



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

MAR 16 1992

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WBRD-50-390/89-09
WBRD-50-391/92-03

10 CFR 50.55(e)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of the Application of)
Tennessee Valley Authority)

Docket Nos. 50-390
50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - LIMITORQUE ACTUATOR
FAILURE CAUSED BY EXCESSIVE KEYWAY DEPTH - WBRD-50-390/89-09 AND
WBRD 50-391/92-03 - REVISED FINAL REPORT FOR UNIT 1 AND FINAL REPORT FOR
UNIT 2

The subject deficiency for Unit 2 was determined to be potentially reportable and was reported to the NRC Operations Center on February 24, 1992, in accordance with 10 CFR 50.55(e) as Significant Corrective Action Report (SCAR) WBP890616SCA. The subject deficiency for Unit 1 was initially reported to NRC Region II on October 23, 1989, in accordance with 10 CFR 50.55(e) as Condition Adverse to Quality Report (CAQR) WBP890532. TVA submitted a final report for Unit 1 to NRC on November 21, 1989. Enclosure 1 revises TVA's final report for Unit 1 to include applicability to Unit 2. TVA considers 10 CFR 21 to be applicable to the subject deficiency.

The commitment made in this report is contained in Enclosure 2.

If there are any questions, please telephone P. L. Pace at (615) 365-1824.

Sincerely,

John H. Garrity

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Enclosures
cc: See page 2

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U.S. Nuclear Regulatory Commission

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2
LIMITORQUE ACTUATOR FAILURE CAUSED BY EXCESSIVE
KEYWAY DEPTH
CONDITION ADVERSE TO QUALITY REPORT (CAQR) WBP890532
AND SIGNIFICANT CORRECTIVE ACTION REPORT (SCAR) WBP890616SCA
WBRD-50-390/89-09 AND WBRD-50-391/92-03
REVISED FINAL REPORT FOR UNIT 1 AND FINAL REPORT FOR UNIT 2

DESCRIPTION OF CONDITION

While performing maintenance request (MR) A-569483 on the Limitorque actuator of valve 1-FCV-72-21-B, the motor pinion gear was found to have rotated approximately 1/3 of a revolution on the motor shaft. Upon further inspection, the keyway in the motor pinion gear was found to be cut too deep for the size key installed which allowed the motor pinion gear to rotate on the motor shaft. The failure of this connection would result in a loss of electrical operation of the actuator. Manual operation would still be available. This valve supplies the containment spray header from the refueling water storage tank (RWST).

The depth of the motor pinion gear keyway was measured to be 0.111 to 0.106 inches. Using the 0.125-inch square by 0.875-inch long motor pinion key, only 0.014 to 0.019 inches of key interference remained to prevent the gear from rotating on the motor shaft. This inadequate interference resulted in key failure and subsequent gear rotation. The motor pinion gear's setscrew galled the motor shaft, temporarily preventing further gear rotation.

Additionally, inspection of the actuator on the opposite train component (1-FCV-72-22-A) per MR-A-569117 revealed a similar motor pinion gear keyway depth. This key had not yet failed; however, the key had indentions along its length which indicated impending failure.

The affected actuators are Model SB-0, manufactured by Limitorque Corporation, Lynchburg, Virginia, provided to TVA by Westinghouse Corporation (W), Pittsburgh, Pennsylvania, under the Nuclear Steam Supply System (NSSS) contract (71C62-054114-01).

From the maintenance history review performed on the two actuators, it was determined that the two gears have not been replaced or modified by TVA. From conversations with the supplier of the actuators, it was stated that W had not replaced or modified the gears in question. Based on this, it appears that the actuators were assembled by the manufacturer with the defective motor pinion gears.

Through conversation with the manufacturer, TVA ascertained that the gears are made in lots (several at a time) and that industry standard sizes are used for the keys and keyways. According to the Machinery's Handbook, the motor pinion gear keyway depth should have been between 0.074 and 0.084 inches for a 0.625-inch diameter shaft. Additionally, discussion with Limitorque indicates that this problem could affect size 0 or 00 actuators with 41-tooth motor pinion gears.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2
LIMITORQUE ACTUATOR FAILURE CAUSED BY EXCESSIVE
KEYWAY DEPTH
CONDITION ADVERSE TO QUALITY REPORT (CAQR) WBP890532
AND SIGNIFICANT CORRECTIVE ACTION REPORT (SCAR) WBP890616SCA
WBRD-50-390/89-09 AND WBRD-50-391/92-03
REVISED FINAL REPORT FOR UNIT 1 AND FINAL REPORT FOR UNIT 2

A visual check of the replacement gears stocked at WBN was performed. These gears were found to be acceptable. Additionally, a review of existing records indicates that valves 1-FCV-72-21-B, 1-FCV-72-22-A, 2-FCV-72-21-B, and 2-FCV-72-22-A have the only Limitorque actuators supplied with the 41-tooth motor pinion gear at WBN.

Significant Corrective Action Report (SCAR) WBP890616SCA was issued to document the potential for the subject deficiency to exist on Unit 2 Limitorque actuators. Since the potentially affected Unit 2 motor pinion gears had not been inspected, no actual existing deficiency was documented. SCAR WBP890616SCA was initially evaluated as not being reportable. Additional information received from Limitorque and Nuclear Engineering indicates that the potentially affected Unit 2 motor pinion gears may have come from the same lot as the Unit 1 motor pinion gears. Therefore, SCAR WBP890616SCA has been determined to be potentially reportable.

SAFETY IMPLICATIONS

The affected valves are the isolation valves from the RWST to the Containment Spray System. Failure of both valves would result in failure of an automatic or remote manual open signal to provide water for containment spray. This could result in failure to mitigate the high containment pressures associated with major line breaks inside containment. Therefore, this condition could have adversely affected the safe operation of the plant had it remained uncorrected.

CORRECTIVE ACTION

1. The defective motor pinion gear and keys for the actuators on Unit 1 valves 1-FCV-72-21-B and 1-FCV-72-22-A have been replaced.
2. Potentially defective motor pinion gears for the actuators on Unit 2 valves 2-FCV-72-21-B and 2-FCV-72-22-A will be inspected and repaired or replaced, if necessary. This action will be completed before Unit 2 System 72 turnover for preoperational testing.

ENCLOSURE 2

LIST OF COMMITMENTS

Potentially defective motor pinion gears for the actuators on Unit 2 valves 2-FCV-72-21-B and 2-FCV-72-22-A will be inspected and repaired or replaced, if necessary. This action will be completed before Unit 2 System 72 turnover for preoperational testing.