

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

31 AUG 19 11:00

August 14, 1981

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:

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2 - EXPANSION ANCHORS NOT PASSING  
QUALIFICATION TESTS - NCR'S 871 AND 898 - FINAL REPORT

NCR 871 was initially reported on July 10, 1978 to R. W. Wright, NRC-OIE Region II, in accordance with 10 CFR 50.55(e). This was followed by our first interim report dated August 9, 1978. After that time, related NCR 898 was determined to be reportable in accordance with 10 CFR 50.55(e) and was reported in our second interim report dated January 26, 1979. This was followed by our combined interim reports dated April 9, June 7, and July 20, 1979, January 7, March 25, and July 8, 1980, January 14, March 18, and May 19, 1981. As discussed with R. V. Crlenjak on August 7, 1981, enclosed is our final report.

If you have any questions concerning this matter, 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

Enclosures

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

IE27  
3  
1/1

ENCLOSURE 1

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2  
EXPANSION SHELL ANCHORS INSTALLED  
BEFORE QUALIFICATION  
10 CFR 50.55(e)  
FINAL REPORT

Description of Deficiency

Self-drilling expansion shell anchors were installed in the plant before their qualification as required by TVA General Construction Specification G-32. Initial qualification testing failed to qualify all sizes of expansion shell anchors that had been installed in the plant.

Safety Implication

Because the testing and analysis for the anchors was found acceptable, had the subject condition remained uncorrected, it could not have affected adversely the safety of operation of the plant.

Corrective Action

For the configuration of anchors without cutting rebar, each size of self-drilling anchor being used on the project has been qualified according to the requirements of TVA General Construction Specification G-32. The qualification test reports have been reviewed by the Division of Engineering Design and found to be acceptable. Revision 5, dated July 21, 1977, was made to General Construction Specification G-32 which required qualification tests for all anchorages set in hardened concrete before installation at the plant site. The plant site was admonished to more closely follow the requirements of the G-32 specification.

## ENCLOSURE 2

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2  
EXPANSION SHELL ANCHORS INSTALLED  
IN HOLES WITH CUT REINFORCING STEEL  
10 CFR 50.55(e)  
NONCONFORMANCE REPORT 898  
FINAL REPORT

### Description of Deficiency

Supports for safety-related cable trays and heating and ventilation ducts were installed using expansion shell anchors in core-drilled holes when rebar had been cut as allowed by the design drawings. The installed attachments were thought to have a reduced load-carrying capacity. This type of installation was not covered by TVA General Construction Specification G-32. An evaluation was initiated to determine if this type of installation is equivalent to that covered in G-32 specification. The results indicated a reduction in tensile values for expansion anchors installed through rebar.

### Safety Implication

Because the testing and analysis for the anchors was found acceptable, had the subject condition remained uncorrected, it could not have affected adversely the safety of operation of the plant.

### Corrective Action

In order to determine the actual capacity of in-place supports, a random survey was initiated in accordance with the OIE Bulletin 79-02 inspection guidelines. The survey was performed on those attachments which were installed before issuance of revision 6 to G-32. For the survey, plate loads were obtained through analysis and worst case loadings were chosen for anchor load determination.

A total of 363 anchors were evaluated representing 78 supports. Of these supports, only one was found to be incapable of supporting its load; however, failure of this support would not have jeopardized the safe operation of the plant during a seismic event. The remaining supports were found to be adequate with actual anchor loadings well below the design values.

In addition to performing analysis on the attachments, revision 6 to the G-32 construction specification dated February 17, 1981 was made to prevent use of expansion shell type anchors in holes with cut rebar. This was made to ensure against recurrences and similar deficiencies at Bellefonte Nuclear Plant and other TVA nuclear plants.