APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-285/92-33

Operating License: DPR-40

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: November 22, 1992, through January 2, 1993

Inspectors: R. Mullikin, Senior Resident Inspector
R. Azua, Resident Inspector
T. Reis, Project Engineer, Project Section B

Approved: P. H. Harrell, Chief, Technical Support Staff 1/12/93
Division of Reactor Projects Date

Inspection Summary

Areas Inspected: Routine, unannounced inspection of onsite followup of events, operational safety verification, safety system walkdown, maintenance and surveillance observations, and followup of licensee event reports.

Results:

- Inadequate attention to detail by a licensed senior operator and a nonlicensed operator, during the development of a danger tagout, resulted in the overpressurization of the steam generator blowdown processing system. As a result, a violation was identified (Section 2.1).

- Housekeeping is generally good but some areas continue to require additional management attention (Section 3.2).

- Response by radiological protection personnel to an elevated airborne activity event was thorough and conservative (Section 3.3).

- Performance by security personnel during nondesignated vehicle inspections was excellent (Section 3.4).

- Prestaging of equipment by maintenance personnel to minimize exposure time in an airborne contamination area was very good (Section 5).

- Good questioning attitude by electrical maintenance personnel was noted during surveillance testing activities (Section 6).

Summary of Inspection Findings:

- Violation 285/9233-01 was identified (Section 2.1).

- Licensee Event Reports 92-14 and 92-25 were closed (Section 7).

Attachment:

- Attachment - Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS

The licensee operated the Fort Calhoun Station at 100 percent power throughout this inspection period.

2 ONSITE RESPONSE TO EVENTS (93702)

2.1 Inoperability of Fire Suppression Water System

On December 3, 1992, Danger Tagout 92-2455 was generated by the operations department to isolate Steam Generator Blowdown Flow Transmitter FT-1392 and the electric/pneumatic controller on Valve HCV-1390 for maintenance. This tagout was reviewed and approved and the licensed senior operator was issued to the field for installation. After maintenance on the components was completed, an instrument and control technician requested that the danger tagout be cleared and the system be placed in service for postmaintenance testing.

During the tag clearance process, an equipment operator called the control room to determine the return-to-service position of the four valves associated with the tags that he was to clear. In accordance with the tagout sheet, the control room operator stated that all four of the valves (FW-1055, -183, -605, and -606) were to be placed in the open position. The equipment operator then cleared the tags, opened each of the four valves, and called the control room to inform them that the tags were clear. Once all the other tags had been cleared, the instrument and control technician performed the postmaintenance testing satisfactorily and reported the results to the control room. Later that same day, the control room received fire detector alarms for Zone 4, which provides detection in the air compressor bay in Room 19. Major equipment located in Room 19 consists of the plant air compressors, air dryers/receivers, two auxiliary feedwater pumps, and steam generator blowdown heat exchanger. In addition, motor-driven Fire Pump FP-1A automatically started due to a decrease in the fire protection system pressure.

Shortly after Fire Pump FP-1A started, a control room operator directed the water plant operator to close Recirculation Valve FP-300 for Fire Pump FP-1A. This action was taken based on the instructions provided in Operations Memorandum 92-09, Revision 1, dated October 15, 1992. Valve FP-300 is normally locked open, but is to be closed under certain circumstances specified in the operations memorandum. This memorandum was implemented, as an interim measure, to address a potential concern regarding the ability of Fire Pump FP-1A to provide adequate flow to the sprinkler systems under certain unique conditions. The operations memorandum indicated that Valve FP-300 was to be closed if diesel-driven Fire Pump FP-1B is inoperable, river level is below 985.6 feet elevation, Fire Pump FP-1A starts, and flow of 1000 gallons per minute is initiated through sprinkler actuation or hose demand. As Fire Pump FP-1B was inoperable, river level was reported as 984.25 feet, and the control room had indication of sprinkler system flow in

Room 19, the conditions were present for the licensee to take the action specified in the operations memorandum.

A fire brigade was dispatched to Room 19 to investigate the cause of the fire detector alarm. Upon arriving, the fire brigade encountered a significant amount of steam and initially could not ascertain the source of the steam or if the fire protection system was spraying down an actual fire. This information was relayed to the control room operators, who realized that the steam generator blowdown system had just been placed in service and suspected it as being the source of the steam, thus the operators isolated blowdown from both steam generators. The steam leak diminished and the fire brigade was able to identify the source of the steam as a blown diaphragm on steam generator blowdown processing system Drain Valve FW-1314. Once appraised as to the source, operations personnel closed Valve FW-1055 to further isolate the leak.

The steam and high humidity conditions in Room 19 had activated the fire detectors, which signaled the deluge valve on the preaction sprinkler system to trip and fill the sprinkler dry-pipe system. This caused a decrease in the fire protection system pressure, which automatically started Fire Pump FP-1A. Because there was no fire present, the sprinkler head fusible links remained intact and no sprinkler flow was discharged to the room. When it was apparent that no fire existed in Room 19, the fire pump was secured. The pump ran for approximately 7 minutes under no flow conditions.

Actions were taken to remove the steam/humidity and clear the fire detector alarms. Valve FP-300 was locked open and the fire protection system was returned to normal.

Following an inspection of Fire Pump FP-1A, the water plant operator reported to the control room that water had been found in the lower motor bearing of the pump. The pump was declared inoperable. With both fire pumps declared inoperable, the licensee entered Technical Specification 2.19(4)b, which applies to situations when no suppression water systems are operable. This Technical Specification requires that a backup fire suppression water system be established within 24 hours or a reactor shutdown be initiated.

Upon declaring both fire pumps inoperable, the fire protection system was immediately cross-tied to the station demineralized water system to provide a partial backup fire suppression system. Efforts began to restore both fire pumps to an operable status. Fire Pump FP-1B was declared operable before the Technical Specification deadline, thus Technical Specification 2.19(4)b was exited.

A review of Danger Tagout 92-2455 determined that the return-to-service position specified on the tagout sheet for Valve FW-1055 was open but should have stated that the valve was to be closed. This valve is an isolation valve between the steam generator blowdown system and the steam generator blowdown processing system. Opening Valve FW-1055 allowed the high temperature (500°F)/high pressure (820 psia) blowdown water to fill and pressurize a

portion of the steam generator blowdown processing system, which was designed for 150°F/150 psig. As a result, the diaphragm on Valve FW-1314 failed, which resulted in the steam leak in Room 19.

The failure to identify the proper return-to-service valve position for Valve FW-1055 is contrary to the requirements set forth in Standing Order SO-O-20, "Equipment Tagging Procedure," Revision 28. This is an apparent violation of NRC requirements (285/9233-01).

2.2 Waiver of Compliance

On December 23, 1992, the licensee made a containment entry as part of its periodic containment pressure reduction evolution. Once the licensee personnel had exited containment, a 5-psig, Type-B leak rate surveillance test was performed on both the inner and outer personnel access door seals, as required by the Technical Specifications. During performance of this test, it was determined that at least one of the two inner door seals was leaking. As a result, the door was declared inoperable. The outer personnel air lock door was found to be within specifications, and was administratively locked. The test was performed from outside the air lock and containment integrity was maintained throughout the test.

To repair the inner personnel air lock door, the licensee would have to open the outer door. This would have been in violation of Technical Specification 2.6.(1)a, which prohibits the violation of containment integrity unless the reactor is in a cold shutdown condition. As a result, the licensee requested a temporary waiver of compliance from the provisions of the Technical Specification 2.6.(1)a. On December 24, the NRC granted the licensee a 24-hour temporary waiver of compliance that commenced when the licensee initiated repairs.

On December 26, the licensee proceeded to repair the inner personnel air lock door seal. The licensee prestaged all the equipment necessary to repair the inner door in an effort to minimize the opening of the outer door. This effort was completed the same day. Once completed, the licensee retested the inner door seals and found that they were within specifications. The personnel air lock assembly was declared operable.

2.3 Conclusions

Operations personnel response to the steam generator blowdown event was considered to be good, but the failure of the nonlicensed operator and a licensed senior operator to identify the incorrect return-to-service valve position indicated a lack of attention to details.

3 OPERATIONAL SAFETY VERIFICATION (71707)

3.1 Routine Control Room Observations

The inspectors observed operational activities throughout this inspection period to verify that proper control room staffing and control room professionalism were maintained. Shift turnover meetings were conducted in a manner that provided proper communication of plant status from one shift to the other. Discussions with operators indicated that they were aware of plant and equipment status and reasons for lit annunciators. The inspectors observed that Technical Specification limiting conditions for operations were properly documented and tracked. Operators were observed to properly control access into the control room operating area.

3.2 Plant Tours

The inspectors toured various areas of the plant to verify that proper housekeeping was being maintained. Housekeeping was generally good throughout the vital areas. However, an area near the south door of the east switchgear room was accumulating plastic wrappers from ear plugs. This area had been properly maintained after the inspectors had previously noted it to the licensee. Further action is apparently needed to eliminate this housekeeping concern.

The inspectors verified, during plant tours, that various valve and switch positions were correct for the current plant conditions. Personnel were observed obeying rules for personnel safety and rules for escorts, visitors, entry, and exits into and out of vital areas.

On December 3, 1992, the inspector toured with an auxiliary building operator during the performance of his routine rounds. The operator demonstrated a good knowledge of his responsibilities and duties.

3.3 Radiological Protection Program Observations

The inspectors verified that selected activities of the licensee's radiological protection program were properly implemented. Radiation and contaminated areas were properly posted and controlled. Health physics personnel were observed routinely touring the controlled areas.

On December 6, 1992, following the initiation of maintenance activity to replace a filter drain valve and reroute piping to the ion exchanger in the spent fuel pool cooling system, an increase in airborne activity in the spent fuel pool cooling room (Room 5) was noted, specifically the activity level of alpha particles. This was the result of the licensee having breached the spent fuel pool cooling system and the presence of a failed fuel pin in the spent fuel pool.

Due to the potential for high alpha activity in adjacent systems, the radiation protection department began taking confirmatory measurements of

those adjacent systems. The activity levels in Room 5 were found to slightly exceed the protection factor of the standard full-face respirators, which have a protection factor of 50. As a result, the radiation protection department required the use of powered-air purifying respirators, which have a protection factor of 1000. This requirement was extended to all adjacent systems until the results of the confirmatory measurements could be evaluated. The licensee's efforts during this evolution were found to be thorough and conservative.

3.4 Security Program Observations

3.4.1 Search of Nondesignated Vehicles

The inspector observed security personnel search several nondesignated vehicles entering into the protected area through the sally port, including a truck carrying washed protective clothing, which required a survey by radiological personnel prior to a security inspection. Once the radiological survey had been completed, a security officer proceeded to inspect the truck. The inspector noted that the officer had the proper dosimetry and verified that she had read and signed the appropriate radiological work permit to perform this effort. The inspector also noted that the security officer performed a thorough inspection of both the cab and the trailer, while adhering to good radiological protection practices. Nondesignated vehicles entering the protected area were also found to be properly escorted by armed security personnel.

3.4.2 Unattended Weapon

On December 4, 1992, the inspector, while preparing to enter a vital area, encountered a security officer exiting the vital area through the same door. Upon entering through the door, the inspector noted that a black nylon bag, normally used by security personnel to carry their assigned shotguns, was lying on a security lock box. The inspector examined the bag and verified that it contained a shotgun. The inspector remained in the area to maintain positive control of the weapon. Approximately 1 minute and 40 seconds after the inspector had noticed the bag, the security officer that had earlier been identified leaving the area returned, looking for the weapon he had left behind. The security officer explained that he had momentarily been distracted by some of his other duties and absentmindedly forgot to carry his weapon when he left the area but, within a short period of time, had realized his mistake and immediately returned to retrieve it. The security officer also noted that the shotgun was not loaded and that he had the shells on his person, which is a standard practice.

Security management personnel, upon being notified of this event, took actions to preclude recurrence. Although the weapon was not loaded, security management considered this to be a serious event. The immediate action taken by security management was to issue a memorandum describing the event to all security personnel and instructing them on the importance of maintaining positive control of their weapons. The licensee was reviewing the actions

taken by the security officer prior to leaving his weapon unattended to determine what action, if any, should be taken to preclude recurrence of this event.

Security management personnel, even though they considered this to be a serious event, stated that it had minimal safety significance due to the fact that the weapon was unloaded; was left unattended in a vital area, thus restricting access to it; was under positive control of an NRC inspector; and was left unattended for a very brief period of time. The licensee determined this to be a recordable event.

3.5 Conclusions

Plant housekeeping, in general, was maintained in a good condition, but some areas appeared to continue to need additional management attention. Radiological protection department performance, following the discovery of higher than normal alpha activity, was very good. Security personnel performance in the area of nondesignated vehicle inspections was excellent, with very good adherence to radiological protection practices. The security event involving an unattended weapon had minimal safety impact and appeared to be an isolated incident. Prompt licensee action was notable.

4 ENGINEERED SAFETY FEATURE SYSTEM WALKDOWN (71710)

4.1 4160-Volt System - Normal Operation

Switch positions in the 4160-volt system were verified using Operating Instruction OI-EE-1, "4160 Volt System Normal Operation," Checklist OI-EE-1-CL-A. The inspector noted that all breakers were in the proper position.

4.2 480-Volt System - Normal Operation

Switch positions in the 480-volt system were verified using Operating Instruction OI-EE-2, "480 Volt AC System Normal Operation," Checklists OI-EE-2-CL-A, -B, and -C. The inspector noted that all breakers for safety-related equipment were in the proper position. However, four breaker positions for some nonsafety-related loads were contrary to the checklist. The shift supervisor was informed of these discrepancies. The licensee verified that the four breaker positions were not in accordance with the checklist; however, the licensee stated that these are breakers that are seldom used and can be in either the on or off position. The licensee stated that a procedure change would be submitted to ensure that certain breakers were positioned at the shift supervisor's discretion. The inspector verified that the incorrect breaker positions were not caused by the failure to follow tagging procedures. No problems were noted during the review of tagging procedures.

4.3 Raw Water System

The inspector verified the proper valve alignment of the raw water system by checking the as-found position of the valves against the valve position requirements set forth in Operating Instruction Procedure OI-RW-1, "Raw Water System Normal Operation," Revision 12. In addition, the inspector verified that the piping and instrumentation diagram, Drawing 11405-H-100, "Raw Water Flow Diagram," was consistent with the installed system configuration. No anomalies were noted with the valves or system piping inspected.

Seismic supports for the raw water system were also inspected against various drawings (Drawings D-4251, Sheets 1-5, and D-4253) to verify the proper location and orientation and no anomalies were noted. Additionally, a walkdown of control room Panel CB-1 identified that all of the lights and switches were consistent with the valve positions and pump conditions noted in the field.

5 MAINTENANCE OBSERVATION (62703)

5.1 Inspection and Repair of Charging Pump CH-1A Hydraulic Section

On December 14, 1992, the inspector witnessed portions of the preventive maintenance activity that was performed on Charging Pump CH-1A. This activity was being performed in an effort to identify and repair the source of unknown leakage from the reactor coolant system. This effort was performed under Preventive Maintenance Order 9303695.

The inspector reviewed the preventive maintenance order work package, including attached Maintenance Procedure MM-RR-CH-0001, "Inspection and Repair of Charging Pump Hydraulic Section," for technical adequacy. It was determined that both had been reviewed and approved, as noted by the appropriate signatures. The work package was found to be complete. The procedure was noted to be detailed in nature with sign offs for all the steps performed and with quality control hold points at appropriate steps within the procedure.

The work effort was performed in the charging pump room (Room 6), which is within the radiation controlled area of the plant. The room in question was designated as an airborne contamination area, thus requiring that the maintenance personnel performing this effort wear powered-air purifying respirators. The inspector noted that the maintenance personnel's efforts to prestage all the equipment necessary to perform this effort was excellent. Personnel knowledge and experience in performing this effort was also noted to be very good. Quality control personnel were on hand during this effort to witness the appropriate hold points. The maintenance personnel adhered to good radiological protection practices throughout this effort.

5.2 Conclusions

Maintenance personnel efforts in prestaging equipment to minimize exposure time in the airborne contamination area was excellent. Knowledge displayed by the maintenance personnel in performing this effort clearly indicated that this activity was within the skill of the craft.

6 SURVEILLANCE OBSERVATION (61726)

6.1 Monthly Station Battery Test

On December 14, 1992, the inspector monitored portions of the electrical maintenance personnel's performance of Surveillance Test Procedure EM-ST-EE-0001, "Monthly Station Battery 1 (EE-8A) Test." The surveillance procedure provided instructions for obtaining and recording the voltage, specific gravity, and temperature of the pilot cells.

The inspector reviewed the surveillance procedure for clarity and technical adequacy. The procedure had been reviewed and approved, as indicated by the appropriate signatures. The procedure was found to provide good step-by-step instructions, delineating the order in which data was to be collected. In addition, the procedure provided appropriate precautions for personnel safety. It must be noted, though, that the procedure depended on the skill of the craft, for it did not instruct the electrical maintenance personnel on how to operate the digital multimeter or read the float hydrometer. For this reason, one of the precautionary statements required that the lead man performing this procedure be qualified to Electrical Category 1. A review of the licensee's training records indicated that the electrical maintenance personnel involved in performing this surveillance were qualified to this category.

The electrical maintenance personnel performance during this effort was found to be very good. Maintenance personnel wore the appropriate safety equipment and took steps to prevent spillage of the electrolyte. In addition, the meticulous manner in which they took the data was found to be notable. They also displayed a good questioning attitude. This was apparent when the electrical maintenance personnel noted that the hydrometer readings for all the cells tested were unusually low. Questioning the validity of this data, the electrical maintenance personnel retrieved another hydrometer and notified the instrumentation and controls department of the possible deficiency. After taking a second set of hydrometer readings, the results of the two hydrometers were compared. The results of the second hydrometer were found to be consistent with the results of previous monthly surveillance tests. Thus, the electrical maintenance personnel determined that the first hydrometer was deficient and returned it to the instrumentation and controls department. This hydrometer was then tagged as deficient.

The instrumentation and controls department then requested other electrical maintenance personnel performing a separate surveillance to run comparative tests between the deficient hydrometer and another hydrometer. The results of the comparison provided additional evidence that the hydrometer in question

was deficient, thus it was set aside for further inspection by instrumentation and controls personnel. In addition, the licensee proceeded to review the logs to determine when and where the deficient hydrometer had been used since its most recent calibration date. The licensee determined, as a result of their review, that no problems existed with respect to previous use of the deficient hydrometer.

The inspector reviewed the results of the surveillance test and verified the accuracy of the calculated values. The final results were within the acceptance criteria set forth in the procedure.

6.2 Conclusions

The surveillance procedure was found to be technically adequate for the task and experience level of the personnel involved. Personnel performance during this effort was very good. The questioning attitude displayed by the electrical maintenance personnel was found to be good.

7 ONSITE REVIEW OF LICENSEE EVENT REPORTS (92700)

7.1 (Closed) Licensee Event Report 92-014: Reactor Trip Following Maintenance on a Moisture Separator Level Instrument

This licensee event report documented an unplanned reactor trip following maintenance on a moisture separator level instrument. On May 14, 1992, a steam leak was identified coming from a capped connection on the turbine trip switch (LA-1303B) on Moisture Separator ST-3C. The level float chamber associated with this switch was valved out and the connection repaired. The upper isolation valve for the float chamber was then cracked open as the first step to returning the float chamber to service. Condensed steam trapped above the upper isolation valve drained into the float chamber causing a false high moisture separator level indication, which resulted in a turbine trip and a subsequent reactor trip on loss of load.

The licensee determined that the root cause of this event was the shift supervisor's decision not to disable the turbine trip circuit prior to opening the float chamber's upper isolation valve. The applicability of Standing Order SO-G-87, "Non-Routine Activities Requiring Formalized Plans," which addresses the need for Plant Manager approval of very high risk maintenance activities, was not considered during the event. Utilization of Standing Order SO-G-87 would have provided a mechanism for clarification of communication and resolution of the perceived high risk of lifting the lead for restoring the transmitter to an operable status.

The licensee's corrective actions included:

- The definition of a Priority 1 maintenance work order and the applicability of Standing Order SO-G-87 to maintenance work orders was reviewed and clarified.

- The maintenance work order planning and review process was reviewed to determine its responsiveness to operations department needs with respect to timely completion of Priority 1 and Priority 2 maintenance work orders.

- Standing Order SO-G-87 was reemphasized in departmental meetings.

- Training was provided to maintenance and operations supervisory and support staff, with a discussion of Standing Order SO-G-87 as a lessons learned topic.

The inspector reviewed documentation for the completion of the corrective actions taken by the licensee. Based on the review performed by the inspector, it appeared that the licensee had taken appropriate actions to preclude repetition of this event.

7.2 (Closed) Licensee Event Report 92-25: Inadvertent Manual Start of an Emergency Diesel Generator at the Local Control Panel

Licensee Event Report 92-025 reported an event in which a nonlicensed operator inadvertently started Emergency Diesel Generator 2 to idle speed during the performance of a surveillance test. As part of the test, the Channel B containment pressure high signal was actuated. An automatic emergency diesel generator start would be derived from this actuation; therefore, Procedure OP-ST-ESF-0010, "Channel B Safety Injection, Containment Spray and Recirculation Actuation Signal Test," provides instructions to transfer the emergency diesel generator from the emergency standby mode to the local control mode to prevent an automatic start from occurring during the test.

A nonlicensed operator performed the transfer, as directed by the procedure, at the local control panel and, as designed, received an alarm, which he was to acknowledge and silence. The alarm startled the individual and, instead of pushing the alarm acknowledge button, he inadvertently pushed the local start button. The licensee determined the primary cause of the event to be a lack of self checking to ensure the intended action was correct.

As corrective action, the licensee committed to incorporate training on the importance of self checking into the next operator training cycle, to be completed by November 15, 1992, and perform an evaluation of human factors considerations on the local control panel.

The inspector verified that all operations personnel, both licensed and nonlicensed, had received training on the event and the importance of self-checking. The inspector found that one of the training sessions had been video-taped and viewed the training. The inspector found that the importance of self-checking/verification was stressed and there was significant classroom exchange on how self checking/verification could be performed. The inspector considered the training to have adequately communicated the importance of self-checking to the attendees. The inspector randomly interviewed five

operators, both licensed and nonlicensed, and found they had been adequately trained on the event and the importance of self-checking.

The inspector reviewed the licensee's human factors review of the local control panel, which is documented in Internal Memorandum PED-FC-92-2382. The review concluded that modifications to the panel were not necessary. The inspector performed a walkdown of the panel to evaluate the layout of the controls and annunciators and noted no problems.

ATTACHMENT 1

1. PERSONS CONTACTED

1.1 Licensee Personnel

*R. Andrews, Division Manager, Nuclear Services
*J. Chase, Manager, Fort Calhoun Station
*G. Cook, Supervisor, Station Licensing
*M. Frans, Supervisor, Systems Engineering
*S. Gambhir, Division Manager, Production Engineering
*J. Gasper, Manager, Training
*W. Gates, Vice President, Nuclear
*R. Jaworski, Manager, Station Engineering
*L. Kusek, Manager, Nuclear Safety Review Group
*W. Orr, Manager, Quality Assurance and Quality Control
*T. Patterson, Division Manager, Nuclear Operations
*J. Sefick, Manager, Security Services
*R. Short, Manager, Nuclear Licensing and Industry Affairs
D. Lippy, Licensing Engineer

*Denotes personnel that attended the exit meeting. In addition to the personnel listed above, the inspectors contacted other personnel during this inspection period.

2 EXIT MEETING

An exit meeting was conducted on January 8, 1993. During this meeting, the inspector reviewed the scope and findings of the report. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.