TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

83 SEP 20 A11 : 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

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 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.