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TENNESSEE VALLEY AUTHORITY

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WBRD-50-390/82-99
WBRD-50-391/82-95

JUL 31 1986

U.S. Nuclear Regulatory Commission
Region II
Attention: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Dear Dr. Grace:

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 AND 2 - QUALIFICATION OF PROCESS PIPING WITH INSTRUMENT LINES ATTACHED - WBRD-50-390/82-99 and - WBRD-50-391/82-95 - REVISED FINAL REPORT FOR UNIT 1 AND FINAL REPORT FOR UNIT 2

The subject deficiency was initially reported to NRC-OIE Inspector R. V. Crlenjak on September 9, 1985, in accordance with 10 CFR 50.55(e) as NCR WBN CEB 8228. Interim reports were submitted on October 8, 1982, April 13 and October 4, 1983, April 10 and October 29, 1985. Our final report for unit 1 was submitted on October 4, 1983. Enclosed is our revised final report for unit 1 and our final report for unit 2.

If there are any questions, please get in touch with J. A. McDonald at (615) 365-8527.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. L. Gridley, Director
Nuclear Safety and Licensing

Enclosure

cc (Enclosure):

Mr. James Taylor, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
QUALIFICATION OF PROCESS PIPING WITH INSTRUMENT LINES ATTACHED
WBRD-50-390/82-99, WBRD-50-391/82-95
NCR WBN CEB 8228
10 CFR 50.55(e)
REVISED FINAL REPORT FOR UNIT 1
FINAL REPORT FOR UNIT 2

Description of Deficiency

Some thick-walled instrument piping, attached to small bore process piping, were not accounted for in the analysis (i.e., qualification) of the process piping. The instrument lines have approximately the same stiffness as the process piping; therefore, the thermal and dynamic qualification of the process piping may be affected.

The cause of this deficiency is that the engineers performing the analysis assumed that the instrument branch lines would be made of tubing, would have a flexible connection to the process piping, or the process piping would be supported to withstand the seismic effects of the instrument lines. The instrument lines are field routed, and CEB does not normally review the installations.

Safety Implications

Since the stiffness of the thick-walled instrument piping is substantially different from the stiffness of light-weight, flexible tubing, the seismic analyses that erroneously presumed use of the flexible tubing were not adequately conservative. Consequently, the integrity of the safety-related process piping affected by this nonconformance, under conditions of a seismic event, is questionable. Therefore, the cited nonconformance may be adverse to the safety of operations of the plant.

Corrective Action

TVA has identified all the stress analysis problems where the instrument lines were not adequately considered in the qualification of the process piping. TVA has reanalyzed all small bore process piping with attached instrument branch lines that did not meet one of the following criteria:

1. The ratio of the moment of inertia of the run to that of the branch line (I_R/I_b) is greater than or equal to 40,
2. A flexible hose has been installed between the instrument line and the process piping,
3. Tubing has been installed between instrument lines and the process piping with at least one three-diameter bend in the first span, or
4. An anchor, three-way restraint, or some other rigid support configuration is located within close proximity of the instrument line connection.

All unit 1 design evaluations and rework have been completed under Engineering Change Notice (ECN)-3069. The unit 2 design work was completed under ECN-4785 on March 21, 1986. Modifications of the unacceptable unit 2 instrument piping supports will be completed before the unit 2 fuel loading.

To prevent recurrence, TVA issued a new section, WBN-RAH-202, to the Rigorous Analysis Handbook establishing a decoupling criteria for instrument lines. TVA has also revised the rigorous analysis checklist to ensure that instrument lines satisfy the Rigorous Analysis Handbook criteria. The checklist includes a requirement that the analyst must verify the actual line size and material of the instrument line.