

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

September 15, 1983

USNRC REGION II  
ATLANTA, GEORGIA

SEP 16 11:48

WBRD-50-390/82-58  
WBRD-50-391/82-55

U.S. Nuclear Regulatory Commission  
Region II  
Attn: Mr. James P. O'Reilly, Regional Administrator  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

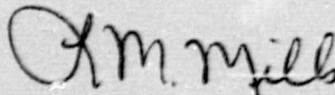
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - CONCRETE ANCHORAGE FREE EDGE  
VIOLATION - WBRD-50-390/82-58, WBRD-50-391/82-55 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector D. Quick on May 28, 1982 in accordance with 10 CFR 50.55(e) as NCR 4068R R1. Interim reports were submitted on June 24 and October 26, 1982 and February 3 and June 24, 1983. Enclosed is our final report.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY



L. M. Mills, Manager  
Nuclear Licensing

Enclosure

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

Records Center (Enclosure)  
Institute of Nuclear Power Operations  
1100 Circle 75 Parkway, Suite 1500  
Atlanta, Georgia 30339

8309200354 830915  
PDR ADOCK 05000390  
S PDR

ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
CONCRETE ANCHORAGE FREE EDGE VIOLATION  
NCR 4068R R1  
WBRD-50-390/82-58, WBRD-50-391/82-55  
10 CFR 50.55(e)  
FINAL REPORT

Description of Deficiency

The subject deficiency involves expansion bolt anchors for supports of various systems having been installed too close to concrete free edges. These bolt anchors are attached to nonload bearing walls and are, in some instances, installed in grout instead of concrete. Grout has little or no resistance to anchor pullout. Other bolt anchors are installed in these walls with less than ten nominal bolt diameters from the concrete edge. This violates the requirements of TVA Construction Specification G-32 which specifies a minimum distance of ten nominal bolt diameters unless otherwise approved by the design engineer. The tension and shear capacities of bolt anchors can be significantly reduced when anchors are installed near concrete free edges.

There are several walls in the auxiliary building and control building which contain unreinforced construction joints and/or gaps as part of their design. These discontinuities are not always readily apparent. They must, however, be considered free edges for the purpose of bolt anchor installation. They occur mainly in nonload bearing (partition and shield) walls and fall into two categories--horizontal and vertical.

The horizontal gaps occur where partition and shield walls intersect the ceiling. These walls were designed with a two-inch space at the top so that the ceiling above will not bear directly upon them. The two-inch gap is obscured by a narrow mortar joint which was placed to prevent air flow. Since the mortar joint is not designed to transmit load, the joint must be considered a free edge. This circumstance occurs on all shield and partition walls in the control and auxiliary buildings. Specifically these show up on the following concrete drawing series: 41N366, 368, 370, 372, 373, and 391 in the auxiliary building and 41N483 in the control building.

The unreinforced vertical construction joints occur where partition and shield walls intersect columns or structural walls. These circumstances occur in the same nonload bearing walls described above and are shown on the same drawing series listed above.

The perimeter walls of these buildings as well as the "C3" and C11" walls in the control building; the "A5," "A11," "U," "X," and "Y" in the auxiliary building and various other structural walls are not subject to these problems.

The apparent cause of this deficiency is that free edges were not discernible at the time of installation and inspection of the bolt anchors.

## Safety Implications

Since bolt anchors are installed in violation of G-32's edge distance requirements, the anchors may pull out of the concrete before reaching the loads for which the system is designed to carry. This condition could cause the support to fail and thus failure of a safety-related system.

## Corrective Action

Evaluations have been performed and completed on the edge distance violations for the bolts that were identified from the field survey. One hundred and nineteen supports require some type of rework out of a total number of 477 supports that were identified as having an edge distance violation. The following guidelines were used in arriving at the number to be reworked.

1. No bolt anchors with edge distances less than three nominal bolt diameters from the concrete edge, including those installed in a joint will be accepted. (Although G-32 does require ten nominal bolt diameters for a minimum distance, less may be accepted if first approved by the design engineer. However, never less than three diameters may be accepted.)
2. Accept no plates that bridge or span across a joint.
3. Maintain a factor of safety of at least five when evaluating tension/shear capacities of anchors near joints.

Ninety-nine supports require some type of redesign and/or rework by TVA's Division of Construction (CONST) to alleviate the G-32 violations. The remaining 20 supports will be revised and issued on TVA's Division of Engineering Design (EN DES) drawings. Unit 1 design work will be performed under engineering change notice (ECN) 3786 and unit 2 work will be performed under ECN 3853.

A memorandum was written by the Watts Bar Construction Engineer on August 10, 1982, to all supervisors in CONST who are responsible for the installation and inspection of bolt anchors to inform and advise them of the problems associated with the subject deficiency. These supervisors have been kept continually informed of this situation since the memorandum was released by comments made in weekly supervisors' meeting at the Watts Bar site. Moreover, another memorandum was written and released on May 16, 1983, to further instruct the responsible supervisors in CONST to prevent recurrence of this situation. These memorandums identified assignable cause of the deficiency, noted drawings on which the condition occurs, outlined areas where the problem will not occur, and detailed how the problem areas can be identified by closer visual examination.

All EN DES engineers who have responsibility for support plate attachments have been informed and are now aware of the problems associated with these nonconformances.

All EN DES drawings associated with free edge violations for unit 1 are scheduled to be issued and corresponding work by CONST completed on or before December 30, 1983. EN DES drawings for unit 2 are scheduled to be issued by May 30, 1984, and completion of unit 2 CONST work by October 1, 1984.