UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# TENNESSEE VALLEY AUTHORITY

# EVALUATION OF CONCRETE ELASTIC MODULUS FOR REANALYSIS OF CATEGORY I CIVIL STRUCTURES

# BELLEFONTE NUCLEAR PLANT, UNITS 1 AND 2

# DOCKET NOS. 50-438 AND 50-439

## 1.0 INTRODUCTION

In its submittal of a position paper of February 14, 1991 regarding reanalysis of seismic design of Category I structures of Bellefonte Nuclear Plant, Units 1 and 2 (BLN) (Reference 1), TVA proposed to use the effective concrete elastic modulus of 0.5 to 0.75 times the modulus obtained from the laboratory static tests. The basis for using this effective modulus is the study performed by Stone and Webster Engineering Corporation (TVA consultant) for the Watts Bar Nuclear Plant (WBN) and the use of the effective modulus for the WBN seismic analysis of Category I structures.

The NRC staff reviewed the February 14, 1991 TVA position paper and issued a safety evaluation on August 29, 1991 (Reference 2). In that safety evaluation the NRC staff concluded that the use of the effective concrete elastic modulus for BLN seismic reanalysis is not acceptable, and requested that TVA revisit the construction records, compare the data and other information for BLN with the WBN records, and provide justification for the adequacy of the reduced modulus of concrete elasticity for BLN seismic structural reanalysis. On September 3, 1991 (Reference 3), TVA provided the justification for the use of reduced modulus of concrete elasticity at BLN. This safety evaluation evaluates the TVA justification outlined in Reference 3.

## 2.0 EVALUATION

From the review of the Attachment to Reference 3, the NRC staff noted that TVA demonstrated to the NRC's satisfaction that the modulus of elasticity of BLN concrete mixes is approximately the same as the WBN concrete mixes. Therefore, the NRC staff's conclusions drawn for WBN concrete elastic modulus (Reference 4) are applicable to BLN concrete.

## 3.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the use of the effective concrete modulus (reduced modulus) of elasticity for BLN seismic structural reanalysis is acceptable.

## 4.0 REFERENCES

1. Letter from E. G. Wallace (TVA) to NRC Document Control Desk, "Transmittal of TVA Position Regarding Seismic Design of Category I Structures," dated February 14, 1991.

2. Letter from Mohan C. Thadani (NRC) to Dan A. Nauman (TVA), "TVA Positions Regarding Seismic Design of Category 1 and 2," dated August 29, 1991.

3. Letter from E. G. Wallace (TVA) to NRC Document Control Desk, "Bellefonte Nuclear Power Plant (BLN) - Transmittal of Additional Information Required for the Position Paper Regarding the Seismic Design of Category I Structures," dated September 3, 1991.

4. NRC Inspection Report Nos. 50-390/89-21 and 50-391/89-21 dated May 10, 1990.

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