

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II GEORGIA

April 12, 1983
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WBRD-50-390/82-62, -391/82-59

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:

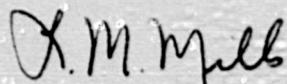
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - NONCONSERVATIVE CALCULATION METHOD
FOR GENERAL CONSTRUCTION SPECIFICATION G-32 VIOLATIONS - FINAL REPORT

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 WBN SWP 8208. Related NCR GEN CEB 8205 was also determined to be reportable under 10 CFR 50.55(e). This was followed by our interim reports dated July 2 and October 12, 1982. Enclosed is our final report. For disposition purposes, a separate report is being submitted for Bellefonte, Hartsville, and Yellow Creek. A final report on NCR WBN SWP 8208 was submitted separately to you on March 31, 1983.

If you have any questions concerning this matter, please get in touch with R. H. Shell at FTS 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

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ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
NONCONSERVATIVE CALCULATION METHOD FOR GENERAL CONSTRUCTION
SPECIFICATION G-32 SPACING VIOLATIONS
NCR GEN CEB 8205
WBRD-50-390/82-62, -391/82-59
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency

This deficiency concerns too closely spaced stud anchors on strip plates which could fail because of pulling out a section of concrete rather than failure of the studs themselves if overloaded. Per TVA's Design Standard, DS-C6.1, if a steel failure (stud failure) cannot be assured because of inadequate embedment of stud spacing and the failure mechanism is concrete, then a safety factor of 4 is required. However, computations for strip plates using closely spaced Nelson studs on Watts Bar Nuclear Plant indicate that in some cases design loads for each stud were compared to the ultimate concrete capacity when checking attachments, whereas close spacing of the studs results in a reduction of the load carrying capability of each stud because of the interaction of the forces within the concrete. This could indicate that some safety-related supports could have a factor of safety as low as one instead of the required minimum of four. The failure of the designers to apply the correct factor of safety was due to ambiguous instructions in DS-C6.1.

Safety Implications

Use of incorrect safety factors in checking attachments on strip plates with closely spaced stud anchors could allow an overloading of the concrete sufficient to cause it to fail and cause a subsequent failure of the embedded plate and any safety-related attachments. This condition could adversely affect safe operation of the plant.

Corrective Actions

A randomly selected sample of 69 plates was analyzed for inadequate factors of safety. No plate was found to have a factor of safety of less than 4 when comparing the calculated anchor load to the concrete capacity. In an unlimited population, 60 occurrences with no failures result in a failure rate of less than 5 percent at a 95-percent confidence level. All 69 plates were found to be acceptable; therefore, the reduced spacing of the stud anchors does not have a statistically significant effect on the adequacy of the embedded plates.

The Design Standard is being revised to clarify the use of the factors of safety given in DS-C6.1 and to prevent a recurrence of this problem. The Design Standard will be reissued as DS-C1.7.1 by April 30, 1983.