



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-8064**

April 5, 2002

R. T. Ridenoure  
Division Manager - Nuclear Operations  
Omaha Public Power District  
Fort Calhoun Station FC-2-4 Adm.  
P.O. Box 550  
Fort Calhoun, Nebraska 68023-0550

**SUBJECT: FORT CALHOUN STATION NRC SPECIAL TEAM INSPECTION REPORT  
50-285/02-06**

Dear Mr. Ridenoure:

On March 8, 2002, the NRC completed an inspection at your Fort Calhoun Station. The enclosed report documents the inspection findings which were discussed on March 8, 2002, with you and other members of your staff.

This inspection examined activities associated with a fire that occurred on December 19, 2001, in a corridor between Safety Injection Pump Room 22 and the containment tendon stressing gallery. The inspection focused on operator and fire brigade effectiveness in response to the fire, abnormal and emergency procedures usage, and the root cause analysis that was conducted for this event.

Based on the results of this inspection, the NRC has identified six issues that were evaluated under the Significance Determination Process as having very low safety significance (Green). The NRC has also determined that four violations are associated with these issues. These violations are being treated as noncited violations (NCVs), consistent with Section VI.A of the Enforcement Policy. These NCVs are described in the subject inspection report. If you contest the violation or significance of these NCVs, 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 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if any, 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).

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

*/RA/*

Kriss M. Kennedy, Chief  
Project Branch F  
Division of Reactor Projects

Docket: 50-285  
License: DPR-40

Enclosure:  
NRC Inspection Report  
50-285/02-06

cc w/enclosure:  
Mark T. Frans, Manager  
Nuclear Licensing  
Omaha Public Power District  
Fort Calhoun Station FC-2-4 Adm.  
P.O. Box 550  
Fort Calhoun, Nebraska 68023-0550

James W. Chase, Division Manager  
Nuclear Assessments  
Fort Calhoun Station  
P.O. Box 550  
Fort Calhoun, Nebraska 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, Nebraska 68023-0550

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

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

Sue Semerena, Section Administrator  
Nebraska Health and Human Services System  
Division of Public Health Assurance  
Consumer Services Section  
301 Centennial Mall, South  
P.O. Box 95007  
Lincoln, Nebraska 68509-5007

Daniel K. McGhee  
Bureau of Radiological Health  
Iowa Department of Public Health  
401 SW 7th Street, Suite D  
Des Moines, Iowa 50309

Electronic distribution from ADAMS by RIV:

Regional Administrator (**EWM**)

DRP Director (**KEB**)

DRS Director (**ATH**)

Senior Resident Inspector (**WCW**)

Branch Chief, DRP/C (**KMK**)

Senior Project Engineer, DRP/C (**Vacant**)

Staff Chief, DRP/TSS (**PHH**)

RITS Coordinator (**NBH**)

Jim Isom, Pilot Plant Program (**JAI**)

**RidsNrrDipmLipb**

Scott Morris (**SAM1**)

FCS Site Secretary (**NJC**)

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**ENCLOSURE**

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket: 50-285  
License: DPR-40  
Report No: 50-285/02-06  
Licensee: Omaha Public Power District  
Facility: Fort Calhoun Station  
Location: Fort Calhoun Station FC-2-4 Adm.  
P.O. Box 399, Hwy. 75 - North of Fort Calhoun  
Fort Calhoun, Nebraska  
Dates: January 14 through March 8, 2002  
Team Leader: J. Kramer, Resident Inspector, San Onofre Nuclear Generating Station  
Inspector: R. Mullikin, Senior Reactor Inspector, NRC Region IV  
Approved By: K. Kennedy, Chief, Project Branch F

## SUMMARY OF FINDINGS

### Fort Calhoun Station NRC Inspection Report 50-285/02-06

IR 05000285-02-06; 01/14-03/08/2002; Omaha Public Power District, Fort Calhoun Station, Special Inspection

The inspection was conducted by resident and regional inspectors. This inspection identified six Green findings, four of which were noncited violations. The significance of each issue is indicated by its color (Green, White, Yellow, or Red) and was determined by the Significance Determination Process in Inspection Manual Chapter 0609.

#### Cornerstone: Mitigating Systems

- Green. Licensee personnel performed unauthorized modifications to the plugs of two drum heaters, allowing them to be inserted into underrated outlets and extension cords. These modifications ultimately caused the containment tendon stressing gallery fire. This was a noncited violation of Technical Specification 5.8.1.

This finding was of very low safety significance because no safety equipment was rendered inoperable as a result of the fire in the containment tendon stressing gallery (Section 02).

- Green. The license failed to implement adequate corrective actions for the control of non-load shedding electrical outlets. As a result, on three separate occasions since December 1999 the licensee placed unapproved and unanalyzed loads on nonload shedding busses. This was a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions."

This finding was of very low safety significance because the diesel generator load limit margins were not exceeded and the diesel generators remained operable (Section 03).

- Green. The licensee failed to implement the requirements of a work order during the performance of the containment tendon stressing gallery work. As a result, work order steps were not performed and a fire impairment permit was not obtained. As a result, a fire watch was not established to compensate for an open fire barrier. This was a noncited violation of Technical Specification 5.8.1.

This finding was of very low safety significance because no safety equipment was ultimately rendered inoperable as a result of the fire in the containment tendon stressing gallery (Section 05.2).

- Green. The licensee failed to perform the required updates of a fire protection program implementing procedure. As a result, a fire impairment was not initiated when the containment tendon stressing gallery door was opened. Therefore, a fire watch was not established to compensate for an open fire barrier. This was a noncited violation of Technical Specification 5.8.5.

This finding was of very low safety significance because no safety equipment was ultimately rendered inoperable as a result of the fire containment tendon stressing gallery (Section 05.3).

- Green. The licensee failed to implement immediate corrective action to prevent recurrence of opening the containment tendon stressing gallery door without obtaining the required fire impairment. Operations personnel unlocked and opened the containment tendon stressing gallery door three weeks after the fire without obtaining a fire impairment.

This finding was of very low safety significance because no safety equipment was declared inoperable as a result of the open door (Section 05.4).

Cornerstone: Miscellaneous

- Green. Several human performance issues were identified during the inspection: 1) personnel performed inappropriate modifications to the heater plugs directly contributed to the cause of the fire; 2) personnel failed twice to implement adequate corrective actions for the control of nonload shedding outlets; 3) personnel failed to implement the requirements of a work order, as a result, a fire impairment was not obtained and an hourly fire watch was not established; 4) personnel failed to update a fire protection program implementing procedure; and, 5) personnel failed to implement immediate corrective actions to prevent recurrence of opening the containment tendon stressing gallery door and not obtaining the required fire impairment.

Each of these findings had a potential impact on safety by increasing the frequency of initiating events or affecting the reliability of safety-related equipment. This performance trend is considered a substantive crosscutting issue not captured in the individual issues (Section 09).

## Report Details

### **SPECIAL INSPECTION ACTIVITIES**

The team conducted a special inspection to better understand the cause and impact of the fire that occurred on December 19, 2001, in a corridor between Safety Injection Pump Room 22 and the containment tendon stressing gallery. The fire resulted from the failure of an overloaded extension cord used to supply power to a 55-gallon grease drum heater that ignited combustible materials in the area. The team evaluated operator and fire brigade effectiveness in response to the fire and reviewed operability assessments of the affected equipment. The team also reviewed operator use of abnormal and emergency procedures and the licensee's root cause analysis and risk assessment. In addition, the team conducted field observations and interviewed plant personnel during the course of the inspection.

#### 01 Sequence of Events

##### a. Inspection Scope

The team reviewed the root cause analysis and control room logs and discussed the event with licensee personnel to develop a sequence of events.

##### b. Findings

In October 2001, the licensee began a surveillance of the containment prestressing system. This surveillance included testing of the tension of the containment concrete tensioning cables and pumping grease into the containment tendon sheathings to replace grease lost due to leakage.

On December 17, 2001, surveillance activities were being conducted in the containment tendon stressing gallery. This tendon gallery is adjacent to Room 22, and is accessed through a watertight steel door from Room 22. Room 22 contains Low Pressure Safety Injection Pump SI-1B, High Pressure Safety Injection Pump SI-2B, and Containment Spray Pumps SI-3B and SI-3C. To support the activity, 55-gallon drums of grease were located in the tendon gallery. Drum heaters were placed on the outside of the drums to heat the grease to facilitate pumping the grease into the containment tendon sheathings. Two drum heaters were being used, one powered from a receptacle located in the tendon gallery, and the other powered from a receptacle located in Room 22. In order to supply power from the outlet in Room 22 to one of the drum heaters, two extension cords were connected and routed through the open door separating Room 22 and the tendon gallery. At the conclusion of activities on December 17, the drum heaters were de-energized.

On December 18, 2001, personnel resumed surveillance activities. They discovered that the grease was too cold to use and would need to be heated prior to its use. The drum heaters were energized to heat the grease. At the end of the day, one drum heater was left energized to maintain the grease warm overnight so work could begin the next morning. The heater that remained energized was powered from the receptacle in Room 22.

Unbeknownst to personnel involved in the performance of the surveillance, the extension cords used to power the drum heater were not rated for this application. The extension cords were rated at 15 amperes, and had plugs that would only allow them to be connected to 15 ampere receptacles and loads. However, the 20 ampere plugs on the drum heater had been inappropriately modified to allow it to be connected to a 15 ampere plug or receptacle. The licensee later determined that the 2000 watt drum heater drew a current of 17.39 amperes.

During the shift turnover by the operating crew in the control room, personnel discussed the work activities in the tendon gallery, including the energized drum heater. By 7:15 p.m., both the shift radiation protection technician and the auxiliary building operator had conducted tours in Room 22 and the tendon gallery and did not identify any problems.

As a result of using underrated extension cords, the extension cords continued to heatup during the evening. The following series of events occurred on December 19, 2001:

- 2:48 a.m.                    The control room operators received an alarm for an ionization detector in Room 22. This alarm was rapidly followed by two additional ionization alarms for Room 22. A control room operator dispatched the auxiliary building operator and a radiation protection technician to investigate the cause of the alarms.
- 2:49 a.m.                    The radiation protection technician reached Corridor 4 outside Room 22 and noticed heavy smoke emanating from around the closed door to Room 22. The technician notified the control room of the observations.
- 2:50 a.m.                    The auxiliary building operator arrived at the door to Room 22, cracked the door open, and determined that there was too much smoke to enter the room without the use of bunker gear and a self-contained breathing apparatus. The auxiliary building operator informed the control room personnel of the observations. The fire brigade was activated and operators entered Procedure AOP-6, the abnormal operating procedure for fighting fires.
- 2:52 a.m.                    The control room operators completed sounding the fire alarm and made a plant announcement for the fire brigade to respond to the assembly area on the turbine floor.
- 2:55 a.m.                    The control room received an ionization detector alarm in Corridor 4.
- 2:57 a.m.                    The auxiliary building ventilation automatically stopped as designed.

- 2:58 a.m. The fire brigade leader called the control room and requested mutual aid from Blair Fire Department. This request was based on the reports of black smoke in Corridor 4.
- 2:59 a.m. The fire brigade entered the auxiliary building and proceeded to Corridor 4.
- 3:01 a.m. The Shift Manager called 911 to request assistance from the Blair Fire Department.
- 3:02 a.m. The fire brigade laid out an attack line from the hose cabinet outside of Room 22 and a backup line from the cabinet outside of Room 6. The attack team prepared to enter Room 22.
- 3:05 a.m. The attack team entered Room 22 and proceeded down the stairs toward the entrance to the containment tendon stressing gallery. The nozzle man described Room 22 as completely filled with smoke with no visibility.
- 3:06 a.m. The nozzle man observed fire in the open doorway to the containment tendon stressing gallery and radioed this information to the fire brigade leader and the control room. The fire brigade initiated water suppression of the area.
- 3:07 a.m. Smoke that escaped Room 22 through the open door resulted in an actuation of the deluge system on the auxiliary building stairwell and caused water to spray onto safety-related motor control centers.
- 3:08 a.m. The attack team reported that the fire was out. They unplugged the extension cord from the Room 22 outlet and started to overhaul the fire.
- 3:09 a.m. The Shift Manager directed security personnel to hold the Blair Fire Department outside of the protected area.
- 3:11 a.m. The control room received 480v bus ground alarms due to the deluge system spraying water on the motor control centers. Operators restarted Room 22 ventilation to remove the smoke.
- 3:12 a.m. The Blair Fire Department arrived at the south security gate.
- 3:13 a.m. The fire brigade leader notified the control room that the fire was overhauled, a reflash watch set, and the stairwell and equipment hatch deluge valves isolated.
- 3:20 a.m. The fire brigade leader completed inspection of the pumps in Room 22 and notified the control room that the pumps were completely dry but had a light covering of soot.

3:21 a.m. The last of the motor control center ground indications cleared.

3:49 a.m. Operators exited Procedure AOP-6.

## 02 Root Cause Analysis

### a. Inspection Scope

The team reviewed Condition Report 200103787 and the licensee's root cause analysis report for the containment tendon stressing gallery fire. The team discussed the analysis with plant personnel; observed the modified heater plugs, burnt extension cord, and location of the fire; and, reviewed the root cause analysis for independence, completeness, and accuracy.

### b. Findings

Licensee personnel performed unauthorized modifications to the plugs of two drum heaters allowing them to be inserted into underrated outlets and extension cords. These modifications ultimately caused the fire in the containment tendon stressing gallery. This was a noncited violation of Technical Specification 5.8.1 and was determined to be a finding of very low safety significance using the Significance Determination Process.

The licensee evaluated the events leading up to the fire and determined that the root cause of the fire was the modification of the power plug on a 2000 watt drum heater. The plug on a second 2000 watt drum heater was also found to be modified. This resulted in defeating a manufactured safety device, allowing the heaters to be energized using extension cords and electrical outlets that were not rated for the current drawn by the heaters. The original heaters contained 20 ampere plugs. Both of the drum heater plugs were modified to allow the plugs to fit into a 15 ampere outlet or extension cord. On one of the plugs, a prong was twisted 90 degrees to make it similar to a 15 ampere plug. On the other heater, the plug was completely removed and replaced with a 15 ampere plug. The licensee was unable to determine when the modifications were performed.

The team evaluated the licensee's program to control the modification of the plugs. Procedure SO-O-25, "Temporary Modification Control," Revision 61, provided the requirements for controlling temporary functional changes to components. Attachment 7.4 provided examples of when a temporary modification is not controlled by Procedure SO-O-25. Step 14 stated that the use of any installed electrical outlet to power equipment that is desirable for use in the station, as long as the intent of the design of the electrical outlet is not defeated, does not require a temporary modification. The team determined that the licensee modified the plugs on two drum heaters and defeated the intent of the design of electrical outlets without performing the procedural requirements for a temporary modification.

The team evaluated the significance of the issue and determined that it had an actual impact on safety because modifications to the plugs caused a fire in an area adjacent to a room with safety-related equipment. There was not a fire barrier between the fire and

Room 22 since the containment tendon stressing gallery door was open. In addition, the issue could be reasonably viewed as a precursor to a significant event (Group 1 questions answered yes). The team determined that the issue had a credible affect on the availability and reliability of the safety-related equipment in Room 22 (Group 2 question answered yes). However, because no safety equipment was ultimately rendered inoperable as a result of the fire, the finding was determined to be of very low safety significance (Green) using the Significance Determination Process.

Technical Specification 5.8.1 requires procedures as described in Regulatory Guide 1.33, Appendix A. Regulatory Guide 1.33, Appendix A, Section 1.d, requires administrative procedures for temporary changes. Procedure SO-O-25, "Temporary Modification Control," Revision 61, provides the requirements for controlling, documenting, and reviewing temporary functional changes to components. Contrary to the above, the licensee modified plugs on two drum heaters and failed to control, document, and review the temporary changes. This ultimately caused the fire in the containment tendon stressing gallery. This violation of Technical Specification 5.8.1 is being treated as a noncited violation, consistent with Section VI.A of the Enforcement Policy (NCV 285/2002006-01). This violation is in the licensee's corrective action program as Condition Report 200103787.

Overall, the team determined that the licensee's root cause analysis was effective in identifying the specific cause and other contributing causes of the fire. The scope of the analysis was broad and addressed relevant issues. The root cause team was independent, knowledgeable, and well staffed.

### 03 Use of 480v Nonload Shedding Outlets

#### a. Inspection Scope

The team reviewed the circumstances surrounding the initial use of a nonload shedding 480v outlet to power equipment in the containment tendon stressing gallery as documented in Condition Report 200103752.

#### b. Findings

The licensee failed to implement adequate corrective actions for the control of nonload shedding electrical outlets. As a result, on three separate occasions since December 1999 the licensee placed unapproved and unanalyzed loads on nonload shedding busses. This was a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," and was determined to be of very low safety significance using the Significance Determination Process.

On December 10, 1999, the licensee determined that a 480v motor control center was being used to supply power to two portable heaters rated at 13.5 kW each. Design features would not have removed the heater's electrical load from the motor control center during a design-basis accident. The diesel generator loading calculation did not account for these additional loads. The licensee performed an operability evaluation for the additional loads and ultimately determined that, in this case, the increased load did not adversely affect the diesel generator. The licensee initiated Condition

Report 199902690 to document the issue and corrective actions. The NRC documented this issue in Inspection Report 50-285/00-02 as a finding of very low safety significance.

On January 24, 2001, the inspectors identified that power welding machines and heating elements were connected to nonload shed welding receptacles without being properly evaluated as a temporary modification. The licensee's corrective actions for the 1999 issue included requiring a temporary modification evaluation prior to using nonload shed receptacles to assess the effect on diesel generator loading. This evaluation was not performed prior to using the nonload shed receptacles on January 24. The inspectors determined that the issue was a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," and was of very low safety significance. The issue was documented in Inspection Report 50-285/00-11. The licensee initiated Condition Report 200100155 to document the issue and future corrective actions.

On December 13, 2001, the licensee identified that a nonload shedding 480v receptacle, powered from a safety-related motor control center, was used to supply equipment for containment tendon testing. The licensee identified the use of the nonload shedding receptacle when investigating the source of grounds, following instances of rain, which were traceable to the equipment used to support the tendon testing equipment. The licensee's root cause analysis indicated that previous corrective actions focused on solving the problem with the use of welding receptacles and did not adequately consider the generic implications of unanalyzed loads powered from nonload shedding busses.

The team evaluated the significance of the issue. The team determined this issue had a credible impact on safety because uncontrolled loading of nonload shedding receptacles had the potential to overload the diesel generators and impact their ability to successfully mitigate a design-basis accident (Group 1 question answered yes). The team determined that the issue had a credible affect on the operability of the diesel generators (Group 2 question answered yes). However, because the diesel generator load limit margins were not exceeded and the diesel generators remained operable, the finding was determined to be of very low safety significance (Green) using the Significance Determination Process.

10 CFR Part 50, Appendix B, Criterion XVI, states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, on December 13, 2001, the licensee's corrective actions established in December 1999 and January 2001 did not prevent the placement of unanalyzed loads on nonload shedding safety-related motor control centers. This violation of 10 CFR Part 50 is being treated as a noncited violation, consistent with Section V1.A of the Enforcement Policy (NCV 285/2002006-02). This violation is in the licensee's corrective action program as Condition Report 200103752.

04 Personnel Response to the Fire

.1 Control Room Response to the Fire

a. Inspection Scope

The team reviewed operator performance to determine the effectiveness of control room personnel in mitigating the effects of the fire. The team interviewed the shift manager, licensed operators and fire brigade members, and reviewed procedures and control room logs.

b. Findings

The team concluded that operator performance during the event was effective in identifying the source of the fire, initiating fire fighting activities, and monitoring the operability of plant equipment.

The operators received a control room panel annunciator at 2:48 a.m., on December 19, 2001, indicating that an ionization detector had alarmed. A licensed operator determined from a control room computer that the alarm had originated in Room 22. Control Room personnel dispatched an auxiliary building operator to investigate the cause of the alarm and requested that a radiation protection technician respond.

The auxiliary building operator, after confirming the presence of smoke emanating from Room 22, contacted the control room. The shift manager activated the fire brigade and entered Procedure AOP-6, "Fire Emergency," Revision 9. Operators performed the procedural requirements to sound the fire alarm, made an announcement over the plant communication system, and implemented the emergency plan. Based upon a recommendation from the fire brigade leader, assistance was requested from the local offsite fire department. The control room maintained adequate communication with the fire brigade during the fire fighting activities.

At 3:07 a.m., smoke escaped from Room 22 into Corridor 4 and activated the deluge system. The deluge systems were located around a stairwell and an open hatch. The deluge system in the stairwell splashed water on Motor Control Centers MCC-3A2 and MCC-4C2, resulting in electrical grounds. The deluge system was secured at 3:13 a.m. and no further grounds were reported after 3:21 a.m. Operations personnel requested that electrical maintenance personnel inspect the affected motor control centers. No signs of equipment damage were noted.

.2 Fire Brigade Actions

a. Inspection Scope

The team reviewed fire brigade performance to determine their effectiveness in mitigating the effects of the fire. The team interviewed fire brigade members and reviewed relevant procedures.

b. Findings

The team concluded that the licensee's fire brigade adequately controlled and extinguished the fire. Based upon interviews, the team determined that communications between the control room, fire brigade leader, and fire brigade members were acceptable throughout the fire fighting efforts.

The licensee's fire protection program is defined in the Update Safety Analysis Report, Revision 6. The Update Safety Analysis Report requires that a five-person fire brigade be maintained on the site at all times. The Fire Hazards Analysis Manual, Revision 3, stated that the fire brigade was composed of a licensed operator (fire brigade leader), auxiliary equipment operators, and security personnel.

Due to extra personnel on the shift, the fire brigade was ultimately composed of eight qualified members that were dressed out in fire fighting gear. The fire brigade arrived at the entrance to Room 22 at approximately 3:00 a.m. The fire brigade leader decided to fight the fire using water from the two manual hose stations in Corridor 4, a decision consistent with the prefire plans described in Procedure SO-G-28, "Station Fire Plan," Revision 48.

Two fire brigade members opened the door to Room 22 (989-foot elevation) and encountered heavy smoke. Visibility at the entrance was essentially zero and no flames could be observed. When the two brigade members reached the stairwell halfway point, the smoke was lighter and flames could be seen inside the open door to the containment tendon stressing gallery. Upon reaching the floor of Room 22 (971-foot elevation) the two brigade members noted that the entire room was filled with smoke, but the smoke was much lighter at the floor of the room, making visibility adequate to locate and fight the fire. They observed small flames at two different locations just inside the entrance to the containment tendon stressing gallery. They discharged water onto the flames and quickly extinguished the fire. At 3:08 a.m. the fire brigade leader reported to the control room that the fire had been extinguished.

Subsequently, the licensee determined that the initial fuel for the fire was likely the extension cord and the protective cloth that was on the containment tendon stressing gallery floor. The licensee determined that other contributors to the significant level of smoke were a plastic trash bag and a rubber air hose that was routed through the door. The air hose had been used for pumping grease into the tendon sleeves.

05 Fire Barriers and Compensatory Measures

.1 Transient Combustible Controls

a. Inspection Scope

The team reviewed the control of transient combustible material in the containment tendon stressing gallery and in Room 22 and discussed combustible material control with fire protection personnel.

b. Findings

The licensee's control of transient combustible material was acceptable. The calculation of the transient fire load used reasonable assumptions. The amount of transient combustible material in the containment tendon stressing gallery did not exceed the maximum allowable for the area.

On December 13, 2001, a fire protection engineer completed Form FC-1244, "Relief from General Requirements for Control and Transportation of Transient Combustible Materials," for the temporary storage of eight 55-gallon drums of tendon grease and 5 gallons of grease solvent in the containment tendon stressing gallery. The fire protection engineer determined that eight full drums of grease plus the solvent equated to 27,049 BTU/square foot, which is less than the 80,000 BTU/square foot listed in the Fire Hazards Analysis as a low fire hazard. The engineer concluded, based on this calculation, that no additional compensatory actions, such as a fire watch, were required. On December 19, 2001, eight grease drums were spaced around the containment tendon stressing gallery. The amount of grease in the drums was equivalent to approximately 6-1/3 drums of new and waste tendon grease.

.2 Work Order Fire Impairment

a. Inspection Scope

The team reviewed the control of fire impairments, Condition Report 200103787, and Work Order 87838-01. The team discussed the use of fire impairments with licensee personnel.

b. Findings

The licensee failed to implement the requirements of a work order during the performance of the containment tendon stressing gallery work. As a result, work order steps were not performed and a fire impairment permit was not obtained. As a result, a fire watch was not established to compensate for an open fire barrier. This was a noncited violation of Technical Specification 5.8.1 and was determined to be a finding of very low safety significance using the Significance Determination Process.

The licensee used Work Order 87838-01 to support the containment tendon stressing gallery surveillance activities. Work Order 87838-01, Step 5.9, had instructions to ensure a fire impairment permit was provided prior to grease being transferred to the containment tendon stressing gallery. That step was not performed. As a result, a fire watch was not established to compensate for an open fire barrier.

The team evaluated the significance of the issue. The team determined that the issue had a credible impact on safety because the open door between the containment tendon stressing gallery and Room 22 did not provide fire separation between a room with safety-related equipment and the room with several 55-gallon drums of grease. In addition, the licensee did not initiate any compensatory measures (Group 1 question answered yes). The team determined that the issue involved an impairment or degradation of a fire protection feature (Group 2 question answered yes). However,

because no safety equipment was ultimately rendered inoperable as a result of the fire in the containment tendon stressing gallery, the finding was determined to be of very low safety significance (Green) using the Significance Determination Process.

Technical Specification 5.8.1 requires, in part, procedures as described in Regulatory Guide 1.33, Appendix A. Regulatory Guide 1.33, Appendix A, Section 9.a, requires, in part, instructions for performing maintenance. Work Order 87838-01, Step 5.9, required, in part, to ensure a fire impairment permit is provided prior to grease being transferred to the containment tendon stressing gallery. Contrary to the above, the licensee failed to obtain a fire impairment prior to transferring grease into the containment tendon stressing gallery. This violation of Technical Specification 5.8.1 is being treated as a noncited violation, consistent with Section VI.A of the Enforcement Policy (NCV 285/2002006-03). This violation is in the licensee's corrective action program as Condition Report 200200042.

.3 Previously Identified Fire Door

a. Inspection Scope

The team reviewed the licensee's control of fire impairments and discussed the use of fire impairments with licensee personnel. In addition, the inspectors reviewed the following procedures: SE-ST-CONT-3001, "Surveillance of the Containment Prestressing System," Revision 1; SO-G-58, "Control of Fire Protection System Impairments," Revision 29; SO-G-102, "Fire Protection Program Plan," Revision 3; and SO-G-103, "Fire Protection Operability Criteria and Surveillance Requirements," Revision 11. Condition Reports 199601031 and 200103833 were also reviewed.

b. Findings

The licensee failed to perform the required updates of a fire protection program implementing procedure. As a result, a fire impairment was not initiated when the containment tendon stressing gallery door was opened. Therefore, a fire watch was not established to compensate for an open fire barrier. This was a noncited violation of Technical Specification 5.8.5 and was determined to be of very low safety significance using the Significance Determination Process.

The team reviewed the corrective actions from Condition Report 199601031. The licensee had performed Engineering Analysis EA-FC-97-015, "Fire Barrier Evaluation Between Room 22 and Containment Stressing Gallery," to evaluate the adequacy of nonrated Penetration Door 971-2 to withstand fire hazards in the surrounding area. The licensee concluded that the largest expected containment tendon stressing gallery fire would not cause damage to safe shutdown systems, equipment or circuits separated by the fire barrier (Door 971-2) isolating Room 22 from the containment tendon stressing gallery. Based upon this analysis, the licensee updated the Fire Hazards Analysis to include Door 971-2 in the description of Fire Area 2 (Room 22) and referenced the analysis. In addition, Drawing A-59921, "Penetration Data Schedule," was updated to add Door 971-2 as a penetration. However, the licensee did not transfer Door 971-2 into Procedure SO-G-103, which depicts the safety-related barriers for fire impairment purposes.

The team reviewed Procedure SE-ST-CONT-3001 used to perform the surveillance test of the containment prestressing system. Step 6.8 directed, in part, that Form FC-1142, a fire impairment permit, be completed to allow blocking open the containment tendon stressing gallery door in Room 22 or to N/A the step if no permit was required. The individual who was completing Form FC-1142 contacted fire protection engineering to determine if a permit was required. The engineer reviewed Procedure SO-G-103, which had not been updated to include Door 971-2, and determined that a fire impairment permit was not required. As a result, the step was marked N/A and a fire impairment permit was not obtained. Had a fire impairment permit been obtained, compensatory measures, such as a fire watch, would have been established.

The team evaluated the significance of the issue. The team determined that the issue had a credible impact on safety because the open door between the containment tendon stressing gallery and Room 22 did not provide fire separation between a room with safety-related equipment and the room with several 55-gallon drums of grease. In addition, the licensee did not initiate any compensatory measures (Group 1 question answered yes). The team determined that the issue involved an impairment or degradation of a fire protection feature (Group 2 question answered yes). However, because no safety equipment was ultimately rendered inoperable as a result of the fire in the containment tendon stressing gallery, the finding was determined to be of very low safety significance (Green) using the Significance Determination Process.

Technical Specification 5.8.5 requires, in part, that written procedures shall be established and maintained for implementation of the fire protection program. Procedure SO-G-102, was the governing document for all fire protection program plan implementing procedures. Step 5.2 required, in part, that Procedure SO-G-58 implement the fire protection program plan. Procedure SO-G-58, Section 5.1.2.C, required, in part, that fire barriers required to be operable by Procedure SO-G-103 require an FC-1142 impairment permit when they are breached. Contrary to the above, Procedure SO-G-103 was not maintained and updated to indicate that the containment tendon stressing gallery door was a fire barrier. As a result, Procedure SO-G-103 incorrectly indicated a fire impairment was not required when the door was opened. This violation of Technical Specification 5.8.5 is being treated as a noncited violation, consistent with Section VI.A of the Enforcement Policy (NCV 285/2002006-04). This violation is in the licensee's corrective action program as Condition Report 200103833.

#### .4 Compensatory Measures after the Fire was Extinguished

##### a. Inspection Scope

The team reviewed the licensee's compensatory measures established following the fire to control the operation of the containment tendon stressing gallery door. The team reviewed Condition Reports 200103787 and 200200090 and discussed the compensatory measures with licensee personnel.

##### b. Findings

The licensee failed to implement immediate corrective action to prevent recurrence of opening the containment tendon stressing gallery door without obtaining the required

fire impairment. Operations personnel unlocked and opened the containment tendon stressing gallery door three weeks after the fire without obtaining a fire impairment. This issue was determined to be of very low safety significance using the Significance Determination Process.

After the fire was extinguished on December 19, 2001, the licensee implemented a continuous fire watch until initial cleanup activities were completed and Door 971-2 was closed. However, on January 10, 2002, operators unlocked and opened containment tendon stressing gallery Door 971-2 to allow access for decontamination activities in the containment tendon stressing gallery. A fire impairment permit was not obtained and compensatory measures, such as a fire watch, were not established. Approximately eight hours later, while observing a control room shift turnover, a resident inspector questioned the compensatory measures in place. Control room personnel researched the draft root cause analysis for the fire in the containment tendon stressing gallery and learned that the door was evaluated to be a fire barrier. Control room personnel contacted the fire protection engineer and implemented an hourly fire watch. Shortly after the fire, the licensee had identified that opening the containment tendon stressing gallery door would require a fire impairment. However, from the time of the fire on December 19, 2001, until January 10, 2002, on-shift operations personnel were not informed of the requirement to obtain a fire impairment when opening Door 971-2.

The team evaluated the significance of the issue. The team determined that the issue had a credible impact on safety because the open door between the containment tendon stressing gallery and Room 22 did not provide fire separation between a room with safety-related equipment and the containment tendon stressing gallery (Group 1 question answered yes). The team determined that the issue involved an impairment or degradation of a fire protection feature (Group 2 question answered yes). However, because no safety equipment was rendered inoperable as a result of the open door, the the finding was determined to be of very low safety significance (Green) using the Significance Determination Process (FIN 285/2002006-05).

06 Abnormal and Emergency Procedure Review

.1 Abnormal Operating Procedure

a. Inspection Scope

The team reviewed the actions required by Procedure AOP-06, "Fire Emergency," Revision 9. The team discussed the procedure with operations personnel.

b. Findings

The team reviewed the actions required by Procedure AOP-06, "Fire Emergency," Revision 9. Step 15 of the procedure states, in part, that if the reactor is critical and safe shutdown equipment is potentially affected by the fire, then trip the reactor. The team determined that Procedure AOP-06, Step 15, was too prescriptive and did not take into account appropriate risk considerations. Tripping the reactor would cause an

initiating event and could increase the risk significance of a fire-related event. The licensee initiated Condition Report 200200118 to address the team's concern and to review Procedure AOP-06 and other procedures for appropriate risk considerations.

.2 Emergency Plan Implementing Procedure

a. Inspection Scope

The team reviewed the operators' use of Procedure EPIP-OSC-1, "Emergency Plan Implementing Procedure," Revision 34, and operator licensed training on the emergency plan. The team discussed the classification of the event with the shift manager.

b. Findings

Based on wording of the emergency action levels in Procedure EPIP-OSC-1, and on the training the shift manager received, the shift manager properly implemented Procedure EPIP-OSC-1 and appropriately determined that the event did not warrant an emergency classification.

Notification of Unusual Event (NOUE) Classification Review

The team reviewed Procedure EPIP-OSC-1, EAL 6.1, used for classification of an NOUE for a fire or explosion inside the protected area. Either of the following would require the declaration of an NOUE: a fire within the protected area fence which is not extinguished within 10 minutes after initiating fire fighting efforts, or an explosion within the protected area resulting in visible damage to permanent structures or equipment. On the day of the fire, the control room received an ionization detector alarm at 2:48 a.m. At 2:50 a.m., an operator confirmed heavy smoke in the affected room. At 3:06 a.m., the fire brigade initiated spraying water on the fire. At 3:08 a.m., the fire was declared out. Based on the sequence of events, the fire burned for 20 minutes inside the protected area. However, the fire was extinguished within two minutes after the fire brigade initiated water spray on the fire.

The licensee's interpretation of Procedure EPIP-OSC-1, EAL 6.1, was that the 10-minute time frame to declare an NOUE was based on the time of water spray initiation until the fire was extinguished. In this case, the fire burned for two minutes after the fire brigade began spraying the fire with water. As a result, the shift manager determined that the fire did not meet the entry requirements for declaring an NOUE.

Although the team concluded that the shift manager properly implemented Procedure EPIP-OSC-1, the inspectors were concerned with the wording of EAL 6.1. The inspectors found that the criterion in EAL 6.1 was not consistent with the criterion in NUREG 0654, "Criteria For Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." The criterion contained in NUREG 0654 for declaring an NOUE is a "Fire within the plant lasting more than 10 minutes." However, the licensee's criterion was dependent on how long it took to extinguish the fire once fire fighting efforts began. Thus, a fire could burn for any period of time and, as long as it was extinguished within 10 minutes after initiating fire fighting efforts, an NOUE would not be declared.

The licensee initiated Condition Report 200103840 to evaluate the adequacy of Procedure EPIP-OSC-1, EAL 6.1, to ensure it is consistent with current industry practice. At the exit meeting, licensee management indicated that they plan to revise Procedure EPIP-OSC-1, EAL 6.1, to require the declaration of an NOUE 10 minutes after confirmation of a fire instead of 10 minutes after initiating fire fighting efforts. The licensee planned to implement the change by June 14, 2002. The team considered the procedural change a prudent and appropriate action.

#### Alert Classification Review

The team reviewed Procedure EPIP-OSC-1, EAL 6.3, used for classification of an Alert due to a fire or explosion affecting one train of an engineered safety function. The following criteria were used to determine if an Alert classification was required: a fire or explosion causing potential or actual loss of a single train of any engineered safety function and any of the following; affected system parameter indications (indicators, annunciators, etc.) show degraded performance or plant personnel report visible damage (scorching, deformation, etc.) to safety system structures or equipment.

On the night of the fire, the shift manager determined that none of the criteria for declaring an Alert were met. The team disagreed with the shift manager's interpretation regarding one criterion. The team concluded that, with three smoke alarms in Room 22 (a room that contained safety-related pumps and valves) and the report of heavy smoke exiting the room when the door to the room was opened, there was a fire causing a potential loss of a single train of any engineered safety function equipment. However, the team agreed with the shift manager's conclusion that the remaining criteria necessary to enter an Alert were not met and therefore the overall conditions for declaring an Alert were not met.

#### 07 Operability Assessments

##### a. Inspection Scope

The inspectors reviewed the licensee's operability assessments for smoke-filled Safety Injection Pump Room 22 and the water intrusion of the motor control centers that experienced grounds.

##### b. Findings

The inspectors concluded that the operability of the safety injection pumps and the equipment powered from the motor control centers was ensured during and after the fire. In addition, operations personnel started all the pumps in Room 22 to verify the smoke had not resulted in any operability concerns. Operators identified no problems.

#### 08 Risk Analysis

##### a. Inspection Scope

The team reviewed the licensee risk analysis of the event and discussed the risk-significance analysis with the regional Senior Reactor Analyst.

b. Findings

The team concluded that the fire was of very low safety significance because no safety-related equipment was damaged and the fire did not cause an initiating event or plant transient.

09 Human Performance

a. Inspection Scope

The team reviewed the issues surrounding the fire to evaluate the human performance aspects of the event.

b. Findings

Several human performance issues were identified during the inspection:

- Personnel performed inappropriate modifications to the drum heater plugs directly contributing to the cause of the fire (Section 02).
- Personnel failed on two occasions to implement adequate corrective actions for the control of nonload shedding outlets (Section 03).
- Personnel failed to implement the requirements of a work order. As a result, a fire impairment was not obtained and an hourly fire watch was not established (Section 05.2).
- Personnel failed to perform the required updates to a fire protection program implementing procedure (Section 05.3).
- Personnel failed to implement immediate corrective actions to prevent recurrence of opening the containment tendon stressing gallery door and not obtaining the required fire impairment (Section 05.4).

Each of these findings had an impact on safety by increasing the frequency of initiating events or affecting the reliability of safety-related equipment. This performance trend is considered a substantive crosscutting issue not captured in the individual issues and is characterized as a Green finding (FIN 285/2002006-06).

10 Meetings

.1 Inspection Debrief Meeting Summary

The team presented the facts surrounding the event to Mr. Ridenoure and other members of the licensee management upon completion of the onsite inspection on January 18, 2002.

The team asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Exit Meeting Summary

The team presented the inspection results to Mr. Ridenoure and other members of licensee management at an exit meeting on March 8, 2002. The licensee acknowledged the findings presented.

The team asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

## ATTACHMENT

### **SUPPLEMENTAL INFORMATION**

#### PARTIAL LIST OF PERSONS CONTACTED

##### Licensee

D. Bannister, Plant Manager  
J. Chase, Division Manager, Nuclear Assurance  
M. Core, Manager, System Engineering  
M. Frans, Manager, Nuclear Licensing  
S. Gambhir, Division Manager, Nuclear Projects  
G. Gates, Vice President, Nuclear  
R. Haug, Manager, Chemistry  
J. McManis, Manager, Design Engineering  
M. Puckett, Manager, Radiation Protection  
H. Sefick, Manager, Security and Emergency Planning  
M. Tesar, Division Manager, Nuclear Support  
J. Tills, Manager, Maintenance  
R. Westcott, Manager, Training

##### NRC

W. Walker, Senior Resident Inspector, Fort Calhoun Station  
L. Willoughby, Resident Inspector, Fort Calhoun Station

#### ITEMS OPENED AND CLOSED

##### Opened and Closed During this Inspection

285/02006-01	NCV	Unauthorized modification of drum heater plugs (Section 02)
285/02006-02	NCV	Inadequate corrective actions for use of nonload shedding outlets (Section 03)
285/02006-03	NCV	Failure to follow work order (Section 05.2)
285/02006-04	NCV	Failure to update a fire protection program procedure (Section 05.3)
285/02006-05	FIN	Failure to implement immediate corrective actions (Section 05.4)
285/02006-06	FIN	Human performance deficiencies (Section 09)

## DOCUMENTS REVIEWED

The following documents were selected and reviewed by the inspectors to accomplish the objectives and scope of the inspection and to support any findings:

### Condition Reports

199601031	199601122	200103045	200103402
200103752	200103787	200103788	200103789
200103790	200103793	200103794	200103833
200103840	200103860	200103866	200200016
200200041	200200042	200200043	200200044
200200045	200200046	200200070	200200090
200200118			

### PROCEDURES

<u>Number</u>	<u>Title</u>	<u>Revision</u>
AOP-06	Fire Emergency	9
EPIP-OSC-1	Emergency Classification	34
FCSG-3	Housekeeping	4
SECOP-6	Personnel Access Control	16
SE-ST-CONT-3001	Surveillance of Containment Prestressing System	1
SO-G-7	Operating Manual	44
SO-G-23	Surveillance Test Program	49
SO-G-28	Station Fire Plan	48
SO-G-58	Control of Fire Protection System Impairments	29
SO-G-91	Control and Transportation of Combustible Materials	15
SO-G-103	Fire Protection Operability Criteria and Surveillance Requirements	11
SO-O-25	Temporary Modification Control	61
SO-M-100	Conduct of Maintenance	32

MISCELLANEOUS DOCUMENTS

Calculation No. FC05814, "UFHA Combustible Loading," Revision 4

Drawing No. A-5992, File No. 41970, "OPPD Fire barrier Penetration Schedule," Revision 42

Drawing No. D-4094, Sheet 2, "Fire Detection System - Basement Floor Plan - Elevation 995'-6", " Revision 2

Emergent Quality Assurance Surveillance Report 25(E)-0102, Room 22 Fire, dated January 15, 2002

Engineering Analysis EA-FC-97-015, "Fire Barrier Evaluation Between Room 22 and Containment Stressing Gallery," Revision 0

FC-1155, "Fire Report," dated December 19, 2001

Fire Protection Program Review - Fort Calhoun Unit 1, dated December 31, 1976

Fort Calhoun Nuclear Station Fire Hazards Analysis (FHA) Manual, Revision 3

Fort Calhoun Station Updated Safety Analysis Report, Revision 6, Section 9.11, "Fire Protection System"

Letter from the NRC to Omaha Public Power District, dated August 23, 1978

Letter from the NRC to Omaha Public Power District, dated April 24, 1981

Letter from the NRC to Omaha Public Power District, dated May 4, 1982

Letter from Omaha Public Power District to the NRC, dated June 26, 1981

Letter from Omaha Public Power District to the NRC, dated June 1, 1982

Material Safety Data Sheet, "Visconorust 2090P-4," dated April 27, 1998

Simulator Scenario Guide: 82111s, and 82103a

Procedure/Procedure Change Request EC-29296

Work Orders 00087838-01, 00104669-01, 00104665-01

Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654, REMA-REP-1, Revision 1