance (Green) and no further analysis was required.

This finding was entered into the licensee's CAP as PIP report C-07-2025. The finding directly involved the cross-cutting area of Human Performance under the "procedural compliance" aspect of the "Work Practices" component, in that the licensee failed to effectively communicate expectations regarding procedure compliance for testing of replacement emergency lighting batteries (H.4.b).

Enforcement: Catawba Operating License Condition 2.C.(5), for Units 1 and 2, requires that the licensee implement and maintain in effect all provisions of the approved FPP as described in the UFSAR, as amended, for the facility and as approved in the SER

through Supplement 5. BTP CMEB 9.5-1, which incorporated the guidance of Appendix A to BTP ASB 9.5-1 and the technical requirements of Appendix R to 10 CFR 50, established the regulatory and licensing requirements for the FPP at CNS. The CNS FPP was reviewed against and approved for conformance with BTP CMEB 9.5-1 in the SER through Supplement 5. BTP CMEB 9.5-1, Item C.4.e, Test and Test Control, states in part that tests should be performed in accordance with written test procedures. UFSAR Section 9.5.1, states that the CNS Fire Protection Review is documented and maintained in the Plant Design Basis Specification for Fire Protection, CNS-1465.00-00-0006, Rev. 14. Item A.1.3.e, Test and Test Control, states that “Nuclear System Directives, Engineering, and manufacturer’s recommendations establish the required test programs and procedures for the station.” Procedure IP/0/B/3540/002 is the emergency lighting periodic maintenance and testing procedure. It provides instructions for performing discharge tests on the emergency lighting batteries and what actions should be taken if a battery fails the test and it has to be replaced. Upon replacement of a failed battery, the procedure directs maintenance personnel to verify the charging indicator light illuminates, and allow the battery to charge for 24 hours before retesting.

Contrary to the above, on August 2, 2007, the team identified that the required test program was not being adequately implemented in that batteries were being replaced in ELUs without the required post installation test or retest performed in accordance with Procedure IP/0/B/3540/002. Because this finding is of very low safety significance (Green) and has been entered into the licensee’s CAP as PIP C-07-2025, this violation is being treated as an NCV consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000413,414/2007007-02, ELU Replacement Batteries Not Tested After Installation.

.10 Cold Shutdown Repairs

a. Inspection Scope

The team reviewed the licensee’s SSA to determine if any repairs were necessary to achieve cold shutdown. Fire Damage Control Procedures IP/1/A/3890/027A and IP/2/A/3890/027A, describe methods for repairing equipment, following a fire, needed to bring Units 1 and 2, respectively, from hot standby to cold shutdown. The team inspected the fire damage repair kits and inventoried their contents in accordance with station procedure IP/0/A/3890/027C, Procedure for Inventory of Fire Damage Control (FDC) Kit, and verified that repair kits necessary to restore the KC Pumps for remote operation as well as bulk cable reels were tagged and stored on-site for the sole purpose of damage control measures. The team also reviewed calibration test records for the temporary instrumentation used in conjunction with the damage control procedures.

b. Findings

No findings of significance were identified.

.11 Compensatory Measures

a. Inspection Scope

The team reviewed the administrative controls for out-of-service, degraded, and/or inoperable, fire protection features (e.g., detection and suppression systems and equipment, passive fire barriers, or pumps, valves or electrical devices providing SSD functions or capabilities). The team reviewed selected items on the fire protection impairment log and compared them with the FAs/zones selected for inspection. The compensatory measures that had been established in these areas/zones were compared to those specified for the applicable fire protection feature to verify that the risk associated with removing the fire protection feature from service was properly assessed and adequate compensatory measures were implemented in accordance with the approved FPP. Additionally, the team reviewed the licensee's short term compensatory measures (compensatory fire watches) to verify that they were adequate to compensate for a degraded function or feature until appropriate corrective action could be taken and that the licensee was effective in returning the equipment to service in a reasonable period of time.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

a. Inspection Scope

PIP reports related to the Catawba FPP, and the capability to successfully achieve and maintain the plant in a SSD condition following a plant fire, as well as selected fire brigade response, emergency / incidents, and fire safety inspection reports were reviewed. This review was conducted to assess the frequency of fire incidents and effectiveness of the fire prevention program and any maintenance-related or material condition problems related to fire incidents. The inspectors reviewed PIP C-07-02458 and the associated licensee event report (LER) 413/2007-001-00 which recently identified a breaker coordination/cable issue associated with post-fire safe shutdown.

The team also reviewed other CAP documents, including completed corrective actions documented in selected PIPs, and operating experience program (OEP) documents to verify that industry-identified fire protection problems potentially or actually affecting CNS were appropriately entered into, and resolved by, the CAP process. Items included in the OEP effectiveness review were NRC Regulatory Issue Summaries, Information Notices (INs), Generic Letters (GL), industry or vendor-generated reports of defects and noncompliance under 10 CFR Part 21, and vendor information letters. In addition, the inspectors reviewed a sample of the FPP audits which the licensee performed in the previous one-year period to assess the types of findings that were generated and that

the findings were appropriately entered into the licensee’s CAP. The inspectors evaluated the effectiveness of the corrective actions for a sample of identified issues. The documents reviewed are listed in the Attachment.

b. Findings

The Licensee’s Original Associated Circuits Analysis Failed to Identify Circuits Whose Failure Could Prevent the Proper Performance of SSD Equipment in Fire Areas 12, 13, 36 and 37

Introduction: A noncompliance with Catawba Operating License Condition 2.C.(5), for Units 1 and 2, was identified for the licensee’s failure to ensure that one train of systems was free of fire damage in Fire Areas 13 and 37 on Unit 1, and Fire Areas 12 and 36 on Unit 2. On May 17, 2007, the licensee determined that a fire-induced failure of associated circuits CA581 (in the auxiliary feedwater pump turbine control panel room) or IRE761 (in the 577 elevation electrical penetration room) could result in the loss of SSD power sources EDF or EDP, respectively. The violation meets the criteria of NRC Enforcement Policy, “Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)” for enforcement discretion.

Description: The licensee was revising calculations CNC-1112.11-00-0031 and CNC-1112.11-00-0032 (Units 1 and 2 Associated Circuit Analysis For Post Fire Safe Shutdown), as part of the re-constitution project when they identified that some cables may not have proper breaker coordination or proper cable routing with regards to safe shutdown capability. The affected cables were Train B cables (CA581 and IRE761) located in Train B Fire Areas with associated breakers that were not coordinated from a selective tripping standpoint. Due to the lack of coordination between the protective devices, Train B was not kept free of fire damage. Because the cables were not protected from fire damage, a fire in the area where the cable is located could cause a short circuit between the cable conductors. The fault current through the faulted cable could reach the magnitude of current necessary to trip the upstream breaker, resulting in a loss of the associated power supply. The licensee’s post-fire safe shutdown strategy for fires in these areas involved shutdown from the main control room utilizing train “B” equipment. The following cables and power sources were impacted by the identified condition:

<u>Cable No.</u>	<u>Fire Area</u>	<u>Affected Panel</u>
1*CA581	Unit 1 AFW Pump Turbine Control Panel Room (FA 37)	1EDF
2*CA581	Unit 2 AFW Pump Turbine Control Panel Room (FA 36)	2EDF
1*IRE761	Unit 1 577 Electrical Penetration Room (FA 13)	1EPD
2*IRE761	Unit 2 577 Electrical Penetration Room (FA 12)	2EPD

These power supplies are required to power SSD equipment or functions. Fire damage to cable CA581 could result in loss of 125 volts direct current (VDC) panelboard EDF which supplies DC control power to train "B" circuits associated with the 4160 VAC switchgear, diesel generator load sequencer, and AFW system control power. Fire damage to cable IRE761 could result in loss of 125 VDC Vital Instrumentation and Control Panelboard EPD which powers a variety of train B safety-related loads. This issue was entered into the CAP as PIP C-07-02458 and 1-hour roving compensatory fire watch patrols were initiated for the plant areas.

Analysis: The finding was a performance deficiency because the licensee failed to ensure that one train of systems was free of fire damage in accordance with BTP CMEB 9.5-1, Item C.5.b.1.a. The finding was more than minor because it was associated with the external factors attribute i.e., fire, of the Mitigating Systems cornerstone and it affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was given a high degradation rating because the SSD analysis was incomplete. The SDP Phase 1 analysis concluded that a Phase 2 analysis was required. The team performed walkdown inspections of the affected cables in Fire Areas 12, 13, 36, and 37, and looked for possible ignition sources (both fixed and transient) that could damage the target cables in accordance with the zone of influence charts given in Tables 2.3.2 and 2.3.3 of IMC 0609, Appendix F. The team excluded those ignition sources that fell outside the zone of influence for the target cables. Based on this review, the team concluded that this item would not be associated with a finding of high safety significance (Red) based on the low component-based fire frequency.

Enforcement: Operating License Condition 2.C.(5), for Units 1 and 2, requires that the licensee implement and maintain in effect all provisions of the approved FPP as described in the UFSAR, as amended, for the facility and as approved in the SER through Supplement 5. BTP CMEB 9.5-1, which incorporated the guidance of Appendix A to BTP ASB 9.5-1 and the technical requirements of Appendix R to 10 CFR 50, established the regulatory and licensing requirements for the FPP at CNS. The CNS FPP was reviewed against and approved for conformance with BTP CMEB 9.5-1 in the SER through Supplement 5. BTP CMEB 9.5-1, Item C.5.b.1, requires that fire protection features be provided that are capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot standby conditions from either the control room or emergency control station(s) is free from fire damage. BTP CMEB 9.5-1, Item C.5.b.2 requires one redundant train to be protected from fire damage by one of three specified methods. Proper coordination and selective tripping of fuses and breakers on associated circuits is an acceptable method for meeting the requirements.

Contrary to the above, on May 17, 2007, the licensee identified train B cables (CA581 and IRE761) located in train B Fire Areas with associated breakers that were not coordinated from a selective tripping standpoint. As a consequence, a fire-induced failure of associated circuits CA581 (in the AFW pump turbine control panel room) or IRE761 (in the 577 elevation train A electrical penetration room) could result in the loss of SSD power sources EDF or EDP, respectively. This condition has existed since

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original construction. This issue was entered into the licensee's CAP as PIP C-07-02458.

No enforcement action is required for the above noncompliance because pursuant to the Commission's Enforcement Policy and NRC Manual Chapter 0305, under certain conditions fire protection findings at nuclear power plants that transition their licensing bases to 10 CFR 50.48(c) are eligible for enforcement and reactor oversight process (ROP) discretion. The Enforcement Policy and ROP also state that the finding must not be evaluated as Red.

Because the licensee committed, prior to December 31, 2005, to adopt NFPA 805 and change their fire protection licensing bases to comply with 10 CFR 50.48(c), the NRC is exercising enforcement discretion for this issue in accordance with the NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)." Specifically, this issue was licensee identified as a result of its initiative to adopt NFPA 805, it was entered into the licensee's corrective action program and will be corrected, was not likely to have been previously identified by routine licensee efforts, was not willful, and was not associated with a finding of high safety significance. The licensee entered this issue in their CAP under PIP C-07-02458 and implemented 1-hour roving fire watches as compensatory measures in the FAs.

4OA3 Event Followup

- .1 (Closed) LER 05000413/2004-003-00, Unanalyzed Condition Due To Inadequate Evaluation of Fire Interactions.

(Closed) LER 05000413/2004-003-01, Unanalyzed Condition Due To Inadequate Evaluation of Fire Interactions.

The team reviewed this item as part of the followup for unresolved item (URI) 05000413,414/2004007-01, Failure to Protect Cables of Valves Required for Post-Fire Safe Shutdown in Multiple Fire Areas. On June 23, 2004, the licensee identified an unanalyzed condition related to fire protection cable separation requirements. It was postulated that a fire in the Unit 2 A train 4160 Volt switchgear room could cause a hot short to spuriously close centrifugal charging pump suction valve 2NV188A and damage the running pump. Because the running pump and the 4160 Volt switchgear room may be opposite train components, the postulated fire may result in both charging pumps being unavailable for post-fire recovery. This postulated loss of both trains of charging was not analyzed in the safe shutdown analysis. Subsequently, on June 24, 2004, Unit 1 was determined to have a similar problem in the B train 4160 Volt switchgear room. The apparent cause was an inadequate safe shutdown analysis of certain hot short valve operations. This condition was entered into the CAP as PIPs C-04-3101 and C-04-3060 for Units 1 and 2. This finding is more than minor because it is associated with the external factors attribute of the Mitigating Systems cornerstone and it affected the cornerstone objective. The team identified a noncompliance, of very low safety significance, with Catawba Operating License Condition 2.C.(5), for both Units 1 and 2,

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for the licensee's failure to protect the control circuits for volume control tank (VCT) outlet motor operated valves (MOVS) in multiple FAs of the plant. The enforcement aspects of the violation are discussed in Section 4OA5.b.(1). This LER is closed.

- .2 (Closed) LER 05000413/2007-001-00, Safe Shutdown Capability Potentially Challenged by Fire Protection Deficiencies Attributed to Design Oversight. On May 17, 2007, the licensee determined that a fire induced failure of associated circuits CA581 (in the auxiliary feedwater pump turbine control panel room) or IRE761 (in the 577 elevation train A electrical penetration room) could result in the loss of SSD power sources EDF or EDP, respectively. This condition was attributed to an oversight by engineering during the original evaluation and development of the Unit 1 and 2 Catawba Fire Protection Associated Circuits Analysis for Post Fire SSD. The circuits associated with those cables were not analyzed adequately to determine whether the cables had breaker and/or fuse coordination to prevent loss of a needed power source, located outside the fire area. This condition was entered into the CAP as PIP C-07-02458 for Units 1 and 2. This finding is more than minor because it is associated with the external factors attribute of the Mitigating Systems cornerstone and it affected the cornerstone objective. A noncompliance with Catawba Operating License Condition 2.C.(5), for Units 1 and 2, was identified for the licensee's failure to ensure that one train of systems was free of fire damage in FAs 13 and 37 on Unit 1, and FAs 12 and 36 on Unit 2. The enforcement aspects of the violation are discussed in Section 4OA2. This LER is closed.

4OA5 Other Activities

- .1 (Closed) URI 05000413,414/2004007-01, Failure to Protect Cables of Valves Required for Post-Fire Safe Shutdown in Multiple Fire Areas

a. Inspection Scope

This URI involved spurious operation of the following components due to postulated fire damage:

- (1) VCT Outlet Valves 2NV188A and 2NV189B
- (2) Charging Pump Mini-Flow Valves 2NV202B and 2NV203A
- (3) Chemical and Volume Control System (NV) Letdown Valve 2NV015B

The team evaluated the findings utilizing the SDP to determine if the findings met the criteria for granting of enforcement discretion under NRC Interim Enforcement Policy for Plants that transition their fire protection licensing basis to NFPA 805. The following is a discussion of the resolution of these items.

b. Findings

- (1) VCT Outlet Valves 2NV188A and 2NV189B

Introduction: The team identified a noncompliance, of very low safety significance, with

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Catawba Operating License Condition 2.C.(5), for both Units 1 and 2, for the licensee's failure to protect the control circuits for VCT outlet motor operated valves (MOVS) in multiple FAs of the plant. The violation meets the criteria of NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" for enforcement discretion.

Description: As described in Inspection Report (IR) 05000413,414/2004007, the NRC identified that the control cables of Units 1 and 2 VCT outlet MOVs (NV188A and NV189B) were not protected in redundant train fire areas to prevent spurious operation during a fire. These normally open valves are in series and both valves are required to remain open during initial hot standby conditions for post-fire SSD from the MCR using train A or train B SSD equipment. The scenario of concern, from a SSD analysis design and license basis standpoint is that fire damage to the VCT control cables in a redundant train fire area could cause one of the valves to spurious close, while the opposite train charging pump is operating. Because the fueling water storage tank (FWST) valves do not automatically open, the operating charging pump will fail due to lack of a suction source path. The other train of charging is assumed to fail as a result of the fire. If the running charging pump was the one credited for SSD during the fire, and the fire damaged the other charging pump, the plant could be left with no operable charging pump with which to shut down. Consequently, the credited post-fire SSD functions of reactor coolant system (RCS) makeup and reactor coolant pump (RCP) seal cooling would be lost.

The licensee's cable routing data showed that this problem was associated with six fire areas on Unit 1 (FAs: 6, 8, 13, 15, 32, and 34) and seven fire areas on Unit 2 (FAs: 5, 7, 12, 14, 31, 33, and 46). BTP CMEB 9.5-1, Item C.5.b.1.a, requires one train of systems to be free of fire damage. The inspectors found that the licensee had not identified MOVs NV188A and NV189B in the Design Basis Specification as being required to assure SSD for a fire in these areas. In addition, cable routing information showed that cables for KC and the SSF standby makeup pump could also be affected by a fire that could cause the VCT outlet valves to spurious close. Consequently, all means for providing reactor coolant pump seal cooling could potentially be impacted.

The licensee entered this issue into the CAP as PIP reports C-04-3101 and C-04-3060 for Units 1 and 2, respectively. Upon discovery, the licensee established fire watches in Units 1 and 2 Essential Switchgear Rooms as an immediate compensatory measure. The compensatory fire watches were subsequently discontinued after procedural controls were put in place to re-align the charging pump suction from the VCT to the FWST upon confirmation of an active fire in the affected areas. The long term corrective actions will require a plant modification to add an electrical interlock between the VCT outlet valves and the charging pump suction valves from the FWST. The interlock will automatically open the FWST suction valves NV-252A and NV-253B if either VCT outlet valves (NV-188A or NV-189B) start to close. The licensee notified the NRC about this issue on June 23 and 24, 2004, pursuant to 10 CFR 50.72, for Units 2 and 1, respectively. The licensee subsequently submitted LERs 05000413/2004003-00 and 01.

Analysis: This issue is a performance deficiency because the licensee failed to maintain one train of RCS makeup and RCP seal cooling free of fire damage. This finding was more than minor because it was associated with the external factors attribute i.e., fire, of the Mitigating Systems cornerstone and it affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined that this finding was of very low safety significance (Green) after reviewing the results of the licensee's risk analysis which evaluated scenarios involving spurious opening of the power operated relief valve (PORV) with failure of the block valve to close and failure of all RCP seal injection and cooling. The results of the analysis were documented in Severe Accident Analysis Report 853, Probabilistic Risk Assessment of Fire-Induced VCT valve Closure at Catawba. The inspectors reviewed the licensee's analysis and found it to be acceptable.

Enforcement: Operating License Condition 2.C.(5), for Units 1 and 2, requires that the licensee implement and maintain in effect all provisions of the approved FPP as described in the UFSAR, as amended, for the facility and as approved in the SER through Supplement 5. BTP CMEB 9.5-1, which incorporated the guidance of Appendix A to BTP ASB 9.5-1 and the technical requirements of Appendix R to 10 CFR 50, established the regulatory and licensing requirements for the FPP at CNS. The CNS FPP was reviewed against and approved for conformance with BTP CMEB 9.5-1 in the SER through Supplement 5. BTP CMEB 9.5-1, Item C.5.b.1, requires that fire protection features be provided that are capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot standby conditions from either the control room or emergency control station(s) is free from fire damage. BTP CMEB 9.5-1, Item C.5.b.2 requires one redundant train to be protected from fire damage by one of three specified methods.

Contrary to the above, on June 25, 2004, the inspectors identified that the licensee failed to provide fire protection features to protect control circuits and cables for VCT outlet valves NV188A and NV189B in fire areas 6, 8, 13, 15, 32, and 34 on Unit 1; and fire areas 5, 7, 12, 14, 31, 33, and 46 on Unit 2. This condition has existed since original construction.

Pursuant to the Commission's Enforcement Policy and NRC Manual Chapter 0305, under certain conditions fire protection findings at nuclear power plants that transition their licensing bases to 10 CFR 50.48(c) are eligible for enforcement and ROP discretion. The Enforcement Policy and ROP also state that the finding must not be evaluated as a finding of high safety significance (Red).

Because the licensee committed, prior to December 31, 2005, to adopt NFPA 805 and change their fire protection licensing bases to comply with 10 CFR 50.48 (c), the NRC is exercising enforcement discretion for this issue in accordance with the NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)." Specifically, this issue would have been expected to be identified and addressed during the licensee's transition to NFPA 805, was entered into the licensee's corrective action program and will be corrected, was not

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willful, and was not associated with a finding of high safety significance. The licensee entered this issue into the CAP as PIP reports C-04-3101 for Unit 1 and C-04-3060 for Unit 2 and implemented procedural guidance to re-align the charging pump suction from the VCT to the FWST upon confirmation of an active fire in the affected areas. The permanent long-term corrective action is to install an electrical interlock between the VCT outlet valves and the charging pump suction valves from the FWST. The interlock will automatically open the FWST suction valves NV-252A and NV-253B if either VCT outlet valves NV-188A or NV-189B start to close.

(2) Charging Pump Mini-Flow Valves 2NV202B and 2NV203A

Introduction: The team identified a noncompliance with Catawba Operating License Condition 2.C.(5), for both Units 1 and 2, for the licensee's failure to protect the control circuits for charging pump mini-flow valves NV202B and NV203A, charging pump return flow path to VCT, to prevent spurious operation during a fire. The violation meets the criteria of NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" for enforcement discretion.

Description: This discussion will focus on Unit 2, however, the finding is also applicable to those equivalent areas on Unit 1. The concern raised by the inspection team was that it might be possible for a fire in a train "A" or "B" shutdown FA to lead to a loss of RCP seal cooling if the fire was in an area that rendered the train-related charging pump unavailable, spuriously closed the train-related charging pump mini-flow isolation valve, and caused one or more of the RCP thermal barrier KC isolation valves to spuriously close; then ultimately a loss of RCP seal cooling could occur since the opposite train charging pump would lack adequate mini-flow. On Unit 2, this finding is applicable to Fire Areas 5 and 33 for 2NV202B; and Fire Areas 14, 31, and 46 for 2NV203A. This scenario assumes that the normal charging flowpath was isolated by a spurious closure of the train related charging line isolation valve (2NV-312A or 2NV-314B) and that emergency core cooling system flowpath through safety injection system (NI) valves 2NI-9A and 2NI-10B also remained isolated.

Spurious closing of charging pump mini-flow valves 2NV202B or 2NV203A would result in isolation of the 60 gallons per minute (gpm) minimum flow path for the charging pumps. The credited method for RCS makeup and RCP seal cooling, as stated in the SSA, is using the charging pumps for seal injection which adds water to the RCS. The normal charging flowpath and the KC flowpath to the RCP thermal barriers were not analyzed in the SSA to remain open and free of fire damage during SSD from the control room. As a result, isolation of the minimum flow path could reduce the running charging pump flow to about 35 gpm of RCP seal injection, which is less than the 60 gpm that the pump manufacturer specified as being required to ensure that the charging pump does not overheat and become damaged. Given this scenario, if the running charging pump was the one credited for SSD during the fire, and the fire damaged the other charging pump, the plant could be left with no operable charging pump with which to shut down. Consequently, the credited post-fire SSD functions of RCS makeup and RCP seal cooling would be lost. The minimum flow valves are required to remain open

during a post-fire train A or train B shutdown from the main control room (MCR) to provide cooling through the minimum flow path for the operating charging pump. The valves were not identified in the SSA as required components for train A or train B shutdown from the MCR. The Unit 2 cable routing data showed that valve 2NV202B had control cables routed through FAs 5 and 33 (train A credited for SSD); while valve 2NV203A had control cables routed through FAs 14, 31, and 46 (train B credited for SSD). Fire damage to the control cables in the FAs identified above could cause one of the valves to spuriously close isolating the minimum flow path for both charging pumps.

BTP CMEB 9.5-1, Item C.5.b.1.a, requires one train of systems to be free of fire damage. The inspectors found that the licensee had not identified MOVs 2NV202B and 2NV203A in the Design Basis Specification as being required to assure SSD for a fire in these areas. The licensee entered this issue into its CAP as PIP report C-04-04276.

Analysis: This finding is a performance deficiency because the licensee failed to maintain one train of RCS makeup and RCP seal cooling free of fire damage. This finding was more than minor because it was associated with the external factors attribute i.e., fire, of the Mitigating Systems cornerstone and it affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team concluded that this item would not be associated with a finding of high safety significance (Red) based on the results of the analysis performed by the licensee for the VCT valve closure issue discussed above.

Enforcement: Operating License Condition 2.C.(5), for Units 1 and 2, requires that the licensee implement and maintain in effect all provisions of the approved FPP as described in the UFSAR, as amended, for the facility and as approved in the SER through Supplement 5. BTP CMEB 9.5-1, which incorporated the guidance of Appendix A to BTP ASB 9.5-1 and the technical requirements of Appendix R to 10 CFR 50, established the regulatory and licensing requirements for the FPP at CNS. The CNS FPP was reviewed against and approved for conformance with BTP CMEB 9.5-1 in the SER through Supplement 5. BTP CMEB 9.5-1, Item C.5.b.1, requires that fire protection features be provided that are capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot standby conditions from either the control room or emergency control station(s) is free from fire damage. BTP CMEB 9.5-1, Item C.5.b.2 requires one redundant train to be protected from fire damage by one of three specified methods.

Contrary to the above, on June 25, 2004, the inspectors identified that the licensee failed to provide fire protection features to protect control circuits and cables associated with charging pump mini-flow valves NV202B and NV203A on Units 1 and 2. This condition has existed since original construction.

Pursuant to the Commission's Enforcement Policy and NRC Manual Chapter 0305, under certain conditions fire protection findings at nuclear power plants that transition their licensing bases to 10 CFR 50.48(c) are eligible for enforcement and ROP discretion. The Enforcement Policy and ROP also state that the finding must not be

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evaluated as a finding of high safety significance (Red).

Because the licensee committed, prior to December 31, 2005, to adopt NFPA 805 and change their fire protection licensing bases to comply with 10 CFR 50.48(c), the NRC is exercising enforcement discretion for this issue in accordance with the NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)." Specifically, this issue would have been expected to be identified and addressed during the licensee's transition to NFPA 805, was entered into the licensee's corrective action program and will be corrected, was not willful, and was not associated with a finding of high safety significance. The licensee entered this issue into the CAP as PIP report C-04-04276. The licensee revised the fire response procedure AP/045 to incorporate contingency actions for local valve operation to restore isolated flow paths and to increase seal injection flow to restore minimum flow. A new caution statement was added to the procedure to warn the operator not to run a charging pump for more than 3 hours with less than 35 gpm flow through the pump. A new step was added to the procedure to require the operator to verify operating charging pump has 60 gpm minimum flow by looking at charging flow, SI valves open or pump mini-flow valves open. A note was also added to inform the operators of alternate locations of charging and seal injection flow indication. The long term corrective actions will be determined as part of the reconstitution project.

(3) Letdown Valve 2NV015B

Introduction: The team identified a noncompliance of Catawba Unit 2 Operating License Condition 2.C.(5) for the licensee's failure to protect the control cables of MOV 2NV015B, normal letdown, to prevent spurious operation during a fire in Fire Areas 5, 7, and 33. The violation meets the criteria of NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" for enforcement discretion.

Description: As previously discussed in IR 413,414/2004007, NV valve 2NV015B, is in the credited post-fire SSD letdown flowpath for removing water from the RCS during SSD from the control room. Spurious valve closure could result in isolation of this letdown flowpath. Since the credited method of RCP seal cooling is by seal injection, which adds water to the RCS, loss of the letdown flowpath would result in an increasing level in the pressurizer. If this normally open valve remains open during post-fire shutdown to maintain normal letdown, this would prevent challenges to the PORVs and safety relief valves due to the pressurizer going water solid. The cable routing data showed that valve 2NV015B had unprotected control cables routed through FAs 5 (B Train Electrical Penetration Room), 7 (B Train 4KV Switchgear Room), and 33 (Train B Auxiliary Shutdown Panel Room). The shutdown train for these areas is "A" train. Fire damage to the cables in these areas could cause the valve to spuriously close resulting in an isolation of the letdown flowpath.

BTP CMEB 9.5-1, Item C.5.b.1.a, requires one train of systems to be free of fire damage. The inspectors found that the licensee had not identified MOV 2NV015B in the Design Basis Specification as being required to assure SSD for a fire in these areas. The licensee entered this issue into its CAP as PIP C-04-04276.

Analysis: The finding was a performance deficiency because the licensee did not ensure that one train was free of fire damage in accordance with BTP CMEB 9.5-1, Item C.5.b.1.a. The finding was more than minor because it was associated with the external factors attribute i.e., fire, of the Mitigating Systems cornerstone and it affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was given a high degradation rating because the SSD analysis was incomplete. The SDP Phase 1 analysis concluded that a Phase 2 analysis was required. The team performed walkdown inspections of the affected cables in Fire Areas 5, 7, and 33, and looked for possible ignition sources (both fixed and transient) that could damage the target cables in accordance with the zone of influence charts given in Table 2.3.2 and 2.3.3 of IMC 0609, Appendix F. The team excluded those ignition sources that fell outside the zone of influence for the target cables. A component-based fire frequency was calculated for each fire area which included the fire severity factor and the probability of spurious operation based on armored cable. Based on this review, the team concluded that this item would not be associated with a finding of high safety significance (Red) considering the low component-based fire frequency combined with the probability of the spurious operation.

Enforcement: Catawba Unit 2 Operating License Condition 2.C.(5), requires that the licensee implement and maintain in effect all provisions of the approved FPP as described in the UFSAR, as amended, for the facility and as approved in the SER through Supplement 5. BTP CMEB 9.5-1, which incorporated the guidance of Appendix A to BTP ASB 9.5-1 and the technical requirements of Appendix R to 10 CFR 50, established the regulatory and licensing requirements for the FPP at CNS. The CNS FPP was reviewed against and approved for conformance with BTP CMEB 9.5-1 in the SER through Supplement 5. BTP CMEB 9.5-1, Item C.5.b.1, requires that fire protection features be provided that are capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot standby conditions from either the control room or emergency control station(s) is free from fire damage. BTP CMEB 9.5-1, Item C.5.b.2 requires one redundant train to be protected from fire damage by one of three specified methods.

Contrary to the above, on June 25, 2004, the inspectors identified that the licensee failed to provide fire protection features to protect control circuits and cables associated with letdown valve 2NV015B. This condition has existed since original construction. This finding is also applicable to Unit 1.

Pursuant to the Commission's Enforcement Policy and NRC Manual Chapter 0305, under certain conditions fire protection findings at nuclear power plants that transition their licensing bases to 10 CFR 50.48(c) are eligible for enforcement and ROP discretion. The Enforcement Policy and ROP also state that the finding must not be

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evaluated as a finding of high safety significance (Red).

Because the licensee committed, prior to December 31, 2005, to adopt NFPA 805 and change their fire protection licensing bases to comply with 10 CFR 50.48 (c), the NRC is exercising enforcement discretion for this issue in accordance with the NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)." Specifically, this issue would have been expected to be identified and addressed during the licensee's transition to NFPA 805, was entered into the licensee's corrective action program and will be corrected, was not willful, and was not associated with a finding of high safety significance. The licensee entered this issue into the CAP as PIP report C-04-04276. The licensee has provided new guidance to the operators in the fire response procedure (AP/045) to use the reactor head vents in the event that neither normal letdown nor excess letdown are available to maintain the pressurizer level between 25 percent and 92 percent.

.2 (Closed) URI 413,414/2001008-02: Adequacy of Hemyc Cable Wrap Fire Barrier Qualification Tests and Evaluations for Installed Configurations.

a. Inspection Scope

The inspection and significance determination review was documented in URI 413,414/2001008-02, which identified the potential inadequacy of Hemyc Electrical Raceway Fire Barrier System (ERFBS) wrap material installed in FAs 2 and 3 at CNS to meet the circuit protection and 1-hour fire resistance as required by the licensing basis. The inspectors conducted onsite and in-office review of the significance of potential credible fires that could affect the Heymc ERFBS in FAs 2 and 3. To accomplish this review, the inspectors located the fire wrap on drawings and walked them down in the fire areas; inspected the FAs and potential ignition sources of concern; reviewed CAP documents associated with the Heymc ERFBS; reviewed licensee fire modeling calculation and other design information for equipment potentially affected by the fires of concern; evaluated the licensee's safety significance analysis of the identified finding with consideration for plant design and fire loading characteristics; evaluated the licensee's compensatory measures; and, discussed the ERFBS licensing and design basis and pertinent NRC and industry fire barrier qualification testing with licensee engineers.

b. Findings

Introduction: The Team identified a noncompliance with Catawba Operating License Condition 2.C.(5), Fire Protection Program, of very low safety significance, for both Units 1 and 2, involving failure to provide Hemyc ERFBS wrap configurations that have fire endurance circuit protection (1-hour fire resistance rating) as required by the licensing basis. The violation meets the criteria of NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" for enforcement discretion.

Description: As described in URI 413,414/2001008-02, NRC inspectors identified that cables for both Unit 1 and 2 Train A and Train B MDAFW Pumps were routed within FA 3 (Unit 1) and FA 2 (Unit 2) Rooms, respectively. Additionally, each unit's associated TDAFWP power and control circuits were not routed independent of FAs 3 or 2. [The URI is documented in Inspection Report 05000413,414/2001008, ADAMS Accession No. ML012710409]. Hemyc ERFBS is installed at Catawba in the Unit 1 and Unit 2 AFW Pump Rooms on select cable trays as well as some individual cable bundles to protect circuits and cables associated with the motor-driven AFW and turbine-driven AFW pumps as used with the alternative shutdown capability (Standby Shutdown System). An exposure fire in this area, would result in fire damage to all credited AFW capability for steam generator cooling to achieve and maintain safe plant shut down should the Heymc ERFBS fire wrap material fail to perform its designed 1-hour fire barrier protection function.

In June 2001, the NRC initiated confirmatory fire wrap qualification tests in response to Task Interface Agreement 99-028 (ADAMS Accession No. ML003736721), after concluding that existing Hemyc testing was likely insufficient to qualify Hemyc ERFBS material as a rated fire barrier. In subsequent NRC full-scale fire tests, conducted on March 11 and 25, 2005, results indicated that Hemyc ERFBS material did not pass the criteria to achieve a 1-hour fire rating and cannot be routinely relied upon as 1-hour fire barrier. (Tests are documented in ADAMS Accession No. ML050880176)

The NRC staff has completed a significant effort informing industry of the concerns regarding Heymc ERFBS material performance by holding public meetings with licensees and interested members of the public on April 29, 2005, (Meeting Summary is documented in ADAMS Accession No. ML052270236) and September 29, 2005, (Meeting Summary is documented in ADAMS Accession No. ML052850115), as well as, issuing IN 2005-07, Results of Hemyc Electrical Raceway Fire Barrier System Full Scale Fire Testing (ADAMS Accession No. ML050890089), and GL 2006-03, Potentially Nonconforming Hemyc and MT Fire Barrier Configurations (ADAMS Accession No. ML053620142). On June 7, 2006 Duke submitted to the NRC a response letter to GL 2006-03 (ADAMS Accession Nos. ML061640310 and ML071430127). The submitted documentation indicated that CNS expects to bring the Hemyc issue into full compliance through the NFPA 805 transition process in accordance with 10 CFR 50.48(c) scheduled to be completed in 2010.

Analysis: The failure to provide Hemyc ERFBS wrap configurations that have fire endurance circuit protection of 1-hour fire resistance rating is a performance deficiency because it is contrary to the requirements of Catawba Units 1 and 2 Operating License Condition 2.C.(5). This performance deficiency is more than minor because it is associated with the reactor safety Mitigating Systems cornerstone attribute of protection against external events, i.e. fire, and it adversely affects the objective of ensuring the reliability and capability of a system (i.e., an electrical raceway fire barrier system) that responds to initiating events. The team determined that this issue was of very low safety significance (Green) after reviewing the results of the licensee's fire modeling calculation (CNC-1435.00-00-0014, Revision 2) and safety significance risk analysis (SAAG File# 681, dated 6/8/2005) which had assumed no credit for manual suppression

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for postulated fires in FA 3 or FA 2. The inspectors reviewed the licensee's calculation and risk analysis and found them to be acceptable. This finding did not present an immediate safety concern because the affected FAs have installed automatic fire detection and suppression systems that would likely detect and control an exposure fire prior to it breaching the existing Heymc ERFBS fire wrap enclosures and damaging Standby Shutdown System (SSS) circuits and cables. This finding is applicable to Units 1 and 2.

Enforcement: Operating License Condition 2.C.(5), for Units 1 and 2, requires that the licensee implement and maintain in effect all provisions of the approved FPP as described in the UFSAR, as amended, for the facility and as approved in the SER through Supplement 5. BTP CMEB 9.5-1, which incorporated the guidance of Appendix A to BTP ASB 9.5-1 and the technical requirements of Appendix R to 10 CFR 50, established the regulatory and licensing requirements for the FPP at CNS. The CNS FPP was reviewed against and approved by the NRC for conformance with BTP CMEB 9.5-1 in the SER through Supplement 5. BTP CMEB 9.5-1, Item C.5.b.1, requires that fire protection features be provided that are capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot standby conditions from either the control room or emergency control station(s) is free from fire damage. BTP CMEB 9.5-1, Item C.5.b.2 requires one redundant train to be protected from fire damage by one of three specified methods. One method of complying with this requirement is to separate one safe shutdown train from its redundant train with a 1-hour rated fire barrier with automatic fire detection and suppression installed in the area. Catawba SER Supplement 3, Section 9.5.1.8, states that cables for the SSS in the Unit 1 and 2 Train A and Train B MDAFW pump areas are completely enclosed in a 1-hour fire rated barrier.

Contrary to the above, on August 3, 2007, the inspectors identified that the licensee failed to provide fully qualified 1-hour fire rated barriers to protect circuits and cables associated with the motor-driven AFW and turbine-driven AFW pumps as used with the alternative shutdown capability (SSS) on Units 1 and 2. This condition has existed since original construction.

No enforcement action is required for the above noncompliance because pursuant to the Commission's Enforcement Policy and NRC Manual Chapter 0305, under certain conditions fire protection findings at nuclear power plants that transition their licensing bases to 10 CFR 50.48(c) are eligible for enforcement and ROP discretion. The Enforcement Policy and ROP also state that the finding must not be evaluated as Red.

Because the licensee committed, prior to December 31, 2005, to adopt NFPA 805 and change their fire protection licensing bases to comply with 10 CFR 50.48(c), the NRC is exercising enforcement discretion for this issue in accordance with the NRC Enforcement Policy, "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)." Specifically, this issue would have been expected to be identified and addressed during the licensee's transition to NFPA 805, was entered into the licensee's corrective action program and will be corrected, was not likely to have been previously identified by routine licensee efforts, was not willful, and was not associated with a finding of high safety significance. The licensee had entered

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this issue into the CAP as PIP reports C-01-00427 and C-05-01710 for Units 1 and 2. In 2005, the licensee took compensatory actions which included additional controls on the introduction of transient combustible/flammable materials into the affected fire areas and a requirement to establish continuous fire watches in the affected fire areas whenever any of the three trains of the AFW is unavailable.

4OA6 Meetings, Including Exit

On August 3, 2007, the lead inspector presented the inspection results to Mr. B. Pitesa and other members of his staff. The licensee acknowledged the findings. Proprietary information is not included in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

A. Dickard, Principle Engineer
B. Ferguson, Mechanical Civil Engineering Manager
D. Goforth, NFPA-805 Transition Technical Manager
G. Hamrick, Engineering Manager
M. Hogan, Senior Engineer
A. Jackson, Regulatory Compliance Engineer
J. Oldham, Duke Fleet Fire Protection Lead Support
B. Pitesa, Station Manager
B. Pryce, Safe Shutdown Engineer
K. Nicholson, Regulatory Compliance

NRC personnel

A. Sabisch, Senior Resident Inspector
C. Payne, Chief, Engineering Branch 2, Division of Reactor Safety, Region II

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened/Closed

05000413/2007007-01	NCV	Degraded Fire Barrier Penetration Seal (Section 1R05.03.b)
05000413,414/2007007-02	NCV	ELU Replacement Batteries Not Tested After Installation (Section 1R05.09.b)

Closed

0500413,414/2001008-02	URI	Adequacy of Hemyc Cable Wrap Fire Barrier Qualification Tests and Evaluations for Installed Configurations (Section 4OA5.2)
05000413,414/2004007-01	URI	Failure to Protect Cables of Valves Required for Post-Fire Safe Shutdown in Multiple Fire Areas (Section 4OA5.1)
05000413/2004003-00	LER	Unanalyzed Condition Due To Inadequate Evaluation of Fire Interactions (Section 4OA3.1)
05000413/2004003-01	LER	Unanalyzed Condition Due To Inadequate Evaluation of Fire Interactions (Section 4OA3.1)

05000413/2007001-00

LER Safe Shutdown Capability Potentially Challenged
by Fire Protection Deficiencies Attributed to Design
Oversight (Section 4OA3.2)

Discussed

None.

LIST OF DOCUMENTS REVIEWED

Section 1R05.03.a: List of Fire Barrier Features Inspected in Relation to Safe Shutdown Separation Requirements

Floors/Walls/Ceiling Identification

Vertical Concrete Block Wall
Expansion Joint Fire Stop
Horizontal Concrete Hatch

Description

FA 2 to FA 33
FA 2 to FA 4
FA 2 to FA 39

Fire Damper Identification

2-VA-FD-40
2-VA-FD-146
2-VA-FD-147

Description

FA 2 to FA 39
FA 2 to FA 4
FA 2 to FA 4

Fire Door Identification

AX-260F
AX-514B

Description

FA 2 to FA 39
FA 8 to FA 15

Fire Barrier Penetration Seal Identification

B-AX-260-W-001
C-AX-258-W-033
C-AX-258-W-036
C-AX-260-W-039
C-AX-260-W-040
C-AX-260-W-073
C-AX-260-F-039
F-AX-348-W-134
G-AX-365-W-001

Description

FA 2 to FA 39
FA 2 to FA 4
FA 2 to FA 4
FA 2 to FA 33
KC Pumps 1A2 to 1B1
FA 11 to FA 45

Section 1R05.09.a: Emergency Lighting

Procedures

IP/0/B/3540/002, Emergency Battery Lighting (ELD) Periodic Maintenance and Testing, Rev. 32
IP/0/B/3540/002, Emergency Battery Lighting (ELD) Periodic Maintenance and Testing, Rev. 33

Test Records

WO # 01705895-01, WO # 01702597-01, WO # 01131476-01, WO # 98724866-01, WO # 98765287-01, WO # 98702838-01, WO # 01709115-01, and WO # 01713099-01

Drawings

CN-1105-03, Fire Boundary Wall Plans - AB - EL 543+0, Rev. 14
CN-1105-04.04, Fire Boundary Wall Plans - AB - EL 554+0, Rev. 9
CN-1105-06, Fire Boundary Wall Plans - AB - EL 560+0, Rev. 16
CN-1105-06.01, Fire Boundary Wall Elevations - AB - EL 560+0, Rev. 18
CN-1105-09.08, Fire Boundary Wall Plans - AB - EL 577+0, Rev. 16
CN-1105-16, Electrical Penetration Seal Fire Stop Details, Rev. 2
CN-1105-17, Mechanical Penetration Seal Fire Stop Details, Rev. 2

CN-1200-5.5, AB - Unit 2 - Floor EL 534+0 - General Arrangement/Architectural - AFW Pump Area, Rev. 16
 CN-1200-8.5, AB - Units 1 & 2 - Floor EL 560+0 - General Arrangement/Architectural - Switchgear Room Plans, Rev. 68
 CN-1200-09.05, Aux Bldg - Units 1 & 2 - Floor EL 577+0 - General Arrangement/Architectural - Switchgear Room Plans, Rev. 66
 CN-1201-1, Concrete Block Wall Plans - AB - EL 543+0, Rev. 26
 CN-1202-1, Concrete Block Wall Plans - AB - EL 560+0, Rev. 26
 CN-1202-5, Concrete Block Wall Elevations - AB - EL 560+0, Rev. 58
 CN-1209-10.09, Fire Protection Equipment - Fire Hose Houses, Rev. 14
 CN-1209-10.11, Fire Protection Equipment - AB - EL 543+0, Rev. 14
 CN-1209-10.12, Fire Protection Equipment - AB - EL 560+0, Rev. 20
 CN-1209-10.13, Fire Protection Equipment - AB - EL 577+0, Rev. 18
 CN-1209-10.20, Expansion Joint Fire Stop - AB, Rev. 6
 CN-1499-RF.01-00, Instrument Detail, Fire Protection Header Pressure, Rev. 5
 CN-1499-RY.01-00, Instrument Detail, Fire Protection Discharge Pressure, Rev. 5
 CN-1522-01.44-00, HVAC, AB Ventilation (VA), Plans and Sections, EL 543+0, Rev. 24
 CN-1522-03.48-00, HVAC, Switchgear Room Ventilation (VC), Plan at EL 560+0, Rev. 17
 CN-1522-01.45-00, HVAC, AB Ventilation (VA), Plan at EL 560+0, Rev. 25
 CN-1522-1.2 and 1.3, Flow Diagram of Battery Room and MCC Rooms Ventilation System (VC), Rev. 6
 CN-1577-1.1 to 1.11, Flow Diagram of AB Ventilation System (VA), Rev. 19
 CN-1599-1.0 series, Flow Diagram of Exterior Fire Protection (RY), Rev. 37
 CN-1815-19.01, Elementary Diagram, Radio & Emergency Telephone System, Rev. 7
 CN-2553-1.0, Flow Diagram of Reactor Coolant System, Rev. 27
 CN-2562-1.0, Flow Diagram of Safety Injection, Rev. 10
 CN-2562-1.2, Flow Diagram of Safety Injection, Rev. 29
 CN-2573-1.0, Flow Diagram of Component Cooling System, Rev. 22
 CN-2573-1.2, Flow Diagram of Component Cooling System, Rev. 13
 CN-2573-1.4, Flow Diagram of Component Cooling System, Rev. 11
 CN-2573-1.7, Flow Diagram of Component Cooling System, Rev. 11
 CN-2573-2.2, Flow Diagram of Component Cooling System, Rev. 4
 CN-2573-2.3, Flow Diagram of Component Cooling System, Rev. 6
 CN-2574-2.1, Flow Diagram of Nuclear Service Water System, Rev. 48
 CN-2574-2.2, Flow Diagram of Nuclear Service Water System, Rev. 17
 CN-2592-1.0, Flow Diagram of Auxiliary Feedwater System, Rev. 29
 CN-2593-1.0, Flow Diagram of Main Steam System, Rev.23
 CN-2593-1.4, Flow Diagram of Steam Supply to Feedwater Pump Turbine System, Rev. 5
 CN-2593-1.5, Flow Diagram of Steam Supply to Feedwater Pump Turbine System, Rev. 5
 CNEE-0115-02.08-01, Elementary Diagram, 4160V Blackout Switchgear 1FTB Unit 2, Main Fire Pump B, Motor Feeder (Part 2), Rev. 14
 CNEE-0116-01.47, Elementary Diagram, 6900V Switchgear #1TC Unit #11, Main Fire Pump A Motor Feeder , 1PMTR0279, Rev. 13
 CNEE-0215-02.03-01, Elementary Diagram, 4160V Blackout Switchgear 2FTB Unit 2, Main Fire Pump C, Motor Feeder (Part 2), Rev. 8
 CNSF-1574-RN.01, Summary Flow Diagram of Nuclear Service Water System, Rev. 6
 CNSF-2553-NC.01, Summary Flow Diagram of Reactor Coolant System, Rev. 0

CNSF-2553-NC.02, Summary Flow Diagram of Reactor Coolant System, Rev. 0
 CNSF-2562-NI.01, Summary Flow Diagram of Safety Injection, Rev. 0
 CNSF-2573-KC.01, Summary Flow Diagram of Component Cooling System, Rev. 1
 CNSF-2592-CA.01, Summary Flow Diagram of AFW System, Rev. 5
 CNSF-2593-SA.01, Summary Flow Diagram Main Steam to Auxiliary Equip System, Rev. 1

Procedures

AP/0/A/5500/020, Loss of Nuclear Service Water, Rev. 36
 AP/0/A/5500/045, Plant Fire, Rev. 3
 AP/2/A/5500/017, Loss of Control Room, Rev. 42
 EDM 601, Appendix K, Engineering Review Screen for Design Changes, Rev. 1/3/2007
 IP/0/A/3024/002, Main Fire Pumps Backup Pressure Switches, Rev. 7
 IP/0/B/3540/002, Emergency Battery Lighting (ELD) Periodic Maintenance and Testing, Rev. 32
 IP/0/B/3540/002, Emergency Battery Lighting (ELD) Periodic Maintenance and Testing, Rev. 33
 IP/1/A/3890/027A, Unit 1 Fire Damage Control Procedure, Rev. 18
 IP/2/A/3890/027A, Unit 2 Fire Damage Control Procedure, Rev. 19
 MP/0/A/7650/069, Installation and Repair of Penetration Seals, Rev. 23
 NSD 104, Material Condition/Housekeeping, Cleanliness/Foreign Material, Rev. 27
 NSD 112, Fire Brigade Organization, Training, and Responsibilities, Rev. 7
 NSD 117, Emergency Response Organization Staffing, Training, and Responsibilities, Rev. 7
 NSD 208, Problem Identification Process, Rev. 28
 NSD 313, Control of Combustible and Flammable Material, Rev. 6
 NSD 314, Hot Work Authorization, Rev. 6
 NSD 316, Fire Protection Impairment and Surveillance, Rev. 7
 NSD 320, Guidance for Performing Licensing Review of Proposed Changes to the Fire Protection Program, Rev. 0
 NSD 403, Shutdown Risk Management (Modes 4, 5, 6, and No-Mode) per 10 CFR 50.65 (a)(4), Rev. 16
 NSWP 4.2, Fire Prevention, Rev. 0
 OP/0/B/6100/013, SSF Operations, Rev. 48
 OP/0/B/6700/002, Sound Powered Telephone System, Rev. 10
 MP/0/A/7650/069, Installation and Repair of Penetration Seals, Rev. 23
 PT/0/A/4200/048, Periodic Inspection of Fire Barriers and Related Structures, Rev. 22
 PT/1/A/4350/023, Sound Power Phone System Emergency Circuit Verification, Rev. 8
 PT/2/A/4350/023, Sound Power Phone System Emergency Circuit Verification, Rev. 7
 PT/0/A/4400/001A, Exterior Fire Protection Capability Test, Rev. 46
 PT/0/A/4400/001C, Fire Suppression System Test, Rev. 87
 RP/0/B/5000/029, Fire Brigade Response, Rev. 16

Completed Surveillance Test Procedures and Test Records

IP/0/A/3890/027C, Procedure for Inventory of Fire Damage Control (FDC) Kit, 01/30/2006
 IP/0/A/3890/027C, Procedure for Inventory of Fire Damage Control (FDC) Kit, 01/24/2005
 IP/1/A/3890/027B, Damage Control Procedure Temporary Instrumentation Calibration, 02/08/2005
 IP/1/A/3890/027B, Damage Control Procedure Temporary Instrumentation Calibration, 08/25/2003

PT/2/A/4350/022, CA Control From SSF Operability Test, 10/16/2004
 PT/2/A/4350/022, CA Control From SSF Operability Test, 04/14/2006
 PT/2/A/4200/007C, Standby Makeup Pump #2 Performance Test, 04/19/2007
 PT/2/A/4200/007C, Standby Makeup Pump #2 Performance Test, 07/11/2007
 Material Condition Evaluation Reports for AB EL 543' and 560', completed
 1/18/2007, 3/13/2007, and 5/9/2007
 Work Order Task 9861223502, MP/0/A/7650/069, Installation and Repair of Penetration Seals,
 completed 10/06/2003
 Work Order Task 0105185001, PT/0/A/4200/048, Periodic Inspection of Fire Barriers and
 Related Structures, completed 1/27/2003
 Work Order Task 0175904101, Inspect and Repair Penetration Fire Stop G-AX-365-W-001,
 completed 6/28/2007
 PT/0/A/4400/001 A, Exterior Fire Protection Capability Test, completed 6/26/2006

Calculations

CNC-1435.00-00-0001, Qualification of QA Condition 3 Dow Corning Silicone Foam for QA
 Condition 1 Applications, Rev. 0
 CNC-1435.00-00-0009, Fire Endurance Test of Concrete Block Walls, Rev. 1
 CNC-1435.00-00-0010, NRC Committed Fire Dampers, Rev. 5
 CNC-1435.00-00-0013, NRC Committed Fire Door Inspection Requirements, Rev. 0
 CNC-1435.00-00-0016, Conduit Fire Protection Test, Rev. 0
 CNC-1435.00-00-0020, Evaluation for AB Header Loops (RF), Rev. 1
 CNC-1435.00-00-0035, CNS Penetration Seal Database and 86-10 Evaluations, Rev. 2
 Fire Protection Evaluation for Large Bore Pipes, Duke Engineering & Services, Rev. 0

Design Changes

Minor Design Change CNCE-62078, Revise Cable Installation For Plant Paging System in AB,
 dated 10/14/2003

Fire Strategies

Fire Strategy FA 2, Section 2.1, Unit 2 CA Pump Room and Motor Driven CA (2A, 2B) Pump
 Pits, Elevation 543 Level, Rooms 260-260A
 Fire Strategy FA 8, Section 1.14, Unit 1 Essential Switchgear, Elevation 560 Level, Rooms 372
 & 373
 Fire Strategy FA 11, Section 1.15, Auxiliary Building, Elevation 560 Level

Applicable Codes and Standards

NFPA 10 - 1978, Standard for Portable Fire Extinguishers
 NFPA 12 - 1980, Standard for CO2 Systems
 NFPA 13 - 1976, Standard for Sprinkler Systems
 NFPA 14 - 1978, Standard for Standpipe and Hose Systems
 NFPA 20 - 1978, Standard for Centrifugal Fire Pumps
 NFPA 24 - 1977, Standard for Outside Fire Protection
 NFPA 30 - 1977, Standard for Combustible Liquids
 NFPA 72D - 1975, Standard for Proprietary Signaling Systems
 NFPA 72E - 1974, Standard for Automatic Fire Detectors

NFPA 80 - 1986, Standard for Fire Doors and Windows
 NFPA 90A -1978, Standard for Air Conditioning and Ventilating Systems
 NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Electric
 Generating Plants, 2001 Edition
 NUREG-1552, Supplement 1, Fire Barrier Penetration Seals in Nuclear Power Plants, dated
 01/99
 OSHA Standard 29 CFR 1910, Occupational Safety and Health Standards
 Underwriters Laboratory Standard 555, Standard for Fire Dampers and Ceiling Dampers, dated
 05/14/79

Technical Manuals and Vendor Information

Burgess Sales and Supply Inc. Specification Sheet for Fire Doors: AX-217F and AX-260F,
 Rev. A
 Fenestra Corporation, Specification Sheet for Hollow Metal Doors and Frames, dated
 11/06/1981
 Ruskin Manufacturing Company, Specification Sheet for 3-Hour Horizontal Fire Damper Model
 N-18023, Type A, Rev. DB
 S & R Products Inc., Specification Sheet for Electro Thermo Link (ETL), dated 2/15/1984
 Ventilator Users Guide for SuperVac Smoke Ventilators, dated 8/28/98
 SuperVac Smoke Ventilation Training Manual for Smoke Ventilators, dated 8/28/1998
 Emergi-Lite Vendor Documents, dated 10/16/1984

Licensing Basis Documents

10 CFR 50.48, Fire Protection
 Appendix A to Branch Technical Position Auxiliary and Power Conversion Systems Branch
 APCSB) 9.5-1, Guideline for Fire Protection for Nuclear Power Plants
 Catawba SER Supplement 2, Section 9.5.1, Fire Protection Program
 Catawba SER Supplement 3, Section 9.5.1, Fire Protection Program
 Catawba SER Supplement 4, Section 9.5.1, Fire Protection Program
 Catawba SER Supplement 5, Section 9.5.1, Fire Protection Program
 UFSAR Chapter 9, Section 9.5.1, Fire Protection System, dated 4/24/2006
 UFSAR Table 9-35, Lighting Systems Available to Illuminate Safety Related Equipment
 UFSAR Chapter 16, Fire Protection Selected Licensee Commitments
 Title 10 of the Code of Federal Regulations, Part 50 (10 CFR 50), Appendix R, Sections III. G,
 J, L, and O
 Letter W. O. Parker (Duke) to H. R. Denton (NRC), Catawba Fire Protection Review of APCSB
 (CMEB) 9.5-1, dated 10/3/1981
 Letter H. B. Tucker (Duke) to H. R. Denton (NRC), Catawba Fire Protection Review of APCSB
 (CMEB) 9.5-1, dated 11/4/1983

Design Basis Documents

CNS-1599.RF-00-0001, Design Basis Specification for the Fire Protection System (RF/Ry),
 Rev.14
 CNS-1435.00-00-0002, Design Basis Specification for the Post Fire Safe Shutdown, Rev. 17
 CNS-1465.00-00-0006, Design Basis Specification, Part B, Plant Fire Protection, Rev. 14

Audits and Self Assessment Reports

Fire Protection Program Health Reports, 2005T1, 2005T2, 2005T3, and 2006T1
 Assessment Report GO-07-08(NPA)(TFP)CNS), 2007 Triennial Fire Protection Audit, dated
 3/15/2007

Other Documents

JPM for OP/0/B/6100/013, SSF Operations, Transfer Controls to the SSS
 JPM for EP/1/A/5000/ECA-0.0, Place SSF Diesel in Operation
 JPM for EP/2/A/5000/ECA-0.0, Transfer MCC 2EMXS to Alternate Power Supply
 JPM for AP/1/A/5500/021, Establish NC Pump seal Injection From SSF (U-1 KC)
 Control Room Shift Turnover Records for Day and Night Shifts for the following dates:
 07/09/2007, 12/25/2006, 03/17/2007, and 12/01/2006
 Background Document for AP/0/A/5500/45
 Background Document for AP/2/A/5500/17
 A Study of the Fire Resistive Performance of the Fire Division Walls used in Power Plant
 Construction, R. W. Bletzacker and Associates, dated 4/08/1983
 Conduit Fire Test Report, Professional Loss Control Inc., dated 6/01/1987
 Catawba Fire Emergency Reports, NSD 112, Appendix A 112 dated 1/26/2004, 8/16/2004,
 5/23/2005, 9/30/2005, and 3/30/2006
 Catawba Fire Drill Summary Reports for Fire Brigade Drills Conducted in 2006 and 2007
 Catawba FPP Impairment Log for Systems/Equipment Out of Service for 2006
 Catawba Cable Installation Data, Cable Number - 1EFA736, EFA Control Process Center
 Power from 1KXPB, dated 8/26/1981
 Catawba Cable Installation Data, Cable Number - 1EFA1008, EFA Control Process Center
 Power from 2KXPB, dated 2/13/1984
 Catawba Cable Installation Data, Cable Number - 1RY501, MOV 1RY 25, dated 10/29/1982
 Catawba Cable Installation Data, Cable Number - 1RY528, MOV 1RY 25, dated 11/12/1982
 Catawba Cable Installation Data, Cable Number - 2ATC683, MOV 1RY 25, dated 9/24/1980
 Catawba Cable Installation Data, Cable Number - 2ATC1136, MOV 1RY 25, dated 12/2/1980
 Catawba Cable Installation Data, Cable Number - 1EOA943, MOV 1RY 25, dated 3/6/1981
 Catawba Cable Installation Data, Cable Number - 1ATC683, MOV 1RY 32, dated 9/29/1978
 Catawba Cable Installation Data, Cable Number - 1ATC1073, MOV 1RY 32, dated 3/11/1981
 Catawba Cable Installation Data, Cable Number - 1EOA943, MOV 1RY 32, dated 3/6/1981
 Catawba Cable Installation Data, Cable Number - 1RY502, MOV 1RY 32, dated 10/10/1980
 Catawba Cable Installation Data, Cable Number - 1RY527, MOV 1RY 32, dated 9/12/1980
 Catawba Cable Installation Data, Cable Number - 1RY503, RY Fire Pump B, dated 1/16/1984
 Catawba Cable Installation Data, Cable Number - 1RY505, RY Fire Pump A, dated 1/17/1984
 Catawba Cable Installation Data, Cable Number - 1RY509, RY Fire Pump C, dated 1/16/1984
 Catawba Cable Installation Data, Cable Number - 1RY520, RY Fire Pump A, dated 7/22/1980
 Catawba Cable Installation Data, Cable Number - 1RY519, RY Fire Pump B, dated 7/13/1980
 Catawba Cable Installation Data, Cable Number - 1RY518, RY Fire Pump C, dated 7/13/1980
 Catawba Cable Installation Data, Cable Number - 1RF559, RY Fire Pump A, dated 6/25/1980
 Catawba Cable Installation Data, Cable Number - 1RF560, RY Fire Pump A, dated 6/25/1980
 Catawba Cable Installation Data, Cable Number - 1RF882, RY Fire Pump C, dated 1/08/1982
 Catawba Operation Training Lesson Plan, OP-CN-SS-RFY, Fire Protection Systems, Rev. 18
 CNS Fire Brigade Monthly/Periodic Review of Qualifications, dated 7/5/2007
 Duke Initial Fire Brigade Training, Fire Hose, Nozzles, Appliances, and Streams, Rev. 4

Duke Letter of Intent to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants, 2001 Edition, dated 2/28/2006
 Duke Letter to NRC, Response to Generic Letter 2006-03, dated 6/7/2006
 Emergency Response Training, Volunteer Fire Departments, conducted 2/20/2006 and 2/19/2007
 General Employee Training, Objective #5, Fire Protection, Rev. 12
 Letter of Agreement, Bethel Volunteer Fire Department and Catawba Nuclear Station, dated 4/13/2005
 NRC GL 2006-03: Potentially Nonconforming Hemyc and MT Fire Barrier Configurations, dated 4/10/2006
 NRC IN 2005-07: Results of Hemyc Electrical Raceway Fire Barrier System Full Scale Fire Testing, dated 4/1/2005
 Severe Accident Analysis Report # 76, Fire PRA of Simultaneous Hot Short of 1RY-25 and 1RY-32 in Either Catawba Control Room or Cable Spreading Room, dated 11/27/2001
 Severe Accident Analysis Report # 681, Probabilistic Risk Assessment of Fire Induced Failures Associated with Hemyc Wrapped Cables in the CNS CA Pump Room, dated 6/8/2005
 Severe Accident Analysis Report # 853, Probabilistic Risk Assessment of Fire-Induced VCT valve Closure at Catawba, approved 3/31/2005

Problem Investigation Process (PIP) Reports Generated as a Result of This Inspection

C-07-03254, Penetration Seal G-AS-365-W-001 Not Properly Repaired After Being Breached, dated 6/27/2007
 C-07-03626, Auctioneered Diode Assemblies are incorrectly identified on electrical equipment location drawings.
 C-07-03911, NRC inspector identified concerns with the retesting of emergency lighting 8-hour battery pack unit
 C-07-03935, Documentation to support testing of the fire brigade radios could not be produced during the NRC inspection.

Other Corrective Action Documents (PIPs) Reviewed During This Inspection

C-00-05641, Potential for Spurious Fire Pump Stop Because Circuits for Manual Stop Controls for RY Fire Pumps A, B, and C are Located in Control Room and Unit 1 Cable Spreading Room, dated 11/8/2000
 C-01-01873, Pagers did not activate during a site drill.
 C-01-03509, Potential for Spurious Closing and Fire Water Isolation Due to Fire-Induced Hot Short Because Control Cables for Motor Operated Valves 1RY25 and 1RY32 are Routed in the Same Cable 1EOA943 dated 8/09/2001
 C-01-03532, Battery powered lighting not provided to illuminate exit paths.
 C-01-04092, Voice-Only Paging Transmitter Does Not Appear on any Drawings, dated 9/13/2001
 C-04-01566, 2004 Catawba Fire Protection Audit
 C-04-03060, Fire Scenario exist that could lead to NCP "A" and "C" seal failures if run to conclusion.
 C-04-04276, This PIP is to document and track the 3 NRC unresolved items discussed in the triennial fire protection inspection.
 C-05-06055, CNS Response to the NRC Proposal to Withdraw Operator Manual Action Rule
 C-06-00664, Items Found Missing While Performing PM on Fire Damage Control Kit
 C-06-03746, NFPA 805 Issues for Resolution, dated 5/15/2006

C-07-0044, Items identified during the monthly and quarterly emergency planning periodic tests.

C-07-00872, Corrective Action 10, Verify Installed Fire Hose Nozzles are of the Proper Rating for the Hazards at Each Nozzle's Location, dated 2/26/2007

C-07-02327, Pagers received to the PA system from the site telephone system are not audible in the power block.

C-07-02990, Relocation of SCBA Air Compressor to an Area Outside the RCA, dated 6/13/2007

LIST OF ACRONYMS

AB	Auxiliary Building
AFW	Auxiliary Feedwater
AP	Abnormal Procedure
ASB	Auxiliary Systems Branch
BTP	Branch Technical Position
CAP	Corrective Action Program
CFR	Code of Federal Regulation
CMEB	Chemical Engineering Branch
CNS	Catawba Nuclear Station
CO ₂	Carbon Dioxide
COR	Code of Record
DC	Direct Current
DID	defense-in-depth
EL	Elevation
ELU	Emergency Lighting Unit
ERFBS	Electrical Raceway Fire Barrier System
FA	Fire Area
FHA	Fire Hazards Analysis
FPP	Fire Protection Program
ft.	foot
FWST	Fueling Water Storage Tank
GL	Generic Letter
gpm	gallons per minute
HVAC	Heating, Ventilation, and Air Conditioning
IMC	Inspection Manual Chapter
IN	Information Notice
LER	Licensee Event Report
IP	Inspection Procedure
IR	Inspection Report
KC	Component Cooling Water
MCC	Motor Control Center
MCR	Main Control Room
MDAFW	Motor Driven Auxiliary Feedwater Pump
MOV	Motor Operated Valve
NCV	Non-Cited Violation
NFPA	National Fire Protection Association
NI	Safety Injection System
NRC	U. S. Nuclear Regulatory Commission
NV	Chemical and Volume Control System
OEP	Operating Experience Program
OMA	Operator Manual Action
OSHA	Occupational Safety and Health Administration
P&IDs	Piping and Instrumentation Drawings
PIP	Problem Investigation Report
PORV	Pilot Operated Relief Valve
RCP	Reactor Coolant Pump

RCS	Reactor Coolant System
ROP	Reactor Oversight Process
SCBA	Self-Contained Breathing Apparatus
SDP	Significance Determination Process
SER	Safety Evaluation Report
SSA	Safe Shutdown Analysis
SSD	Safe Shutdown
SSF	Standby Shutdown Facility
SSS	Standby Shutdown System
TDAFWP	Turbine Driven Auxiliary Feedwater Pump
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VAC	Volts Alternating Current
VCT	Volume Control Tank
VDC	Volts Direct Current
WO	Work Order