

TENNESSEE VALLEY AUTHORITY

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**MAY 06 1987**

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

Gentlemen:

WATTS BAR NUCLEAR PLANT (WBN) - UNITS 1 AND 2 - REGION II INSPECTION REPORT  
50-390/86-24 AND 391/86-24 - REVISED RESPONSE TO VIOLATIONS

Enclosed is our revised response to G. G. Zech's letter dated February 12, 1987, to S. A. White, which transmitted Inspection Report Nos. 50-390/86-24 and 50-391/86-24, citing activities at WBN which appeared to be in violation of NRC regulations. The revised response addresses the HVAC duct welding, Violation 01, part 1, and Violation 2.

If there are any questions, please call R. D. Schulz at (615) 365-8527.

To the best of my knowledge, I declare the statements contained herein are complete and true.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



R. L. Gridley, Director  
Nuclear Safety and Licensing

Enclosure  
cc: See page 2

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U.S. Nuclear Regulatory Commission

**MAY 06 1987**

cc (Enclosure):

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WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
RESPONSE TO NRC REGION II LETTER  
FROM GARY G. ZECH TO S. A. WHITE DATED FEBRUARY 12, 1987  
REFERENCE: REPORT NOS. 50-390/86-24 AND 391/86-24

This revised report responds to Violation 01, part 1, and Violation 2 described in enclosure 1 of the NRC Region II inspection report referenced above. This is our final report on these items of noncompliance.

Violation 390, 391/86-24-01

10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," as implemented by TVA's QA Topical Report, TVA-TR75-1A, Revision 8, Section 17.1.5, requires that activities affecting quality shall be accomplished in accordance with instructions, procedures and drawings.

Drawings 47W915-1, Revision 29, "Heating and Ventilating," 47W915, Revision 9, and 47W930-1, Revision 50, both titled "Heating, Ventilating, and Air Conditioning," require full penetration welds for Hydrogen Collector duct welds 130 and 180.

Quality Control Procedure (QCP) 1.06, Revision 20, "Receipt Inspection of Safety-Related Items," requires the use of a receipt inspection checklist.

TVA's QA Topical Report, paragraph 17-1.16.2, as implemented by Quality Control Instruction (QCI) 1.02, Revision 15, "Control of Nonconforming Items," requires conditions adverse to quality (CAQs) be documented as nonconforming condition reports (NCRs).

1. Contrary to the above, on October 23, 1986, Hydrogen Collector duct welds 130 and 180, as shown on isometric drawings 47W915-100, Revision 5, and 47W915-101, Revision 4, both titled "H<sub>2</sub> Heating, Ventilating, and Air Conditioning," were identified as not having full penetration welds.

This applies to units 1 and 2.

Part 1 - Hydrogen Collector Duct Welds

1. Admission or Denial of Alleged Violation

TVA agrees that a violation occurred.

2. Reason for Violation

Safety-related ductwork (including the Hydrogen Collection System) was fabricated and installed (1978 timeframe) without a Quality Assurance (QA) program and without specific welding requirements from Engineering or described in the Final Safety Analysis Report (FSAR). A QA program was established in 1980 for these systems. Subsequently, the Engineering Design (EN DES) drawings were revised to require full penetration welds. Welds completed before the requirement for full penetration welds were not visually inspected for compliance with this criteria. On February 10, 1981, NRC issued a Confirmation of Action Letter (CAL) documenting the agreed upon corrective actions to be taken to ensure that

HVAC systems would perform their design functions. As a result, in April 1981, a stopwork order was issued against all safety-related HVAC systems. In addition, NRC issued a violation, in May 1981, to document the lack of a QA program and for failure to report a significant deficiency. The stopwork order was lifted in September 1981. The basis for lifting the stopwork order included the development of an "alternative acceptance criteria" for inspection and testing. The use of an alternate acceptance criteria was described in TVA's final report to the CAL dated January 21, 1982, which stated that "all completed systems will be verified by inspection and/or test to determine that they meet the current established design requirements. Where alternate acceptance criteria are applied to already installed systems, EN DES has evaluated and approved those criteria." The alternate acceptance criteria established for the HVAC system welds was a leak test in lieu of visual weld inspection for inaccessible welds. Leak tests were performed in 1982 to 25 percent over design pressure with less than one percent of total volume leakage. Nonconformance reports (NCRs) 3761 and 3604 were written in late 1981 to document that welds on ductwork were not inspected. The disposition of the NCRs included the acceptance of the inaccessible as well as accessible welds, based upon satisfactory performance of leak testing, per ANSI N-509 and 510. The disposition was not in accordance with the established alternate acceptance criteria which stated that a leak test was acceptable in lieu of visual weld inspection only for inaccessible welds. The reason for the violation was an inadequate disposition for NCRs 3761 and 3604 due to a failure to follow EN DES Engineering Procedure 3.10, section 5.4. Specifically, section 5.4 required a design review that evaluated the effects of the changes on the overall design. The NCR disposition was not properly coordinated with the appropriate design organization to ensure seismic integrity of HVAC ductwork and was, therefore, inadequate. This disposition was also reflected in revision 2 to Construction Specification N3M-914 and made applicable to all safety-related HVAC ductwork, including the Hydrogen Collection System. However, during review of HVAC system welding in 1986, the Weld Evaluation Project (WEP) identified the inadequacy of revision 2 of Construction Specification N3M-914, which specified leak test, in lieu of weld inspection. As a result, revision 3 was issued on December 29, 1986, to require a visual weld inspection in accordance with the established acceptance criteria outlined in the specification.

The specific welds cited in violation 86-24-01, part 1 (i.e., numbers 130 and 180), are located at the interface of the 12-inch circular pipe (0.375-inch wall thickness) and a transition piece that connects to a rectangular section of 10-gauge ductwork on the Hydrogen Collection System. These connections are located up against the containment wall which precluded the possibility of welding the wall side of the joint from the exterior. This condition is known to exist at each end of the transition pieces for a total of eight welds on each unit.

3. Corrective Action Taken and Results Achieved

Significant Condition Report (SCR) 7077-S, was written in November 1986 against welds 130 and 180 on the Hydrogen Collection System ductwork. Additional SCRs, WBN MEB 8714 on Hydrogen Collection System ductwork, WBN MEB 8721 (unit 1) and WBN MEB 8722 (unit 2), on all other safety-related HVAC welded ductwork were issued to document the inadequate disposition of NCRs 3604 and 3671. Due to the uncertainty of the safety implications of the above SCRs, two stopwork orders, DNQA WBN-87-02 and WBN-87-03, were issued on January 12, 1987, on the circumferential welds in both the round pipe and spiral HVAC ducts. In addition, TVA is in the process of developing a program to establish the structural adequacy of welded safety-related ductwork (including the Hydrogen Collection System) for all operating conditions (including seismic event). This program will include visual inspection, destructive testing, seismic analysis, and weld repairs as required. The administrative hold on HVAC ductwork will remain in place until a satisfactory program is established to adequately resolve the identified discrepancies.

4. Corrective Actions to Avoid Further Violation

The full penetration weld requirement for ductwork established in 1980 is excessive. The safety-related HVAC ductwork code jurisdiction, referenced in the FSAR, is SMACNA, High Velocity Duct Construction Standards, second edition, 1969. This code does not require welding for strength but only for sealing where minimum leakage is required. The minimum required weld strength established by analysis, for all operating conditions (including a seismic event), can be met by a full circumferential (360°) partial penetration weld. The design drawings and documents will be revised to indicate a partial penetration weld requirement.

A survey (through paint) of 100 percent of the accessible TVA welds on the HVAC system (approximately 2,100) will be conducted to determine full circumferential weld presence and to categorize the weld type. Obvious (visible) weld defects will be noted. The welds will be grouped by type (i.e., butt weld, fillet weld, groove weld, etc.). From each identified weld type, a random statistical inspection sample of welds will be chosen for detailed visual inspection. In addition, all 16 welds on the Hydrogen Collection duct transition pieces (including welds 130 and 180) will be inspected. The inspection of the welds on the hydrogen collections system transition pieces and those chosen from the statistical sample referenced above, with the paint removed, is to confirm weld quality by statistical methods. Once again, any obvious weld defects (cracks, undercut, etc.) will be noted. Where the weld is not visible on the exterior, access openings will be cut to verify that the duct was welded from the interior. The sampling technique, acceptance criteria and possible corrective actions will be implemented as outlined in the program plan.

From the welds inspected, test samples for each weld type will be randomly chosen. Also, additional test samples will be taken from the welds identified during the survey and the detailed inspection that exhibited the poorest workmanship. These samples will be destructively tested to determine weld strength. Analyses will be performed to determine the minimum weld strength required for maintaining structural integrity under all design loading conditions. If the test results from the destructive testing indicate that the welds have a strength greater than the minimum required, no further samples will be taken. If not, then additional samples and/or corrective actions will be taken (based on analysis of test results).

5. Corrective Steps Taken to Avoid Further Violation

WBN Construction Specification N3M-914, "Quality Assurance Requirements for Construction Testing, and Inspection of Safety-Related HVAC Systems," was revised December 29, 1986. This revision (R3) requires visual inspection of welds completed after December 29, 1986.

Nuclear Engineering Procedure (NEP) 3.3, "Internal Interface Control," which was issued subsequent to occurrence of this deficiency, provides improved interface control between design organizations.

The FSAR will be updated to include acceptance criteria established in the above program for the welding of the safety-related HVAC systems accomplished before December 29, 1986. The revision will also include the design welding requirements for welding after December 29, 1986. This revision will be submitted to NRC six months before fuel load of unit 1.

6. Date of Full Compliance

TVA will be in full compliance by fuel load of each respective unit.

Violation 390, 391/86-24-02

10 CFR 50, Appendix B, Criterion III, "Design Control," as implemented by TVA's QA Topical Report, TVA-TR75-1A, Section 17.1.3.3, requires that appropriate quality standards be specified and included in design documents.

Contrary to the above, specification N3M-914, "Quality Assurance Requirements for Construction, Construction Testing, and Inspection of Safety-Related HVAC Systems," allows leak check testing in lieu of welding/brazing inspections on class Q-seismic, Category I, safety-related ducts. Leak check testing is inadequate to verify seismic Category I requirements.

1. Admission or Denial of Alleged Violations

See violation 390, 391/86-24-01, part 1.

2. Reason for the Violation

See Violation 390, 391/86-24-01, part 1.

3. Corrective Action Taken and Results Achieved

See Violation 390, 391/86-24-01, part 1.

4. Corrective Steps Taken to Avoid Further Violation

See Violation 390, 391/86-24-01, part 1.

5. Date of Full Compliance

See Violation 390, 391/86-24-01, part 1.