A7
Mark I
Owners Mtg 6/20/79

RELATIONSHIP OF SERVICE LEVEL ASSIGNMENTS TO LOADING COMBINATION CONSERVATISMS

NWE-1
6/29/79

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8001 030 678
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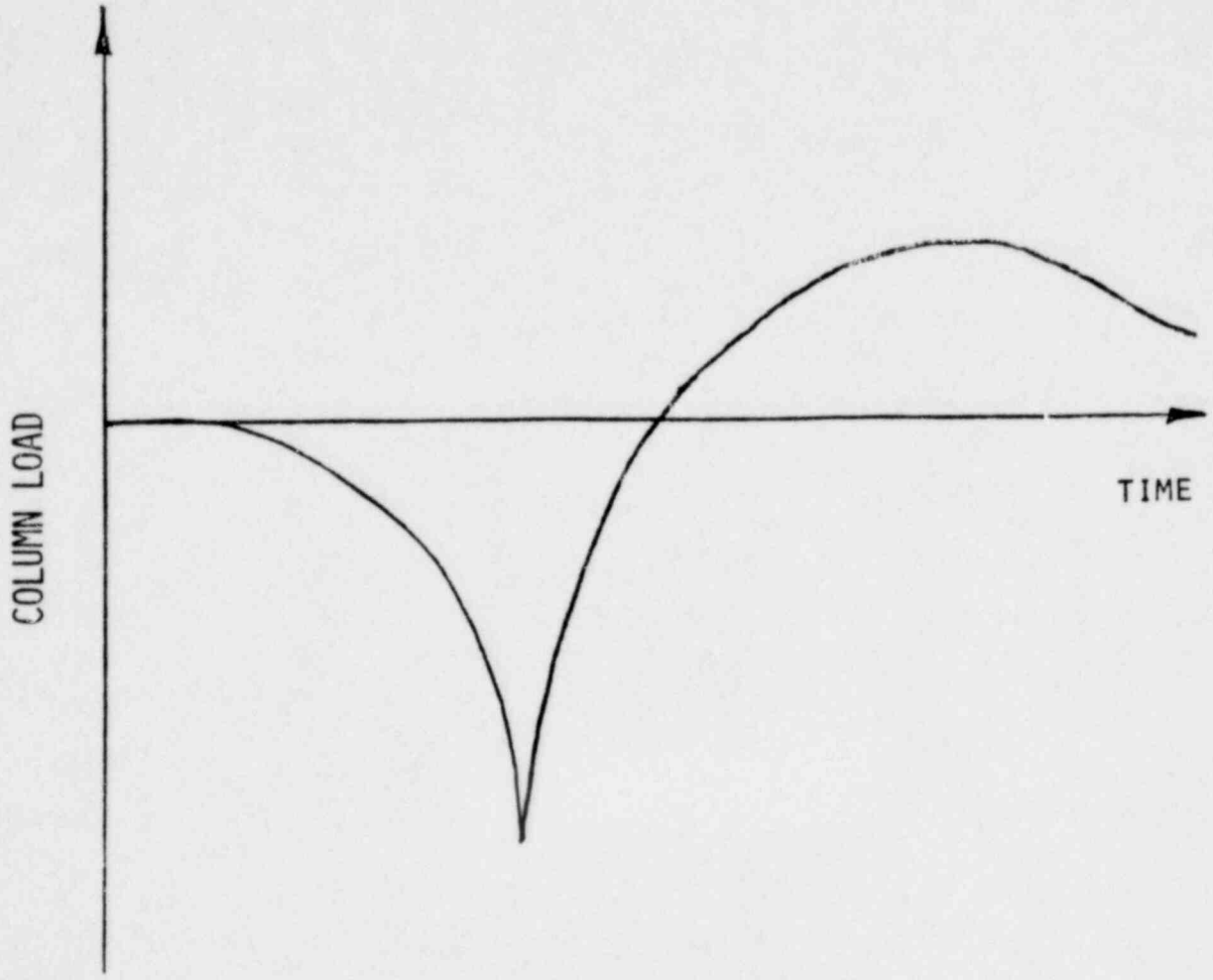
POOL SWELL COLUMN LOAD



NWE-2
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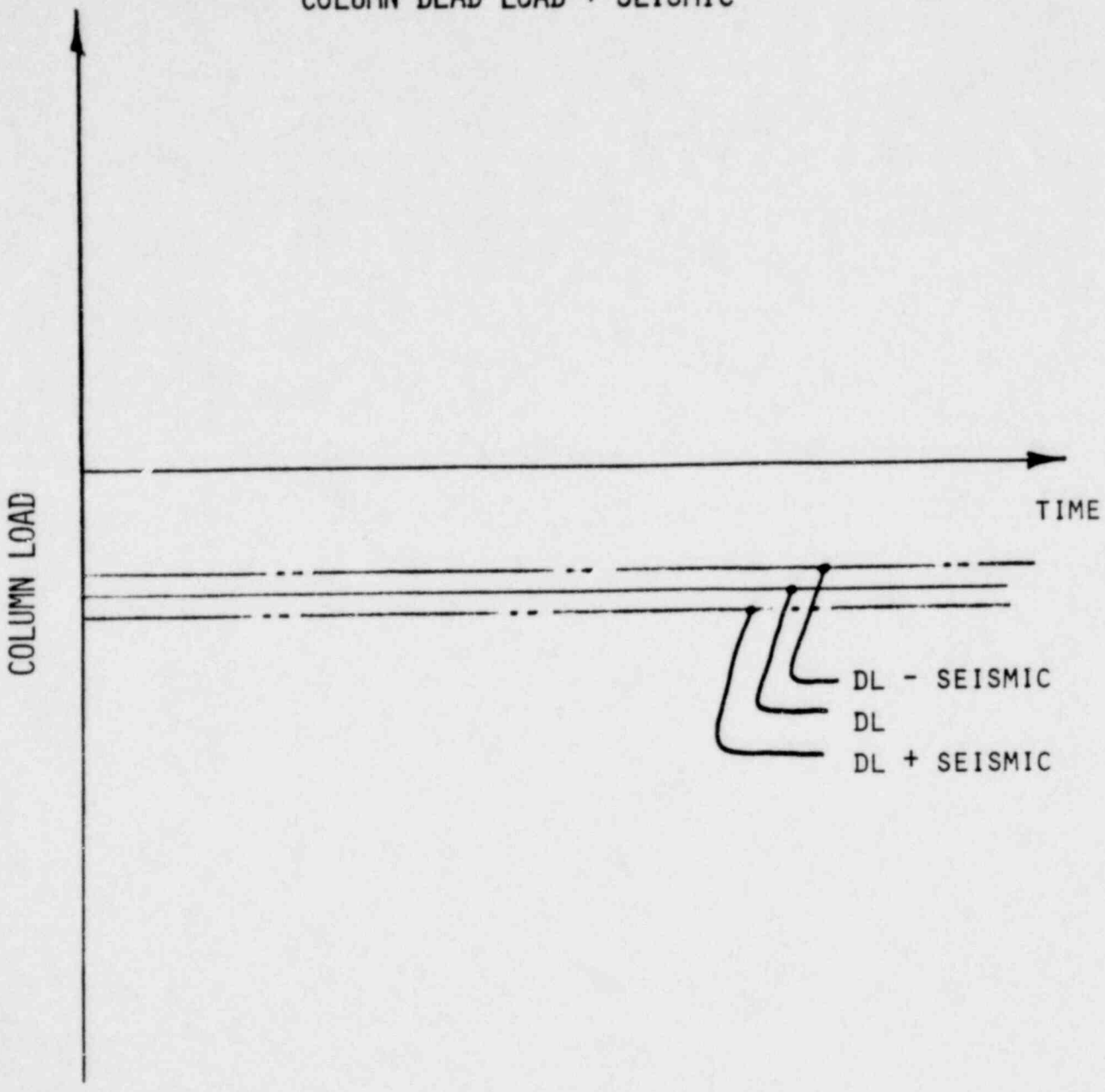
COLUMN DEAD LOAD + SEISMIC



NWE-3
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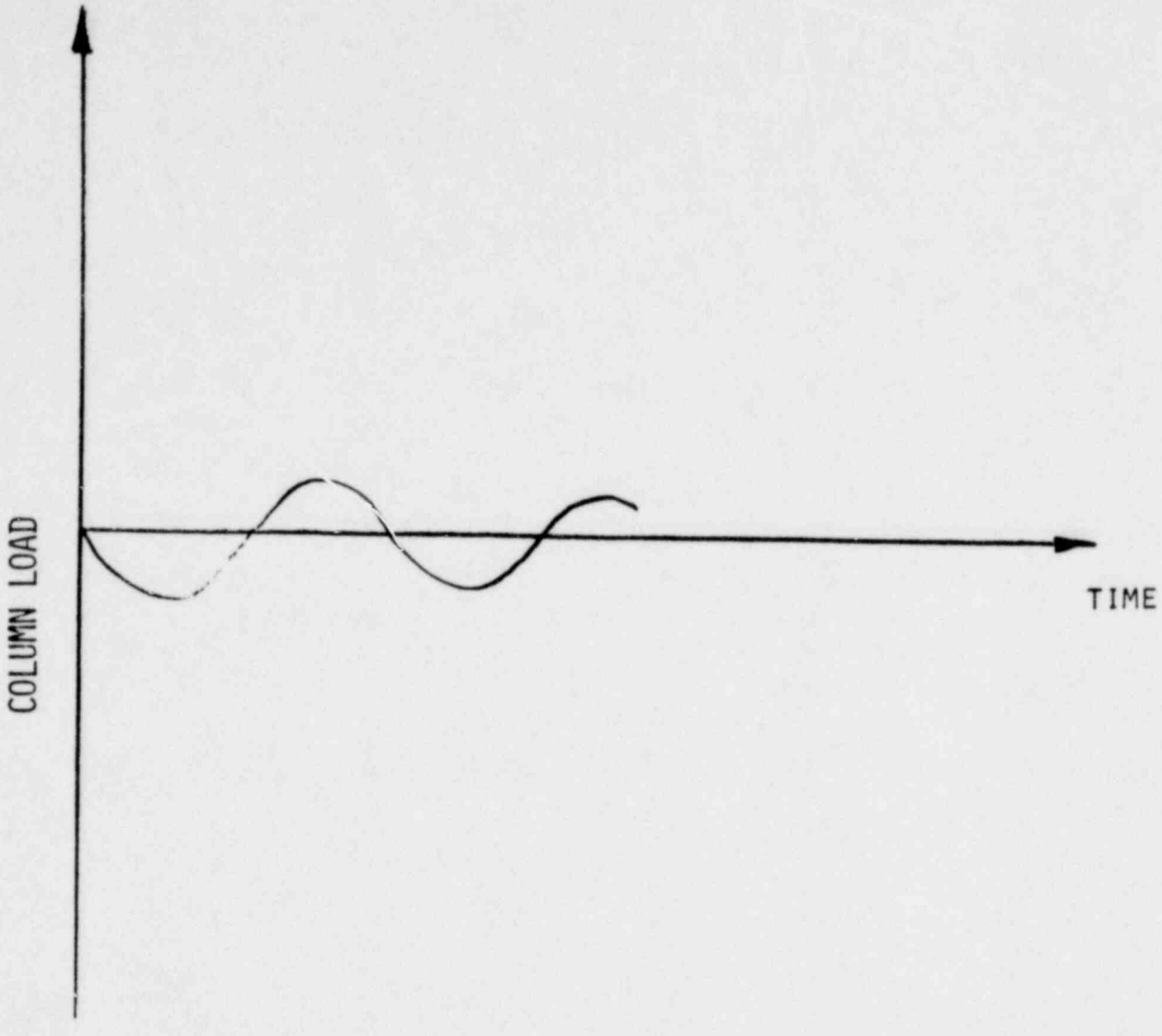
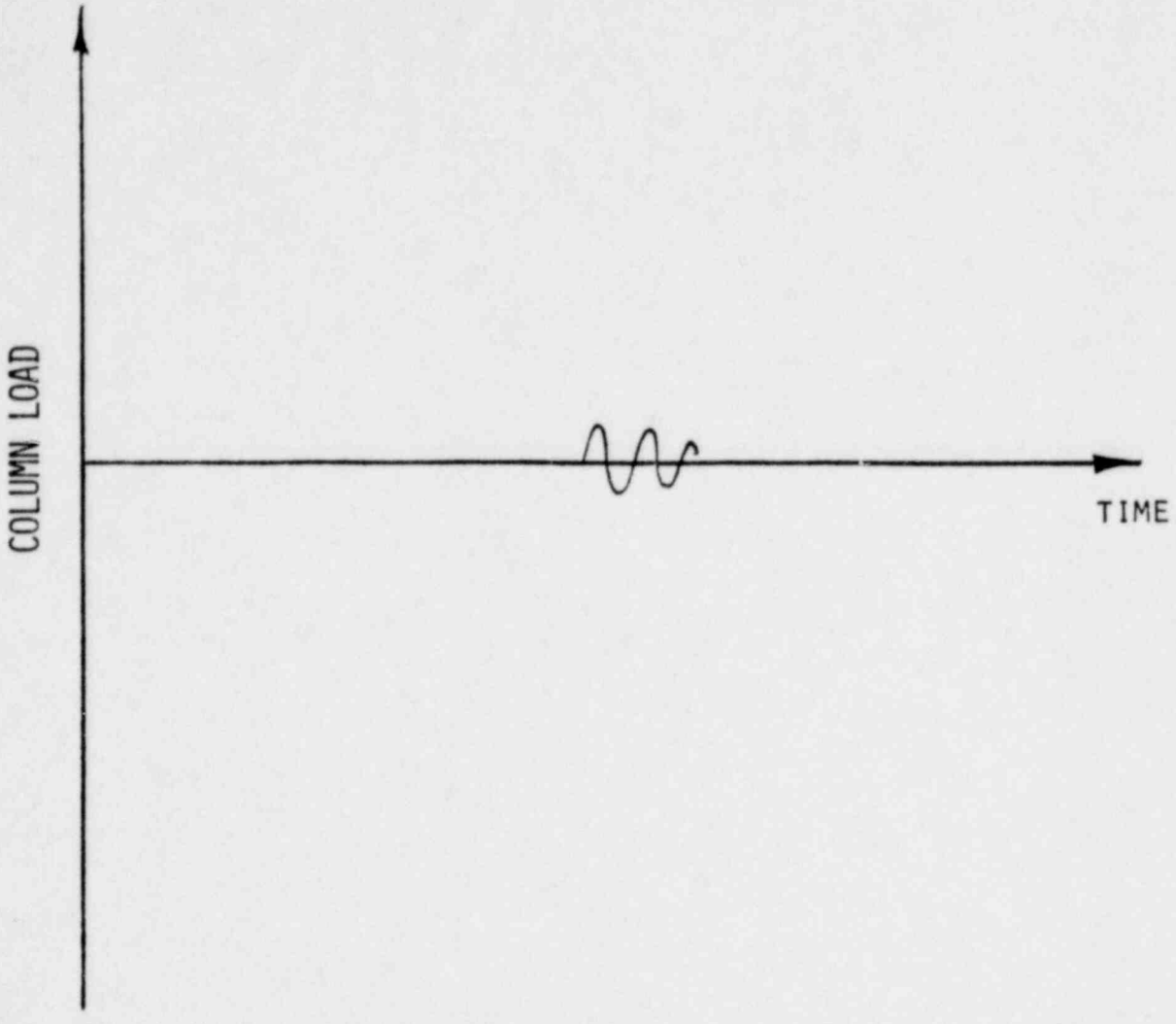
SRV DISCHARGE COLUMN LOADS



VENT HEADER IMPACT COLUMN LOADS



NWE-5
6/29/79

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TYPICAL NOMINAL COLUMN LOADS

LOADING	COLUMN REACTION (KIPS)
DEAD LOAD	-185
SEISMIC	-20 +20
P.S. PRESSURES	-625 +240
P.S. VENT HDR REACTIONS	-10 +40
SINGLE SRV (TEST)	-100 +60
SINGLE SRV (LDR AMP. RATIO)	-190 +110

1700 220

NWE-6
6/29/79

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NET COLUMN TENSION

	LOADING	NET TENSION (K)	% OF NOMINAL
(A)	NOMINAL (DL - EQ + $P.S._{MEAN}$)	75	100
(B)	NOMINAL + 2σ	90	120
(C)	1.15 NOMINAL + 2σ	125	167
(D)	(C) + SRV_{TEST}	185	247
(E)	(C) + SRV_{LDR}	235	313
(F)	(C) + $\sqrt{SRV^2_{LDR} + (\text{VENT HDR})^2}$	242	322
(G)	(C) + SRV_{LDR} + VENT HDR	275	367

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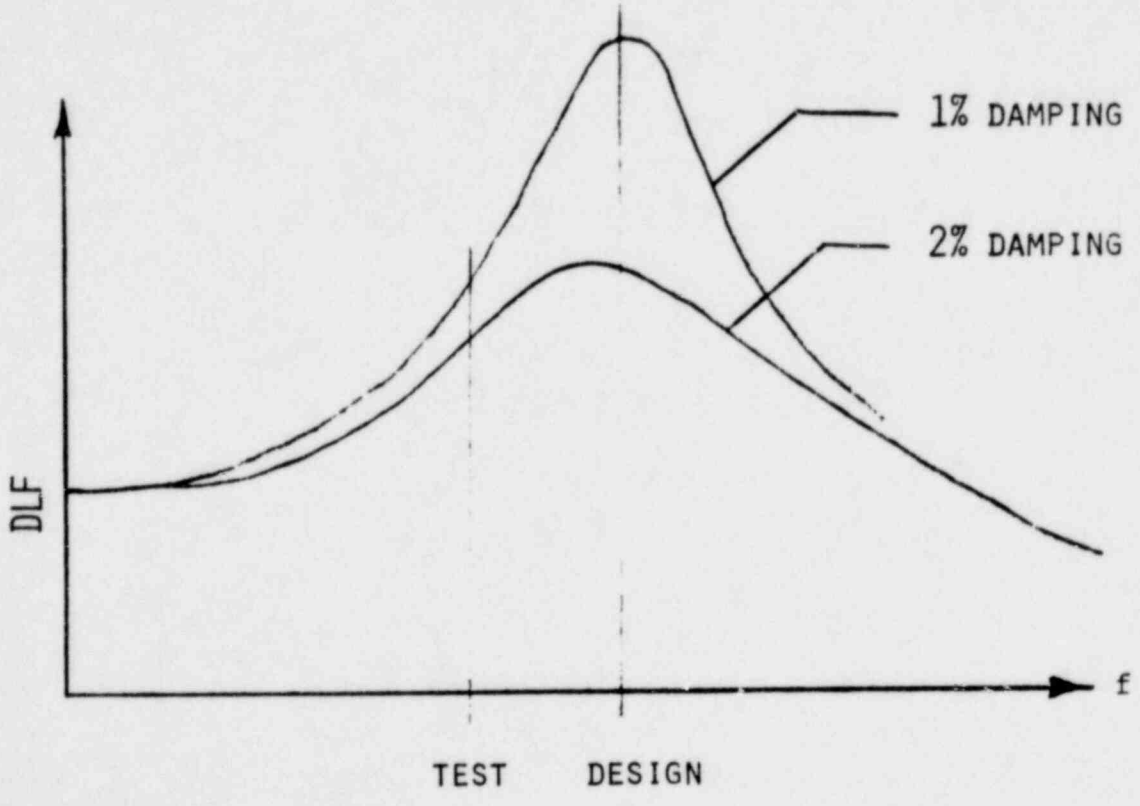
ADDITIONAL CONSERVATISMS

- FREQUENCY ADJUSTMENTS
- DAMPING RATIO



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NWE-8
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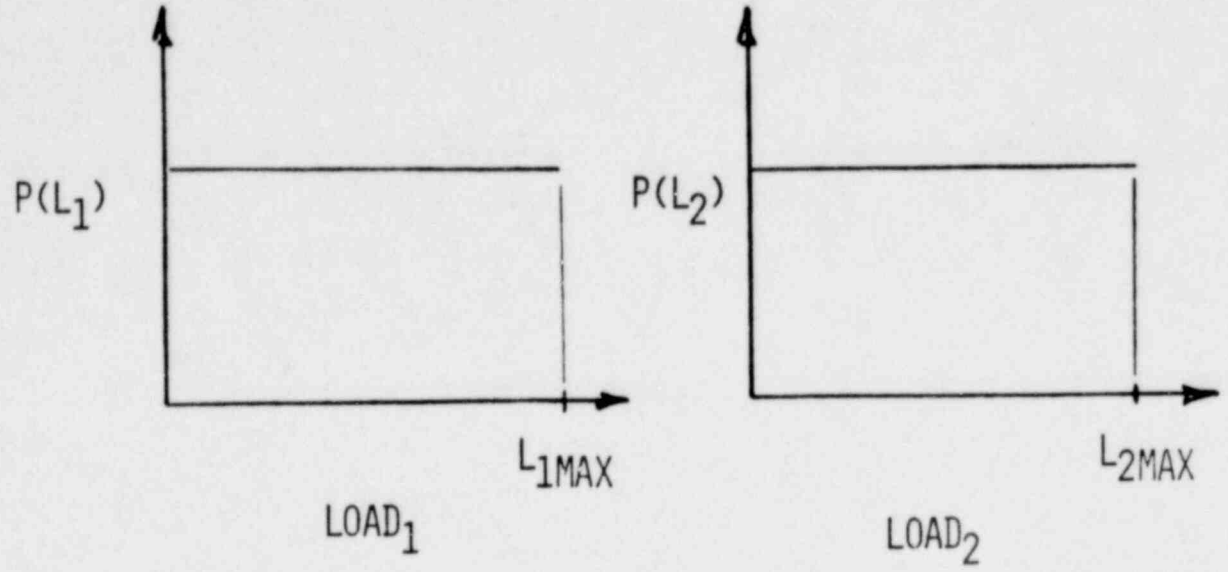
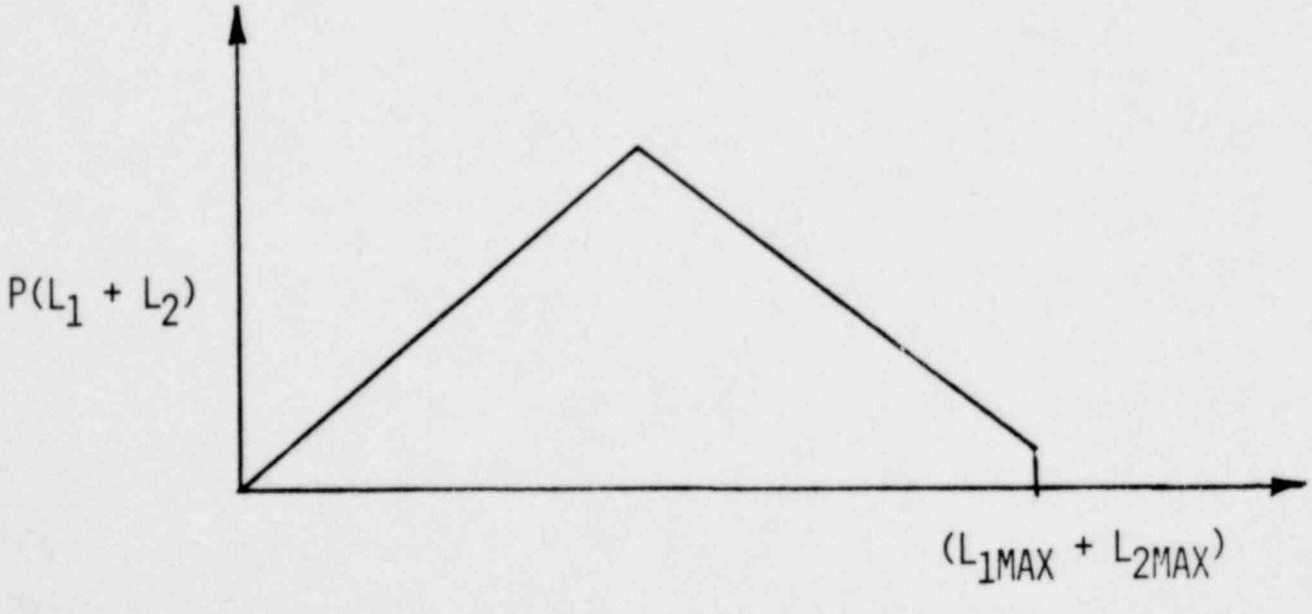
PROBABLE LOAD vs PROBABLE COMBINED LOADING





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NWE-9
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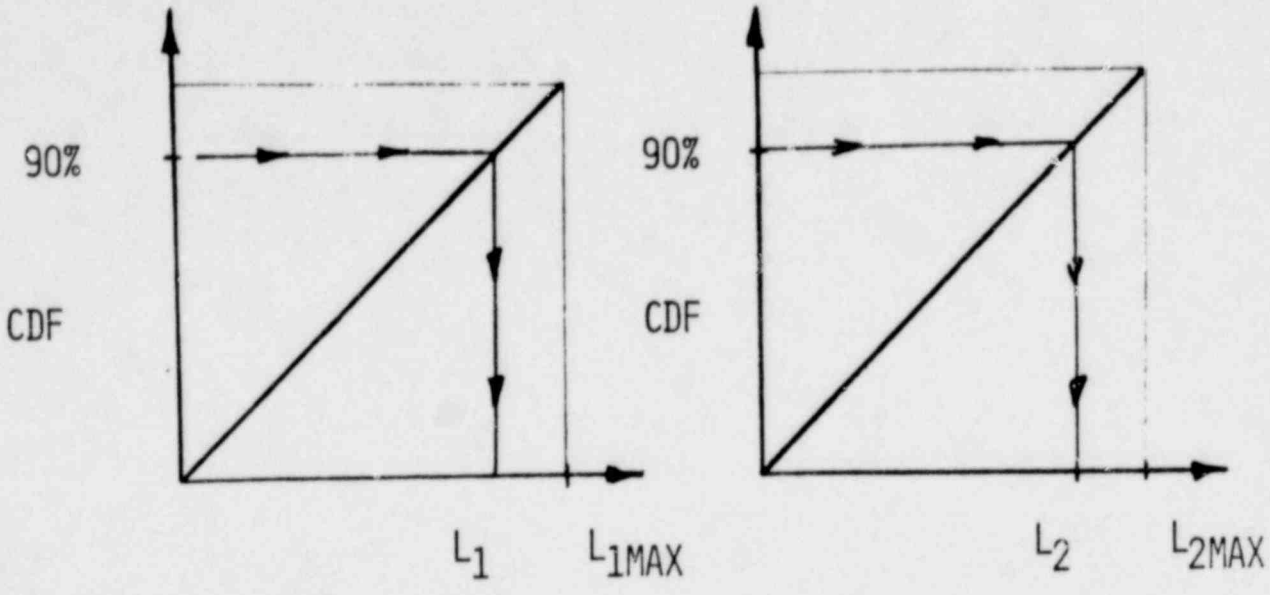
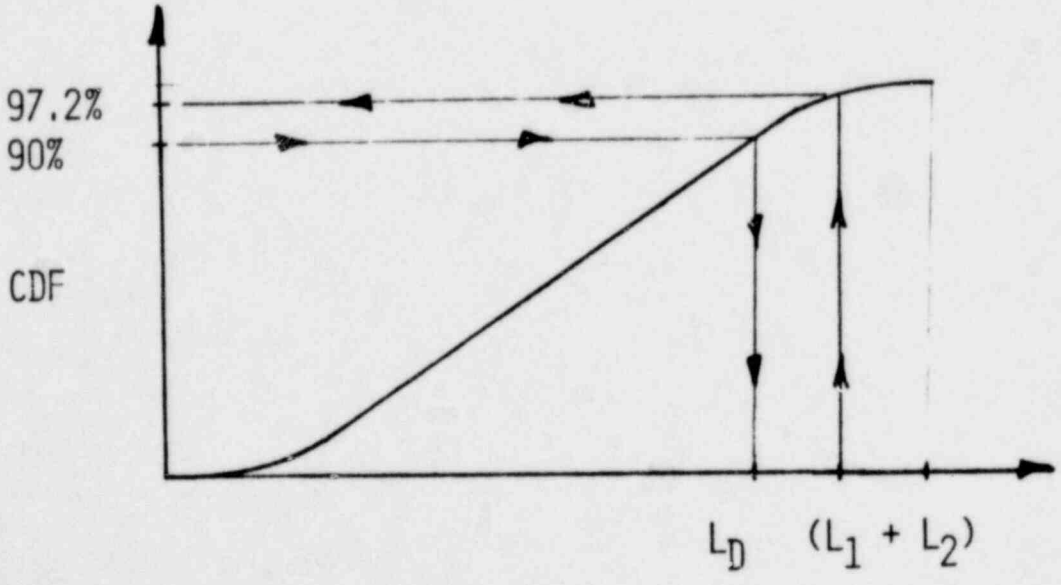
PROBABILITY OF NON-EXCEEDENCE

INDIVIDUAL LOAD vs LOADING COMBINATION

(EXAMPLE 1)





LOADING COMBINATION

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NWE-10
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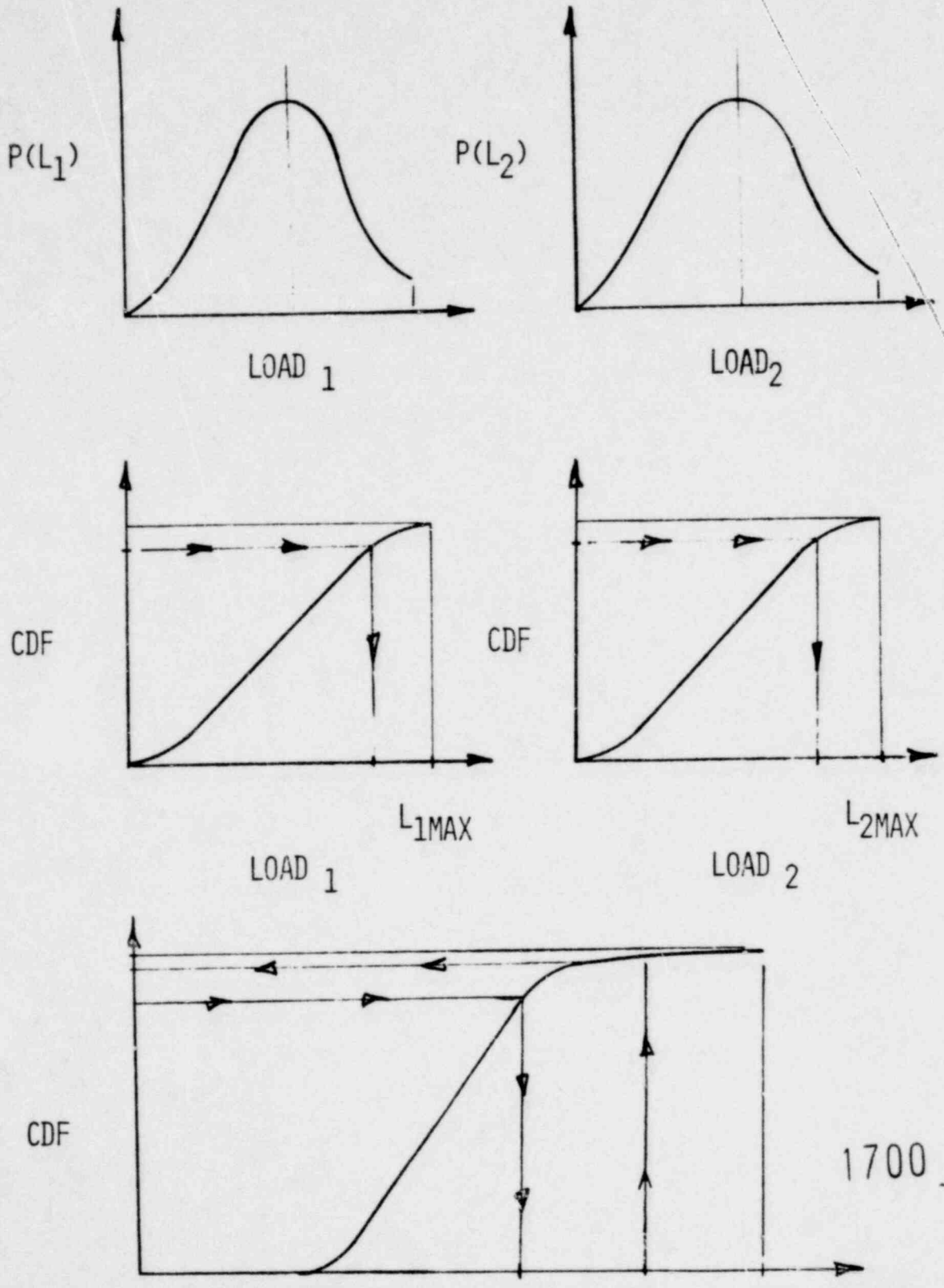
PROBABILITY OF NON-EXCEEDENCE

INDIVIDUAL LOAD vs LOADING COMBINATION

(EXAMPLE 2)



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NWE-11
6/29/79

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CONSISTENT CRITERIA

TWO POSSIBLE APPROACHES AVAILABLE FOR THE APPLICATION OF A CONSISTENT CRITERIA:

- ESTABLISH VALUES OF DESIGN LOADS FOR
  - -- EVALUATION OF INDIVIDUAL LOADS
  - -- EVALUATION OF LOADING COMBINATIONS

- ESTABLISH ACCEPTANCE CRITERIA FOR
  - -- EVALUATION OF INDIVIDUAL LOADS
  - --- EVALUATION OF LOADING COMBINATIONS

POOR ORIGINAL

EVENT COMBINATIONS		SRV	SRV + EQ		SBA IBA		SBA + EQ IBA + EQ				SBA + SRV IBA + SRV		SBA + SRV + EQ IBA + SRV + EQ				DBA + SRV		DBA + EQ + SRV			
						CO, CH			CO, CH			CO, CH			CO, CH		PS (1)	CO, CH	PS		CO, CH	
TYPE OF EARTHQUAKE			0	S			0	S	0	S			0	S	0	S			0	S	0	S
COMBINATION NUMBER		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
LOADS																						
Normal (2)	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Earthquake	EQ		X	X			X	X	X	X			X	X	X	X			X	X	X	X
SRV Discharge	SRV	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X
LOCA Thermal	T_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Reactions	R_A				X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Quasi-Static Pressure	P_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Pool Swell	P_{PS}																X		X	X		
LOCA Condensation Oscillation	P_{CO}					X			X	X		X			X	X		X			X	X
LOCA Chugging	P_{CH}					X			X	X		X			X	X		X			X	X
STRUCTURAL ELEMENT	ROW																					
External Class MC																						
Torus, External Vent Pipe, Bellows, Drywall (at Vent), Attachment Welds, Torus Supports, Seismic Restraints	1	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3,6)	A	B (3,6)	C	B	C
Internal Vent Pipe																						
General and Attachment Welds	2	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3,5)	A	B (3,5)	C	B	C
At Penetrations (e.g., Header)	3	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3)	A	B (3)	C	B	C
Vent Header																						
General and Attachment Welds	4	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3,5)	A	B (3,5)	C	B	C
At Penetrations (e.g., Downcomers)	5	A	B	C	A	A (4)	B	C	B (4)	C	A	A (4)	B	C	B (4)	C	A (3, 4,5)	A (4)	B (3, 4,5)	C	B (4)	C
Downcomers																						
General and Attachment Welds	6	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3, 5)	A	B (3,5)	C	B	C
Internal Supports	7	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A	A	B	C	B	C
Internal Structures																						
General	8	A	B	C	A	A	C	D	C	D	C	C	D	E	D	E	E	E	E	E	E	E
Vent Deflector	9	A	B	C	A	A	C	B	C	B	C	C	D	D	D	D	D	D	D	D	D	D

1700 227

Figure 5.3-1

Class MC Components and Internal Structures

NWE-13
6/29/79

EVENT COMBINATIONS		SRV	SRV + EQ		SBA IBA		SBA + EQ IBA + EQ				SBA + SRV IBA + SRV		SBA + SRV + EQ IBA + SRV + EQ				DBA + SRV		DBA + EQ + SRV			
						CO, CH			CO,CH			CO, CH			CO,CH		PS	CO, CH	PS		CO,CH	
TYPE OF EARTHQUAKE			O	S			O	S	O	S			O	S	O	S			O	S	O	S
COMBINATION NUMBER		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
LOADS																						
Normal (2)	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Earthquake	EQ		X	X			X	X	X	X			X	X	X	X			X	X	X	X
SRV Discharge	SRV	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X
LOCA Thermal	T_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Reactions	R_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Quasi-Static Pressure	P_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Pool Swell	P_{PS}																X		X	X		
LOCA Condensation Oscillation	P_{CO}					X			X	X		X			X	X		X			X	X
LOCA Chugging	P_{CH}					X			X	X		X			X	X		X			X	X
		A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A	A	B	C	B	C

Figure 3.3-1
Load Combinations

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NWE-15
6/29/79

New Proposal 6/30/79

EVENT COMBINATIONS		SRV	SRV + EQ		SBA IBA		SBA + EQ IBA + EQ				SBA + SRV IBA + SRV		SBA + SRV + EQ IBA + SRV + EQ				DBA [redacted]		DBA + EQ [redacted]				DBA + SRV		DBA + EQ + SRV			
						CO, CH			CO,CH			CO, CH			CO,CH		PS	CO, CH	PS		CO,CH		PS	CO, CH	PS		CO,CH	
TYPE OF EARTHQUAKE			O	S			O	S	O	S			O	S	O	S			O	S	O	S			O	S	O	S
COMBINATION NUMBER		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	16	17	18	19	20	21
LOADS																												
Normal (2)	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Earthquake	EQ		X	X			X	X	X	X			X	X	X	X			X	X	X	X			X	X	X	X
SRV Discharge	SRV	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Thermal	T_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Reactions	R_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Quasi-Static Pressure	P_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Pool Swell	P_{PS}																X		X	X			X		X	X		
LOCA Condensation Oscillation	P_{CO}					X			X	X		X			X	X		X			X	X		X			X	X
LOCA Chugging	P_{CH}					X			X	X		X			X	X	·	X			X	X	·	X			X	X
		A	B	C	A	A	B	C	B	C	C	C	C	C	C	C	A	A	B	C	B	C	C	C	C	C	C	C

POOR ORIGINAL

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