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Paul O'Connor, Project Manager
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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Seismic Design Considerations
SEP Topic III-6

NRC Docket 50-237

Dear Mr. O'Connor:

At the request of Dr. John Stevenson, Commonwealth Edison had General Electric prepare the attached letter-report discussing all the loads the piping can impose on the reactor pressure vessel.

Please direct any questions concerning this matter to this office.

Yours very truly,

Robert F. Janecek

Robert F. Janecek
Nuclear Licensing Administrator
Boiling Water Reactors

NPS/lcp
Attachments

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IMPOSED LOADS ON DRESDEN II

REACTOR PRESSURE VESSEL

Reference: 1. GE Drawing 885D910, Revision 6
2. Design Report for Dresden II Reactor
B&W Contract 610-0098,51/52, August 1970
Volume 5, Report 8, Sheet B-19-3

The nozzle reaction loads tabulated on Reference One were intended to include all loads that the piping can impose on the reactor pressure vessel (RPV) including seismic and restrained free end thermal loads. These loads were used by the RPV vendor as design mechanical loads and also as operating loads.

The nozzle reaction loads have a minimal affect on the RPV support skirt because the nozzles are located approximately uniformly around the RPV. Thus, the majority of the load from one nozzle will be reacted by the loads from the other nozzles not by the RPV skirt. For all types of nozzles listed in Reference One, the nozzles are 180° apart. That is, for any nozzle there is an identical nozzle 180° away. Thus, the Fx, Fz, Mx, and Mz forces will completely cancel and will not contribute any net load to the RPV skirt.

In addition, the magnitude of the nozzle reactions is small compared to the skirt loads. The below table shows that even if it is assumed that all nozzles are on the same azimuth and the absolute value of all loads are used, then the total moment at the RPV skirt due to nozzle reactions is only 26% of the maximum skirt design moment used in the RPV stress report (Reference Two). Similarly, the total shear force is only 13% of the maximum skirt design shear force.

NOZZLE	N	Fx Lb	Fz Lb	Fy Lb	F' 10^3Lb	L In	L+17 In	d In	Mx FtLb	Mz FtLb	M'x 10^6inLb	M'z 10^6inLb	M 10^6in
Recirc Inlet	10	4000	3600	3600	53.81	181	198.4	140	13500	16700	13.80	9.94	17.0
Recirc Outlet	2	3200	1040	3400	6.73	161.5	178.9	140	33000	116000	2.12	3.93	4.4
Steam Outlet	4	7200	12800	2000	58.74	620.	637.4	140	83000	26200	37.74	19.61	42.5
Feedwater	4	1350	1900	5700	9.32	486	503.4	140	45000	33000	9.18	4.30	[illegible]0.1
Iso Cond	2	15200	19300	3400	49.13	565	582.4	140	3100	32000	23.57	18.47	29.9
Core Spray	2	400	600	2000	1.44	472	489.4	140	23000	10700	1.70	0:65	1.8
					Σ179.17 x 10^3Lb								Σ105.8

N = Number of Nozzles

L+17= Distance from nozzle centerline to bottom of RPV support skirt.

d = Approximate radius of safe end of pipe weld

Fx, Fy, Fz, Mx, My are maximum nozzle load from reference 2.

$$F' = N \frac{\sqrt{Fx^2 + Fz^2}}{1000}$$

$$M'x = \frac{N}{10^6}\left[12\ Mx + Fz\ (L+17) + Fy\ d\right]$$

$$M'z = \frac{N}{10^6}\left[12\ Mz + Fx(L+17)\right]$$

$$M = \sqrt{(M'x)^2 + (M'z)^2}$$

Coordinate System shown below