

REPORT OF EFFECT OF OUTDATED AMPLIFIED RESPONSE
SPECTRUM CURVES ON SERVICE WATER PUMPHOUSE SETTLEMENT

NORTH ANNA UNITS 1 AND 2

During the review of the seismic analysis of Category I piping, as required by Inspection and Enforcement Bulletin No. 79-14, an inconsistency was discovered in the way in which certain of the seismic amplified response spectrum (ARS) curves were used as input data to the stress analysis (Information about amplified response spectra can be found in section 3.7.2 of the North Anna 1 & 2 FSAR). An investigation showed there to be three types of inconsistencies in the ARS data. The first inconsistency was that certain curves had two or more values of acceleration for the same period (i.e., multiple periods). The second was that the peak-spreading (the technique used to develop a conservative envelope) of some curves was not exactly ± 15 percent of the peak's period as described in FSAR Section 3.7.3. The third discrepancy was that a few of the ARS curves were not the most current. It has been determined by a complete review of the ARS input to pipe stress calculations that there are no inconsistencies other than those described above.

The piping systems affected by the above findings are located in the Service Water Pump House, the Auxiliary Building, the Safeguards Buildings, the Fuel Building, the Auxiliary Feedwater Pump Houses, and the Main Steam Valve Houses. Curves having multiple periods were used in the Main Steam Valve Houses, the Fuel Building, and the Safeguards Buildings. The peak spreading problem affects only those analyses using the ARS data for the Unit I Main Steam Valve House. Outdated curves were used for analyses in the Service Water Pump House, the Auxiliary Building and the Auxiliary Feedwater Pump Houses.

These discrepancies affect only the dynamic analysis of piping systems. The static analysis involving seismic building movements is not affected. In addition, the ARS inconsistencies apply only to analyses using the SHOCK III program and not those using the NUPIPE program.

The only portion of the piping in the Service Water Pump House (SWPH) that is affected by the use of outdated ARS curves is that which extends from the point at which the two 36-inch discharge headers are embedded in the north wall of the SWPH to the pumps inside the structure. The two 36-inch return headers and the service water spray piping to the south of the SWPH are not affected. The stress analysis of the affected piping is not affected by the pump house settlement, nor is it related to the motion of the short section of pipe that extends from the north face of the SWPH to the expansion joints. The motion of that short section of pipe is a direct result of pump house seismic motion. The seismic input information used to calculate the SWPH motion has been reviewed and is current.

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The analysis of the buried piping and the expansion joint outside of the SWPH is completely unaffected by SHOCK III because that analysis was conducted using the NUPIPE program. Since NUPIPE requires input data in a format that is different from the data for the SHOCK III program, a separate file of digitized ARS curves is maintained for NUPIPE analyses. The ARS curves that were used with NUPIPE for the SWPH buried piping and expansion joint analysis are current, as has been verified by a recent detailed check. Therefore, the existing analysis is valid and not affected by the SHOCK III format inconsistencies described above.

In order to verify our piping seismic design, we are revising all computerized analyses which had inconsistencies in the SHOCK III format ARS input. As explained above, however, the analyses performed on the expansion joints and the buried lines north of the SWPH and on the service water spray piping south of the SWPH are not affected by the inconsistencies. Therefore, our design analysis and consequently, our testimony before the Appeal Board*remains valid.

*Hearing of June 18-20, 1979.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

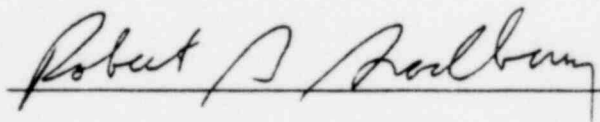
In the Matter of) Doc. Nos. 50-338 OL
) 50-339 OL
VIRGINIA ELECTRIC AND POWER COMPANY)
) (Pumphouse Settlement and
(North Anna Power Station, Units) Turbine Missiles)
1 and 2)

AFFIDAVIT OF
ROBERT B. BRADBURY

My name is Robert B. Bradbury. My business address is 245 Summer St., Boston, Mass. I am the Project Engineer for North Anna Unit 2 with the Stone & Webster Engineering Corporation. A statement of my professional qualifications was entered into the record of this proceeding at the hearing June 18-20, 1979. I am responsible for the execution of all engineering on the project, including pipe stress analysis. I am familiar with the overall conduct of these analyses.

Some of my colleagues and I at Stone & Webster Engineering Corporation have prepared a report from the Atomic Safety and Licensing Appeal Board entitled "Report on Effect of Outdated Amplified Response Spectrum Curves on Service Water Pumphouse Settlement - North Anna Units 1 and 2." A copy of that report is attached to and made a part of this affidavit. I assisted in and supervised the preparation of the report.


Because of my involvement in North Anna 1 and 2. I am satisfied that the report attached as this affidavit is true and correct to the best of my knowledge and belief.



Commonwealth of Massachusetts

Suffolk County, ss.

The foregoing instrument was acknowledged before me this 14th of December, 1979.



Notary Public
My Commission Expires September 21, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of) Doc. Nos. 50-338 OL
) 50-339 CL
VIRGINIA ELECTRIC AND POWER COMPANY)
) (Pumphouse Settlement and
(North Anna Power Station, Units) Turbine Missiles)
1 and 2)

AFFIDAVIT OF
Glenn P. Milley

My name is Glenn P. Milley. My business address is 245 Summer Street, Boston, Massachusetts. I am a Lead Engineering Mechanics Engineer with the Stone & Webster Engineering Corporation. An accurate statement of my professional qualifications is attached as a part of this affidavit.

I have worked on and supervised pipe stress analysis work for safety-related piping systems throughout the last seven years. I have worked exclusively on the North Anna Units 1 and 2 for four years.

Some of my colleagues and I at Stone & Webster Engineering Corporation have prepared a report for the Atomic Safety and Licensing appeals Board entitled "Report on Effect of Outdated Amplified Response Spectrum Curves on Service Water Pumphouse Settlement - North Anna Units 1 and 2." A copy of that report is attached to and made a part of this affidavit. I supervised and directed the preparation of this report.

Because of my involvement in the pipe stress analyses at North Anna 1 and 2, I am satisfied that the report attached to this affidavit is true and correct, to the best of my knowledge and belief.

Glenn P. Milley

Commonwealth of Massachusetts
Suffolk County, ss.

The foregoing instrument was acknowledged before me this 14th day of December 1979.

John D. [Signature]
Notary Public
My Commission Expires September 21, 1984

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PROFESSIONAL QUALIFICATIONS
GLENN P. MILLEY
LEAD ENGINEER - NORTH ANNA UNIT 1&2
STONE & WEBSTER ENGINEERING CORPORATION

My name is Glenn P. Milley. My business address is 245 Summer Street, Boston, Massachusetts. I am a Lead Engineer assigned to the North Anna Units 1 and 2 Power Plant Projects. My present responsibilities are the review and supervision of all work and personnel assigned to pipe stress and pipe support analysis, structural mechanics and mechanical design and analysis.

I received a B.S. degree in Mechanical Engineering from Lowell Technological Institute in 1971 where I minored in stress analysis. I also received a Master's degree in Mechanical Engineering from Northeastern University in 1976.

I have been employed by Stone & Webster in the Pipe Stress and Supports Section since 1973. I have worked on and supervised pipe stress analysis of Class 1, 2, 3 and non Q piping systems on both fossil and nuclear power stations. I have worked on the Vepco project exclusively since March of 1976.

I am a registered Professional Engineer in the state of Massachusetts.