

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401  
400 Chestnut Street Tower II

83 SEP 20 All: 25  
September 16, 1983

WBRD-50-390/81-59  
WBRD-50-391/81-55

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:

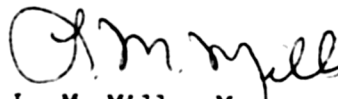
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - ROCK SUPPORTED STRUCTURES  
DIFFERENTIAL SETTLEMENT - WBRD-50-390/81-59, WBRD-50-391/81-55 -  
FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector  
R. V. Crlenjak on July 7, 1981 in accordance with 10 CFR 50.55(e) as  
NCR WBN CEB 8108. Interim reports were submitted on August 6 and  
November 9, 1981; March 15, May 17, June 29, and October 5, 1982; and  
May 4, 1983. Enclosed is our final report.

If you have any questions, 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

8309230386 830916  
PDR ADOCK 05000390  
S PDR

## ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
ROCK SUPPORTED STRUCTURES DIFFERENTIAL SETTLEMENT  
NCR WBN CEB 8108  
WBRD-50-390/81-59, WBRD-50-391/81-55  
10 CFR 50.55(e)  
FINAL REPORT

### Description of Deficiency

During a recent review of Watts Bar Commitment item No. WBN-SER-003, which states that "The foundations (of Category I rock supported structures) will be designed to behave independently under the specified loads and accommodate 1 inch differential settlements," TVA discovered that there was no documentation or evidence of completion of this commitment. The Preliminary Safety Analysis Report, Final Safety Analysis Report, and NRC's draft Safety Evaluation Report state that the rock supported structures will be designed for a 1 inch differential settlement, but this 1 inch differential settlement criterion is not given in any of the Design Criteria except for one concerning water stops between buildings. Apparently at that time, this type of information was not placed in Design Criteria but was sent by an internal TVA memorandum. This memorandum has been identified as F. P. Lacy to J. W. Smith dated March 5, 1971, WBNP - Foundation Characteristics and Expected Settlement.

This condition represents a potential deficiency in the final design since there is no evidence that the requirements of the memorandum were satisfied and since issued Design Criteria did not state that the foundations (of Category I rock supported structures) would be designed to behave independently under the specified loads and accommodate 1 inch differential settlements as required. Also, as a result, there are apparently no Design Criteria that have this requirement for the design of adjacent rock supported structures, or for the design of electrical conduits or piping between adjacent Category I structures.

### Safety Implications

In general, failure to incorporate design information into plant design could cause errors in design such that a safety-related system would not be able to meet operations conditions or conditions occurring from a design basis event and adversely affect plant operation.

Specifically, the effect of the failure to include the 1-inch differential settlement between adjacent rock-supported structures would be limited to HVAC duct, cable trays, Category 1 piping, instrument lines, and conduit (plus their related supports) which pass between adjacent buildings. Through evaluation TVA has determined that all such HVAC duct, cable trays, and their supports can withstand a 1-inch settlement as is. TVA has also determined by analysis of settlement data on all Category 1 structures in the main plant area that the differential settlement of adjacent structures would not be 1 inch, but rather the maximum differential would be less than 1/2 inch. (This 1/2 inch figure is based on settlement which occurred in

1976 and early 1977 which is before the great majority of utility lines were installed. The analysis also demonstrates that after 1982 no significant settlement will occur.)

By the engineering judgment of TVA design personnel, the conservatism inherent in the design of the plant is sufficient to accept the effects of this settlement on Category I piping, conduit, and instrumentation lines without causing line failure or adversely affecting safe operation of the plant.

Corrective Action

To control quality information and ensure that integrity of TVA's overall QA program, TVA has issued a <sup>x0</sup> Division of Engineering Design (EN DES) Engineering Procedure (EP) 1.50, "TVA Memorandums Transmitting Quality Information - Handling in EN DES." This action will prevent a recurrence of the subject nonconformance.