Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

JUL 22 1991

WBRD-50-390/91-28
WBRD-50-391/91-28

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) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - VENDOR-SUPPLIED COMPONENT NOZZLE-TO-SHELL FILLET WELDS FOUND TO BE UNDERSIZED - WBRD-50-390/91-28 AND WBRD-50-391/91-28 - FINAL REPORT

The subject deficiency was initially reported to NRC Region II on June 21, 1991, in accordance with 10 CFR 50.55(e) and 10 CFR 21 as Significant Corrective Action Report WBP 890514 SCA (Unit 1). Condition Adverse to Quality Report WBP 890650 documents the same deficiency for Unit 2. Enclosure 1 is TVA's Final Report. The commitments in this report are provided in Enclosure 2.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

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Enclosures
cc: See page 2

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U.S. Nuclear Regulatory Commission

JUL 22 1991

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN)
VENDOR-SUPPLIED COMPONENT NOZZLE-TO-SHELL FILLET WELDS FOUND TO BE UNDERSIZED
SIGNIFICANT CORRECTIVE ACTION REPORT (SCAR) WBN 890514 SCA
WBRD 50-390/91-28 AND 50-391/91-28

FINAL REPORT

DESCRIPTION OF DEFICIENCY

TVA has determined that various vendor-supplied component nozzle-to-shell fillet welds are undersized and do not meet minimum strength requirements.

In 1985, the NRC issued IE Information Notice No. 85-33, "Undersized Nozzle-to-Shell Welded Joints in Tanks and Heat Exchangers Constructed Under the Rules of the ASME Boiler and Pressure Vessel Code," to inform nuclear power plants of the potential for having undersized nozzle-to-shell welded joints on tanks and heat exchangers. TVA evaluated the subject Information Notice in 1986 for applicability to WBN and determined that a field inspection was not necessary. Information from various utilities and a review for any adverse trends provided the basis for this decision.

During the NRC broad-based construction assessment walkdown conducted at WBN in 1989, the inspectors identified undersized nozzle-to-shell welded joints on tanks and heat exchangers manufactured by various vendors. These observations were consistent with those made at several nuclear power plants during previous NRC Construction Appraisal Team inspections. Subsequent inspections initiated by Nuclear Quality Assurance, after the NRC inspection, identified additional examples confirming the inspectors findings. However, the undersized fillet welds identified were determined to meet minimum strength requirements. Subsequent evaluations of nozzle welds completed to date have identified six undersized fillet welds that do not meet minimum strength requirements.

ROOT CAUSE

The components involved were contracted to be supplied in accordance with American Society of Mechanical Engineers (ASME) Section III code requirements. Since the design requirements were correctly specified in the contracts issued for the subject components, the root cause of these unexpected deficiencies is that the suppliers did not adequately implement their Quality Assurance (QA) Program for weld fabrication and inspection. TVA considers this to be reportable under 10 CFR 21. The deficiency represents a defect in a basic component which could create a substantial safety hazard.

SAFETY IMPLICATIONS

Nozzle-to-shell fillet welds fall into one of four categories of welds: 1) welds that meet the drawing size requirements, 2) welds that do not meet the drawing size requirement but do meet the ASME code size requirement, 3) welds that do not meet the drawing or code size requirements but did meet minimum

strength requirements, and 4) welds that do not meet the drawing size, code size, or minimum strength requirements. TVA has determined only the welds in Category 4 would have actually failed and must be repaired. TVA has identified six welds that fall into Category 4. They are located on the following components:

1. Auxiliary Air Compressor A-A dryer afterfilter vent nozzle (manufactured by Pall Trinity, filter model No. 5EHD10602-037EC32).

2. Waste Gas Compressor Heat Exchanger A shellside drain nozzle (compressed gas side), tube side vent nozzle (component cooling water side), and tube side drain nozzle (manufactured by American Standard, heat exchanger model No. EF).

3. Waste Gas Compressor Heat Exchanger B tube side vent nozzle and tube side drain nozzle (manufactured by American Standard, heat exchanger model No. EF).

If the dryer afterfilter vent nozzle had failed during an accident due to a fractured weld, the Train A Auxiliary Compressed Air System could not have supplied sufficient air. The safety function of supplied components such as the Train A Auxiliary Feedwater System and the Train A Emergency Gas Treatment System would be affected.

If the tube side or component cooling water side of the waste gas compressors had failed during an accident due to a fractured weld, the Train A component cooling water would lose its water. This would cause a loss of cooling water to system loads such as Train A centrifugal charging pump, Train A safety injection pump, and Train A residual heat removal pump.

The shell side of the waste gas compressor heat exchanger is the pressure boundary for the compressed waste gas. This pressure boundary has no accident mitigation function and is ASME code because the boundary failure could cause a gas release resulting in an offsite dose exceeding 0.5 rem.

CORRECTIVE ACTION

1. The components within the scope of the nozzle-to-shell fillet weld deficiency includes ASME Section III and VIII tanks, filters, and heat exchangers used in TVA Class B, C, or D applications (i.e., American Nuclear Society (ANS) Safety Class 2a, 2b, or 3, respectively). From the total scope of components, the accessible welds from the following components were inspected:

   a. High energy components. (The criteria of WBN's Final Safety Analysis Report, Section 3.6A, for high energy piping [i.e., where the maximum operating condition is greater than 275 psig and 200°F] was used. These components were identified as the most susceptible to failure from undersized welds.)

b. TVA Class B components. (The TVA Class B components perform ANS Safety Class 2a functions. These components were identified as the most safety significant components.)

c. One of each component type for each manufacturer not inspected in items a or b above.

d. Previously inspected components. (Many components beyond the scope described in items a, b, and c above were inspected shortly after the NRC broad-based walkdown in 1989.)

e. Components from a manufacturer who had nozzle welds that required repair.

f. For inaccessible welds on a component requiring repair, a technical justification will be developed for excluding the weld from evaluation or the weld will be made accessible for inspection.

As a result of applying the above criteria to a total of 156 components within the scope of the deficiency, TVA has inspected 874 nozzle welds associated with 82 components manufactured by 28 different companies. Although the engineering evaluation of these nozzle welds has not been verified or issued, preliminary results indicate that approximately 105 nozzle welds are less than code minimum size, with only 6 of these nozzle welds not meeting minimum strength requirements. None of the 6 welds were high energy or in a Class B (most safety significant) application.

The engineering evaluation of the nozzle weld issue will be verified and issued, and the 6 nozzle welds below minimum strength requirements will be repaired or replaced. For the remaining nozzle welds not meeting code minimum size but meeting minimum strength requirements, a code exception request will be submitted to NRC in accordance with 10 CFR 50.55a(a)(3). These actions will be completed by August 28, 1992.

2. To provide recurrence control for this condition, a list of vendors who supplied components with undersize welds and vendors listed on the current acceptable suppliers list who could potentially supply ASME tanks, filters, and heat exchangers in the future have been identified by Nuclear Engineering. This information has been supplied to the Material and Procurement Quality Group for inclusion in their Supplier Information Center (SIC). The Supplier Audit Program requires the audit team members to review this information and other suppliers' performance history and concentrate on identified vendor QA program weaknesses during field audits.

3. A sample of welds on components supplied for Unit 2 were reviewed by TVA and found to have undersize nozzle-to-shell welds similar to those identified in Unit 1. Condition Adverse to Quality Report (CAQR) WBP890650 was initiated to document this condition for Unit 2. The corresponding corrective actions will be completed before Unit 2 fuel load.

ENCLOSURE 2

LIST OF COMMITMENTS

1. The engineering evaluation of the nozzle weld issue will be verified and issued, and the 6 nozzle welds below minimum strength requirements will be repaired or replaced. For the remaining nozzle welds not meeting code minimum size but meeting minimum strength requirements, a code exception request will be submitted to NRC in accordance with 10 CFR 50.55a(a)(3). These actions will be completed by August 28, 1992.

2. A sample of welds on components supplied for Unit 2 were reviewed by TVA and found to have undersize nozzle-to-shell welds similar to those identified in Unit 1. Condition Adverse to Quality Report (CAQR) WBP890650 was initiated to document this condition for Unit 2. The corresponding corrective actions will be completed before Unit 2 fuel load.