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TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

AUG 5 - 1976

Mr. Norman C. Moseley, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 818
230 Peachtree Street, NW.
Atlanta, Georgia 30303

Dear Mr. Moseley:

BROWNS FERRY NUCLEAR PLANT UNITS 2 AND 3 - POTENTIAL DESIGN DEFICIENCY IN VALVE YOKE TO MOTOR MOUNT WELD

RECEIVED
AUG 11 1976
U.S. NUCLEAR REGULATORY COMMISSION
Mail Section

Initial report of the subject potential deficiency was made on May 14, 1974, and was followed by our June 14, July 15, August 12, September 13, 1974, January 15, 1975, March 3, and March 17, 1975, letters, J. E. Gilleland to Donald F. Knuth. An eighth interim report was submitted to John G. Davis from J. E. Gilleland on March 30, 1976. Because the yoke to motor base welds of FCV-74-58 in unit 1 failed, similar valves (FCV's 74-58 and 74-72) in units 2 and 3 may be subject to the same type of failure.

The ninth interim report of DDN 191 is enclosed.

Very truly yours,

J. E. Gilleland
Assistant Manager of Power

Enclosure
CC (Enclosure):
Dr. E. Volgenau, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

ENCLOSURE

BROWNS FERRY NUCLEAR PLANT UNITS 2 AND 3

POTENTIAL FOR FAILURE OF THE WELD BETWEEN THE YOKE AND MOTOR MOUNTING PLATE FOR FLOW CONTROL VALVES (FCV'S) 74-58 AND 74-72

NINTH INTERIM REPORT
DDN 191

On May 14, 1974, an intial report regarding the subject deficiency was made by telecon to W. S. Little, AEC-DRO Inspector, Region II. The report was made by L. D. Weber and J. A. Raulston in compliance with 10CFR50.55(e). There have been eight subsequent interim report dated June 14, 1974; July 15, 1974; August 12, 1974; September 13, 1974, January 15, 1975; March 3, 1975; March 17, 1975; and March 30, 1976. The initial report was made because the weld between the yoke and motor mounting plate of FCV 74-58 (4-inch globe valve) in the RHR test return line torus spray connection failed in unit 1. Since the unit 1 failure appeared to be vibration related, the corresponding valves and valves in close proximity, such as FCV 74-59 (12-inch globe valve), in units 2 and 3 were assumed to potentially be subject to a similar type of failure.

The eighth interim report summarized the Southwest Research Institute (SwRI) report on their initial phase of testing and their evaluation of the RHR system test return lines for potential vibration induced component failures. It also presented a proposed solution, consisting of the addition of a flow restricting orifice downstream of the 12-inch globe valve in the test return line. This orifice would provide sufficient back pressure on the 12-inch valve to effectively reduce downstream cavitation and its associated induced vibrations. However, the addition of orifices in the discharge lines of the RHR pump runout (DDR 224) greatly reduced the pressure drop available for any orifice located downstream of the 12-inch globe valve.

After installation of the RHR pump discharge line orifice and the RHR test return line orifice, several tests were performed to determine the effects the addition of the orifices would have on test return line flow and flow induced vibration. The flow rates achieved in units 1 and 2 met the minimum flow requirements (8000 gpm per pump, total 16,000 gpm per loop) established by General Electric for two RHR pump operation, but they provided very little margin. The flow rates in unit 3 exceeded the minimum flow requirements (8000 gpm per pump, total 16,000 gpm per loop), but also with limited margin.

Preliminary results for units 1 and 2 on the vibration measurements performed by SwRI indicate that cavitation and vibration levels have been reduced very little from those observed earlier without the pump or test return line orifice plates (original design). The very large hole required in the test return line orifice plate, because of the addition of the RHR pump discharge line orifice, has rendered the test return line orifice relatively ineffective in reducing cavitation. The SwRI recommendation is to replace the 12-inch globe valve with a drag-type valve (or equivalent) of appropriate size.

Preliminary results for unit 3 on the vibration measurements performed by SwRI indicate that cavitation and vibration levels have been reduced significantly from those observed earlier without the pump or test return line orifice plates (original design). However, the relatively large hole required in the test return line orifice plate, because of the addition of the RHR pump discharge line orifice, has rendered it somewhat ineffective in reducing cavitation to very low levels. SwRI is also recommending the replacement of the 12-inch globe valve on unit 3 with a drag-type valve (or equivalent) of appropriate size.

TVA is taking steps to replace the 12-inch globe valve in the test return line with a larger globe valve and orifice plate combination or with a drag-type valve (or equivalent) on all Browns Ferry units. This commitment is intended to provide increased margins in the test return line flow and reduce the flow induced vibrations downstream of the valve to low values. After installation of the new valves, flow and vibration measurements will be taken to verify the final configuration.

Before replacement of the valves, the test return lines on units 1 and 2 will not be operated at high flow ($\geq$ 12,000 gpm) unless required for special testing or emergency operation. This restriction has been recommended by SwRI and should minimize flow-induced vibration and associated fatigue. In addition, the test return line orifice plates will be removed from units 1 and 2 because of their ineffectiveness. A sparger will be installed on each test return line discharge to disperse the flow. Whenever feasible, both test return lines will be used to avoid prolonged high flow operation. The test return lines on unit 3 will be equipped with orifice plates and spargers. The effect of spargers on test return line flow and vibration was found during testing to be inconsequential. They are being added to minimize suppression chamber flow induced vibration. There will be no operating restrictions on unit 3.

A final report will be prepared and submitted after the 12-inch globe valves have been replaced with drag-type valves and after confirmatory testing has been completed.

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