

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

March 25, 1983

BLRD-50-438/82-77
BLRD-50-439/82-71

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:

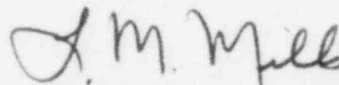
BELLEVILLE NUCLEAR PLANT UNITS 1 AND 2 - SUBSTITUTION OF GROUTED ANCHORS
FOR WEDGE BOLTS WITHOUT ENSURING ADEQUATE SHEAR LOAD CAPACITIES -
BLRD-50-438/82-77, BLRD-50-439/82-71 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector
P. E. Frederickson on November 17, 1982 in accordance with 10 CFR 50.55(e)
as NCR 2072. This was followed by our first interim report dated
December 15, 1982. Enclosed is our final report. TVA does not now
consider the subject nonconforming condition adverse to the safe operation
of the plant. Therefore, TVA will amend our records to delete the subject
nonconformance as a 10 CFR 50.55(e) item.

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

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ENCLOSURE

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2 SUBSTITUTION OF GROUTED ANCHORS FOR WEDGE BOLTS WITHOUT ENSURING ADEQUATE SHEAR LOAD CAPACITIES

NCR 2072

BLRD-50-438/82-77, BLRD-50-439/82-71

10 CFR 50.55(e)

FINAL REPORT

Description of Deficiency

The substitution of grouted anchors of the same nominal outside diameter (OD) as the specified wedge bolt anchors on design drawings was authorized by site engineering personnel in violation of the substitution guidelines in General Construction Specification G-32 and site QA procedures BNP-QCP-2.8 and 10.6.

Safety Implication

TVA's Civil Engineering Branch (CEB) evaluated the subject deficiencies and dispositioned the affected anchors "use as is" (CEB 830107 001). The reasons justifying this disposition are detailed below.

Figure 1 (attached) is a plot of the allowable tension load for wedge bolts and grouted anchors versus the allowable shear load. The plot indicates that equal size grouted anchors have greater capacity than Grinnell-designed wedge bolt anchors for all combinations of tension and shear. For wedge bolt anchors designed by TVA in accordance with Civil Design Standard DS-C6.1, the allowable design load for wedge bolt anchors exceeds the allowable design load for equal size grouted anchors when the anchor loading is primarily shear. Substitution of grouted anchors for wedge bolt anchors for shear loadings would result in a reduction in the factor of safety.

The following table gives allowable shear loads for TVA-designed wedge bolts and grouted anchors.

Allowable Shear Load (Kips)

<u>Size (Inches)</u>	<u>Wedge Bolts</u>	<u>Grouted Anchors</u>	<u>Percent Reduction</u>
3/8	1.20	0.95	21%
1/2	2.00	1.72	14%
5/8	3.00	2.73	9%
3/4	4.15	4.04	3%
7/8	5.40	5.60	None
1	6.70	7.30	None
1-1/4	9.75	11.70	None

The possible reduction in capacity for the 3/8- and 1/2-inch grouted anchors is larger than would normally be permitted. However, TVA does not believe that these substitutions would have any significant effect on safety for the following reasons:

1. The reductions would occur only for the rare situation where the design shear load is near 100 percent of the shear only allowable and the tensile load is less than 10 percent of tension only allowable.
2. The reductions apply only when the critical shear plane passes through the bolt threads.
3. Even with the 21-percent reduction in capacity, the factor of safety would still be greater than 3.0.
4. The tensile strength of ASTM A307 bolts is typically 20 to 50 percent greater than the minimum required.

Therefore, TVA believes that the grouted anchors which were substituted for equal size wedge bolts may be used as is. Future substitutions shall be in accordance with G-32.

Based upon this disposition, TVA concludes that there is no condition adverse to the safety of operations of the plant. Consequently, TVA no longer considers this item reportable under the provisions of 10 CFR 50.55(e).

Figure 1
ALLOWABLE DESIGN LOADS

