



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005**

November 30, 2005

R. T. Ridenoure
Vice President
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
P.O. Box 550
Fort Calhoun, NE 68023-0550

SUBJECT: FORT CALHOUN STATION - INSPECTION REPORT 05000285/2005008

Dear Mr. Ridenoure:

On November 10, 2005, the Nuclear Regulatory Commission (NRC) completed an inspection at the Fort Calhoun Station. The enclosed report documents the inspection findings, which were discussed in a debrief meeting at the end of the onsite inspection on August 12, 2005, with you and other members of your staff and again in an exit meeting conducted via conference call on November 10, 2005.

During this triennial fire protection inspection, the inspection team examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and the conditions of your license. The inspection consisted of selected examination of procedures and records, observations of activities and installed plant systems, and interviews with personnel.

Based on the results of this inspection, the NRC has identified two findings which were evaluated under the risk significance determination process as having very low safety significance (green). The NRC has determined that these findings involve violations of NRC requirements. These violations are being treated as noncited violations, consistent with Section VI.A of the Enforcement Policy. These noncited violations are described in the subject inspection report. If you contest the violations or significance of these noncited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Fort Calhoun Station facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response will be made 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/

Linda Joy Smith, Chief
Engineering Branch 2
Division of Reactor Safety

Docket: 50-285
License: DPR-40

Enclosures: NRC Inspection Report 05000285/2005008
w/Attachment: Supplemental Information

cc w/enclosure:

Joe I. McManis, Manager - Licensing
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
P.O. Box 550
Fort Calhoun, NE 68023-0550

David J. Bannister
Manager - Fort Calhoun Station
Omaha Public Power District
Fort Calhoun Station FC-1-1 Plant
P.O. Box 550
Fort Calhoun, NE 68023-0550

James R. Curtiss
Winston & Strawn
1400 L. Street, N.W.
Washington, DC 20005-3502

Chairman
Washington County Board of Supervisors
P.O. Box 466
Blair, NE 68008

Sue Semerena, Section Administrator
Nebraska Health & Human Services
Dept. of Regulation & Licensing
Division of Public Health Assurance
301 Centennial Mall, South
P.O. Box 95007
Lincoln, NE 68509-5007

Daniel K. McGhee
Bureau of Radiological Health
Iowa Department of Public Health
Lucas State Office Building, 5th Floor
321 East 12th Street
Des Moines, IA 50319

Electronic distribution by RIV:
 Regional Administrator (**BSM1**)
 DRP Director (**ATH**)
 DRS Director (**DDC**)
 DRS Deputy Director (**RJC1**)
 Senior Resident Inspector (**JDH1**)
 Branch Chief, DRP/E (**DNG**)
 Senior Project Engineer, DRP/E (**VGG**)
 Team Leader, DRP/TSS (**RLN1**)
 RITS Coordinator (**KEG**)

ROPreports

DRS STA (**DAP**)
 J. Dixon-Herrity, OEDO RIV Coordinator (**JLD**)
 FCS Site Secretary (**BMM**)
 W. A. Maier, RSLO (**WAM**)

SISP Review Completed: Yes ADAMS: : Yes No Initials: ljs
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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 50-285
License: DPR-40
Report: 05000285/2005008
Licensee: Omaha Public Power District
Facility: Fort Calhoun Station
Location: Fort Calhoun Station FC-2-4 Adm.
P.O. Box 399, Highway 75 - North of Fort Calhoun
Fort Calhoun, Nebraska
Dates: July 25 through November 10, 2005
Team Leader J. M. Mateychick, Senior Reactor Inspector, Engineering Branch 2
Inspectors: L. Willoughby, Resident Inspector
Accompanying Personnel: R. Mullikin, Consultant
K. Sullivan, Consultant
S. Graves, Reactor Inspector, Nuclear Safety Professional
Development Program
Approved By: Linda Joy Smith, Chief
Engineering Branch 2
Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000285/2005008; 07/25 - 11/10/2005; Omaha Public Power District; Fort Calhoun Station; Fire Protection (Triennial)

The NRC conducted an inspection with a team of one regional inspector, one resident inspector and two contractors. The inspection identified two Green noncited violations and five unresolved items (URI). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 "Significance Determination Process." Findings for which the significance determination process does not apply are indicated by "No Color" or by the severity level of the applicable violation. The NRC described its program for overseeing the safe operation of commercial nuclear power reactors in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self Revealing Findings

Cornerstone: Mitigating Systems

- C Green. The team identified three examples of a noncited violation of License Condition 3.D of the Fort Calhoun Station Operating License for the failure to take prompt corrective action to correct deficiencies adverse to fire protection, as required in the NRC-approved fire protection program. License Condition 3.D states that the licensee shall implement and maintain in effects all provisions of the approved fire protection program as described in the updated safety analysis report. The fire hazards analysis manual, which is described in the updated safety analysis report, states in Section 3.7.9 that the quality assurance program assures that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material, and non-conformances are promptly identified, reported and corrected. The cause of the violation is related to the crosscutting element of Problem Identification and Resolution. (Section 4OA2.b)

Example 1: The licensee failed to take prompt corrective action to resolve NRC-identified Noncited Violation 05-285/0001-01 for the failure to meet the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 for ensuring that one redundant train of equipment required to achieve and maintain hot shutdown conditions remains free of fire damage. After withdrawing their exemption request in 2003, the licensee did not promptly reroute power cables needed for achieving cold shutdown or provide procedures and materials needed for repair. The licensee had instituted fire watches in the affected area (Fire Area 32) and entered the finding into the corrective action program as Condition Report 200000207, when the NRC issued Noncited Violation 50-285/0001-01, on May 9, 2000.

The performance deficiency was a failure to meet the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 for ensuring that one redundant train of equipment required to achieve and maintain hot

shutdown conditions remains free of fire damage. This finding affected the mitigating systems cornerstone and was considered more than minor since it affected the cornerstone attribute of protection against external factors (i.e., fire). This finding had been evaluated using the significance determination process and had been determined to be of very low safety significance (Green). The team verified that changes to the conditions in the area would not have increased the safety significance of the finding and that the fire watches that were implemented in January 2000 were still being conducted.

Example 2: The licensee failed to take prompt corrective action to resolve an NRC-identified noncited violation of Technical Specification 5.8.1.c, Fire Protection Program Implementation, for the failure to implement procedures to ensure that fire barriers protecting safety-related areas were functional. NRC Inspection Report 05000285/2004003 documented a Green noncited violation as a result of Fire Barrier 69-F-24 being a nonfunctional fire barrier that separated Fire Area 20.5 (Room 62 - Ion Exchanger Area) and Fire Area 20.7 (Room 69 - Auxiliary Building Ventilation Room, Elevation 1025). The licensee instituted fire watches in the affected areas and entered the finding into the corrective action program as Condition Report 200401063. The inspectors found the condition still existing without repairs or engineering evaluation to accept the condition as is.

The performance deficiency was the failure to implement procedures to ensure that fire barriers protecting safety-related areas were functional. This finding affected the mitigating systems cornerstone and was considered more than minor since it affected the cornerstone attribute of Protection Against External Factors. Based on Manual Chapter 0609, Appendix F, the finding was determined to be in the Fire Confinement category because the fire barrier separated one fire area from another. The inspectors assigned a moderate degradation rating since there was defense-in-depth and more than 20 feet of horizontal separation between the degraded barrier and safety-related equipment. The inspectors performed the Phase 1 qualitative screening check and characterized the finding as having very low safety significance (Green) since the existing barrier would protect all safety-related equipment in the exposed fire area for at least a minimum of 20 minutes. The licensee is continuing the hourly fire watch in the areas as an interim compensatory measure.

Example 3: The licensee failed to take prompt corrective action to resolve an NRC-identified noncited violation of 10 CFR Part 50, Appendix R, for failure to provide fire protection features for structures, systems, and components important to achieve and maintain cold shutdown or having the capability of repairing these components within 72 hours. The raw water pumps are safety-related pumps located in the intake structure and are required for the plant to achieve and maintain cold shutdown conditions. The pumps receive power from the auxiliary building via underground cables. In Manhole 5, the cables are in trays located on a

nonrated concrete wall that separates the two trains. The licensee did not provide proper cable separation nor the necessary fire protection features for the raw water pump cabling in Manhole 5. In addition, the licensee did not have a procedure and materials available to repair the cabling within 72 hours. NRC Inspection Report 05000285/2004003 documented a Green noncited violation of 10 CFR Part 50, Appendix R. The licensee had entered this finding into the corrective action program as Condition Report 200400348 and had established an hourly fire watch in the area above Manhole 5 as an interim compensatory measure. The inspectors found that repair procedures had not been developed and repair materials had not been designated.

The performance deficiency was the failure to provide fire protection features for structures, systems, and components important to achieve and maintain cold shutdown or having the capability of repairing these components within 72 hours as required by 10 CFR Part 50, Appendix R. This finding affected the mitigating systems cornerstone and was considered more than minor since it affected the cornerstone attribute of Protection Against External Factors. Based on Manual Chapter 0609, Appendix F, the finding was determined to be in the Cold Shutdown category since the raw water pumps are needed to achieve and maintain cold shutdown. The inspectors assigned a moderate degradation rating because the concrete partition separating the trains would provide some protection. The inspectors performed the Phase 1 qualitative screening check and characterized the finding as having very low safety significance (Green) since the finding only affected the ability to reach and maintain cold shutdown conditions. The licensee is continuing the hourly fire watch in the area above Manhole 5 as an interim compensatory measure.

- C Green. The team identified a noncited violation of 10 CFR Part 50, Appendix R, Section III.G.1 for failure to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency station(s) is free of fire damage. For example, the reactor coolant gas vent system is designed to permit venting of the reactor vessel head and pressurizer steam space. The system consists of six valves. Spurious opening of three valves is sufficient to open both vent paths. Each vent path has an orifice such that the flow through one vent path is less than the reactor coolant makeup capability of one charging pump. Opening both flow paths, however, would exceed the capacity of a single charging pump. The team identified a fire area where fire damage could open both vent paths and leave only one charging pump available.

This finding is greater than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to external events (such as fire) to prevent undesirable consequences (i.e., core damage). This issue was identified as an apparent violation of 10 CFR Part 50, Appendix R, Section III.G.1.a during a previous fire protection triennial inspection in 2000. The issue was evaluated using the significance determination process, and was determined to be within the licensee response band (very low safety significance) based

on the presence of automatic suppression, low fire ignition frequency and remaining mitigation capability. In 2000, the licensee disagreed that postulating multiple fire-induced circuit failures was required by NRC regulations or its operating license. Because licensees have had numerous interpretations of the regulations concerning circuit analysis, the NRC temporarily suspended the associated circuits portion of the fire protection inspection. The team revisited this finding and conducted the inspection consistent with the approach explained in NRC Regulatory Issue Summary 2004-03, Revision 1, "Risk-Informed Approach for Post-Fire Safe-Shutdown Circuit Inspections". This finding is being treated as a noncited violation based on the guidance of NRC Enforcement Manual Section 8.1.7.1, Fire Induced Circuit Failures. The licensee did not dispute the violation, promptly established compensatory measures and entered the issue in the corrective action program. (Section 4OA5)

B. Licensee-Identified Findings

None.

REPORT DETAILS

1 REACTOR SAFETY

1R05 Fire Protection

The purpose of this inspection was to review the Fort Calhoun Station's fire protection program for selected risk-significant fire areas. Emphasis was placed on verification of the licensee's post-fire safe shutdown capability. The inspection was performed in accordance with the NRC regulatory oversight process using a risk-informed approach for selecting the fire areas and attributes to be inspected. The team used the Individual Plant Examination for External Events for the Fort Calhoun Station to choose risk-significant areas for detailed inspection and review. Inspection Procedure 71111.05T, "Fire Protection (Triennial)," requires selecting three to five fire areas for review. The three areas reviewed during this inspection were:

Fire Area 20 - Auxiliary Building Elevations 989' and 1025' (Fire Zones 20.1 and 20.7)

Fire Area 32 - Air Compressor and Auxiliary Feedwater Pump Area (Room 19)

Fire Area 43 - Service and Condensate Tank Area (Room 81)

For each of these fire areas, the inspection focused on fire protection features, systems and equipment necessary to achieve and maintain safe shutdown conditions, and licensing basis commitments.

Documents reviewed by the team are listed in the attachment.

.1 Shutdown From Outside Main Control Room

a. Inspection Scope

The team reviewed the functional requirements identified by the licensee as necessary for achieving and maintaining hot shutdown conditions to ensure that at least one post-fire safe shutdown success path was available in the event of fire in each of the selected areas and alternative shutdown for the case of control room evacuation. The team reviewed piping and instrumentation diagrams of systems credited in accomplishing safe shutdown functions to independently verify whether licensee's shutdown methodology had properly identified the required components. The team focused on the following functions that must be available to achieve and maintain safe shutdown conditions:

Reactivity control capable of achieving and maintaining cold shutdown reactivity conditions,

Reactor coolant makeup capable of maintaining the reactor coolant inventory,

Reactor heat removal capable of achieving and maintaining decay heat removal,

Supporting systems capable of providing other services necessary to permit extended operation of equipment necessary to achieve and maintain hot shutdown conditions,

Verify that a safe shutdown can be achieved and maintained with and without off-site power.

A review was also conducted to ensure that all required components in the selected systems were included in the licensee's safe shutdown analysis. The team identified the systems required for each of the primary safety functions necessary to achieve and maintain shutdown conditions. These systems were then evaluated to identify the systems that interfaced with the selected fire areas and were the most risk significant systems required for reaching hot shutdown conditions.

b. Findings

No findings of significance were identified.

.2 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the licensee's piping and instrumentation diagrams, safe shutdown equipment list, safe shutdown design basis documents, and the post-fire safe shutdown analysis to verify whether the licensee's shutdown methodology had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions for equipment in the fire areas selected for review. The team also reviewed and observed walkdowns of the licensee's procedures for achieving and maintaining safe shutdown in the event of a fire to verify that the safe shutdown analysis provisions were properly implemented. The team focused on the following functions that must be ensured to achieve and maintain post-fire safe shutdown conditions: (1) reactivity control capable of achieving and maintaining cold shutdown reactivity conditions, (2) reactor coolant makeup capable of maintaining the reactor coolant level within the level indication in the pressurizer, (3) reactor heat removal capable of achieving and maintaining decay heat removal, (4) supporting systems capable of providing all other services necessary to permit extended operation of equipment necessary to achieving and maintaining hot shutdown conditions, and (5) process monitoring capable of providing direct readings to perform and control the above functions.

The team reviewed the separation of safe shutdown cables, equipment, and components within the same fire areas, and reviewed the licensee's methodology for meeting the requirements of 10 CFR 50.48, Appendix A to Branch Technical Position 9.5-1 and 10 CFR Part 50, Appendix R, Section III.G. Specifically, this was to determine whether at least one post-fire safe shutdown success path was free of fire damage in the event of a fire in the selected areas. The evaluation focused on the cabling of selected components for the chemical and volume control system, high pressure safety injection system, and the auxiliary feedwater system. A sample of components was selected whose inadvertent operation could significantly affect the

shutdown capability credited in the licensee's safe shutdown analysis. The specific components selected are listed in the attachment. In addition, the team reviewed license documentation, such as NRC safety evaluation reports, the Fort Calhoun Station Updated Final Safety Analysis Report, submittals made to the NRC by the licensee in support of the NRC's review of their fire protection program, and exemptions from NRC regulations to verify that the licensee met license commitments.

b. Findings

(1) Failure To Maintain the Safety Injection and Refueling Water Tank Valves Free of Fire Damage

Introduction. The team identified an unresolved item related to compliance with Section III.G.2 of 10 CFR Part 50, Appendix R, for the failure to ensure that redundant trains of safe shutdown systems in the same fire area were free of fire damage. This will be treated as an unresolved item pending further inspection to determine safety significance.

Description. The team determined that there was a potential for a fire to cause a loss of redundant trains of systems and equipment relied on to achieve and maintain hot shutdown conditions in Fire Area 20 (Zone 20.1). Specifically, in the event of fire in this area, the safe shutdown analysis credited the use of high pressure safety injection Pumps SI-2A and/or SI-2B taking suction from the safety injection and refueling water tank as a means of accomplishing the reactor coolant system inventory control hot shutdown function. Therefore, a minimum set of components within the high pressure safety injection system that are capable of performing the reactor coolant system inventory control function must remain free of fire damage.

Depending on which high pressure safety injection pump (SI-2A or SI-2B) is selected for use, one of the two safety injection and refueling water tank discharge isolation valves (LCV-383-1 or LCV-383-2) must remain open to provide a suction source. Specifically, if Pump SI-2A is selected for use, Valve LCV-383-2 must remain open to establish a suction flow path to the pump. Similarly, if Pump SI-2B is selected, Valve LCV-383-1 must remain open. Therefore, Valves LCV-383-1 and LCV-383-2 are required equipment for the high pressure safety injection system to accomplish its shutdown function and at least one of the two valves must remain free of fire damage. The team determined that cables associated with the safety injection and refueling water tank discharge isolation Valves LCV-383-1 and LCV-383-2 were not physically protected from fire damage for a fire in Zone 20.1 of Fire Area 20.

The team determined from a review of schematic and wiring diagrams, that a single hot short on Cable EB3884 (for Valve LCV-383-1) or Cable EA3890 (for Valve LCV-383-2) would cause the associated valve to fail in the undesired (closed) position. Reviewing cable routing information, the team determined that both cables (EB3884 and EA3890) were routed in cable trays that are located in close proximity (less than 10 feet of horizontal separation) within Fire Area 20 (Zone 20.1) resulting in the potential for both Valves LCV-383-1 and LCV-383-2 to close as a result of a fire in Fire Area 20 (Zone 20.1). The licensee entered this finding into the corrective action program as

Condition Report 2000504001 and has established an hourly fire watch for this fire area as an interim compensatory measure.

Analysis. This finding is unresolved pending the completion of additional inspection to complete the significance determination process. Additional inspection will be required to determine potential fire ignition sources in the fire area, the routing of the cables of concern relative to the potential fire ignition sources and the possibility of damage to the cables of concern allowing completion of Phase 2 of the Fire Protection Significance Determination Process in accordance with NRC Manual Chapter 0609, Appendix F. This finding is of greater than minor safety significance because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to external events (such as fire) to prevent undesirable consequences. Specifically, a fire in Fire Area 20 (Zone 20.1) has the potential to cause damage to circuits which could adversely affect the ability of the licensee to provide makeup to the reactor coolant system via the safety injection and refueling water tank.

Enforcement. The licensee's fire hazard analysis states that it will comply with the requirements of Appendix R, Section III.G.2 to 10 CFR Part 50, which requires that cables whose fire damage could prevent the operation or cause maloperation of safe shutdown functions be physically protected from fire damage. However, the team found that the licensee failed to maintain one train of the systems required for reactor coolant system inventory control free of fire damage. Specifically, the licensee failed to protect one train of cables required to assure a safe shutdown required valve (LCV-383-1 or LCV-383-2) remained in the proper position. Pending completion of further inspection and a significance determination, this finding is identified as Unresolved Item (URI) 05000285/2005008-01, Failure To Maintain the Safety Injection and Refueling Water Tank Valve Cables Free of Fire Damage.

(2) Lack of an Evaluation of Fire-Induced Automatic Actuation Signals on a Fire Area Basis

Introduction. The team identified an unresolved item related to compliance with Section III.G.2 of 10 CFR Part 50, Appendix R, for failure to consider the potential for fire-induced actuations of automatic control systems. This will be treated as an unresolved item pending further inspection of the extent of condition and determination of safety significance.

Description. The team noted that certain fire-initiated automatic actuation signals could have a significant impact on shutdown capability. The licensee's safe shutdown analysis did not evaluate automatic control systems or related instrumentation and cables. For example, in the event of fire in Fire Area 20 (Zone 20.1) the licensee's safe shutdown analysis credits the use of high pressure safety injection pumps SI-2A and/or SI-2B taking suction from the safety injection and refueling water tank as a means of accomplishing the reactor coolant system inventory control hot shutdown function. However, if a recirculation actuation signal were to be generated as a result of fire damage in this area, the discharge valves for the tank would close and Pumps SI-2A and/or SI-2B suction would be transferred to the containment sump which could be dry. This could result in damage to an operating pump. In addition, a fire-initiated containment spray actuation signal in this area would result in a significant flow diversion

of high pressure safety injection suction flow by causing the automatic start of all three containment spray pumps and opening of Containment Spray Isolation Valves HCV-344 and HCV-345.

The licensee entered this finding into the corrective action program as Condition Report 200503738. During the inspection, the licensee's preliminary evaluation of the potential for fire to initiate emergency safeguards actuations, determined that a fire in Fire Area 20 (Zone 20.1) could potentially initiate a recirculation actuation signal as a result of cable damage. In response to this finding, the licensee has established an hourly fire watch for this fire area as an interim compensatory measure.

Analysis. This finding is unresolved pending the completion of further inspection of the extent of condition and completion of a significance determination. The licensee must evaluate the plant's automatic control systems, related instrumentation and cables to identify combinations of fire damage which could result in system actuations. The licensee must also identify any fire areas where the potential for such fire-induced damage exists by evaluating the routing of critical combinations of cables by fire area. This finding is of greater than minor safety significance because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to external events (such as fire) to prevent undesirable consequences. Specifically, the licensee did not evaluate the potential for fire induced actuations of automatic control systems, the impact on safe shutdown of such actuations, the ability of sufficient instrumentation to allow identification of an actuation, or the availability of equipment required to respond to an actuation before the plant entered into an unrecoverable condition.

Enforcement. The licensee's fire hazard analysis states that it will comply with the requirements of Appendix R, Section III.G.2 to 10 CFR Part 50, which requires that cables whose fire damage could prevent the operation or cause maloperation of safe shutdown functions be physically protected from fire damage. However, the team found that the licensee failed to evaluate the effects of fire damage on automatic control systems as part of the safe shutdown analysis and as a result failed to physically protect against a fire induced recirculation actuation signal adversely affecting the high pressure safety injection system, which is required for safe shutdown. Pending completion of further inspection for extent of condition and a significance determination, this finding is identified as URI 05000285/2005008-02, Lack of an Evaluation of Fire-Induced Automatic Actuation Signals on a Fire Area Basis

(3) Inadequate Procedure for Implementing the Fire Protection Program as Required by Technical Specification 5.8.1.c.

Introduction. The team identified an unresolved item related to compliance with Technical Specification 5.8.1.c for the failure to have an adequate procedure to implement the fire protection program. Standing Order SO-G-28, "Station Fire Plan," provides the instructions for operators to mitigate the effects of fire damage to safe shutdown equipment due to a fire in plant areas other than the control room and the cable spreading room. The procedure did not provide adequate instructions to operators to mitigate the effects of fire damage. This will be treated as an unresolved item pending a determination of safety significance and enforcement.

Description. Abnormal Operating Procedure AOP-06, "Fire Emergency," was the procedure that operators would follow when a fire is detected anywhere on the plant site. It also provided detailed manual actions that must be taken for a fire that requires a control room evacuation. However, Procedure SO-G-28 was the procedure that operators would use in the event of a fire in most plant areas. One of the purposes of Procedure SO-G-28 was to provide plant operators with a list of safe shutdown equipment which may be damaged or lost, on a fire area basis, and to identify manual actions which may be taken to restore safe shutdown equipment. Attachment 14, to Procedure SO-G-28, "Restoration of Safe Shutdown Conditions in the Event of a Fire," directed operators as to the manual operator actions that must be performed to mitigate fires in certain fire areas. In addition, some of the listed actions referred operators to use emergency or abnormal operating procedures. Thus, the licensee was utilizing manual operator actions instead of providing the required level of protection described by 10 CFR Part 50, Appendix R, Section III.G.2.

The team performed tabletop walkthroughs of plant procedures in response to fires in sample Fire Areas 20, 32 and 43. The team noted that:

- Procedure AOP-06 did not reference Procedure SO-G-28 as a procedure to use to perform manual actions to mitigate the effects of fire damage in many fire areas.
- Procedure SO-G-28 did not direct operators to enter Attachment 14. The team noted operators did not use Attachment 14 during a fire drill and during a tabletop walkthrough of the procedure.
- Procedure SO-G-28 did not provide operators information as to what diagnostic instrumentation may be relied upon for a fire in each fire area. Since the licensee's response to spurious operations or fire damage was based on the observations of symptoms, damage to instrumentation may mask these symptoms.
- Procedure SO-G-28 did not provide operators detailed information identifying the manual actions to be performed in response to a fire.
- Procedure SO-G-28 did not provide operators information as to which, if any, manual actions are time critical.
- Procedure SO-G-28, Attachment 14, Fire Area 43, stated that a fire in this area could result in the spurious opening of Main Steam Safety Valves MS-291 or MS-292. The required manual action listed was to isolate the air assist to the valves by closing manual Valve IA-3119. However, the team observed that this valve would probably be unaccessible due to it being located in the same fire area (Fire Area 43).

Analysis. This finding is unresolved pending the completion of a significance determination. The failure to have a shutdown procedure to mitigate the effects of fire damage to safe shutdown components following a fire was the performance deficiency.

The Phase 2 process of the Fire Protection Significance Determination Process in NRC Manual Chapter 0609, Appendix F, is intended to support the assessment of known issues only in the context of an individual fire area. A systematic plant-wide search and assessment effort is beyond the intended scope of the Fire Protection Significance Determination Process. Inspection to support a Phase 3 significance determination is required to determine the numbers and complexity of manual actions required. The team determined that this finding had more than minor significance because the inadequate procedure impacted the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of the system that responds to the event to prevent undesirable consequences

Enforcement. Technical Specification 5.8.1.c. requires that written procedures and administrative policies shall be established, implemented and maintained covering fire protection program implementation. The licensee's fire protection program utilized manual actions to mitigate the effects of fire damage to safe shutdown equipment for fires in several areas of the plant. Inspection Procedure 71111.05T provides inspection guidance in Enclosure 2 that for an interim period, manual actions without an approved exemption or deviation may be acceptable, if the manual actions are feasible based on the criteria provided. The following are the manual action feasibility criteria that were not met:

- Procedural guidance shall be adequate and operators should not rely on having time to study normal plant procedures to find a method of operating plant equipment that is seldom used. Procedure SO-G-28 did not identify all the manual actions to be performed or any critical time limits.
- Diagnostic instrumentation, unaffected by the postulated fire, is provided for the operator to detect the specific spurious operation that occurred. Procedure SO-G-28 did not provide operators information as to what diagnostic instrumentation may be relied upon for a fire in each fire area.
- Environmental conditions must be acceptable where the operator may encounter while traveling to the area where the manual action will be performed and within the area where the manual action will take place. Procedure SO-G-28 directed operators to enter Fire Area 43 to perform a manual action in response to a fire in that same area.

Standing Order SO-G-28 was the procedure used to implement the licensee's manual actions required to achieve safe shutdown due to fire damage. However, the licensee failed to provide a procedure to adequately mitigate the effects of fire damage to safe shutdown equipment as required by Technical Specification 5.8.1.c. The licensee entered this finding into the corrective action program as Condition Report 200504006 and has established an hourly fire watch for fire areas requiring manual actions as an interim compensatory measure. Pending completion of a significance determination, this finding is identified as URI 05000285/2005008-03, Inadequate Procedure for Implementing the Fire Protection Program as Required by Technical Specification 5.8.1.c.

.3 Passive Fire Protection

a. Inspection Scope

For the selected fire areas, the team evaluated the adequacy of fire area barriers, penetration seals, fire doors, electrical raceway fire barriers and fire rated electrical cables. The team observed the material condition and configuration of the installed barriers, seals, doors, and cables. The team compared the as-installed configurations to the approved construction details and supporting fire tests. In addition, the team reviewed license documentation, such as NRC safety evaluation reports, and exemptions from NRC regulations and the National Fire Protection Association code to verify that fire protection features met license commitments.

b. Findings

No findings of significance were identified.

.4 Active Fire Protection

a. Inspection Scope

For the selected fire areas, the team evaluated the adequacy of fire suppression and detection systems. The team observed the material condition and configuration of the installed fire detection and suppression systems. The team reviewed design documents and supporting calculations. In addition, the team reviewed license basis documentation, such as NRC safety evaluation reports, and exemptions from NRC regulations and the National Fire Protection Association codes to verify that fire suppression and detection systems met license commitments.

The team also observed an announced site fire brigade drill and the subsequent drill critique using the guidance in Inspection Procedure 71111.05AQ. Team members observed the fire brigade turnout, donning of protective gear, use of fire preplans, simulated fire fighting activities in plant Fire Area 32, communications between the fire brigade members and with operations personnel, support of fire brigade activities by operations, radiological controls and security, and the licensee's critique of the drill performance.

b. Findings

No findings of significance were identified.

.5 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

For the sample areas, the team verified that redundant trains of systems required for hot shutdown were not subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems including the effects of flooding.

b. Findings

No findings of significance were identified.

.6 Alternative Shutdown Capability

a. Inspection Scope

The team reviewed Abnormal Operating Procedure (AOP) 06, "Fire Emergency," Revision 12. Procedure AOP-06, Section II, provided instructions for performing a reactor shutdown, establishing control at the remote shutdown panel, and for manipulating equipment locally in the plant. The team observed a timed walkthrough of the procedure with licensed and non-licensed operators to determine its adequacy to direct safe shutdown. The team verified that the minimum number of available operators, exclusive of those required for the fire brigade, could reasonably be expected to perform the procedure actions within the applicable plant shutdown time requirements, and that equipment labeling was consistent with the procedure. The team verified that procedures, equipment, lighting, and communications were available to support successfully performing the procedure as intended. The team also reviewed records for training conducted on this procedure.

The team reviewed the time-critical manual actions identified by the licensee as being necessary to support alternate shutdown from outside the control room. Calculations and analyses, which provided the bases for these critical times, were also reviewed. The simulated completion times recorded during the procedure walk-through were then compared to the analytical values to verify that the procedure could be implemented as intended.

b. Findings

Introduction. The team identified an unresolved item related to compliance with Technical Specification 5.8.1.c for the failure to have an adequate procedure to implement the fire protection program. The team identified an example where simulated operator actions during a timed walkthrough of Procedure AOP-06, "Fire Emergency," could not be performed in a timely manner if a spurious actuation of auxiliary feedwater occurred due to fire damage. The licensee did not account for any spurious actuation of auxiliary feedwater due to fire damage in the control room or the cable spreading room. This will be treated as an unresolved item pending a determination of significance.

Description. The inspectors performing reviews and timed walkthroughs of AOP-06 identified the following example of an inadequate procedural guidance for achieving post-fire safe shutdown following evacuation of the control room. The walkthrough of Section II of AOP-06, "Control Room Evacuation," was timed by the inspectors to observe the actions of the Shift Manager, Control Room Supervisor, licensed control room operators, non-licensed plant equipment operators, Shift Technical Advisor and communicator.

Procedure AOP-06 Section II notes state that alternate shutdown capability is defined as establishing control at AI-179, Auxiliary Feedwater Panel, and AI-185, Alternate Shutdown Panel. The procedure does not state the time frame that control is needed but Engineering Calculation FC06355 requires establishing auxiliary feedwater at AI-179 panel in as little as 12 minutes. The time mentioned in Procedure AOP-06 just references declaring a Site Area Emergency if control has not been established within 15 minutes at both AI-179 and AI-185. Prior to establish control at AI-179, the procedure requires the communicator to first manually throttle Valves HCV-1107B, "Steam Generator RC-2A Auxiliary Feedwater Inlet Valve," and HCV-1108B, "Steam Generator RC-2B Auxiliary Feedwater Inlet Valve," to approximately 75 percent closed. The communicator can easily accomplish this when the valves are in their normally closed position by manipulating the installed top-mounted adjustable up travel stop handwheel. If the valves receive a spurious open signal prior to throttling, interviews with operators indicated that the valves may not be able to be manually throttled. There are no contingency actions in Procedure AOP-06 if the valves could not be throttled closed or for establishing control at AI-179 if the valves are not throttled closed.

Analysis. The inspectors determined that this finding had more than minor significance because the inadequate procedure impacted the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of the system that responds to the event to prevent undesirable consequences. Additional analysis will be needed from the licensee to determine the impact on plant conditions caused by not being able to meet the critical time specified in the safe shutdown analysis. This will be tracked as an unresolved item pending completion of that analysis and further inspection by the NRC. The licensee entered this finding into the corrective action program as Condition Report 200503731 and has revised Procedure AOP-06 to include contingency actions should the valves open prior to completion of manual throttling.

Enforcement. Technical Specification 5.8.1.c. requires that written procedures and administrative policies shall be established, implemented and maintained covering fire protection program implementation. The enforcement implications of this finding will be determined upon review of the additional analysis needed to determine the safety significance. This finding is identified as an unresolved item: 05000285/2005008-04, Inadequate Fire Safe Shutdown Procedure for Control Room Evacuation.

.7 Circuit Analyses

a. Inspection Scope

The team reviewed the licensee's post-fire safe shutdown analysis to verify that the licensee had identified circuits that may impact safe shutdown. On a sample basis, the team verified those cables for equipment required to achieve and maintain hot shutdown conditions in the event of fire in selected fire zones had been properly identified. The evaluation focused on the cabling of selected components for the chemical and volume control system, high pressure safety injection system, and the auxiliary feedwater system. Included in this evaluation were a sample of components whose inadvertent operation could significantly affect the shutdown capability credited in the safe shutdown analysis. In addition, the team verified that these cables had either been adequately

protected from the potentially adverse effects of fire damage, mitigated with approved manual operator actions, or analyzed to show that fire-induced faults (e.g., hot shorts, open circuits, and shorts to ground) would not prevent safe shutdown. In order to accomplish this, the team reviewed electrical schematics and cable routing data for power and control cables associated with each of the selected components.

In addition, the team verified, on a sample basis, that circuit breaker coordination and fuse protection have been analyzed, and are acceptable as means of protecting the power source of the designated redundant or alternative safe shutdown component.

For the selected fire areas, the team also reviewed the location and installation of diagnostic instrumentation that was necessary for achieving and maintaining safe shutdown conditions to ensure that in the event of a fire, this instrumentation would remain functional.

b. Findings

The objective of the fire protection requirements and guidance is to provide reasonable assurance that one train of systems necessary to achieve and maintain hot shutdown is free of fire damage. This includes protecting circuits whose fire-induced failure could prevent the operation, or cause maloperation, of equipment necessary to achieve and maintain post-fire safe shutdown. As described in Section 1R05.02 above, the team identified deficiencies in the adequacy of fire protection features provided to ensure that one train of shutdown cables and circuits would remain free of fire damage.

.8 Communications

a. Inspection Scope

The team reviewed the adequacy of the communication system to support plant personnel in the performance of alternative safe shutdown functions and fire brigade duties. The team verified that portable radios were available for use and maintained in working order. The team reviewed that the electrical power supplies and cable routing for the phone system would allow them to remain functional following a fire in the control room fire area.

b. Findings

No findings of significance were identified.

.9 Emergency Lighting

a. Inspection Scope

The team reviewed the emergency lighting system required to support plant personnel in the performance of alternative safe shutdown functions to verify it was adequate to support the performance of manual actions required to achieve and maintain hot shutdown conditions, and for illuminating access and egress routes to the areas where

manual actions are required. The locations and positioning of emergency lights were observed during a walkthrough of the control room evacuation procedure.

b. Findings

No findings of significance were identified.

.10 Cold Shutdown Repairs

a. Inspection Scope

The team reviewed licensee procedures to determine whether repairs were required to achieve cold shutdown and to verify that the repair material was available on the site.

b. Findings

NRC Inspection Report 05000285/2004003 documented a Green noncited violation of 10 CFR Part 50, Appendix R, as a result of the failure to provide fire protection features for structures, systems, and components important to achieve and maintain cold shutdown or having the capability of repairing these components within 72 hours. Specifically, the licensee did not provide proper cable separation nor the necessary fire protection features for the raw water pump cabling in Manhole 5. In addition, the licensee did not have a procedure and materials available to repair the cabling within 72 hours.

During the triennial fire inspection, the inspectors reviewed the corrective actions associated with Condition Report 200400348. The licensee indicated repair procedures had not been developed and repair materials had not been designated. This finding is one of three examples of the licensee's failure to take prompt corrective actions for fire protection deficiencies and is discussed in detail in Section 4OA2 of this report.

.11 Compensatory Measures

a. Inspection Scope

The team reviewed the licensee's program with respect to compensatory measures in place for out-of-service, degraded, or inoperable fire protection and post-fire safe shutdown equipment, systems or features.

The team reviewed Standing Order SO-G-103, "Fire Protection Operability and Surveillance Requirements," Revision 18; Standing Order SO-G-58, "Control of Fire Protection System Impairments," Revision 32; Standing Order SO-G-91, "Control and Transportation of Combustible Materials," Revision 20 to determine whether the procedures adequately controlled compensatory measures for fire protection systems, equipment and features (e.g., detection and suppression systems and equipment, and passive fire barriers).

The team reviewed procedure FCSG-19, "Performing Risk Assessments," Revision 5 and Standing Order SO-M-100, "Conduct of Maintenance," Revision 39 to determine

whether the procedures adequately controlled compensatory measures for out-of-service, degraded, or inoperable equipment that could affect post-fire safe shutdown equipment, systems or features.

b. Findings

Introduction. The team identified an unresolved item involving the adequacy of assessing and managing increases in risk due to potential fire events. The potential fire events in combination with out-of-service, degraded, or inoperable equipment could affect post-fire safe shutdown.

Description. The team reviewed the licensee's procedure FCSG-19, "Performing Risk Assessments," and Standing Order SO-M-100, "Conduct of Maintenance," for treatment of maintenance.

Standing Order SO-M-100 discusses the risk assessment process for both the planned plant configurations and situations involving emergent conditions. SO-M-100 also provides general categories of actions to be taken based on the level of risk. Procedure FCSG-19 expands on the standing order process and provides additional guidance and implementing instructions. The licensee's Configuration Risk Management program followed the guidance of NUMARC 93-01 which was endorsed by the NRC in Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants."

The licensee considered that the fire protection program minimized the risk of a significant fire. Therefore, the licensee concluded that fire events do not have to be considered in the risk assessment. What was not considered is the affects of potential fire events in combination with other maintenance on post-fire safe shutdown equipment. The licensee entered the issue into their corrective action program for further evaluation as Condition Report 200503979.

Analysis. The safety significance of this issue will be determined upon completion of the enforcement assessment.

Enforcement. Section (a)(4) of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," states, "Before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. The scope of the assessment may be limited to structures, systems, and components that a risk-informed evaluation process has shown to be significant to public health and safety." Additional NRC staff review was needed to determine whether the licensee's practices were in compliance with 10 CFR 50.65(a)(4). This will be tracked as an unresolved item pending completion of this review: URI 05000285/2005008-05, Assessing and Managing Maintenance Risk for Post-Fire Safe Shutdown Equipment.

4OA2 Problem Identification and Resolution

a. Inspection Scope

The team reviewed a sample of Condition Reports to verify that the licensee was identifying fire protection-related issues at an appropriate threshold and entering those issues into the corrective action program. The inspectors also reviewed the corrective actions taken to address findings documented in Resident Inspection Report 05000285/2004003. A listing of Condition Reports reviewed is provided in the attachment to this report.

b. Findings

Introduction. The team identified three examples of a noncited violation of very low safety significance (Green) for failure to promptly correct conditions adverse to fire protection, which is a provision of the Fort Calhoun Station fire protection program. This is a violation of License Condition 3.D of the Fort Calhoun Station Operating License.

Description.

Example 1 - Failure to Take Prompt Corrective Action for an NRC-Identified Violation of III.G.2 Requirements

The first example of failure to take prompt corrective action involves an NRC-identified noncited violation for the failure to meet the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 for ensuring that one redundant train of equipment required to achieve and maintain hot shutdown conditions remains free of fire damage. The NRC issued Noncited Violation 50-285/0001-01, on May 9, 2000. The licensee instituted fire watches in the affected area (Fire Area 32) and entered the finding into the corrective action program as Condition Report 200000207.

During the walkdown in January 2000, of Fire Area 32, the team identified two locations where redundant trains of cables associated with safe shutdown equipment were not provided with either 20 feet of separation or 1-hour fire rated wrap to ensure one train was free of fire damage. In one location, the team identified cable trays containing redundant trains of power and control cables separated by 3 feet 3 inches with no 1-hour fire wrap. In another location, the team identified cable trays containing redundant trains of power cables, which were separated from each other by 10 feet of horizontal distance. Furthermore, cable trays containing redundant control cables were located within that 10 feet of horizontal distance, parallel to the power cables, and separated from each other by just 5 feet. The NRC had previously granted an exemption in Fire Area 32 to the requirement that power feeder cables meet the requirement to provide a 1-hour rated enclosure. This was based, partially, on the licensee's information that cable trays containing redundant trains of power cables have a minimum separation of approximately 10 feet horizontally. The licensee's exemption request also did not describe any control cables that lacked the required protection.

From May 2000 through October 2003, the licensee attempted to address the issue through the exemption process. The licensee withdrew the exemption request after

agreement with the NRC staff could not be reached. Subsequently, the licensee determined that the optimum approach would be a combined approach that utilized the rerouting of cables and manual actions to achieve compliance. Only instrumentation and control cables would be rerouted. The compliance for 480 volt power cables would be accomplished using manual operator actions and meeting the original exemption conditions. The 4160 volt power cables are required for cold shutdown. Compliance would be achieved by repair of the required cables within 72 hours of a fire. During the Spring 2005 Refueling Outage, the licensee implemented a modification that rerouted twelve instrumentation and control cables out of Fire Area 32 to separate fire areas in the switchgear rooms and lower/upper penetration rooms.

However, for the 4160 volt power cables, a procedure for the cold shutdown repairs and identification of the required materials had not been completed by the end of this inspection. The failure to promptly develop procedures and to identify material needed for cold shutdown repairs after October 2003 is the first example of Noncited Violation 05000285/2005008-06

Example 2 - Failure to Take Prompt Corrective Action for an NRC-Identified Violation of Technical Specification 5.8.1.c, Fire Protection Program Implementation

The second example of failure to take prompt corrective action involves an NRC-identified noncited violation of Technical Specification 5.8.1.c, Fire Protection Program Implementation, for the failure to implement procedures to ensure that fire barriers protecting safety-related areas were functional.

NRC Inspection Report 05000285/2004003 documented a Green noncited violation as a result of Fire Barrier 69-F-24 being a nonfunctional fire barrier that separated Fire Area 20.5 (Room 62 - Ion Exchanger Area) and Fire Area 20.7 (Room 69 - Auxiliary Building Ventilation Room, Elevation 1025). The barrier was a personnel hatch for egress into Room 62 from 69 and was constructed of a 5/16-inch thick metal plate. The hatch was secured by hinges on one edge and a hasp on the opposite edge to hold the plate flat against the concrete floor. Engineering Evaluations EA-FC-98-005, "Fire Barrier Evaluation for 86-10 Miscellaneous Penetrations," Revision 3, and EA-FC-91-112, "Evaluation of the Fire Barrier Separating Rooms 62 and 69," Revision 2, evaluated the barrier for adequacy in accordance with Generic Letter 86-10. The evaluation indicated that angle irons were used to provide a barrier overlap, thus preventing any openings or gaps for flame propagation. The inspectors identified that angle irons were not placed on two sides of the hatch, thus creating gaps up to 2 inches wide on the sides of the barrier. The licensee entered this violation in their corrective action program as Condition Report 200401063. The failure to promptly evaluate or repair a degraded fire barrier is the second example of Noncited Violation 05000285/2005008-06.

During the triennial fire inspection the inspectors reviewed the corrective actions associated with Condition Report 200401063 and toured the plant to look at the repair of the condition. The inspectors found the condition still existing and no evidence of repair. The inspectors asked licensee if the engineering evaluations were updated to accept the condition as is and were told that they were not.

Example 3 - Failure to Take Prompt Corrective Action for an NRC-Identified Violation of 10 CFR Part 50, Appendix R

The third example of failure to take prompt corrective action involves an NRC-identified noncited violation of 10 CFR Part 50, Appendix R, for failure to provide fire protection features for structures, systems, and components important to achieve and maintain cold shutdown or having the capability of repairing these components within 72 hours.

The raw water pumps are safety-related pumps located in the intake structure and are required for the plant to achieve and maintain cold shutdown conditions. The pumps receive power from the auxiliary building via underground cables. These cables pass through two cable vaults identified as Manholes 5 and 31. In Manhole 31 the cables pass through the cable vault in individual conduits as they enter the intake structure. In Manhole 5 the cables are in trays located on a nonrated concrete wall that separates the two trains. The licensee did not provide proper cable separation nor the necessary fire protection features for the raw water pump cabling in Manhole 5. In addition, the licensee did not have a procedure and materials available to repair the cabling within 72 hours. NRC Inspection Report 05000285/2004003 documented a Green noncited violation of 10 CFR Part 50, Appendix R. The licensee had entered this finding into the corrective action program as Condition Report 200400348 and had established an hourly fire watch in the area above Manhole 5 as an interim compensatory measure.

During the triennial fire inspection, the inspectors reviewed the corrective actions associated with Condition Report 200400348. The inspectors asked the licensee for a copy of the repair procedure and also be shown the repair materials. The licensee indicated repair procedures had not been developed and repair materials had not been designated. The failure to promptly develop procedures and identify materials needed for cold shutdown repairs is the third example of Noncited Violation 05000285/2005008-06.

Analysis. The team evaluated the performance deficiencies and safety significance of these findings. For the first example, the performance deficiency was a failure to provide fire protection features for structures, systems, and components important to achieve and maintain cold shutdown or having the capability of repairing these components within 72 hours as required by 10 CFR Part 50, Appendix R. This finding affected the mitigating systems cornerstone and was considered more than minor since it affected the cornerstone attribute of Protection Against External Factors (i.e., fire). This finding had been evaluated using the significance determination process and had been determined to be of very low safety significance (green). The team verified that changes to the conditions in the area would not have increased the safety significance of the finding and that the fire watches that were implemented in January 2000 were still being conducted.

For the second example, the performance deficiency was the failure to implement procedures to ensure that fire barriers protecting safety-related areas were functional. This finding affected the mitigating systems cornerstone and was considered more than minor since it affected the cornerstone attribute of Protection Against External Factors. Based on Manual Chapter 0609, Appendix F, the finding was determined to be in the Fire Confinement category because the fire barrier separated one fire area from

another. The inspectors assigned a moderate degradation rating since there was defense-in-depth and more than 20 feet of horizontal separation between the degraded barrier and safety-related equipment. The inspectors performed the Phase 1 qualitative screening check and characterized the finding as having very low safety significance (Green) since the existing barrier would protect all safety-related equipment in the exposed fire area for at least a minimum of 20 minutes.

For the third example, the performance deficiency was the failure to provide fire protection features for structures, systems, and components important to achieve and maintain cold shutdown or having the capability of repairing these components within 72 hours as required by 10 CFR Part 50, Appendix R. This finding affected the mitigating systems cornerstone and was considered more than minor since it affected the cornerstone attribute of Protection Against External Factors. Based on Manual Chapter 0609, Appendix F, the finding was determined to be in the Cold Shutdown category since the raw water pumps are needed to achieve and maintain cold shutdown. The inspectors assigned a moderate degradation rating because the concrete partition separating the trains would provide some protection. The inspectors performed the Phase 1 qualitative screening check and characterized the finding as having very low safety significance (Green) since the finding only affected the ability to reach and maintain cold shutdown conditions. The licensee is continuing the hourly fire watch in the area above Manhole 5 as an interim compensatory measure.

Enforcement. License Condition 3.D of the Fort Calhoun Station operating license states that Omaha Public Power District shall implement and maintain in effects all provisions of the approved fire protection program as described in the updated safety analysis report. The Fort Calhoun Station fire hazards analysis manual, which is described in the updated safety analysis report, states in Section 3.7.9 that the quality assurance program assures that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material, and non-conformances are promptly identified, reported and corrected. Contrary to the above, complete corrective actions have not been accomplished in a timely manner. The first example has been an ongoing issue since it was identified in January 2000. The second and third examples have been identified for more than a year with the actions required to correct the findings known and able to be implemented. The fire watches that were implemented as interim compensatory measures when the violations were initially identified were still being conducted during this inspection. The licensee entered this violation in their corrective action program as Condition Report 200504021.

Because this violation of License Condition 3.D of the Fort Calhoun Station operating license, is of very low safety significance and has been entered into the licensee's corrective action program, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy:
NCV 05000285/2005008-06, Failure to Take Prompt Corrective Action for Fire Protection Program Deficiencies

4OA4 Crosscutting Aspects of Findings

Cross-Reference to Problem Identification and Resolution Findings Documented Elsewhere

Section 4OA2 describes a finding with three examples where the licensee failed to promptly correct conditions adverse to fire protection by completing corrective actions for NRC identified noncited violations from previous inspections.

4OA5 Other Activities

(Closed) Apparent Violation (AV) 050000285/2000002-02: Apparent violation of 10 CFR Part 50, Appendix R, Section III.G.1.a for failure to ensure that one train of systems in Fire Areas 34B and 36B required for safe shutdown is free of fire damage.

Introduction. During the 2000 triennial fire protection inspection, the team identified that a fire in either Fire Area 34B (upper electrical penetration room) or 36B (west switchgear room) could cause fire-induced circuit failures of the reactor coolant gas vent system valves (HCV-176, HCV-177, HCV-178, HCV-179, and HCV-180), resulting in a loss of coolant accident beyond the capability of makeup, as analyzed in the safe shutdown analysis. The team identified that for these ungrounded dc circuits, multiple, concurrent, circuit failures could cause spurious opening of the reactor coolant gas vent system valves in Fire Areas 34B and 36B. The licensee did not consider this failure mode in their safe shutdown analysis, because it is their position that simultaneous multiple spurious actuations are not required to be considered in accordance with their licensing basis. At the time of the 2000 inspection, this issue was under review by the Office of Nuclear Reactor Regulation.

Although the licensee did not agree that this scenario was required to be addressed, they established an hourly fire watch for Fire Areas 34B and 36B as a compensatory measure to ensure the conditions of the rooms did not change. In addition, licensee representatives were able to describe a method of coping with the events in Fire Area 34B, as well as, in 36B. This included, for a fire in Fire Area 34B, manually starting one charging pump from the control room and either manually aligning a second charging pump from outside the control room or manually establishing an injection path using a high pressure safety injection pump discharging to the chemical volume control charging header. For a fire in Fire Area 36B, mitigation actions included manually starting one charging pump from the control room and manually establishing an injection path using a high pressure injection pump discharging to the chemical volume control charging header. These manual actions were described in procedures and were considered by the team to be reasonable and within the capabilities of licensed operators to perform in a timely manner. Although not formally analyzed by the licensee in their safe shutdown analysis, EA-FC-89-055, the team considered this described method to be feasible for mitigating and coping with the postulated event.

Description. The reactor coolant gas vent system is designed to permit venting of the reactor vessel head and pressurizer steam space. The reactor vessel vent line is installed in the reactor vessel head and the pressurizer vent line taps into the line between the pressurizer and the power operated relief valves. Each vent connection has a 7/32-inch orifice to limit flow in the event of a pipe break.

The reactor vessel vent path is comprised of the parallel combination of Valves HCV-176 and HCV-177, which are in series with the parallel combination of Valves HCV-180 and HCV-181. The pressurizer vent line is comprised of the parallel combination of Valves HCV-178 and HCV-179, which are in series with the parallel combination of Valves HCV-180 and HCV-181. All valves are normally closed, air-operated valves. According to the licensee's analysis, the 7/32" diameter orifice that is installed in each line will limit flow to 29 gpm, which is within the makeup capability of a single charging pump (40 gpm).

Spurious opening of two valves in either line is sufficient to open a single flow path. Spurious opening of three valves (e.g., HCV-176, HCV-178 and HCV-180) is sufficient to open both flow-paths. The control cable for each of the six valves is a multi-conductor, cable with thermoset insulation. A single conductor-to-conductor short within the multi-conductor cable is sufficient to cause its associated valve to open.

The team noted that at least one charging pump is protected/credited for each of the fire areas of concern. A fire-induced conductor-to-conductor short in three of the valve cables would, therefore, adversely affect the safe shutdown capability since the inventory loss of 58gpm would exceed the makeup capability of a single charging pump (40gpm). From a review of cable routing information, the team determined that only one charging pump (CH-1A) may be available in the event of fire in Fire Area 36B.

In addition to the concern cited above, spurious opening of reactor coolant gas vent, flow path valves could also impact safe shutdown by hindering the operators ability to enter containment to perform actions required to cool down the reactor and establish shutdown cooling. The evaluation performed (as documented in Calculation EA-FC-97-045) was based on a similar, but more significant, scenario (40 gpm of RC for 8 hours - which resulted in a general areas dose rate of 11.3 R/H). However, the calculation does not provide a quantitative assessment of actual containment conditions for this specific scenario. Based on a qualitative assessment the analysis concludes that containment entry would be "Highly undesirable - but possible to perform necessary functions". In the absence of a specific evaluation of containment conditions for this scenario, the ability of operators to perform required shutdown actions inside containment can not be assured.

Analysis. The significance of this finding was evaluated in NRC Inspection Report 50-285/00-02 and determined to be within the licensee's response band (Green). The licensee issued Condition Report 200504013 to document this issue.

Enforcement. The failure to ensure that, for a fire in Fire Areas 34B and 36B, one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage is a violation of 10 CFR Part 50, Appendix R, Section III.G.1.a. Because this finding is of very low

safety significance and has been entered into the licensee's corrective action program, this violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000285/2005008-07, Failure to Ensure One Train of Systems Required for Safe Shutdown is Free of Fire Damage.

4OA6 Management Meetings

Debrief Meeting Summary

The team leader presented the inspection results to Mr. M. Frans, Assistant Plant Manager, and other members of licensee management at the conclusion of the onsite inspection on August 12, 2005.

During this meeting, the team leader confirmed to the licensee's management that no materials considered to be proprietary had been examined during the inspection.

Exit Meeting Summary

The team leader presented the inspection results to members of licensee management at the conclusion of the inspection in a conference call on November 10, 2005.

KEY POINTS OF CONTACT

Licensee

D. Buell, Fire Protection Design Engineer
C. Cauloon, Shift Manager/Operations
G. Cavanaugh, Supervisor - Regulatory Compliance
S. Chomos, Lead QA Engineer / QA
M. Core, Manager - System Engineering
H. Faulhaber, Division Manager - Engineering
M. Frans, Assistant Plant Manager
T. Giebelhausen, Lead OP Engineer / Operations
K. Hyde, Design Engineering - Mechanical
T. Leibel, Design Engineer
E. Matzke, Station Licensing
J. McManis, Manager Licensing
R. Muller, Design Engineering - Electrical
T. Pilmies, Manager - Chemistry
G. Riva, Fire Protection System Engineer
J. Skiles, Manager - Design Engineering
D. Spires, Manager - Work and Outage Management
M. Tesar, Division Manager - Nuclear Support Services

NRC

J. Hanna, Senior Resident Inspector

ITEMS OPENED AND CLOSED

Opened

05000285/2005008-01	URI	Failure To Maintain the Safety Injection and Refueling Water Tank Valve Cables Free of Fire Damage (Section 1R05.2.b(1))
05000285/2005008-02	URI	Lack of an Evaluation of Fire-Induced Automatic Actuation Signals on a Fire Area Basis (Section 1R05.2.b(2))
05000285/2005008-03	URI	Inadequate Procedure for Implementing the Fire Protection Program as Required by Technical Specification 5.8.1.c (Section 1R05.2.b(3))
05000285/2005008-04	URI	Inadequate Fire Safe Shutdown Procedure for Control Room Evacuation (Section 1R05.6)

05000285/2005008-05 URI Assessing and Managing Maintenance Risk for Post-Fire Safe Shutdown Equipment (Section 1R05.11)

Opened and Closed

05000285/2005008-06 NCV Failure to Take Prompt Corrective Action for Fire Protection Program Deficiencies (Section 4OA2.b)

05000285/2005008-07 NCV Failure to Ensure One Train of Systems Required for Safe Shutdown is Free of Fire Damage (Section 4OA5)

Closed

05000285/2000001-02 APV Apparent violation of 10 CFR Part 50, Appendix R, Section III.G.1.a for failure to ensure that one train of systems in Fire Areas 34B and 36B required for safe shutdown is free of fire damage (1RO5.6).

LIST OF DOCUMENTS REVIEWED

The following documents were selected and reviewed by the team to accomplish the objectives and scope of the inspection.

COMPONENTS SELECTED FOR REVIEW

<u>Component</u>	<u>Description</u>
CH-1A	Charging Pump 1A
CH-1B	Charging Pump 1B
CH-1C	Charging Pump 1C
HCV-240	Auxiliary Pressurizer Spray Valve
HCV-1107A	Auxiliary Feedwater to Steam Generator RC-2A Isolation Valve
HCV-1107B	Auxiliary Feedwater to Steam Generator RC-2A isolation Valve
HCV-1108A	Auxiliary Feedwater to Steam Generator RC-2B Isolation Valve
HCV-1108B	Auxiliary Feedwater to Steam Generator RC-2B Isolation Valve
LCV-218-2	Volume Control Tank Ch-14 Outlet Valve

LCV-218-3	Charging Pumps CH-1A, CH-1B, Ch-1C Suction Header Supply Valve
LCV-383-1	Safety Injection Refueling Water Tank Discharge Isolation Valve
LCV-383-2	Safety Injection Refueling Water Tank Discharge Isolation Valve
SI-2A	High Pressure Safety Injection Pump 2A
SI-2B	High Pressure Safety Injection Pump 2B
SI-2C	High Pressure Safety Injection Pump 2C

CALCULATIONS

<u>Number</u>	<u>Title</u>	<u>Revision</u>
FC03447	Room 19 (Compressor Bay) Suppression System Demand Calculation	2
FC05509	Updated Analysis of Fire Protection Water Supply at Fort Calhoun Station	5
FC06355	10CFR50 Appendix R Functional Requirements and Component Selection	9
FC06506	Hydraulic Model of the Fire Protection Water Supply System	2

CONDITION REPORTS (CRs)

20000207	200302413	200503731*	200503818*	200503974*	200504006*
200204129	200503471*	200503737*	200503824*	200503979*	
200204313	200503701*	200503738*	200503846*	200503989*	
200204316	200503728*	200503750*	200504869*	200504001*	

*Initiated due to inspection activities.

DRAWINGS

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3-351, Sh 3	Two Viking Deluge System to be Tripped by Electric Detectors	4
6-7358	800 MHz Two-Way Repeater Amplifier 61-89-92132	2
11405-E-4, Sheet 1	480 Volt Auxiliary Power One line Diagram P & ID	29
11405-E-5, Sheet 2	480 Volt Auxiliary Power One line Diagram P & ID	29
11405-E-8, Sheet 1	125 Volt DC Misc Power Distribution Diagram P & ID	59
11405-E-9, Sheet 1	120 Volt AC Instrument Buses One Line Diagrams P & ID	45
11405-E-9, Sheet 2	120 Volt AC Instrument Buses One Line Diagrams P & ID	15
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11405-E-143, Sheet 4	Schematic Diagram - Charging Pump CH-1A	6
11405-E-143, Sheet 5	Schematic Diagram - Charging Pump CH-1B	5
11405-E-144, Sheet 4	Schematic Diagram - Charging Pump CH-1C	5
11405-M-10, Sheet 1	Auxiliary Coolant Component Cooling System Flow Diagram P & ID	66
11405-M-100	Raw Water Flow Diagram P & ID	88
11405-M-252, Sheet 1	Flow Diagram Steam P & ID	97
11405-M-253, Sheet 1	Flow Diagram Steam Generator Feedwater and Blowdown P & ID	86
11405-M-253, Sheet 3	Flow Diagram Steam Generator Feedwater and Blowdown P & ID	11
11405-M-253, Sheet 4	Flow Diagram Steam Generator Feedwater and Blowdown P & ID	33
136B2341, Sheet 34	Elementary Diagram - Charging Pump CH-1A	20
136B2341, Sheet 35	Elementary Diagram - Charging Pump CH-1B	20

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136B3219, Sheet 30	Elementary Diagram - LCV-383-1	10
136B3219, Sheet 31	Elementary Diagram - LCV-383-2	10
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1224-02	Head-End Amplifier Distribution System	0
1224-03	Off-The-Air Calculations	0
B-4250, Sheet 3	Emergency Lighting Routing	1
B-4250, Sheet 3A	Cable Block Diagram - Emergency Lighting Sheet #1	1
B-4250, Sheet 3B	Cable Block Diagram - Emergency Lighting Sheet #2	1
B-4250, Sheet 8	Cable Block Diagram - Charging Pump CH-1A	2
B-4250, Sheet 10	Cable Block Diagram - Charging Pump CH-1B	3
B-4250, Sheet 12	Cable Block Diagram - Charging Pump CH-1C	2
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B-4250, Sheet 189	Cable Block Diagram - NE-004	4
C3-012, Sh PA 19-1	Room 19 Sprinkler System	02
C-4224, Sheet 1	Power Feed for Head Amplifier Cabinet AI-139, Paging Transmitter Cabinet AI-129 and Control Room Handsets	0
D- 4094, Sh 2	Fire Detection System Basement Floor Plan Elevation 995'-6"	3
D- 4094, Sh 3	Fire Detection System Aux. Bldg. & Containment Elevation 1025'-0"	4
D- 4094, Sh 4	Fire Detection System Operating Floor Plan Elevation 1036'-0"	9

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E-23866-210-110, Sheet 1A	Reactor Coolant System Flow Diagram P & ID	9
E-23866-210-120, Sheet 1	Chemical & Volume Control System P & ID	69
E-23866-210-120, Sheet 1A	Chemical & Volume Control System P & ID	16
E-23866-210-121, Sheet 1	Chemical & Volume Control System P & ID	46
E-23866-210-130, Sheet 2A	Safety Injection and Containment Spray System Flow Diagram P & ID	15
Figure 8.1-1	Simplified One Line Diagram Plant Electrical System P & ID	123

ENGINEERING ANALYSIS

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EA-FC-91-084	Breaker Fuse Coordination Study	6
EA-FC-95-022	NFPA Code Compliance	2
EA-FC-97-001	Fire Hazards Analysis (FHA) Manual	8
EA-FC-97-043	Fire Safe Shutdown for Control Room Evacuation Design Basis Analysis	1
EA-FC-97-044	10CFR50 Appendix R Cable Identification	4
EA-FC-97-045	Reactor Coolant Gas Vent System Fire Safe Shutdown Design Basis Analysis	0
EA-FC-98-005	Fire Barrier Evaluation for 86-10 Miscellaneous Penetrations	3
EA-FC-98-022	Plant Specific Analysis to Support 10CFR50 Appendix R Transient Analysis for FCS	1
EA-FC-99-023	Fire Protection Suppression Effects Analysis	0
EA-FC-00-050	Addition of FW-54 to the Appendix R Equipment Set	0

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EA-FC-01-013	Effects of Secondary Environment Resulting from a Fire Event	0

FIRE IMPAIRMENTS

6944	6970	2002-486	2003-013	2004-093	2004-085	2004-285
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MISCELLANEOUS DOCUMENTS

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	Appendix R Cable Routing Data	
	Maintenance Rule: Functional Scoping Data Sheet	2
FCSG-19	Performing Risk Assessments	5
FP TPMP	Fire Brigade Training Program Master Plan	5
LIC-98-0021	OPPD Letter to USNRC - Subject: Fort Calhoun Station Fire Protection	2/18/98
LIC-04-0109	Letter from OPPD to NRC, "Status of Actions Regarding NRC Inspection Report 50-285/00-01 for the Fort Calhoun Station"	October 14, 2004
LER 97-009	Potential Loss of Remote Shutdown Capability Due to Fire Induced Damage	0
50-285/98-01	NRC Inspection Report	4/06/98
Report No. 04-4035	Fort Calhoun Fire Induced Circuit Failure Assessment	12/31/04
SDBD-FP-115	Design Basis Document - Fire Protection	21
TD T960-0010	Instructions and Parts List for Teledyne Big Beam Special Usage Seismic-Nuclear Emergency Light Unit S6L100-80 Series	1
USAR-9.11	Updated Safety Analysis Report - Section 9.11 - Auxiliary Systems - Fire protection System	16

MODIFICATIONS

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AOP-06	Fire Emergency	12
AOP-16	Loss Of Instrument Buss Power	7
AOP-32	Loss Of 4160 Volt Or 480 Volt Bus Power	7
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SO-G-91	Control and Transportation of Combustible Materials	20
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SO-M-100	Conduct of Maintenance	39
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WORK ORDER PACKAGES

00087477 01	00158079 01	0016811201	00176752 01	00201029 01
00144610 01	00158081 01	00174669 01	00198886 01	00209918 01