NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

November 9, 1984

Docket No. 50-423
B11367

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Youngblood:

Millstone Nuclear Power Station, Unit No. 3
Use of Alternative Damping Criteria

As suggested by the Mechanical Engineering Branch (MEB) at a meeting with representatives of Northeast Nuclear Energy Company (NNECO) on September 13-14, 1984, NNECO hereby submits its intention to change the modal damping values utilized for the dynamic analysis of piping systems. The FSAR currently specifies the use of ½% damping for the Operating Basis Earthquake (OBE) and 1% damping for the Safe Shutdown Earthquake (SSE) events. NNECO proposes to utilize the damping curve developed by the Pressure Vessel Research Council (PVRC) in ASME code case N-411 for both OBE and SSE events. The increased damping values provided by the PVRC curve will be utilized during our stress reconciliation program (i.e., finalization of pipe stress analysis or piping systems backfits) in order to avoid costly and schedule sensitive pipe support modifications due to conservatively developed seismic loads. The necessary FSAR changes are attached, and will be included in a subsequent Amendment to the FSAR.

Any increase in seismic piping displacements which result from the use of the higher damping values will be accounted for.

In developing new building acceleration response spectra (ARS), the peak broadening and smoothing techniques provided in NRC Regulatory Guide 1.122 will be utilized. The balance of the FSAR commitments for the development of ARS and their application to the dynamic analysis of piping remain the same.

Since the stress reconciliation effort is currently underway, an expeditious response is requested. If you have any questions or concerns regarding this submittal, please feel free to contact my licensing staff directly.

Very truly yours,

W. G. Counsil
W. G. Counsil
Senior Vice President

3001
1/1

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me W. G. Counsil, who being duly sworn, did state that he is Senior Vice President of Northeast Nuclear Energy Company, an Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Lorraine J. D'Amico
Notary Public

My Commission Expires March 31, 1988

1. Amplified Response Spectra (ARS)

   Obtained for discrete locations in the structure where the piping systems are supported. Enveloping and peak broadening procedures are applied on these ARS curves before input, as described below. Damping values used for piping are 0.5 percent for OBE and 1 percent for SSE (Section 3.7B.1.3), except that increased damping values may be applied on an as-needed basis for final stress reconciliation (or piping system backfits) in accordance with ASME Code Case N-411 (Figure 3.7B-71).

2. Seismic Piping Anchor Movements

   Seismic piping anchor movements are obtained from seismic displacements of structures at piping anchor and support locations. These movements are used as static input to calculate the resulting internal forces and moments throughout the piping system. The methods used to consider differential piping support movements at different support points are discussed in Section 3.7B.3.8.

Where a piping system is subjected to more than one response spectrum, as when support points are located in different parts of the structure or in separate structures, an enveloping procedure as well as peak broadening is applied to generate a composite, or worst-case, spectrum for analysis. Peak broadening of minus 15 percent and plus 15 percent of peak frequencies is provided to account for uncertainties in the calculated values of structural frequencies. Accordingly, piping systems designed using those amplified response spectra having natural frequencies within ± 15 percent of the peak resonant frequency will be assigned the peak response value(s). Outside this range, the amplified response spectra will be used exactly as stated. The response spectra modal analysis provides peak response quantities for each mode which are then combined according to Section 3.7B.3.7. All significant dynamic modes of responses under seismic excitation with frequencies less than 50 cps or modes less than 50, whichever is reached first, are included in the dynamic analysis described in Section 3.7B.3.8. The combined seismic responses, together with internal forces and moments due to seismic anchor movements, are then combined with other loadings according to ASME Section III Code, Articles NB-3600 (Class 1 piping), NC-3600 (Class 2 piping), or ND-3600 (Class 3 piping).

Time-history modal superposition analysis is employed for fluid-induced transient dynamic problems (e.g., water hammer and steam hammer), but is not used for piping seismic analysis.

Small size seismic Category I piping systems (Section 3.7B.3.5.2) are seismically qualified, in part, by the application of standard span procedures. The standard span procedures are restricted to small bore piping systems (1-inch and below ASME Class 1 and 2-inch and below ASME Class 2, 3, and ANSI B31.1) which meet the criteria of the prequalified analysis.

No tests or empirical methods are used in lieu of analytical methods for all Seismic Category I piping.

TABLE 3.7B-1

DAMPING FACTORS

Stress Level	Type of Condition of Structure, System or Component	Percent of Critical Damping
1. Low stress, well below proportional limit. Stresses below 0.25 yield point stress	Steel, reinforced concrete; no cracking and no slipping at joints, piping or components	0.5 to 1*
2. Working stress limited to 0.5 yield point stress	a. Welded steel, well reinforced concrete (with only slight cracking)	2
	b. Bolted steel	5
3. At or just below yield point	a. Welded steel	5
	b. Reinforced concrete	5
	c. Bolted steel	7
4. At all stress levels	a. Rock (translation)	10
	b. Rock (rotation)	

* For final reconciliation of pipe stress analysis or piping system backfits damping values as defined in ASME Code Case N-411 (Figure 3.7B-71) may be utilized for both OBE and SSE.

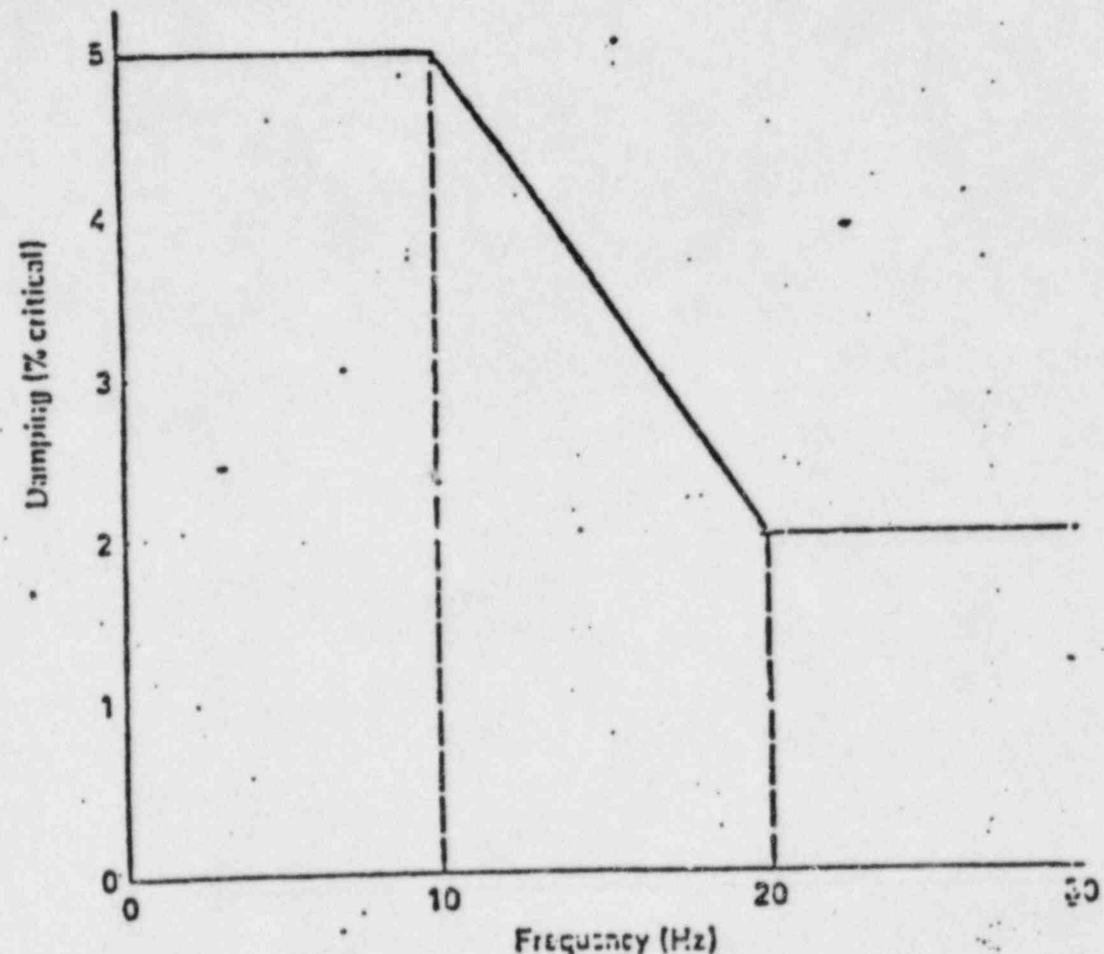

Figure 3.7B-71

Damping Value for Seismic Analysis of Piping

(Applicable to both OBE & SSE, Independent of Pipe Diameter)