TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

June 22, 1981

WBRD-50-390/81-17
WBRD-50-391/81-16
WBRD-50-390/81-32
WBRD-50-391/81-31
WBRD-50-390/81-35
WBRD-50-391/81-34
WBRD-50-390/81-46
WBRD-50-391/81-45

Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - HVAC CONCERNS - WBRD-50-390/81-17, WBRD-50-391/81-16, WBRD-50-390/81-32, WBRD-50-391/81-31, WBRD-50-390/81-35, WBRD-50-391/81-34, WBRD-50-390/81-46, AND WBRD-50-391/81-45 - ADDITIONAL INFORMATION

The subject condition was initially reported to NRC-OIE Inspector T. Heatherly on January 24, 1980, as audit deficiency WB-G-80-02. This deficiency was later determined by TVA to be nonreportable in accordance with 10 CFR 50.55(e). Following the reporting of audit deficiency WB-M-81-03 to NRC-OIE on February 2, 1981, WB-G-80-02 was reported to NRC-OIE on February 4, 1981 as reportable in accordance with 10 CFR 50.55(e). Subsequently, NCR's 2938R and 2929R on similar problems were reported to NRC-OIE on February 10 and 11, 1981, respectively. TVA's first interim report on these combined deficiencies was submitted on February 27, 1981, and a second interim report was submitted on April 30, 1981.

On March 23, 1981, a deficiency concerning HVAC system noncompliances was reported to NRC-OIE Inspector R. V. Crlenjak in accordance with 10 CFR 50.55(e) as deficiency 16 of audit WB-G-81-06. Our first interim report was submitted on April 24, 1981.

On March 27, 1981, deficiencies concerning HVAC system noncompliances were reported to NRC-OIE Inspector R. V. Crlenjak in accordance with 10 CFR 50.55(e) as audit WB-G-81-06 deficiencies 2, 3, 6, 9, and 10 and NCR's WBN NEB 8107R1 and WBN SWP 8120. Our first interim report was submitted on April 27, 1981.

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Mr. James P. O'Reilly June 22, 1981

A supplemental response on the deficiencies listed above was submitted on May 19, 1981. On April 29, 1981, an additional HVAC deficiency was reported to NRC-OIE Inspector R. V. Crlenjak as NCR 3181R. Our first interim report was submitted on May 29, 1981.

Enclosed is additional information on the subject deficiencies. We expect to provide additional information on deficiency 6 of audit WB-G-81-06 and NCR's 2938R3 and 3181R1 by July 23, 1981. Additional information on the remaining deficiencies will be provided by October 27, 1981.

If you have any questions, please get in touch with D. L. Lambert at FTS 857-2581.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure
cc: Mr. Victor Stello, Jr., Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
HVAC CONCERNS
WBRD-50-390/81-17, WBRD-50-391/81-16, WBRD-50-390/81-32, WBRD-50-391/81-31, WBRD-50-390/81-35, WBRD-50-391/81-34, WBRD-50-390/81-46, WBRD-50-391/81-45

Description of Deficiencies - WB-G-80-02, Deficiency No. 1, WB-M-81-03, Deficiency No. 1, and WB-G-81-06, Deficiency No. 3

Watts Bar Nuclear Plant Construction (CONST) began a comprehensive review of the Construction Quality Assurance (CONST QA) program early in 1980 which identified the lack of adequate controls and acceptance criteria concerning activities related to HVAC systems in general. A CONST site audit, WB-G-80-02, conducted from January 14 through February 1, 1980, formally identified this problem in deficiency No. 1 and recommended the following corrective action to initiate a quality control procedure to verify and document the fabrication of those duct systems under the quality assurance program. The initial notification under 10 CFR 50.55(e) on this audit deficiency was made to the NRC-OIE on January 14, 1980. The deficiency was later evaluated and deemed nonreportable by TVA, and NRC was so notified on February 1, 1980. Following receipt of additional information in Audit Deficiency WB-M-81-03, Audit Deficiency WB-G-80-02 was reevaluated and determined reportable (with Audit Deficiency WB-M-81-03) and the NRC-OIE was notified on February 4, 1981.

CONST QAB Audit WB-M-81-03 was conducted by TVA from January 5 through 23, 1981. The scope of the audit included fabrication and installation of duct supports, procurement of HVAC components, HVAC piping classification, and HVAC duct classification. The deficiency identified several entire specialized HVAC systems and portions of other HVAC systems that are designated by design criteria WBN-DC-40.36.1, revision 0, as ANS safety Class 2b that do not specify adequate quality assurance requirements for ductwork, components, and piping.

An additional CONST QAB Audit WB-G-81-06 was conducted by TVA. The resulting deficiency No. 3 concerns inadequate QA requirements for the HVAC system, in particular the QA control (procurement control) of HVAC components. This deficiency was previously identified among the above deficiencies.

Safety Implications

Had this condition remained uncorrected, the installation of safety-related HVAC system piping, ductwork, and components without proper QA controls could result in deficient workmanship and the use of deficient materials and components.

Interim Progress

TVA has issued Design Input Memorandum (DIM) WB-DC-40-36.1 to revise Watts Bar Design Criteria WB-DC-40.36.1 to include quality assurance requirements for each component in each safety-related HVAC system.

A supplemental response on the deficiencies listed above was submitted on May 19, 1981. On April 29, 1981, an additional HVAC deficiency was reported to NRC-OIE Inspector R. V. Crlenjak as NCR 3181R. Our first interim report was submitted on May 29, 1981.

Enclosed is additional information on the subject deficiencies. We expect to provide additional information on deficiency 6 of audit WB-G-81-06 and NCR's 2938R3 and 3181R1 by July 23, 1981. Additional information on the remaining deficiencies will be provided by October 27, 1981.

If you have any questions, please get in touch with D. L. Lambert at FTS 857-2581.

Very truly yours,

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The DIM includes an attachment describing QA requirements for purchasing HVAC system grilles, terminals, and balancing dampers. An additional memorandum provides interim guidance for construction QA requirements for Seismic Catetory I and I(L) (limited requirements), HVAC chilled water piping, and ductwork. Also, Construction Specification N3M-914 is being written to consolidate all HVAC construction QA requirements into one document. Construction Specification N3M-914 is scheduled to be issued in February 1982.

TVA is currently conducting an ongoing program to implement construction quality control procedures (WBN-QCP-4.24, "Inspection of Non-ASME Code Piping Systems", WBN-QCP-4.27, "Inspection and Documentation of Ductwork", WBN-QCP-4.33, "Inspection and Documentation Requirements for Brazed Joints in Safety-Related Refrigeration Piping Systems", WBN-QCT-4.39, "Testing of HVAC Systems", WBN-QCP-4.50, "Location Verification of Category I(L) Piping", and WBN-QCP-4.51, "Hydrostatic Testing of ANSI B31.1 Systems") covering safety-related HVAC systems to determine their adequacy with respect to controlling implementation of design requirements.

Description of Deficiency WB-G-81-06, Deficiency No. 2

During a Watts Bar Construction QA audit, numerous HVAC system flow diagrams (e.g., 47W866-2 and 47W865-5 series) were reviewed revealing that TVA's classification for piping, ductwork, and components, as required by Watts Bar Design Criteria WB-DC-40-36.1, could not be determined. Also, the interface boundaries between TVA classifications could not be determined.

Safety Implications

Flow diagrams without proper labeling could result in safety system piping and components being designed to less rigorous service conditions than those actually required. This could result in multiple failure of safety sytems in service, a situation not considered in the plant safety analysis.

Interim Progress

TVA has reviewed all HVAC safety-related flow diagrams and construction drawings for compliance with the appropriate design criteria and to ensure that classifications and classification boundaries are shown for all components of the systems. An engineering change notice (ECN) has been issued to revise flow diagrams and drawings that are not labeled with TVA classifications and exact interface boundaries. Any discrepancies found in which piping, fittings, and components have been misspecified during the implementation of the ECN will be resolved by internal procedures before completion of the systems.

Description of Deficiency WB-G-18-06, Deficiency No. 9

WBNP-QCI-1.8, Section 4.2, Quality Assurance Records - "Those records which furnish documentary evidence of the quality of an item and/or activities affecting quality. This . . . as a minimum must contain the following."

B. Sufficient information to permit traceability between the record and the item or activity to which it applies.

WBNP-QCI-4.3, "Welding Surveillance and Weld Procedure Assignment"

Section 6.1.8, "Weld History Documentation"

Section 6.1.8.2, "All other welding shall be inspected and approval signified by the presence of the welding inspectors distinguishing mark adjacent to the weld. All welding and associated inspections are subject to the weekly surveillance program . . ."

Section 6.1.9, "General surveillance of welding activities in shops and erection areas shall be conducted. . . A weekly report documenting surveillance activities shall be prepared on Attachment B."

The format used to document weekly surveillance activities does not contain requirements for the identification of individual welds. Thus, the weekly surveillance records do not identify individual welds on the chilled water piping. However, the absence of welding inspectors' identification marks adjacent to the welds indicates that these welds have not been inspected in accordance with the appropriate QA procedure.

This audit deficiency documents an example of lack of adequate controls concerning HVAC activities as previously reported in connection with audits WB-G-80-02 and WB-M-81-03.

Safety Implications

The quality control of the welding procedure, welder qualifications, filler metal, etc., cannot be verified. Thus, some of the welds may be deficient. This could result in the loss of chilled water to some coolers and a subsequent loss of their safety function.

Interim Progress

It was recognized early in 1980 that safety-related piping in the HVAC system was being installed without procedural controls. As a result of this noncompliance, TVA implemented Watts Bar Quality Control Procedure WBN-QCP-4.24, "Inspection of Non-ASME Code Piping Systems," for corrective actions and means to prevent recurrence. This procedure includes provisions for weld inspections.

In particular, section 7.1.3 of this procedure states, ". . . inspection for individual welds will be documented by the welding inspector placing his identifying mark . . ." The absence of the welding inspector identifying marks on a weld indicates that the weld had not been inspected at the time of the audit. Corrective action for this deficiency, while not complete, was in process before the audit. WBNP-QCP-4.27 also utilizes surveillance records (for inaccessible welds). All other welds are being inspected and marked.

Description of Deficiency WB-G-81-06, Deficiency No. 10 and Nonconformance Report No. 2929R1

Nonconformance report 2929R1 concerns the lack of QA documentation for installed HVAC ductwork. Ductwork requiring a Certificate of Compliance or Certified Material Test Report was fabricated without proper QA controls. This nonconformance identifies problems with inspection, checking, and testing of ductwork which has already been insulated. Similar Audit WB-G-81-06, Deficiency No. 10, concerns the lack of documentation to verify that the required tests for Sheet Metal and Air-Conditioning Contracts Association (SMACNA) high velocity duct were performed.

Safety Implications

The installation and testing of ductwork without proper control of materials, testing, apparatus, and records for essential safety-related HVAC systems jeopardizes the structural integrity of those systems. This condition could adversely affect the safe operation of the plant.

Interim Progress

TVA has investigated all structural materials used in duct fabrication and in prefabricated ductwork and found that all material had Certified Material Test Reports or Certificates of Compliance and therefore meets the QA requirements of Watts Bar Procedure WBN-QCP-4.27, "Inspection and Documentation of Ductwork."

Watts Bar Procedure WBNP-QCT-4.39, "Testing of HVAC Systems," will be used to document the testing of all HVAC ducts (insulated and noninsulated) and filter housings. Tests performed before implementation of Procedure WBN-QCT-4.39 will be rechecked under a sampling program which will escalate to include a larger sample if the initial results are unsatisfactory. This will eliminate the need to remove all insulation from the ducts to be inspected. Also, noninsulated ducts will be retested in accordance to Procedure QBN-QCT-4.39. Leak checking of the ductwork will be done by a walkdown of the HVAC system and will be documented in accordance with test procedure WBN-QCT-4.39. Leak testing will be done using the test apparatus and methods detailed in Construction Specification G-37 and will be documented in accordance with Procedure WBNP-QCT-4.39. TVA has scheduled the completion of retesting of the ducts by October 1, 1981.

Description of Deficiency WB-G-81-06 - Deficiency No. 16

During a Watts Bar CONST QA audit, it was discovered that no design document exists describing the QA boundaries for safety-related seismic category I(L) (limited reqirements) piping (TVA classes G, H, J, K, L, M) and ductwork systems (TVA classes Q, S, U, and V). Watts Bar Construction Specification N3G-881, "Identification of Structures, Systems, and Components Covered by the Watts Bar Nuclear Plant Quality Assurance Program," does not identify the QA boundaries of seismic category I(L) classes of ductwork and piping. This report documents a similar deficiency, WBNNEB8107R1, which concerns the accuracy of Construction Specification N3G-881.

Safety Implications

Had this condition remained uncorrected, the lack of proper boundary definition could have resulted in deficient inspection and/or testing of safety-related seismic category I(L) ductwork and piping. This could have resulted in multiple failures in safety system trains, a contingency not considered in the plant safety analysis.

Corrective Actions

Construction Specification N3G-881 has been revised per Specification Revision Notices (SRN) SRN-N3G-881-1 and SRN-N3G-881-2 to correct the areas of concern in this deficiency.

SRN-N3G-881-1 revised Construction Specification N3G-881 to include safety-related category I(L) systems with TVA classes G, H, J, K, L piping and Q, S, U, and V ductwork. The QA boundaries of these systems are located on construction drawings and are not detailed in the construction specification.

CONST has reviewed the existing Quality Control procedures (QCP's) for applicability to seismic category I(L) piping and ductwork systems. Subsequently, two QCP's were written: WBNP-QCP-4.50, "Location Verification of Category I(L) Piping," and WBNP-QCP-4.51, "Hydrostatic Testing of ANSI B31.1 Systems." The original QCP's with the additional QCP's provide adequate control of activities for seismic I(L) systems.

The SRN-N3G-881-2 corrected the title of table B of Construction Specification N3G-881 to cover only primary safety-related systems. Table B was not meant to be a complete scoping document, but was intended only to provide information as noted in section 4.0 (Appendix A). The actual QA boundaries for both primary and secondary safety-related systems are detailed on TVA construction drawings.

All corrective actions have been completed.

Description of Deficiency WBNNEB8107R1

During a safety analysis review, it was discovered that section 3.2.2 of Watts Bar Construction Specification (CONST SPEC) N3G-881, "Identification of Structures, Systems, and Components Covered by the WBN Quality Assurance Program," specifies that only HVAC components designated as Seismic Category I are safety related. This conflicts with sections 3.2.4 and 3.2.5 and other portions of CONST SPEC N3G-881 which indicate that both category I and I(L) (limited requirement) items are safety related and within the QA program. Second, Table B of Appendix A is misleadingly labeled such that it implied all mechanical components that are in the QA program are listed. Contrary to this, only components having primary safety functions are listed for information. Also, some safety-related electrical components were not adequately identified, leading to a possible conclusion that the components were not safety related.

As a result of these ambiguities, some components that are safety related were not treated as such by TVA. Therefore, an adequate QA program was not invoked to ensure quality commensurate with their functions.

Safety Implications

Some safety-related components did not receive adequate quality control and verification, with the net result that they might have failed to perform their safety functions. Since most of the errors subsequently identified by the QA audit were associated with secondary safety functions (i.e., the component does not directly act to prevent or mitigate accidents, but must not fail in such a way as to prevent the functioning of components that do), the most probable result would be that many of the components could fail during a seismic event and possibly cause an accident or prevent the proper mitigation of an accident.

Interim Progress

CONST SPEC N3G-881 has been revised (via SRN-N3G-881-1 and SRN-N3G-881-2) to correct all inexact wording that has led to these problems. The corrections include explicitly stating that I(L) HVAC components are safety related, more exact titling of Table B, and treating in the text those electrical components identified in Appendix A. These changes should prevent recurrence.

TVA has committed to implement these specification changes for all new work and to backfit them onto existing work by a program of inspection and sampling, as appropriate.

Description of Deficiency WBNSWP8120

This NCR identified two groups of deficient drawings: (1) drawings which were issued before the issuance of EP 3.03, and (2) drawings which were issued before issuance of their design calculation.

This NCR was initially deemed reportable because the required documentation could not be located during a preliminary search. Subsequently, a more thorough search did locate the required calculations and documentation. Therefore, this NCR was deemed nonreportable.

Description of Deficiencies 2938R3, 3181R1, and Audit WB-G-81-06 - Deficiency No. 6

These noncompliances concern the lack of QA documentation (traceability) for materials (piping, fittings, and components) installed in Watts Bar HVAC chilled water system (main control room, electrical board room, and shutdown board room). NCR 2938R previously identified materials (fittings, components, and piping) used which are unidentifiable. Subsequently, NCR 2938R3 was written to revise the previous NCR's to include all fittings and components which are unidentifiable, and NCR 3181R1 was written to address piping which is unidentifiable. Audit WB-G-81-06, Deficiency No. 6, documents an example of lack of traceability for piping in the HVAC chilled water system as previously addressed in nonconformance report 2938R.

Safety Implications

The fabrication of materials on essential safety-related HVAC systems without proper QA control and documentation could result in deficient workmanship in these systems. These could result in multiple failures of these systems, adversely affecting the safe operation of the plant.

Interim Progress

TVA is presently investigating this deficiency to determine the corrective actions and means to prevent recurrence. We expect to supply NRC with additional information by July 23, 1981.