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SUBJECT: Forwards addl info, requested during 910621 meeting, re seismic design ground motion & seismic design of category I structures.

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Tennessee Valley Authority, Post Office Box 2000, Hollywood, Alabama 35752

William J. Museler
Vice President, Bellefonte Nuclear Plant

AUG 19 1991

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Gentlemen:

In the Matter of the Application of) Docket No. 50-438
Tennessee Valley Authority) 50-439

**BELLEFONTE NUCLEAR PLANT (BLN) - TRANSMITTAL OF ADDITIONAL INFORMATION
REQUESTED DURING THE JUNE 21, 1991 MEETING**

Reference: NRC's letter to TVA, dated July 16, 1991, "Summary of
June 21, 1991 Meeting to Discuss TVA Response to NRC
Questions on Seismic Ground Motion Raised in June 4, 1991
Meeting"

Enclosed is the additional information concerning Seismic Design Ground
Motion and Seismic Design of Category I Structures that was requested by
the staff during the subject meeting. The information provided in the
enclosure is divided into four sections: Primary Containment, Secondary
Containment, Interior Concrete Structures, and Auxiliary-Control Building.

In the referenced letter, the NRC stated that "the reevaluated seismic
loads (from the new seismic analyses being performed at BLN) will be used
to validate the design calculations for structures, components, piping,
and seismic qualification of equipment in accordance with the Standard
Review Plan (SRP) criteria." TVA agrees that this statement is correct
for Category I structures. However, TVA would like to clarify its
agreement with the staff in that some exceptions will be taken to the SRP
criteria for seismic qualification of equipment (i.e., some B&W supplied
I&C equipment), piping (i.e., response spectra analysis methodology,
damping values for uniform response spectra, etc.) and components. These
latter areas are included in other BLN position papers.

The clarification made above does not include any new positions nor does
it change any existing agreements between the staff and TVA. This letter
is simply a reverification of the progress and understandings made at the
June 21, 1991 meeting.

9108220280 910819
PDR ADOCK 05000438
A PDR

Aool

U.S. Nuclear Regulatory Commission

If you have any questions, please telephone Mr. Schofield at
(205) 574-8058.

Very truly yours,



W. J. Museler

Enclosure

cc (Enclosure):

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Bellefonte Nuclear Plant
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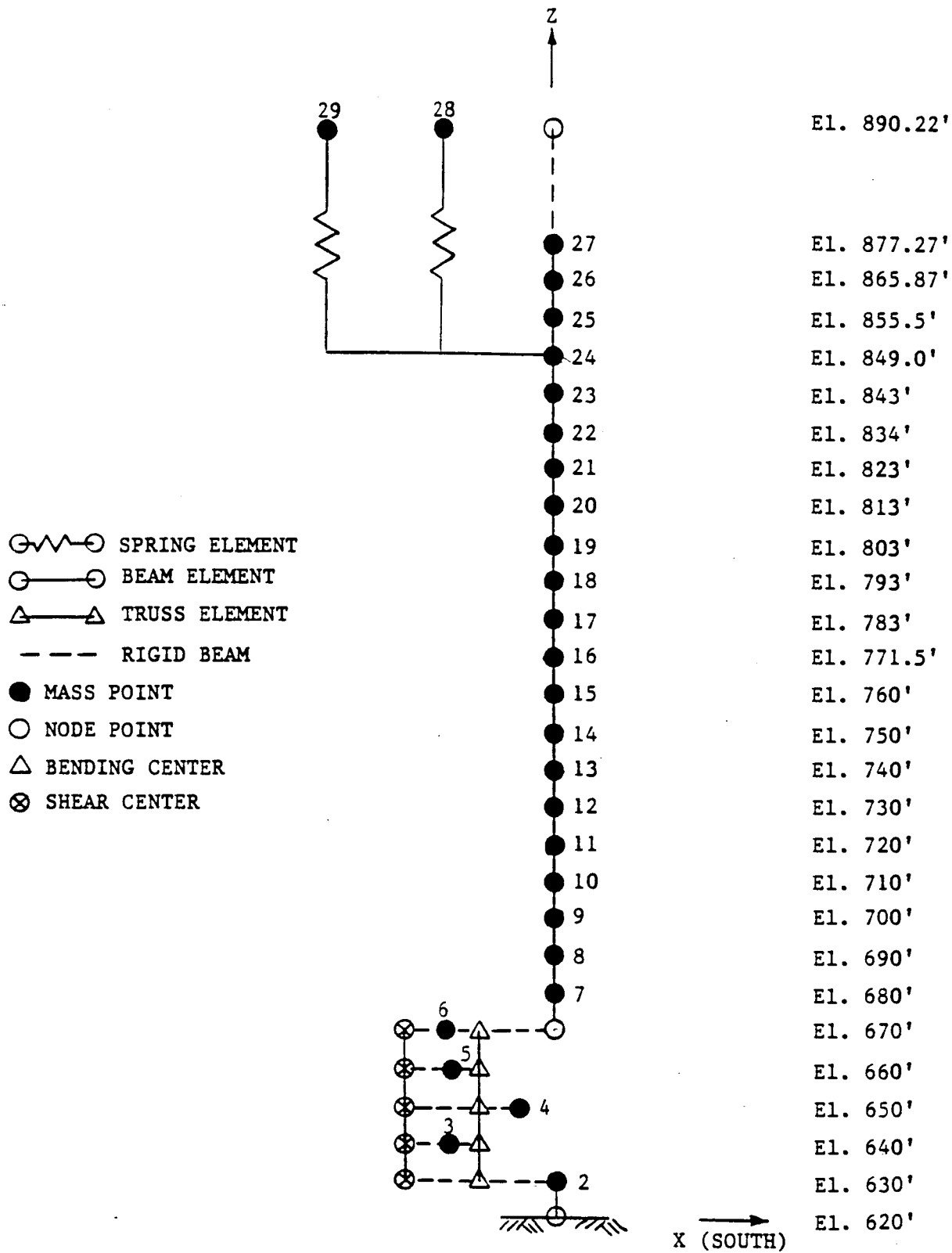
TVA BELLEFONTE NUCLEAR PLANT

UNIT 1

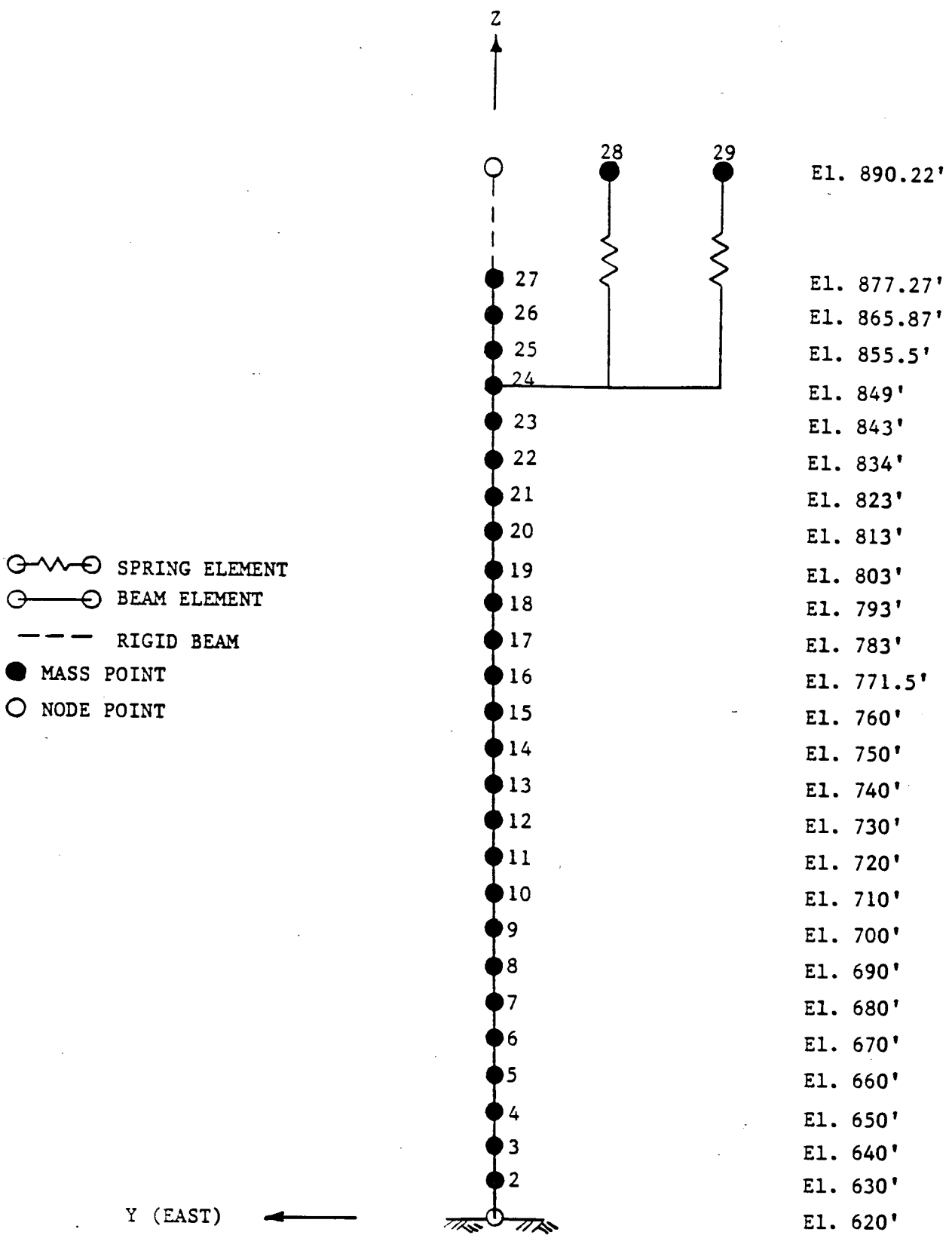
PRIMARY CONTAINMENT (PC)

**COMPARISONS OF MAXIMUM STRUCTURAL RESPONSES FOR
THE DESIGN-BASIS VS. SITE-SPECIFIC GROUND MOTION INPUTS FOR SSE**

(Pages PC-1 through PC-10)



3-D Lumped Mass Stick Model in the X-Z Plane for
 Primary Containment, TVA/BLN UNIT 1



3-D Lumped Mass Stick Model in the Y-Z Plane for Primary Containment, TVA/BLN UNIT 1

**STICK MODEL - LUMPED WEIGHTS
BLN - PRIMARY CONTAINMENT STRUCTURE**

MASS POINT	EL. (ft)	WEIGHT (KIPS)	
		Horizontal	Vertical
29	890.22	-	3420.00
28	890.22	-	2100.00
27	877.27	9397.00	-
26	865.87	6881.00	-
25	855.50	3043.00	-
24	849.00	1554.00	15495.00
23	843.00	1592.00	1592.00
22	834.00	2984.00	2984.00
21	823.00	2487.00	2487.00
20	813.00	2487.00	2487.00
19	803.00	2697.00	2697.00
18	793.00	2919.00	2919.00
17	783.00	2919.00	2919.00
16	771.50	3233.00	3233.00
15	760.00	2487.00	2487.00
14	750.00	2487.00	2487.00
13	740.00	2487.00	2487.00
12	730.00	2487.00	2487.00
11	720.00	2487.00	2487.00
10	710.00	2487.00	2487.00
9	700.00	2487.00	2507.00
8	690.00	2487.00	2557.00
7	680.00	2487.00	2557.00
6	670.00	2739.00	2856.00
5	660.00	2667.00	2667.00
4	650.00	2707.00	2923.00
3	640.00	2699.00	2915.00
2	630.00	2487.00	2590.00

TOTAL 77875.00 78827.00

- Notes:
- (1) The differences between horizontal and vertical weights are due to the differences in the distribution of annulus platform weights shared by the primary and secondary containments.
 - (2) Weigh moments of inertia are included in the model but not shown in the table.

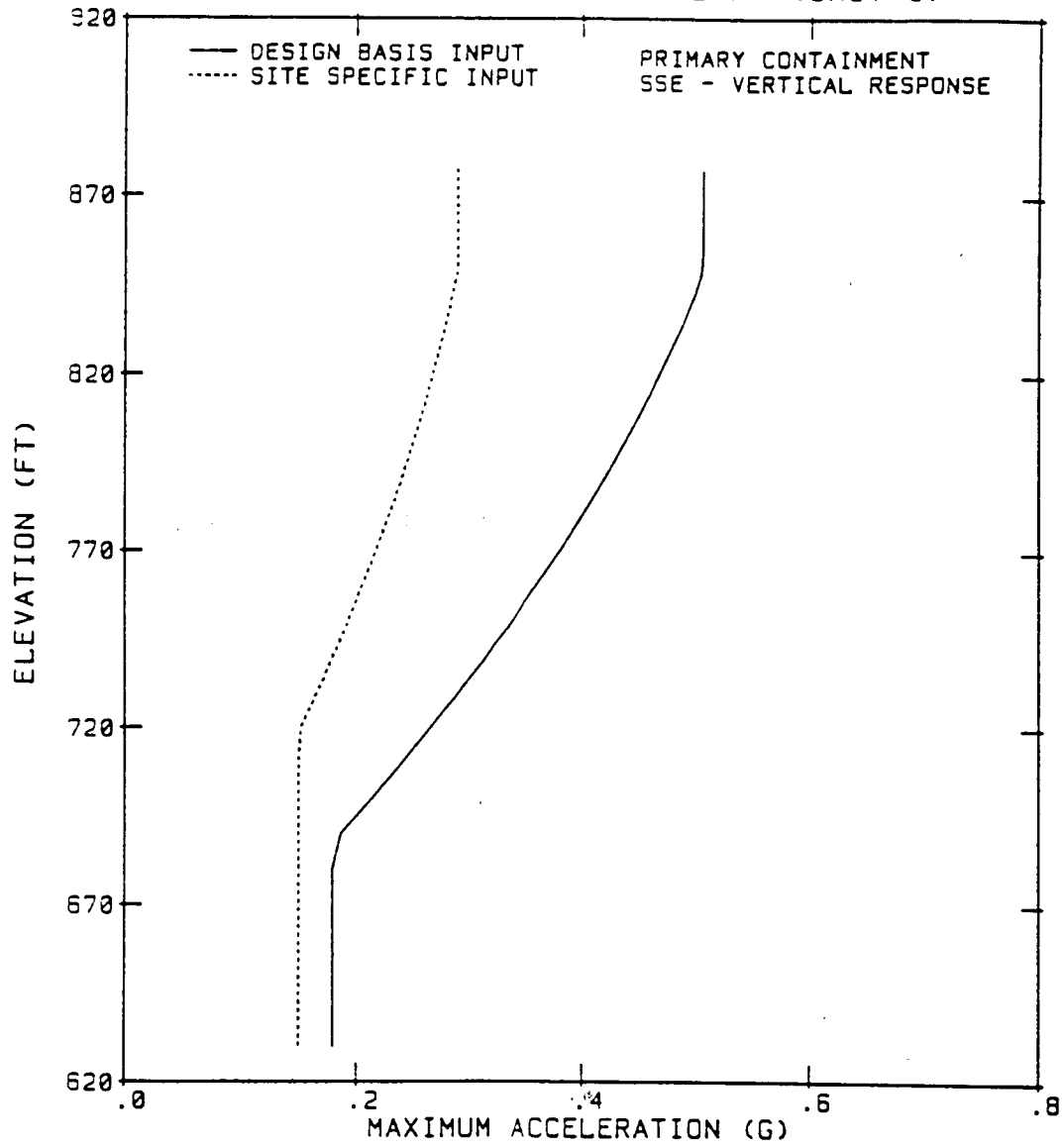
SSE MAXIMUM RESPONSE ACCELERATIONS AT MASS POINTS
BLN - PRIMARY CONTAINMENT STRUCTURE

MASS POINT	EL. (ft.)	DESIGN BASIS INPUT		SITE-SPECIFIC INPUT	
		Horizontal (g)	Vertical (g)	Horizontal (g)	Vertical (g)
29	890.22	-	0.66 (5)	-	0.42 (5)
28	890.22	-	0.74 (5)	-	0.43 (5)
27	877.27	0.71	0.51	0.54	0.29
26	865.87	0.68	0.51	0.51	0.29
25	855.50	0.64	0.51	0.49	0.29
24	849.00	0.62	0.51	0.47	0.29
23	843.00	0.60	0.50	0.45	0.28
22	834.00	0.57	0.49	0.43	0.28
21	823.00	0.54	0.47	0.41	0.27
20	813.00	0.52	0.46	0.40	0.26
19	803.00	0.50	0.44	0.38	0.25
18	793.00	0.48	0.42	0.37	0.24
17	783.00	0.46	0.41	0.36	0.23
16	771.50	0.44	0.38	0.35	0.22
15	760.00	0.42	0.36	0.34	0.21
14	750.00	0.40	0.34	0.33	0.19
13	740.00	0.38	0.31	0.31	0.18
12	730.00	0.36	0.29	0.30	0.17
11	720.00	0.34	0.26	0.29	0.15
10	710.00	0.32	0.24	0.27	0.15
9	700.00	0.29	0.21	0.25	0.15
8	690.00	0.27	0.19	0.24	0.15
7	680.00	0.24	0.18	0.22	0.15
6	670.00	0.21	0.18	0.22	0.15
5	660.00	0.18	0.18	0.22	0.15
4	650.00	0.18	0.18	0.22	0.15
3	640.00	0.18	0.18	0.22	0.15
2	630.00	0.18	0.18	0.22	0.15

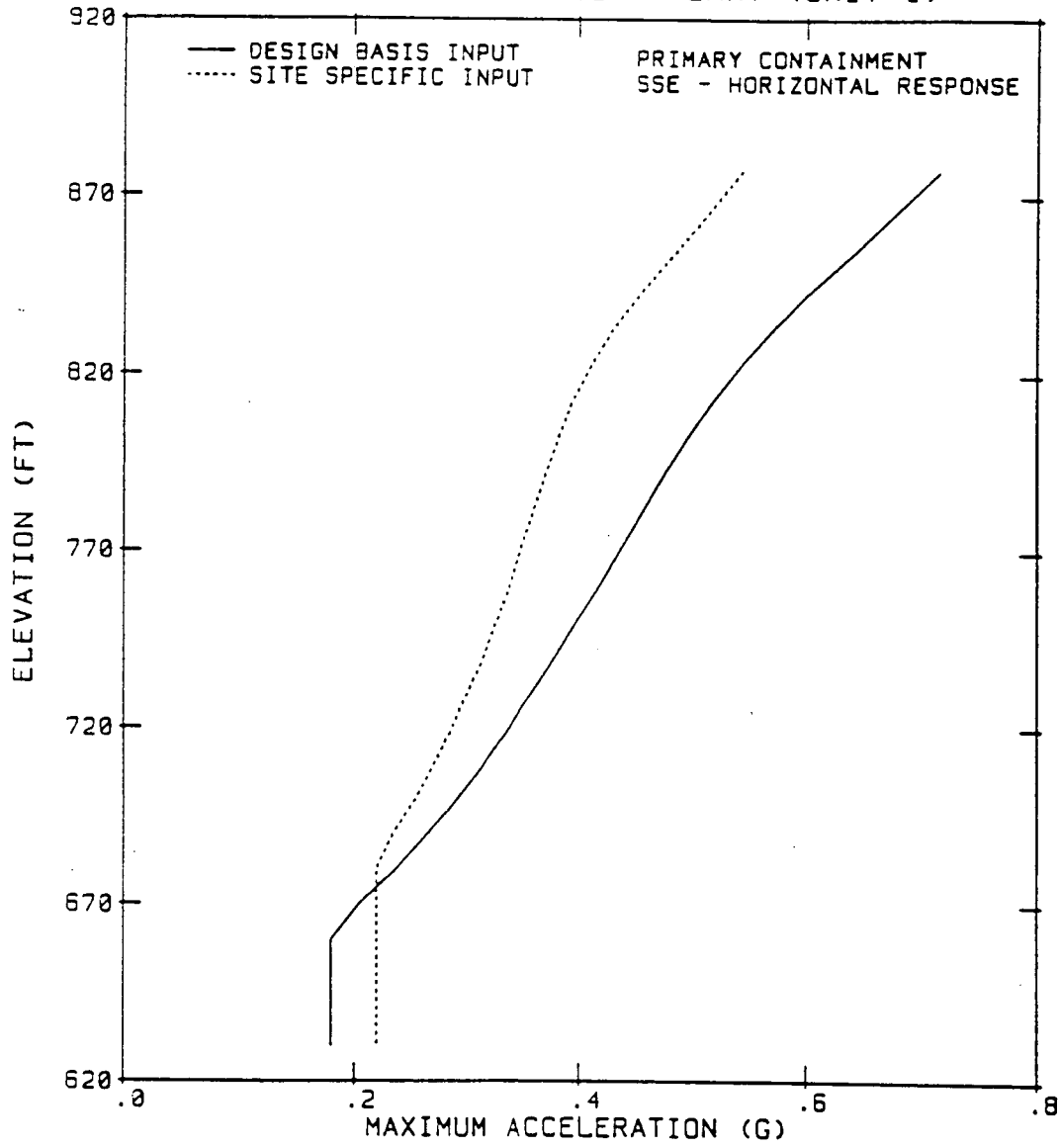
Notes:

- (1) Response accelerations were calculated using the response spectrum analysis technique.
- (2) Double sum method was used for combination of modal responses.
- (3) Co-directional responses were combined using the SRSS combination rule.
- (4) Horizontal response accelerations were obtained from enveloping the NS and EW response accelerations.
- (5) Mass points 28 and 29 are effective modal masses used for simulating the dynamic effects of the two significant vertical drumming modes of the dome below 34 Hz. The maximum acceleration values shown are the response accelerations for the modal coordinates of these dome drumming modes rather than those for specific locations on the dome.

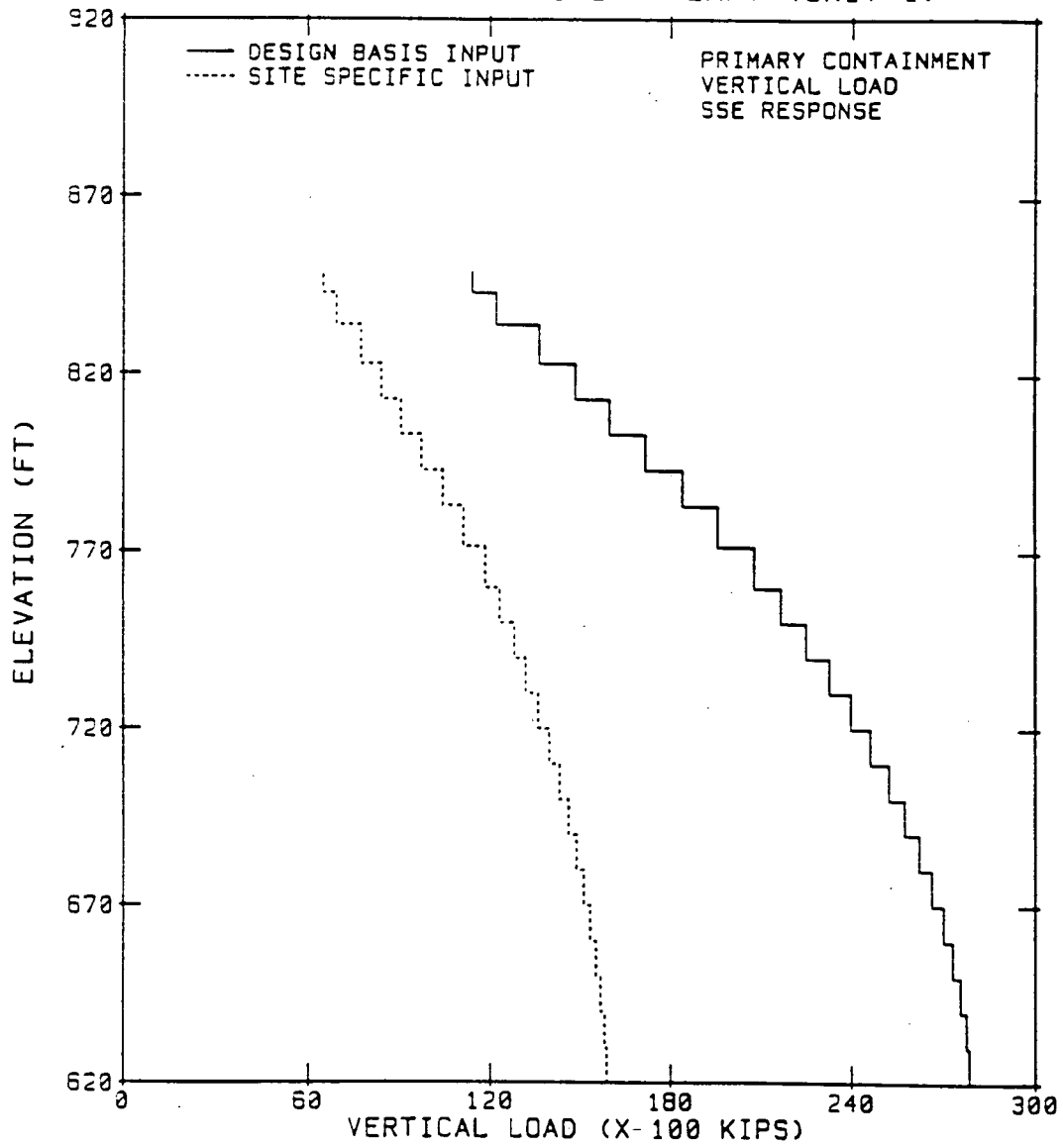
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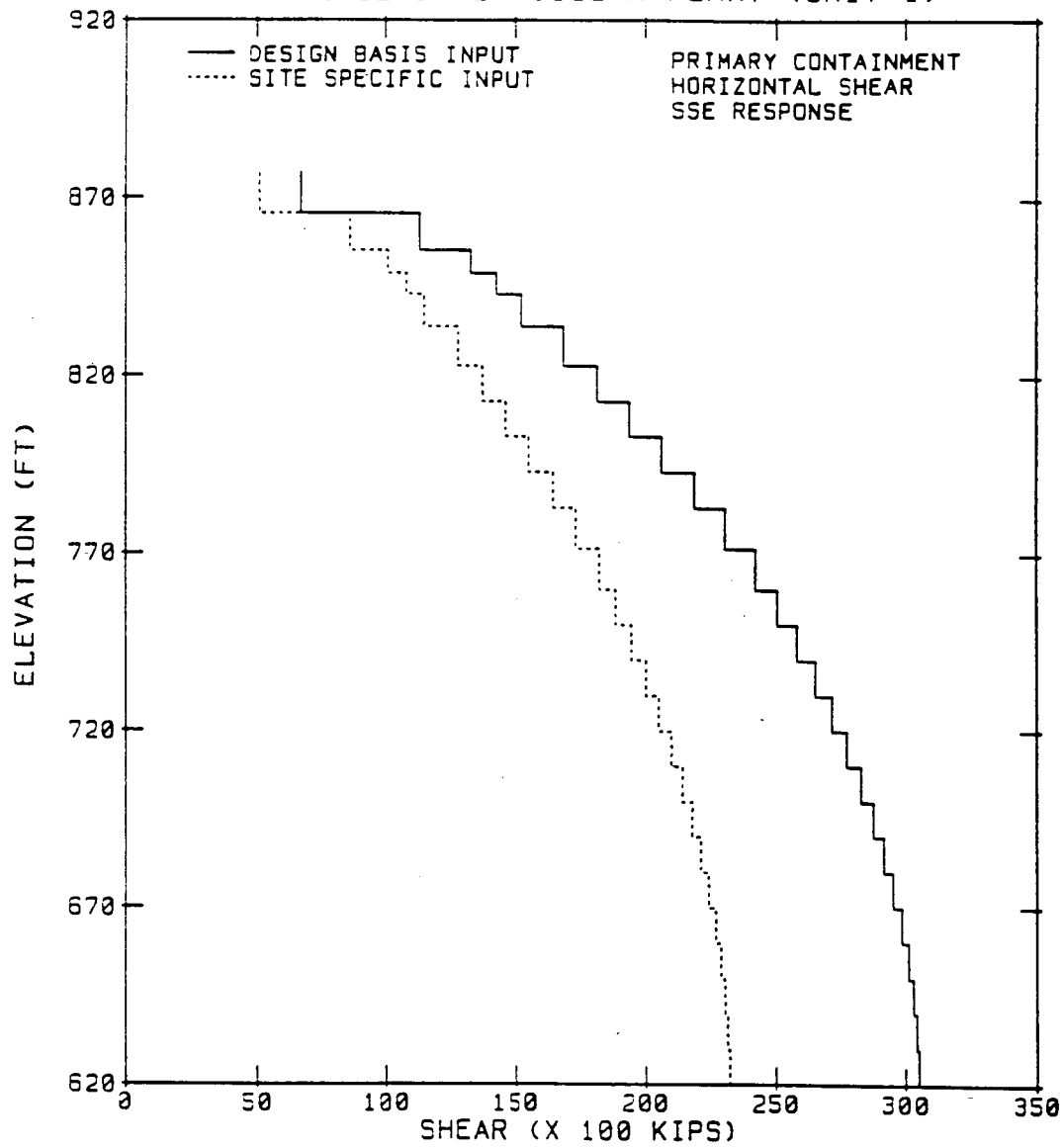
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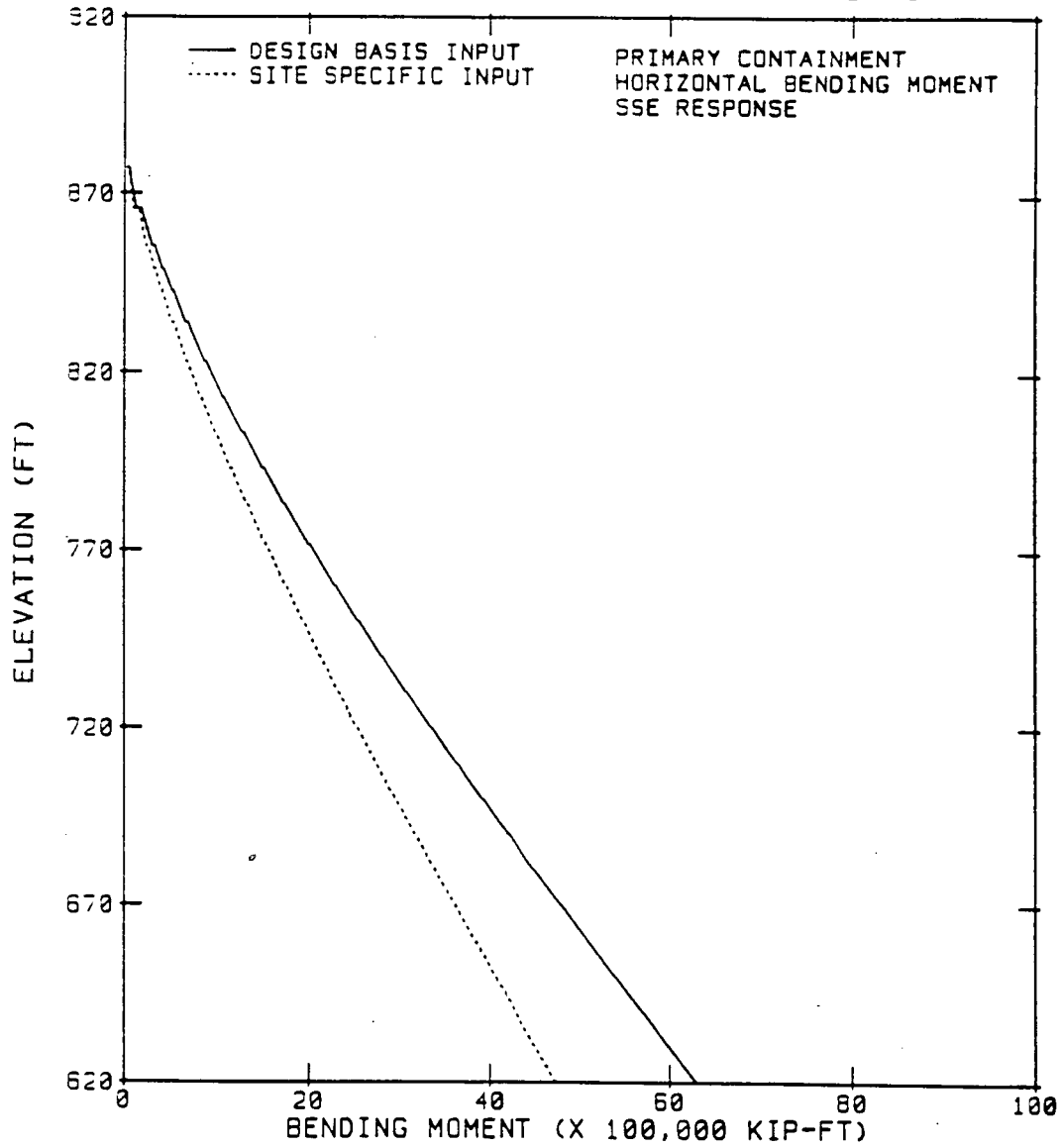
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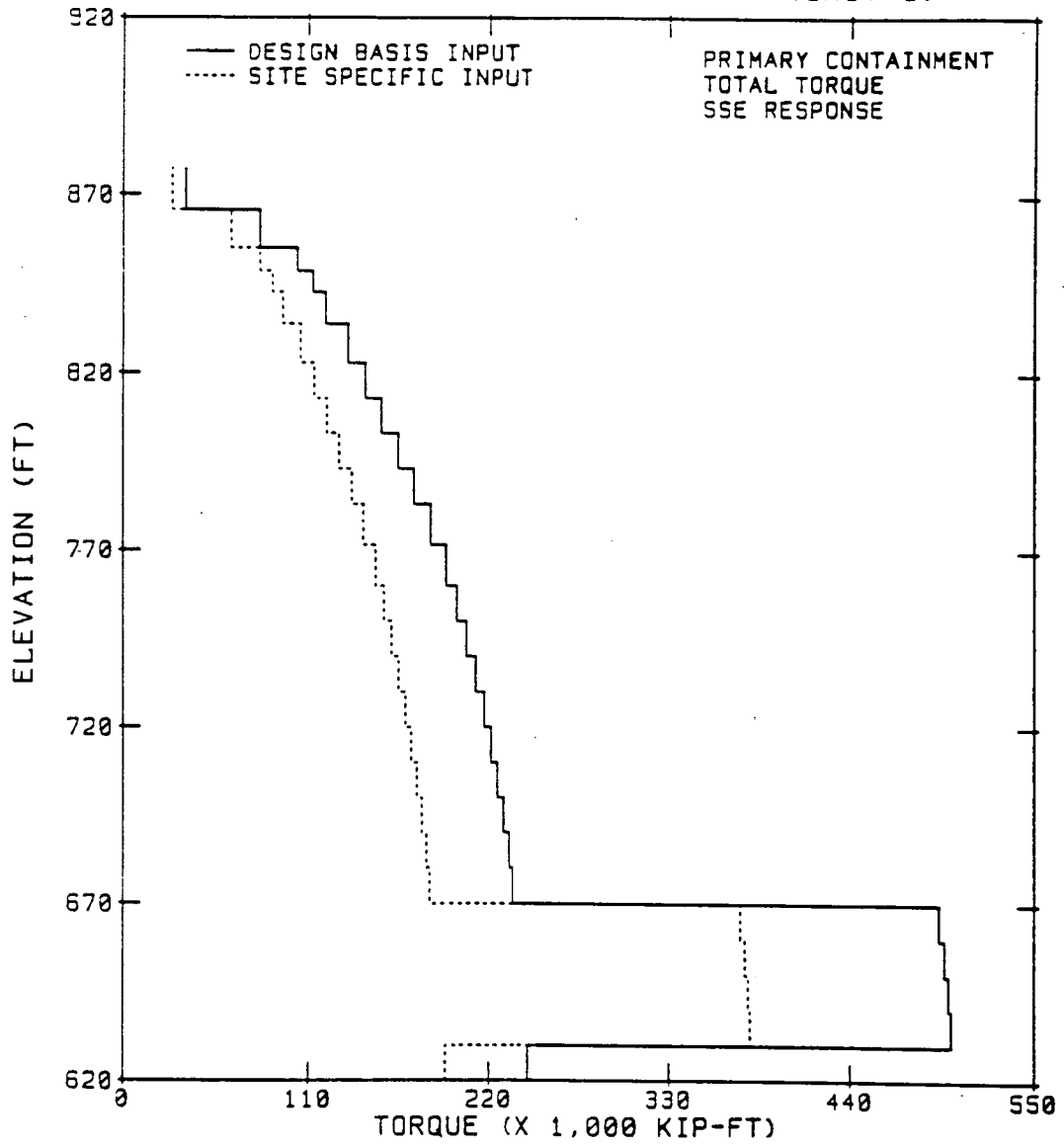
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TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



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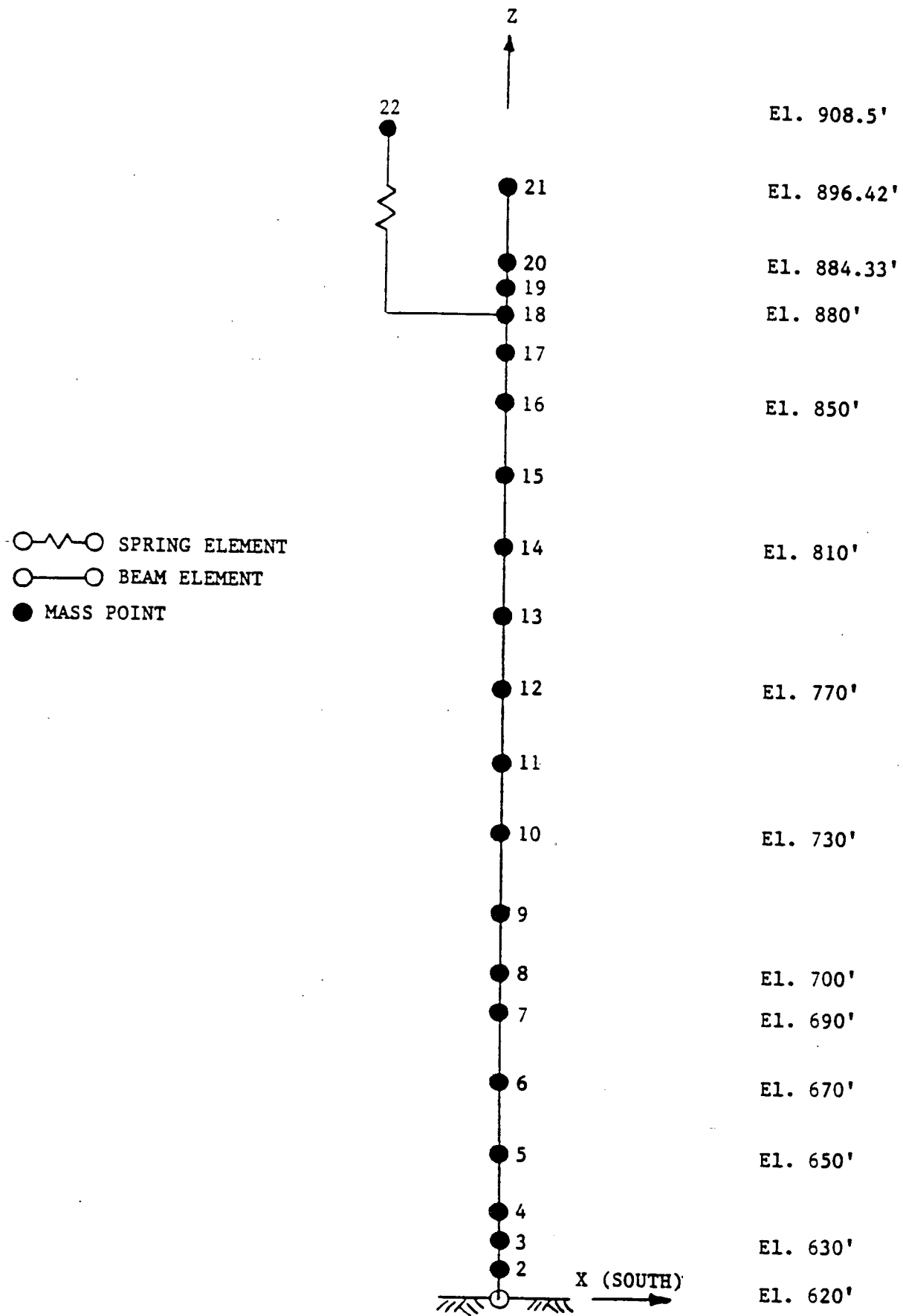
TVA BELLEFONTE NUCLEAR PLANT

UNIT 1

SECONDARY CONTAINMENT (SC)

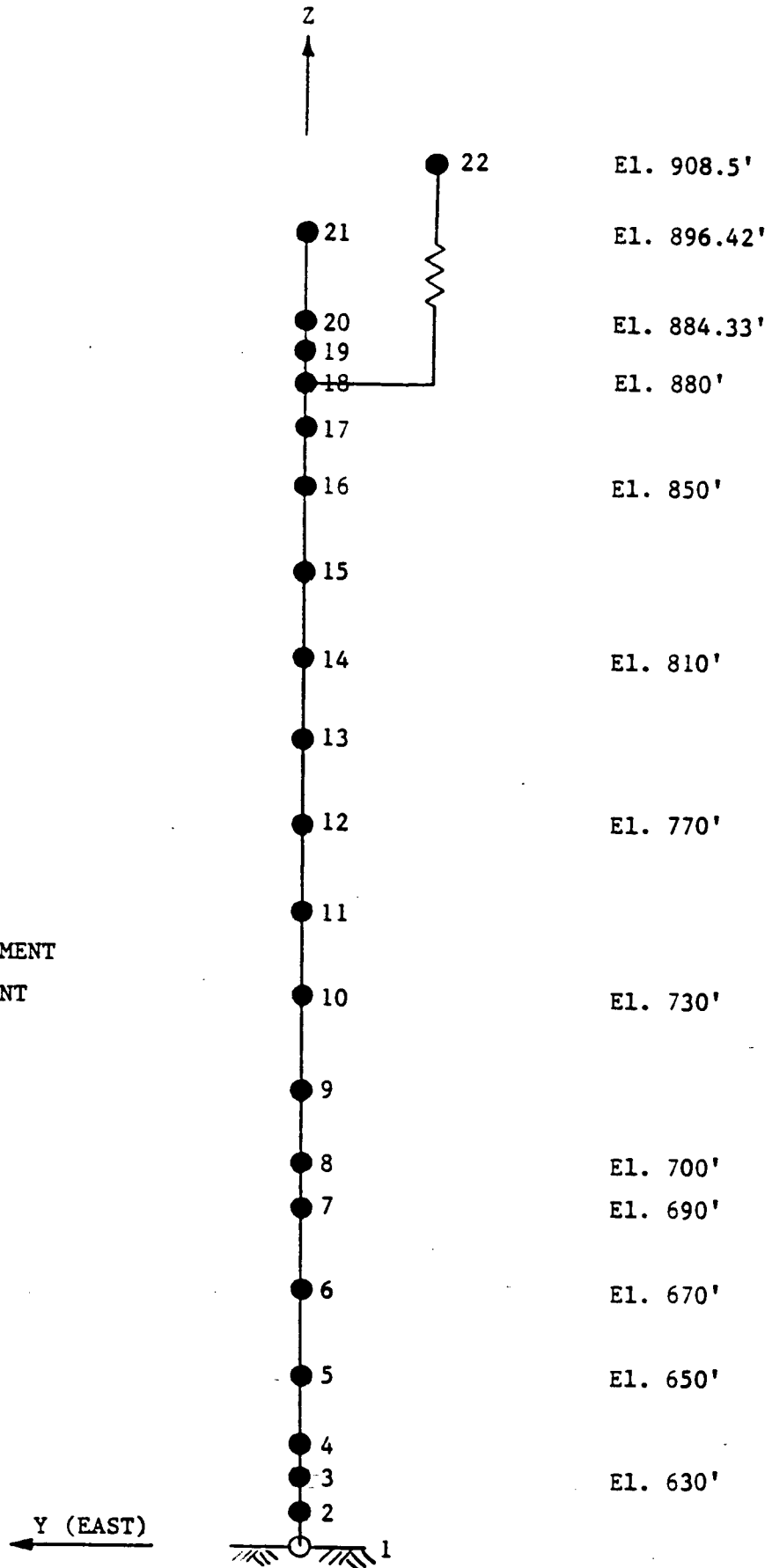
**COMPARISONS OF STRUCTURAL RESPONSES FOR THE DESIGN-BASIS VS.
SITE-SPECIFIC GROUND MOTION INPUTS FOR SSE**

(Pages SC-1 through SC-10)



3-D Lumped Mass Stick Model in the X-Z Plane for Secondary Containment, TVA/BLN UNIT 1

- SPRING ELEMENT
- BEAM ELEMENT
- MASS POINT



3-D Lumped Mass Stick Model in the Y-Z Plane for
Secondary Containment, TVA/BLN UNIT 1

STICK MODEL - LUMPED WEIGHTS
BLN - SECONDARY CONTAINMENT STRUCTURE

MASS POINT	EL. (ft)	WEIGHT (KIPS)	
		Horizontal	Vertical
22	908.50	-	2816.00
21	896.40	4980.00	-
20	884.30	493.00	-
19	881.50	549.00	-
18	880.00	981.00	4187.00
17	866.00	1783.00	1783.00
16	850.00	2360.00	2220.00
15	830.00	2311.00	2311.00
14	810.00	2311.00	2311.00
13	790.00	2311.00	2311.00
12	770.00	2311.00	2311.00
11	750.00	2311.00	2311.00
10	730.00	2331.00	2331.00
9	710.00	1734.00	1734.00
8	700.00	1196.00	1176.00
7	690.00	2013.00	1873.00
6	670.00	2545.00	2428.00
5	650.00	2910.00	2478.00
4	635.00	1172.00	1172.00
3	630.00	914.00	811.00
2	625.00	838.00	838.00

TOTAL 38354.00 37402.00

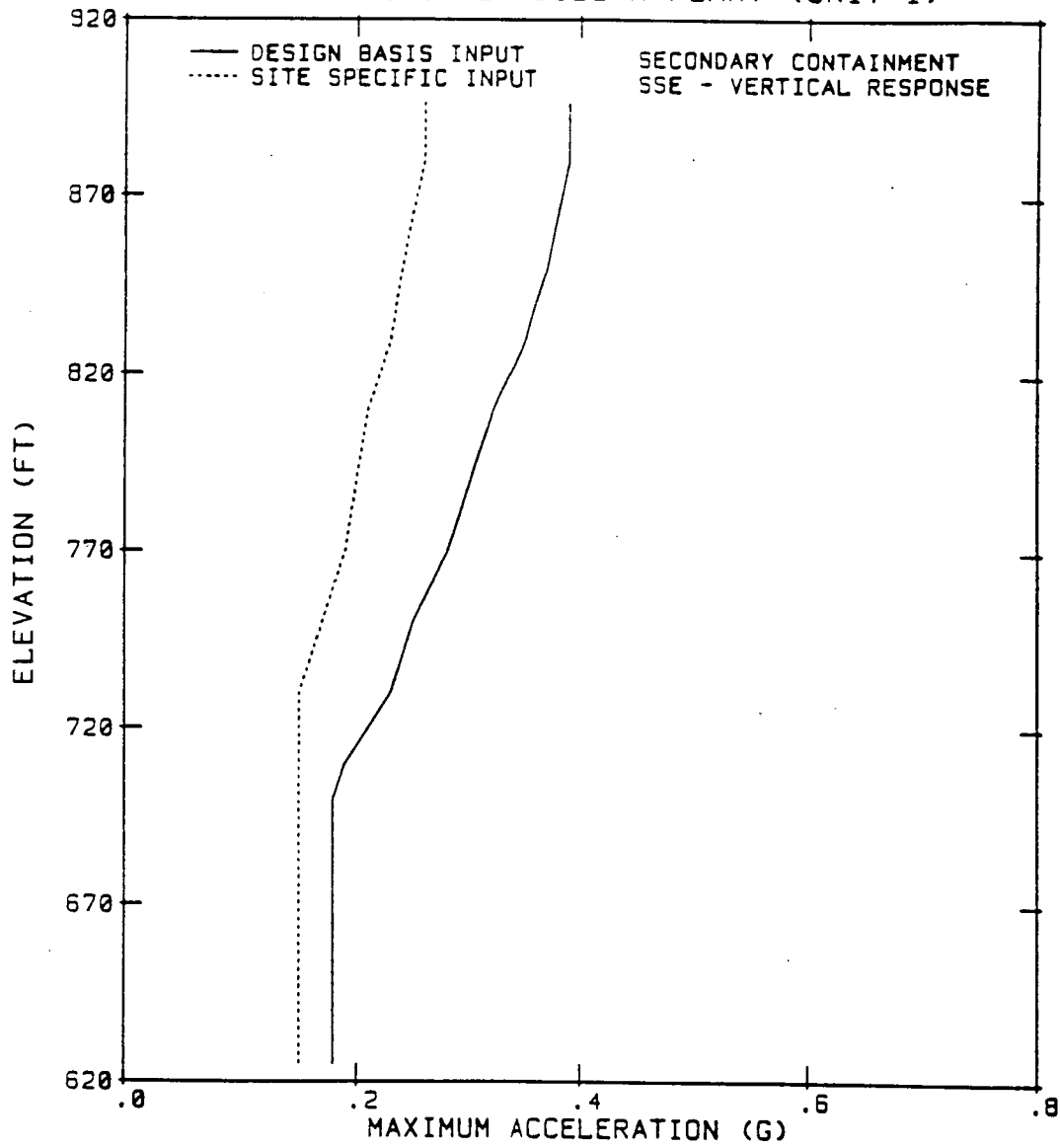
- Notes:
- (1) The differences between horizontal and vertical weights are due to the differences in the distribution of annulus platform weights shared by the primary and secondary containments.
 - (2) Weigh moments of inertia are included in the model but not shown in the table.

**SSE MAXIMUM RESPONSE ACCELERATIONS AT MASS POINTS
BLN - SECONDARY CONTAINMENT STRUCTURE**

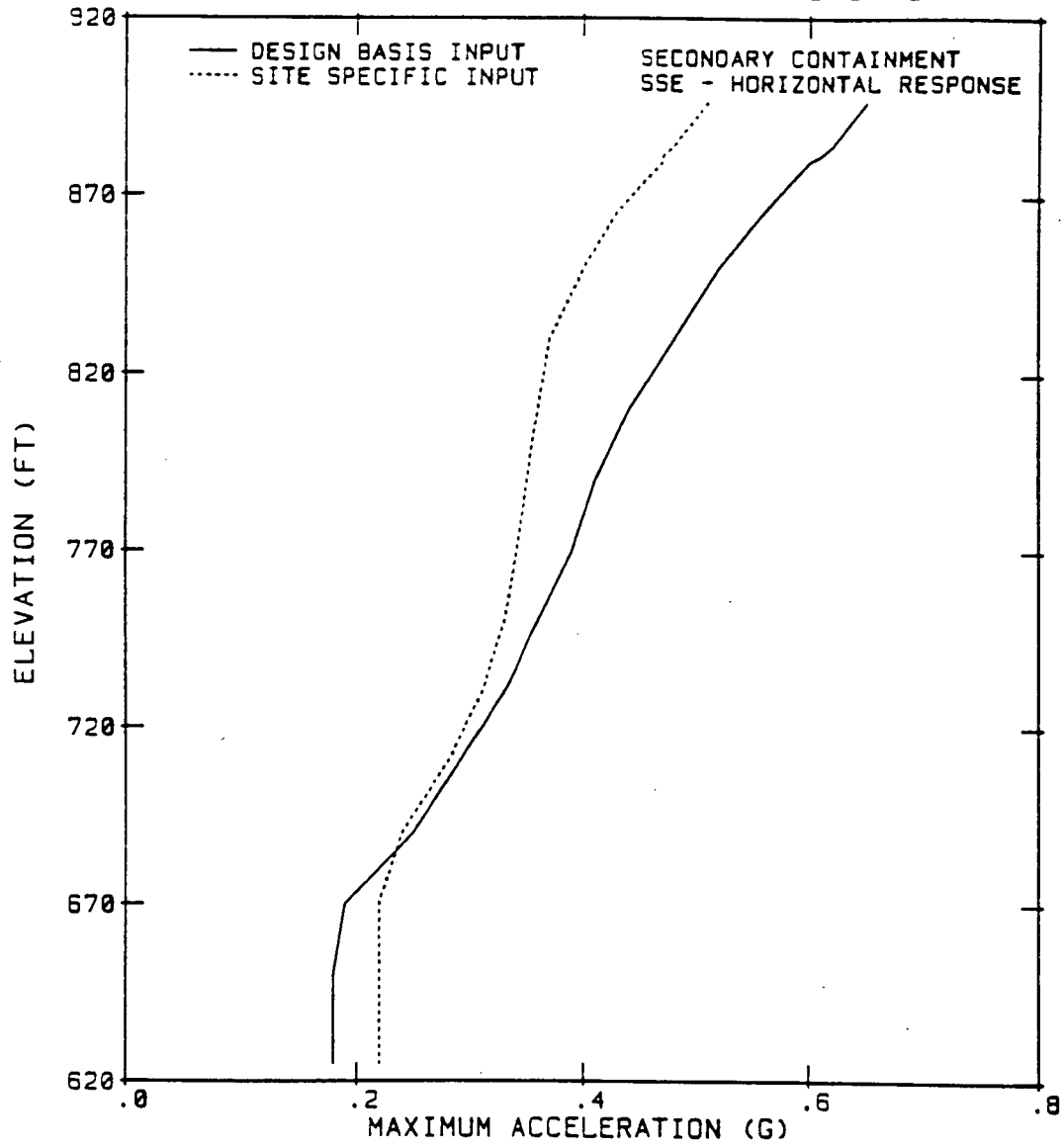
MASS POINT	EL. (ft.)	DESIGN BASIS INPUT		SITE-SPECIFIC INPUT	
		Horizontal (g)	Vertical (g)	Horizontal (g)	Vertical (g)
22	908.50	-	0.99 (4)	-	0.65 (4)
21	896.42	0.65	0.39	0.51	0.26
20	884.33	0.62	0.39	0.48	0.26
19	881.50	0.61	0.39	0.47	0.26
18	880.00	0.60	0.39	0.47	0.26
17	866.00	0.56	0.38	0.43	0.25
16	850.00	0.52	0.37	0.40	0.24
15	830.00	0.48	0.35	0.37	0.23
14	810.00	0.44	0.32	0.36	0.21
13	790.00	0.41	0.30	0.35	0.20
12	770.00	0.39	0.28	0.34	0.19
11	750.00	0.36	0.25	0.33	0.17
10	730.00	0.33	0.23	0.31	0.15
9	710.00	0.29	0.19	0.28	0.15
8	700.00	0.27	0.18	0.26	0.15
7	690.00	0.25	0.18	0.24	0.15
6	670.00	0.19	0.18	0.22	0.15
5	650.00	0.18	0.18	0.22	0.15
4	635.00	0.18	0.18	0.22	0.15
3	630.00	0.18	0.18	0.22	0.15
2	625.00	0.18	0.18	0.22	0.15

- Notes:
- (1) Response accelerations were calculated using the response spectrum analysis technique.
 - (2) Double sum method was used for combination of modal responses.
 - (3) Co-directional responses were combined using the SRSS combination rule.
 - (4) Mass point 22 is the effective modal mass used for simulating the dynamic effects of the vertical drumming mode of the dome below 34 Hz. The maximum acceleration value shown is the response acceleration for the modal coordinate of this dome drumming mode rather than that for a specific location on the dome.

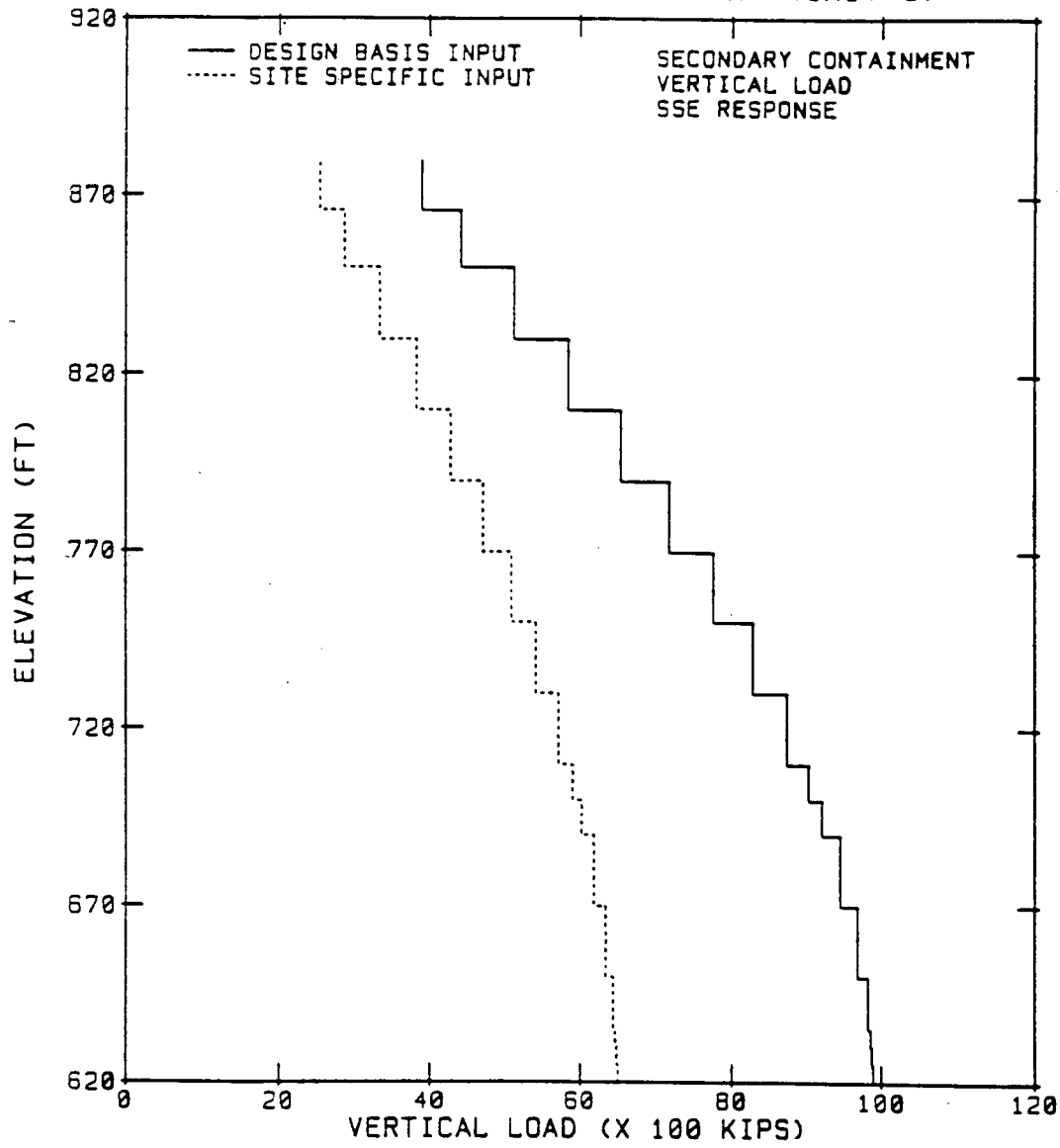
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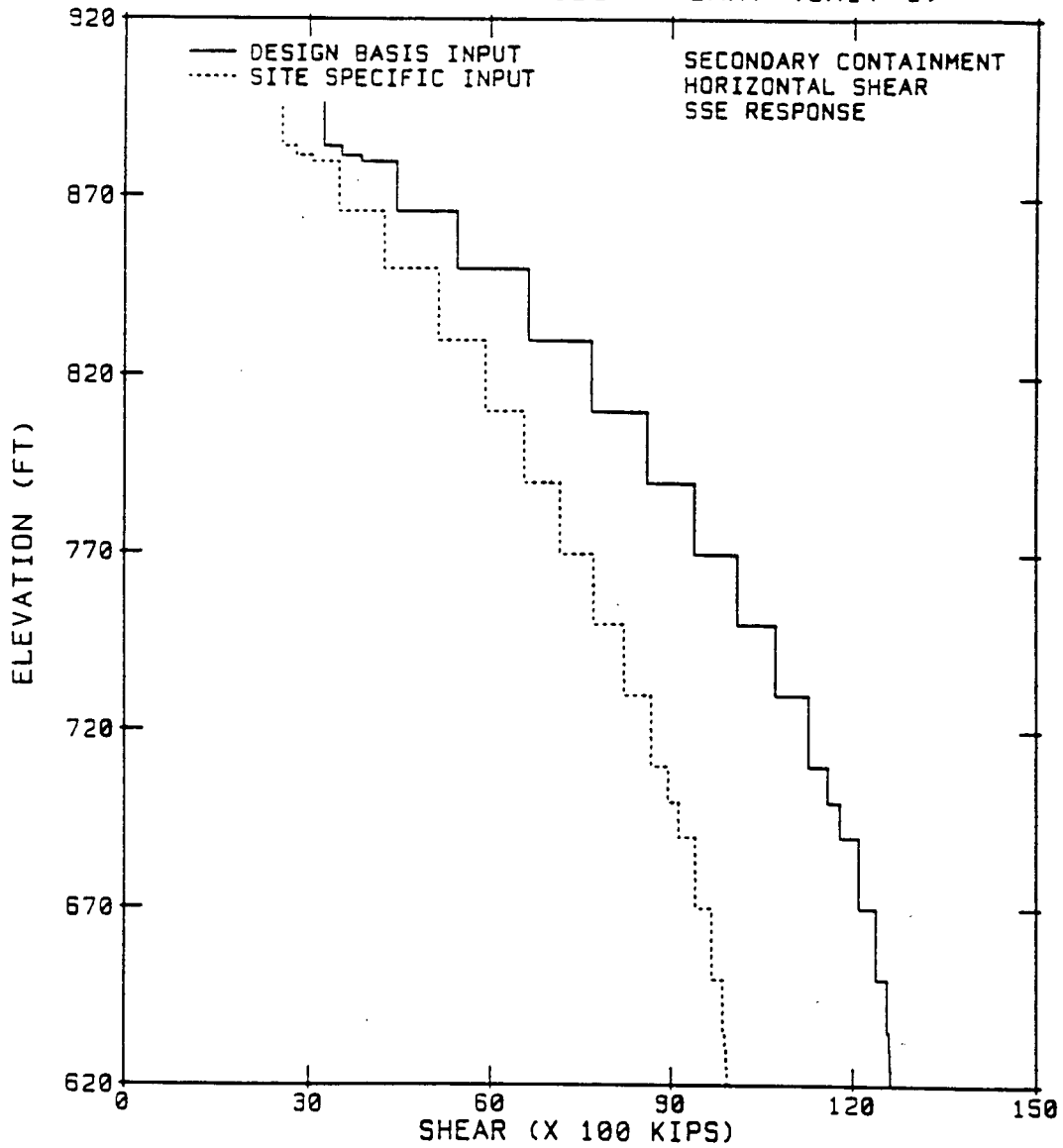
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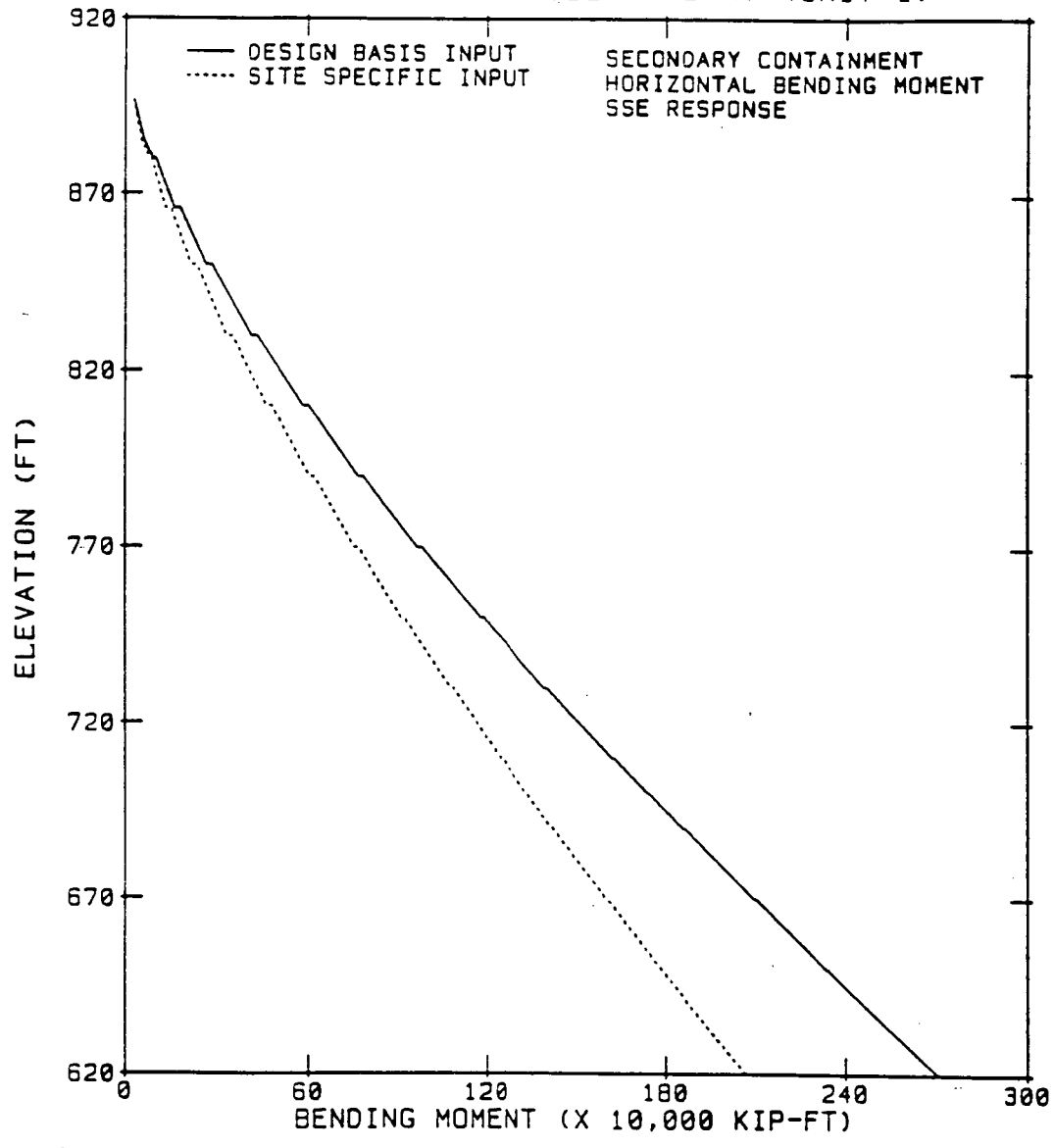
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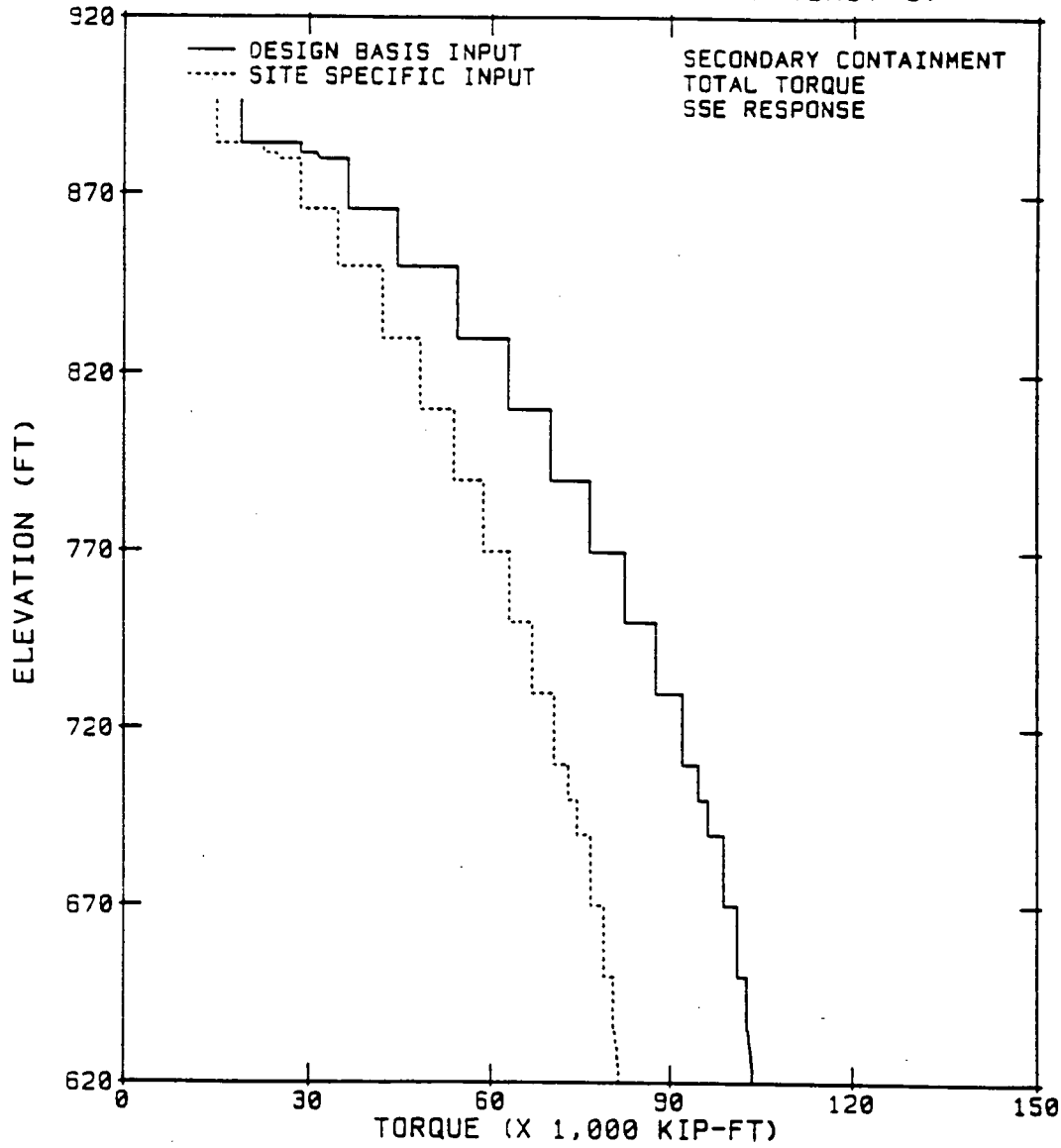
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TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



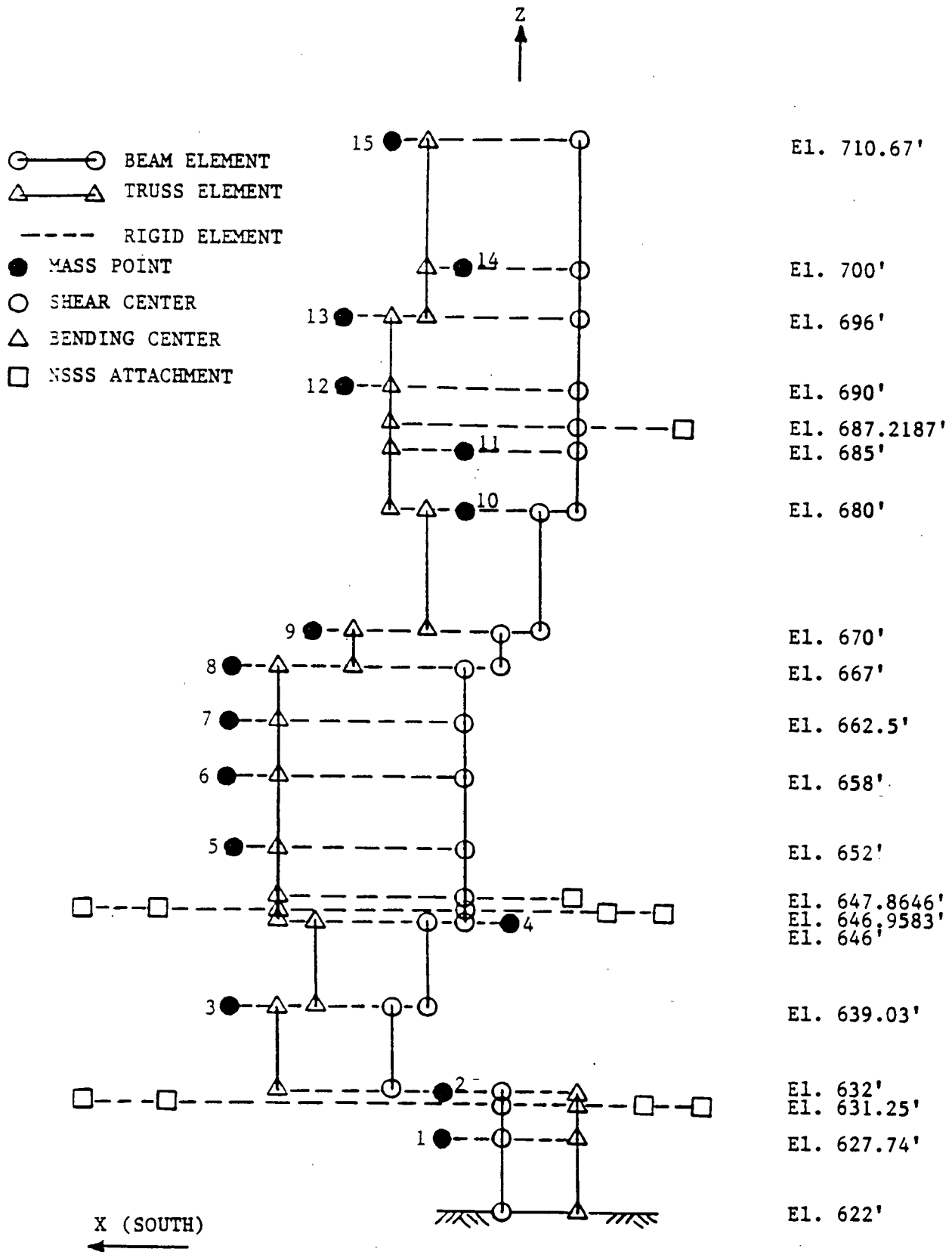
TVA BELLEFONTE NUCLEAR PLANT

UNIT 1

INTERIOR CONCRETE STRUCTURE (ICS)

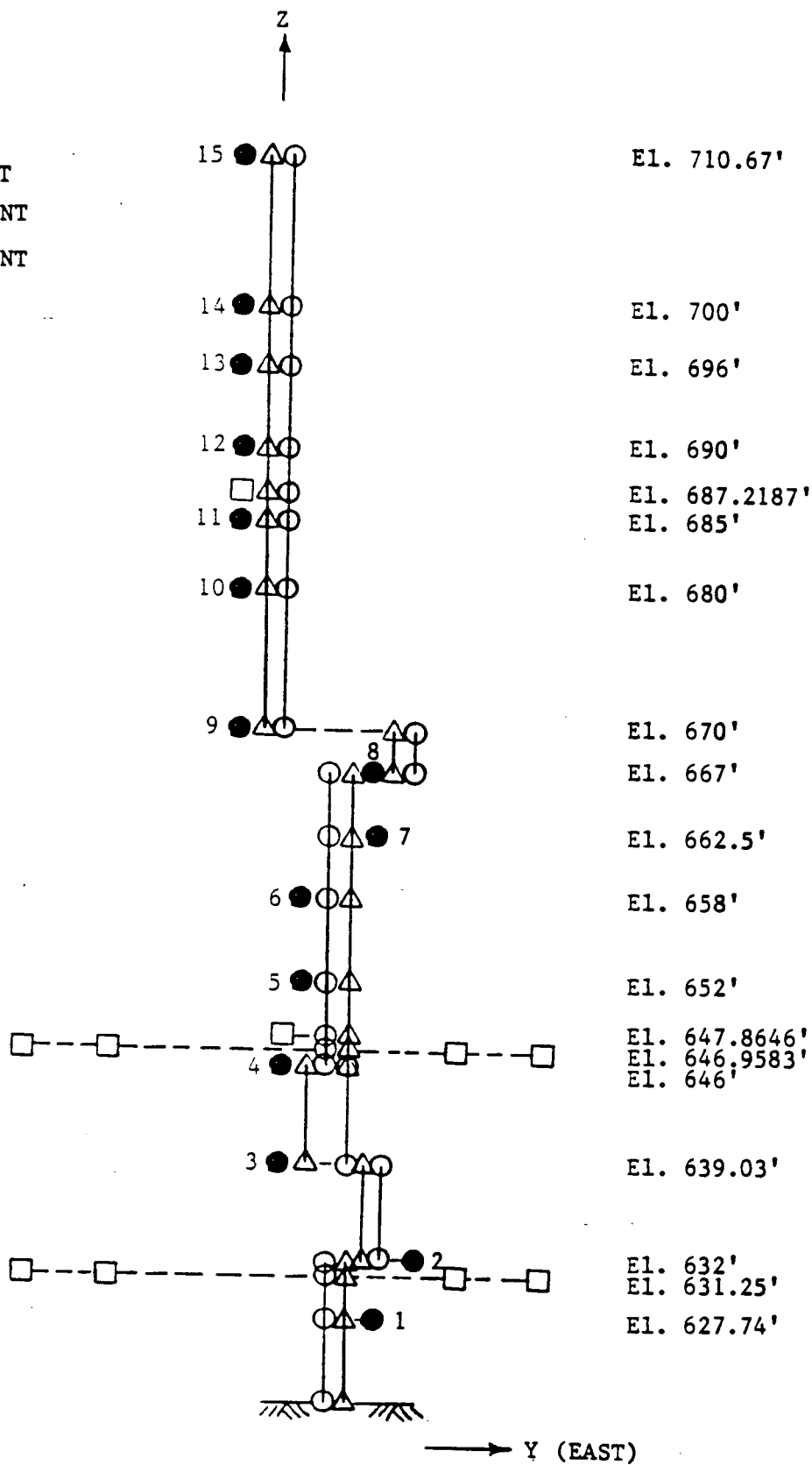
**COMPARISONS OF STRUCTURAL RESPONSES FOR THE DESIGN-BASIS VS.
SITE-SPECIFIC GROUND MOTION INPUTS FOR SSE**

(Pages ICS-1 through ICS-13)



3-D Lumped Mass Stick Model in the X-Z Plane for Interior Concrete Structure, TVA/BLN UNIT 1

- BEAM ELEMENT
- △—△ TRUSS ELEMENT
- RIGID ELEMENT
- MASS POINT
- SHEAR CENTER
- △ BENDING CENTER
- NSSS ATTACHMENT



3-D Lumped Mass Stick Model in the Y-Z Plane for Interior Concrete Structure, TVA/BLN UNIT 1

STICK MODEL - LUMPED WEIGHTS
BLN - INTERIOR CONCRETE STRUCTURE

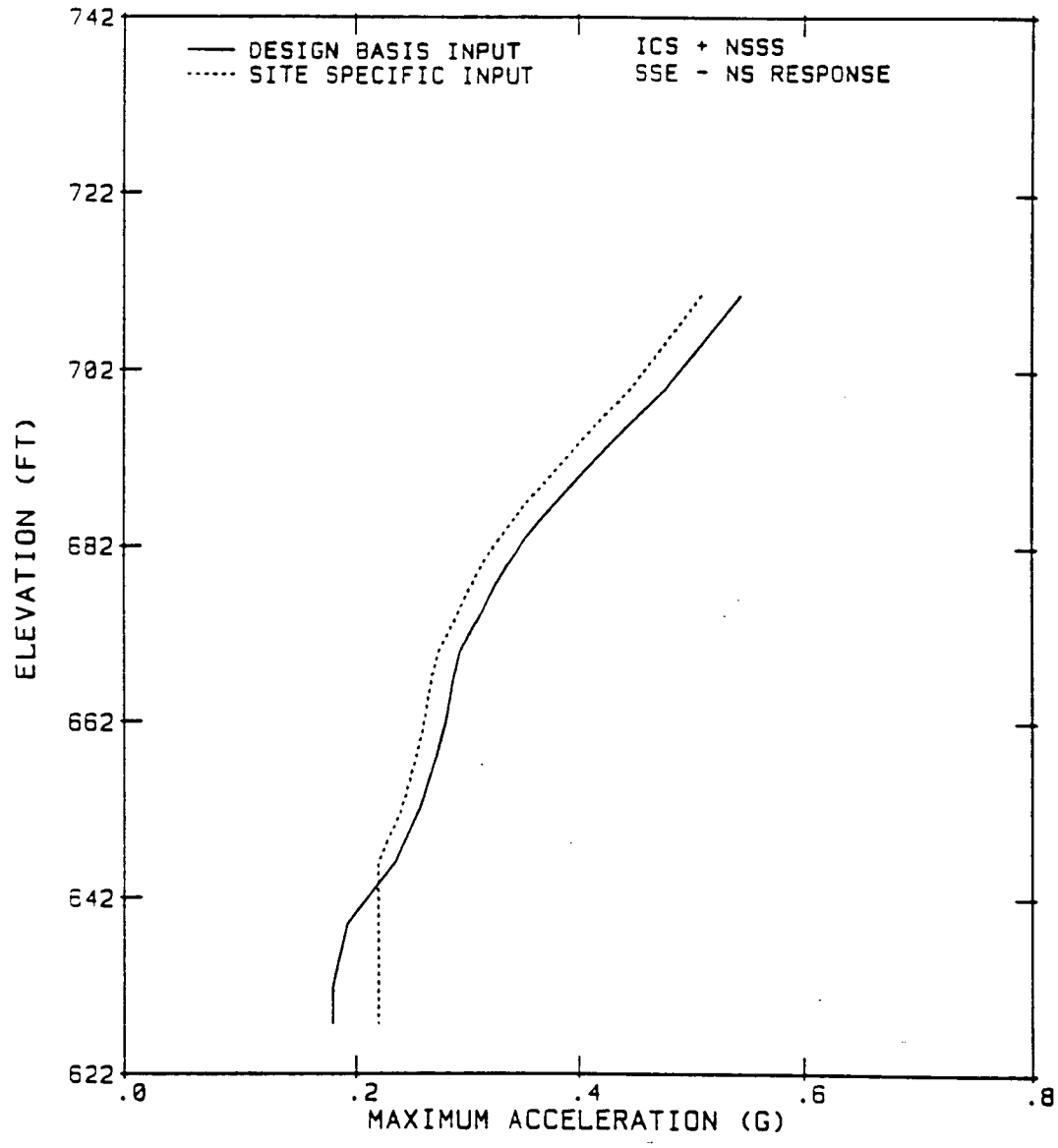
MASS POINT	EL. (ft)	WEIGHT (KIPS)		
		NS	EW	Vertical
15	710.67	1306.00	1306.00	1306.00
14	700.00	2488.00	2488.00	2488.00
13	696.00	1891.00	1891.00	1891.00
12	690.00	1457.00	1457.00	1457.00
11	685.00	1325.00	1325.00	1325.00
10	680.00	1807.00	1807.00	1807.00
9	670.00	2207.00	2207.00	2207.00
8	667.00	1451.00	1451.00	1451.00
7	662.50	1824.00	1824.00	1824.00
6	658.00	2495.00	2495.00	2495.00
5	652.00	2852.00	2852.00	2852.00
4	646.00	4844.00	4844.00	4844.00
3	639.03	3586.00	3586.00	3586.00
2	632.00	2640.00	2640.00	2640.00
1	627.74	2347.00	2347.00	2347.00
TOTAL		34520.00	34520.00	34520.00

SSE MAXIMUM RESPONSE ACCELERATIONS AT MASS POINTS
BLN - INTERIOR CONCRETE STRUCTURE

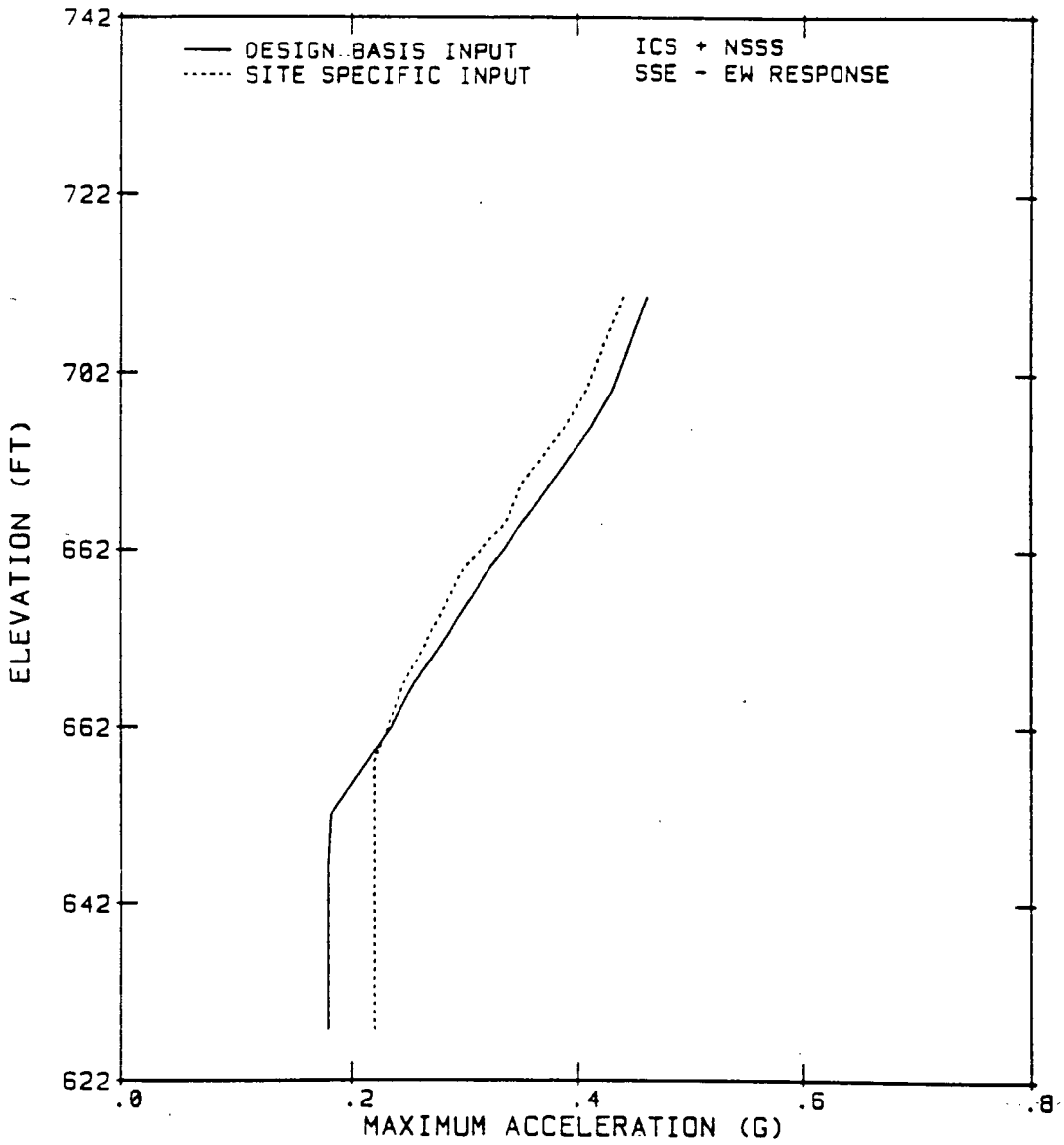
MASS POINT	EL. (ft.)	DESIGN BASIS INPUT			SITE-SPECIFIC INPUT		
		NS (g)	EW (g)	Vertical (g)	NS (g)	EW (g)	Vertical (g)
15	710.67	0.54	0.46	0.27	0.51	0.44	0.24
14	700.00	0.48	0.43	0.27	0.45	0.41	0.24
13	696.00	0.45	0.41	0.26	0.42	0.39	0.23
12	690.00	0.40	0.38	0.25	0.37	0.35	0.22
11	685.00	0.36	0.35	0.24	0.34	0.33	0.21
10	680.00	0.33	0.32	0.22	0.31	0.30	0.20
9	670.00	0.29	0.27	0.19	0.27	0.26	0.18
8	667.00	0.29	0.26	0.18	0.27	0.25	0.15
7	662.00	0.28	0.23	0.18	0.26	0.23	0.15
6	658.00	0.27	0.21	0.18	0.25	0.22	0.15
5	652.00	0.26	0.18	0.18	0.24	0.22	0.15
4	646.00	0.24	0.18	0.18	0.22	0.22	0.15
3	639.03	0.19	0.18	0.18	0.22	0.22	0.15
2	632.00	0.18	0.18	0.18	0.22	0.22	0.15
1	627.74	0.18	0.18	0.18	0.22	0.22	0.15

- Notes:
- (1) Response accelerations were calculated using the response spectrum analysis technique.
 - (2) Double sum method was used for combination of modal responses.
 - (3) Co-directional responses were combined using the SRSS combination rule.

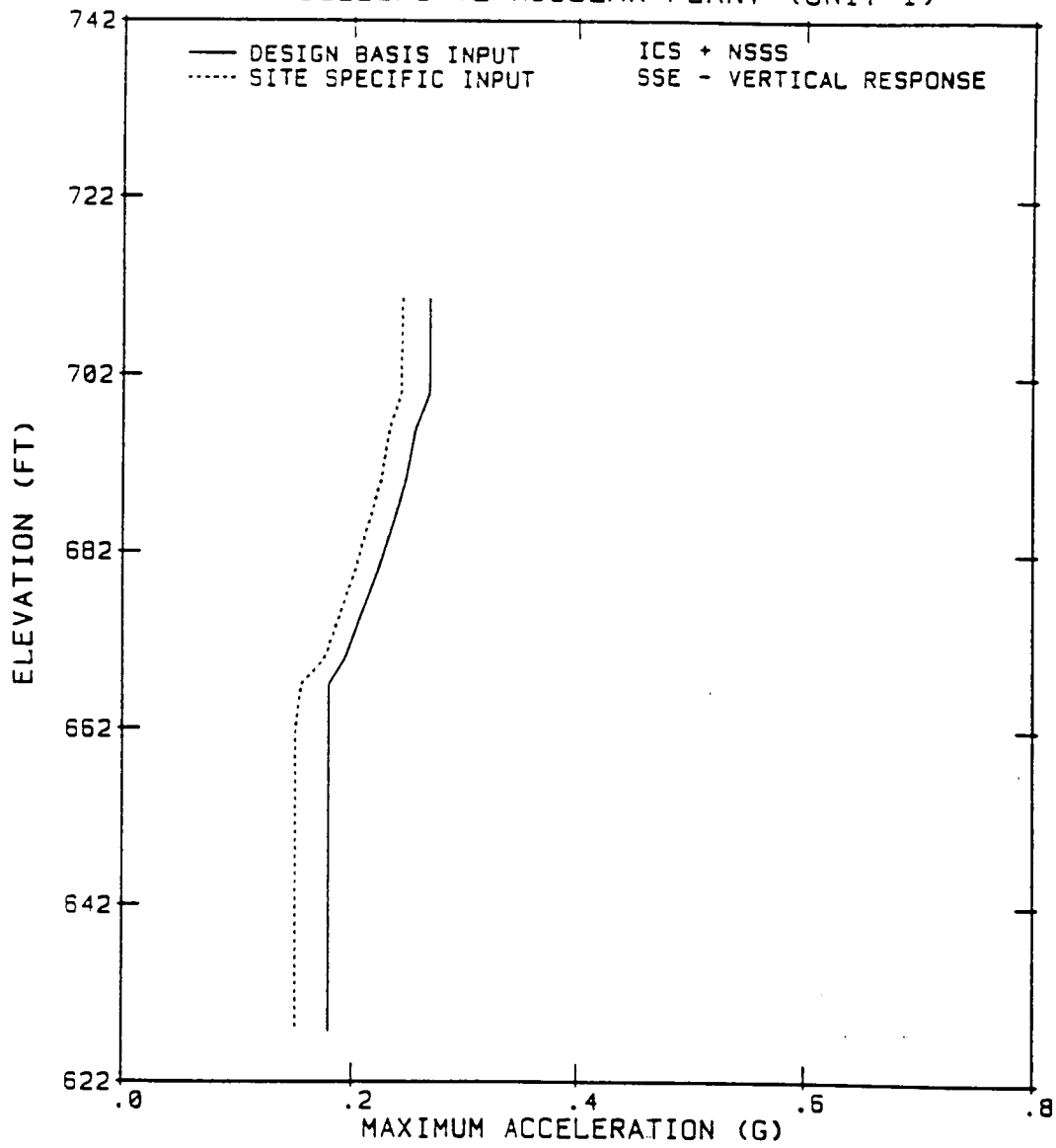
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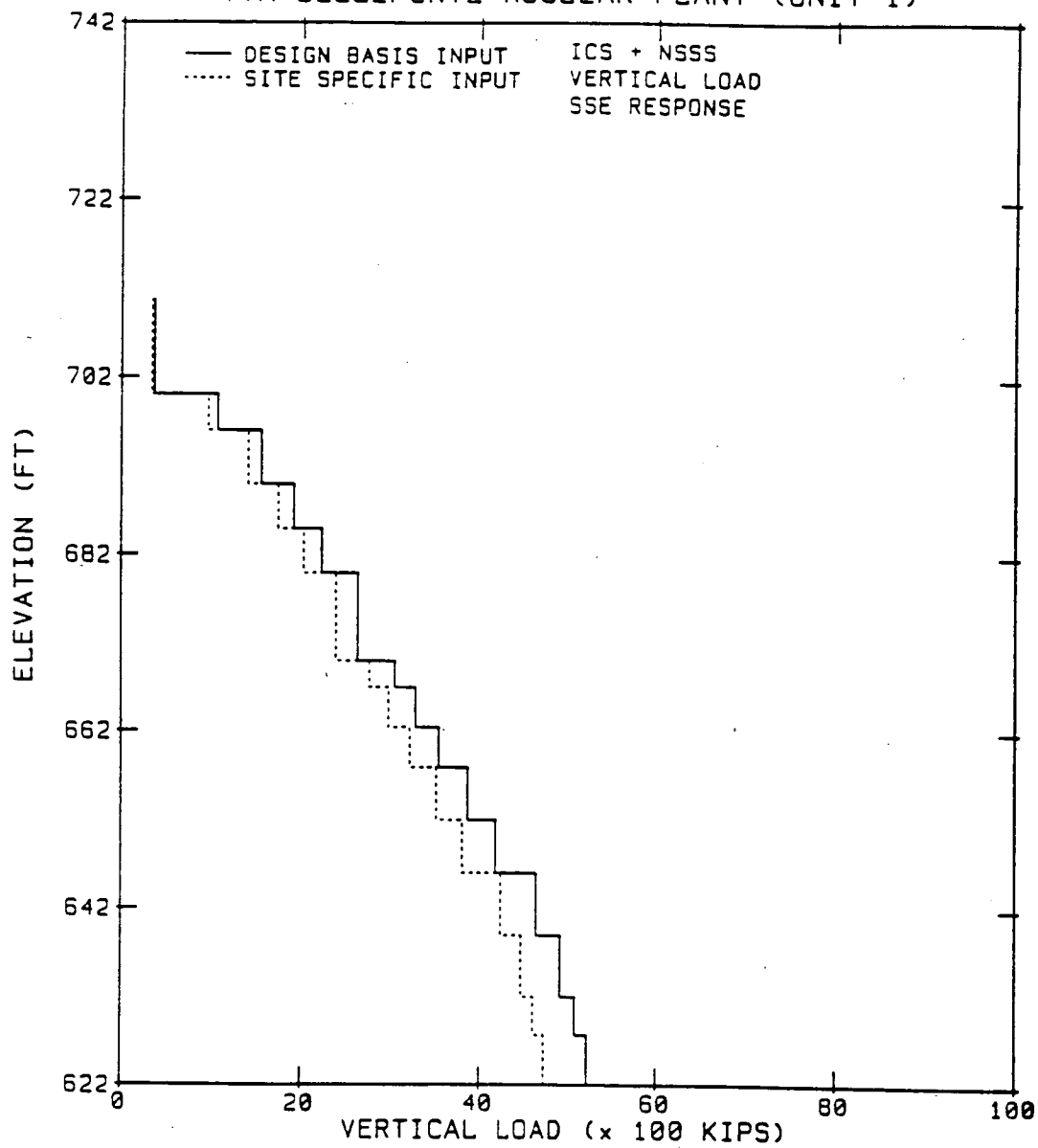
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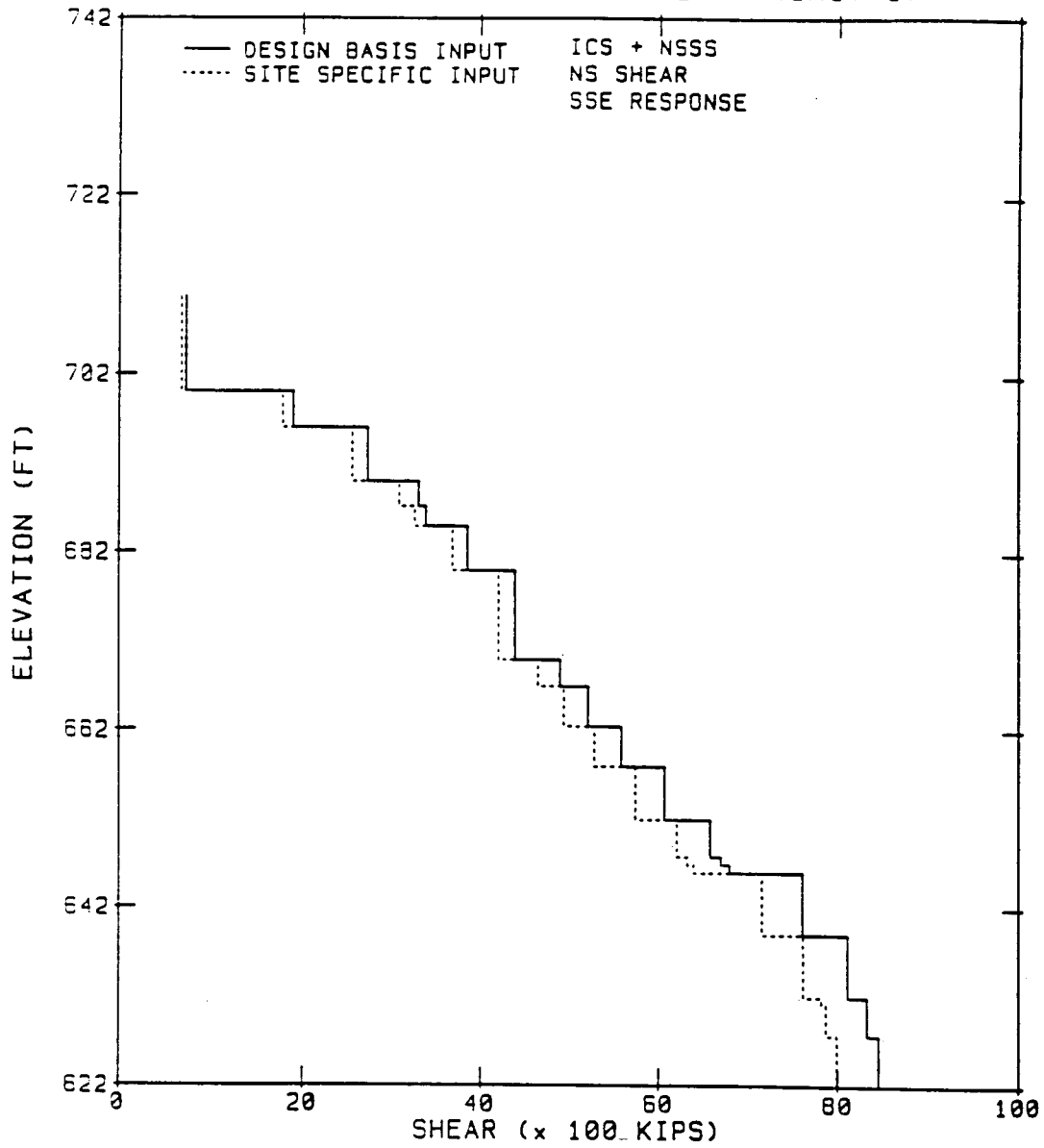
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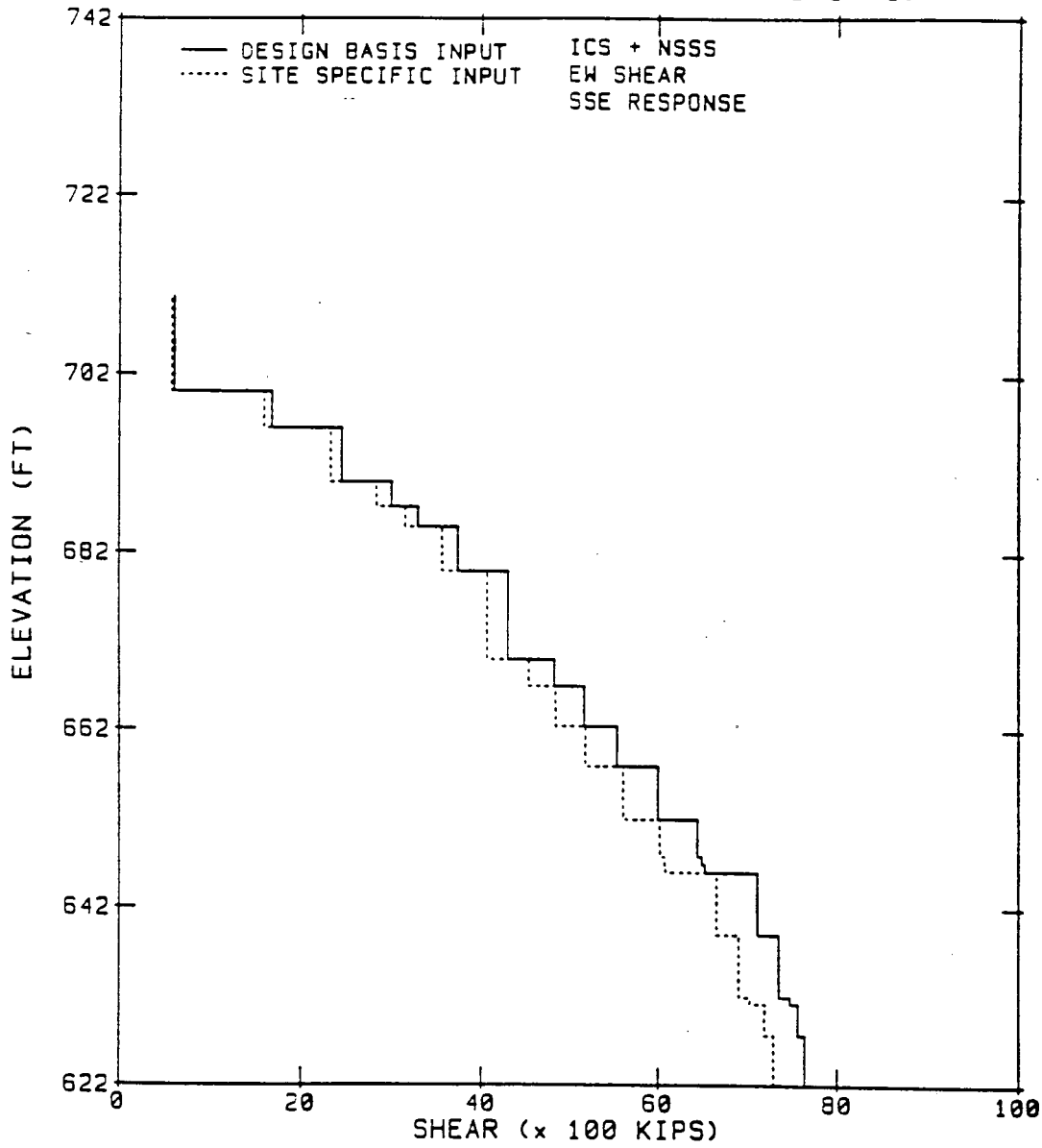
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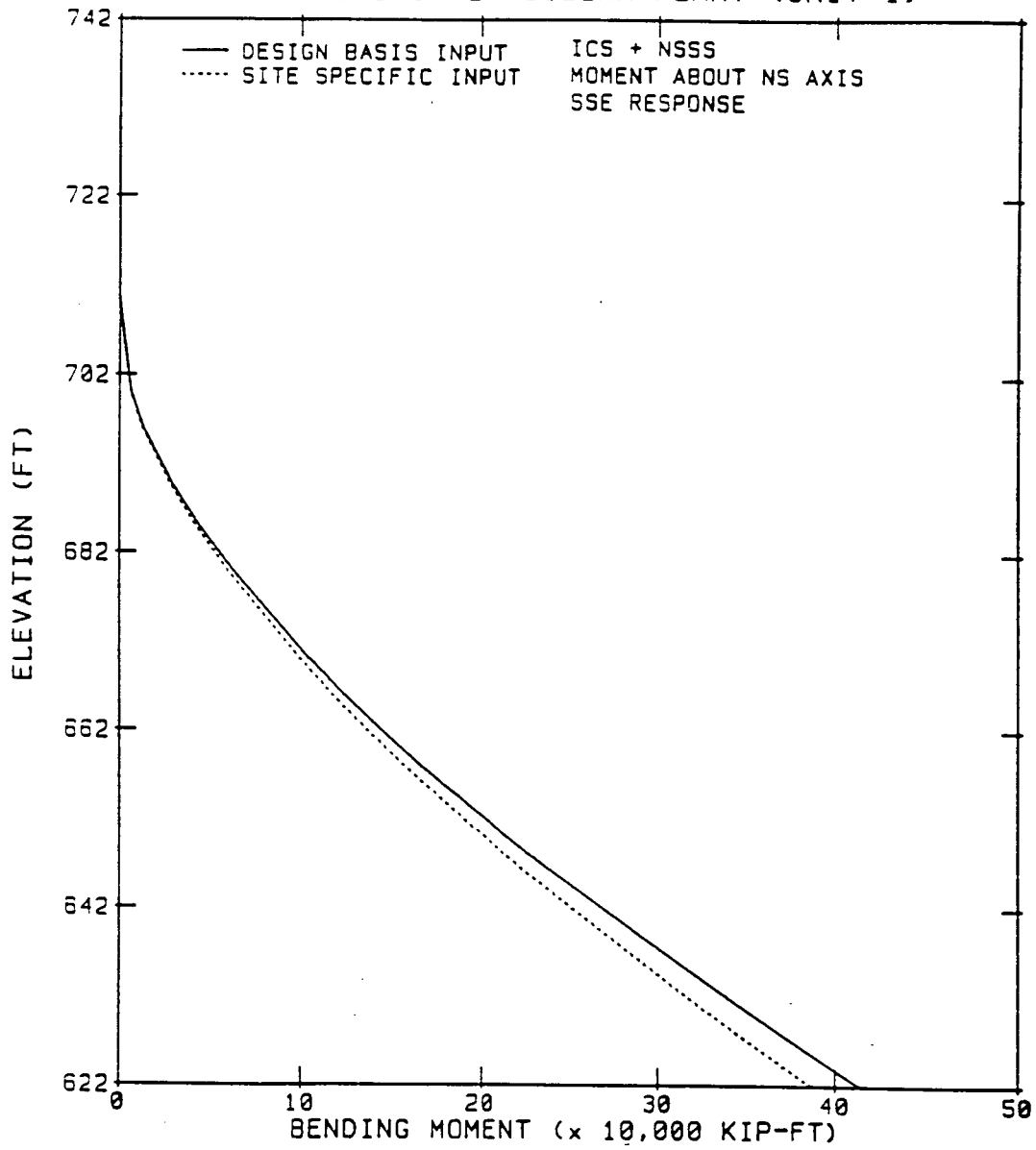
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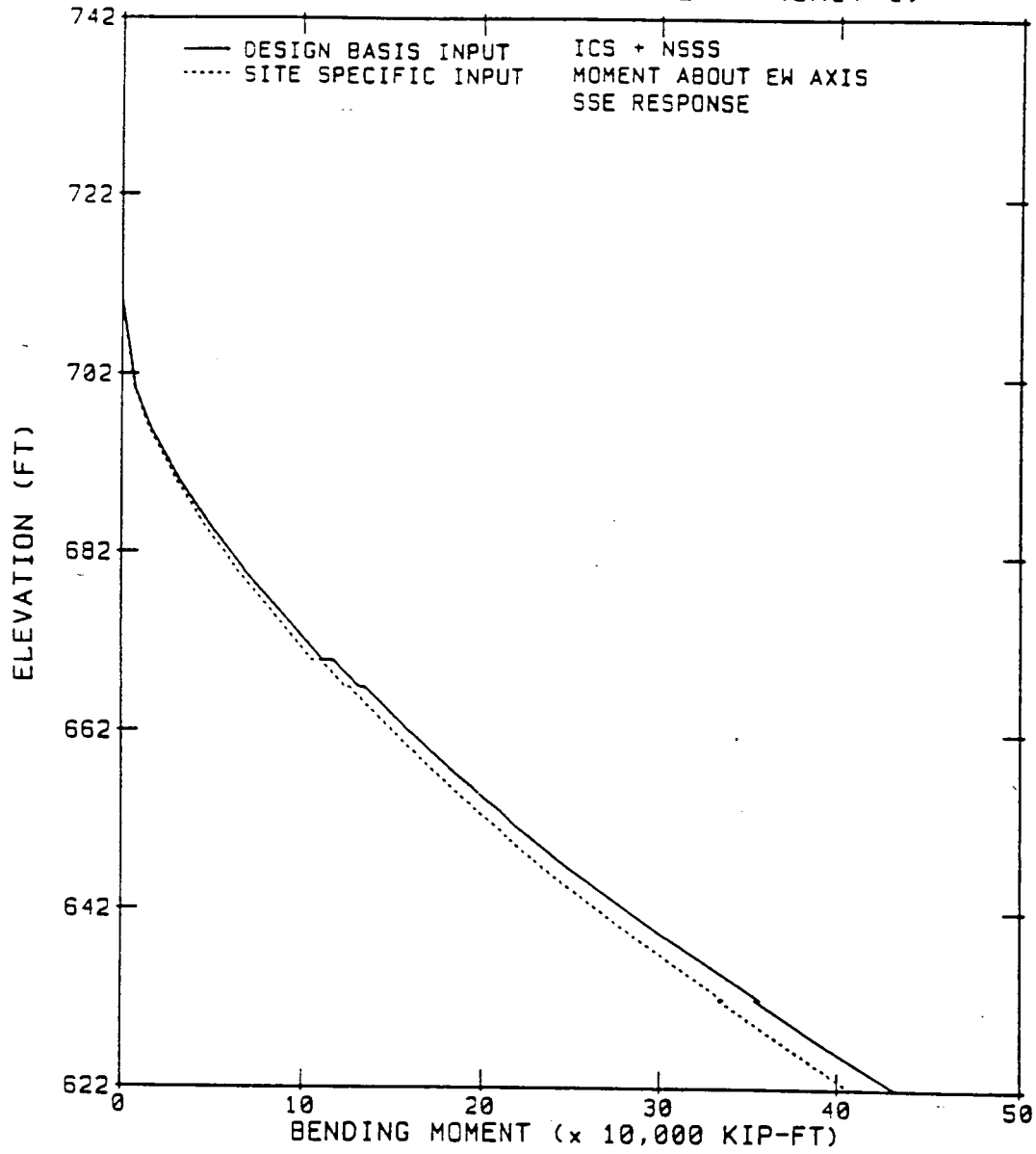
TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



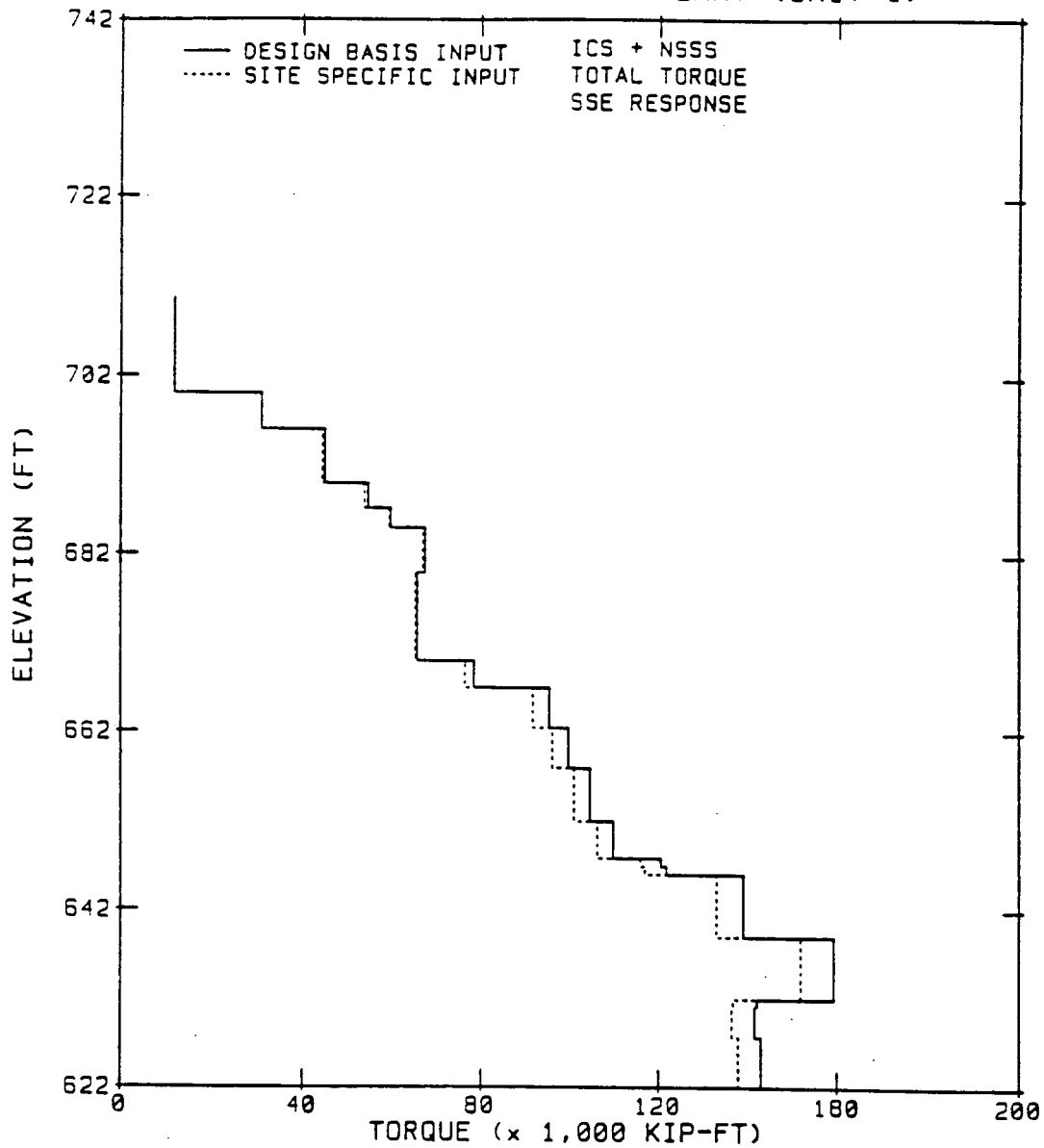
TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



TVA BELLEFONTE NUCLEAR PLANT

UNIT 1

AUXILIARY-CONTROL BUILDING (ACB)

**COMPARISONS OF STRUCTURAL RESPONSES FOR THE DESIGN-BASIS VS.
SITE-SPECIFIC GROUND MOTION INPUTS FOR SSE**

(Pages ACB-1 through ACB-15)

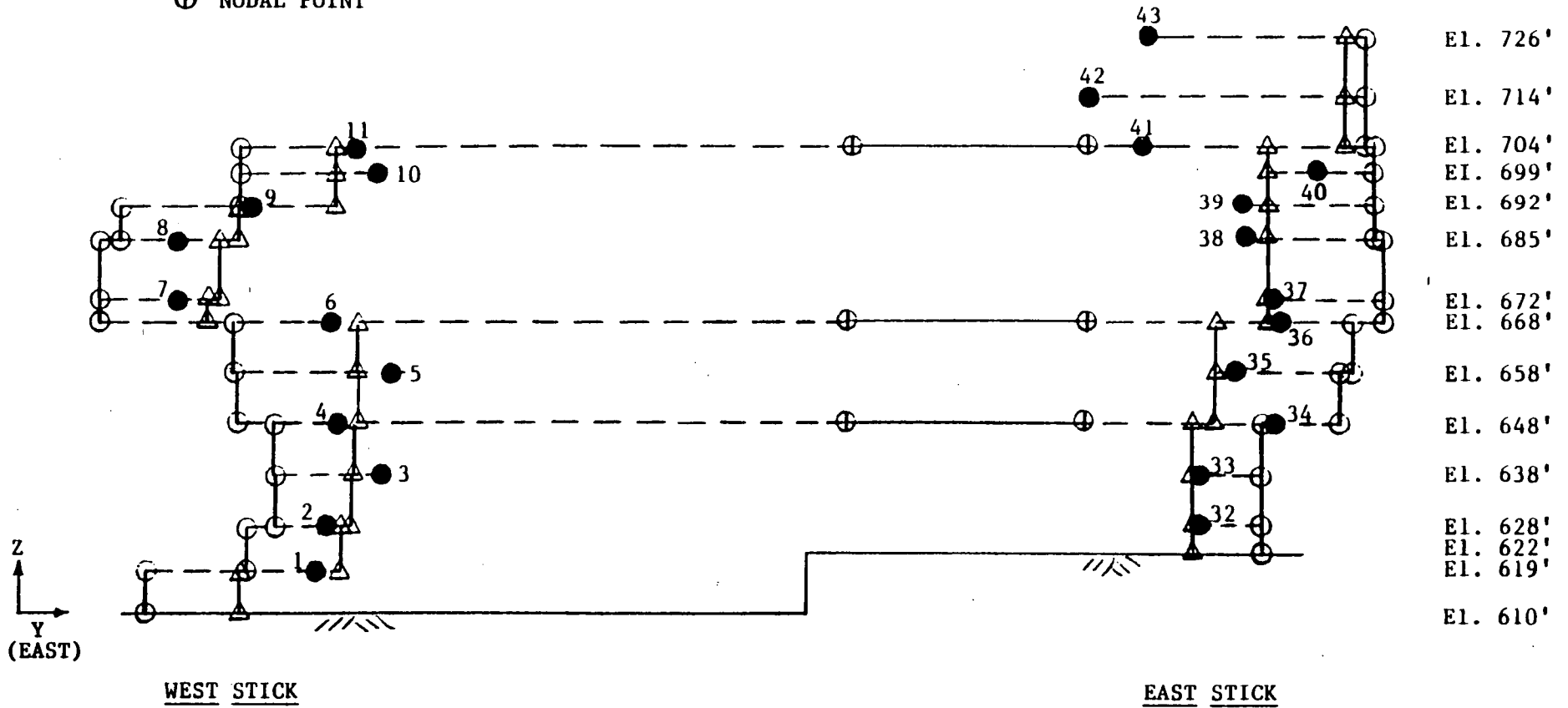
- BEAM ELEMENT
- △—△ TRUSS ELEMENT
- RIGID ELEMENT
- MASS POINT
- △ BENDING CENTER
- SHEAR CENTER
- ⊕ NODAL POINT

(M)

(W)

(Z)

ACB-1



3-D Lumped Mass Stick Model in the Y-Z Plane for
Auxiliary-Control Building, TVA/BLN UNIT 1

**STICK MODEL - LUMPED WEIGHTS
BLN - AUXILIARY CONTROL BUILDING**

	MASS POINT	EL. (ft)	WEIGHT (KIPS)		
			NS	EW	Vertical
WEST STICK	11	704.00	27015.80	27015.80	27015.80
	10	699.00	5989.20	5989.20	5989.20
	9	692.00	8597.40	8597.40	8597.40
	8	685.00	31652.60	31652.60	31652.60
	7	672.00	11012.40	11012.40	11012.40
	6	668.00	27241.20	27241.20	27241.20
	5	658.00	21284.20	21284.20	21284.20
	4	648.00	41860.00	41860.00	41860.00
	3	638.00	21058.80	21058.80	21058.80
	2	628.00	44114.00	44114.00	44114.00
	1	619.00	18321.80	18321.80	18321.80
EAST STICK	43	726.00	3831.80	3831.80	3831.80
	42	714.00	2392.46	2392.46	2392.46
	41	704.00	2492.28	2492.28	2492.28
	40	699.00	1732.36	1732.36	1732.36
	39	692.00	1684.06	1684.06	1684.06
	38	685.00	2363.48	2363.48	2363.48
	37	672.00	1922.34	1922.34	1922.34
	36	668.00	6246.80	6246.80	6246.80
	35	658.00	5602.80	5602.80	5602.80
	34	648.00	9016.00	9016.00	9016.00
	33	638.00	4733.40	4733.40	4733.40
32	628.00	3767.40	3767.40	3767.40	

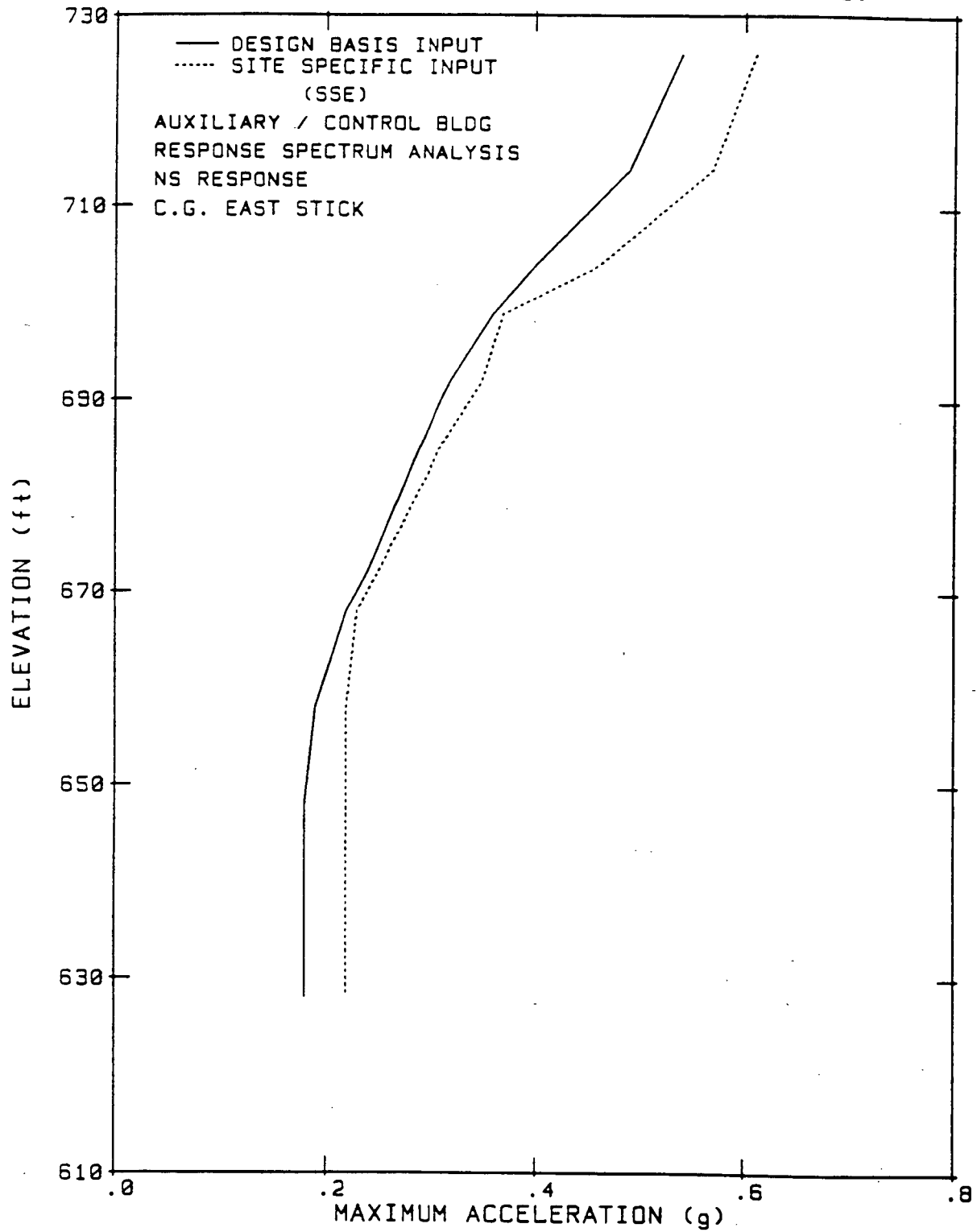
TOTAL 303932.58 303932.58 303932.58

SSE MAXIMUM RESPONSE ACCELERATIONS AT MASS POINTS
BLN - AUXILIARY CONTROL BUILDING

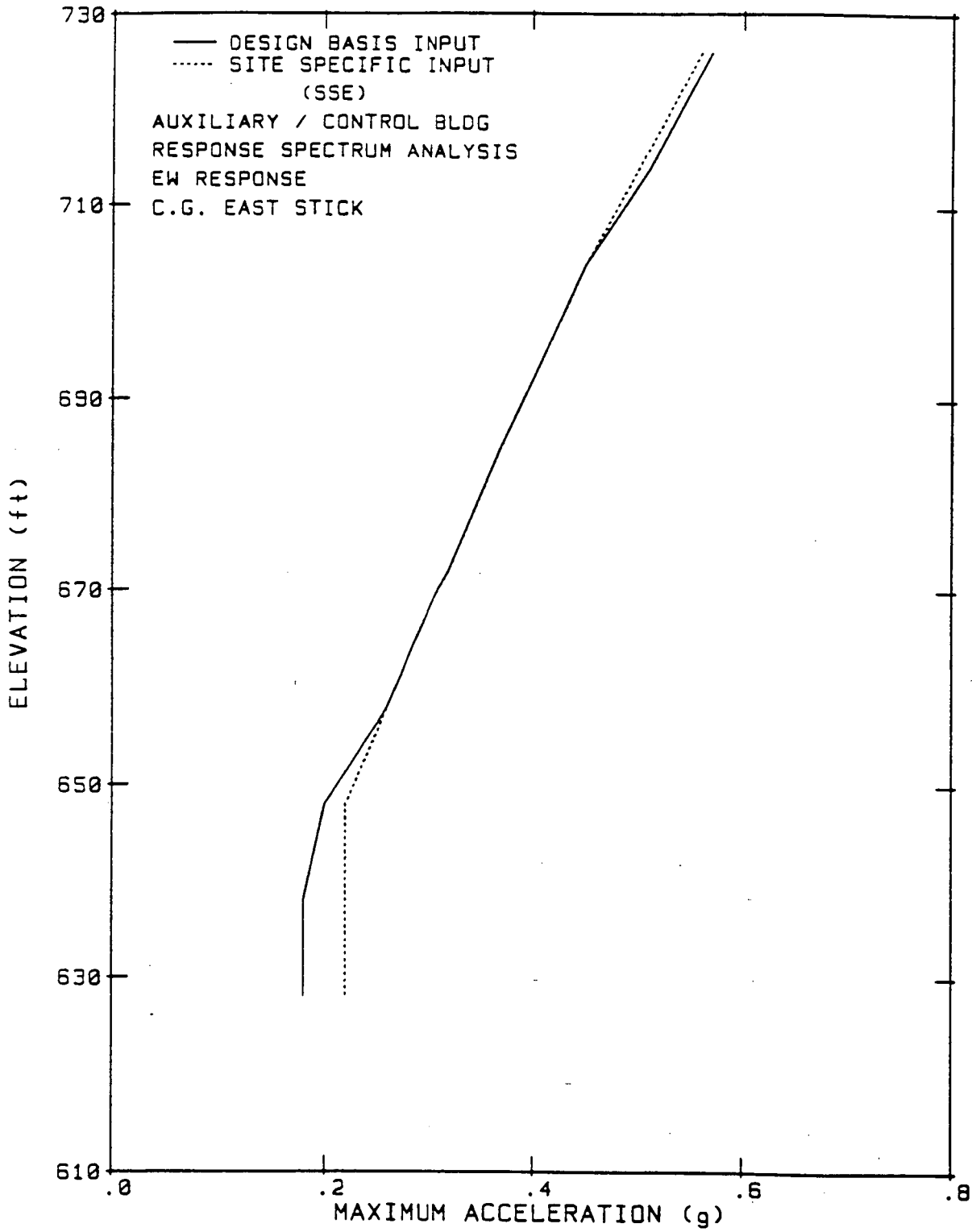
MASS POINT	EL. (ft.)	DESIGN BASIS INPUT			SITE-SPECIFIC INPUT			
		NS (g)	EW (g)	Vertical (g)	NS (g)	EW (g)	Vertical (g)	
WEST SITING K	11	704.00	0.51	0.58	0.33	0.50	0.58	0.26
	10	699.00	0.50	0.56	0.32	0.49	0.56	0.25
	9	692.00	0.46	0.52	0.31	0.45	0.52	0.24
	8	685.00	0.43	0.48	0.29	0.42	0.48	0.23
	7	672.00	0.37	0.38	0.25	0.36	0.38	0.20
	6	668.00	0.35	0.36	0.23	0.34	0.36	0.18
	5	658.00	0.31	0.32	0.20	0.30	0.32	0.16
	4	648.00	0.26	0.28	0.18	0.25	0.28	0.15
	3	638.00	0.20	0.21	0.18	0.22	0.22	0.15
	2	628.00	0.18	0.18	0.18	0.22	0.22	0.15
	1	619.00	0.18	0.18	0.18	0.22	0.22	0.15
EAST SITING K	43	726.00	0.54	0.57	0.41	0.61	0.56	0.35
	42	714.00	0.49	0.51	0.37	0.57	0.50	0.31
	41	704.00	0.40	0.45	0.25	0.46	0.45	0.22
	40	699.00	0.36	0.43	0.22	0.37	0.43	0.20
	39	692.00	0.32	0.40	0.21	0.35	0.40	0.18
	38	685.00	0.29	0.37	0.19	0.31	0.37	0.16
	37	672.00	0.24	0.32	0.18	0.25	0.32	0.15
	36	668.00	0.22	0.30	0.18	0.23	0.30	0.15
	35	658.00	0.19	0.26	0.18	0.22	0.26	0.15
	34	648.00	0.18	0.20	0.18	0.22	0.22	0.15
	33	638.00	0.18	0.18	0.18	0.22	0.22	0.15
32	628.00	0.18	0.18	0.18	0.22	0.22	0.15	

- Notes:
- (1) Response accelerations were calculated using the response spectrum analysis technique.
 - (2) Double sum method was used for combination of modal responses.
 - (3) Co-directional responses were combined using the SRSS combination rule.

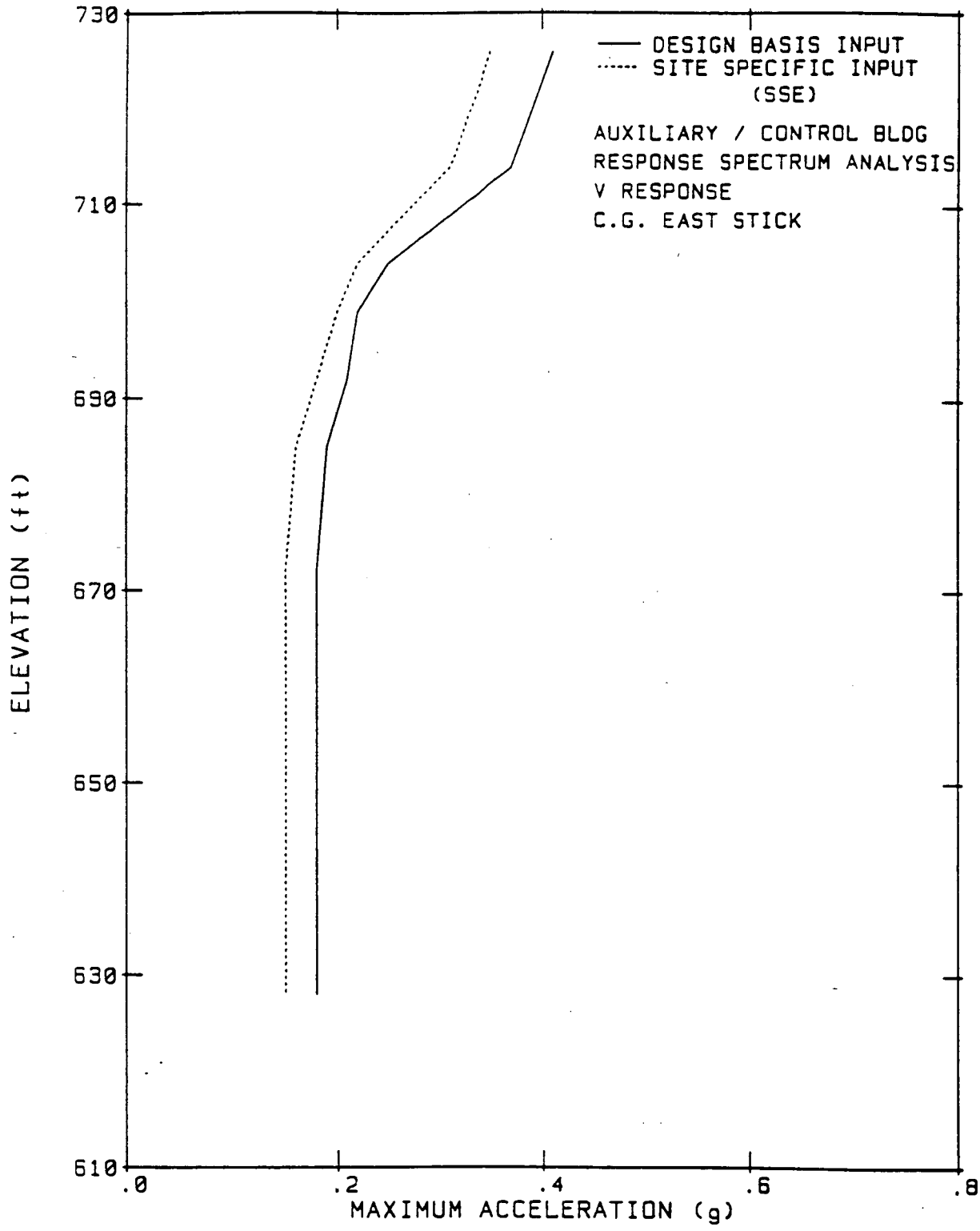
TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



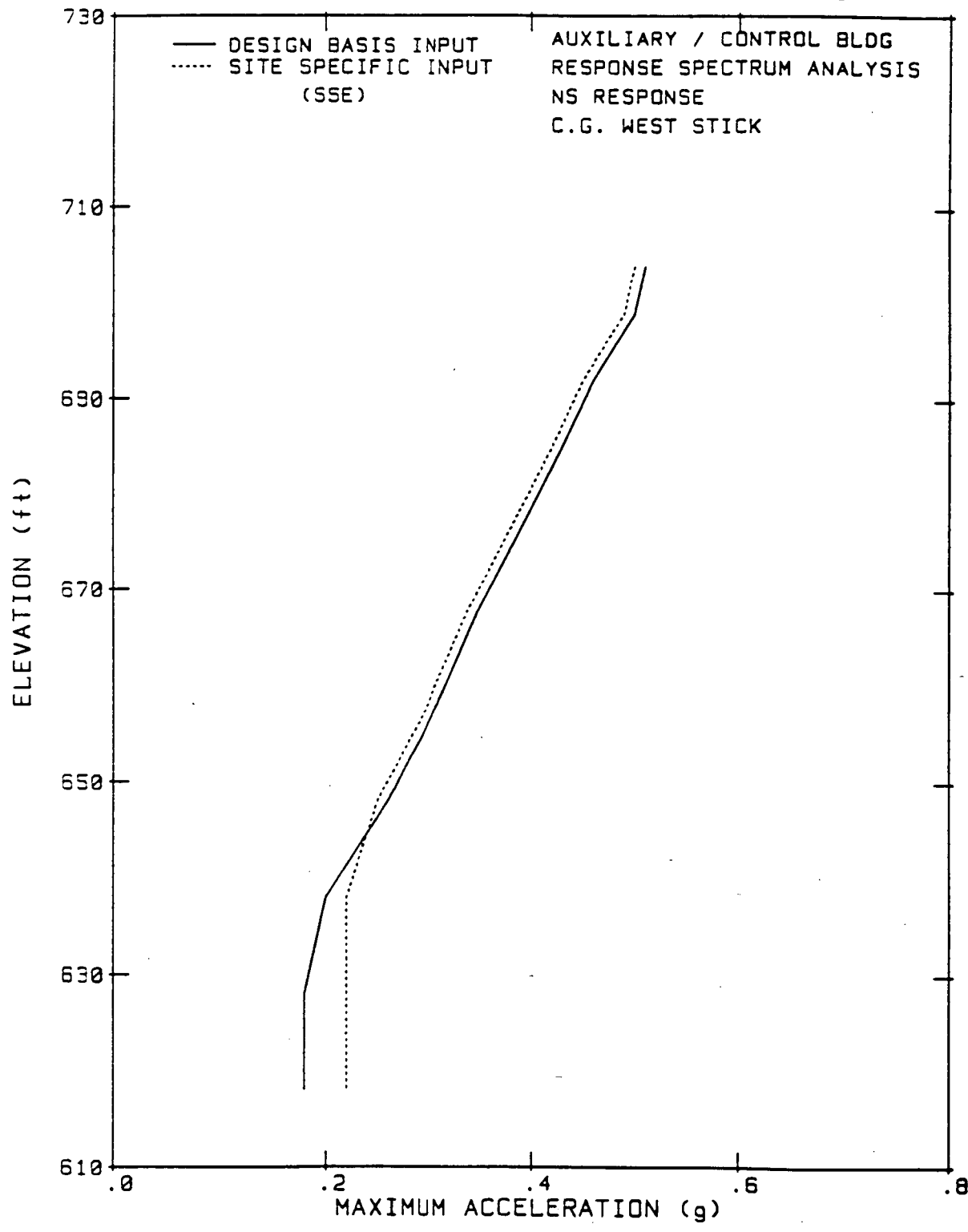
TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



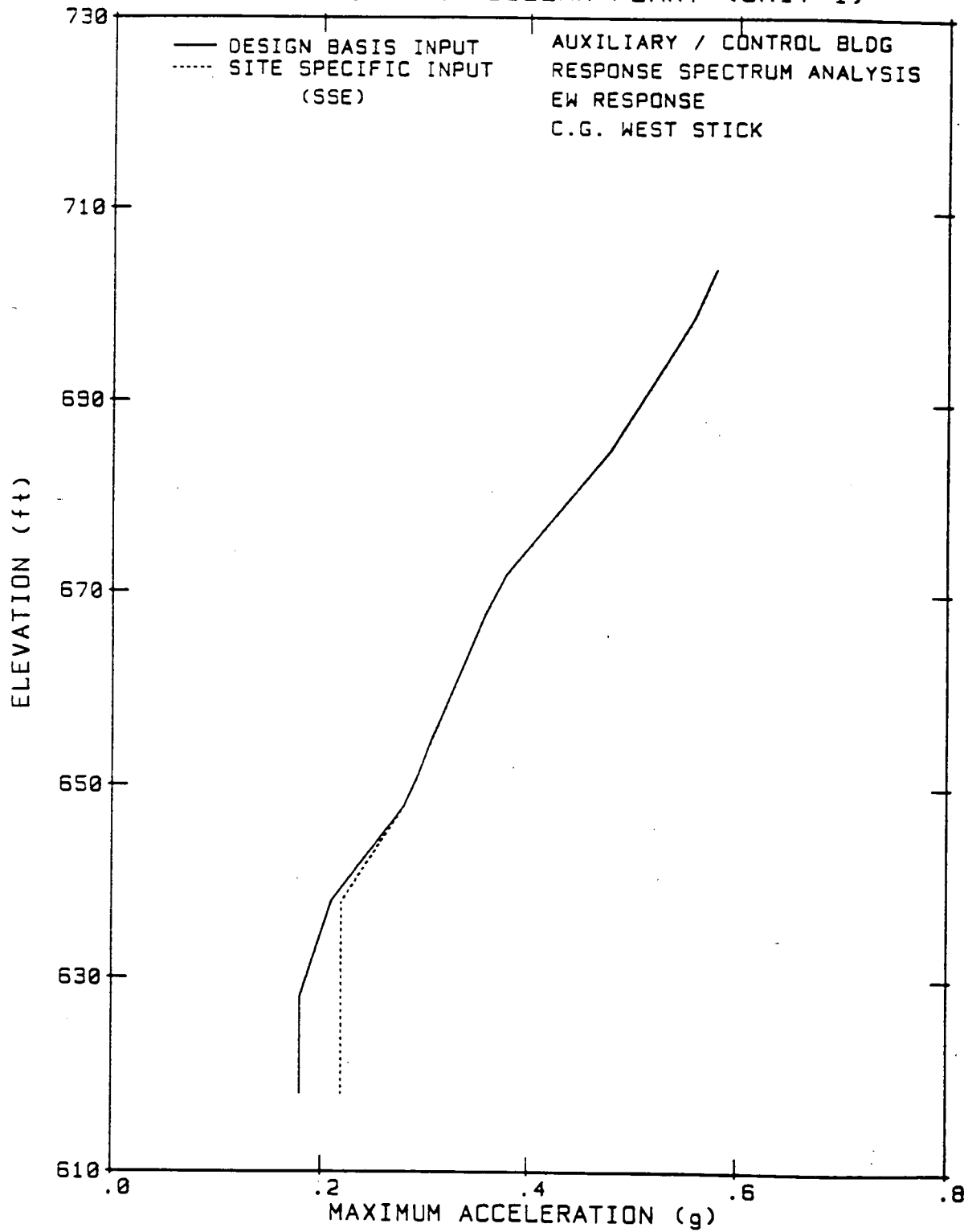
TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



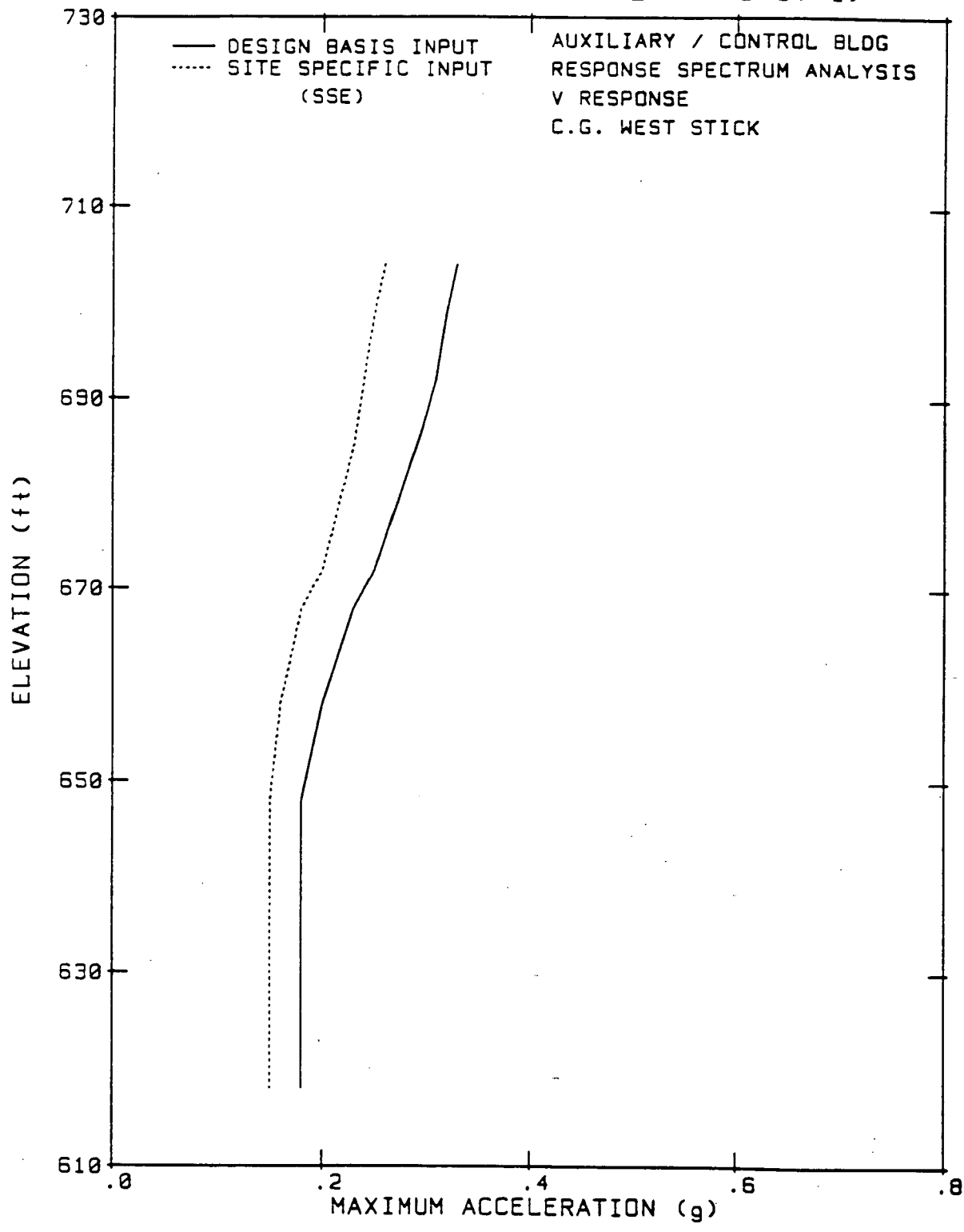
— DESIGN BASIS INPUT
..... SITE SPECIFIC INPUT (SSE)

AUXILIARY / CONTROL BLDG
RESPONSE SPECTRUM ANALYSIS
NS RESPONSE
C.G. WEST STICK

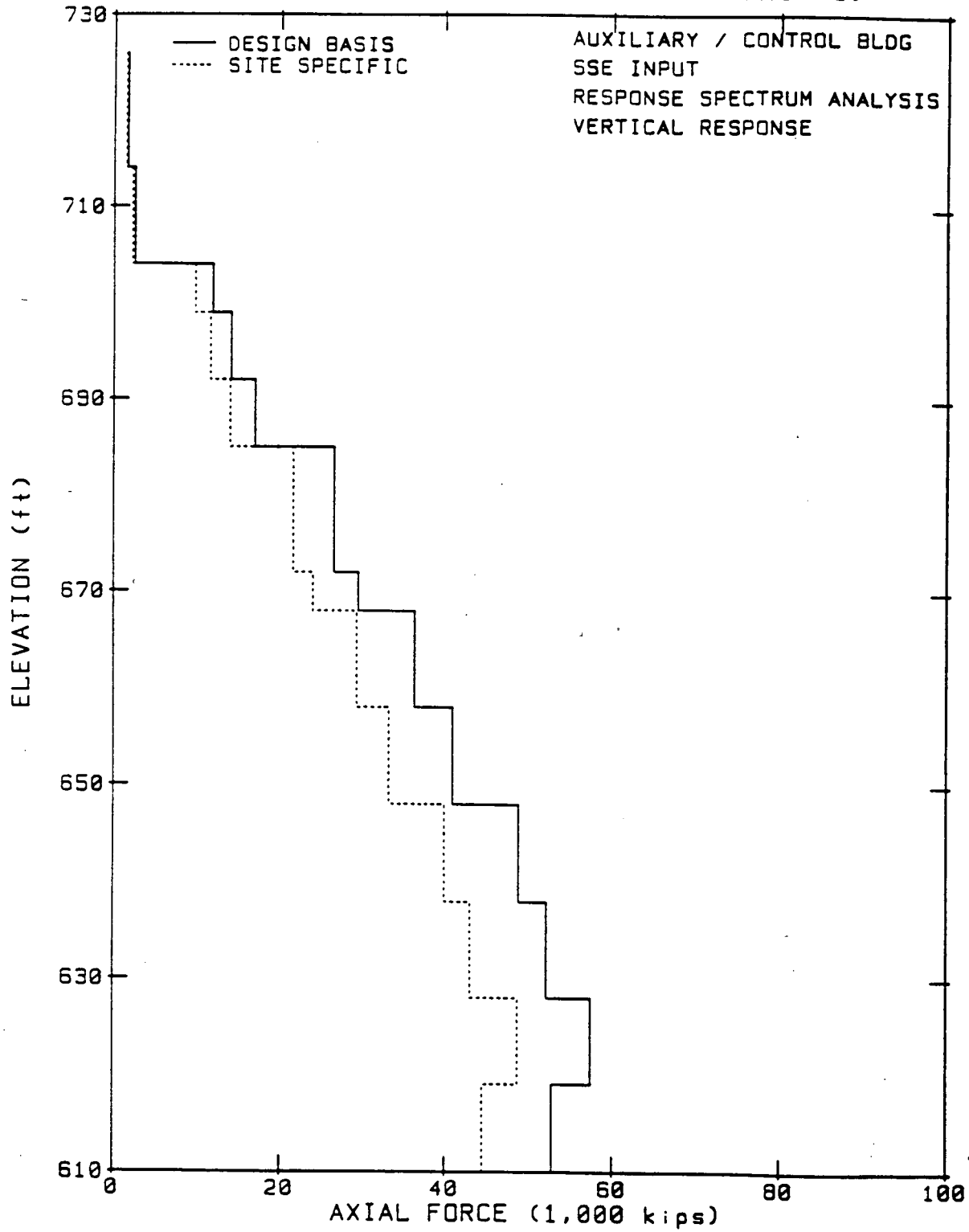
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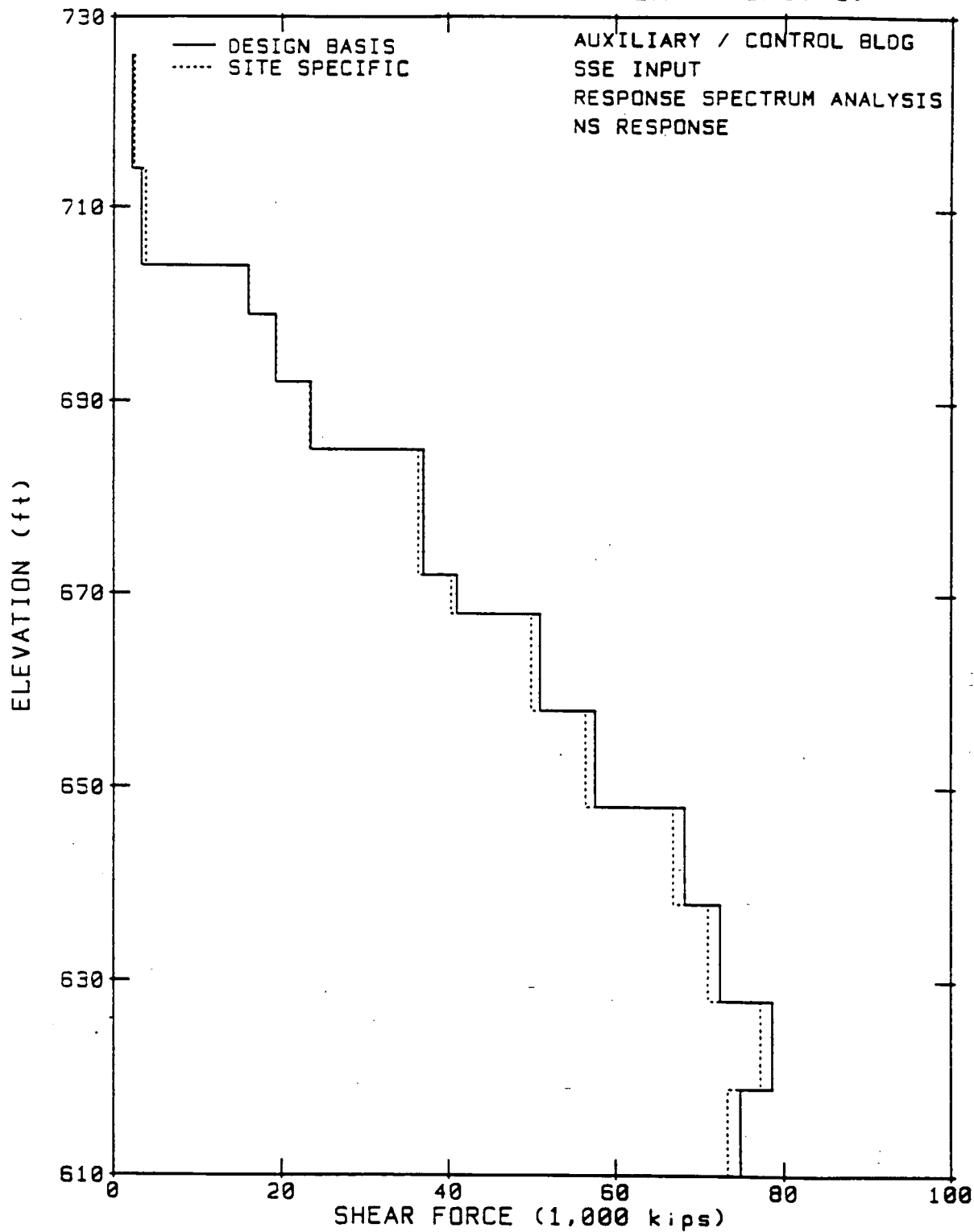
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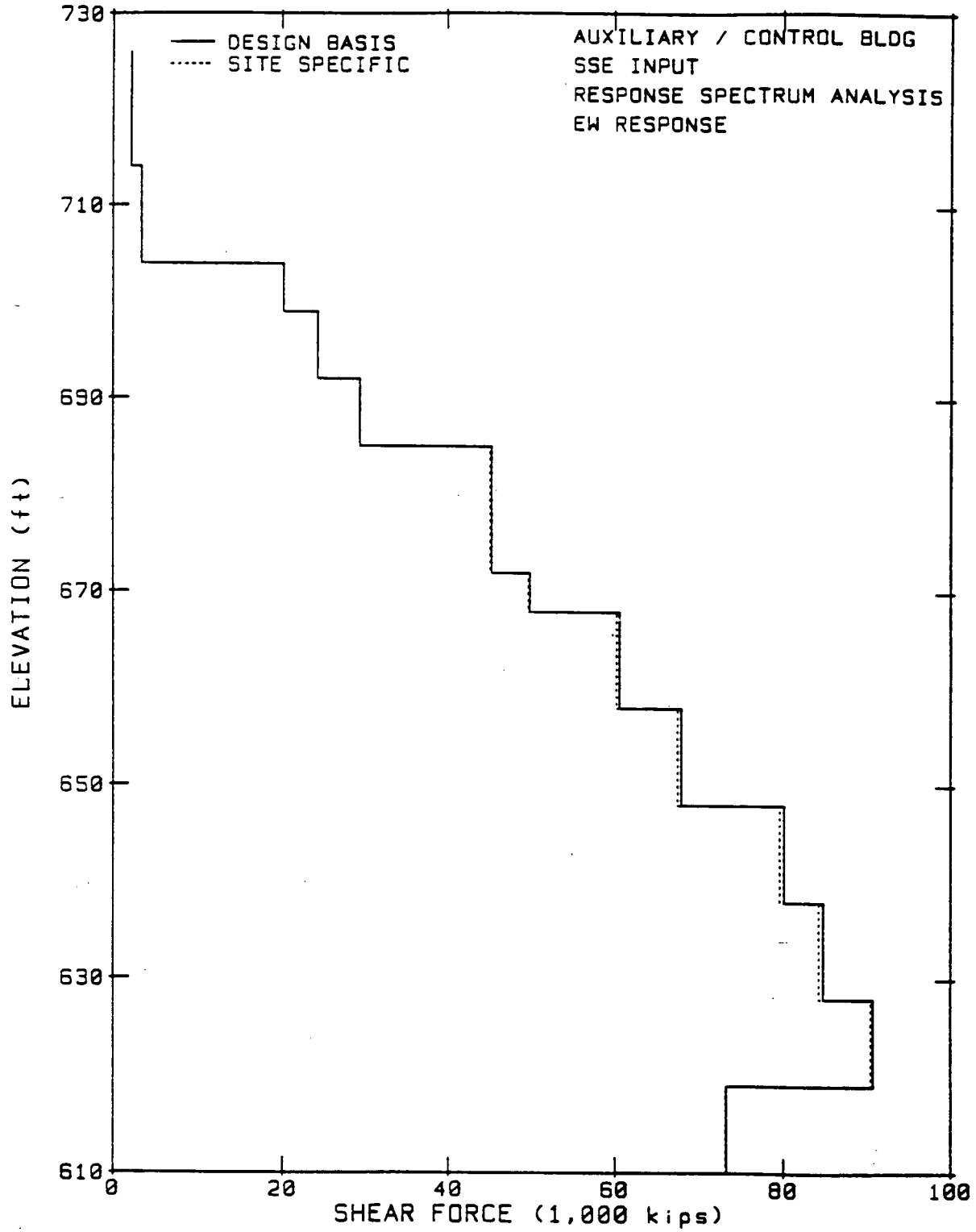
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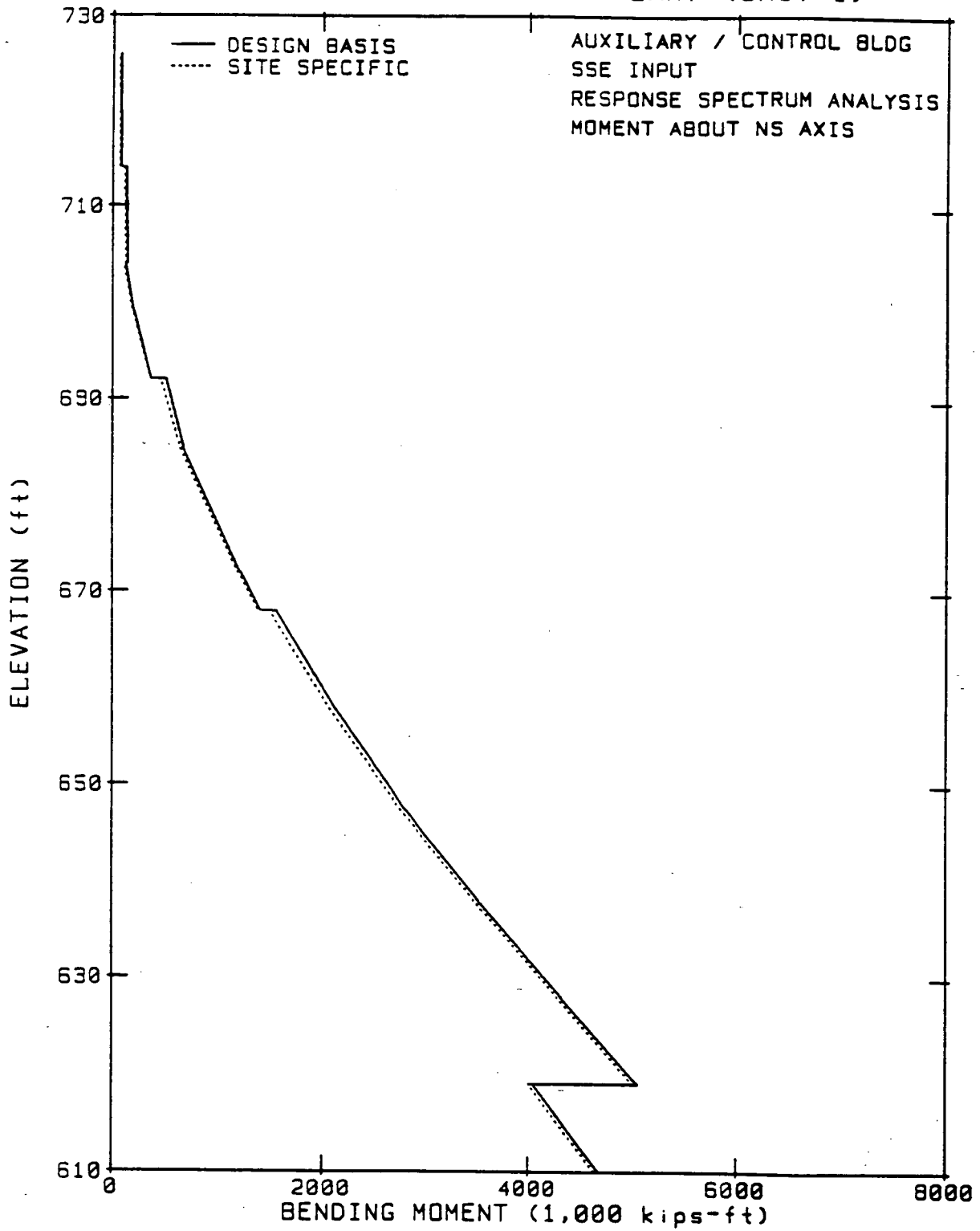
TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



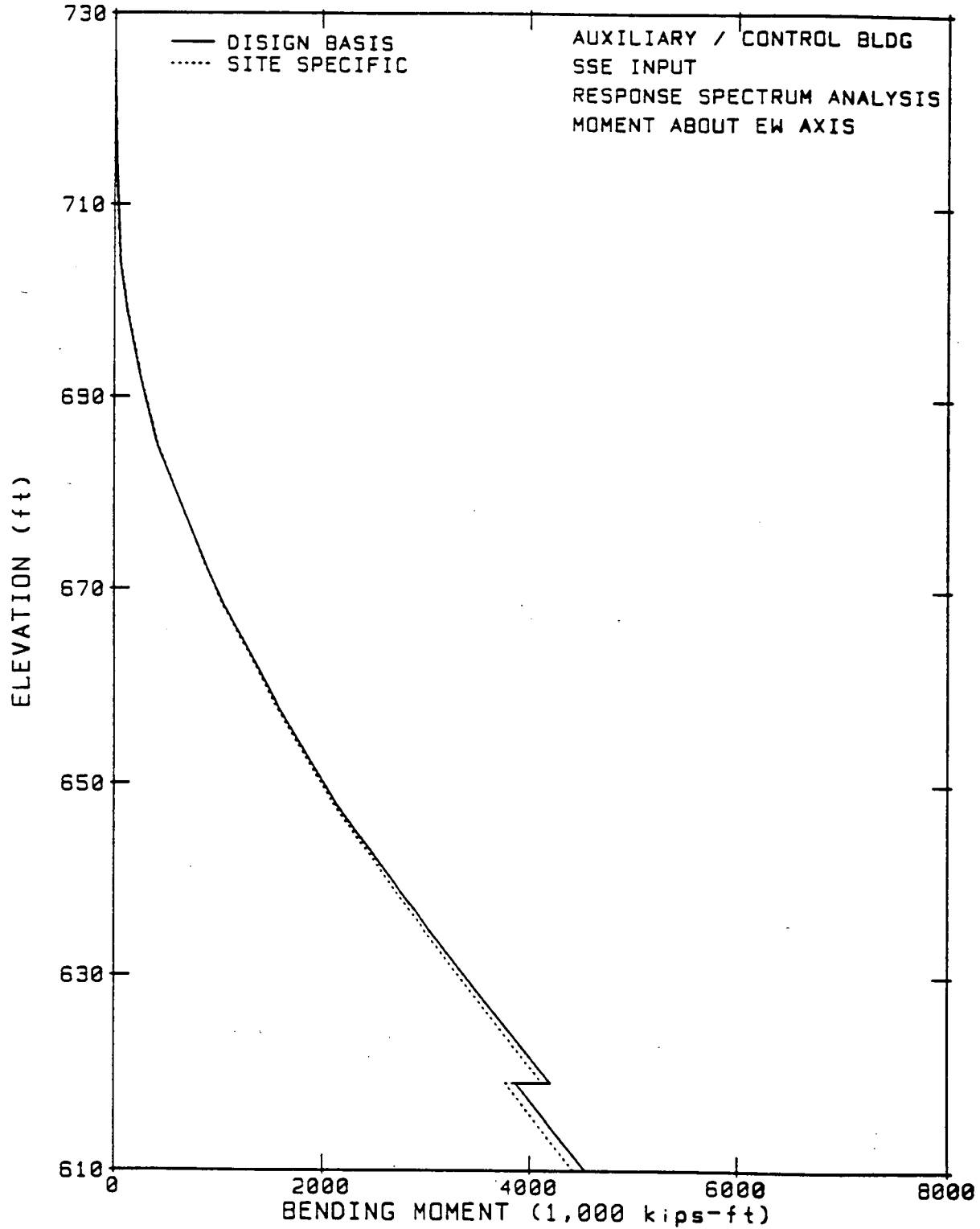
TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)



TVA BELLEFONTE NUCLEAR PLANT (UNIT 1)

