ATTACHMENT 3

PEACH BOTTOM ATOMIC POWER STATION

UNITS 2 AND 3

MARK I LONG TERM PROGRAM PLANT UNIQUE ANALYSIS

DOCKET NUMBERS: 50-277 AND 50-278

PREPARED FOR

PHILADELPHIA ELECTRIC COMPANY

BECHTEL POWER CORPORATION
SAN FRANCISCO, CALIFORNIA

REVISION 1
AUGUST 1983

8308220339 830818
PDR ADOCK 05000277
P PDR

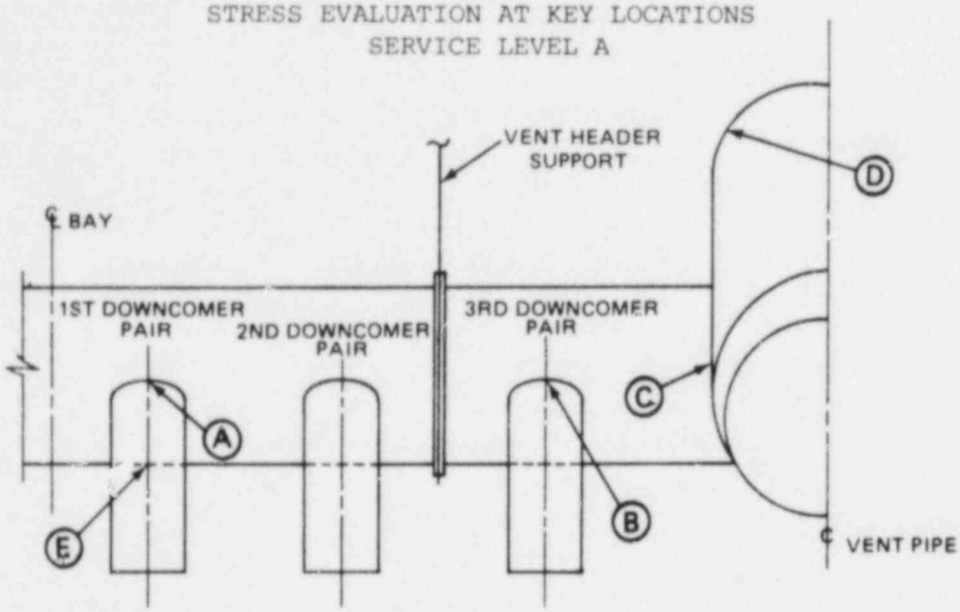
Table 7-1

VENT SYSTEM FREQUENCIES

Mode	Frequency (Hz)
1	8.03
2	11.02
3	11.07
4	13.31
5	13.64
6	13.87
7	14.16
8	14.47
9	14.87
10	17.09

Table 7-2

STRESS EVALUATION AT KEY LOCATIONS
SERVICE LEVEL A



Location	Stress Type	Calculated SI (ksi)	Allowable SI (ksi)	Ratio
Intersection between header and D/C 1 (A)	P_L	28.33	37.70	0.75
	$P_L + P_b + Q$	50.26	58.00	0.87
Intersection between header and D/C 3 (B)	P_L	8.01	37.70	0.21
	$P_L + P_b + Q$	38.30	58.00	0.66
Intersection between header and vent (C)	P_L	10.37	29.00	0.36
	$P_L + P_b + Q$	10.64	58.00	0.18
Main vent (D)	P_M	3.14	19.30	0.16
	$P_L + P_b$	3.34	29.00	0.12
	$P_L + P_b + Q$	3.68	58.00	0.06
Header between D/C 1 and D/C 2 (E)	P_M	10.08	19.30	0.52
	$P_L + P_b$	13.76	37.70	0.36
	$P_L + P_b + Q$	23.20	58.00	0.40

Table 6-3

DESIGN CASE TORUS PRESSURES AND FREQUENCY RANGES*

Load Case	Peak Pressure (psid)	Frequency Range (Hz)
A1.1	6.67	4.09 to 8.49
A3.1	6.67	4.09 to 8.49
A1.3	6.51	4.11 to 8.18
A1.2/A2.2/A3.2	7.53	6.25 to 11.63
C3.1	6.67	3.80 to 10.18
C3.2	7.53	5.31 to 13.49

*Calibration and multiple valve factors not included.

Table 6-4

TORUS FREQUENCIES

	Frequency (Hz)	
No.	Dry Structure	Coupled Structure
1	17.35	14.28
2	17.90	15.08
3	22.41	15.75
4	22.53	16.27
5	23.15	17.58
6	23.48	17.93
7	27.02	18.19
8	27.56	20.35
9	28.68	20.78
10	29.70	21.32

flow rate. Each of the three phases imparts distinctly characteristic dynamic pressures on the shell. The origin and methods of calculating plant unique loads are discussed in detail in the LDR. The plant unique loads are summarized here.

6.2.2.1 Pool Swell Loads

During a postulated LOCA, the torus shell is subjected to two types of pressure transients: (1) submerged pressure transients caused by the downward pressure of water on the wetted area of the torus shell and (2) torus air space pressure transients caused by compression of the air space above the pool surface.

The definition of these two types of torus shell pressure transients was based on test data obtained from the Quarter Scale Test Facility (QSTF) and the 1/12 Scale Test Facility. The methodology used for applying the test data to this analysis is described in Reference 11. Plant unique test data and test results for specific loading conditions are contained in Reference 18. The test results were based on a two-dimensional model. Additional margins were incorporated to account for three-dimensional effects. These adjustments to the test results were based on empirical scale factors. Different scale factors were applied to the download phase and the upload phase of the transient.

6.2.2.2 Submerged Pressure Transients

The basis for the definition of submerged torus shell loads is the "average submerged pressure." The average submerged pressure is the "base" pressure used in determining the pressure history at any submerged point in the torus shell. This is plant unique and is based on QSTF and 1/12-scale test results. Figure 6-13 shows the plant unique average submerged pressure transient for Peach Bottom Units 2 and 3. These QSTF average pressures are adjusted by margins based on empirical relations defined in Reference 11. This additional margin works out to be 21.2% of the net download for the download phase of the transient.

6.2.2.3 Air Space Pressure Transients

The torus air space pressure transients are also based on QSTF tests. The plant unique pressure transient for this portion of the torus shell is shown in Figure 6-14. The magnitude of the QSTF pressure transient for the upload phase was increased by an additional margin of 31.5% of the net upload. The upload additional margin was applied only to that portion of the transient representing the upload phase, starting from the beginning of the upload phase to the end of the transient.

Figure 6-15 shows the adjusted pressure transients in the wetted surface and air space.

6.2.2.4 CO and Chugging Loads

CO and chugging loads are cyclic in nature whereas the pool swell load is a transient. Plant unique CO and chugging loads are defined in the LDR.

6.2.3 SRV Discharge Loads

SRV discharge loads on the torus are transient pressures on the submerged portion of the shell. The SRV discharge phenomenon is briefly described in Section 3. The method of defining the SRV discharge load is given in the LDR. It provides two alternative methods of calculating torus shell loads. They are:

(a) Calculation of shell pressures using the General Electric program QBUBS

(b) Calculation of shell pressures using in-plant SRV test data.

For Peach Bottom, the latter method was used. A detailed test program was conducted in Peach Bottom Unit 2 after the quenchers were installed. Shell pressures and structural responses were measured. The General Electric fluid model QBUBS which calculates the torus shell pressures was calibrated to calculate interface shell pressures. The calibrated program was then

Table 5-3

GOVERNING LOAD COMBINATIONS FOR VENT HEADER PENETRATION

Combination No.	Service Level	Load Combinations	Column No. in Table 5-1, Ref 14
1	A	$N+SRV_m+IBA/SBA(P_A+T_A+R_A)+OBE$	12
+ 2	A	$N+SRV_m+IBA/SBA(P_A+T_A+R_A)+CH+OBE$	14
+ 3*	A	$N+DBA(R_A)+PS+OBE$	18
+ 4	A	$N+DBA(P_A+R_A+T_A)+CO+OBE$	20
5	C	$N+SRV_m+IBA/SBA(P_A+T_A+R_A)+CH+SSE$	15
6	C	$N+SRV_{ss}+DBA(R_A)+PS+SSE$	25
7	C	$N+DBA(P_A+R_A+T_A)+CO+SSE$	27

*(a) Evaluation for fatigue and primary plus secondary stress range is not required.

(b) For the pool swell impingement region of the vent system, allowable stresses may be increased to service Level C.

+(a) For local membrane stress intensity and primary membrane plus bending stress intensity, the S_m values may be increased to 1.3 S_m.

Table 5-4

GOVERNING LOAD COMBINATIONS FOR INTERNAL SUPPORTS

Combination No.	Service Level	Load Combinations	Column No. in Table 5-1, Ref 14
1	A	$N+SRV_m+IBA(P_A+T_A+R_A)+CH+OBE$	14
2	A	$N+DBA(R_A)+PS+OBE$	18
3	A	$N+DBA(P_A+T_A+R_A)+CO+OBE$	20
4	C	$N+SRV_m+IBA(P_A+T_A+R_A)+CH+SSE$	15
5	C	$N+SRV_s+DBA(R_A)+PS+SSE$	25
6	C	$N+DBA(P_A+T_A+R_A)+CO+SSE$	27

ILLUSTRATIONS