

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401  
400 Chestnut Street Tower II

USNRC REGION II  
ATLANTA, GEORGIA

February 5, 1982 82 FEB 12 A 8: 54

U.S. Nuclear Regulatory Commission  
Region II  
Attn: Mr. James P. O'Reilly, Regional Administrator  
101 Marietta Street, Suite 3100  
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - NRC-OIE REGION II INSPECTION  
REPORT 50-390/81-26, 50-391/81-24 - RESPONSE TO VIOLATIONS

The subject inspection report dated December 23, 1981 cited TVA with four Severity Level V Violations in accordance with the provisions of 10 CFR 2.201. The date of our response was extended from January 22 to February 5, 1982 as documented in our February 4, 1982 letter from L. M. Mills to J. P. O'Reilly. Enclosed is our response to those violations. TVA has determined our activities have not violated NRC requirements as stated in alleged violation 390/81-26-03. This item was discussed with Inspector J. McDonald on February 4, 1982.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY



L. M. Mills, Manager  
Nuclear Regulation and Safety

Enclosure

cc: Mr. Richard C. DeYoung, Director (Enclosure)  
Office of Inspection and Enforcement  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

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ENCLOSURE  
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
RESPONSE TO VIOLATIONS

Violation 390/81-26-01, 391/81-24-01

10CFR50, Appendix B, Criterion III, requires that measures be established for the selection and review for suitability of application of materials that are essential to the function of systems and components. The approved QA program, FSAR section 17.1A.3.4, states that material selections are made from codes, standards, and design criteria and that the selections are reviewed for suitability of application by the Thermal Power Engineering Branches.

Contrary to the above, as of November 23, 1981, established measures for the selection and review for suitability of application of materials, that are essential to the function of systems and components did not include provisions ensuring environmental suitability of materials used in containment. Epoxy resin grout, selected for use with safety-related hanger installations in containment, was not reviewed for environmental suitability.

Admission or Denial of the Alleged Violation

TVA admits the violation occurred as stated.

Reasons for the Violation

Design personnel did realize that there were environmental limitations of epoxy grout before allowing its use. In the General Construction Specification for Bolt Anchors Set in Hardened Concrete, G-32, an attempt was made to restrict usage to an acceptable environment. A system to verify compliance existed in the requirement for a TVA Division of Engineering Design (EN DES) document to specify location.

However, the maximum service temperature of 120°F specified in the general construction specification for the epoxy grout was misinterpreted to mean maximum permissible normal operating temperature. Although analysis shows that no compartment will experience normal operating temperatures in excess of this maximum, a limited number of compartments may experience design accident temperatures in excess of the 120°F (maximum temperature recommended by the manufacturer for the epoxy grout to retain its full strength).

The inspection report states that during recent hot functional testing at the Sequoyah facility temperatures in excess of 120°F were experienced in twelve locations. This was noted during testing to be caused by HVAC balancing problems and cooling coils not being properly cleaned. Therefore, these temperatures are not considered to be indicative of maximum normal operating temperatures at WBN, and the aforementioned 120°F maximum is believed to still be valid.

Two brands of epoxy grout were used: Sika Hi-Mod and Niklepoxy No. 9. The Hi-Mod was listed by its manufacturer for grout of anchor bolts. The Niklepoxy was not explicitly listed by the manufacturer as an epoxy for grouted anchor applications, but this epoxy system did meet the physical requirements specified in the purchase requisition.

Design personnel did not consider the effects of radiation on the epoxy significant. This was based on the preliminary results of some testing being performed at Browns Ferry Nuclear Plant and the fact that the epoxy is generally shielded by a steel plate and the surrounding concrete. Consequently, a detailed study of the effects of radiation was not conducted.

The long-term effects of the epoxy aging throughout the life of the plant were not recognized as an effect which required consideration.

#### Corrective Steps Taken and Results Achieved

TVA has identified 72 supports inside containment for which epoxy grout was specified. To address the issue of elevated temperature effects, TVA has conducted a mathematical model analysis of the steam generator anchor bolts to develop the temperature profile which would be expected during a main steam line break. This "worst case" situation would have an expected duration and associated high temperatures that would raise the temperature of the epoxy at the head of the anchor to about 160°F.

TVA has conducted tests at our Singleton Materials Engineering Laboratory (SME) on epoxy grouted anchors at elevated temperatures. These test results indicate that for Sika Hi-Mod, the reliable mean capacity at temperatures between 120 and 160°F is 20 percent of the normal capacity. For Niklepoxy No. 9, the reliable mean capacity at 120°F is 60 percent of the normal capacity and for temperatures between 140 and 160°F is 40 percent of the normal capacity.

Presently, each support in question is being reviewed to determine its design loading and design temperatures. When SME test results are incorporated, the load-carrying effectiveness of the epoxy grouted anchors shall be determined. These results and specific corrective actions identified for any support deficiencies will be reported in subsequent reports on 10 CFR 50.55(e) item WBRD-50-390/81-71, WBRD-50-391/81-67 (NCR 3567R).

Published information on epoxy polymers of the type used in Sika Hi-Mod show no loss of strength because of radiation dose levels expected during the life of the plant or during a loss-of-coolant accident (LOCA). These resins have been shown to have approximately five times the radiation tolerance as the worst case dosage.

To our knowledge, there is no published information on the epoxy system used in Niklepoxy. The Hi-Mod and Niklepoxy use basically the same epoxy resin but utilize a different catalyst or hardener, so it is considered very unlikely that the effects of radiation on the two are significantly different.

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Present long-term experience with epoxy polymers is roughly one-half that of an expected plant life. Epoxy polymers are relatively new and compounds are constantly being refined. TVA is evaluating the possibility of establishing an ongoing testing program to continually monitor the strength of the epoxy grout throughout the life of the plant.

Corrective Steps Taken to Avoid Further Violations

The general construction specification for bolt anchors set in hardened concrete, G-32, is presently in the process of being revised. When implemented (on or before April 1, 1982) epoxy grouted anchors will not be allowed in safety-related applications. Until such time, nonconformance report (NCR) 3567R effectively halts usage of epoxy grout for bolted anchor applications.

Date When Full Compliance Will Be Achieved

Design personnel will complete the analysis to determine the effectiveness of as-installed epoxy grouted anchors by April 1, 1982. Full compliance including any required hardware modifications reported in TVA's final response to NCR 3567R shall be accomplished before fuel loading of each unit.

Violation 390/81-26-03

10CFR50, Appendix B, Criterion XI, requires that a test program be established to assure that all testing required to demonstrate that components will perform satisfactorily in service is identified and performed with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. The approved QA program, FSAR section 17.1A, 11.3, states that the adequacy of field erection and installation is verified by a construction test program. Vendor drawing (American Warming and Ventilating 11577), approved by Engineering Design, specified that the containment air return fan backdraft dampers be capable of withstanding fifteen pounds per square inch differential in the closed direction.

Contrary to the above, as of November 23, 1981, the established test program had not identified testing required to demonstrate the integrity of the containment air return fan backdraft dampers under back pressure, which is a safety-related function.

Admission or Denial of Alleged Violation

TVA denies the violation occurred as stated.

Reason for the Denial of the Violation

The manufacturer of the dampers in question submitted the required seismic analysis which included the 15 lb/in<sup>2</sup> gauge loading. This analysis has been reviewed, approved, and accepted by TVA engineers as sufficient documentation that the damper will perform as required. It is standard practice for TVA to use vendor documentation of analyses and/or testing to assure that design requirements have been met. TVA does not consider it a requirement that each component be necessarily retested by TVA when vendor analyses and/or testing indicates that the component will perform as required. In the specific example cited above, testing by TVA was not required to demonstrate the dampers would perform satisfactorily in service.

Violation 390/81-26-04, 391/81-24-03

10CFR50, Appendix B, Criterion V, requires that activities affecting quality be prescribed by documented drawings of a type appropriate to the circumstances. The approved QA program, FSAR section 17.1A.5, commits to Safety Guide 28 which endorses ANSI Standard N45.2. Section VI of the standard contains the same requirements as does Criterion V.

Contrary to the above, as of November 23, 1981, activities affecting quality were not prescribed by drawings of a type appropriate to the circumstances in that the mechanical ductwork drawing notes (47W915 series) specified the use of construction specification G-39 for cleanliness control; however, G-39 did not contain cleanliness requirements for HVAC ductwork systems.

Admission or Denial of Alleged Violation

TVA admits the violation occurred as stated.

Reasons for the Violation

The drawing note in question concerning cleanliness, in accordance with G-39, does not make reference to ductwork. It is not intended that Construction Specification G-39 have cleanliness requirements for HVAC air handling and ventilation systems. However, Construction Specification G-37, referenced by system drawing 47W866-1, should have contained additional requirements for assuring air handling and ventilation system cleanliness.

Corrective Steps Taken and Results Achieved

An investigation revealed that G-37 is referenced on flow diagrams for other HVAC systems in addition to the system cited. TVA will revise G-37 to incorporate additional procedures for assuring air handling and ventilation system cleanliness. These procedures will require that air handling and ventilation systems be visually inspected for loose or foreign matter which could become airborne and collect on filters, coils or otherwise degrade components. The systems will be flushed for specific periods of time using installed fans and blowers. Flushing will be accomplished with filter and adsorber elements removed to assure maximum airflow. During flushing, existing balancing dampers will be utilized to block flows in various branches in order to maximize the flow in the branch being flushed. After flushing, dampers, coils, etc., will be visually inspected for foreign material.

For HVAC systems which have already passed the appropriate preoperational tests, the designers will work with the construction engineering organizations to assess the adequacy of cleanliness. TVA fully anticipates that the operation that has already been performed during construction and during balancing and testing has provided adequate flushing. If not already accomplished, the upstream faces of coils and dampers will be inspected through existing access ports.

The appropriate drawing note referenced in the violation concerning Construction Specification G-39 has been revised to clearly state that the requirements of G-39 do not apply to air handling and ventilation systems but only to piping shown on the drawings. In addition, TVA will revise G-39 to state that its requirements do not apply to air handling and ventilation systems. This will preclude future misinterpretations.

Corrective Steps Taken to Avoid Further Violations

Construction Specification G-37 will be revised to incorporate adequate procedures for assuring air handling and ventilation system cleanliness. Thus, all HVAC system drawings referencing G-37 will be provided with sufficient air handling and ventilation system cleanliness requirements.

Construction Specification G-39 will be revised to state that its requirements do not apply to air handling and ventilation systems. This will preclude future misinterpretations.

Date of Full Compliance

Both Construction Specification G-37 and G-39 will be revised and issued by February 12, 1982. Assessments of cleanliness on HVAC systems which have passed preoperational testing will be completed by March 5, 1982.

Violations 390/81-26-02, 391/81-24-02

10CFR50, Appendix B, Criterion V, requires that activities affecting quality be accomplished in accordance with procedures. The accepted QA program, FSAR 17.1A, commits to Safety Guide 28 which endorses ANSI N45.2-1971. Section VI of the standard specifies the same requirements as Appendix B. Section 1.0 of Civil Design Standard DS-C1.3.2, "General Design Information, Live Loads," requires that loads estimated during design be rechecked as soon as final manufacturers weights are available to avoid possible overstress conditions.

Contrary to the above, as of November 23, 1981, activities affecting quality were not accomplished with procedures, in that live loads estimated for 3/4" and 1/2" Y-type globe valves shown on TVA drawing 47B001-2 were not rechecked and were exceeded by the manufacturer's final weights.

Admission or Denial of Alleged Violation

TVA admits the violation occurred as stated.

Reasons for the Violation

TVA admits a violation has occurred; however, Civil Design Standard DS-C1.3.2, referenced as the applicable procedure in the cited violation, is not applicable to piping analysis activities. This design standard is applicable to design activities for buildings for which live loads for floors must be calculated. Piping analysis criteria are specified in Watts Bar Design Criteria WB-DC-40-31.7. Engineering Procedures EN DES-EP 4.04 and 4.25 define squad check and design review processes for documents affecting designs on nuclear plants.

The events leading up to the violation are as follows:

The original basis for the piping analysis of the design depicted on TVA drawing 47B001-2 was based on Rockwell drawings D-464948 and D-464530, plus catalog information on Edwards valve figures 3622, 3626, and 3630, all of which listed the design weight of 1/2- and 3/4-inch valves as 12 pounds.

TVA became aware that valves heavier than 12 pounds were being supplied for the design depicted in drawing 47B001-2 during the summer of 1979. The heavier weight of 13.5 pounds was based on actual valve weights supplied by the field. The effect of the heavier weight was reviewed, and the results of TVA's reevaluation was documented in a memorandum from R. G. Domer to R. M. Pierce dated August 29, 1979. The 13.5-pound weight for 1/2- and 3/4-inch valves was approved.

Drawing 47B001-2 was revised per Engineering Change Notice (ECN) 2137 in August 1979. However, the drawing was revised to reflect the 13.5-pound weight for the 3/4-inch valve only. The same information for the 1/2-inch valve was inadvertently omitted.

The valve weights of 1/2- and 3/4-inch valves became an issue again during October 1980 when the NRC inspectors requested that a sample of valves be weighed. As a result, valves were found to be overweight by 1 ounce to 1.75 pounds. Nonconforming Condition Report (NCR) 2697R was issued by TVA to document this condition. Also, NRC-OIE Unresolved Item 50-390/80-30-04, 50-391/80-23-03 documented this condition.

The design shown on 47B001-2 was again reevaluated using the actual valve weights and was found to be acceptable because of the margin existing in the original design. Drawing 47B001-2 was again revised (issued August 12, 1981) to reflect approval of 14.3 pounds for the 1/2-inch valves and 15.25 pounds for the 3/4-inch valves.

The manufacturer's drawings listed the valve weight as 13 pounds  $\pm$  10 percent. TVA considers the nominal design weight of 13 pounds for these valves to be consistent with the 1979 evaluation of 13.5 pounds. Nominal design weights are typically used for analyses rather than the nominal weight plus the tolerance allowed by the manufacturer. When the manufacturer's drawings were received, it is likely that the designer considered the 13-pound nominal weight to be acceptable; and any small excess weight because of tolerance was considered inconsequential.

However, the possibility that these manufacturer's drawings were not properly squadchecked per the appropriate EPs cannot be completely discounted.

#### Corrective Action Taken and Results Achieved

As stated above, the design has been reevaluated using the actual valve weights and found to be acceptable 'as-is.' The drawing has been revised to reflect these results. Therefore, had this condition remained uncorrected, the safety of operations of the plant could not have been adversely affected.

#### Action Taken to Prevent Recurrence

TVA has already taken steps subsequent to the issuance of the NCR to place special emphasis on its internal procedures concerning the review of vendor drawings. These procedures require a copy of all revisions to all valve drawings and specifications which include information relative to valve weight, length, center of gravity, or allowable loads from attached piping to be immediately distributed to EN DES Civil Engineering Branch (CEB) by all procurement organizations. This will allow TVA's piping analysis to reflect the most recent and accurate valve data.

#### Date of Full Compliance

We have been in full compliance as of August 12, 1981, when the appropriate drawing revision was issued.

Generic Implications

TVA recognizes that there has been an industry problem relative to valve weights. TVA has filed recent nonconforming condition reports on this problem, including WBRD-50-390/81-89 and WBRD-50-391/81-83 referenced in the inspection report. In addition, there are other documents, including NRC-OIE Bulletin 79-04, which address this problem.

In addition to the steps taken to strengthen TVA's procedures concerning vendor drawings, TVA's program plan for NRC-OIE Bulletin 79-14 on Watts Bar requires that all valve drawing weights be checked against data used in piping analysis. This will provide a 100-percent verification of valve weights. Any discrepancies which may be found will be evaluated and analyzed as necessary to qualify all components. This effort is required to be completed before fuel load for each unit at Watts Bar.