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VIRGINIA ELECTRIC AND POWER COMPANY, RICHMOND, VIRGINIA 23261

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May 24, 1979

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Mr. James P. O'Reilly, Director
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Serial No. 407
PSE&C/DPB:mac:wang

Docket No. 50-404
50-405

Dear Mr. O'Reilly:

IE BULLETIN NO. 79-07
NORTH ANNA POWER STATION UNITS 3 AND 4

IE Bulletin 79-07 requested certain information concerning seismic analysis of safety-related piping. The following is our response to this Bulletin.

No computer codes have been identified that were used by Stone & Webster (S&W) which used any of the methods described in Item 1 of the Bulletin.

Babcock & Wilcox (B&W) has confirmed that the spectral methods described in the Bulletin were not used by them. Instead, modal reactions were determined, then the square root of the sum of the squares (SRSS) of the modal contributions were determined for the entire structure. Stresses were calculated using the absolute summation of the maximum horizontal earthquake response with the vertical earthquake response. The B&W analysis is limited to the hot leg, cold leg, surge line and spray piping.

In response to Item 3, the following computer programs were used by S&W in the seismic stress analysis of safety-related piping for North Anna Units 3 and 4:

1. NUPIPE 03/01 through 03/10
2. PSTRESS/SHOCK III 03/03

Verification of these computer programs used by S&W are being addressed in response to the April 2nd Addendum to the March 13th "Order to Show Cause" for Surry Units 1 and 2. S&W's in-house benchmarking links all major versions of NUPIPE to Version 03/10.

The following computer programs were used by B&W:

1. ST3DS/LUMS
2. S3PIPE
3. PISOLIA

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The analyses of hot leg, cold leg and surge line piping were performed by B&W using ST3DS/LUMS (References 1&2). These computer codes were verified using sample problems contained in the users manuals. The combination of modal loadings by SRSS was verified by hand calculation. The combination of directional earthquake response and the calculation of piping stresses was performed by computer code S3PIPE (Reference 3). Verification of the method of combining directional earthquake response was performed by hand calculations. The analysis of the spray piping was performed by EDS Nuclear of New York using computer code PISOLIA. PISOLIA has been verified through independent analysis by the Bechtel Power Corporation of San Francisco. In addition, the program has been benchmarked by EDS against the ASME Sample Problem #1 contained in ASME publication, "Pressure Vessel and Piping 1972, Computer Programs Verification."

References

1. A.S. Kadakia, P.G. Tuttle: "Users Manual, ST3DS Piping Flexibility Analysis Program as Modified by B&W Application," NPGD-TM-126, Babcock & Wilcox, P. O. Box 1260, Lynchburg, VA 24505, May 1971.
2. P.G. Tuttle, A.S. Kadakia: "Users Manual, Piping Flexibility Analysis Program LUMS as Modified by B&W Application," NPGD-TM-127, Babcock & Wilcox, P. O. Box 1260, Lynchburg, VA 24505, January 1971.
3. J.M. Anderton, J.E. Galford, F.M. Rundle: "Users Manual, ASME Section III Pipe Stress Analysis Program S3PIPE," Babcock & Wilcox, Nuclear Power Generation Division, P. O. Box 1260, Lynchburg, VA 24505, 1971.

This completes our response to IE Bulletin 79-07. If there are any additional questions, please contact us.

Very truly yours,

Sam C. Brown, Jr.

Sam C. Brown, Jr.
Senior Vice President - Power Station
Engineering and Construction

cc: Mr. John G. Davis, Acting Director
Office of Inspection & Enforcement

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation

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