Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

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Mr. Paul O'Connor
Project Manager
Operating Reactors Branch No. 5
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden 2
SEP Topic III-6,
Seismic Design Considerations

NRC Docket 50-237

Reference: T.J. Rausch's letter of January 8, 1982 to Paul O'Connor.

Mr. O'Connor:

In response to Tom Cheng's request that Edison provide additional information concerning the results summarized in the above referenced letter concerning motor-operated valves on small piping the following information is being provided.

A total sample of nine piping subsystems (small lines) that include twelve massive valves were accessible for field survey at the time of the study. Out of the nine subsystems, three subsystems with four valves were selected to represent the worst cases. The selection of these subsystems was based on Sargent & Lundy's engineering judgment taking into consideration the valve weights as well as the suspension system. As a result, the four selected valves, in the three subsystems, represent 33% of the total samples. These valves are:

Valve No.	Line No.	P&ID	Description
AO-2-1601-58	2-8505-1 1/2"	M-25	Pressure Suppression Piping
AO-2-1601-59	2-8508-1 1/2"	M-25	Pressure Suppression Piping
MO-2-1402-38A	2-1407-1 1/2"	M-27	Core Spray Piping
CV-0302-21A	2-0326-1"	M-34	Control Rod Drive Piping

Based on field survey information, a computer analysis of each valve and its associated piping was considered. Each valve was represented by three elements in a triangular shape with a node located at each end of the valve and at the valve's estimated center of gravity. Piping adjacent to each valve was considered up to the nearest anchors or to where sufficient piping and piping supports would reflect results had the entire system been included. Piping remote from the valves would not experience valve induced pipe stresses.

Weight and seismic loadings were considered for each valve. Valve weights were conservatively estimated to be 120 lbs.

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A response spectra method was used to determine stresses due to a seismic event. The response spectra, with 0.005 Damping Ratio, were taken from the original Blume Report - Dresden Seismic Analysis Combined Reactor and Turbine Buildings, which was transmitted to Sargent & Lundy from General Electric in October 1969 and was used in the initial plant design.

The following steps were taken in performing the seismic analysis for the selected subsystems:

- The response spectra used in the analysis were based on valve locations with respect to the building.
- A maximum of 20 modes of vibration were considered.
- X, Y, and Z excitation responses were combined by the maximum of (X + Y) and (Y + Z) method to give the probable maximum excitations in the three directions (original criterion).
- DBE response was calculated as two times the OBE response.
- Anchors, fittings, and valves were considered as socket welded connections with a stress intensification factor of 1.3 (ANSI B31.1-1967).

Piping stresses for the cases considered varied based on pipe routing, pipe support configuration, the valve orientation and building response spectrum. These stresses were compared with ANSI B31.1-1967 allowables and the results can be summarized as follows:

Valves AO-2-1601-58 and AO-2-1601-59 were installed on the same subsystem. Valve AO-2-1601-58 and its associated piping experienced relatively low stresses. This can be attributed to the valve's proximity to pipe connection anchor to line 2-8506-18" and to the relatively low response spectra used. The highest stresses in this area reached 30.3% of upset condition allowable (5456 psi compared to an allowable of 18,000 psi) and 31.8% of emergency condition allowable (8589 psi compared to an allowable of 27,000 psi) at the anchor. The valve ends experienced 19.3% of upset condition allowable and 19.3% of emergency condition allowable. Valve AO-2-1601-59, located 5.25 feet from AO-2-1601-58, experienced higher stresses but remained within allowables: 55.4% of upset condition allowable and 71.7% of emergency condition allowable at the valve ends. Associated piping also experienced higher stresses including adjacent tee connection with stresses of 81.3% of upset condition allowable and 99.0% of emergency condition allowable.

Valve MO-2-1402-38A and its associated piping experienced maximum stresses at the valve ends of 44.3% of upset condition allowable and 43.3% of emergency condition allowable.

Valve CV-0302-21A and its associated piping was the most highly stressed among the cases considered. Piping reached stresses of 98.0% of upset condition allowable and 1.8% in excess of emergency condition allowable. This is considered insignificant.

It is to be noted that the calculated piping stresses are considerably conservative, when compared to the code allowable, due to the fact that the piping analysis used a 0.5% damping response spectra instead of the 2 to 3% damping as allowed by SEP criteria NUREG/CR-0098 and NRC Regulatory Guide 1.61. Additionally, the original seismic response spectra was employed, whereas the revised response spectra developed in 1980 for the SEP program has accelerations of approximately 2/3's of those used in the study.

Therefore, the results of the analysis indicates that the piping stresses induced by the impact of modelling massive valve C.G.'s can still meet the code (ANSI B31.1-1967) allowables with substantial safety margin. This conclusion can generally be extended to cover all small piping systems.

Please address any questions you may have concerning this matter to this office.

One (1) signed original and forty (40) copies of this transmittal have been provided for your use.

Very truly yours,

Thomas J. Rausch

Thomas J. Rausch
Nuclear Licensing Administrator
Boiling Water Reactor

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cc: RIII Resident Inspector, Dresden
Gregg Cwalina, SEP Integrated Assessment Project Manager