APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-285/92-30 Operating License: DPR-40

Docket: 50-285

Licensee: Omaha Public Power District
444 South 16th Street Mall
Omaha, Nebraska 68102-2247

Facility Name: Fort Calhoun Station

Inspection At: Blair, Nebraska

Inspection Conducted: December 7-11, 1992

Inspectors: P. Goldberg, Reactor Inspector, Engineering Section, Division of Reactor Safety

D. Kelley, Reactor Inspector, Maintenance Section, Division of Reactor Safety

P. Wagner, Team Leader, Division of Reactor Safety

Accompanying Personnel: B. Pendlebury, Consultant, AECL, Ltd.

Approved: Samuel Collins 12/30/92
Dwight D. Chamberlain, Deputy Director Date
for Division of Reactor Safety

Inspection Summary

Areas Inspected:

A routine inspection of the licensee's actions in response to previous inspection findings and licensee event report issues.

Results:

- The licensee's calculations and evaluations related to the electrical distribution system were noteworthy.
- The Fire Protection System Interaction Checklist included in Procedure GEI-4 was excellent.
- No violations or deviations were identified during the inspection.

Summary of Inspection Findings:

- Inspection Followup Item 285/9230-01 - Adequacy of the 161kV Offsite Power Supply - was opened in paragraph 2.2.

- Violation 9210-01 is discussed in paragraph 3 but remains open.

The following Inspection Followup Items were closed in paragraph 2:

- 9101-01 - 4160 Volt Short Circuit Analysis
- 9101-02 - Degraded Voltage Analysis
- 9101-03 - Circuit Breaker/Fuse Coordination
- 9101-04 - 125 Volt dc Voltage Drop Analysis
- 9101-05 - Fuse Control
- 9101-06 - Device Ratings

The following Inspection Followup Items were closed in paragraph 4:

- 8942-01 - Surveillance Test Requirements
- 9001-01 - Emergency Feedwater Storage Tank Level
- 9001-03 - Post Accident Monitoring Instruments
- 9021-01 - Wiring Interlocks

The following Licensee Event Reports (LERs) were closed in paragraph 5:

- 89-014 - Electrical Cable Modifications
- 90-007 - Main Steam and Feedwater System Piping
- 90-016 - Overpressurization of auxiliary feedwater system piping
- 90-022 - Fire Barriers
- 91-003 - Mechanical Containment Penetration M3
- 91-004 - Offsite Power Low Signal
- 91-005 - Violation of Technical Specification Requirement
- 91-007 - Circuit Breaker Coordination of 480 Volt System
- 92-008 - Relief Valves
- 92-010 - Circuit Breaker Coordination of dc System
- 92-012 - Steam Generator Differential Pressure Trip Setpoints
- 92-016 - Containment Spray Pump Suction Head
- 92-017 - Cam Followers in SBM Type Switches
- 92-022 - Heater Drain Pump Motor Electrical Cables

Attachment:

Persons Contacted and Exit Meeting

DETAILS

1 INTRODUCTION

The NRC performed an inspection of the electrical distribution system functional capabilities (EDSFI) in February 1991 as documented in NRC Inspection Report 50-285/91-01. There were some issues identified during the EDSFI which required additional licensee action and followup inspection by the NRC. In addition, some issues were reported to the NRC as a result of the licensee's continued review of the EDSFI findings. This inspection was conducted to review the licensee's completed actions for those issues related to the EDSFI and to review the status of some additional issues that had been identified.

2 ELECTRICAL DISTRIBUTION SYSTEM FOLLOWUP INSPECTION (2515/111)

The inspectors reviewed the status of the issues identified during the EDSFI as part of this inspection effort. The review of additional issues related to the EDSFI are documented later in this report.

2.1 (Closed) Inspection Followup Item 285/9101-01: Short Circuit Analysis

During the EDSFI, some questions were raised about the capability of various components (switchgear and circuit breakers) in the 4160V distribution to withstand or interrupt potential short circuit currents. The licensee was verifying and revising the inputs and assumption that were utilized in computing the maximum short circuits that could be generated as part of the on-going design basis reconstitution effort. The licensee committed to complete the analysis by December 31, 1991.

During this inspection, the licensee's Engineering Analysis FC-90-055, Revision 1, was reviewed. The licensee calculated that the largest attainable short circuit currents on the 4160V buses would occur when the buses were connected to the main generator. The inspectors also noted that the calculations were revised to consider the effects of electrical cable temperatures of 25°C verses the 90°C temperatures utilized in the earlier calculations. The licensee had also initiated operating instructions (AOP-31) to caution the operators to control the main generator output voltage within the analyzed limits.

The inspectors observed that the calculated maximum short circuit currents were within the interrupting capabilities of the switchgear. The inspectors noted, however, that there was no margin in the momentary interrupting capability of the Bus 1A4 Switchgear and the calculated maximum current.

The inspectors also reviewed the licensee's actions to resolve concerns raised with the sizing of the Heater Drain Pump Motor's Feeder Cables (see Licensee Event Report 92-022). The inspectors reviewed Engineering Change

Notice 92-0311 which directed the replacement of the No. 2 AWG cables with No. 4/0 AWG cables. The inspector agreed that the replacement cables would resolve the fire safety concern.

2.2 (Closed) Inspection Followup Item 285/9101-02: Degraded Voltage Analysis

The EDSFI noted problems with the assumptions that had been used in the licensee's calculation of the minimum voltage that would be available to various components while automatically sequencing emergency loads. The concerns included loading onto the emergency generators (EDGs) and under degraded offsite power conditions. The licensee committed to include the EDSFI observations in a revised degraded voltage study that was being conducted as part of their design reconstitution effort.

During this inspection, the licensee's Engineering Analysis FC-92-072, Revision 0, was reviewed. The licensee had calculated the values of voltage and frequency that would result from the automatic loading of the EDGs at discrete intervals. The calculations were performed using the computer program "ETAP" and indicated that the EDGs would perform as designed. The inspectors verified that the assumed loading times and values corresponded to the as-built design. In addition, the inspectors utilized the computer program "MATHCAD" to perform independent calculations. The results of the inspectors' calculations showed good correlation with the values obtained by the licensee.

The inspectors also reviewed Engineering Analysis FC-90-057, Revision 1. This analysis evaluated the voltage available at the 4160V buses during automatic sequencing of emergency loads. The inspectors noted that the licensee had increased the Offsite Power Low Signal (OPLS) relay setpoints to approximately 97 percent of nominal voltage to ensure that adequate voltage would be available. The revised OPLS setpoints, however, required an offsite power supply voltage of approximately 166.3kV at the onsite switchyard. The inspectors reviewed the voltage profiles at the onsite switchyard that were obtained in 1984 and those obtained in 1992. The inspectors noted a decrease in the available voltage levels had occurred. The inspectors questioned whether adequate voltage would be available to automatically sequence safety loads during an accident condition. However, the present condition meets regulatory requirements for safe shutdown power supply capability and the onsite emergency power sources are appropriate for accident condition load sequencing. The inspectors discussed this concern with licensee personnel and were informed that a number of options were being reviewed. The licensee was in the process of providing an additional 161kV transmission line to the onsite switchyard to improve redundancy and power capability. Licensee personnel also stated that additional adjustments to the OPLS relay setpoints was being considered.

The licensee's actions to ensure an adequate source of offsite power for automatic sequencing of accident loads will be reviewed with the Office of NRR

and will be evaluated during a future inspection. (Inspection Followup Item 285/9230-01)

2.3 (Closed) Inspection Followup Item 285/9101-03: Circuit Breaker Coordination Study

The licensee was performing circuit breaker and fuse coordination studies for the 480V and 120V ac systems and the 125V dc system at the time of the EDSFI The licensee committed to complete those studies and implement any necessary corrective actions in response to that inspection.

During this inspection, the licensee's studies and corrective actions were reviewed. The inspectors reviewed Engineering Analysis FC-91-004, Revision 1, and found it to be acceptable. The inspectors noted that the licensee had replaced the trip units from various motor control center supply circuit breakers. The modifications were implemented in accordance with Modification Request FC-88-013 in order to provide acceptable coordination of the trip function. The 120V circuits were modified in accordance with FC-91-020. This modification installed 30 ampere fuses downstream of the load distribution circuit breakers in Distribution Panels AE-40A and -40D. The inspectors verified that the addition of these fuses provided the necessary coordination.

The inspectors also verified that the battery output fuses were replaced in accordance with FC-91-084 on April 20, 1992. The replacement fuses provided the necessary coordination with the battery distribution system. The inspectors also noted that Engineering Analysis FC-91-084 dispositioned the additional dc system coordination concerns that had been raised during earlier reviews. The inspectors found the analysis to contain sound bases for the conclusions.

2.4 (Closed) Inspection Followup Item 285/9101-04: Voltage Drop Analysis for the 125 Volt dc System

The EDSFI concluded that insufficient information was available to provide assurance that all safety-related, dc powered devices would have an adequate terminal voltage throughout the battery duty cycle. The licensee committed to perform a bounding voltage drop analysis for selected devices powered by the 125V dc system.

During this inspection, licensee Calculation FC05827, "125VDC System Voltage Drop Study," Revision 2, dated December 3, 1992, was reviewed. The licensee selected limiting components and determined the minimum operational voltage levels. The voltage drop occurring in the electrical wiring and control devices (e.g., circuit breaker and relay contacts) were calculated and subtracted from the assumed battery terminal voltage of 105V dc. The voltage was determined to be adequate to ensure proper operation of the devices except for three motors related to the emergency diesel generators. However, the licensee determined that the potential inoperability of the motors would not prevent the automatic start of an emergency diesel generator.

The inspectors also noted that the internal shutdown circuitry of the inverters had been adjusted to lower the setpoint to 104V dc to provide margin to the calculated minimum terminal voltage of 104.57V dc. The inspectors found the licensee's calculation and related evaluations to be noteworthy and considered the quality of the engineering effort and its documentation to be a program strength.

2.5 (Closed) Inspection Followup Item 285/9101-05: Fuse Control Program

The first phase of a three phase fuse control effort was underway at the time of the EDSFI. The first phase consisted of sampling 5-10 percent of the station fuses; the remaining two phases were to verify approximately 25 percent of the facility fuses and obtain design data on the remaining fuses to compile a fuse list.

During this inspection the inspectors examined the licensee's progress and determined that all phases had been completed. The licensee had also developed a fuse list (approximately 4000 fuses) that had been published. In addition, the inspectors noted that the licensee had established provisions to control fuses in the procedures that controlled maintenance and modification activities.

2.6 (Closed) Inspection Followup Item 285/9101-06: Rating of Control Circuitry Devices

The EDSFI questioned the capability of various control devices assembled by equipment vendors. The team was especially interested in those devices supplied as part of the emergency diesel generator package. The licensee was unable to retrieve the necessary electrical ratings for some of those devices. Therefore, the licensee committed to review selected devices to ensure that the ratings were appropriate for their function.

During this inspection, licensee Engineering Analysis FC-92-049, "Analysis of the Electrical Ratings of Selected EDG Components," was reviewed. The inspectors found the analysis to be complete and comprehensive. The licensee utilized manufacturers' data when available and performed type testing and inspections to verify findings. During this inspection, the licensee issued Revision 1 to the analysis to incorporate the recent 125Vdc system voltage drop study. The licensee concluded that the selected components were all adequately rated to ensure proper operation.

The inspectors determined that the licensee had used a conservative methodology in evaluating the operability of the selected components.

3 FOLLOWUP ON CORRECTIVE ACTIONS FOR A VIOLATION (92702)

3.1 (Open) Violation 285/9210-01: Failure to Maintain Adequate Procedures for Containment Sump Level Calibration

An NRC inspection in April 1992 determined that the narrow range containment sump level instruments, LT-599 and LT-600, had not been calibrated by the method stated in the Technical Specifications. In 1990, an NRC inspection had identified the same concern with the calibration of these instruments. The calibration procedures were revised in response to that inspection finding to include the Technical Specification requirement. However, during the 1992 refueling outage, the procedures were revised again and the Technical Specification requirement that had been added, was deleted.

During the April 1992 inspection, Surveillance Procedures IC-ST-WDL-0001 and IC-ST-WDL-0002 were revised (Revisions 11 and 8) to once again incorporate physical measurement of the containment sump level. The licensee also added a caution note to the procedures stating that changes should not be made without Plant Review Committee review of the NRC commitment. In addition, the licensee performed the surveillance test to the revised procedures.

The licensee's response to the Notice of Violation, dated June 22, 1992, contained corrective action steps to insure the violation would not reoccur. The corrective actions included: 1) performing a root cause analysis; 2) issuing a memorandum to all members of the Plant Review Committee and Nuclear Safety Review Group emphasizing the need to perform a thorough review of procedure revisions to insure compliance with the Technical Specifications; 3) revising Procedure NOD-QP-3, "10 CFR 50.59 Safety Evaluations," to provide additional guidance in determining Technical Specification compliance; and 4) a review of other float level calibration procedures to determine if revisions were necessary to clarify the method of calibration required by the Technical Specifications. The NRC found these proposed actions to be acceptable by letter dated July 28, 1992.

During this inspection, the "Root Cause and Generic Implications Analysis Report, Containment Sump Level Miscalibration," No. IR-920381 dated June 16, 1992, was reviewed. The inspectors found the report to be a comprehensive and detailed analysis of the root cause. Quality Procedure NOD-QP-3, "10 CFR 50.59 Safety Evaluation," Revision 11, was also reviewed. Section 9.4 of the procedure was revised to include a statement to ensure that the change complied with the Technical Specifications. The inspectors also reviewed Memorandum FC-0792-92 dated July 17, 1992, that was sent to the Plant Review Committee and Nuclear Safety Review Group members. This memorandum discussed the violation and emphasized the importance of reviewing changes to procedures for compliance with the Technical Specifications. The inspectors considered these corrective action items to be complete.

The last corrective action item included a review other float level calibration procedures to ensure Technical Specification compliance. This item was being tracked by the licensee as commitment identification No. 920573 and had a scheduled completion date of December 31, 1992. This violation remains open pending verification that this corrective action item has been completed.

4 FOLLOWUP (92701)

4.1 (Closed) Inspection Followup Item 285/8942-01: Waiver of Surveillance Requirements

During an inspection of the licensee's surveillance procedures and records, some instances were noted where surveillance requirements had been waived. The technical basis for the waivers were not always adequately documented and the authority for waiving surveillance requirements had been granted to the system engineers. The licensee acknowledged this apparent weakness and initiated corrective actions.

During this inspection, the inspectors reviewed the licensee's corrective actions. The licensee redefined the waiver process as a procedure change and revised Standing Orders G-23, "Surveillance Test Program," and G-30, "Setpoint/Procedure Changes and Generation," to implement the actions. The inspectors found these changes to be acceptable in resolving the concern.

4.2 (Closed) Inspection Followup Item 285/9001-01: Electrical Separation for the Emergency Feedwater Storage Tank Level Transmitters

The licensee identified a problem with the separation distance between the electrical cables for the two level transmitters. The separation was acceptable for normal service applications, but did not appear to satisfy the requirements for redundant applications of Post Accident Monitoring Instruments specified in Regulatory Guide 1.97.

The licensee performed walkdowns of the instrumentation loops during the 1992 refueling outage and determined that problems existed which required rerouting of some cables. The licensee initiated Modification Request FC-92-011 to accomplish the necessary rework. The inspectors found the proposed modifications to be acceptable and verified that the modification request was scheduled to be completed during the 1993 refueling outage.

4.3 (Closed) Inspection Followup Item 285/9001-03: Labeling of Regulatory Guide 1.97 Instrumentation

During the inspection of the Post Accident Monitoring Instrumentation, the inspectors noted that the licensee had not provided the required unique identification for the instruments. The licensee included a provision for identifying the specified instruments in Modification Request FC-88-22, "Detailed Control Room Design Review Labeling, Demarcations, Mimics and Color Padding Project."

During this inspection, the modifications were verified to have been completed. The inspectors also toured the control room simulator and verified that the unique orange dot designator had been attached to selected instrument labels.

4.4 (Closed) Inspection Followup Item 285/9021-01: Wiring Interlock on Diesel Generator Output Breaker

During the followup inspection of the loss of shutdown cooling event that occurred on February 26, 1990, a wiring deficiency in the emergency diesel generator auto-close circuit was identified. The wiring deficiency prevented the diesel generator output breaker from closing on an automatic start unless large loads, including the low pressure safety injection pump, had tripped. However, the low pressure safety injection pump does not load shed when manually started. Therefore, the diesel generator output breaker would not automatically close during a loss of offsite power incident if the pump had been manually started.

During this inspection, the licensee's corrective actions were reviewed. The licensee had implemented Modification Request FC-90-024 to jumper the low pressure safety injection pump permissive contacts in the diesel generator output breaker closing circuit. The licensee's evaluations verified that immediate loading of the low pressure safety injection pump on the diesel generator bus would have minimal effect on plant response to a loss of offsite power incident.

5 ONSITE REVIEW OF LICENSEE EVENT REPORTS (92700)

5.1 (Closed) Licensee Event Report 285/89-014: Auxiliary Feedwater Wiring Outside Design Basis

During the design basis reconstitution effort, the licensee discovered that wiring for the wide range steam generator pressure instrument on the auxiliary feedwater control panel had been routed through the control room. A fire in the control room could, therefore, have rendered this instrument inoperable. In addition, the pressurizer pressure and steam generator narrow range level indicators were powered from the "C" inverter that was fed from Battery 1. However, the use of Battery 1 had not been analyzed in the fire safe shutdown.

In the interim, the licensee performed a Safety Analysis for Operability (SAO) and revised the abnormal operating procedures to address forced evacuation of the control room. Final resolution consisted of a plant modification to supply analyzed power to the above instruments and rerouting the wiring so it would not be affected by a control room fire. During this inspection, the modifications were verified to have been completed.

5.2 (Closed) Licensee Event Report 285/90-007: Main Feedwater and Main Steam Piping Outside Design Basis

The licensee reported concerns with the main feedwater and main steam piping and supports outside of containment that could be overloaded during a seismic event. An evaluation was performed which determined that the main feedwater piping and supports were outside the design basis specified in licensing correspondence and in the Updated Safety Analysis Report (USAR) for high

energy line break locations. In addition, the main steam piping stress and support allowable values were outside the USAR design basis.

The licensee implemented short-term corrective actions during the 1990 refueling outage. These corrective actions included the preparation of SAO 90-04, dated April 9, 1990, which established an interim acceptance criteria for plant operation. The inspectors reviewed the SAO and found it to be comprehensive in scope. In addition, two modifications were completed on main steam and main feedwater supports during the outage. The inspectors reviewed Modification Requests FC-90-19, Revision 0, "Main Steam Supports in Room 81 and Turbine Building," and FC-89-45, Revision 0, "Feedwater Supports in Room 81 and Turbine Building." The inspectors noted that the modifications were well written and well documented.

The licensee's long-term corrective actions included: 1) the clarification of the USAR concerning seismic requirements for the main steam and main feedwater piping outside of containment, 2) the modification of piping supports to comply with the design basis, and 3) the initiation of a review of seismic classification of the systems identified in the NRC safety evaluation concerning the potential for flooding caused by ruptures of non-seismic Class I systems. The inspectors also reviewed Modification Request FC-90-038, Revision 1, "Main Steam and Feedwater Supports Room 81 and Turbine Building." The purpose of the modification was to restore the main feedwater and main steam systems between the isolation valves and the turbine building to Seismic Class I requirements. The nonsafety-related piping and supports were reanalyzed to design basis requirements and supports were corrected as needed. In addition, Engineering Analysis FC-92-030 was initiated to review the seismic classification of systems with the potential for flooding. This analysis had not been completed but was being tracked in the licensee's commitment tracking system as CID 900217/09.

5.3 (Closed) Licensee Event Report 285/90-016: Potential for Overpressurization of Auxiliary Feedwater Piping

The licensee reported concerns with the potential for the turbine driven auxiliary feedwater pump (FW-10) to overspeed and cause the discharge piping to be overpressurized. The report stated that the pump had a speed limiter but did not have an overspeed trip; therefore, a single failure of the speed limiter could cause the pump to overspeed.

The inspectors reviewed SAO 90-012 dated May 13, 1990. The SAO justified the continued plant operation based on Engineering Analysis FC-90-28, Revision 1, "Effect of Single Failure of FW-10 Speed Limiting Governor." The inspectors noted that the engineering analysis determined that the maximum discharge pressure would not cause a failure in the auxiliary feedwater piping. The SAO concluded that since the overspeed and overpressure postulated event would not cause a loss of safety function of the auxiliary feedwater system, no immediate compensatory measures were required.

The long-term corrective actions included incorporation of lessons learned from the event into the 10 CFR Part 50.59 safety evaluations training program and a permanent resolution to the concern for overpressurization of the auxiliary feedwater piping from overspeeding of the pump. The inspectors reviewed the Student Handbook Lesson Plan: 2327-07, Revision 3, "10 CFR 50.59 Safety Evaluations," and noted that the lessons learned were incorporated into the lesson plan that satisfied the first commitment. The licensee determined that the current configuration of the auxiliary feedwater system was acceptable and no modification was required. The determination was documented in OPPD Position Paper, "Overpressure of Auxiliary Feedwater Components due to FW-10 Overspeed," dated June 24, 1991. This position was based on a review of codes concerning the overpressure of piping. A 10 percent increase over design pressure was allowed under conditions of safety relief valve actuation. The maximum overpressure expected if pump FW-10 were to overspeed was less than 5 percent for the most limiting components.

5.4 (Closed) Licensee Event Report 285/90-022: Fire Barriers

The licensee reported that some fire barrier penetrations were declared non-functional due to either a lack of documentation to verify critical parameters or inconsistencies between the as-built configuration and the approved configuration. The licensee committed to: 1) perform the necessary evaluations, 2) repair or replace barriers as necessary, 3) revise affected drawings as part of any modifications, and 4) upgrade the procedures related to fire barrier configuration control.

The inspectors verified that the engineering evaluations utilized the guidelines of Generic Letter 86-10, "Implementation of Fire Protection Requirements," and that the modifications had been completed in accordance with Modification Request FC-90-072, "Repair /Replacement of Fire Barrier Seals and Dampers." The inspectors also reviewed Procedures MEI-20, "Fire Barrier Evaluations," Revision 0; MEI-21, "Fire Barrier Configuration Control, Revision 0; and GEI-4, "Fire Protection Systems Interaction," Revision 0. The inspectors determined that the procedures provided detailed guidance to accomplish the required tasks. In particular, the inspectors found the Fire Protection System Interaction Review Questions Checklist included in GEI-4 to be excellent.

5.5 (Closed) Licensee Event Report 285/91-003: Mechanical Containment Penetration M-3 Outside Design Basis

The licensee determined that Containment Penetration M-3 (Chemical Volume Control System) was outside the basis that allowed exclusion from the Type C leak testing required by 10 CFR 50, Appendix J. The basis for the Type C testing exemption had been based on the charging line pressure being higher than containment pressure during accident conditions. The most recent reanalysis of the post-accident containment pressure response and the Emergency Operating Procedure (EOP) charging pump criteria indicated that the previous basis for an exclusion was not valid.

The licensee completed SAO 91-01 in February 1991 to provide the basis for continued operation. The EOPs were revised to require closing the charging pump manual discharge valves whenever the charging pumps were secured. In addition SAO 91-01 and the USAR were revised to include the updated containment pressure analysis and the design basis for Containment Penetration M-3.

The licensee had requested exclusion from the Type C leak testing required by Appendix J based upon a new justification. That request had not been approved at the time of this inspection. However, the inspectors determined that the status of the test exclusion request had no bearing on the continued safe operation of the facility.

5.6 (Closed) Licensee Event Report 285/91-004: Offsite Power Low Signal Outside Design Basis

A licensee engineering analysis revealed that the voltage supplied to some 480V safeguards equipment could fall below 87.5 percent without the offsite power low signal (OLPS) being actuated. Since this voltage reduction was lower than the 90 percent recommended voltage for some safeguards loads, the licensee determined the plant was outside its design basis.

The licensee's corrective actions included administrative controls of equipment configurations and bus loadings, as well as raising the OPLS setpoints. The long-term corrective action was to alter the existing logic circuitry such that, upon receipt of a safety injection actuation signal, large equipment not required for accident mitigation would be automatically load shed.

During this inspection, Modification Request FC-91-008, which changed the load shed logic, was verified to have been fully implemented and tested during the 1992 refueling outage. The completion of the modification negated the need for continued administrative control of equipment configuration and bus loading.

5.7 (Closed) Licensee Event Report 285/91-005: Violation of Instrument and Control Technical Specification 2.15

On February 28, 1991, the Instrument and Control technicians were performing maintenance on Steam Generator Instrument B/PIC-905. The instrument was declared inoperable at 25 minutes past midnight and the trip units were placed in bypass. At 11:44 a.m., a mechanical jumper (bypass) was installed on the instrument. At that time it was realized that the bypass should have been installed within 8 hours of the instrument being declared inoperable. The cause was determined to be wrong interpretation of the requirement by operations personnel.

The licensee's corrective actions included training on this event and the documentation of a Technical Specification Interpretation. During this inspection, all corrective actions were verified to have been completed.

5.8 (Closed) Licensee Event Report 285/91-007: Circuit Breaker Coordination of 480V Distribution System

As discussed in paragraph 3.4.4 of the EDSFI Report, the licensee identified and reported problems with the overcurrent trip coordination of various 480V circuit breakers. The licensee's report provided a commitment to complete a coordination study and resolve any problems.

The inspectors reviewed the circuit breaker coordination study and the related modifications as part of Inspection Followup Item 285/9101-03 and found them to be acceptable. (See paragraph 2.3.)

5.9 (Closed) Licensee Event Report 285/92-008: Safety Relief Valve Setpoints Greater Than Qualified System Design Pressure

The licensee reported concerns with four, safety injection system, relief valves. Valves SI-187, SI-309, SI-310, and SI-311 had setpoints that were greater than the system design pressure as qualified by the original hydrostatic tests. Reviews of relief valve setpoints in the safety injection, chemical and volume control, raw water, component cooling water, auxiliary feedwater, and the reactor coolant systems were performed in accordance with Engineering Assistance Request (EAR) 91-097 to determine if any other relief valves had nonconforming setpoints. No other nonconformances were identified.

During this inspection, the licensee's response to EAR 91-097 for the four valves identified above was reviewed. Valves SI-187 and SI-310 had a setpoint of 600 psig while the piping was qualified to 500 psig by hydrostatic test. Valve SI-309 had a setpoint of 350 psig while the piping was qualified to 300 psig. The licensee determined that the piping systems were operable because the pressure ratings for the most limiting components exceeded the setpoints of the relief valves. Valve SI-311 had a setpoint of 150 psig while the piping was qualified to 66 psig during the original hydrostatic test. However, in 1983 a hydrostatic test had been conducted at 190 psig. The licensee considered the 1983 test sufficient to qualify the piping for 150 psig.

Modification Request FC-92-009, Revision 0, was prepared to reduce the setpoints of SI-187 and SI-310 from 600 to 500 psig and SI-309 from 350 to 300 psig. The inspectors reviewed the Maintenance Work Orders 910725, 910733, and 910732, and determined that the setpoints had been changed and that the valves returned to service during April 1992.

The licensee's long-term corrective actions included revising plant drawings, updating design basis documents, and performing the required 10-year hydrostatic test to verify the acceptability of the piping associated with Relief Valve SI-311. The inspectors reviewed the controlled plant drawings of the relief valves and determined that the valve setpoints had been properly revised. The inspectors also reviewed marked-up revisions to the Shutdown Cooling System and Low Pressure Safety Injection System design basis documents and determined that they had been updated to reflect the changes in relief

valve setpoints and component design pressures. The 10-year hydrostatic test for the piping associated with SI-311 was completed on September 29, 1992, in accordance with Surveillance Test Procedure SS-ST-SI-3002, Revision 4, "(SI) Class 150 Piping 10 Year Hydrostatic Test." The hydrostatic test pressure was 195 psig which qualified the piping for a design pressure of 150 psig.

5.10 (Closed) Licensee Event Report 285/92-010: Circuit Breaker and Fuse Coordination of 125Vdc Distribution System

The licensee reported that problems had been identified during the design basis reconstitution effort with the coordination of 125Vdc circuit breakers and fuses. The problems occurred because system coordination had not been properly considered during the 1980 replacement of the batteries and their output fuses or during the 1985 changes to the system.

The licensee replaced the battery output fuses during the 1992 refueling outage in accordance with Modification Request FC-91-026. The replacement fuses had a slower response time and provided proper system coordination.

The inspectors reviewed the licensee's coordination study and found it to be acceptable. (See paragraph 2.3.)

5.11 (Closed) Licensee Event Report 285/92-012: Nonconserative Steam Generator Differential Pressure Trip Setpoints

The licensee determined that the setpoints for all four channels of the steam generator transient protection trip function were greater than that allowed by the Technical Specifications. The cause was determined to be an inadequate program for implementing and controlling setpoints.

The licensee's corrective actions included the initiation of a new procedure, SEI-9, "Setpoint/Tolerance Change and Review." Additionally, the procedures for design change, electrical system interaction and configuration control were revised to stress the areas of calculation input and uncertainty.

During this inspection, all of the corrective actions were verified to have been implemented.

5.12 (Closed) Licensee Event Report 285/92-016: Insufficient Containment Spray Pump Net Positive Suction Head

The licensee reported that the containment spray pumps might not have an adequate suction head during the recirculation phase of operation. This issue was also discussed in NRC Inspection Report 50-285/92-09, dated May 15, 1992. The report documented that the licensee had approved SAO 92-02, "Inadequate Containment Spray Pump Net Positive Suction Head." The SAO stated that the existing licensing basis did not allow consideration of subcooling in net positive suction head calculations. However, there would be sufficient net positive suction head available under all accident conditions if subcooling were considered in the calculation. The report also stated that the licensee

had performed a 10 CFR Part 50.59 safety evaluation which determined that no unreviewed safety question existed.

The licensee's long-term corrective actions consisted of: 1) the mechanical design engineering group performing a review of the condition and its root cause analysis to emphasize the importance of confirming USAR assumptions when performing calculations, and 2) a revision to USAR Section 6.2.1 which would take credit for liquid subcooling in the net positive suction head calculation. The inspectors reviewed Memorandum PED-FC-92-1908, dated June 5, 1992, which stated that mechanical design engineers had reviewed the condition and the root cause analysis. In addition, the inspectors reviewed the program document review signoff sheet with the signatures of the engineers that had reviewed the package. The inspectors also reviewed the USAR Section 6.2 revision which took credit for 25 percent of the net positive suction head available from sump subcooling. (The previous revision to the USAR did not take credit for subcooling.) This revision to the USAR was submitted to the NRC on September 18, 1992.

5.13 (Closed) Licensee Event Report 285/92-017: Cracking of Cam Followers in SBM Type Switches

The licensee discovered an inoperable General Electric Type SBM Switch associated with a 4160V circuit breaker. Inspection of the switch revealed that the Lexon cam follower was broken rendering the switch inoperable. Previous industry experience, including NRC Information Notice 80-13, had addressed cracking of polycarbonate cam followers due to exposure to hydrocarbons during manufacture. A General Electric service information letter was issued in 1976 recommended the replacement of switches that had been manufactured between 1972 and 1976. The licensee determined that none of the installed switches were manufactured during that period.

In response to Information Notice 80-13, the licensee performed an inspection of one switch and found 50 percent of the cam followers exhibited the cracking described in the information notice. A detailed inspection program using fiber optic techniques was initiated, but due to visual clarity problems, the inspections were abandoned in 1984. During the 1985 refueling outage, 30 of the 90 of the safety-related switches in the control room were replaced. Some cracking was discovered, but it was attributed to stress rather than hydrocarbon exposure. No switch failures were discovered and the replacement of switches was suspended.

The licensee's corrective actions related to this recent switch failure included the inspection and replacement of switches in the 4160V switchgear, control board and auxiliary panel that were cracked or deteriorated. Additional inspection and replacement activities were also scheduled for implementation during future refueling outages.

5.14 (Closed) Licensee Event Report 285/92-022: Heater Drain Pump Cables

During the electrical system short circuit studies, the licensee discovered and reported a problem with the sizing of some electrical cables. The licensee determined that a fire could result in a short circuit between the three phases of the cables that supplied power to some components, including the heater drain pumps' motors. A "bolted short connection" caused by the fire could cause the cable jacket temperature to increase above allowable limits in other areas where the cables were routed. The high cable jacket temperatures could, in turn, cause problems with other, adjacent, cables. Although the heater drain pump motor cables were not safety-related, they could impact the operability of adjacent safety-related cables. Therefore, the licensee replaced the heater drain pump cables in accordance with Engineering Change Notice 92-311.

The inspectors reviewed the licensee's analysis and actions as part of Inspection Followup Item 9101-01 (see paragraph 2.1) and found that they resolved the problem.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Omaha Public Power District Personnel

*R. Andrews, Division Manager, Nuclear Services
*G. Cook, Supervisor, Station Licensing
*S. Gambhir, Division Manager, Production Engineering
*J. Gasper, Manager, Training
*C. Guliani, Supervisor, Operations Training
*R. Jaworski, Manager, Station Engineering
*L. Kusek, Manager, Nuclear Safety Review
R. Lewis, Principle Engineer, Design Engineering
*D. Lippy, Licensing Engineer
*R. Mehaffey, Principal Engineer, Electrical Engineering
*S. Miller, System Engineer
*R. Mueller, Supervisor, Electrical Engineering
*J. O'Connor, Manager, Design Engineering - Electrical
*W. Orr, Manager, Quality Assurance and Quality Control
*T. Patterson, Manager, Fort Calhoun Station
*R. Phelps, Manager, Design Engineering
*R. Short, Manager, Nuclear Licensing and Industry Affairs
*C. Simmons, Station Licensing Engineer
*J. Tills, Assistant Manager, Fort Calhoun Station

1.2 NRC Region IV Personnel

*J. Whittemore, Reactor Inspector

*Denotes personnel that attended the public exit meeting conducted on December 11, 1992.

2 EXIT MEETING

An exit meeting was conducted on December 11, 1992. During this meeting, the lead inspector reviewed the scope and findings of the inspection. The licensee did not identify as proprietary any of the materials provided to, or reviewed by, the inspectors during this inspection.