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50-483

UNION ELECTRIC COMPANY
1901 GRATIOT STREET
ST. LOUIS, MISSOURI

March 20, 1984

DONALD F. SCHNELL
VICE PRESIDENT

MAILING ADDRESS:
P. O. BOX 149
ST. LOUIS, MISSOURI 63166

Mr. James G. Keppler
Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
799 Roosevelt Road
Glen Ellyn, IL 60137

ULNRC- 769

Dear Mr. Keppler:

FINAL 10CFR50.55(e) REPORT NO. U-64
LIMITORQUE VALVE ACTUATORS
CALLAWAY PLANT UNIT 1

On October 17, 1983 Union Electric informed the NRC Region III office of a potential 10CFR50.55(e)/10CFR21 item regarding Limitorque valve actuators BN-HV-8812A&B. On November 11, 1983, Union Electric submitted an interim report requesting an extension in order to receive information from Limitorque which might affect the final report. On January 6, 1984 Union Electric submitted a second interim report informing the NRC Region III that a final report was not expected from Limitorque until February 15, 1984 and requesting an extension for the Union Electric final report until March 1, 1984. On March 2, 1984 a verbal extension was granted by NRC Region III until March 15, 1984, again due to lack of receipt of the Limitorque findings. On March 19, 1984 an additional verbal extension to March 23, 1984 was granted by Mr. Robert Warnick of Region III.

This report documents our evaluation regarding the failure of Limitorque valves BN-HV-8812A&B. Valve BN-HV-8812A exhibited excessive noise on opening, and upon attempting to close the valve, there was no valve movement. This problem was documented on SFR 2-BN-20A which also noted that valve BN-HV-8812B exhibited excessive noise upon operation. The actuator was pulled off valve BN-HV-8812A and disassembled. The reason for valve failure was found to be broken teeth off both the motor pinion and worm shaft clutch gear (6 on the worm gear and 1 on the motor pinion). Although it was suspected that valve BN-HV-8812B had similar problems, further investigation was postponed unitl a Limitorque representative was on site to aid in the evaluation. On October 13, 1983 the actuator for valve BN-HV-8812B was torn down with a Limitorque service representative present. The damage to the motor pinion and worm shaft clutch gear was more extensive than found in BN-HV-8812A although the valve was still operable. The Limitorque representative examined both actuators and felt a possible source of the problem was the heat treatment of the gears.

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Based upon this observation the Westinghouse site office shipped these gears to Limitorque for a metallurgical evaluation. It was also recommended that the valve actuators on valves EJ-HV-8811A&B be inspected because they are the only other Limitorque valves on site with SB-2-80 type actuator(s).

The actuators on valves EJ-HV-8811A&B were inspected for damage. The EJ-HV-8811A actuator had some evidence of wear on the motor pinion and worm shaft clutch gear. Small traces of metal filings were also noted in the grease. The EJ-HV-8811B actuator showed no evidence of damage. These valves had been operated about 5% as much as BN-HV-8812A&B.

On November 7, 1983 new gears were received for the actuators for valves BN-HV-8812A&B. During the repair a question arose as to the proper orientation of the motor pinion gear with respect to the motor. Investigation revealed that for Limitorque actuator types SB-1, 2, 3, 4 and 5 the gear flange faces away from the motor, while for actuator type SB-0 the gear flange faces the motor. The orientation of the motor pinion gear was not noted in any of the previous inspections of valves BN-HV-8812A&B and EJ-HV-8811A&B, Therefore, it was decided to reinspect EJ-HV-8811A&B for proper motor pinion gear orientation.

On November 11, 1983 the reassembly of valves BN-HV-8812A&B was completed with the motor pinion gears correctly orientated. On November 14, 1983 the valve actuators on valves EJ-HV-8811A&B were reinspected; EJ-HV-8811A (the slightly damaged one) motor pinion gear was on backwards and on EJ-HV-8811B (no damage) the gear was installed correctly. Therefore, on November 15, 1983 a review of the maintenance history of the actuators for BN-HV-8812A&B and EJ-HV-8811A&B was made and it was found that the actuators for BN-HV-8812A&B and EJ-HV-8811A had been through a maintenance inspection during which the pinion gear may have been removed.

On March 5, 1984 Westinghouse received the Limitorque report on the metallurgical properties of the damaged gears. The report indicated no material deficiency. On March 15, 1984, Union Electric received a report from Westinghouse which concluded that the SB-2-80 helical gear set failure at the Callaway site was the result of the motor pinion gear being incorrectly installed during site maintenance operations. Limitorque has not had any other reports of helical gear failures that would indicate a generic problem.

Based upon the above, it is the conclusion of Union Electric that the failure of the Limitorque actuators on valves BN-HV-8812A&B was due to the improper installation of the motor pinion gear. In light of this conclusion the following corrective action is being taken:

1. All SB-2-80 type actuators have been verified to have the motor pinion gear installed correctly.

2. We will inspect all other SB-1, 2, 3, 4 and 5 type actuators that have undergone maintenance in the field for improperly installed motor pinion gears (See Attachment A).

3. Our maintenance personnel have been advised to include in their procedures verification of proper orientation of the motor pinion gear with respect to the actuator type.

All corrective actions outlined above will be complete prior to initial criticality.

Very truly yours,

Donald F. Schnell

Donald F. Schnell

TEH/sla

cc: J. E. Konklin, Region III
Richard DeYoung, Director I&E
Bruce Little, NRC Resident Inspector
John Neisler, NRC Resident Inspector
Missouri Public Service Commission

Attachment A

LIST OF AFFECTED SB TYPE ACTUATORS

Bechtel/Westinghouse Scope

AC-HV-181, A, B, C & D

AD-HV-008
AD-HV-017
AD-HV-024
AD-HV-028
AD-HV-030
AD-HV-041
AD-HV-043
AD-HV-054
AD-HV-055
AD-HV-066

AE-HV-015
AE-HV-106
AE-HV-017
AE-HV-018
AE-HV-033
AE-HV-034
AE-HV-038

AF-LV-007C
AF-LV-012C
AF-LV-024C
AF-LV-044C
AF-LV-058C
AF-LV-064B

BB-PV-8702 A, B

BN-HV-8812 A, B

EP-HV-8808 A, B, C, D

EJ-HV-8701 A, B
EJ-HV-8716 A, B
EJ-HV-8809 A, B
EJ-HV-8811 A, B
EJ-HV-8840

S&P Scope

SDE-2002 A, B, C
SDE-2003 A, B, C