APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-285/89-27 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: Fort Calhoun Station, Blair, Nebraska

Inspection Conducted: June 22-23, 1989

Inspector: _____ 7/10/89
R. B. Vickrey, Reactor Inspector, Operational Programs Section, Division of Reactor Safety Date

Approved: _____ 7/10/89
J. E. Gagliardo, Chief, Operational Programs Section, Division of Reactor Safety Date

Inspection Summary

Inspection Conducted June 22-23, 1989 (Report 50-285/89-27)

Areas Inspected: Routine, unannounced inspection of the testing of the turbine driven auxiliary feedwater pump.

Results: On June 13, 1989, the licensee performed Special Procedure SP-FW-12 to test the Turbine Driven Auxiliary Feedwater Pump FW-10. During the test, the pump failed to respond to manually injected air signals to the pnuematic-hydraulic speed governing loop. The licensee determined that the pump may not have been operable prior to the test because of the failed speed control loop components. While the licensee's operational response to this event was deemed appropriate, subsequent followup by the NRC inspector revealed two apparent violations. The first apparent violation involved the inoperability of the Turbine Driven Auxiliary Feedwater Pump FW-10 over an extended period of time due to inadequate testing. The second apparent violation involved a failure to perform appropriate maintenance and calibration of the control system for Turbine Driven Auxiliary Feedwater Pump FW-10. These apparent violations are described in paragraph 2 of this report and will be discussed during the enforcement conference scheduled on July 28, 1989. Therefore, no Notice of Violation is included with this inspection report.

DETAILS

1. Persons Contacted

*C. F. Simmons, Licensing Engineer
*D. J. Matthews, Supervisor, Station Licensing
T. C. Matthews, Station Licensing Engineer
*R. C. Kellogg, Supervisor, Special Services
*J. Hodges, Nuclear Safety Review Group
*J. Kecy, Supervisor, System Engineering
*D. Andes, Nuclear Safety Review Group
K. Hotthaus, Manager, Nuclear Engineering
W. Alhassani, Engineer, Nuclear Engineering
*B. Lennox, Engineer, Special Services
*B. Odden, Lead Secondary System Engineer
M. Schlosser, Shift Technical Advisor
B. Mehaffey, Supervisor Electrical/Instrument and Control
*L. T. Kusek, Manager, Nuclear Safety Review Group
*G. Peterson, Plant Manager
*K. J. Morris, Division Manager, Nuclear Operations
*J. J. Fisicaro, Manager, Nuclear Licensing and Industry Affairs
*A. W. Richard, Assistant Plant Manager
*R. L. Phelps, Manager, Design Engineering Nuclear

*Denotes those present at the exit interview conducted on June 23, 1989.

2. Followup of Events (93702)

2.1 Failure of the Turbine Driven Auxiliary Feedwater (AFW) Pump FW-10, Speed Control Loop

On June 13, 1989, Special Procedure SP-FW-12 was conducted to test the Turbine Driven Auxiliary Feedwater Pump FW-10. The results of the test were to be used to upgrade the surveillance test program for this pump by developing a means to manually control pump speed so that the pump could be tested at the same speed each month as required by the ASME code. The test was also intended to establish reference values for pump speed and steam bowl pressure for further trending and to determine the setting of the speed limiting governor. The initial run of the test revealed that varying the air signal at the output of the differential pressure transmitter (PT-1039) had no effect on pump speed; the pump was running at 6980 rpm at the time. Subsequent trouble shooting disclosed that the two-mode Nullmatic air controller, downstream of PT-1039, had an apparent incorrect setpoint adjustment and the derivative Nullmatic air controller further downstream would not pass an air signal.

A revision to the test procedure was written to bypass the inoperable components in the speed control loop to permit continued testing of the pump. The pump was restarted and the overspeed limiting governor setting was ascertained. The upper pump speed limit was determined to be 7725 rpm and pump discharge pressure was 1210 psig. The air isolation valve to the pump speed control loop was closed, and the pump again tested to verify that it would start and come up to a speed of 7725 rpm and a discharge pressure of 1210 psig. The licensee then considered the pump to be operable based on:

- The instrument air supply to the pump was not required for the pump to perform its intended function (USAR, Section 9.4), and

- The speed limiter setting was set sufficiently high so that the pump would develop the required discharge pressure to inject water into the steam generators under accident conditions.

The station engineering group reviewed the pump data recorded on previous surveillance tests (graphed steam generator pressure versus pump differential pressure) and determined that the pump may not have been operable prior to the June 13, 1989, test because of the failed speed control loop components. A report was made to the NRC, and an in-depth licensee investigation was begun.

After reviewing this matter, the NRC inspector concluded that the following major factors contributed to this event:

- The licensee did not have a program for calibrating or performing preventive maintenance on the speed control loop components. The component technical manual service instructions for the H/P differential pressure transmitters stated, "The Differential Pressure Transmitter has no recommended routine maintenance. The only item to check on a periodic basis is the Transmitter calibration." The manuals for the two-mode Nullmatic controller and the Nullmatic derivative unit included calibration instructions; tuning instructions; and directions for maintenance, servicing, and lubrication. The service instructions contained a list of recommended on-hand spare parts for each of the components. The licensee had no records that any maintenance had been performed on the controllers since their initial installation. The NRC inspector was informed by the licensee that the components did not appear in the licensee's CHAMPS or CQE lists, nor had they been given equipment identification numbers.

- The licensee used Surveillance Test ST-FW-1 to verify operability of the auxiliary feedwater system. Review of early acceptance criteria indicated that the required pump pressure should be 40 psig greater than indicated steam generator pressure. In the latest revision of the procedure (Revision 44 issued May 24, 1989) the acceptance criteria required that discharge pressure be 92 psig (40 psig + 52 psig instrument error) greater than steam generator pressure and that

the expected total head and calculated total head be compared. Review of the monthly surveillance test data for the last 38 months revealed that the pump discharge pressure was consistently at or near 1000 psig. Prior to that, the discharge pressure in the 1984 and 1985 time frames was consistently in the 1100 to 1200 psig ranges. Since the pump had only been operating at 6980 rpm and 1000 psig and the latest licensee test calculations indicated a pump speed of 7290 rpm would have been required to meet design basis accident (DBA) conditions, the pump may have been inoperable since late 1985 because it apparently would not have met the characteristics required during a DBA.

The apparent inoperability of Turbine Driven Auxiliary Feedwater Pump FW-10 since late 1985 due to inadequate testing is considered an apparent violation of Technical Specification 2.5 (paragraph (1)).

The licensee's failure to perform appropriate maintenance and calibration of the control system to the Turbine Driven Auxiliary Feedwater Pump FW-10, and to include the system on the CQE list is an apparent violation of 10 CFR 50, Appendix B, Criterion II.

An enforcement conference has been scheduled for July 28, 1989, to discuss the apparent violations described above. Therefore, no Notice of Violation is included with this report.

The licensee's response to the inoperability of the turbine driven auxiliary feedwater pump was deemed appropriate in that the pump was restored to operability on June 14, 1989, and a report was made to the NRC.

The licensee's response to the issue of inadequate testing was the development of a root cause analysis plan and an action plan that addressed several appropriate concerns. The discovery of the speed control loop problems for the turbine driven auxiliary feedwater pump was a direct result of the licensee's attempt to upgrade the surveillance test program. The licensee's actions appeared to be aggressive in resolving the programmatic and technical deficiencies.

3. Exit Interview

The NRC inspector met with Mr. K. J. Morris, Division Manager, Nuclear Operations, and other members of the licensee's staff on June 23, 1989. At this meeting, the inspector summarized the inspection findings. The licensee did not identify any proprietary information to the NRC inspector.