APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-285/87-17 License: DPR-40

Docket: 50-285

Licensee: Omaha Public Power District (OPPD)
1623 Harney Street
Omaha, Nebraska 68102

Facility Name: Fort Calhoun Station, Unit 1 (FCS)

Inspection At: Fort Calhoun, Nebraska

Inspection Conducted: June 8-12, 1987

Inspector: D. E. Norman 6/29/87
D. E. Norman, Reactor Inspector, Engineering Section, Reactor Safety Branch Date

Approved: T. P. Westerman for 6/30/87
R. E. Ireland, Chief, Engineering Section Reactor Safety Branch Date

Inspection Summary

Inspection Conducted June 8-12, 1987 (Report 50-285/87-17)

Areas Inspected: Routine, unannounced inspection of actions relative to IEB 85-03, IEN 86-29, and previously identified inspection finding 285/8616-01.

Results: Within the areas inspected, one violation was identified. (285/8717-02, paragraph 2.a.(3).)

DETAILS

1. Persons Contacted

Omaha Public Power District (OPPD)

*D. Munderloh, Senior Engineer, Nuclear Regulatory & Industry Affairs
*K. Morris, Division Manager, QA/RA
*G. Gates, Manager, Fort Calhoun Station
*A. Richard, Manager, Quality Assurance
*J. Gasper, Manager, Administrative & Training Services
*M. Core, Supervisor, Fort Calhoun Station Maintenance
*R. Andrews, Division Manager, Nuclear Production
J. Drahota, Senior Engineer, Nuclear Production
D. Hendry, Maintenance Engineer, Fort Calhoun Station
J. Fisicaro, Supervisor, Nuclear Regulatory & Industry Affairs

NRC

*P. Harrell, Senior Resident Inspector, Fort Calhoun Station

*Denotes those present at the exit interview.

2. Inspection Summary

a. IEB 85-03 (Closed)

IEB 85-03, "Motor Operated Valve Common Mode Failure During Plant Transients Due to Improper Switch Settings," was issued as a result of several events during which motor operated valves (MOVs) failed on demand due to improper switch settings. The Bulletin requested that MOVs in certain systems be tested for operational readiness, and that licensees develop and implement a program to ensure that valve operator switches are selected, set, and maintained properly to accommodate maximum differential pressure expected during both opening and closing of the valve for both normal and abnormal events within the design basis. The licensee submitted a response to the Bulletin on May 15, 1986, and submitted additional information requested by the NRC on September 15, 1986.

The inspection was performed to followup on the licensee's activities taken in response to IEB 85-03 and commitments made by the licensee in submittals regarding the Bulletin. The inspection scope included the following:

(1) Program Review - The commitments made by the licensee in the submittals to NRC are implemented by several procedures which are now in place, and which were used for resetting motor operated valve switches during the 1987 refueling outage. The

switches were originally set, in response to the Bulletin, during the 1985 outage. The following procedures, which implemented the program were reviewed by the NRC inspector:

- MP-MOV-3A, Revision 0, dated March 31, 1987, "Calibration and Adjustments of Motor Operated Gate and Globe Valves"
- MP-MOV-1, Revision 7, dated April 3, 1987, "Motor Operated "Limitorque" Valves Type SMB/HMB Limit Switch and Torque Switch Replacement and Adjustment Procedure"
- MP-MOV-3C, Revision 0, dated March 31, 1987, "Calibration of the MOVATS Motor Load Unit"
- SP-SI-HPSI, Revision 0, dated March 26, 1987, "HPSI Stop Valves Special Test"

Practices for accurately setting the switches to prevent occurrences as described in the Bulletin were addressed in the procedures and included:

- Specific procedure for determining switch setting values.
- Requirement that torque switch settings consider backlash by setting bypass margin at the time the valve begins to lift.
- Requirement that torque switches be set with spring pack in a relaxed condition.
- Checking for backseating by turning handwheel after limit switch trip.

The licensee's program provides reliable operation of MOVs by utilizing the Motor Operated Valve Analysis and Test System (MOVATS), a system which permits testing, adjusting, and setting of limit switches, torque switches, and torque switch bypass which are part of the controls for a MOV. MOVATS is a portable signature analysis system designed for field use and displays and stores the following data:

- axial motion of the worm
- motor current
- stem load (thrust)
- actuations of torque and limit switches and the torque switch bypass

The valves within the scope of IEB 85-03, each in the HPSI system are as follows: HCV-311, HCV-312, HCV-314, HCV-315, HCV-317, HCV-318, HCV-320, and HCV-321. Each valve was tested and switches were set in accordance with MP-MOV-3A. During a subsequent test conducted in accordance with SP-SI-HPSI it was verified that the valves would cycle at or near the maximum expected delta pressure across the valves.

In addition to the IEB 85-03 valves, the MOVATS system was used to test all safety-related MOVs at FCS. These tests were performed at static conditions (no delta pressure across valve).

During the review of MP-MOV-3A it was identified that the procedure would permit setting of the torque switch at a value which exceeds the design limits of the operator. For instance, design limits (torque switch setting) of an SMB-00 operator is 14,000 lbs. The procedure permits a maximum setting of 14,575 lbs. All of the IEB 85-03 torque switches were set below the design limits. Pending licensee review of all other safety-related operators to ensure that design limits have not been exceeded, and a change to the procedure to prevent torque switches from being set too high, this is considered an unresolved item (285/8717-01).

(3) Data Review - IEB 85-03 reported that valves failed to operate because the torque switch bypass had not been set to remain closed long enough to provide the necessary bypass function on valve opening with differential pressure conditions across the valve. Switches were reportedly set for 5 percent of full stroke. FCS procedures require the bypass to be set between 10 and 15 percent of the stroke time after the valve begins to unseat.

Open limit switches were set to trip at approximately 95 percent of full stroke. After the limit switch had tripped, the handwheel was turned to bring the valve against the backseat to ensure that backseating had not occurred. Data reviewed by the NRC inspector showed no evidence of backseating; this indicated that the 95 percent limit switch setting was adequate to prevent backseating.

Review of as-left data showed that all thrust switch settings were within design limits of the operators. As-found data for the initial MOVATS tests performed during the 1985 outage showed that five of the eight HPSI valve operators had been operating above the allowable thrust limit established by Limitorque. This condition had not been identified by the licensee, and there was no evaluation showing that the valve operators were acceptable for continued operation. After this discovery, the licensee reviewed as-found data for all remaining safety-related valve operators and found that two had been operating above the

maximum allowable thrust. In order to determine operability of the over-thrust operators, the licensee contacted an engineering firm to perform a preliminary stress analysis, based on fatigue testing, of the worse-case loading conditions. The analysis show the following:

- The valve operators are acceptable from a structural and continued operability standpoint for a total of 240 cycles. (It was estimated that the operator has 200 cycles to date).

- Additional testing is required to justify continued operation beyond 240 cycles at the as-left thrust switch settings.

The failure of the licensee to identify the over thrust condition and to take corrective action is considered a violation of NRC requirements. (285/8717-02)

b. IEN 86-29 (Closed)

IEN 86-29, "Effects of Changing Valve Motor Operator Switch Settings," was provided as an alert that setting torque bypass switches to meet requirements of IEB 85-03 could affect valve position indicators and signals such as "permissives" to other equipment. The problem occurs when the torque bypass switch and valve position indicator share the same limit switch rotor. Therefore, when the position of the rotor was changed to extend the range of the torque bypass switch, the valve open or close position indication was also changed and did not reflect the actual position of the valve. The licensee has issued a memorandum to operations personnel instructing them that it is necessary to hold the control switch in the open or close position for five additional seconds after the indicator lights indicate the valve position. The licensee stated that "permissives" and emergency valve operation would not be effected by the false indicators. This item is considered closed.

c. Followup on Previous Inspection Items

(Closed) Violation 285/8616-01 - This violation resulted from the acceptance of safety-related cable by the licensee without adequate documentation to show that all procurement specification requirements had been met. Specifically, the Certificate of Conformance (COC) did not identify that the item being certified was Rockbestos Firewall III cable; therefore, it was not possible to trace the cable to a Qualification Test Report. The following actions were taken by the licensee and verified by the NRC inspector:

(1) Documentation was added to the purchase order file to correct the omission of Firewall III on the COC.

(2) Purchasing specifications were revised to require certification to a specific qualification test report.

This item is considered closed.

3. Exit Interview

The NRC inspector met with the licensee representatives denoted in paragraph 1 and with Mr. P. H. Harrell, NRC Resident Inspector, on June 12, 1987, and summarized the scope and findings of the inspection.