

WM. H. ZIMMER - UNIT 1

4130-00

REQUIRED RESPONSE SPECTRA
USED FOR EQUIPMENT
QUALIFICATION

8 104230502

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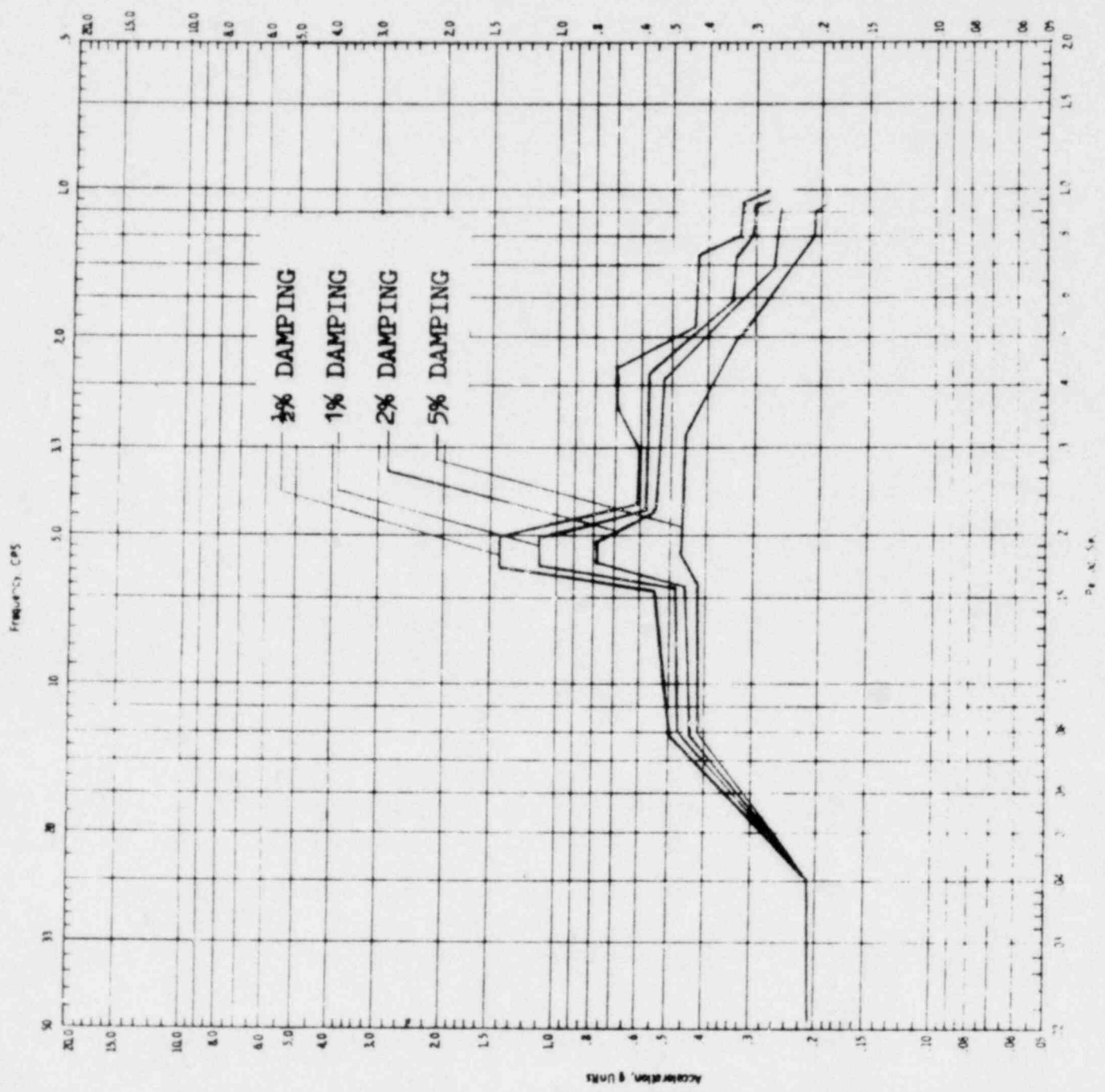
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			SERVICE WATER PUMP STRUCTURE	120

Rev. 4-4-72



HORIZONTAL FLOOR RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 503'-6" (SLAB NO. 1)
 REACTOR BUILDING
 NORTH - SOUTH COMPONENT

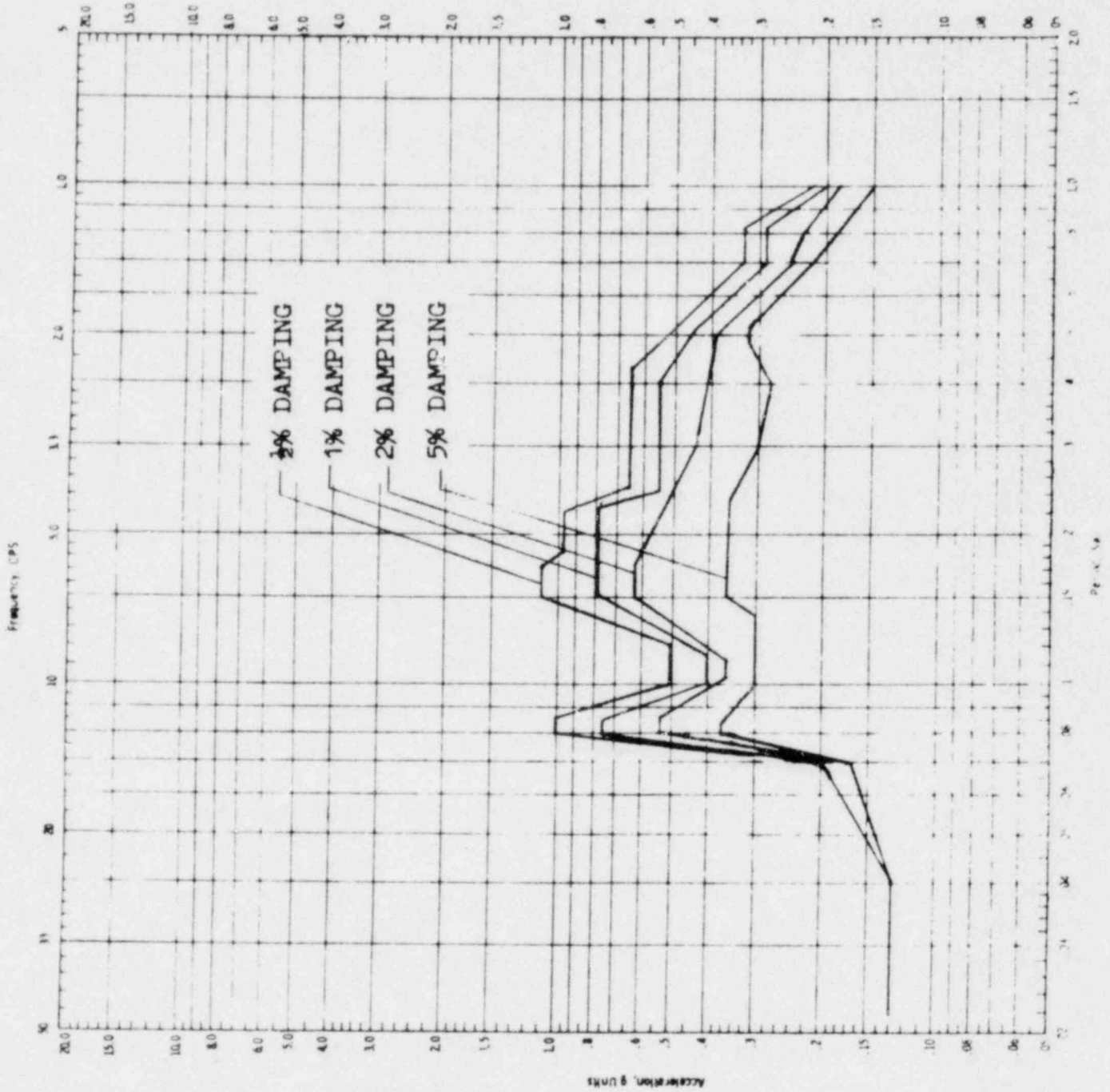
1-A

SARGENT & LUNDY

ENGINEERS

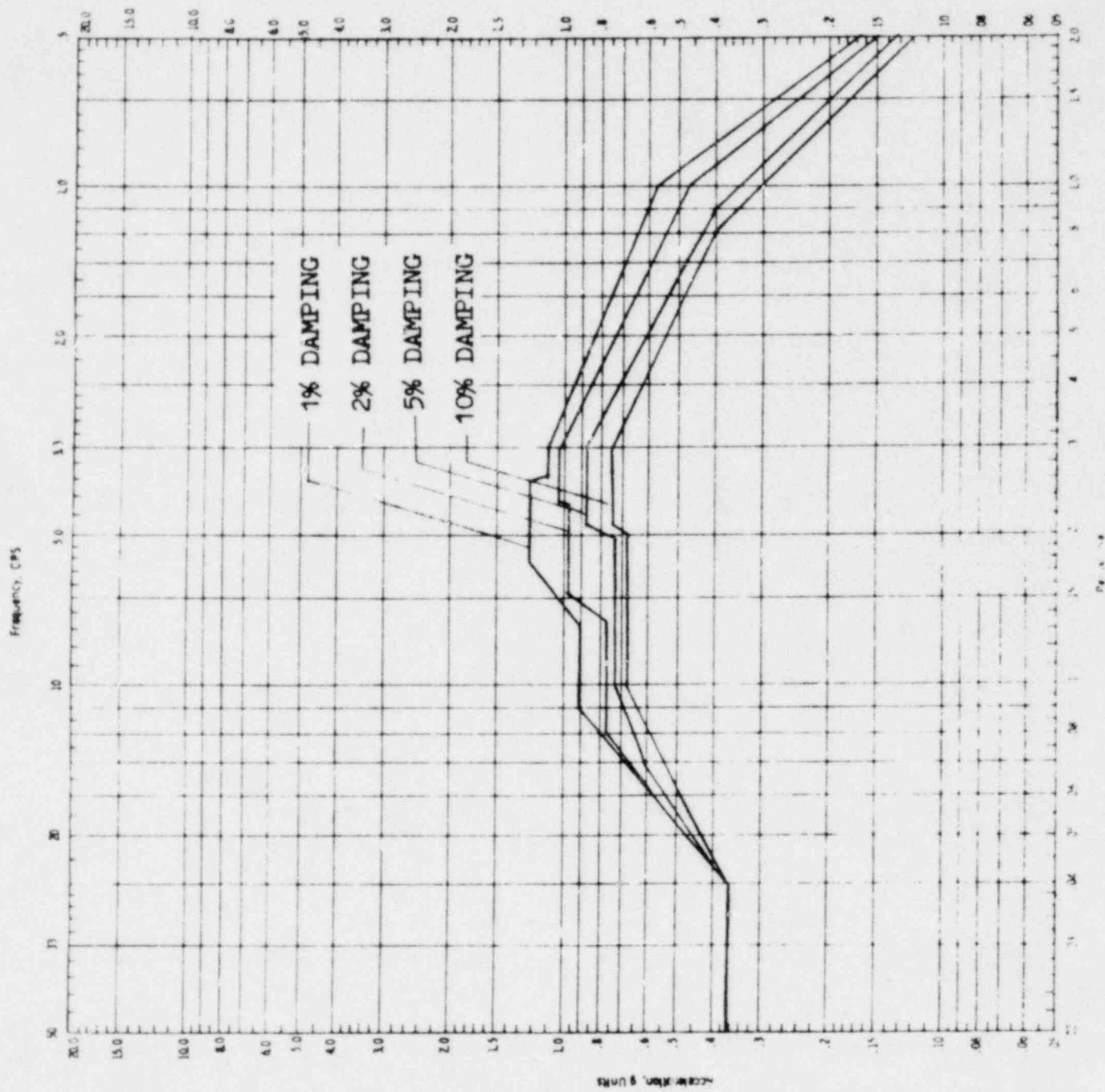
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PROJECT W. H. ZIMMER JOB NO. 4150
DESIGN BY GDF DATE 10-19-71
CHECKED BY HHS DATE 10-19-71 SHEET 2 OF 12

Rev. 4-4-75



HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 503'-6" (SLAB NO. 1)
REACTOR BUILDING
EAST - WEST COMPONENT

1-B



HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 EL. 503'-6" (SLAB NO. 1)
 REACTOR BUILDING
 NORTH - SOUTH COMPONENT

1-C

SARGENT & LUNDY

ENGINEERS

CLIENT CINCINNATI GAS & ELECTRIC CO.

PROJECT ZIMMER

JOB NO. 4130

DESIGN BY GSB

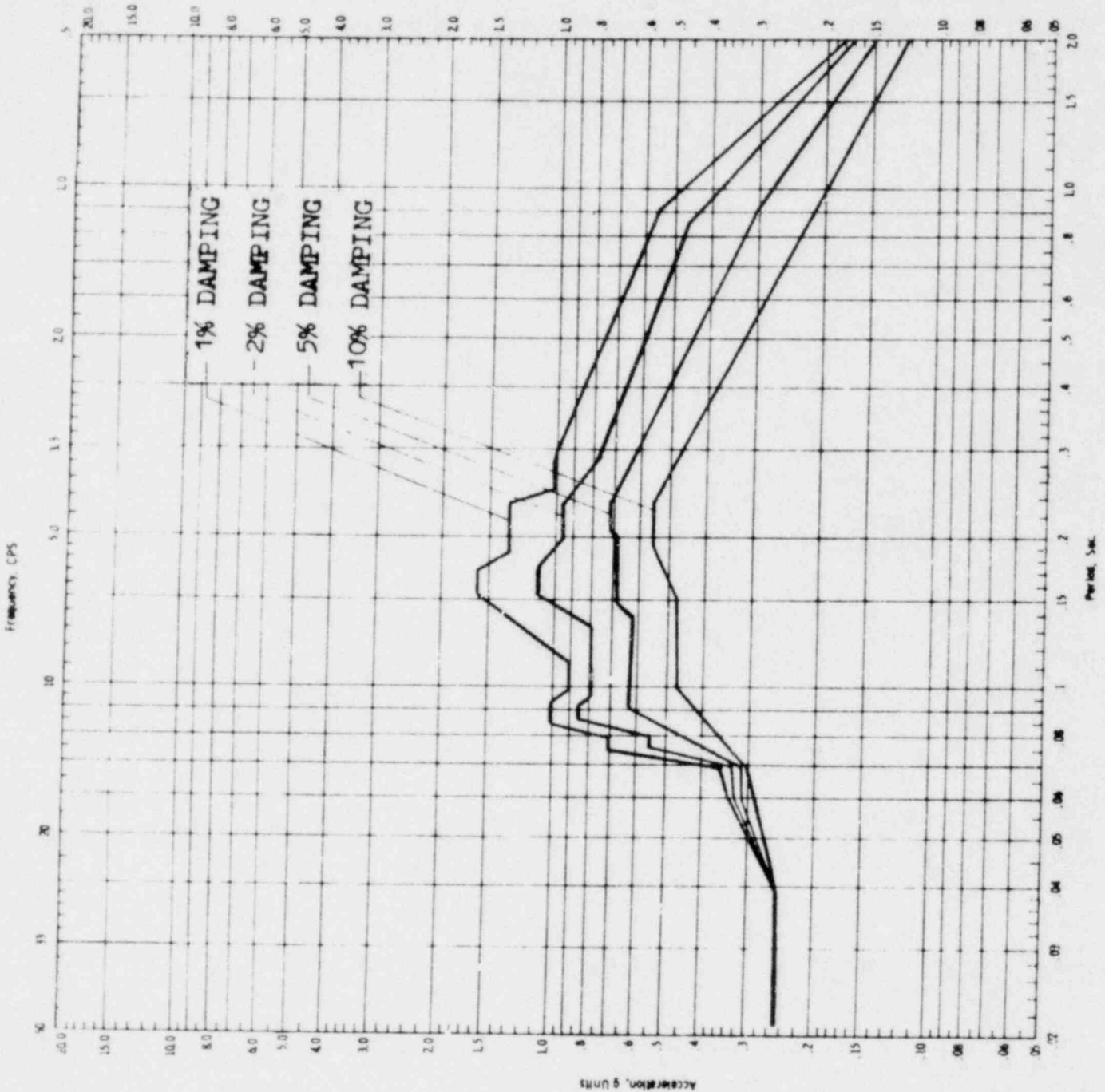
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DATE 4-4-72

SHEET 4 OF 12

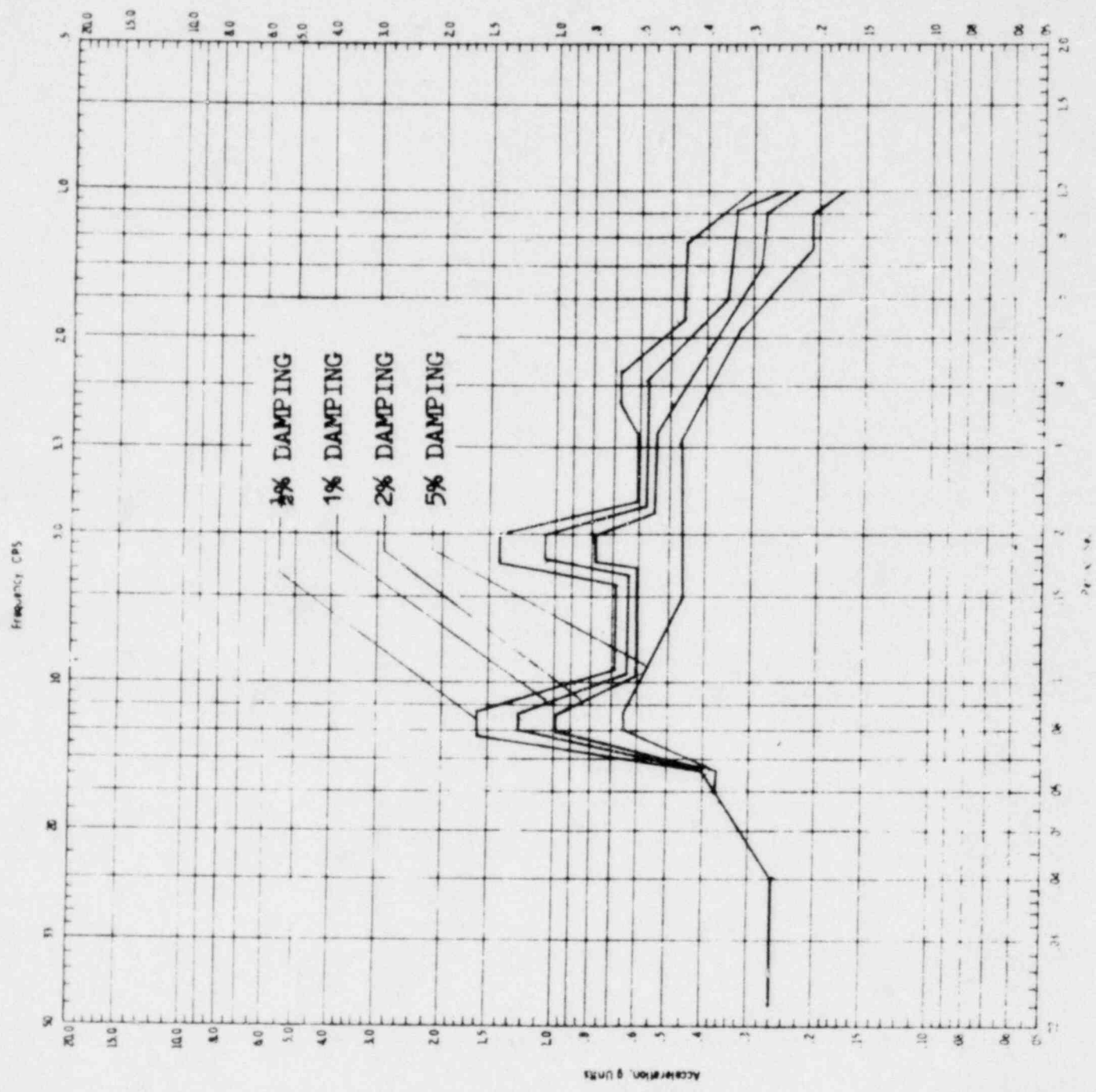
Rev. 8-31-72



HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION 503'-6" (SLAB NO. 1)
REACTOR BUILDING
EAST - WEST COMPONENT

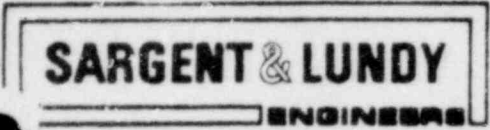
1-D

Rev. 4-4-72



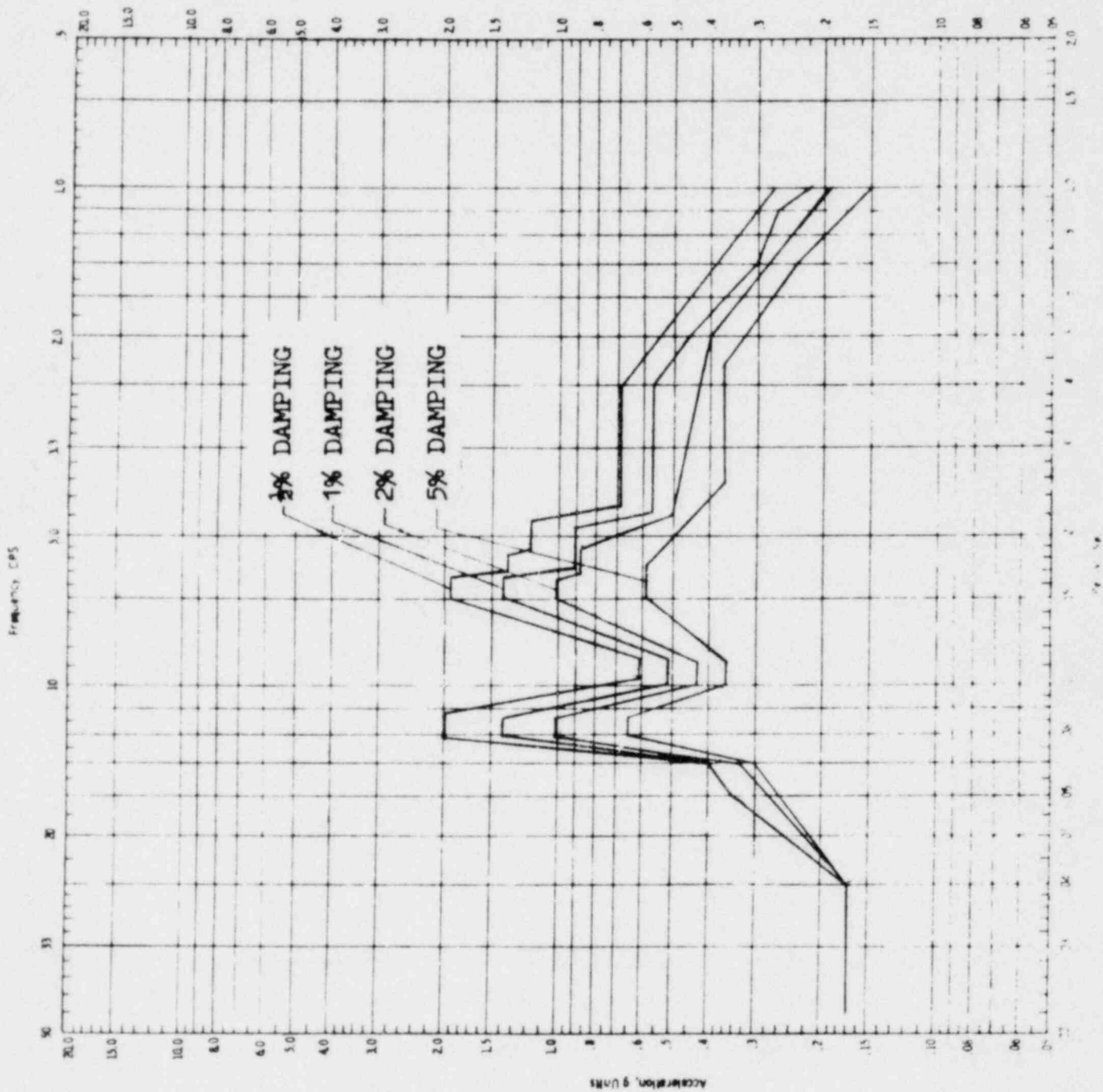
HORIZONTAL FLOOR RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 525'-7" (SLAB NO. 2)
 REACTOR, AUXILIARY, TURBINE BLDG.
 NORTH - SOUTH COMPONENT

2-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT W. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 10-19-71
CHECKED BY HHS DATE 10-19-71 SHEET 6 OF 120

Rev. 4-4-72



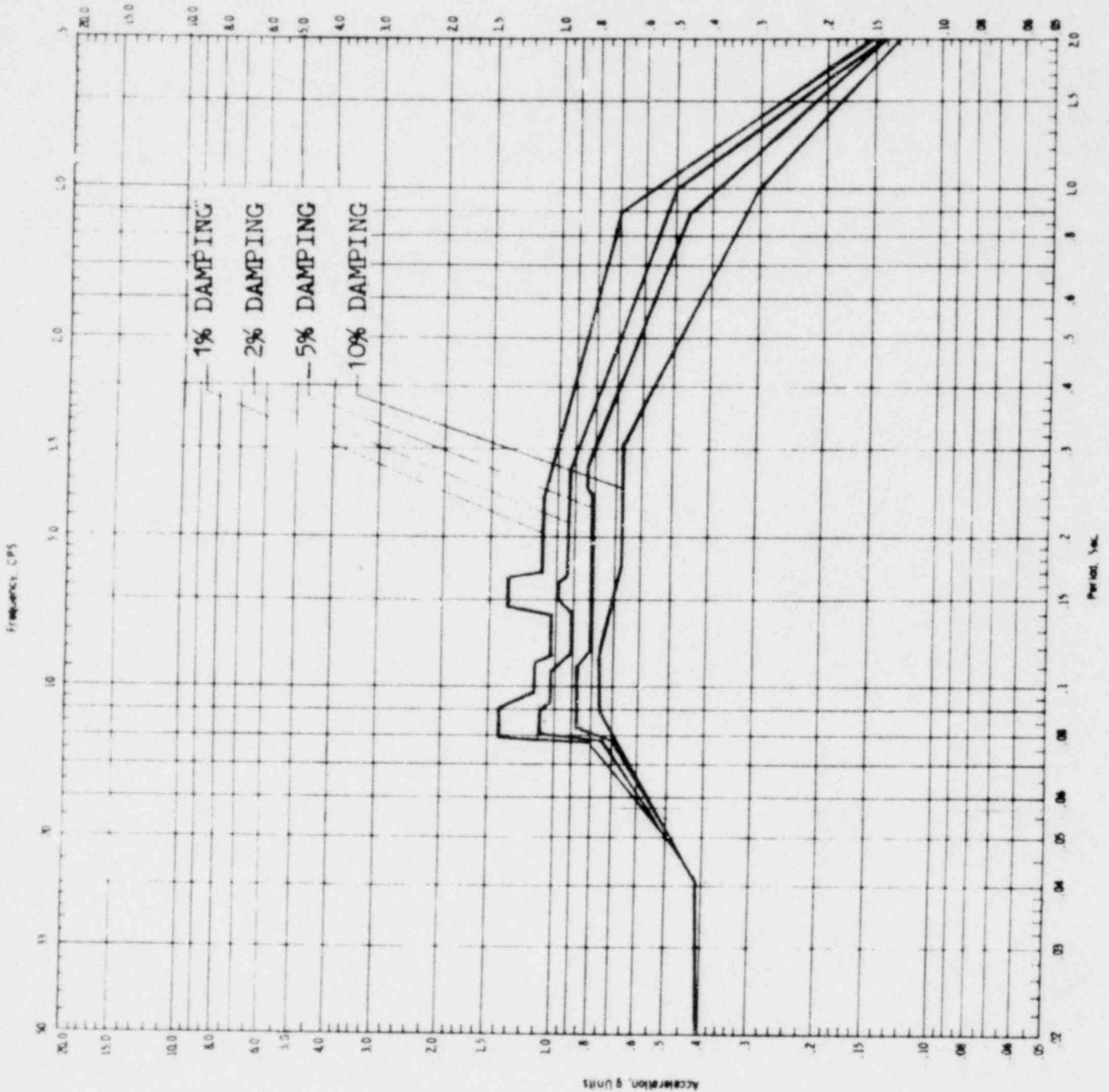
HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 525'-7" (SLAB NO. 2)
REACTOR, AUXILIARY, TURBINE BLDG.
EAST - WEST COMPONENT

2-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-4-72
CHECKED BY HHS DATE 4-4-72 SHEET 7 OF 120

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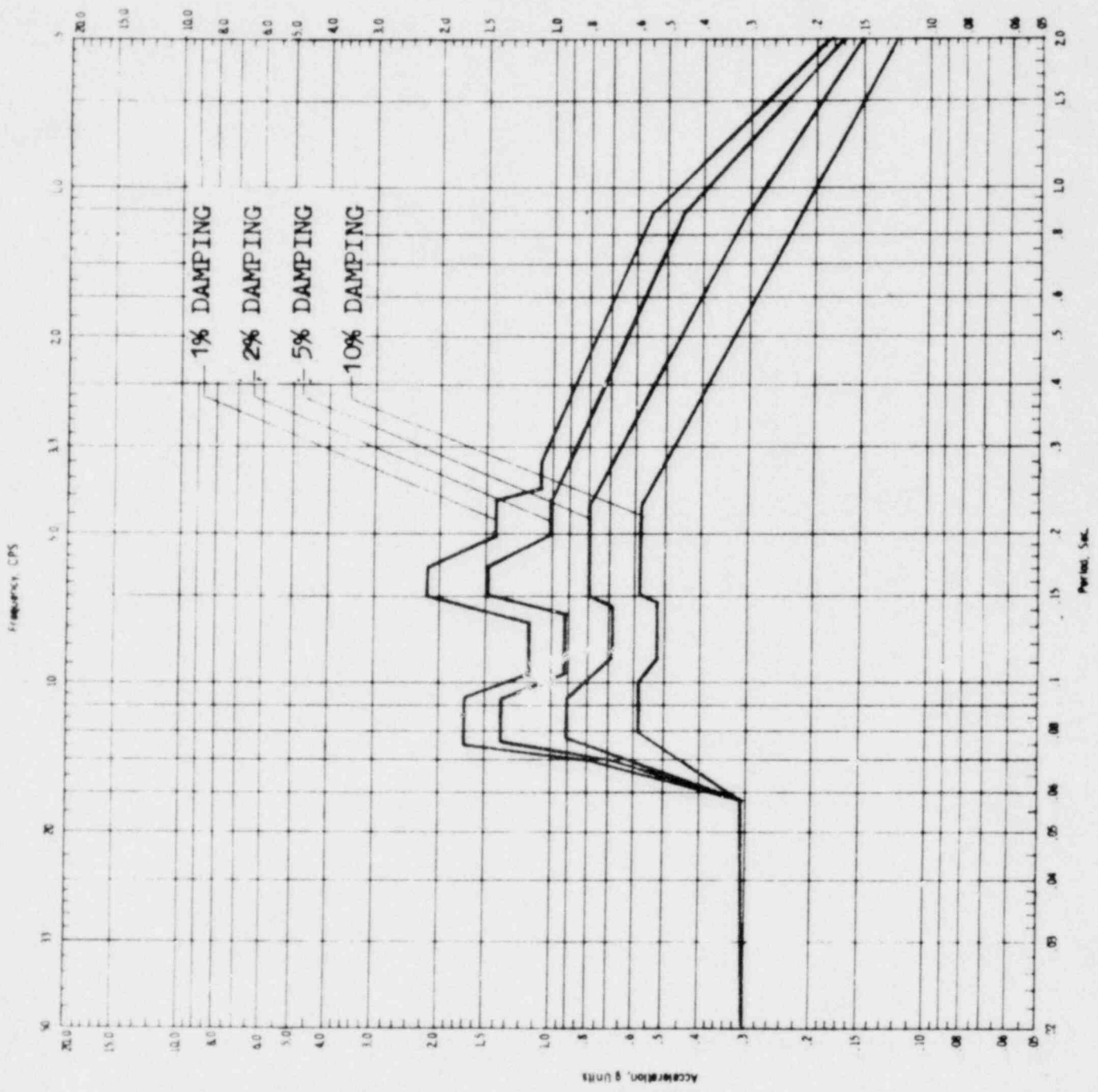
HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION 525'-7" (SLAB NO. 2)
REACTOR, AUXILIARY, TURBINE BLDG.
NORTH - SOUTH COMPONENT

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CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-4-72
CHECKED BY HHS DATE 4-4-72 SHEET 8 OF 120

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HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION 525'-7" (SLAB NO. 2)
REACTOR, AUXILIARY, TURBINE BLDG.
EAST - WEST COMPONENT



SARGENT & LUNDY

ENGINEERS

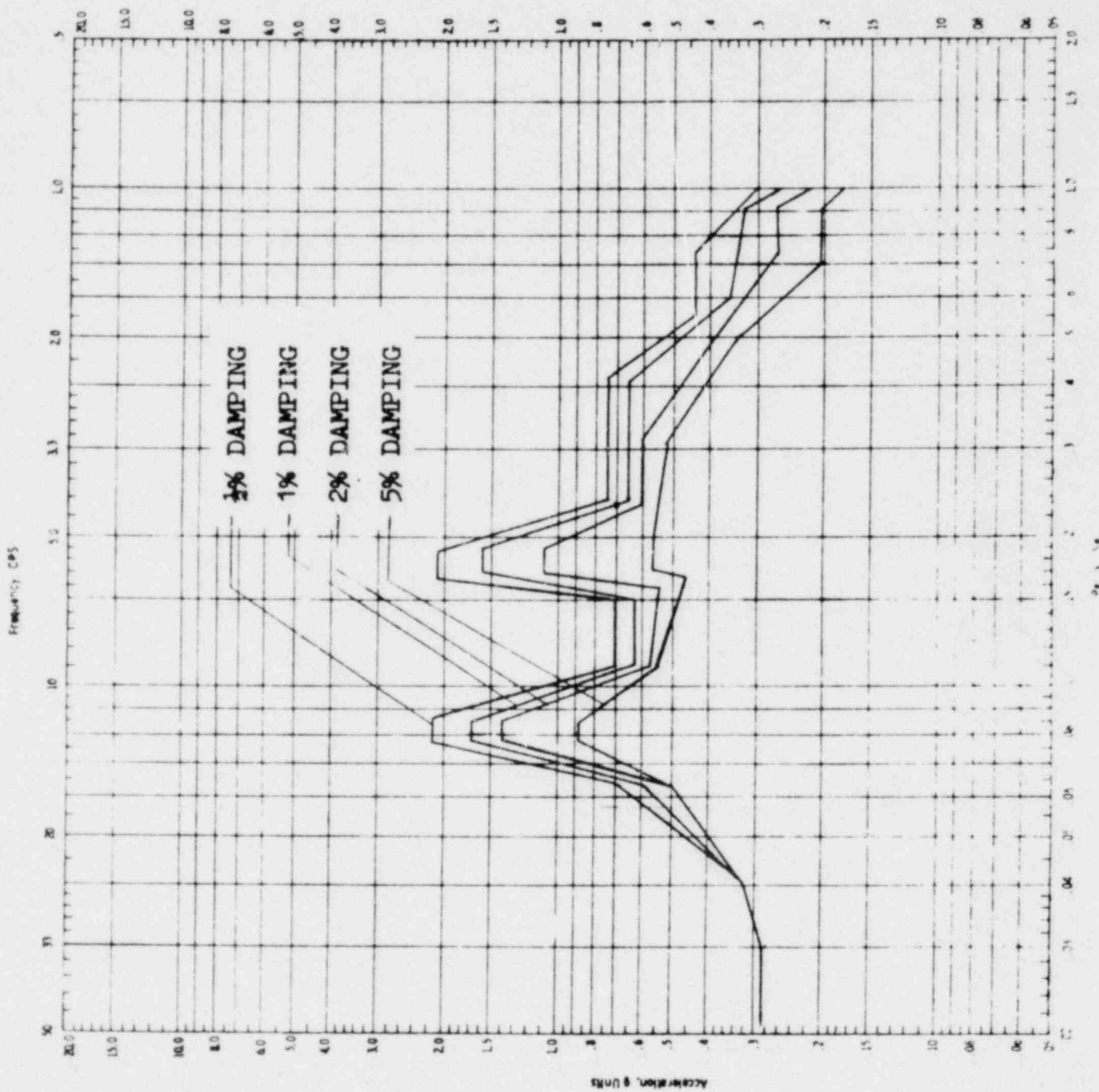
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PROJECT WM. H. ZIMMER JOB NO. 4130

DESIGN BY GSE DATE 10-19-72

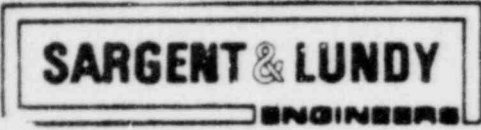
CHECKED BY MHS DATE 10-19-72 SHEET 9 OF 120

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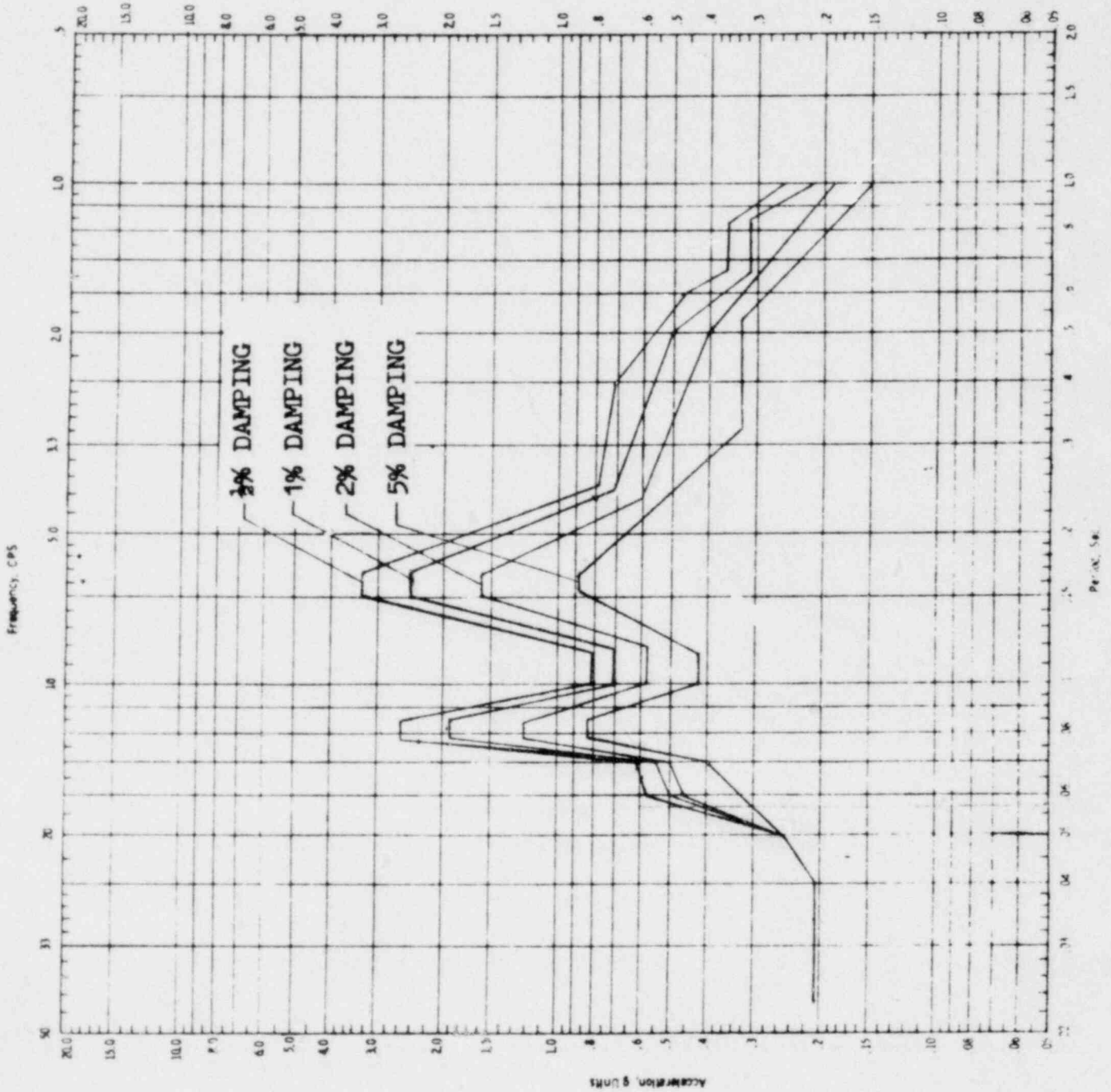
HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 546'-0" (SLAB NO. 3)
REACTOR, AUXILIARY, TURBINE BLDG.
NORTH - SOUTH COMPONENT

3-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT W. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 10-19-71
CHECKED BY HMS DATE 10-19-71 SHEET 10 OF 120

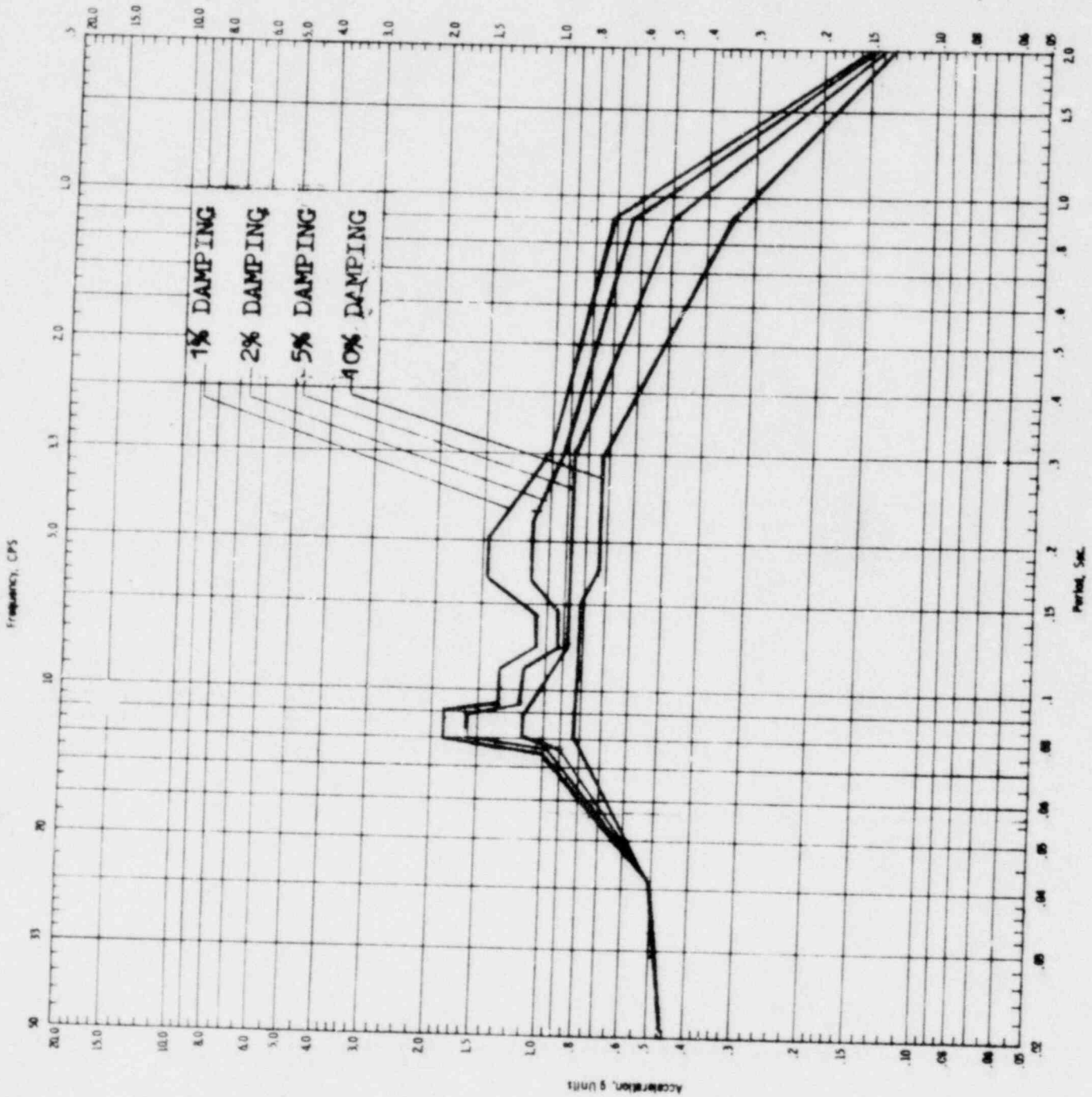
Rev. 4-1-72



HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 546'-0" (SLAB NO. 3)
REACTOR, AUXILIARY, TURBINE BLDG.
EAST - WEST COMPONENT

3-B

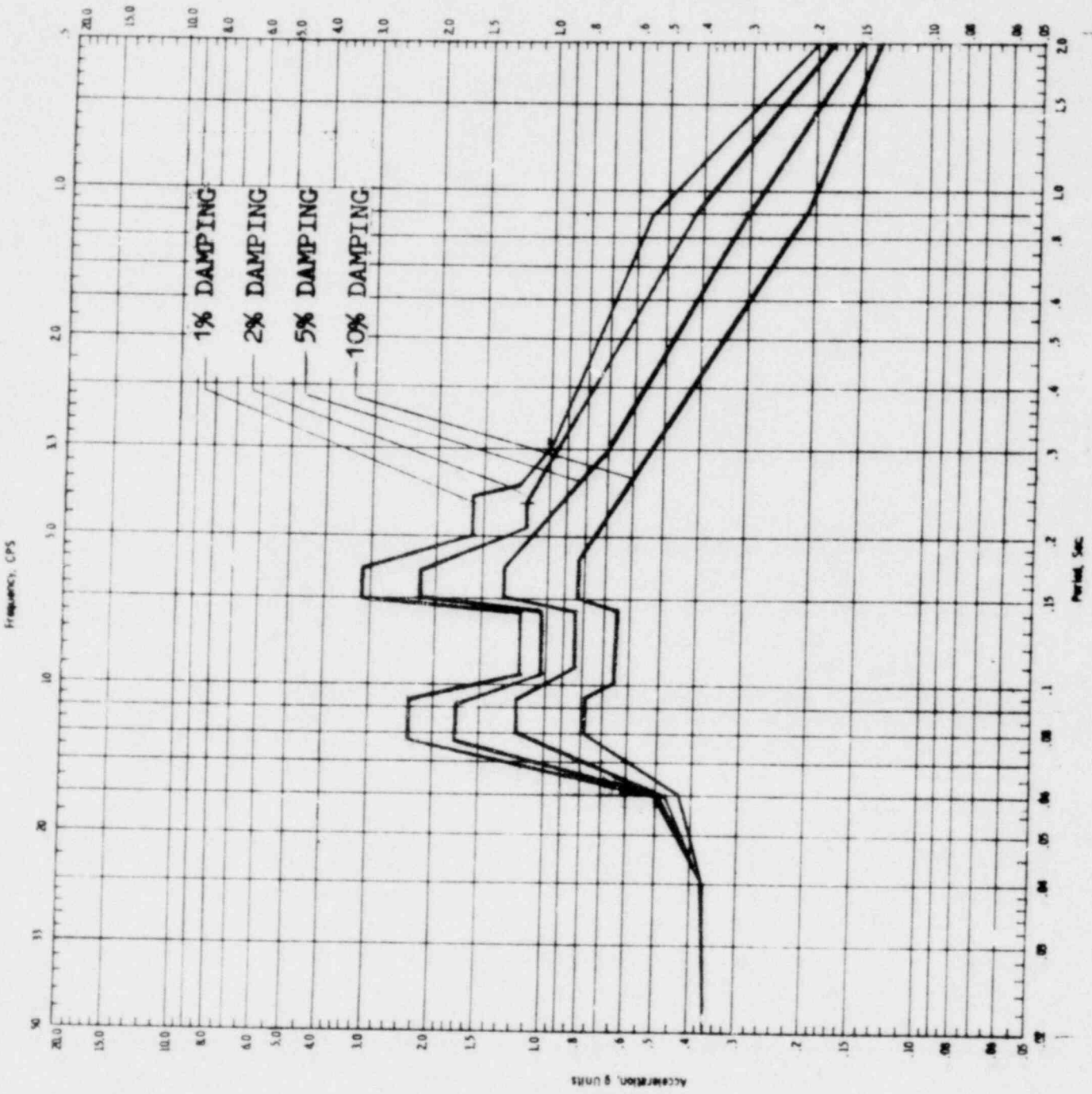
Rev. 8-31-72



HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 ELEVATION 546'-0" (SLAB NO. 3)
 REACTOR, AUXILIARY, TURBINE BLDG.
 NORTH - SOUTH COMPONENT

3-C

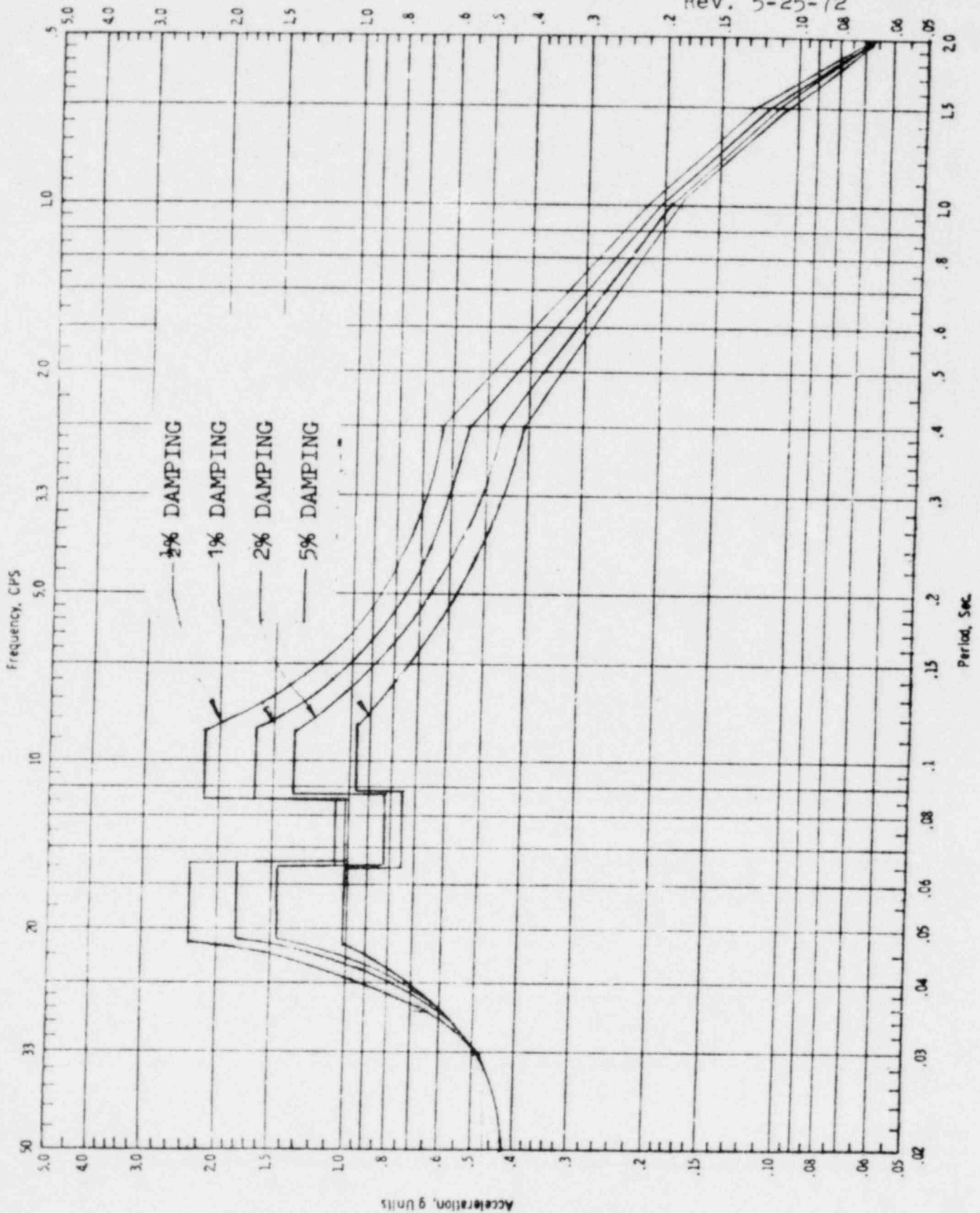
Rev. 8-31-72



HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 ELEVATION 546'-0" (SLAB NO. 3)
 REACTOR, AUXILIARY, TURBINE BLDG.
 EAST - WEST COMPONENT

3-D

Rev. 5-25-72



VERTICAL RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 REACTOR BLDG. SLAB
 EL. 546'-0", 525'-7" & 503'-6"

1-E

2-E

3-E

SARGENT LUNDY

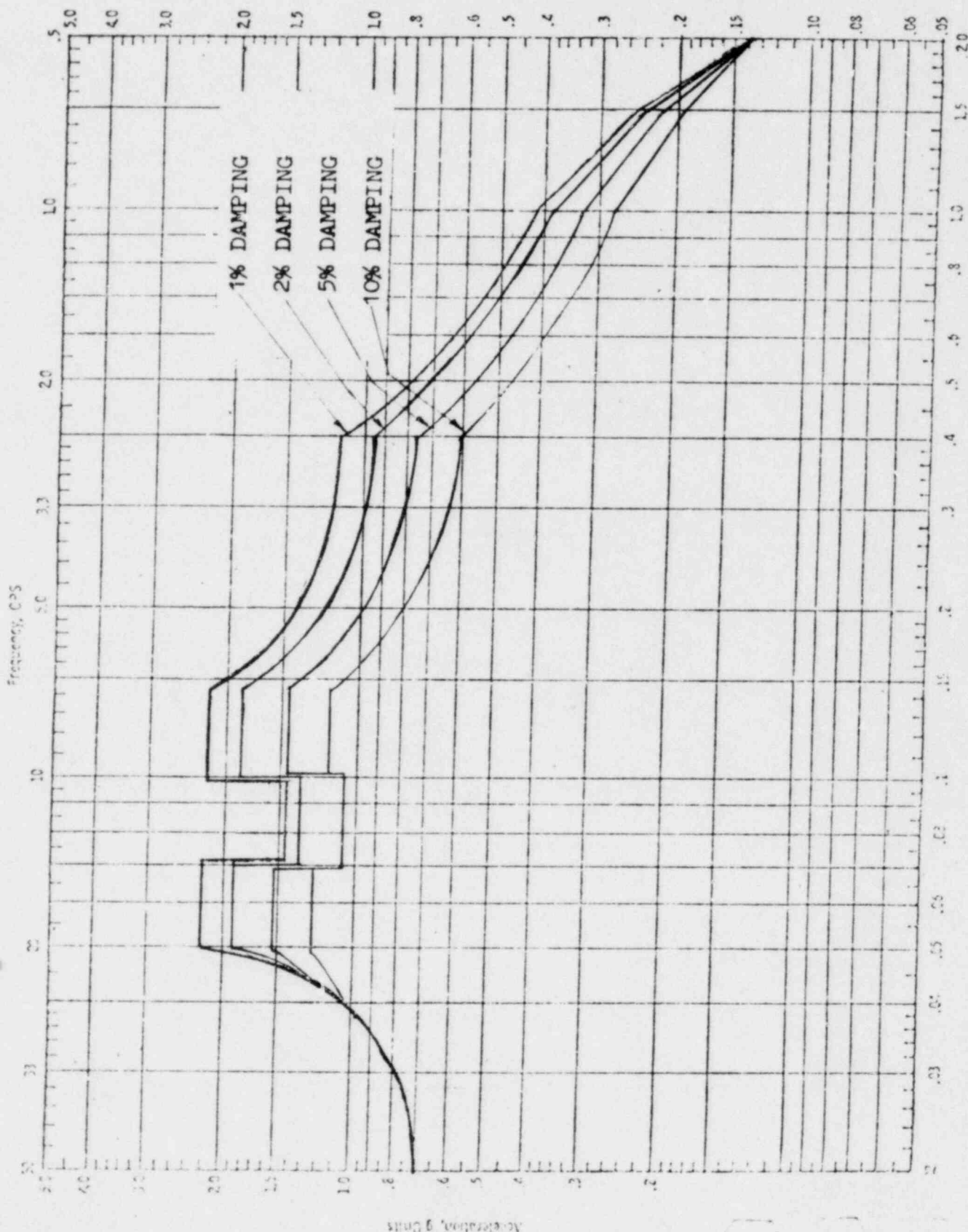
ENGINEERS

CLIENT THE CINCINNATI GAS & ELECTRIC CO.

PROJECT WM. H. ZIMMER JOB NO. 4130

DESIGN BY SCM DATE 5-25-72

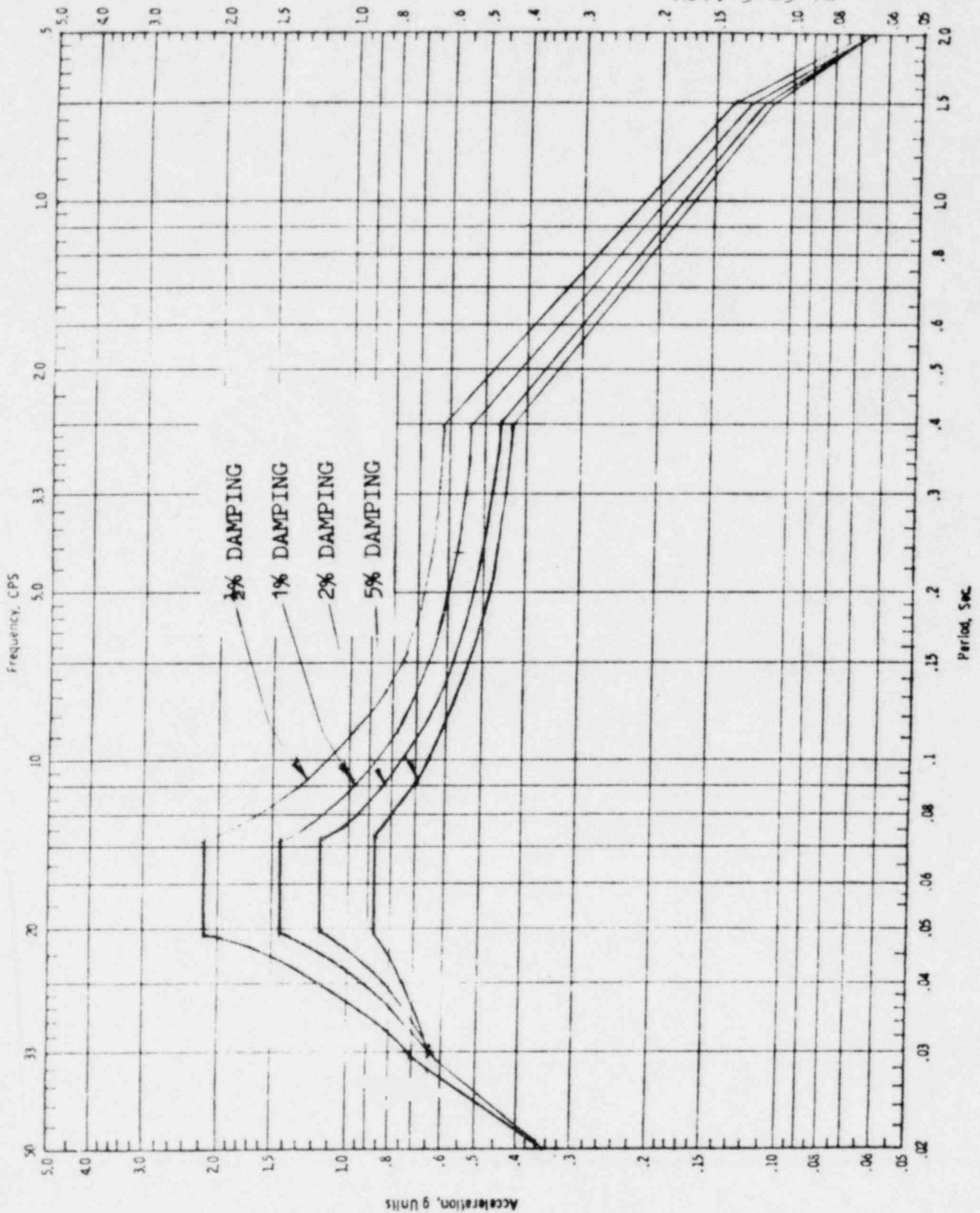
CHECKED BY JHS DATE 5-25-72 SHEET 14 OF 120



VERTICAL RESPONSE SPECTRA
(DESIGN BASIS EARTHQUAKE)
REACTOR BLDG. SLAB
EL. 546'-0". 525'-7". & 503'-6"

1-F 2-F 3-F

Rev. 5-25-72



VERTICAL RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 AUXILIARY BUILDING SLAB
 EL. 546'-0" & 525'-7"

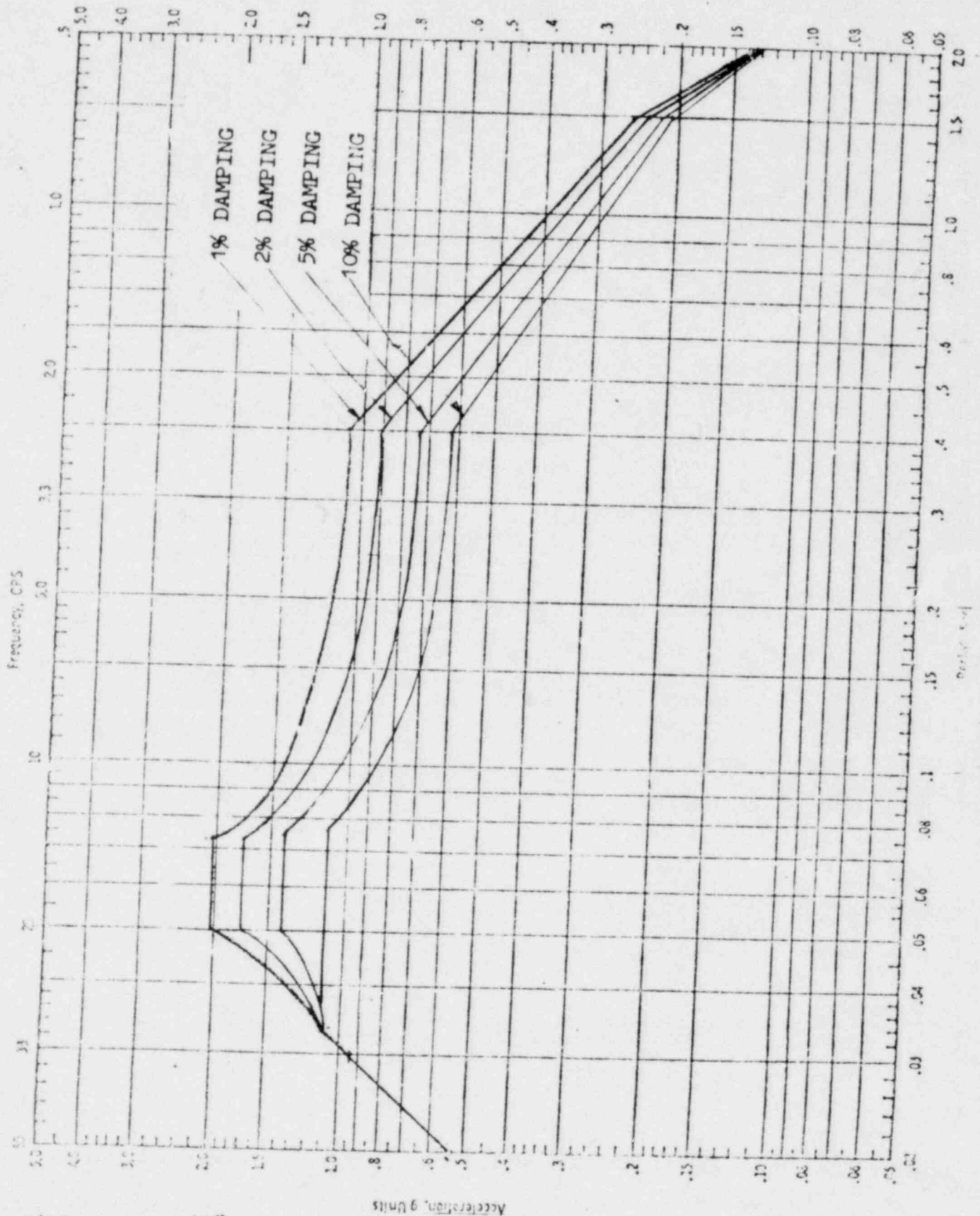
2-E

3-E

SARGENT LUNBY

ENGINEERS

CLIENT THE CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 21130
DESIGN BY SCM DATE 5-25-72
CHECKED BY HHS DATE 5-25-72 SHEET 16 OF 20



EL 546'0" & 525'7"

VERTICAL RESPONSE SPECTRA
(DESIGN BASIS EARTHQUAKE)
AUXILIARY BUILDING SLAB

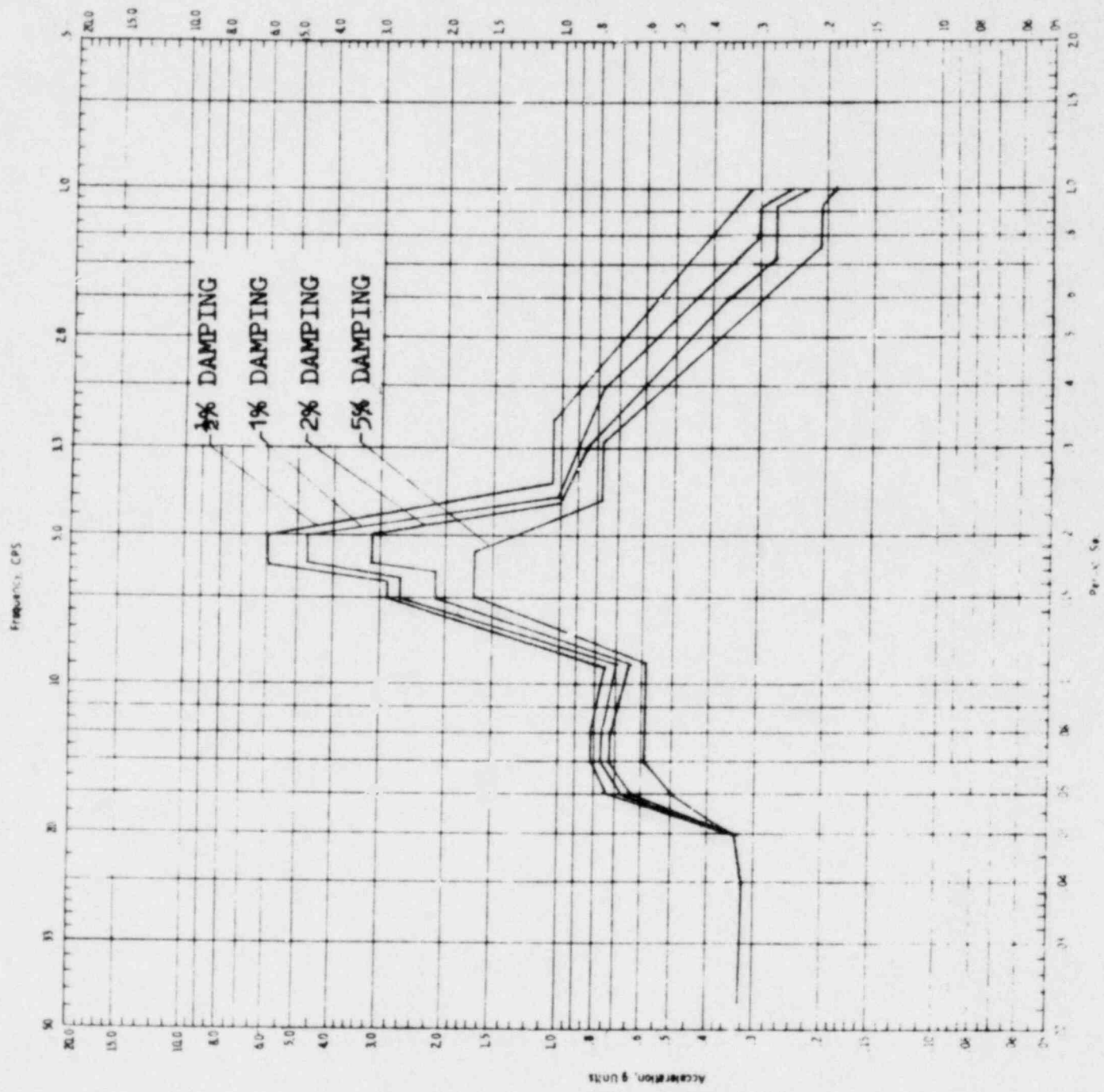
2-F

3-F



CLIENT INDIANAPOLIS GAS & ELECTRIC CO.
 PROJECT W. H. ZIMMER JOB NO. 4130
 DESIGN BY ... DATE 10-19-71
 CHECKED BY ... DATE 10-19-71 SHEET 17 OF 120

Rev. 4-4-72



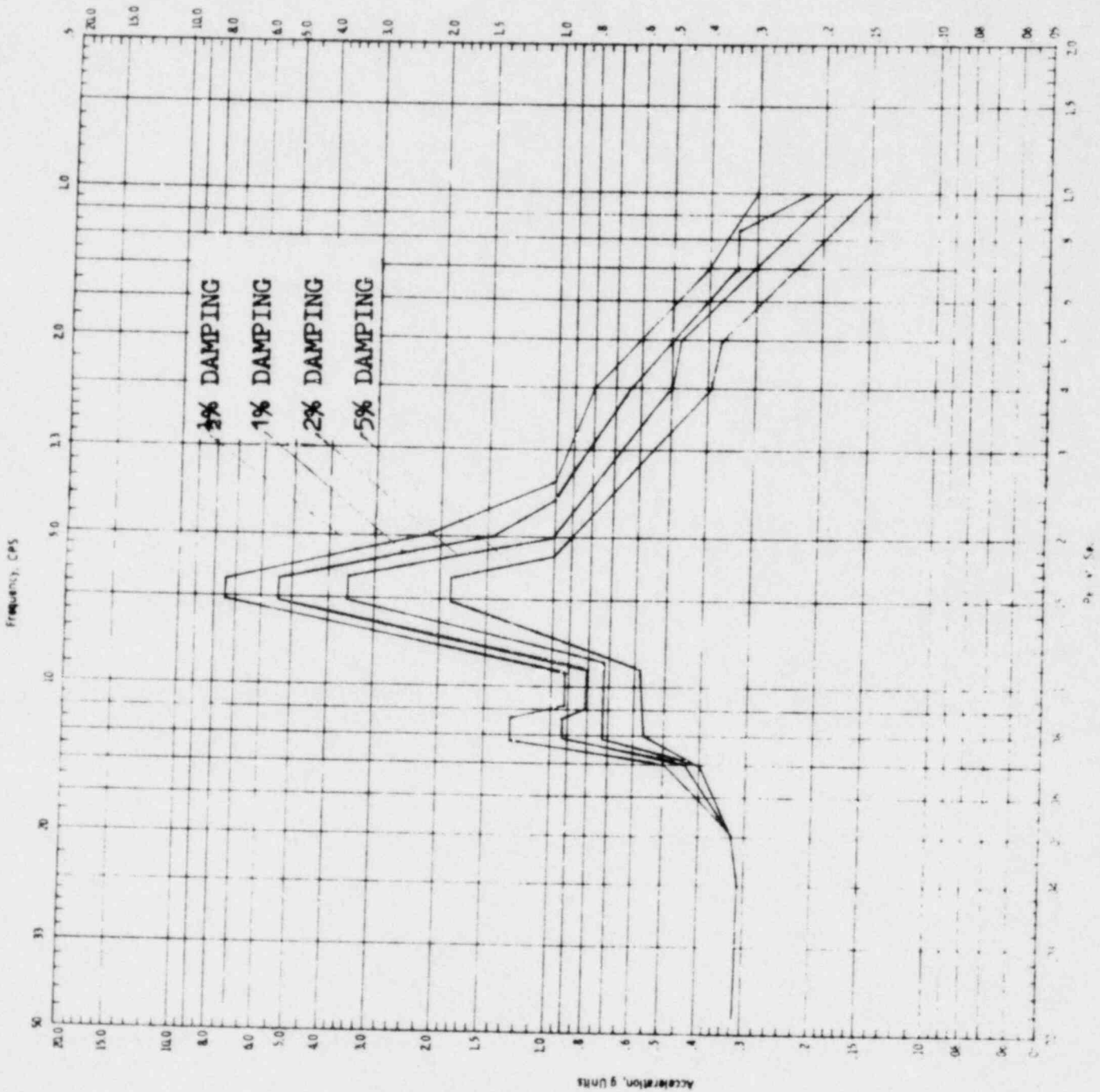
HORIZONTAL FLOOR RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 570'-6" (SLAB NO. 4)
 REACTOR BUILDING
 NORTH - SOUTH COMPONENT

4-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT Wm. H. ZIMMER JOB NO. 4130
DESIGN BY GSD DATE 10-19-71
CHECKED BY HHS DATE 10-19-71 SHEET 10 OF 12

Rev. 4-4-72



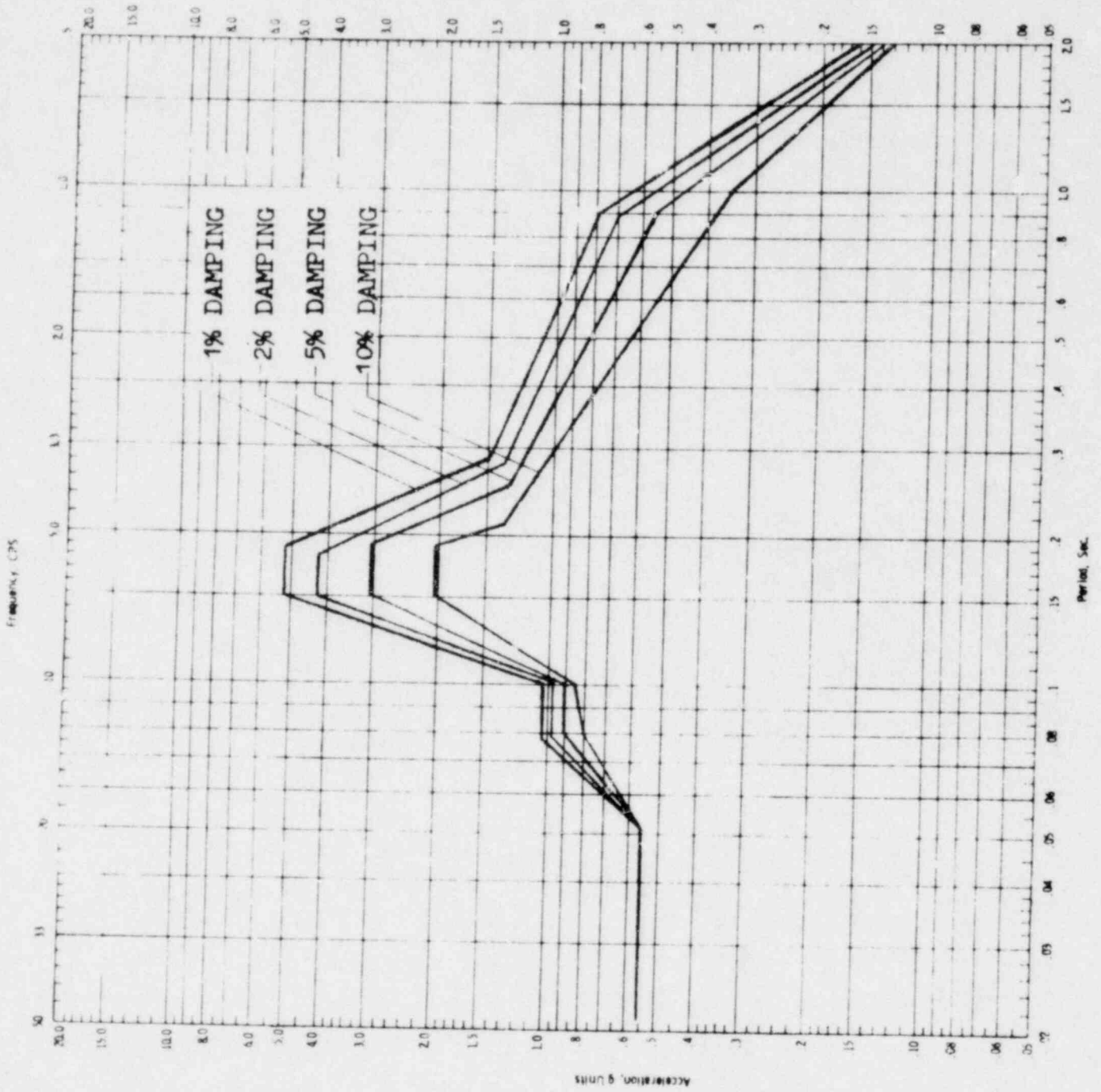
HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 570'-6" (SLAB NO. 4)
REACTOR BLDG.
EAST - WEST COMPONENT

4-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
 PROJECT ZIMMER JOB NO. 4130
 DESIGN BY GSB DATE 4-4-72
 CHECKED BY HHS DATE 4-4-72 SHEET 19 OF 120

Rev. 8-31-72



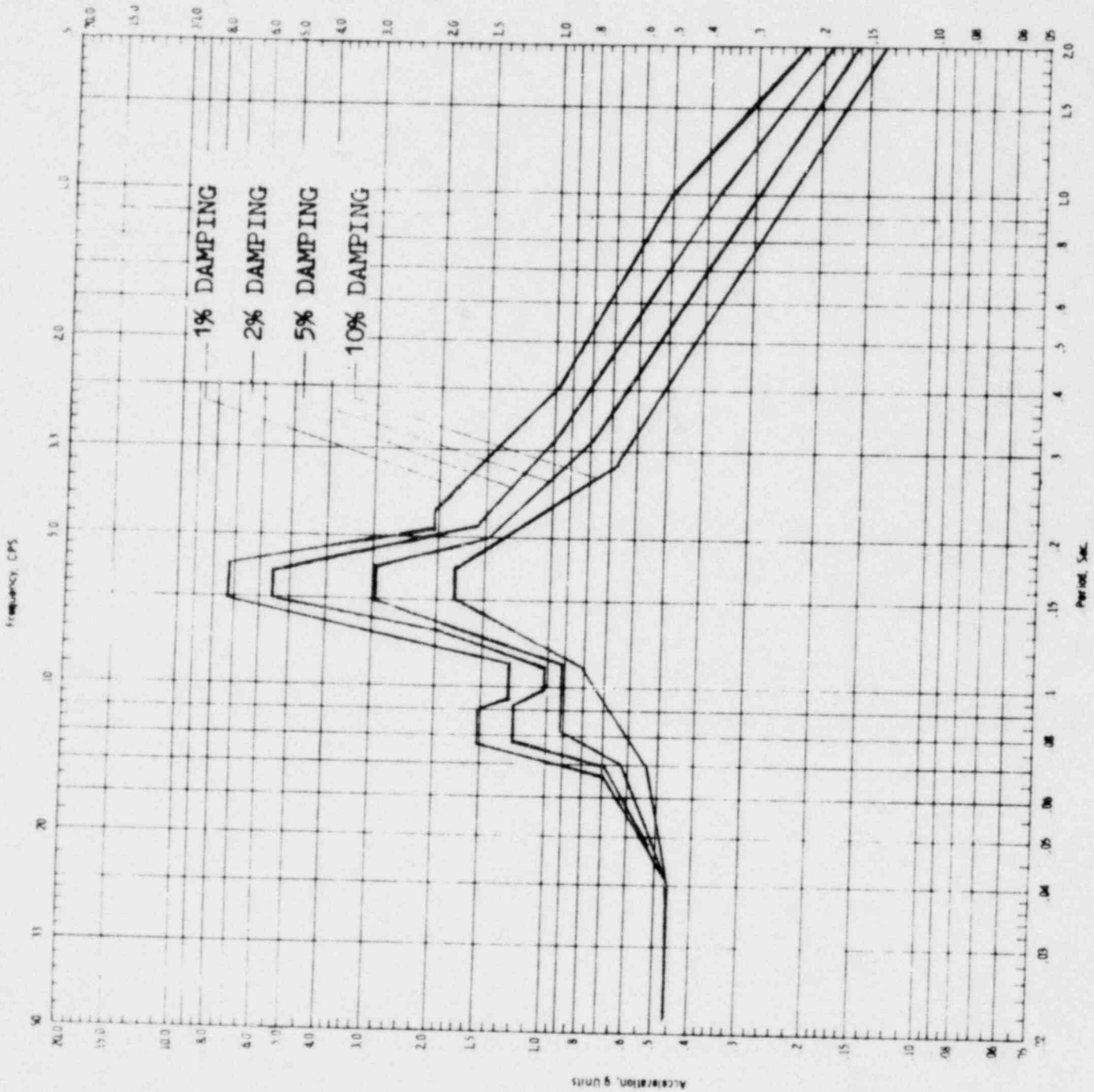
HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 ELEVATION 570'-6" (SLAB NO. 4)
 REACTOR BUILDING
 NORTH - SOUTH COMPONENT





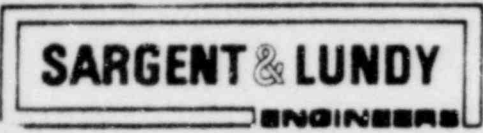
CLIENT CINCINNATI GAS & ELECTRIC CO.
 PROJECT ZIMMER JOB NO. 4130
 DESIGN BY GSE DATE 4-4-72
 CHECKED BY HHS DATE 4-4-72 SHEET 20 OF 120

Rev. 4-31-72



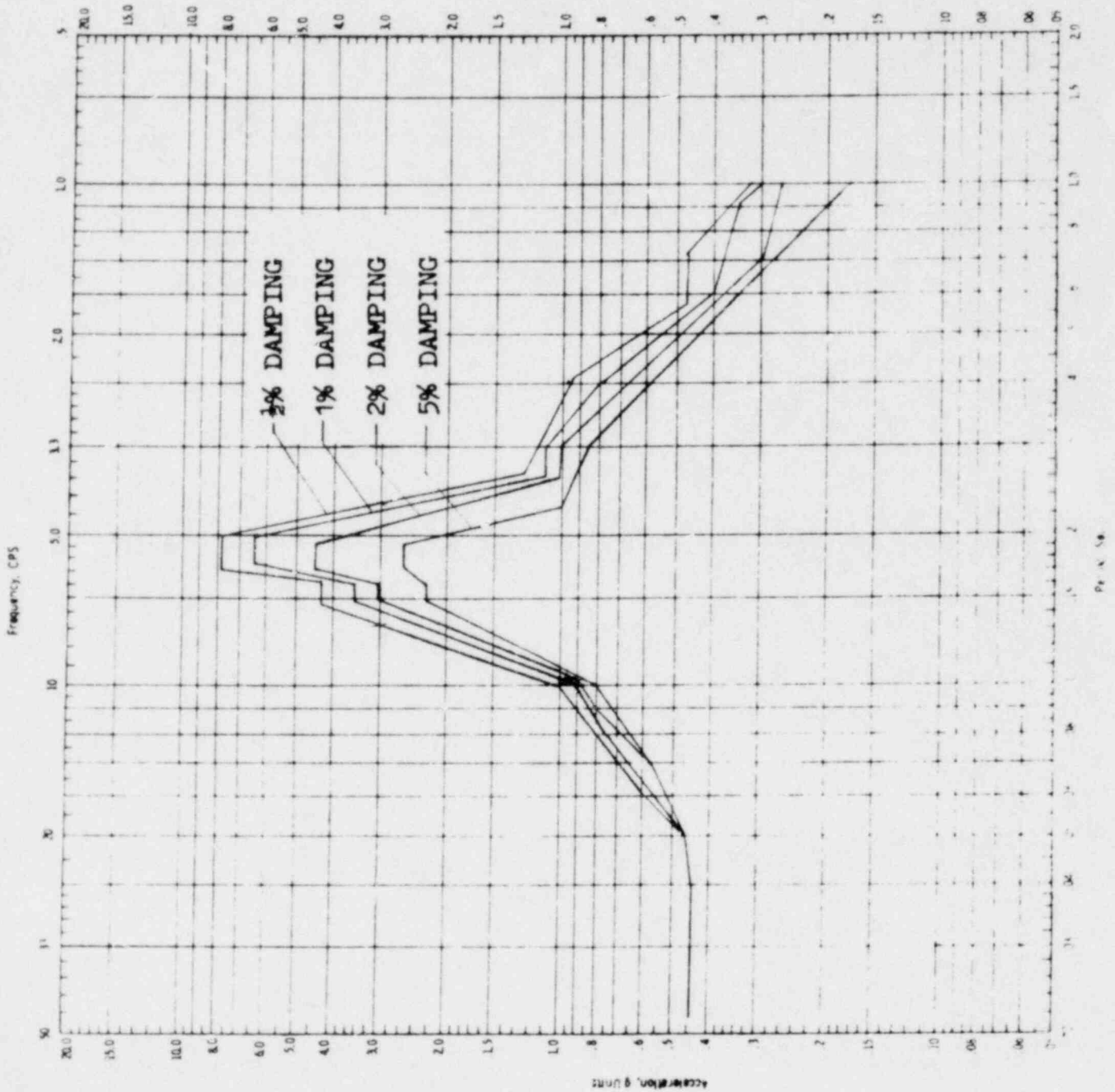
HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 ELEVATION 570'-6" (SLAB NO. 4)
 REACTOR BUILDING
 EAST - WEST COMPONENT





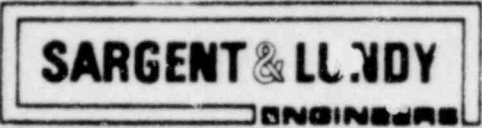
CLIENT GENERAL ATOMIC ELECTRIC CO.
PROJECT W. H. ZIMMER JOB NO. 413
DESIGN BY GSI DATE 10-19-71
CHECKED BY PHS DATE 10-19-71 SHEET 21 OF 120

Rev. 4-4-72



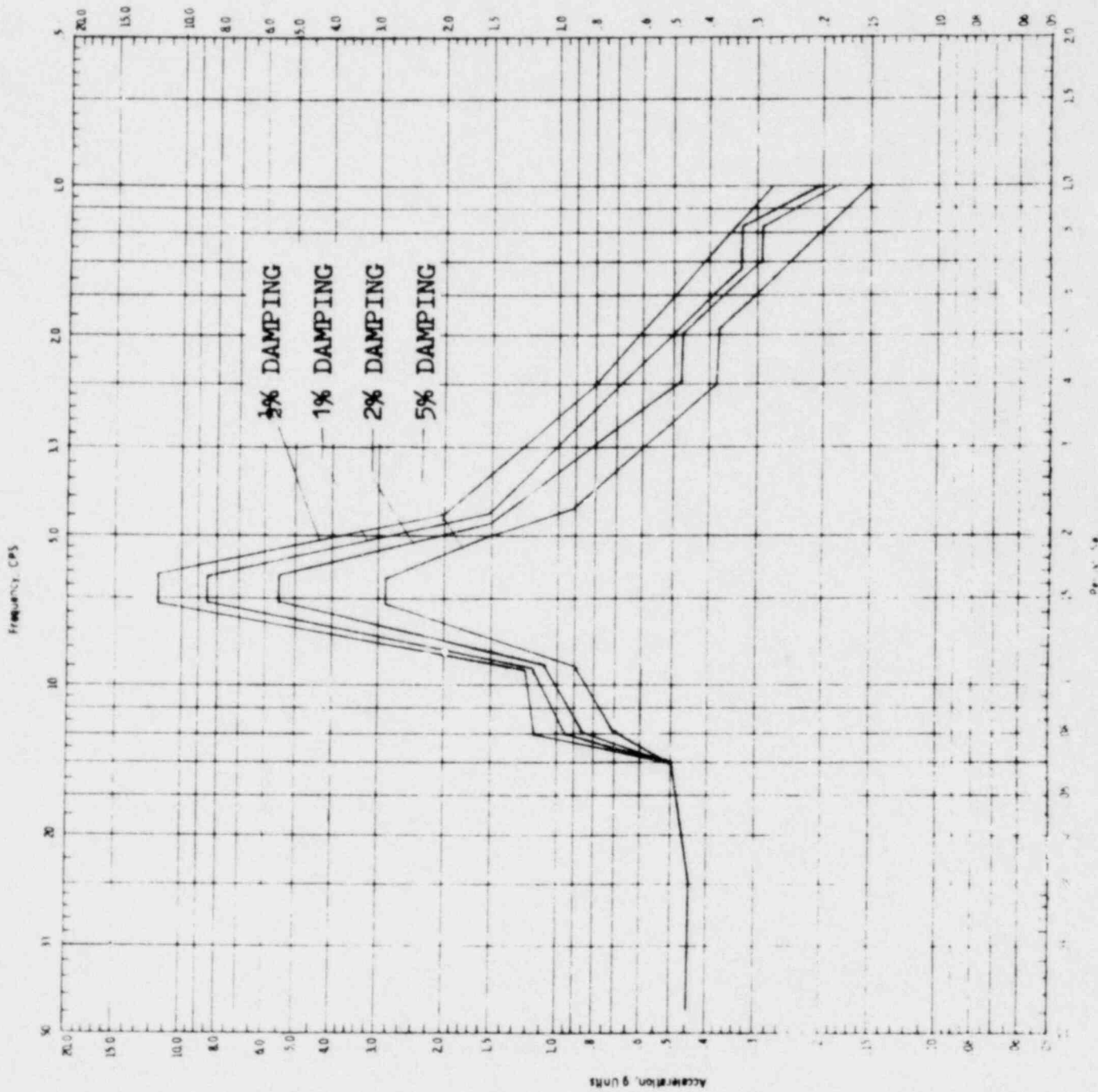
HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 593'-6" (SLAB NO. 5)
REACTOR BUILDING
NORTH - SOUTH COMPONENT

5-A



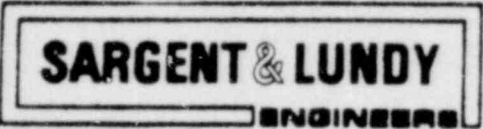
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PROJECT W. L. ZIMMER JOB NO. 4130
DESIGN BY WST DATE 10-19-71
CHECKED BY HHS DATE 10-19-71 SHEET 22 OF 120

Rev. 4-4-72

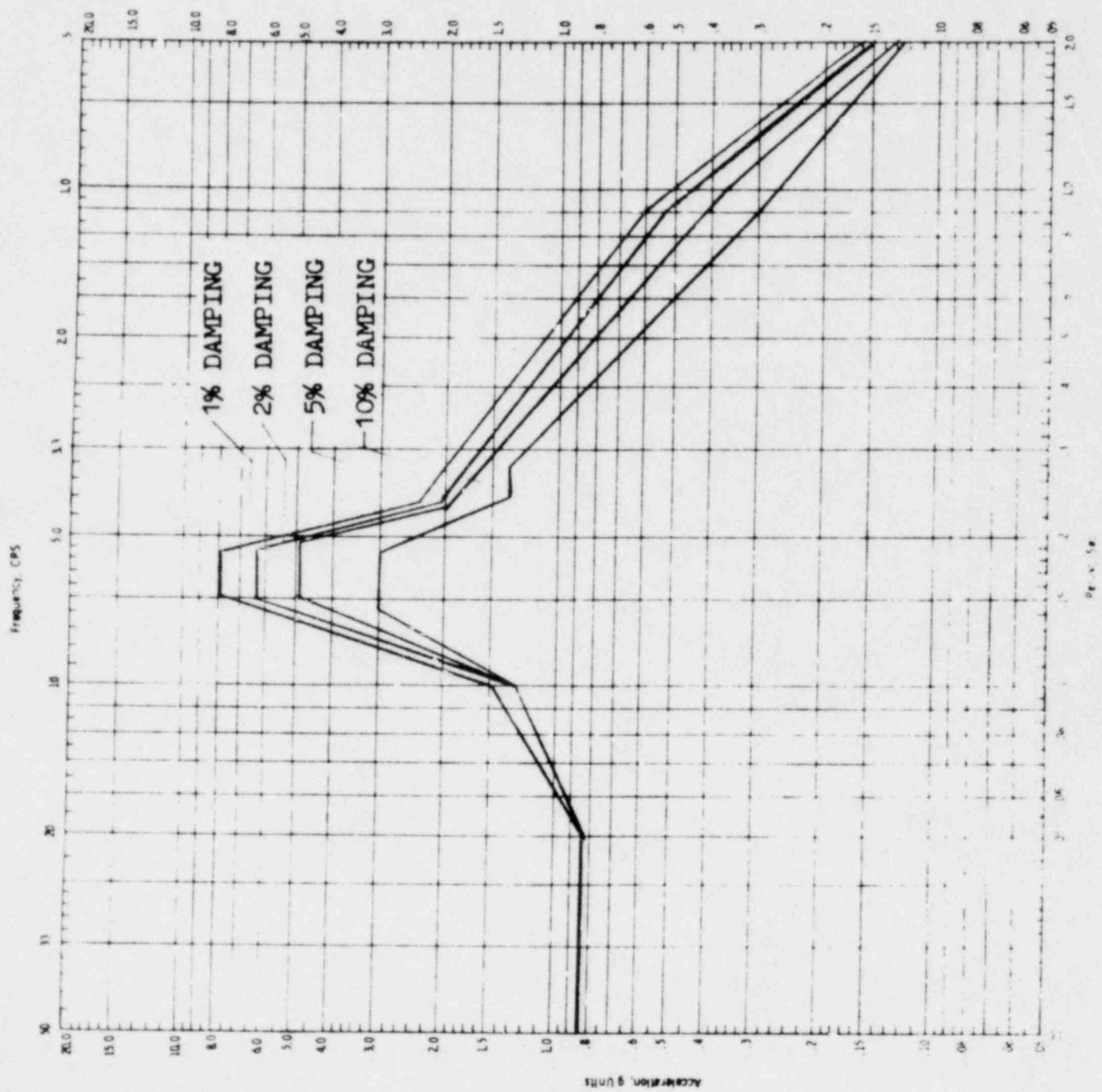


HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 593'-6" (SLAB NO. 5)
REACTOR BLDG.
EAST - WEST COMPONENT

5-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT W.H. ZIMMER JOB NO. 4130
DESIGN BY GGB DATE 4-4-72
CHECKED BY HHS DATE 4-4-72 SHEET 23 OF 120



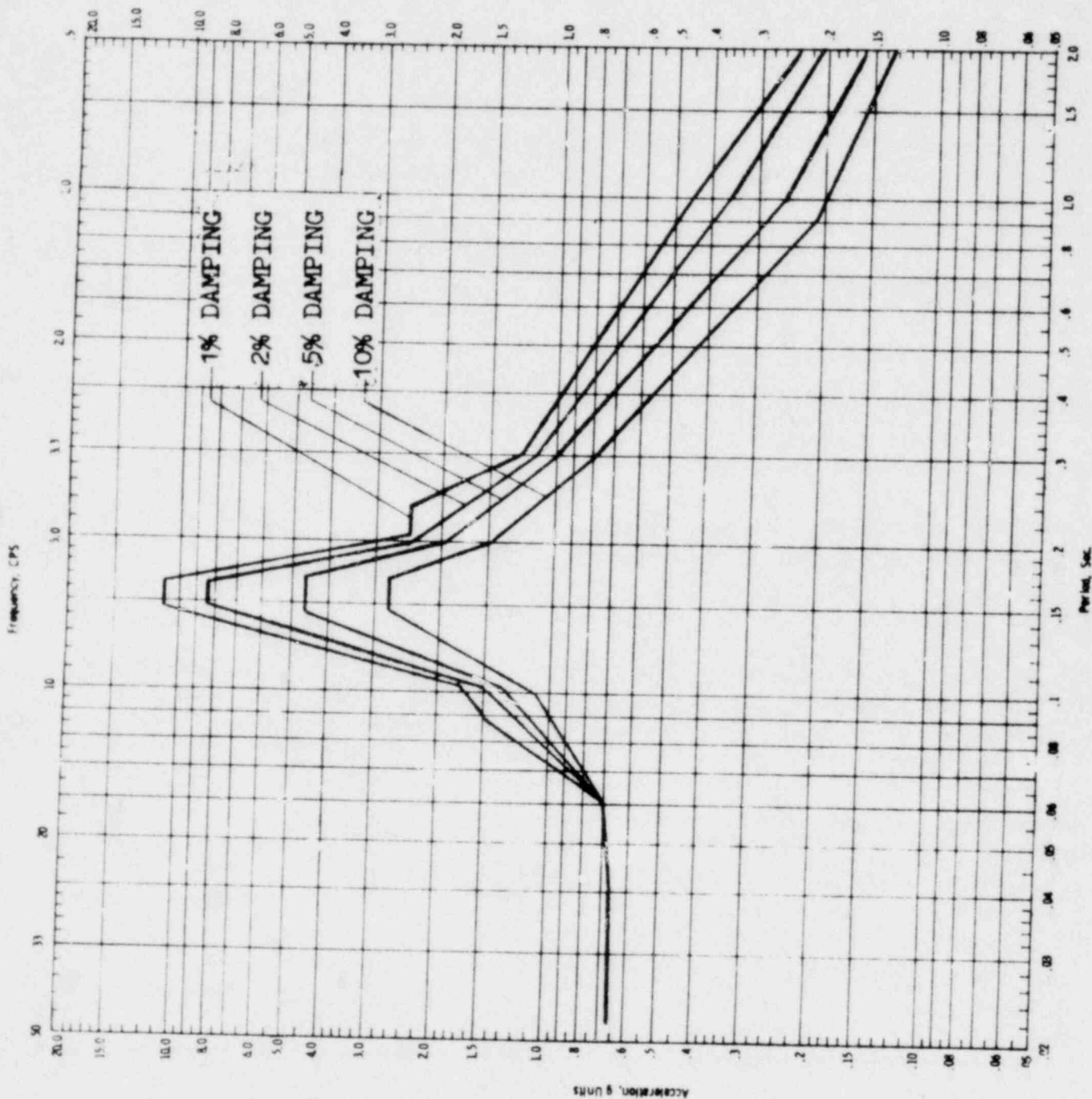
HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 593'-6" (SLAB NO. 5)
REACTOR BUILDING
NORTH - SOUTH COMPONENT

5-C

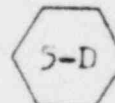


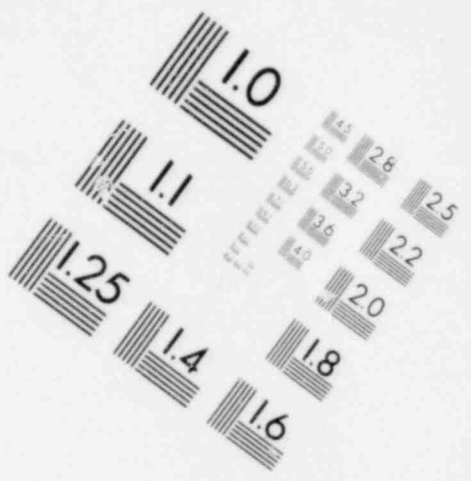
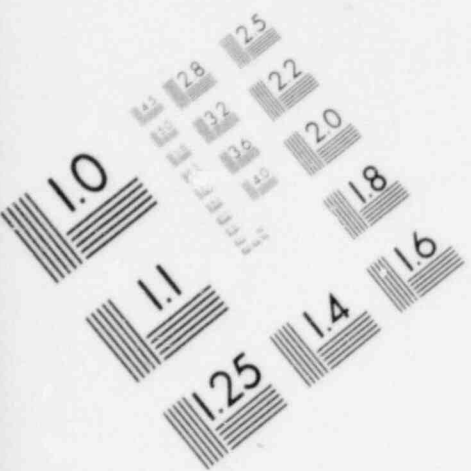
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 4-4-72
CHECKED BY HHS DATE 4-4-72 SHEET 24 OF 120

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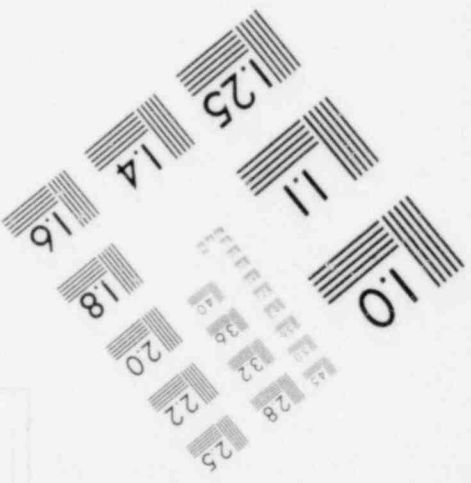
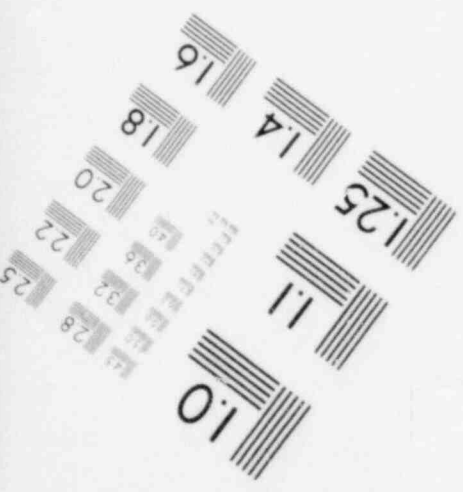
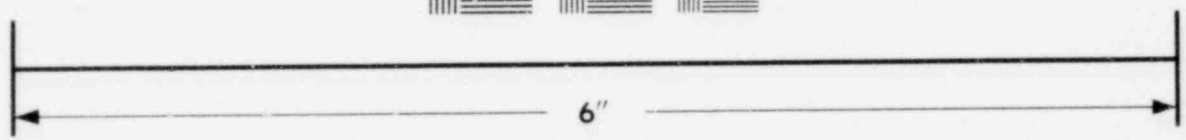
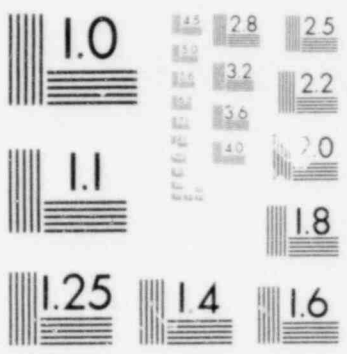


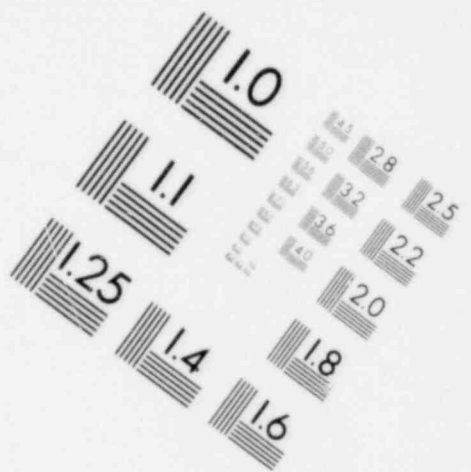
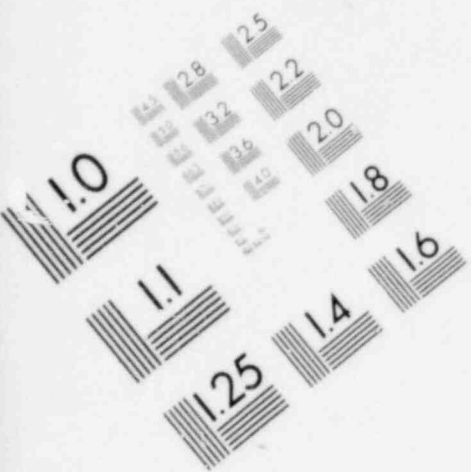
HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION 593' -6" (SLAB NO. 5)
REACTOR BUILDING
EAST - WEST COMPONENT



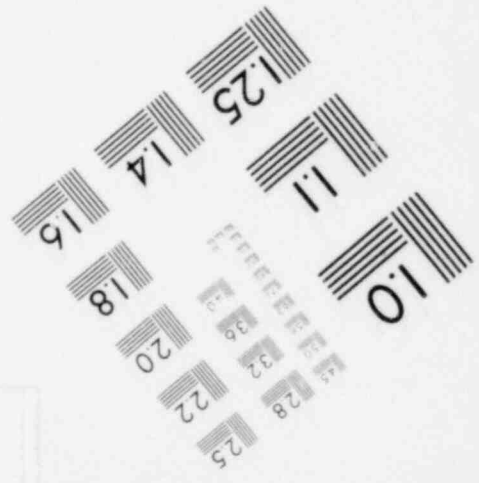
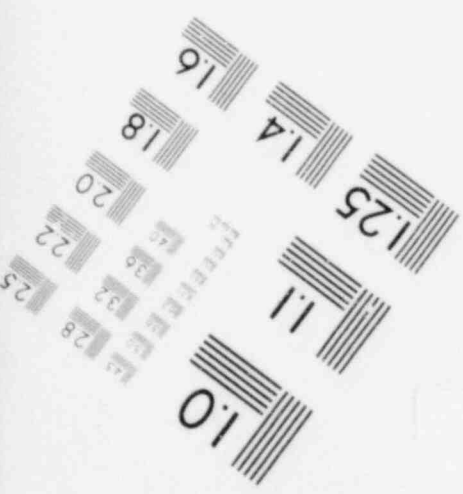
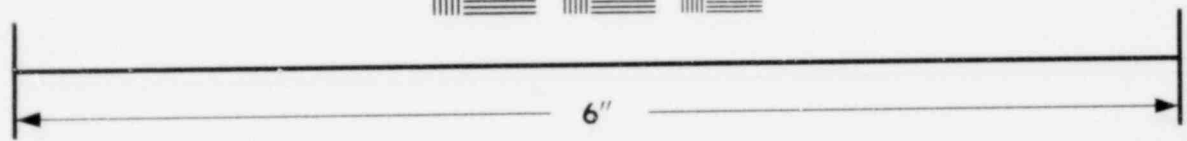
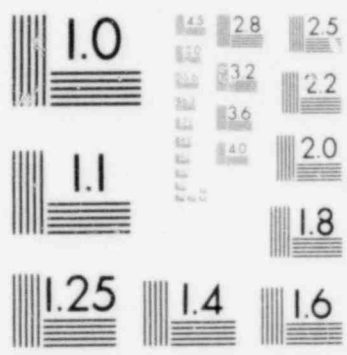


**IMAGE EVALUATION
TEST TARGET (MT-3)**

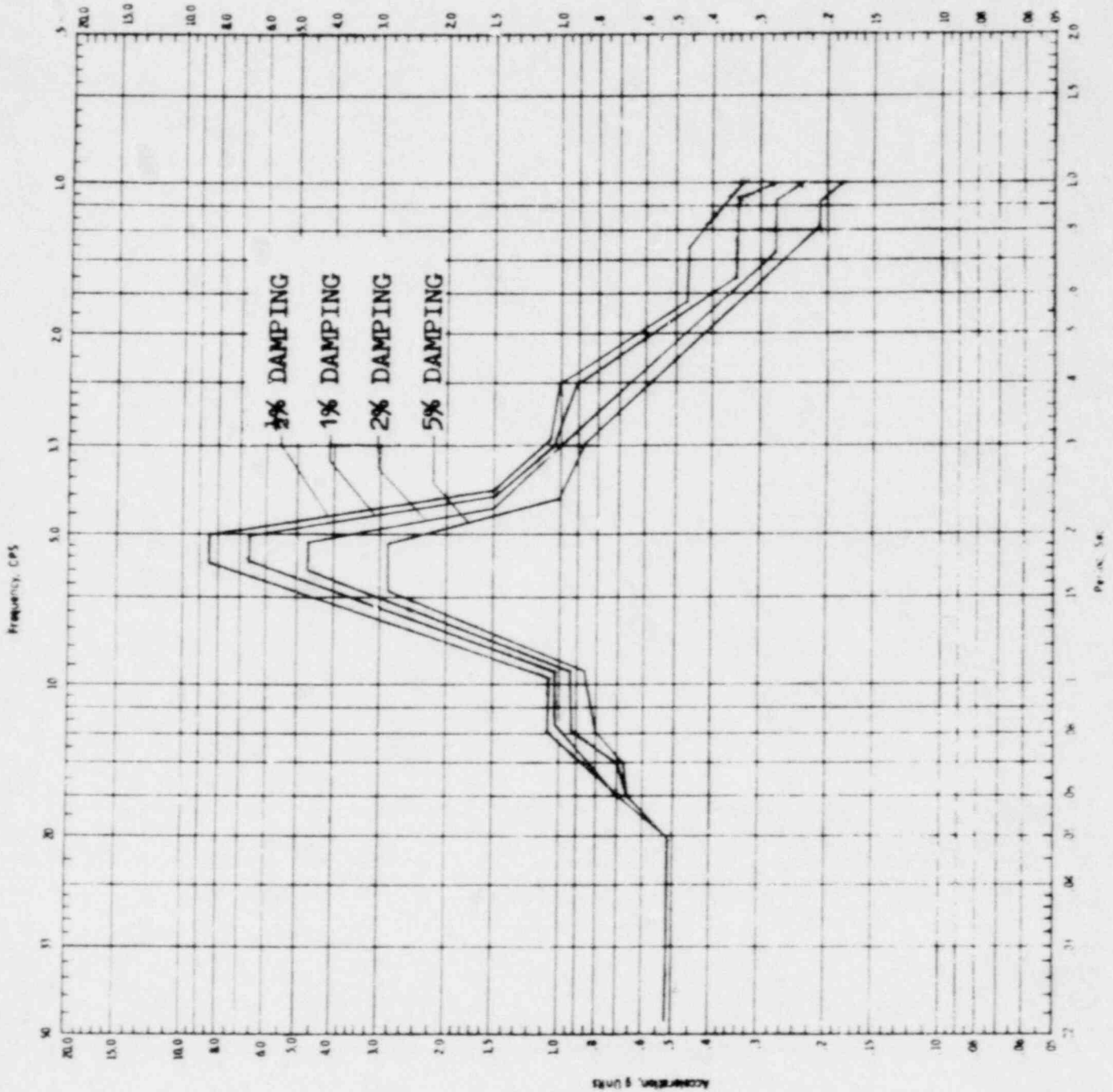




**IMAGE EVALUATION
TEST TARGET (MT-3)**



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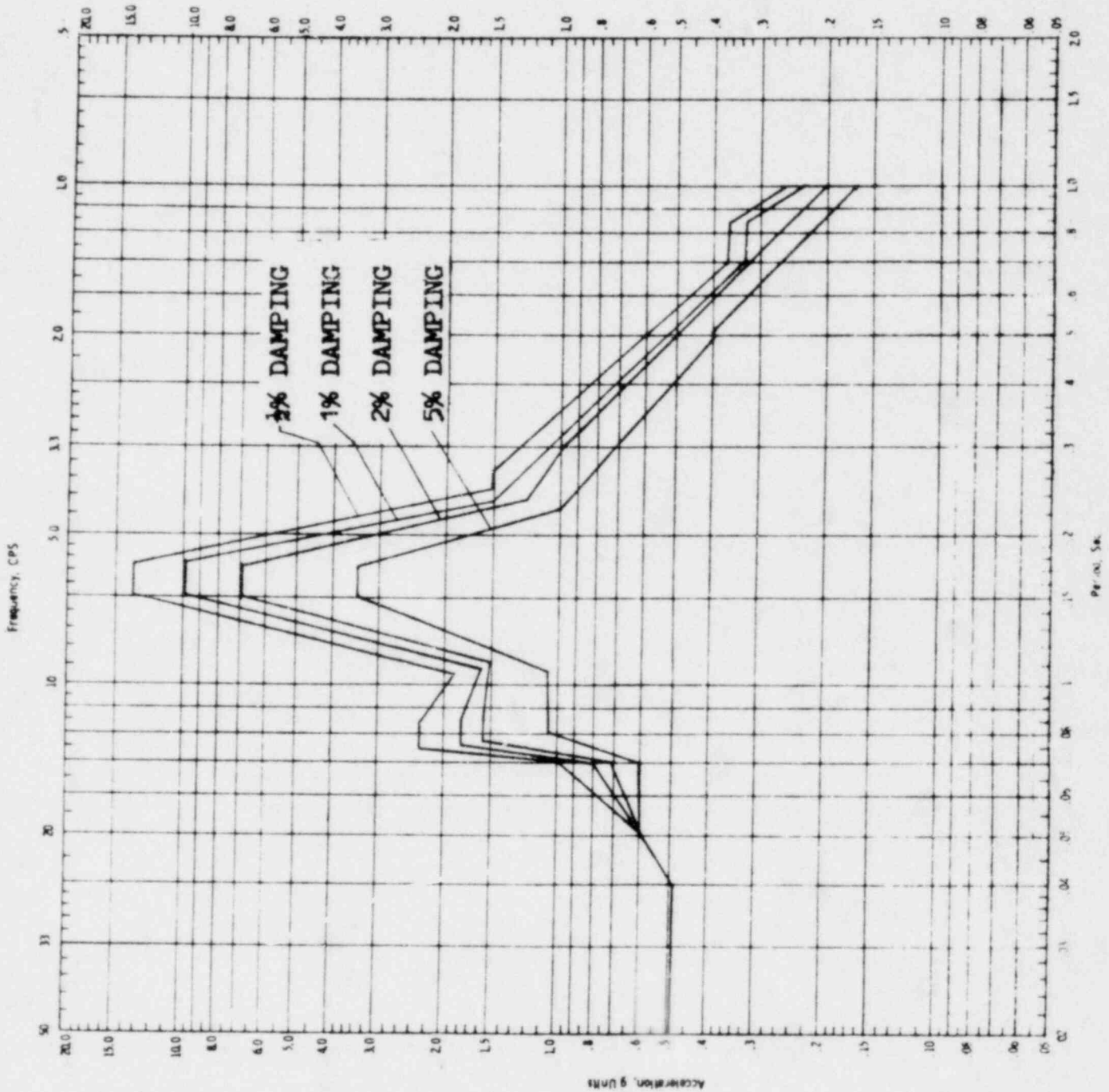
HORIZONTAL FLOOR RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 627'-9" (SLAB NO. 6)
 REACTOR BUILDING
 NORTH - SOUTH COMPONENT

6-A



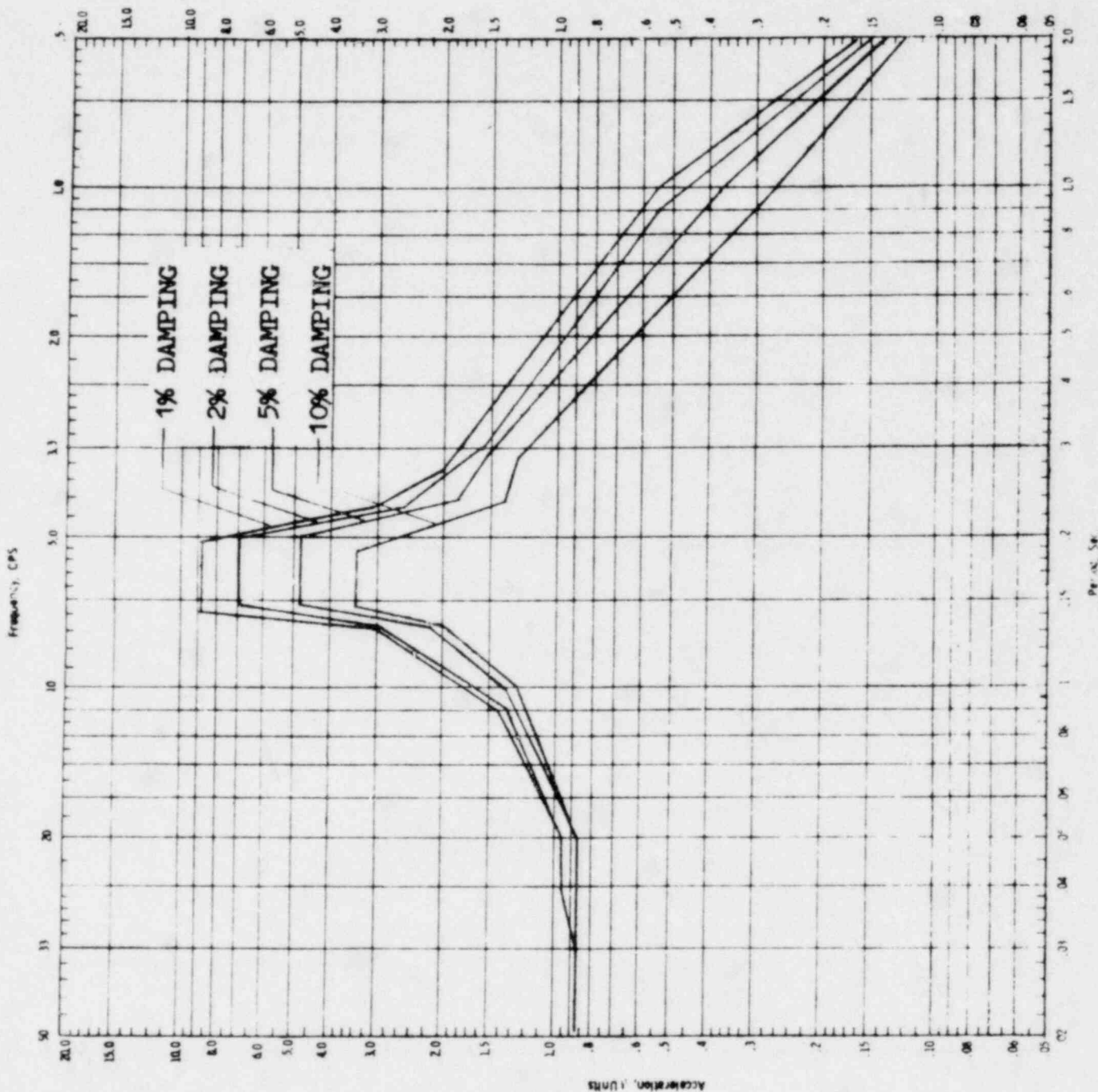
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 10-19-71
CHECKED BY HHS DATE 10-19-71 SHEET 26 OF 20

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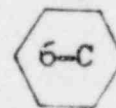


HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 627'-9" (SLAB NO. 6)
REACTOR BLDG.
EAST - WEST COMPONENT

6-B



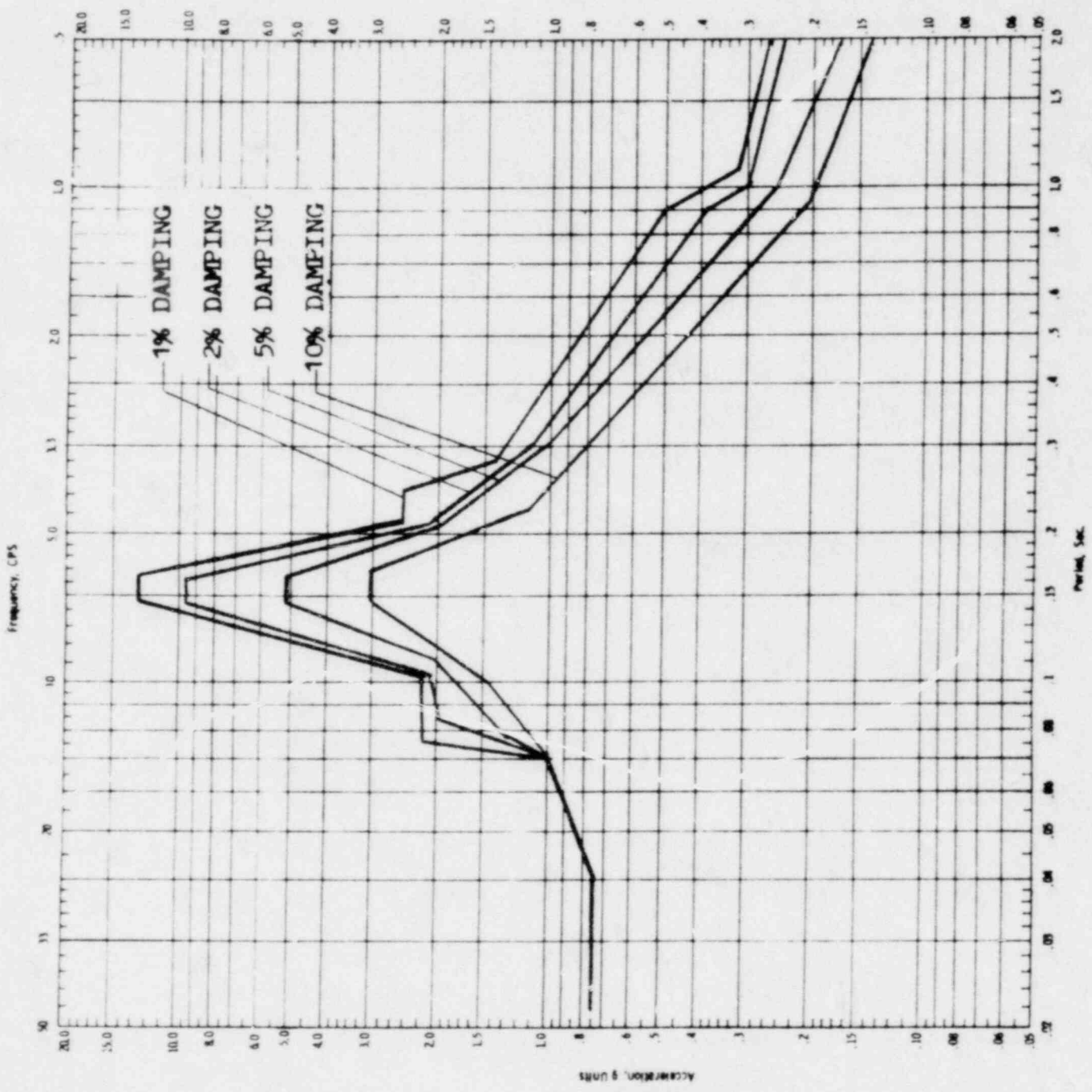
HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 EL. 627'-9" (SLAB NO. 6)
 REACTOR BUILDING
 NORTH - SOUTH COMPONENT





CLIENT CINCINNATI GAS & ELECTRIC CO.
 PROJECT ZIMMER JOB NO. 4130
 DESIGN BY GSB DATE 4-4-72
 CHECKED BY HHS DATE 4-4-72 SHEET 28 OF 120

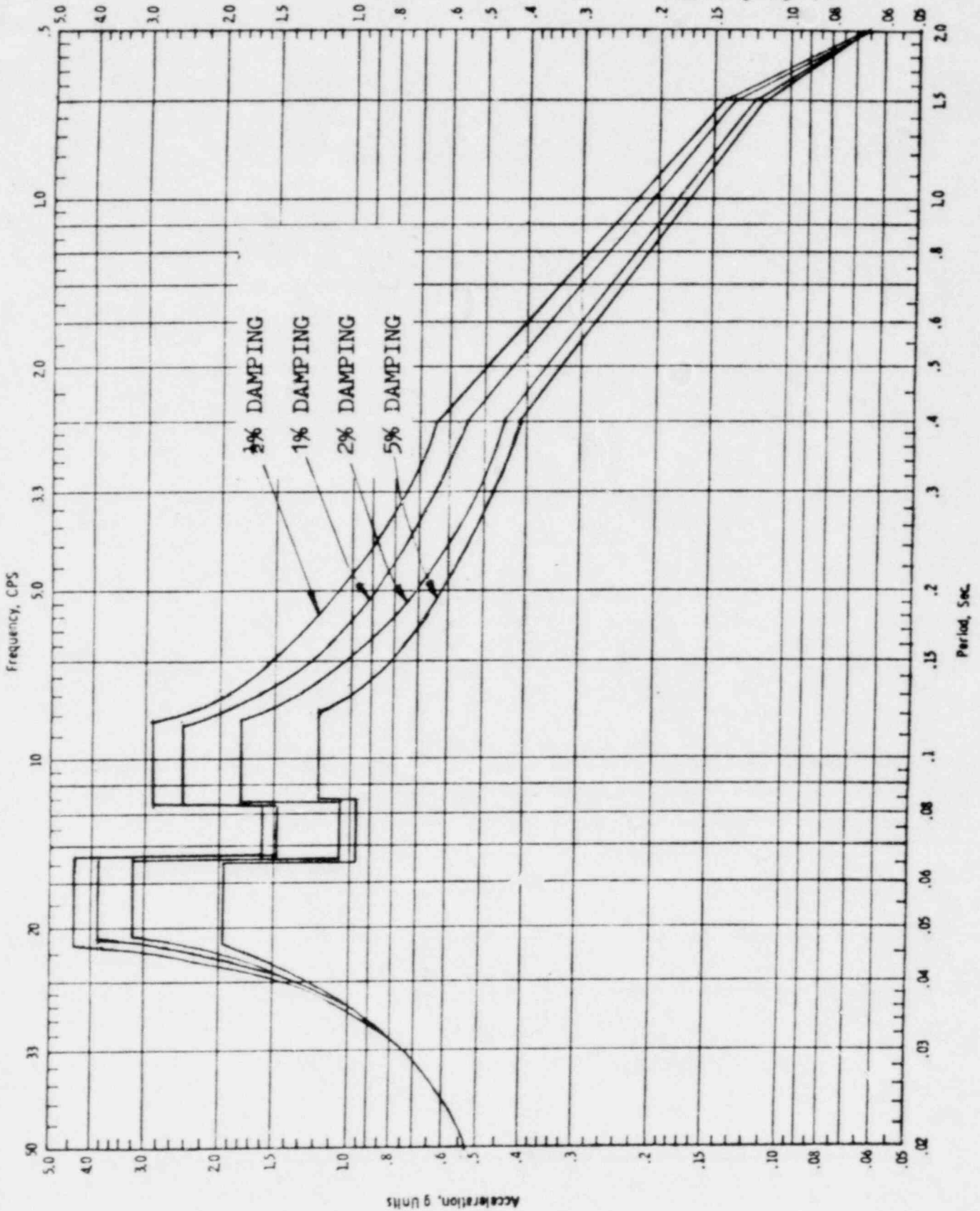
Rev. 8-31-72



HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 ELEVATION 627'-6" (SLAB NO. 6)
 REACTOR BUILDING
 EAST - WEST COMPONENT

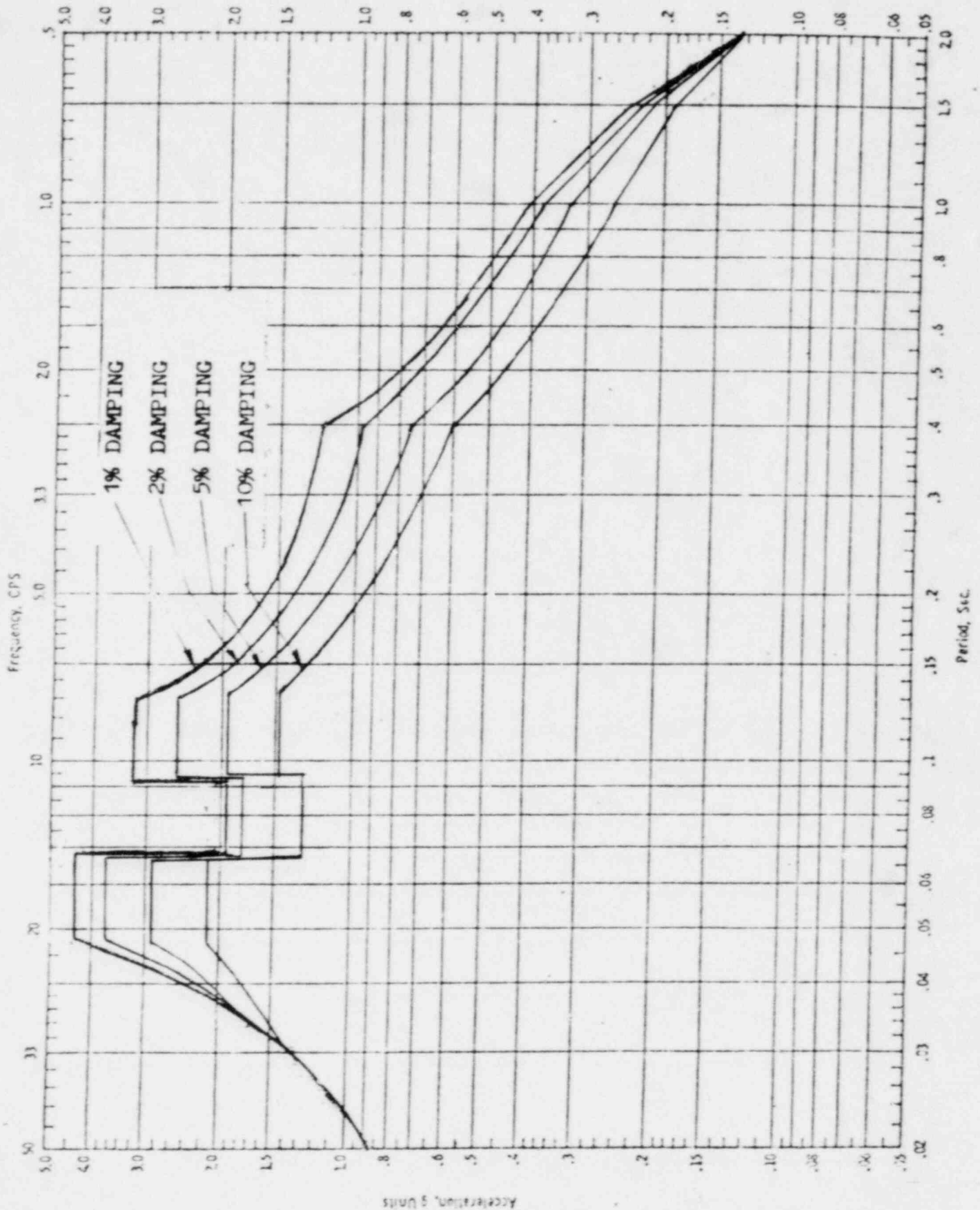


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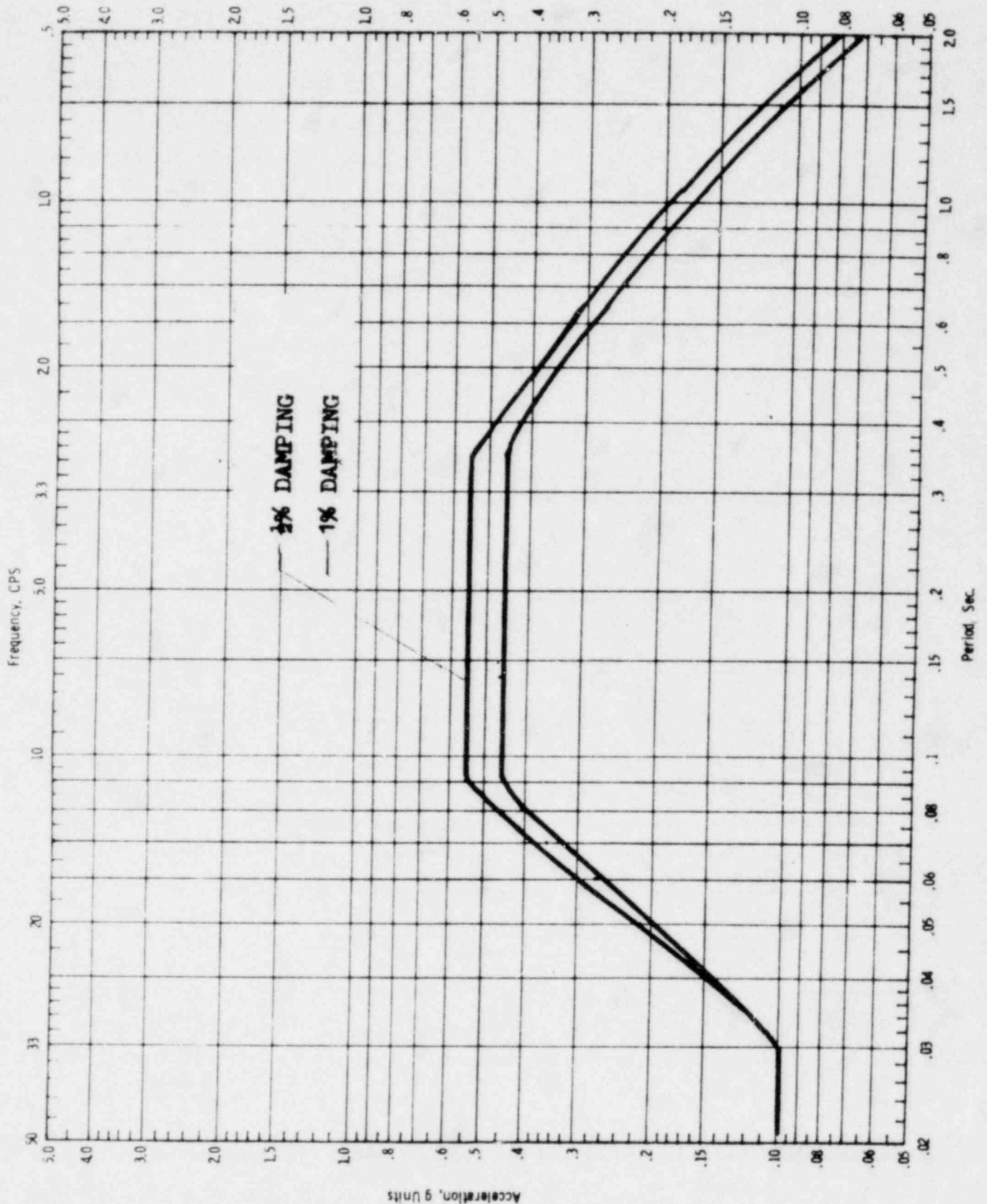
VERTICAL RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 REACTOR BLDG. SLAB
 EL. 627'-9" . 593'-6" & 570'-6"

4-E 5-E 6-E

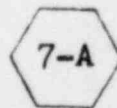


VERTICAL RESPONSE SPECTRA
 (DESIGN BASIS EARTHQUAKE)
 REACTOR BLDG. SLAB
 EL. 627'-9", 593'-0" & 570'-6"





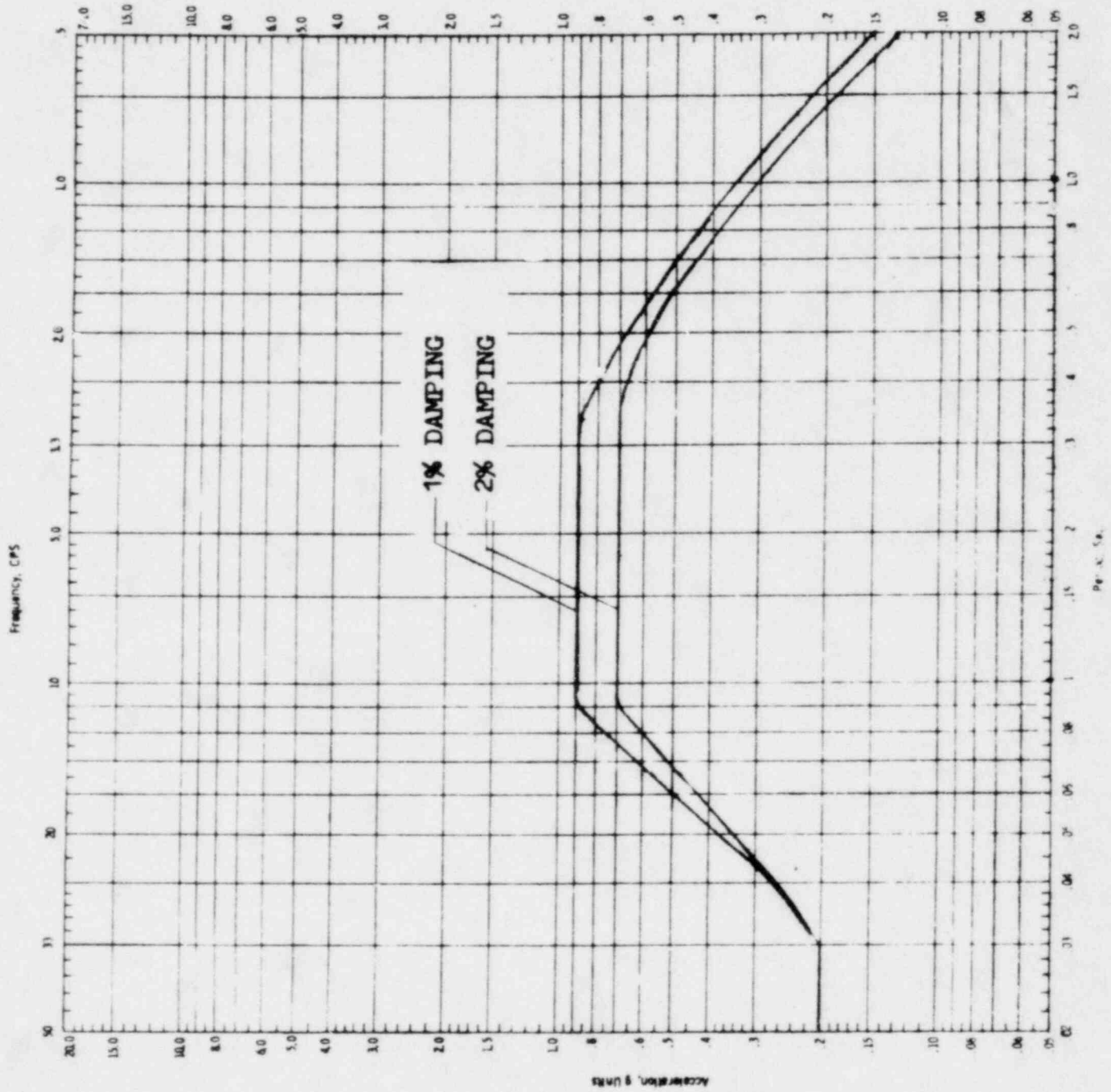
HORIZONTAL FLOOR RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 473'-5" & 496'-0" (SLAB NO.11)
 REACTOR, AUXILIARY, TURBINE BLDG.
 NORTH - SOUTH/EAST-WEST COMPONENT



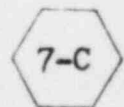


CLIENT CINCINNATI GAS & ELECTRIC CO.
 PROJECT WM. H. ZIMMER JOB NO. 4130
 DESIGN BY GSB DATE 7-7-71
 CHECKED BY HHS DATE 7-7-71 SHEET 32 OF 120

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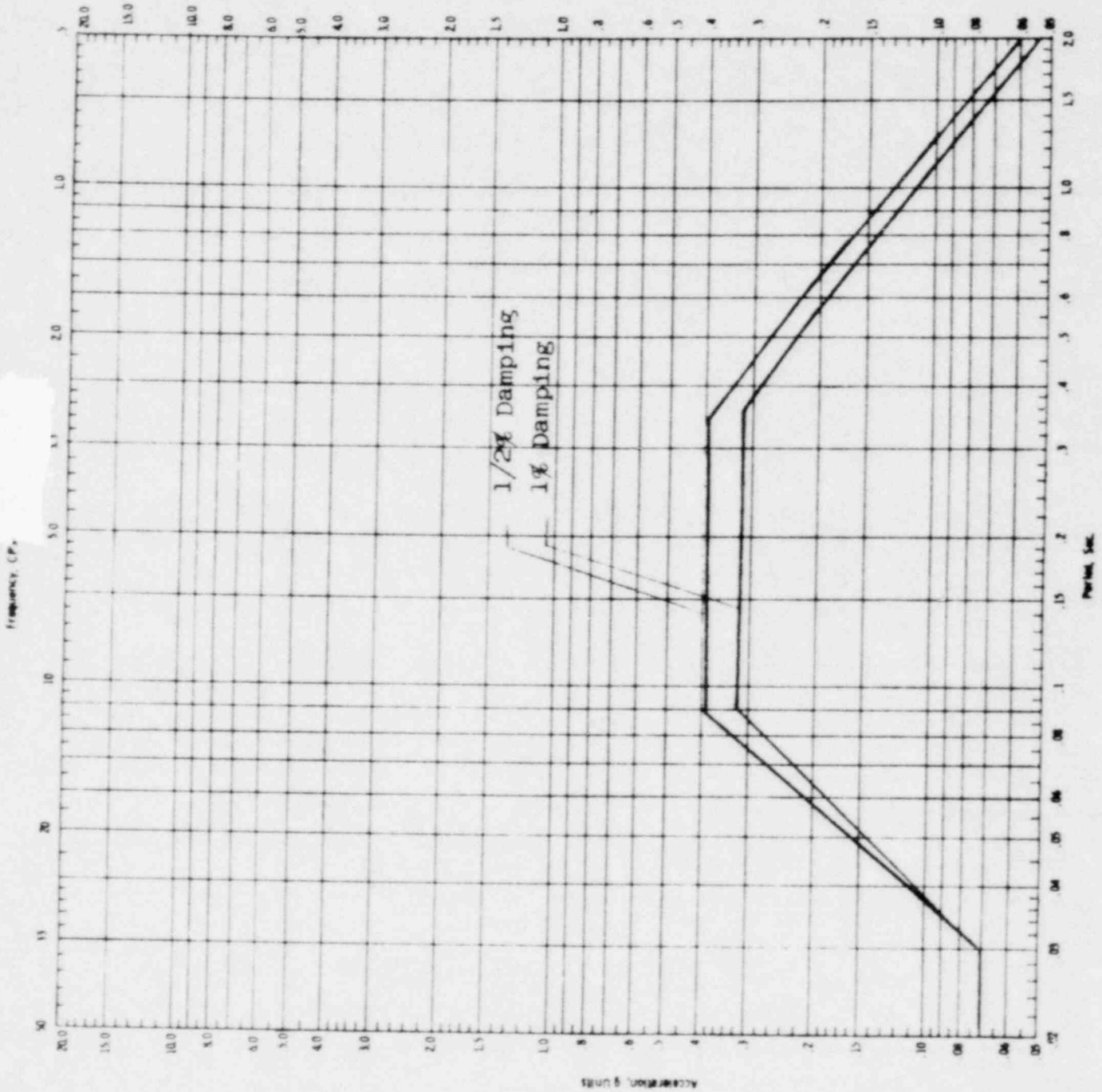
HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 EL. 473'-5" & 496'-0" (SLAB NO.11)
 REACTOR, AUXILIARY, TURBINE BLDG.
 NORTH - SOUTH/EAST - WEST COMPONENT





CLIENT Cincinnati Gas & Electric Co.
PROJECT Wm. H. Zimmer JOB NO. 4130
DESIGN BY GSB DATE 7/8/71
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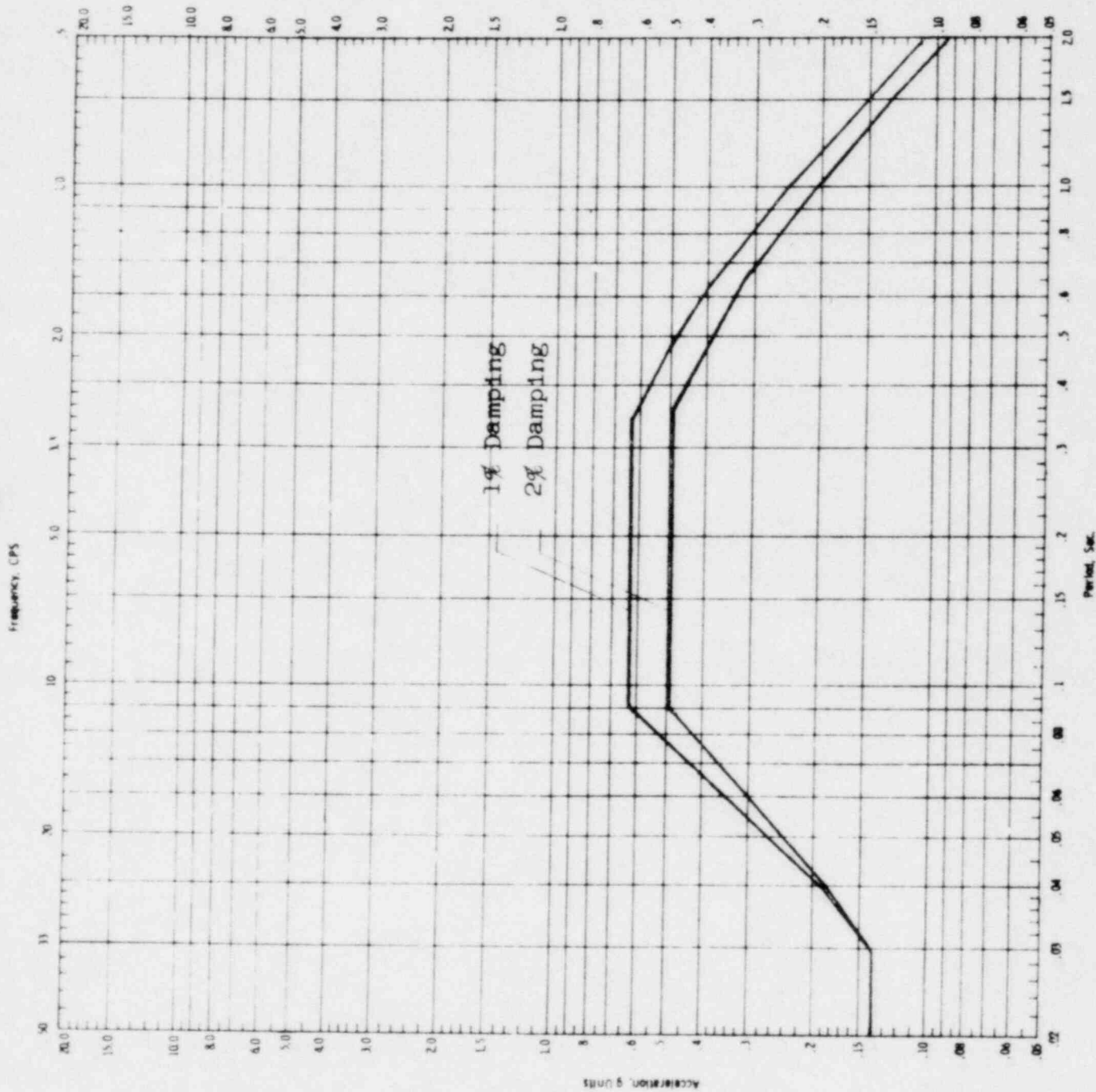
VERTICAL RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
ELEVATION - 473'-5" & 496'-0"
REACTOR AUXILIARY, TURBINE BUILDING



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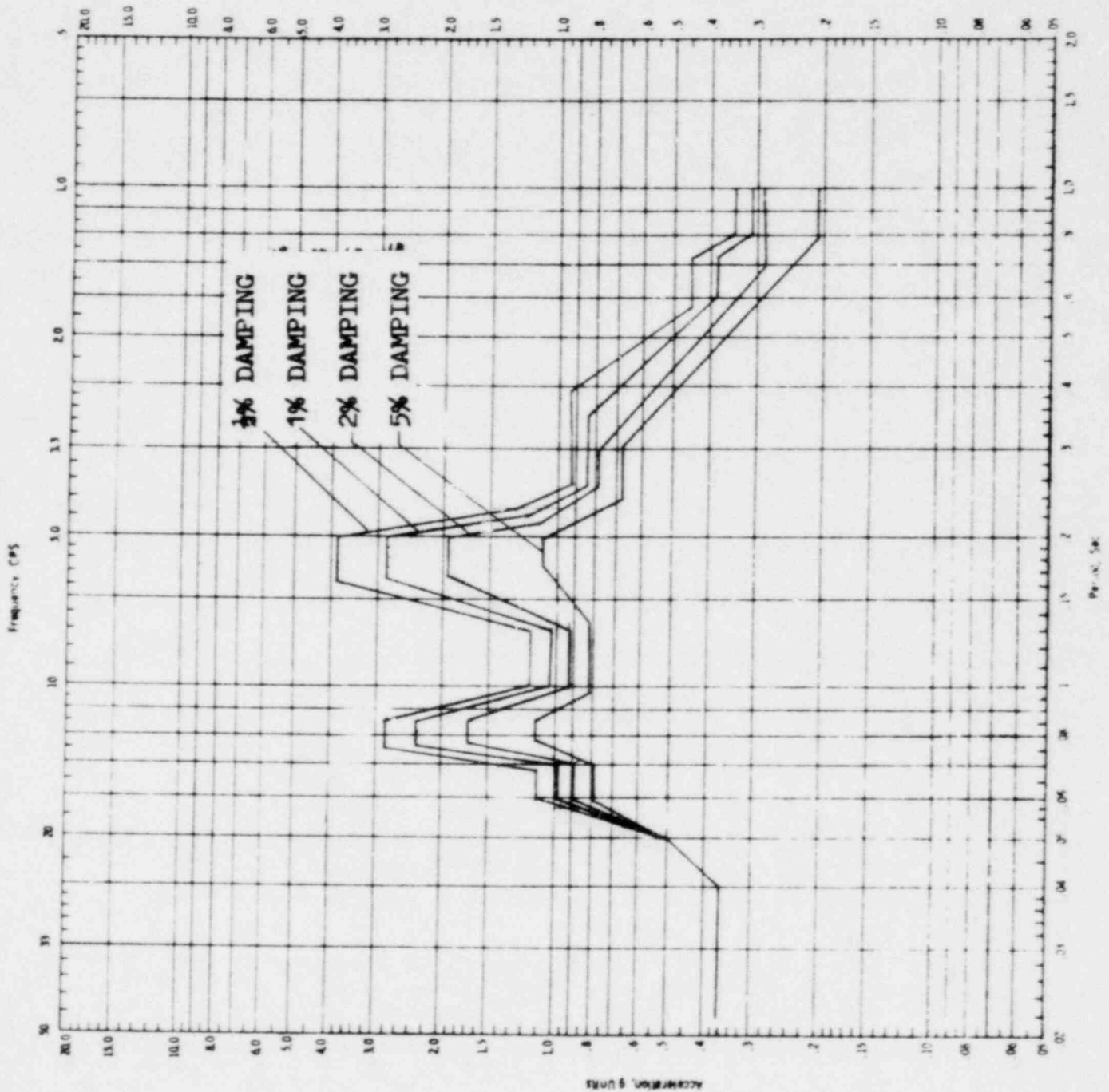
CLIENT Cincinnati Gas & Electric Co.
PROJECT Wm. H. Zimmer JOB NO. 4130
DESIGN BY GSB DATE 8/31/72
CHECKED BY HHS DATE 8/31/72 SHEET 32B OF 120



VERTICAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION - 473'-5" & 496'-0"
REACTOR, AUXILIARY, TURBINE BUILDING

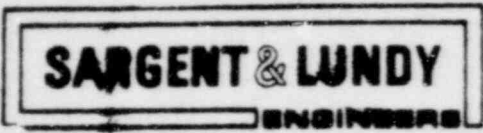
7-F

Rev. 4-4-72



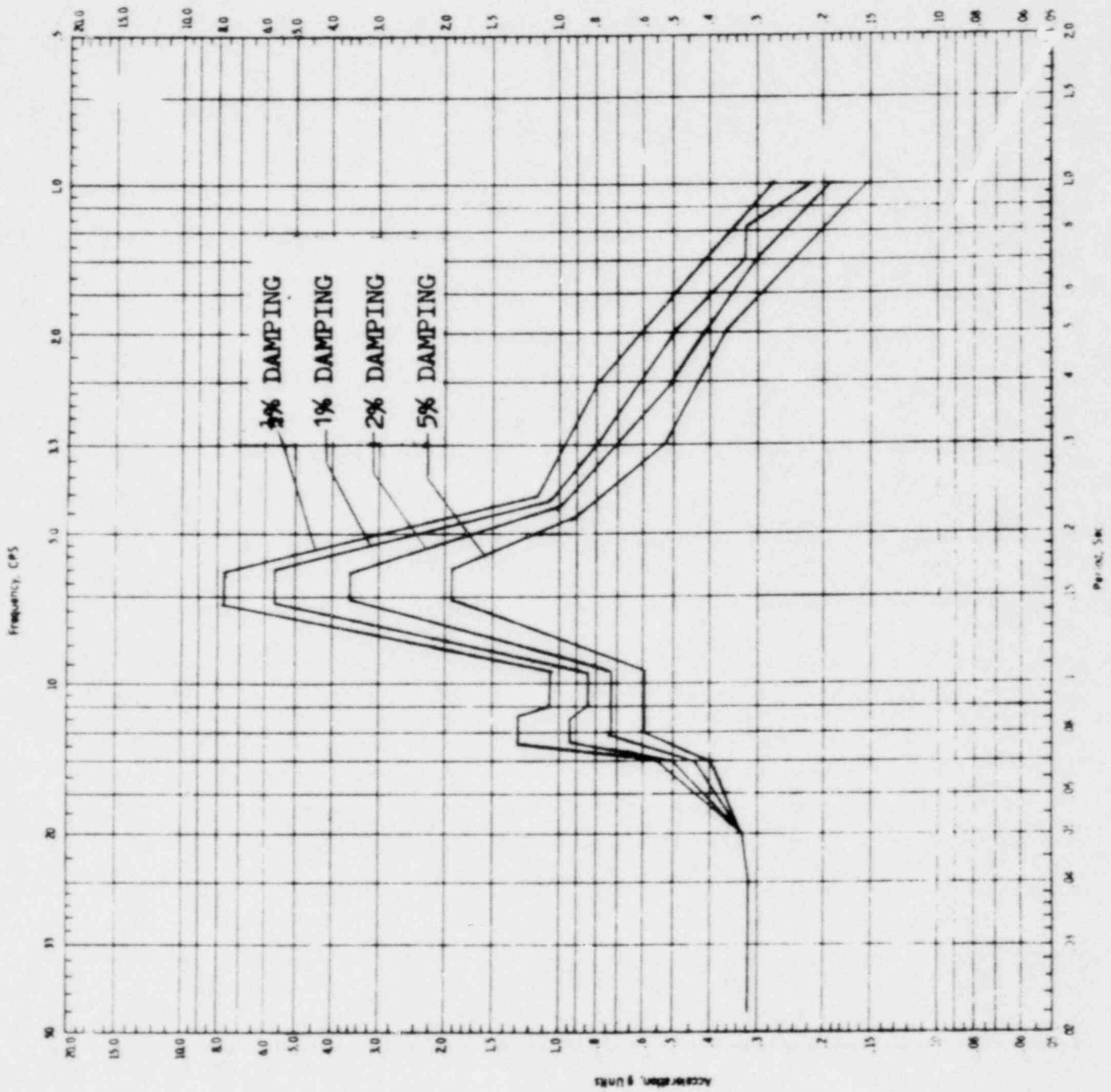
HORIZONTAL FLOOR RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 567'-5" (SLAB NO. 8)
 AUXILIARY BLDG.
 NORTH - SOUTH COMPONENT

8-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 10-19-71
CHECKED BY HHS DATE 10-19-71 SHEET 24 OF 120

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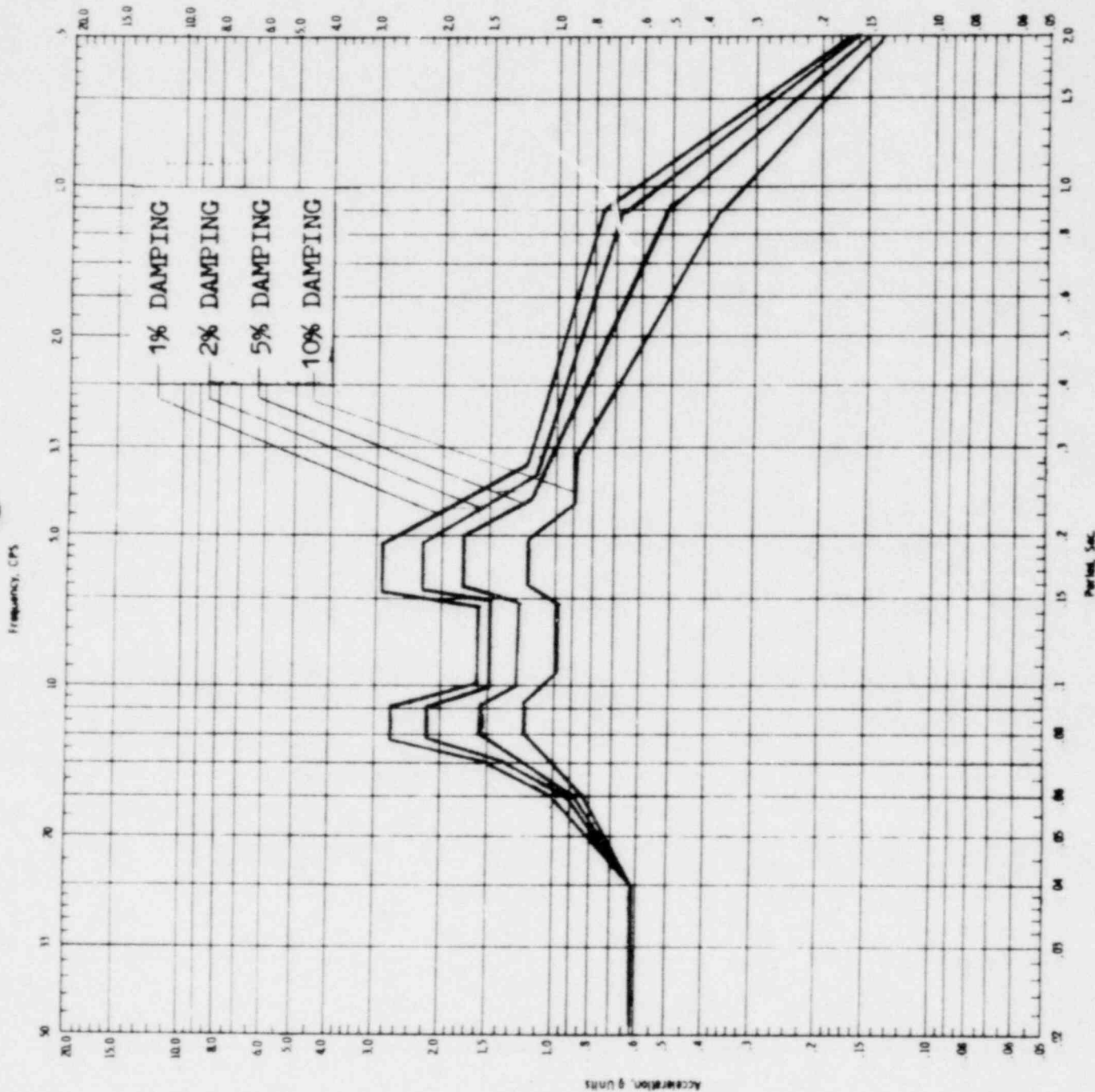
HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 567'-5" (SLAB NO. 8)
AUXILIARY BLDG.
EAST - WEST COMPONENT

8-B

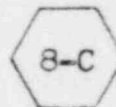


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-4-72
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HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION 567'-5" (SLAB NO. 8)
AUXILIARY BUILDING
NORTH - SOUTH COMPONENT

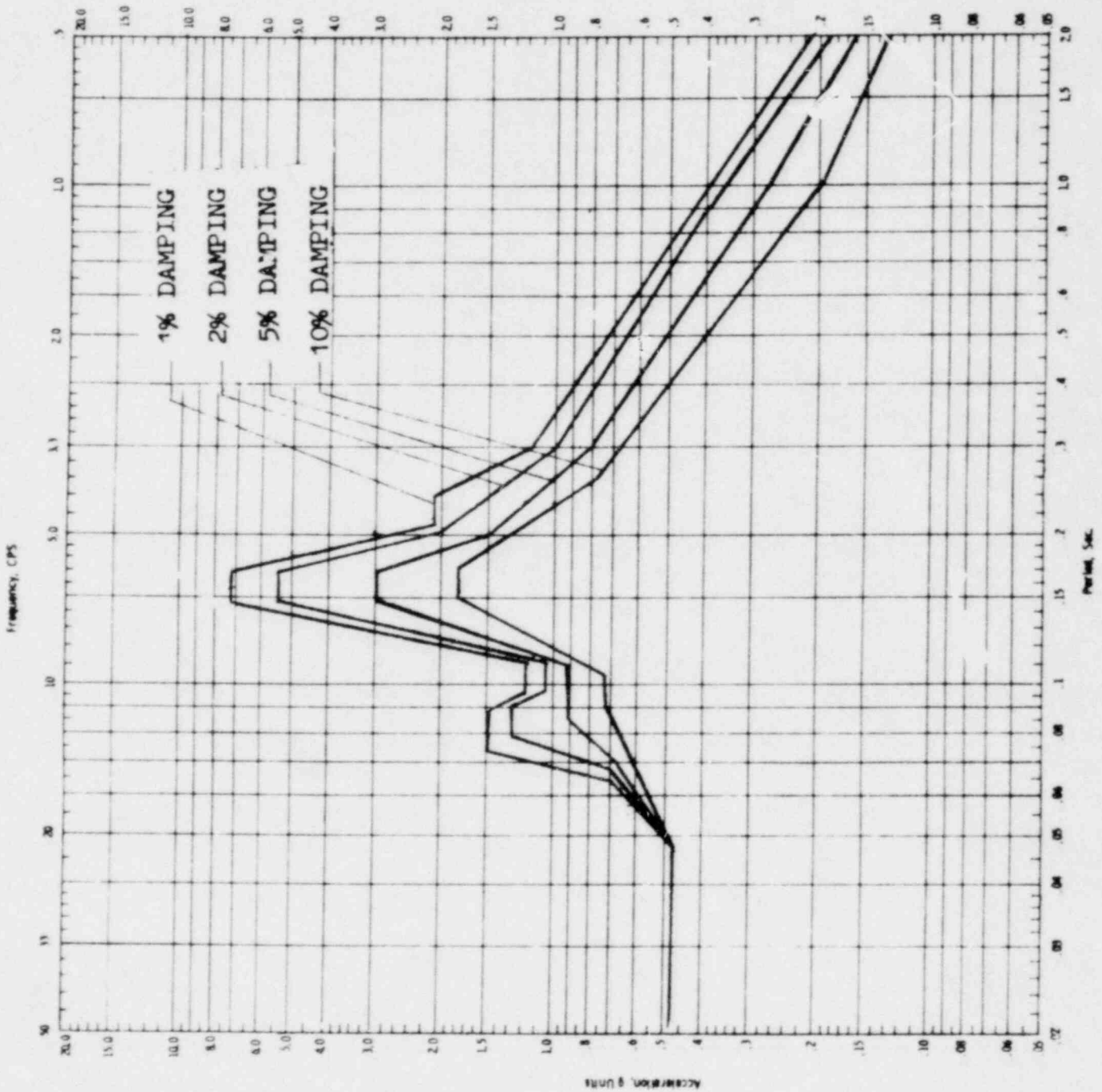




CLIENT CINCINNATI GAS & ELECTRIC CO.

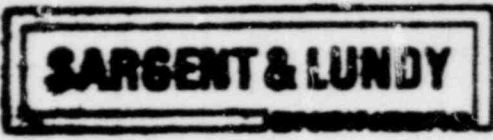
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DESIGN BY GSB DATE 4-4-72
CHECKED BY HHS DATE 4-4-72 SHEET 36 OF 120

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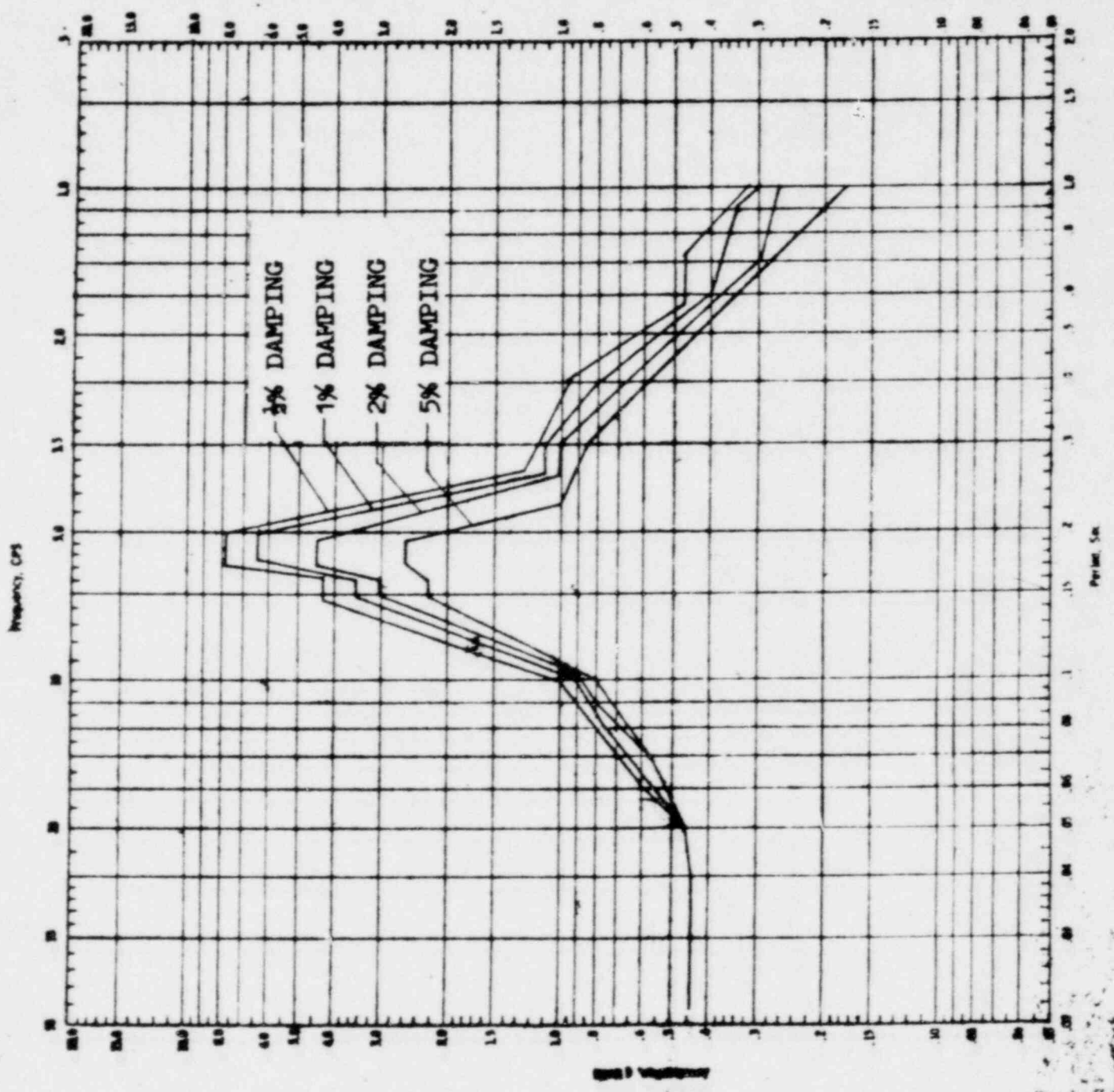


HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION 567'-5" (SLAB NO. 8)
AUXILIARY BUILDING
EAST - WEST COMPONENT

8-D

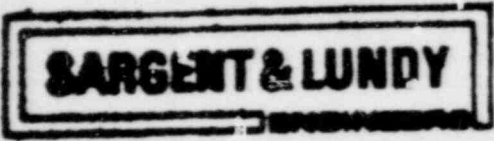


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 4-4-72
CHECKED BY HHS DATE 4-4-72 SHEET 27 OF 180

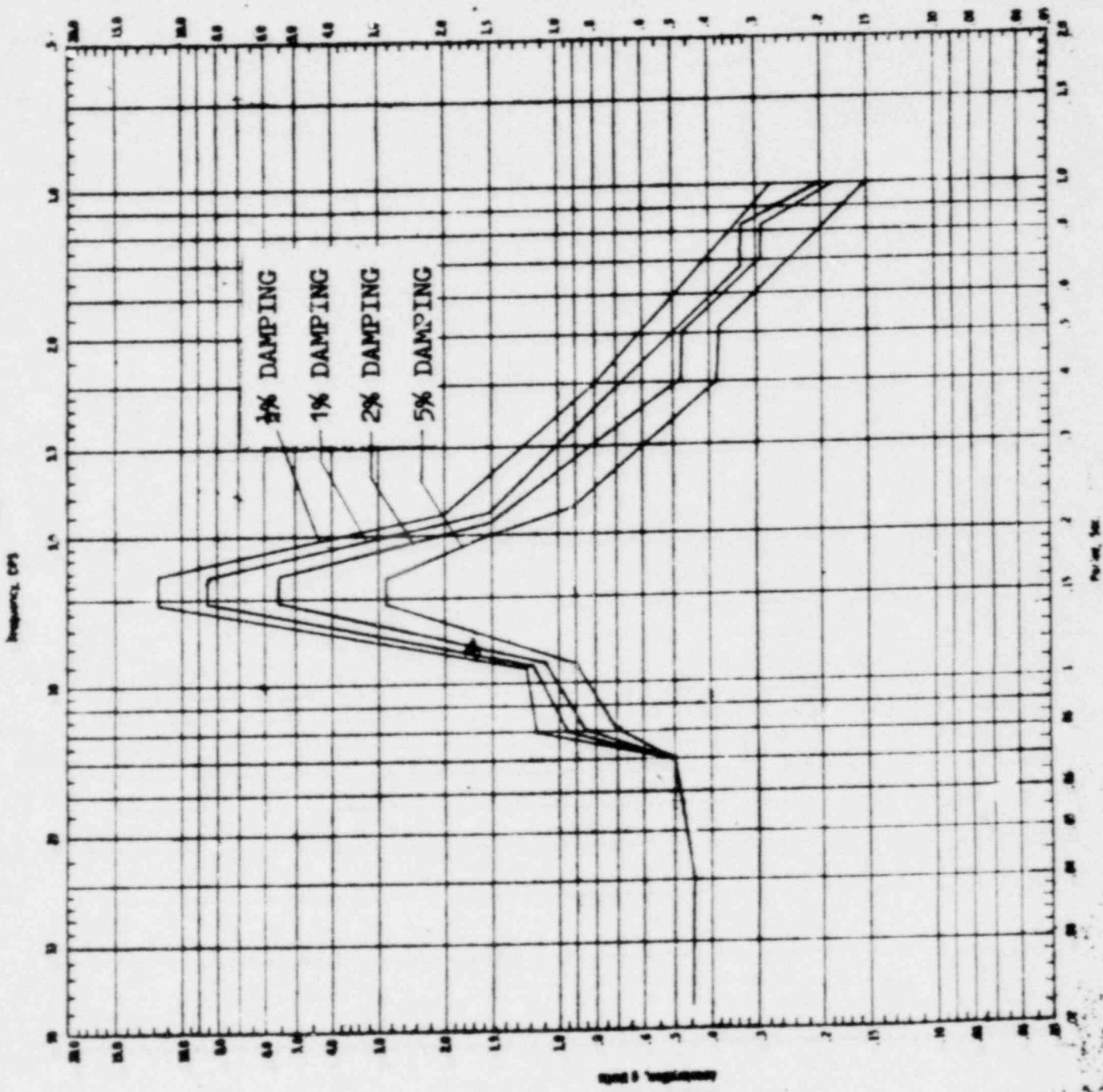


HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 591'-7" (SLAB NO. 9)
AUXILIARY BUILDING
NORTH - SOUTH COMPONENT

9-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-4-72
CHECKED BY HMS DATE 4-4-72 SHEET 28 OF 120

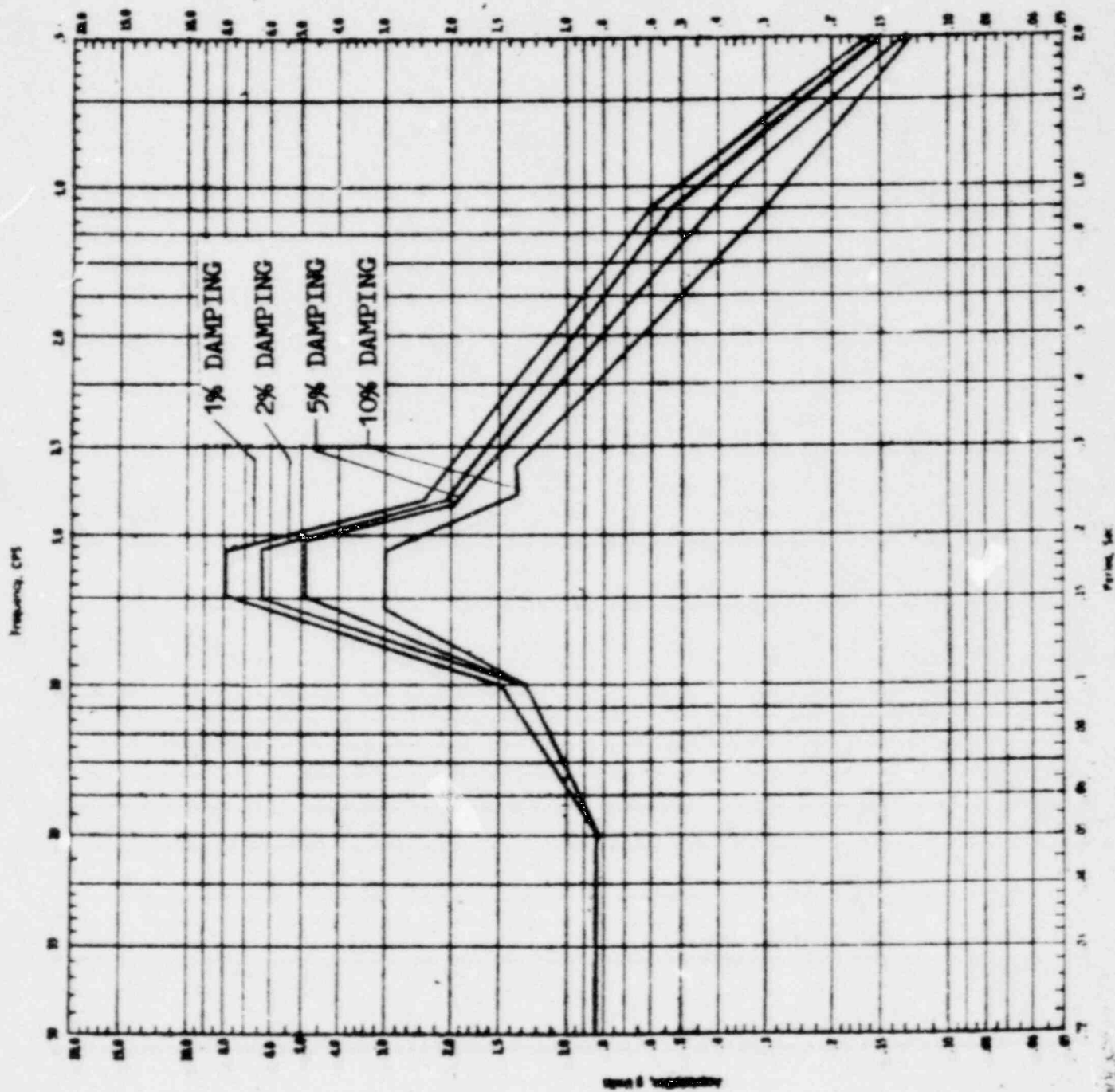


HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 59'1"-7" (SLAB NO. 9)
AUXILIARY BLDG.
EAST - WEST COMPONENT

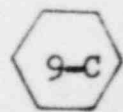
9-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER DRAWING NO. 4130
DESIGN BY GSB DATE 4-14-72
CHECKED BY HHS DATE 4-14-72 SHEET 39 OF 120



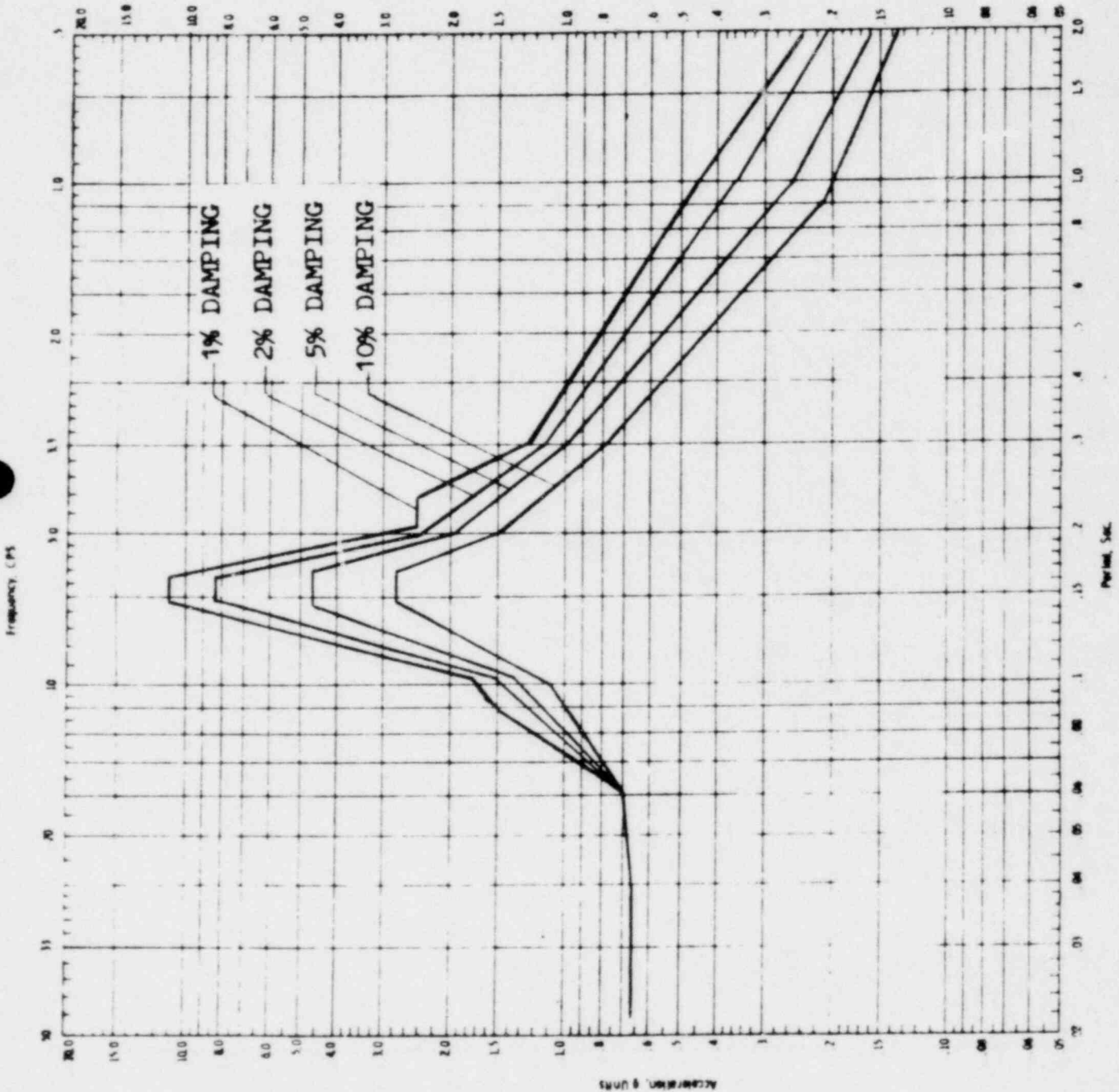
HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 591'-7" (SLAB NO. 9)
AUXILIARY BUILDING
NORTH - SOUTH COMPONENT



SARGENT & LUNDY
ENGINEERS

CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-4-72
CHECKED BY HPS DATE 4-4-72 SHEET 40 OF 120

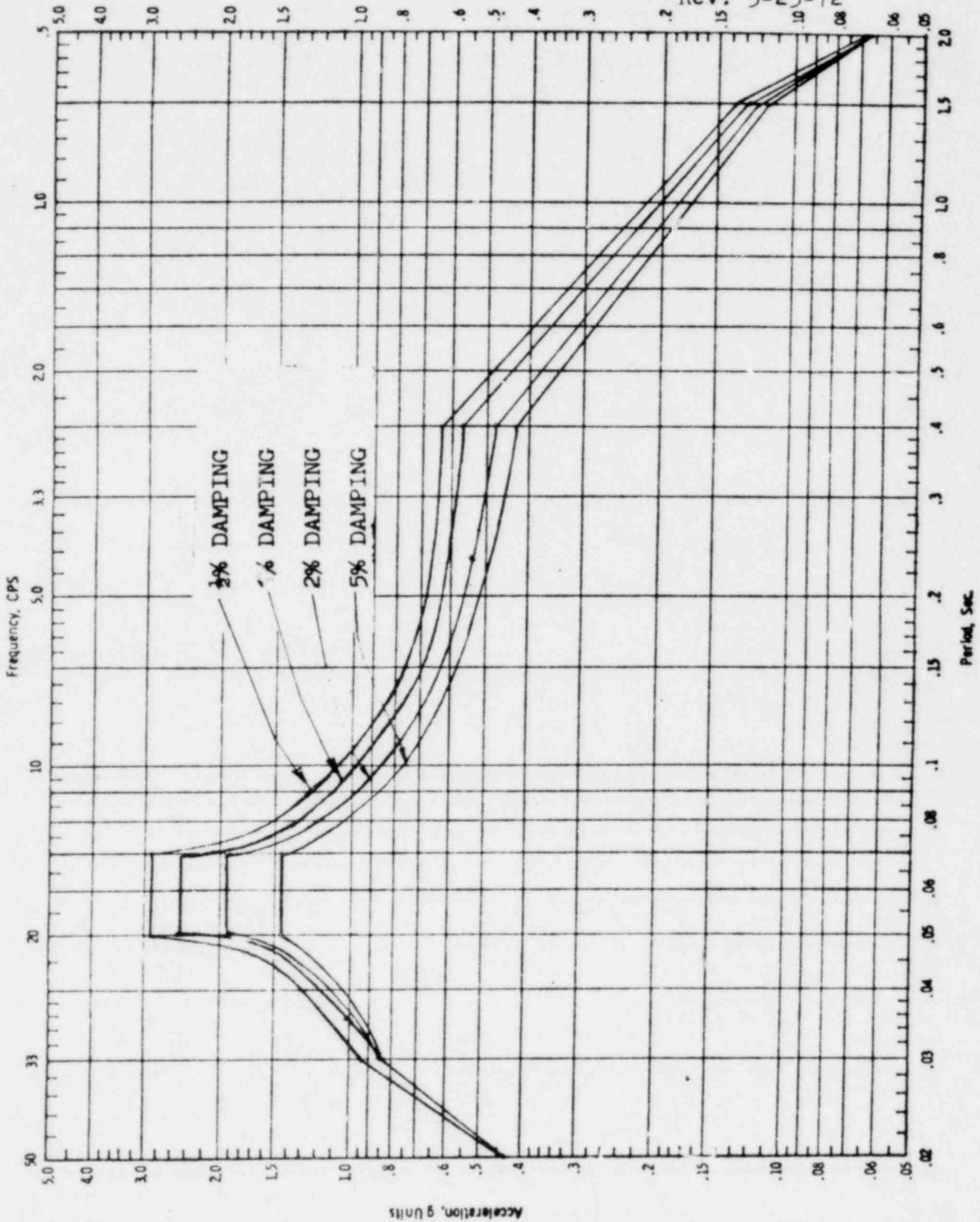
Rev. 8-31-72



HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION 591'-7" (SLAB NO. 9)
AUXILIARY BUILDING
EAST - WEST COMPONENT

9-D

Rev. 5-25-72



VERTICAL RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 AUXILIARY BUILDING SLAB
 EL. 591'-7" & 567'-5"

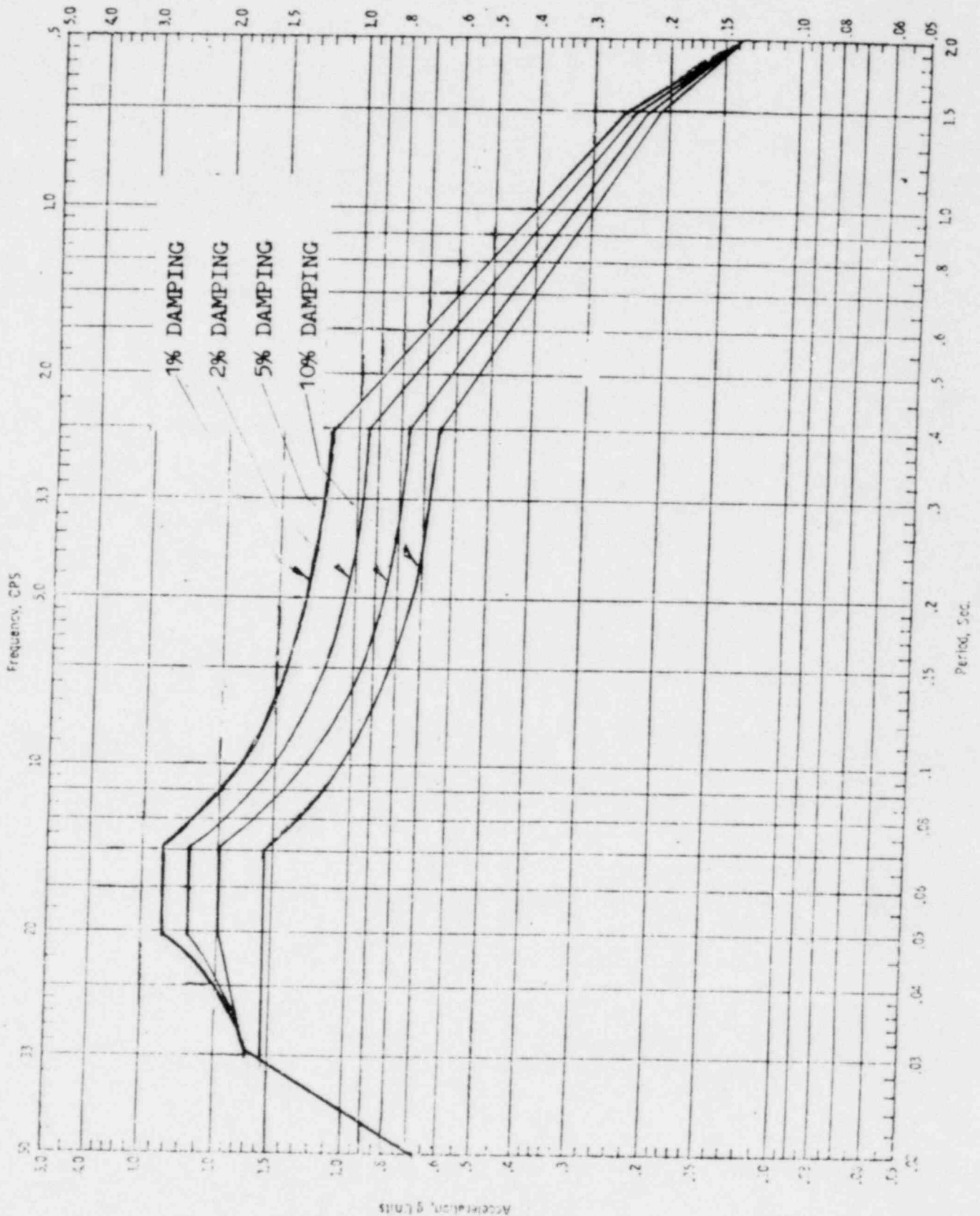
8-E

9-E

SARGENT LUNDY

ENGINEERS

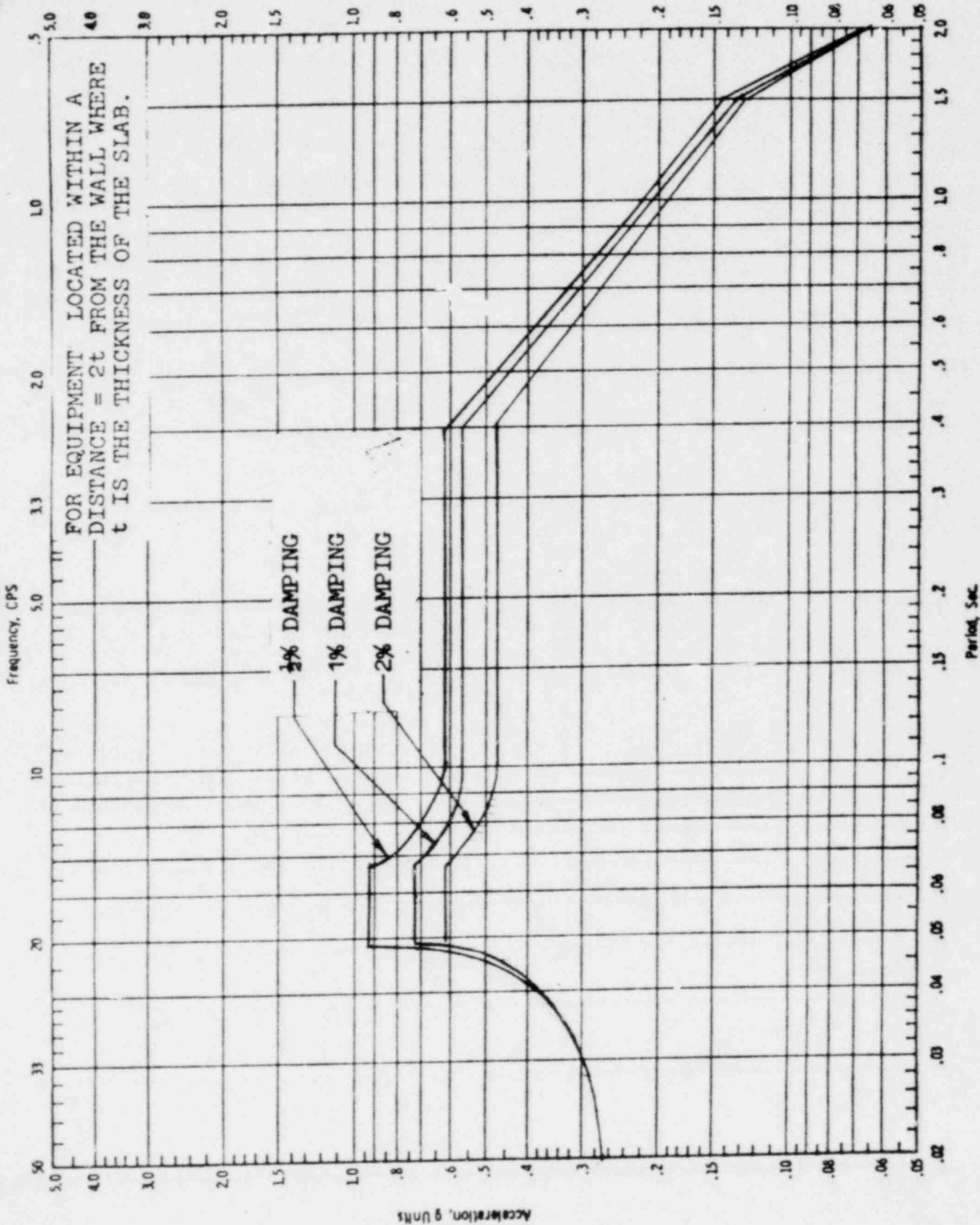
CLIENT THE CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY SGM DATE 5-25-72
CHECKED BY HHS DATE 5-25-72 SHEET 42 OF 120



VERTICAL RESPONSE SPECTRA
(DESIGN BASIS EARTHQUAKE)
AUXILIARY BUILDING SLAB
EL. 591'-7" & 567'-5"

8-F

9-F



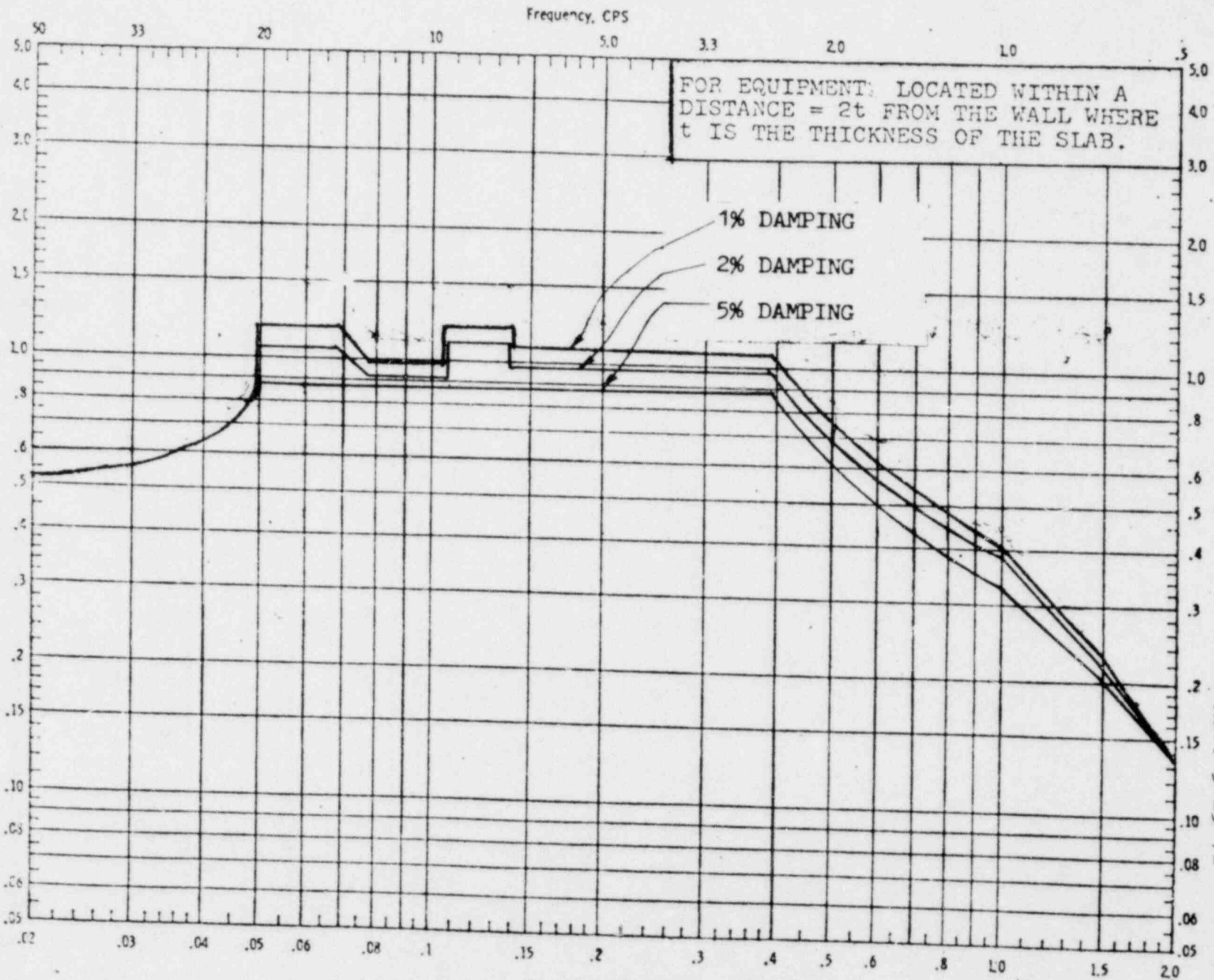
VERTICAL RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 REACTOR & AUXILIARY BLDG. WALL
 EL. 546'-0", 525'-7" & 503'-6"

10-E

SARGENT & LUNDY
ENGINEERS

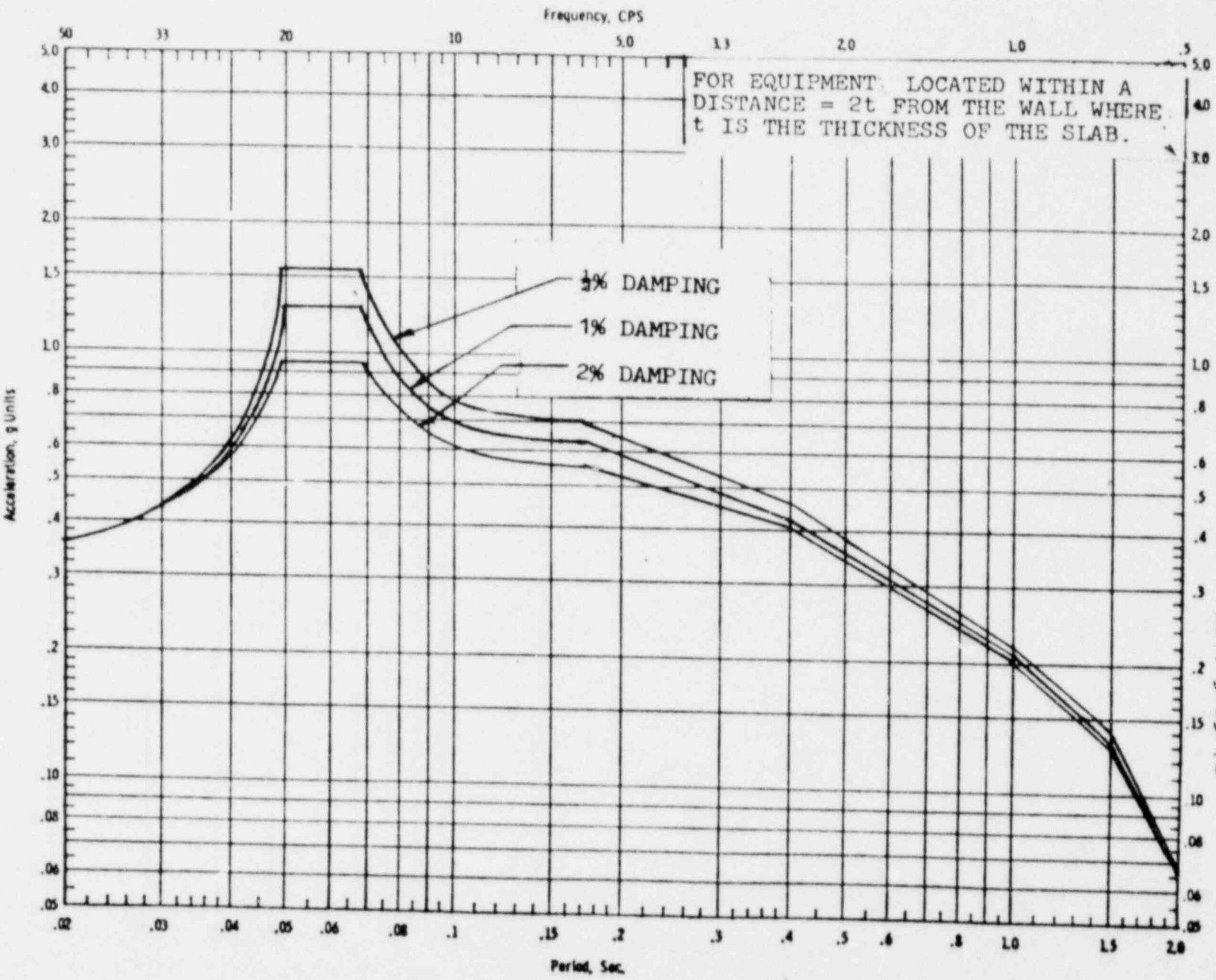
CLIENT THE CINCINNATI GAS & ELECTRIC CO.
 PROJECT WM. H. ZIEGLER
 DESIGN BY SGM
 CHECKED BY HHS
 DATE 10-18-71
 DATE 10-18-71 SHEET 44 OF 120
 JOB NO. 4130

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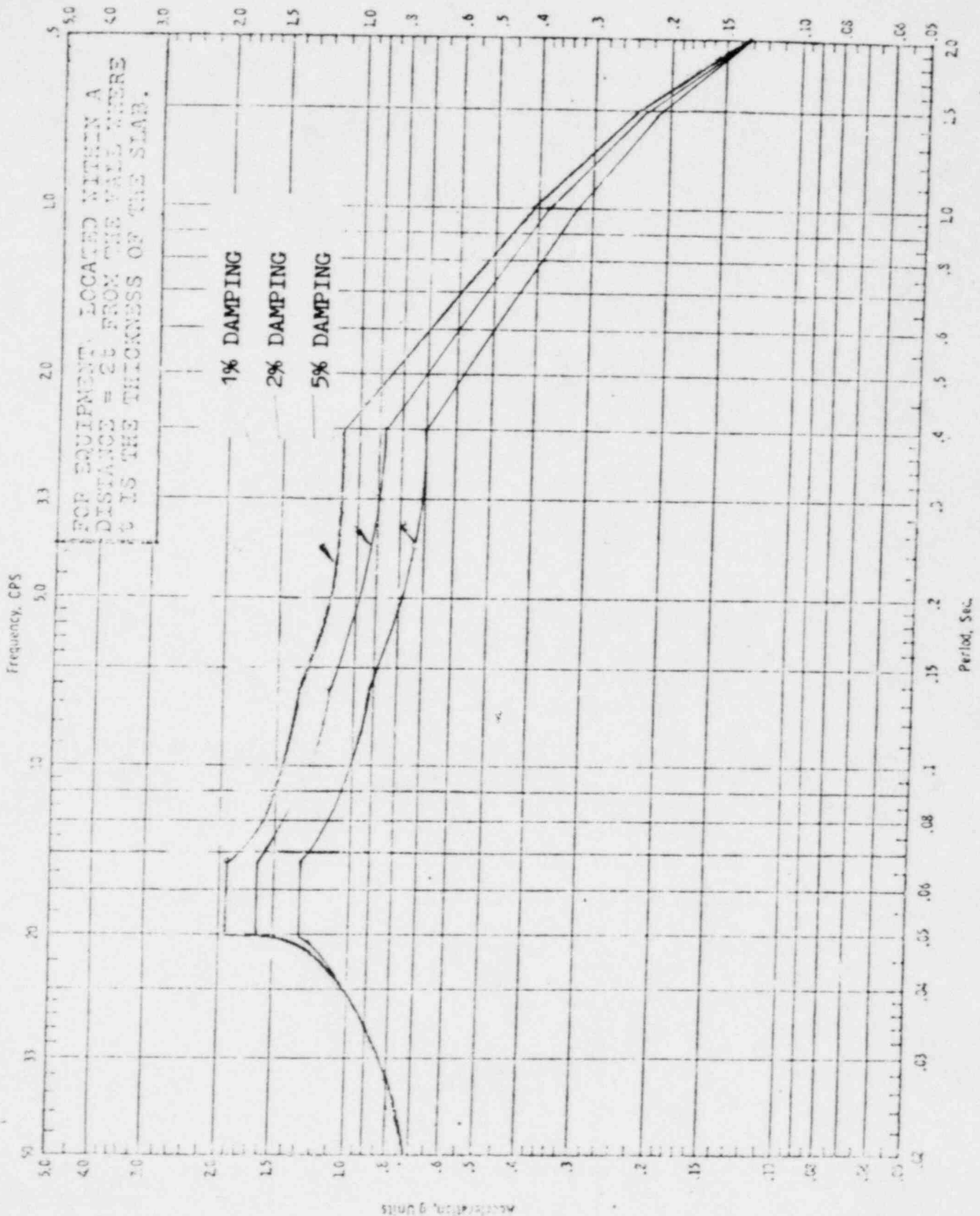
VERTICAL RESPONSE SPECTRA
 (DESIGN BASIS EARTHQUAKE)
 REACTOR & AUXILIARY BLDG. WALL
 BL. 546'-0" . 525'-7" & 503'-6"

10-F



VERTICAL RESPONSE SPECTRA
(OPERATING BASIS EARTHQUAKE)
REACTOR & AUXILIARY BLDG. WALL
EL. 627'-9", 593'-6" & 570'-6"

11-B

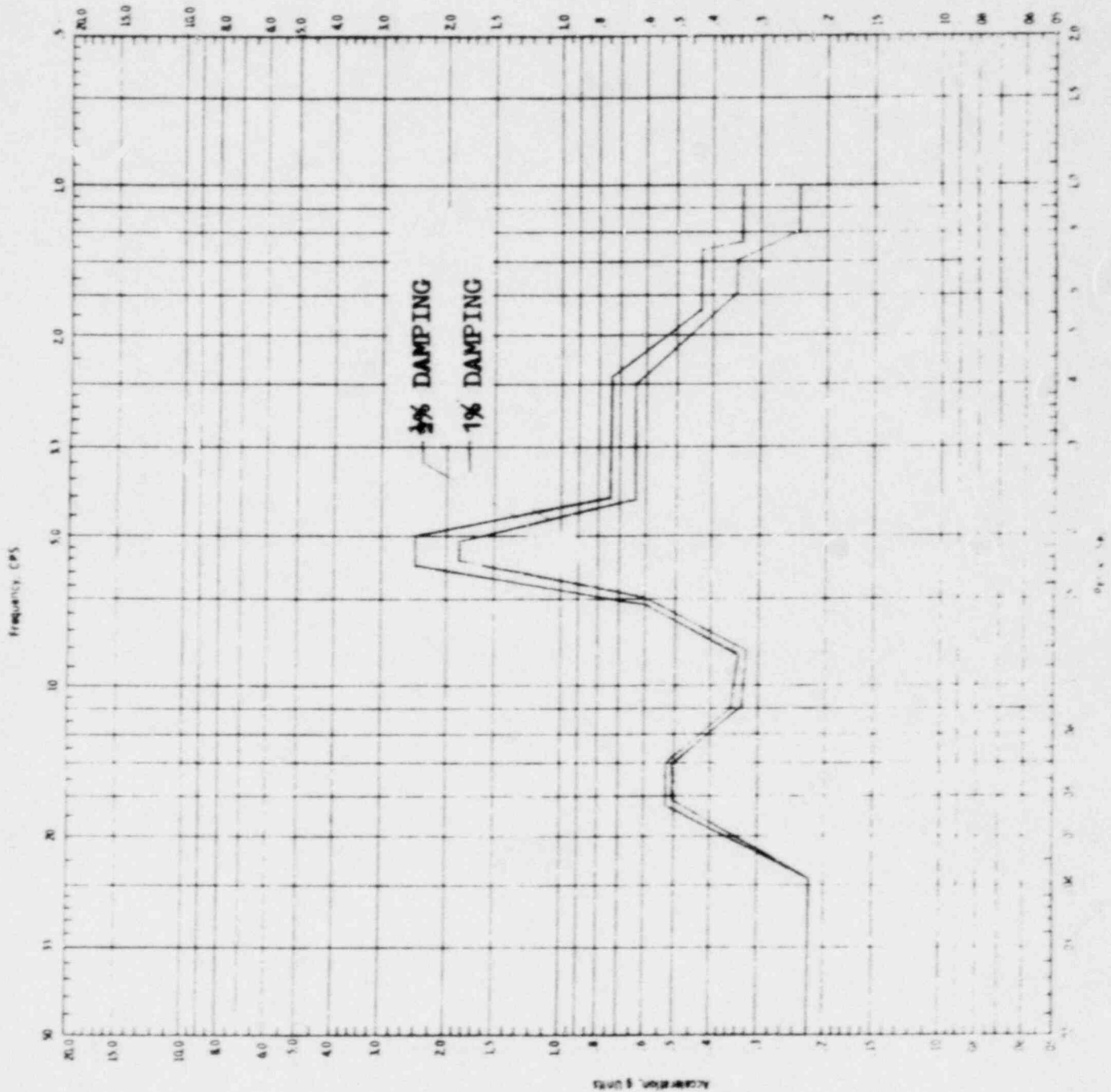


VERTICAL RESPONSE SPECTRA
 (DESIGN BASIS EARTHQUAKE)
 REACTOR & AUXILIARY BUILDING WALLS
 EL. 627'-9", 593'-0" & 570'-6"



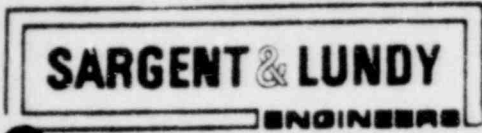
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 11-2-71
CHECKED BY HHS DATE 11-2-71 SHEET 47 OF 120

Rev. 5-5-72



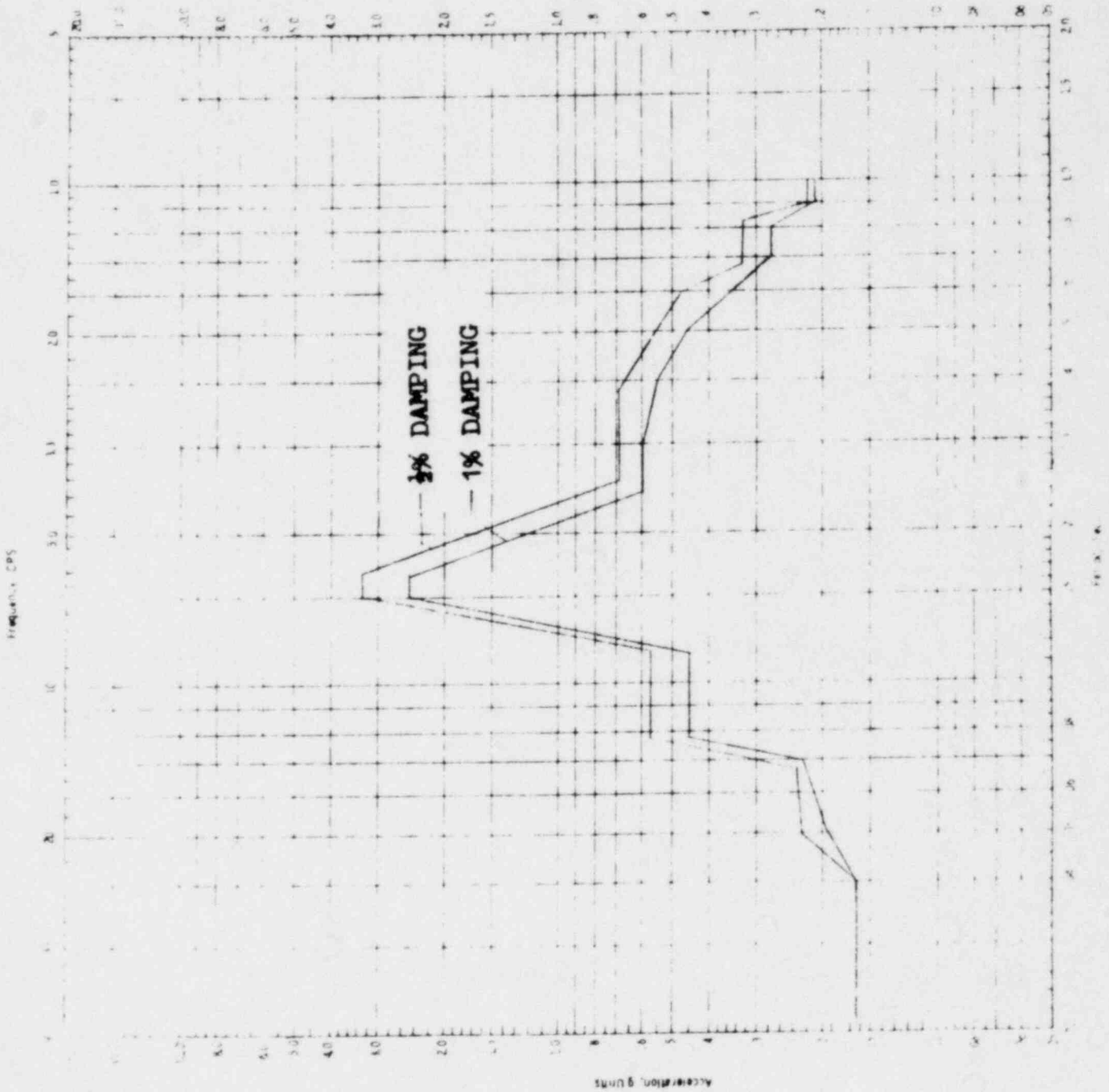
HORIZONTAL RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 503'-6"
REACTOR CONTAINMENT
NORTH - SOUTH COMPONENT

12-A



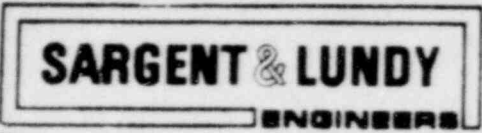
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 11-2-71
CHECKED BY HHS DATE 11-2-71 SHEET 48 OF 120

Rev. 5-5-72

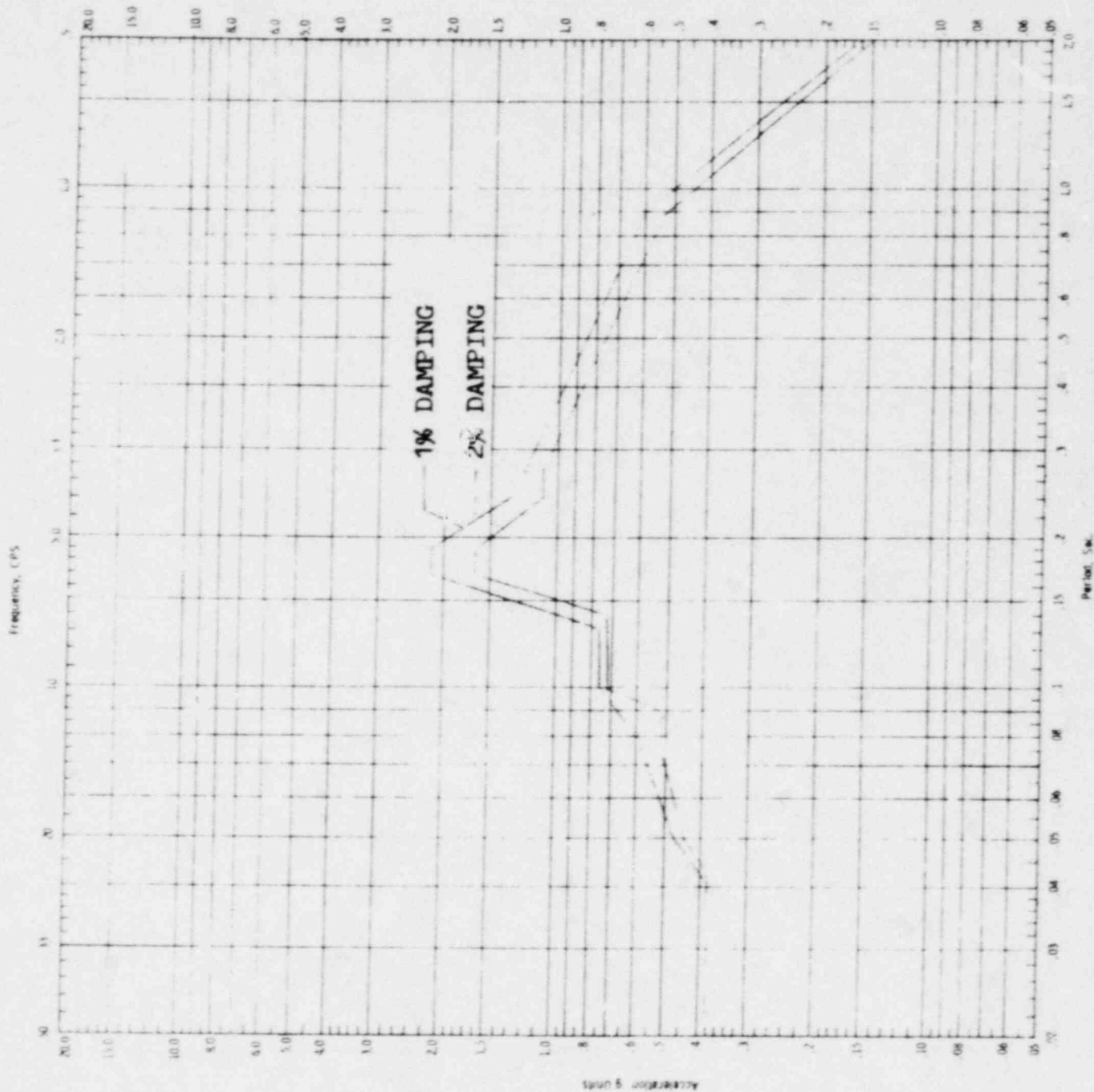


HORIZONTAL RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 503'-6"
REACTOR CONTAINMENT
EAST - WEST COMPONENT

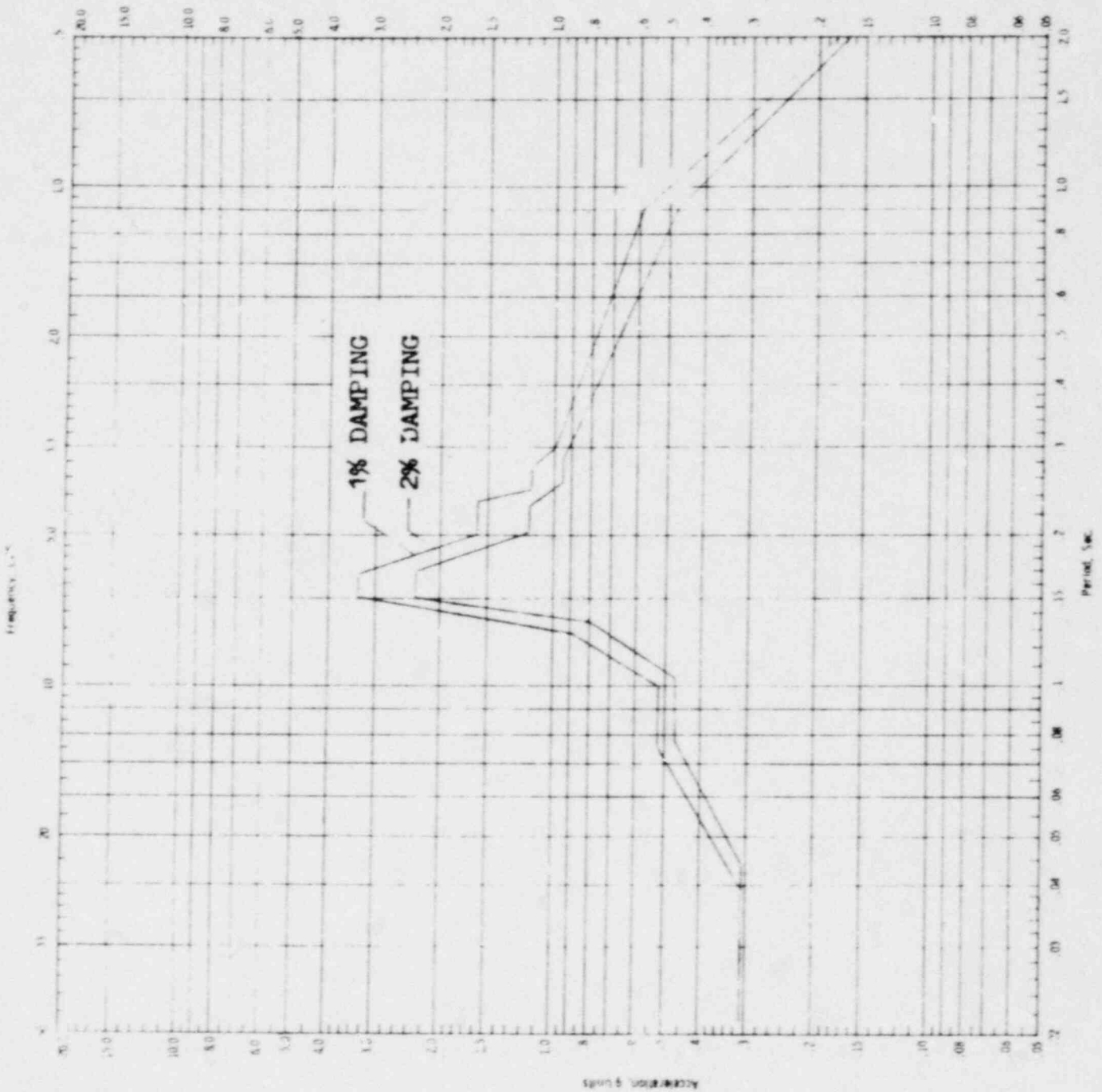
12-B



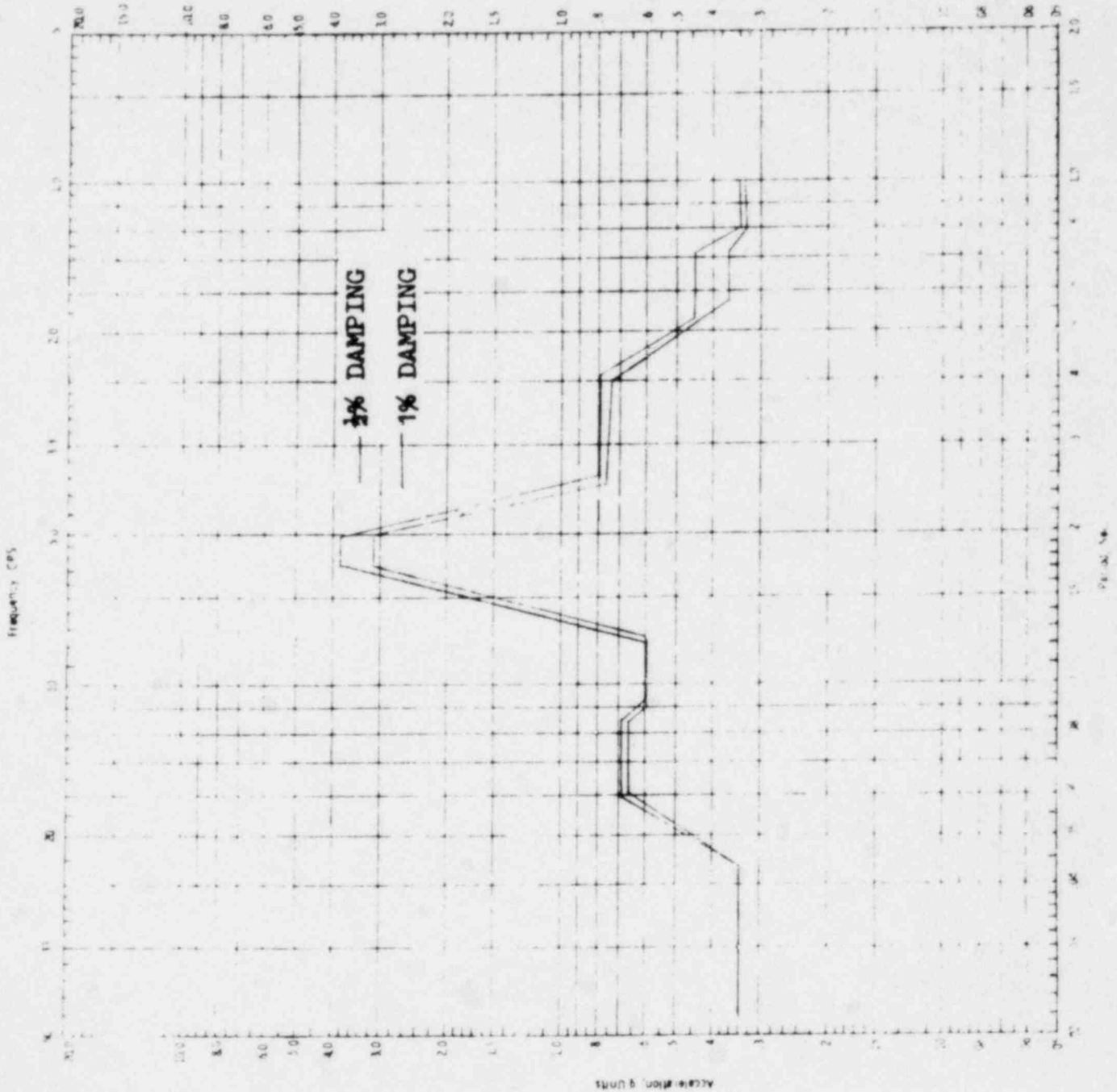
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 19 OF 120



HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 503'-6"
REACTOR CONTAINMENT
NORTH - SOUTH COMPONENT

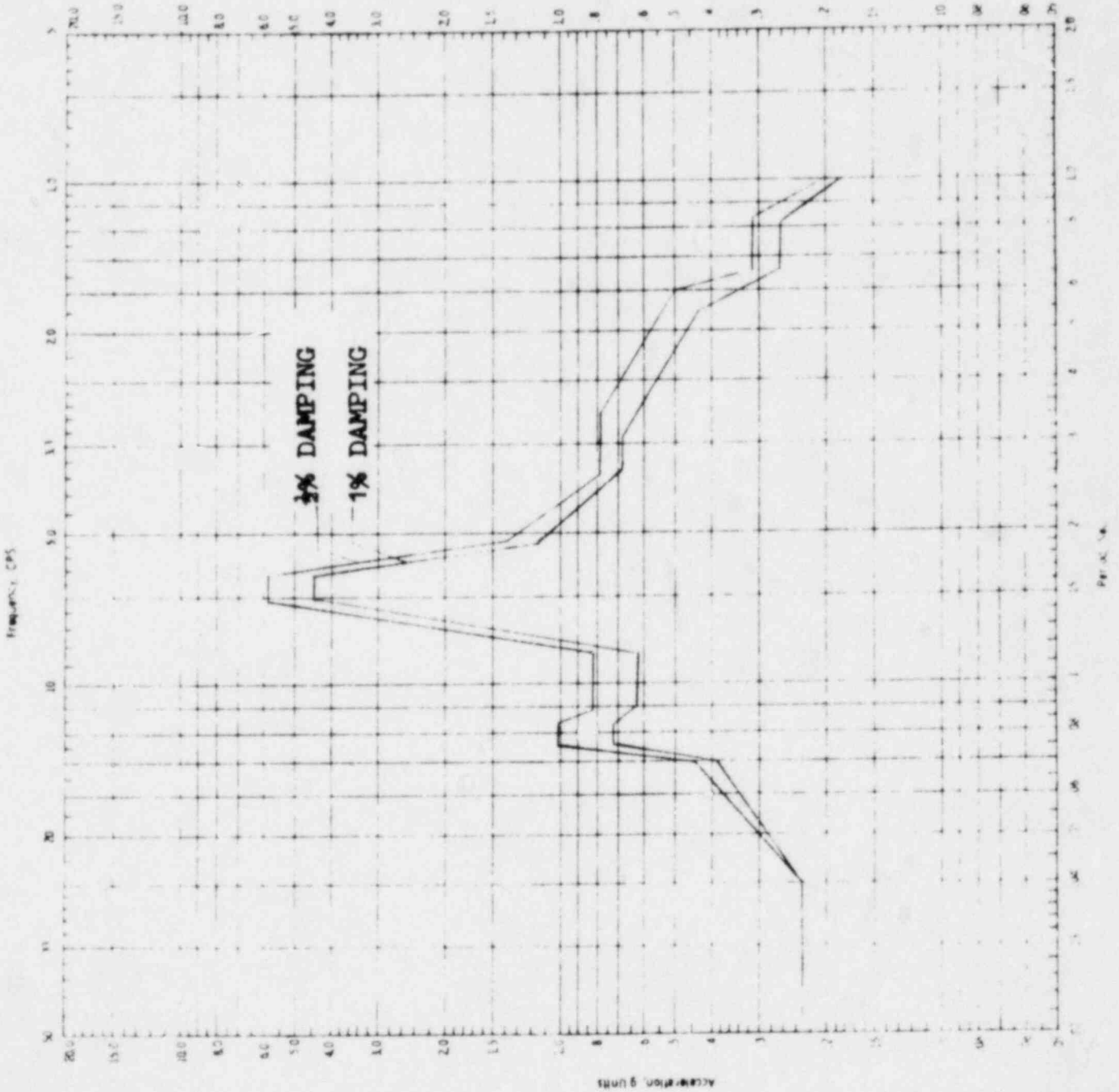


HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 503'-6"
REACTOR CONTAINMENT
EAST - WEST COMPONENT



HORIZONTAL RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 525'-7"
 REACTOR CONTAINMENT
 NORTH - SOUTH COMPONENT

13-A

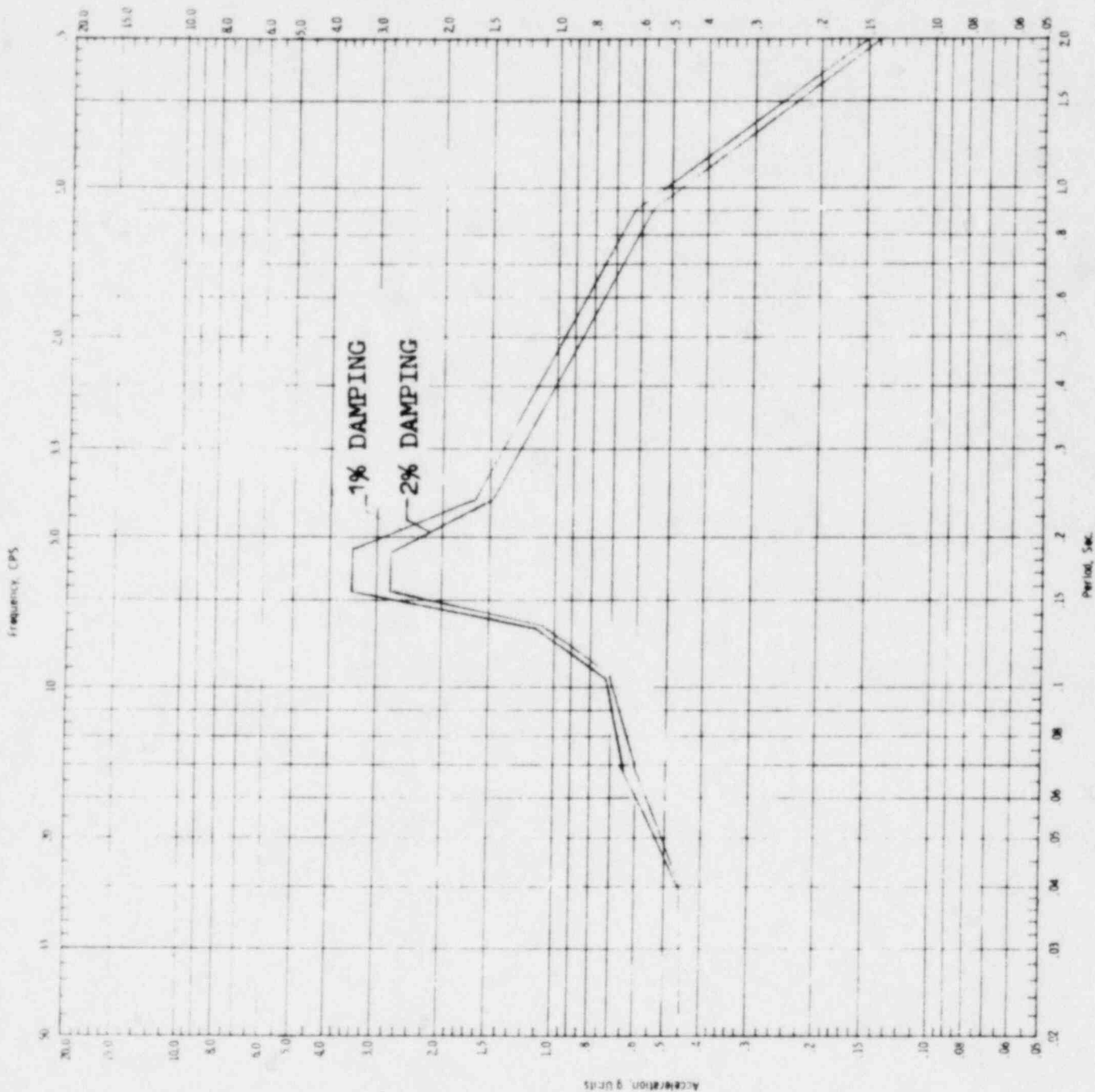


HORIZONTAL RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 525'-7"
 REACTOR CONTAINMENT
 EAST - WEST COMPONENT



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 53 OF 120

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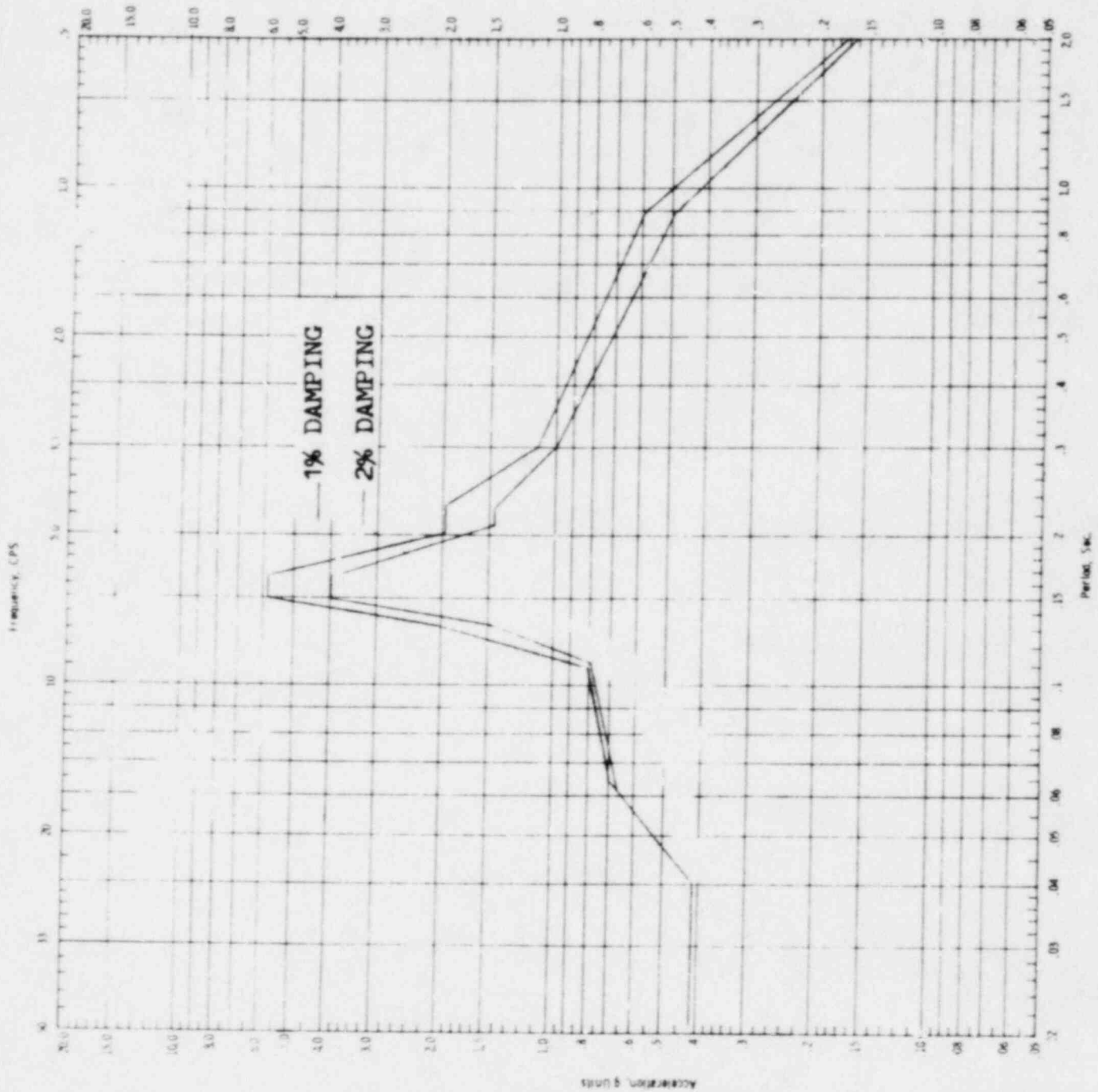
HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 525'-7"
REACTOR CONTAINMENT
NORTH - SOUTH COMPONENT

13-C



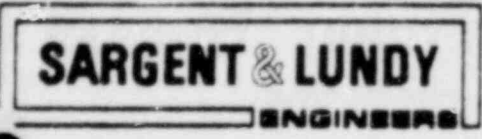
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 54 OF 120

Rev. 8-31-72

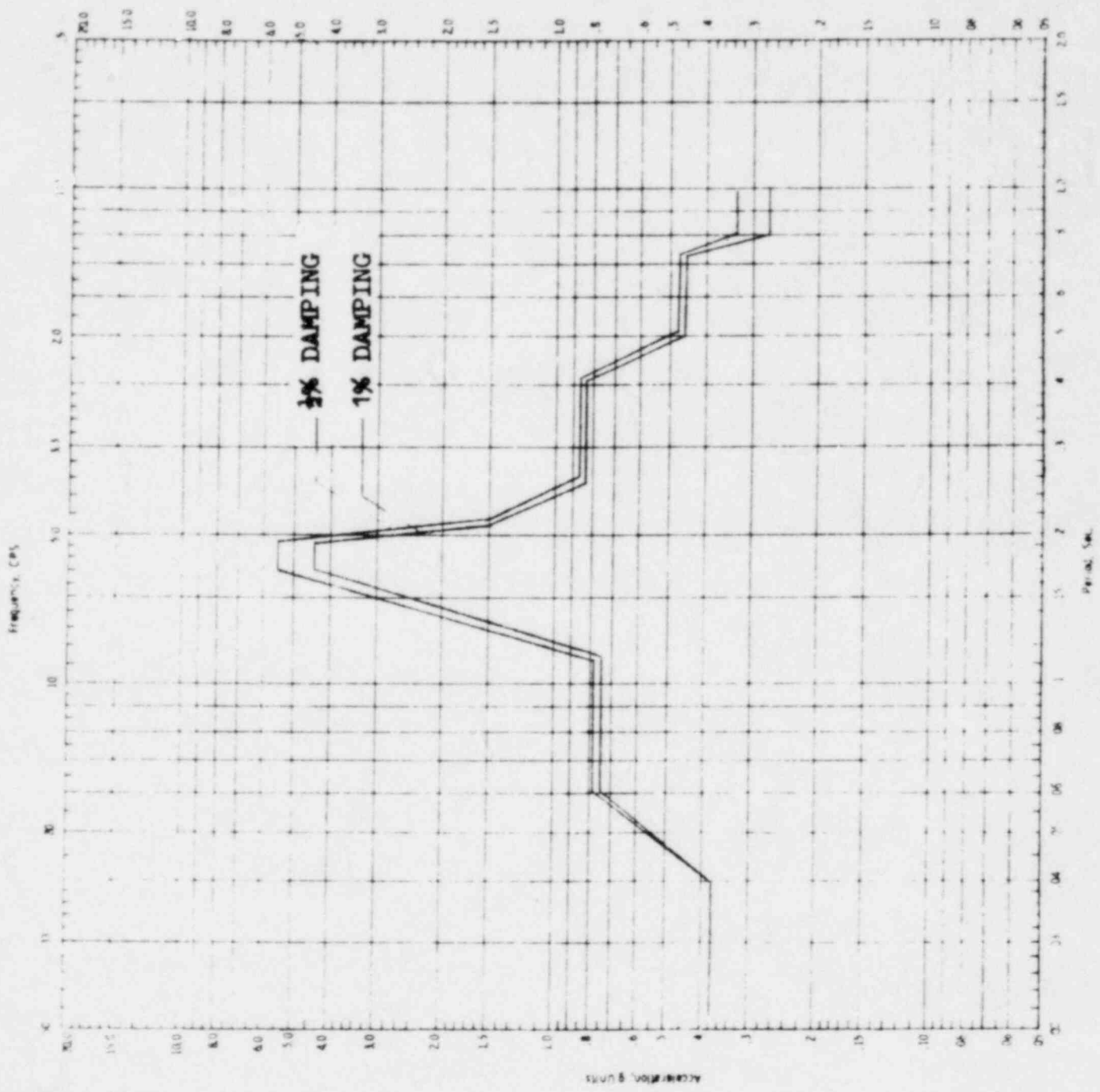


HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 525'-7"
REACTOR CONTAINMENT
EAST - WEST COMPONENT

13-D

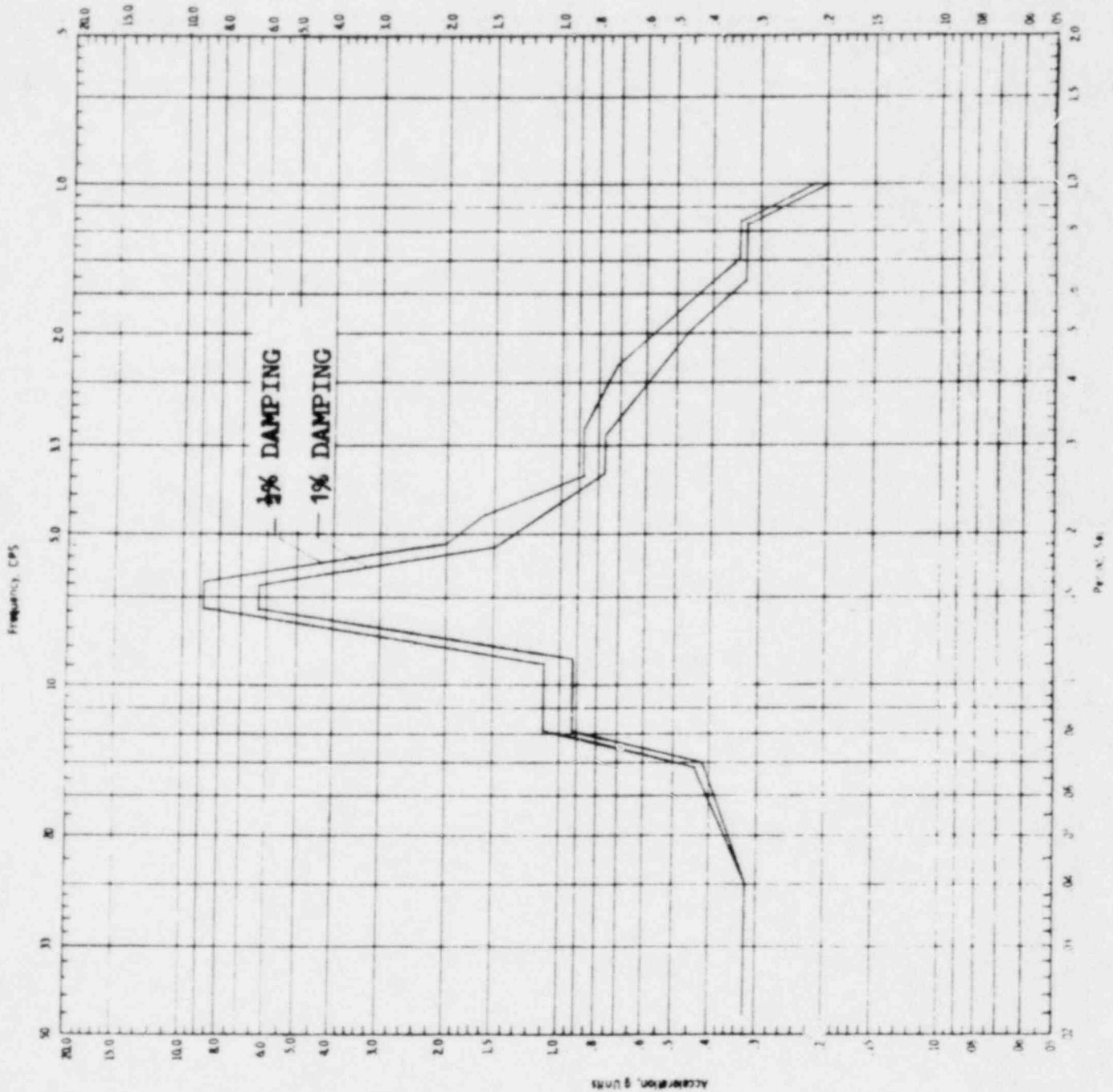


CLIENT CINCINNATI GAS & ELECTRIC CO.
 PROJECT WM. H. ZIMMER JOB NO. 4130
 DESIGN BY GSB DATE 5-5-72
 CHECKED BY HHS DATE 5-5-72 SHEET 55 OF 120



HORIZONTAL RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 546'±0"
 REACTOR CONTAINMENT
 NORTH - SOUTH COMPONENT

14-A



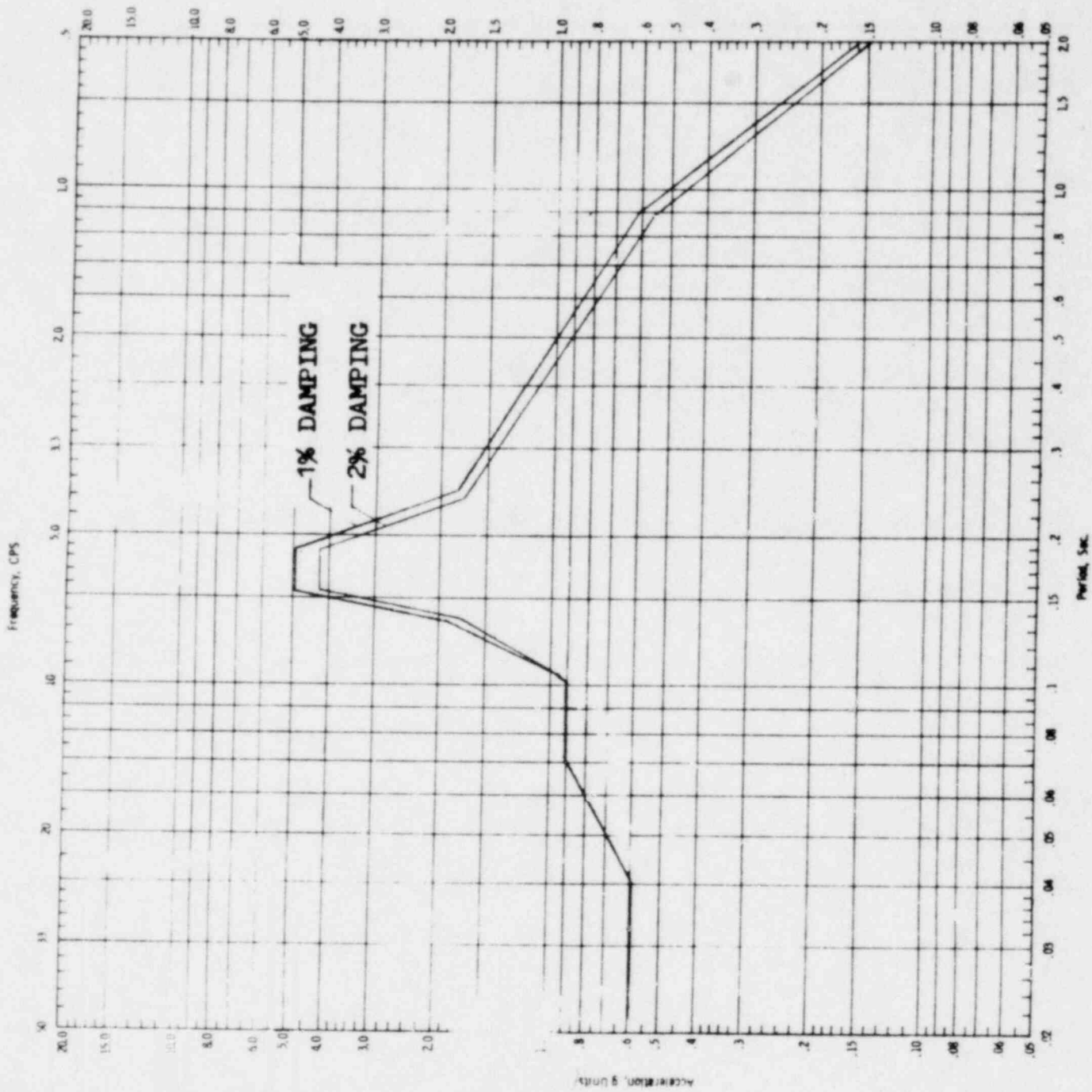
HORIZONTAL RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 546'-0"
 REACTOR CONTAINMENT
 EAST - WEST COMPONENT

14-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 57 OF 120

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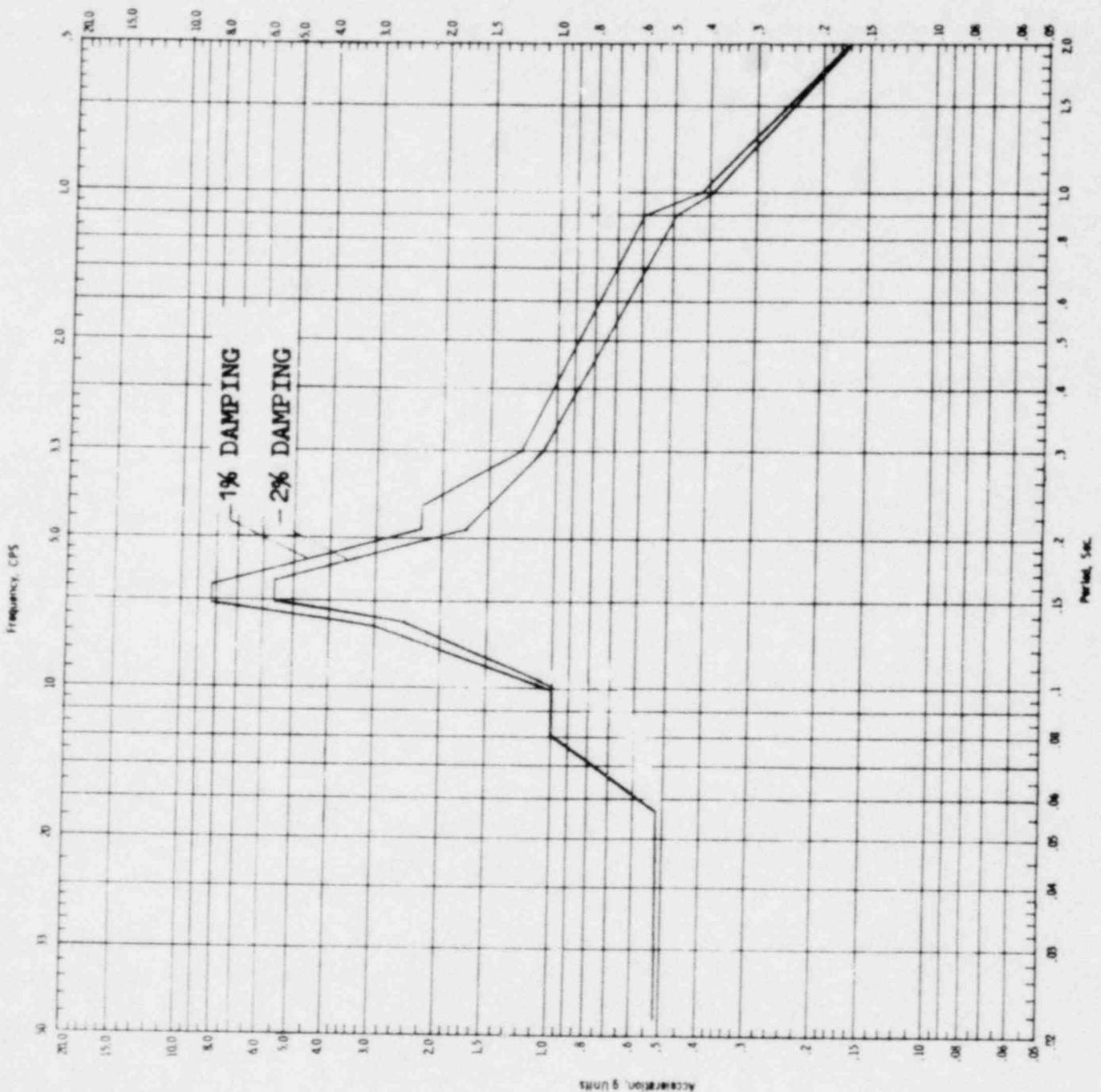
HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 546'-0"
REACTOR CONTAINMENT
NORTH - SOUTH COMPONENT

14-C



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 50 OF 120

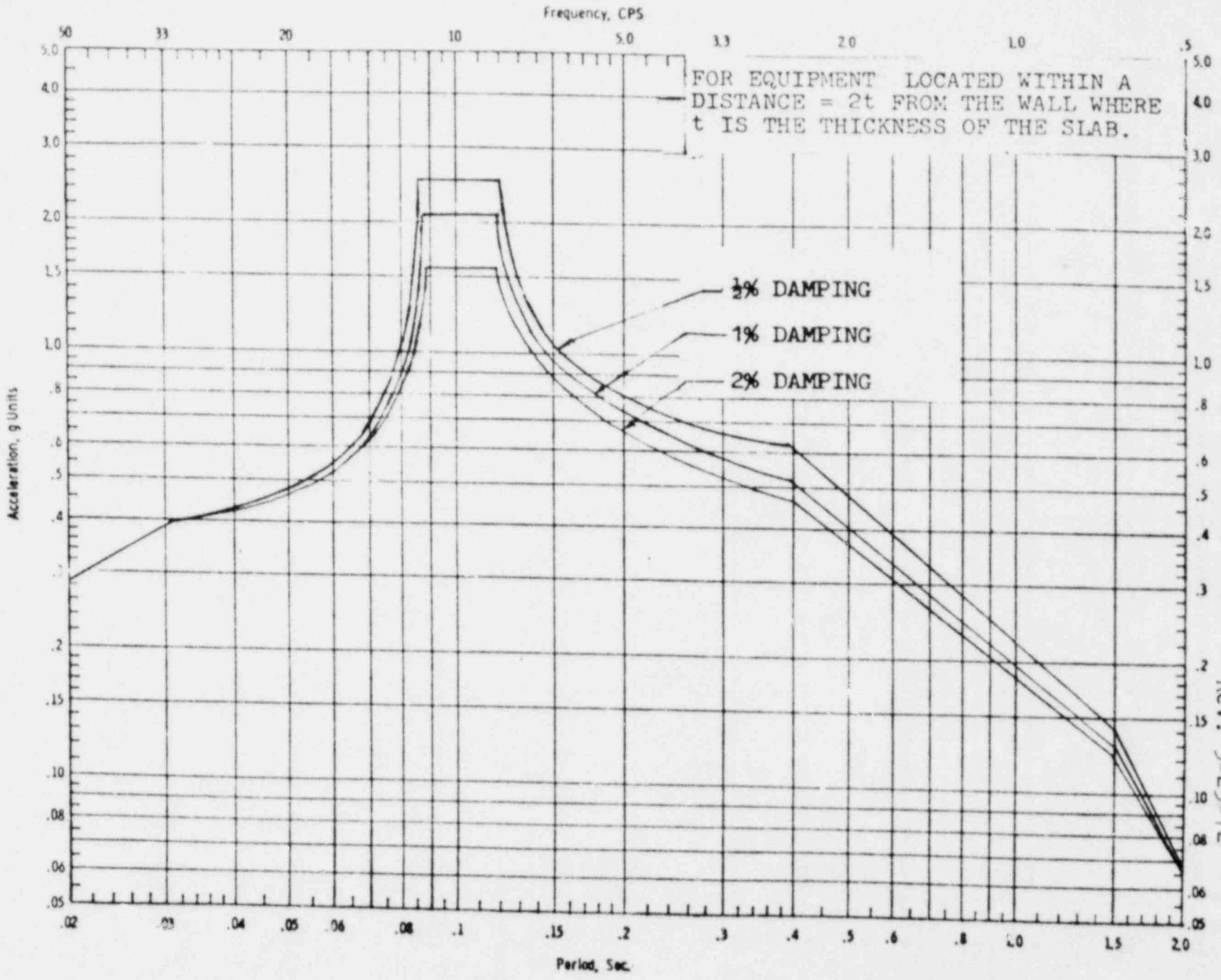
Rev. 8-31-72



HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 546'-0"
REACTOR CONTAINMENT
EAST - WEST COMPONENT

14-D

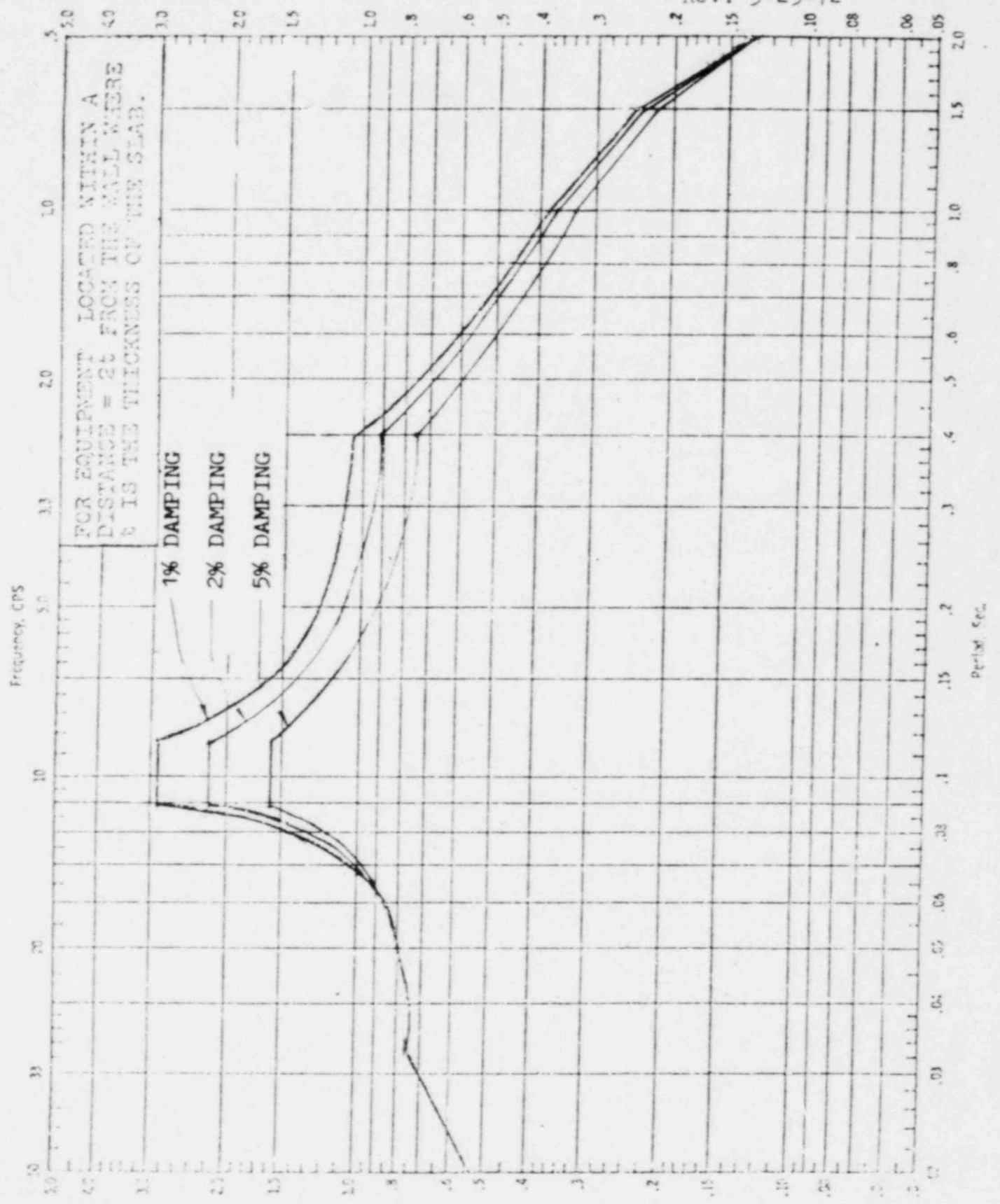
Rev. 5-25-72



VERTICAL RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 REACTOR CONTAINMENT SHIELD
 EL. 546'-0" , 525'-7" & 503'-6"

12-B
 13-B
 14-B

Rev. 5-25-72



VERTICAL RESPONSE SPECTRA
 (DESIGN BASIS EARTHQUAKE)
 REACTOR CONTAINMENT SHIELD
 EL. 546'-0", 525'-7" & 503'-6"

12-F 13-F 14-F

SARGENT & LUNDY

ENGINEERS

CLIENT CINCINNATI GAS & ELECTRIC CO.

PROJECT WM. H. ZIMMER

JOB NO. 4130

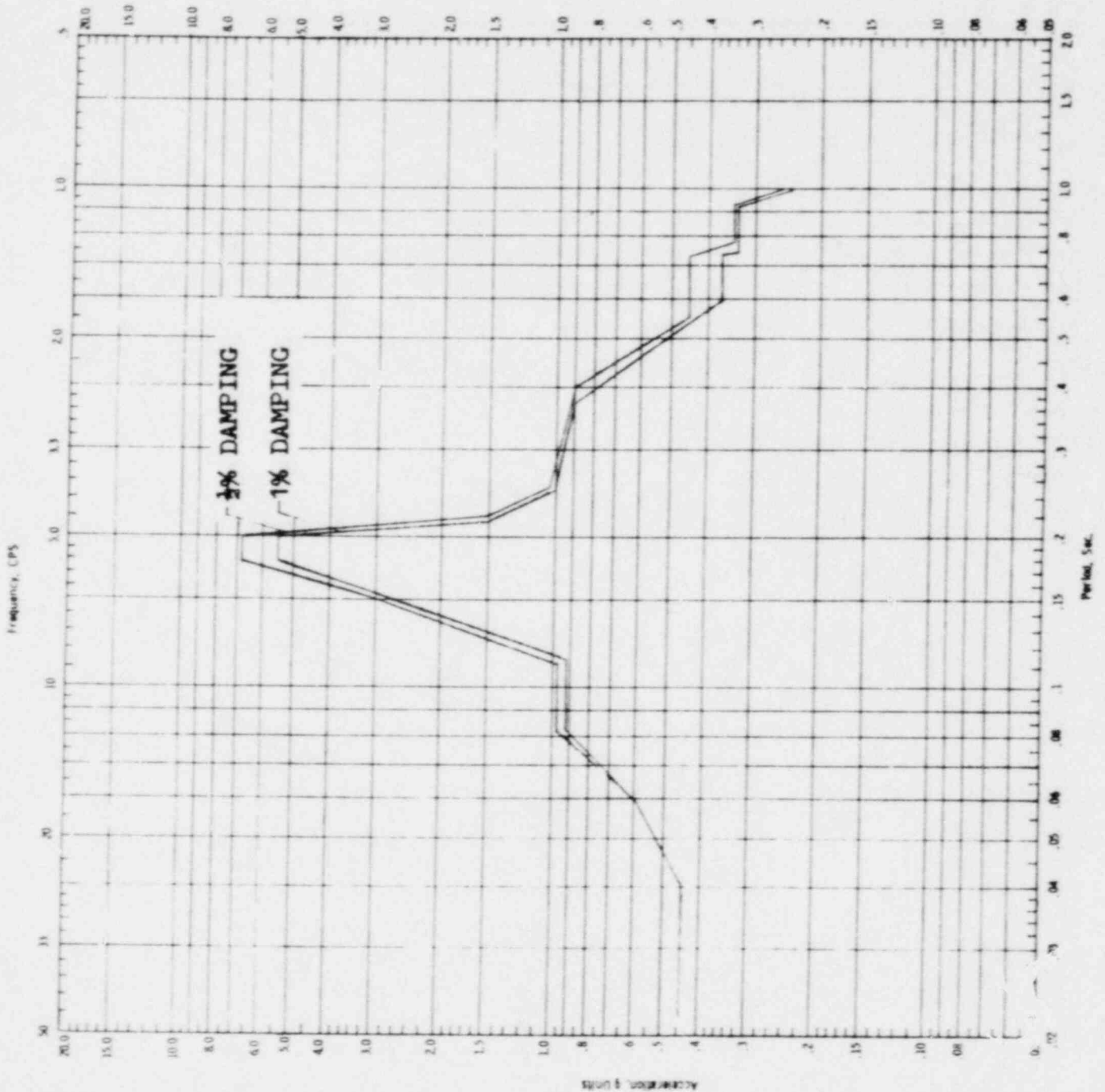
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DATE 5-7-72

CHECKED BY HHS

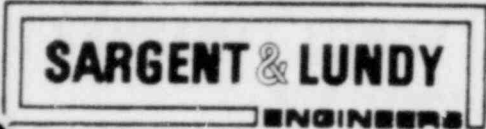
DATE 5-7-72

SHEET 6 OF 20

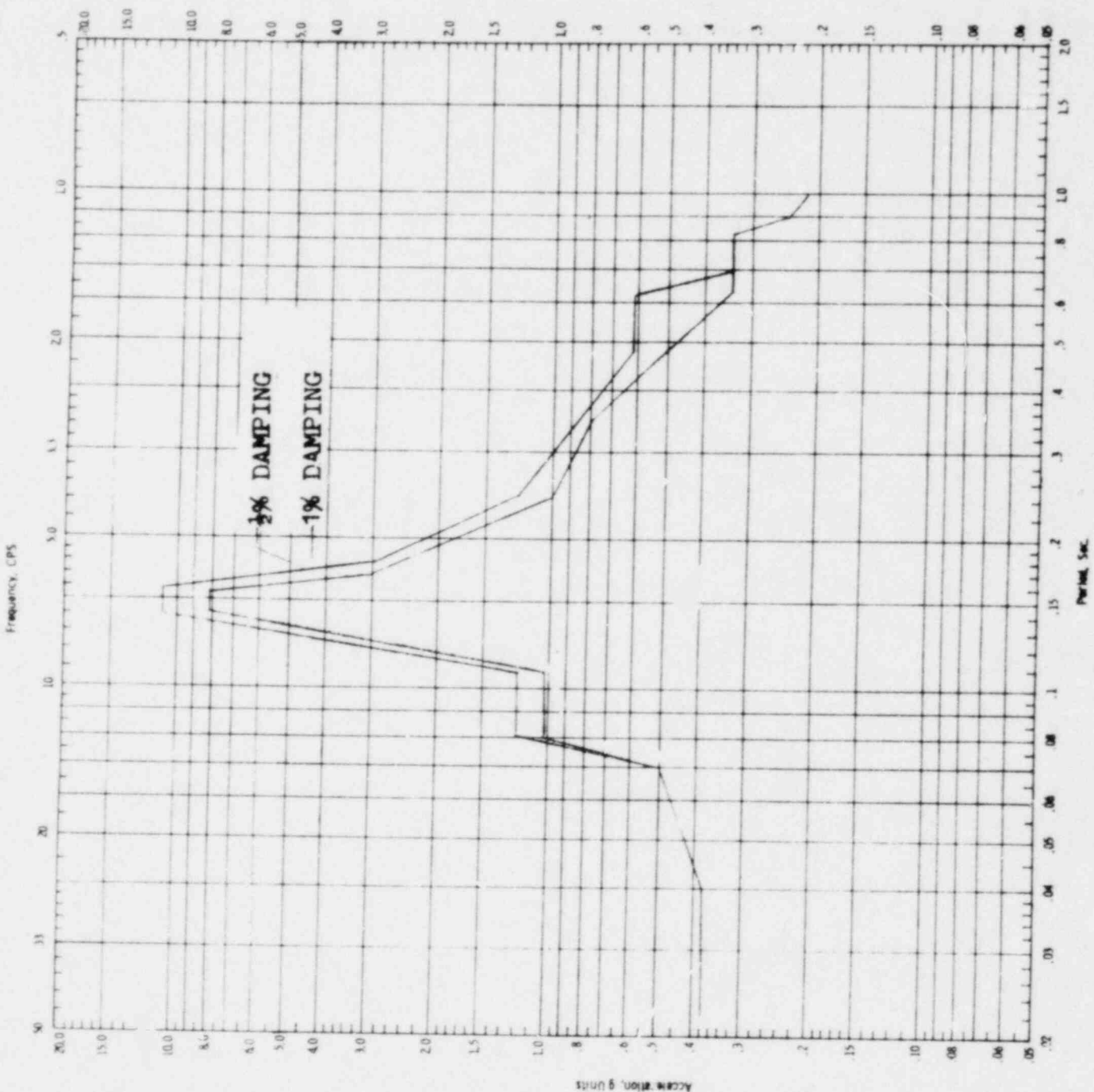


HORIZONTAL RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 570'-6"
REACTOR CONTAINMENT
NORTH - SOUTH COMPONENT

15-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-7-72
CHECKED BY HHS DATE 5-7-72 SHEET 62 OF 120



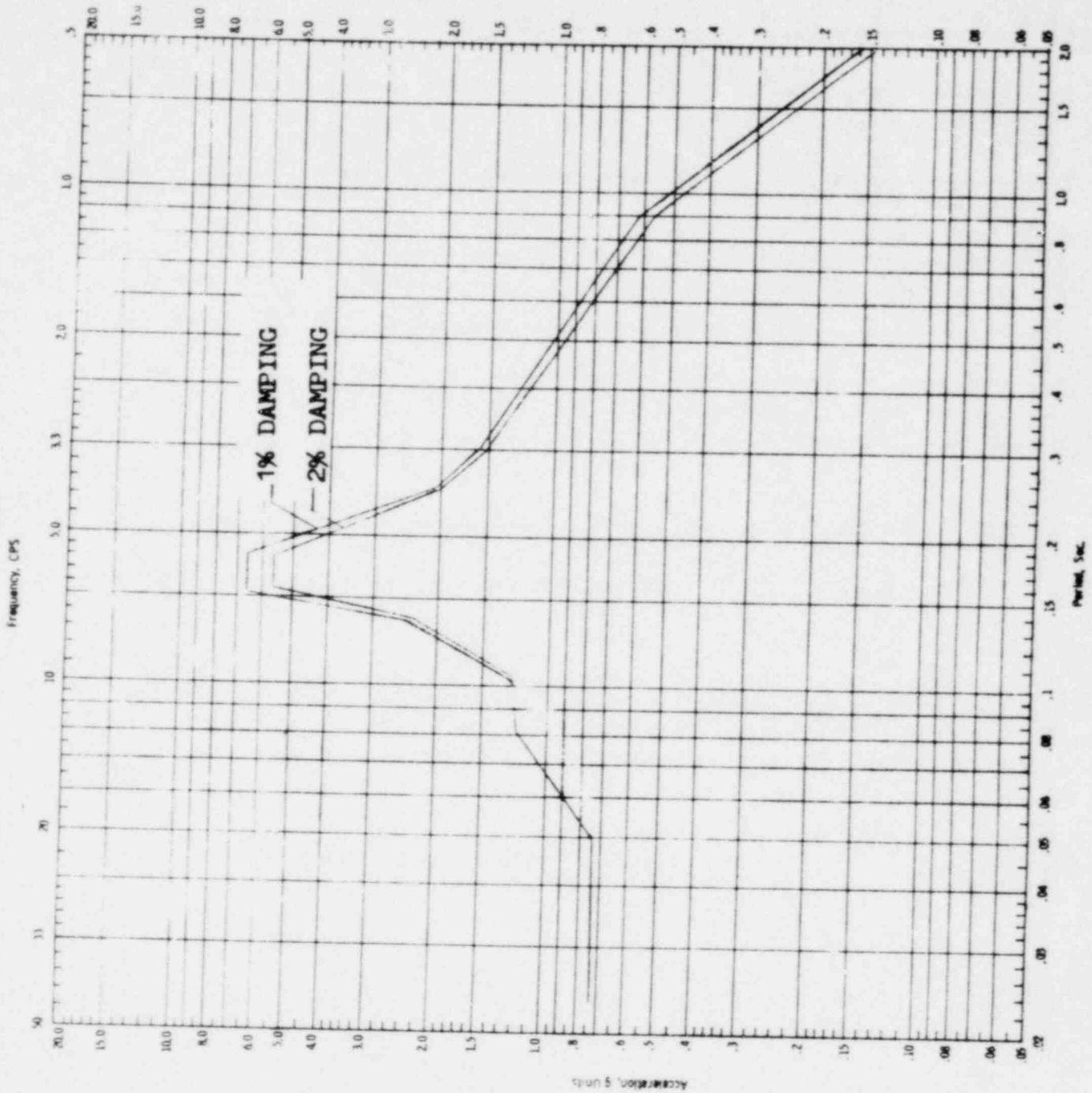
HORIZONTAL RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 570'-6"
REACTOR CONTAINMENT
EAST - WEST COMPONENT

15-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 63 OF 120

Rev. 8-31-72



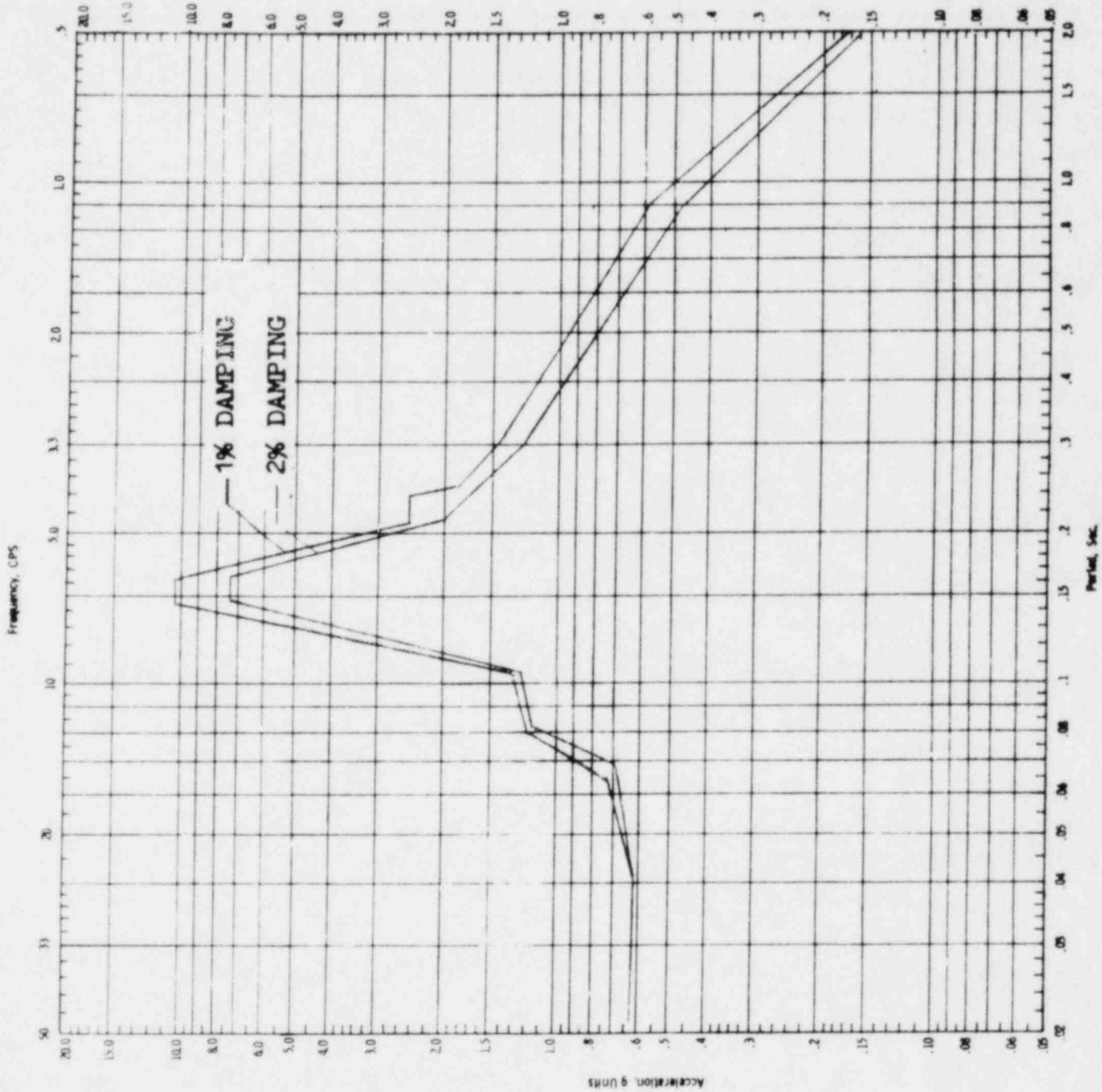
HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 570'-6"
REACTOR CONTAINMENT
NORTH - SOUTH COMPONENT

15-C



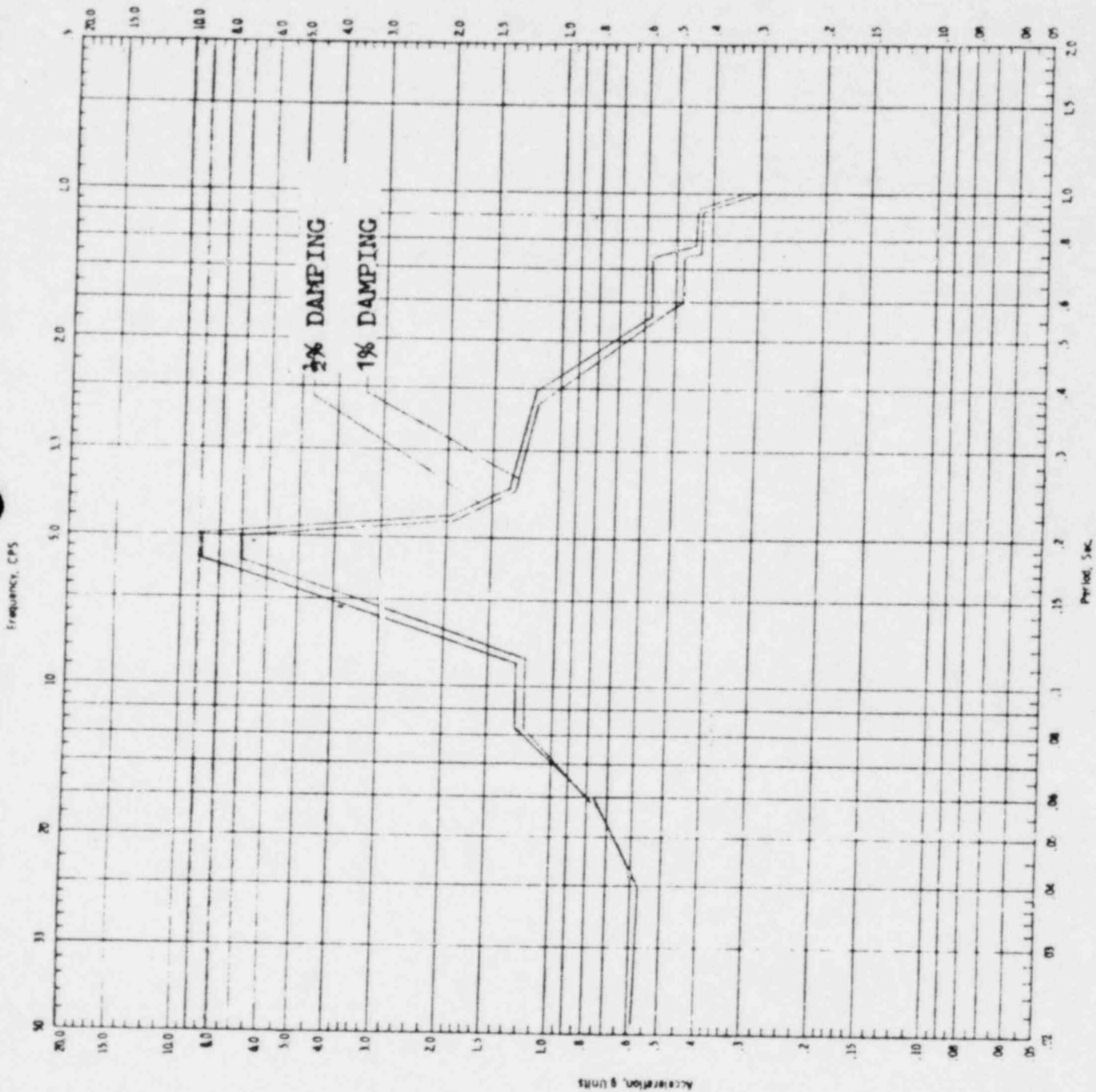
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 64 OF 120

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HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 570'-6"
REACTOR CONTAINMENT
EAST - WEST COMPONENT

15-D

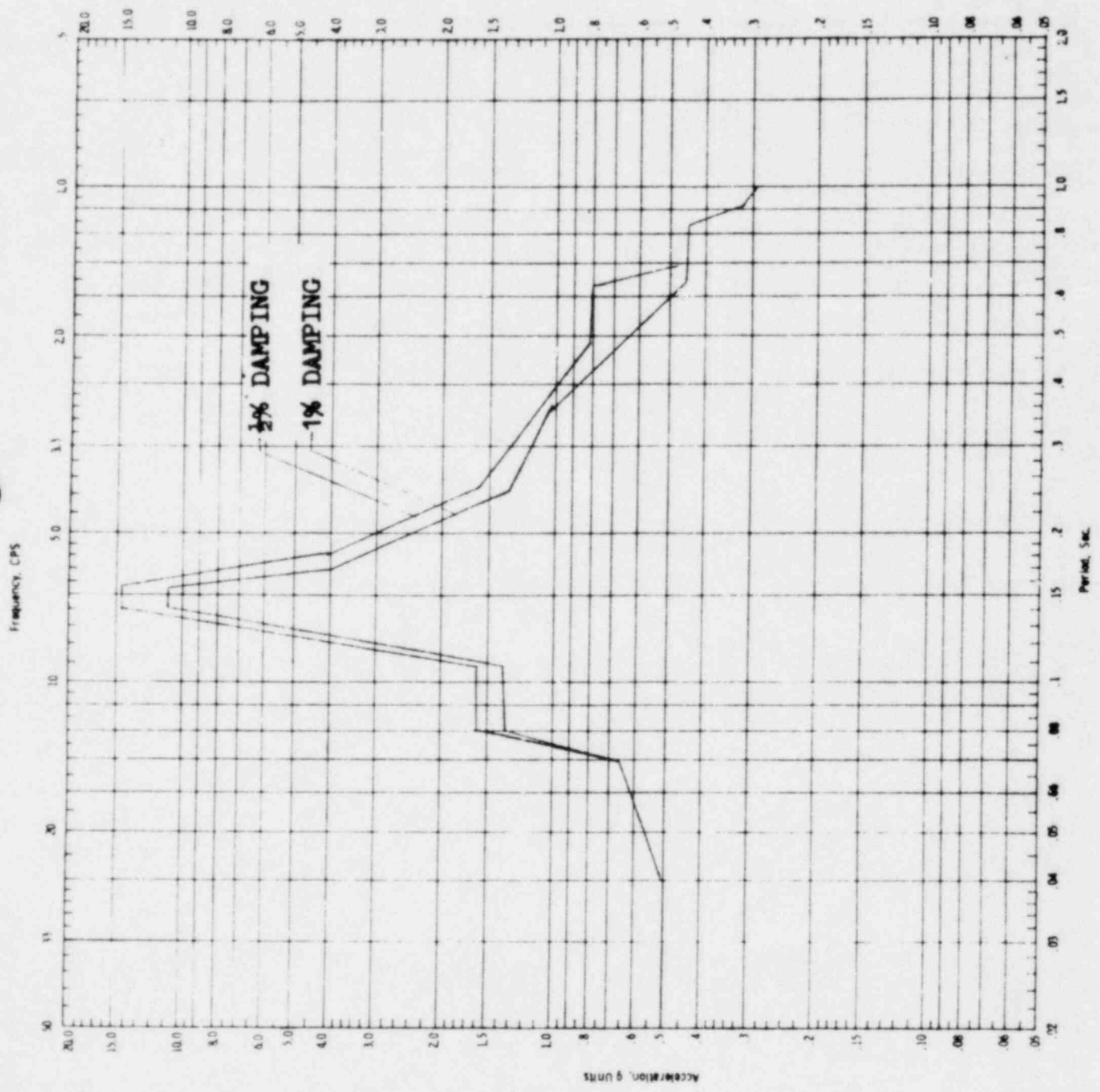


HORIZONTAL RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 593'-6"
 REACTOR CONTAINMENT
 NORTH - SOUTH COMPONENT

16-A

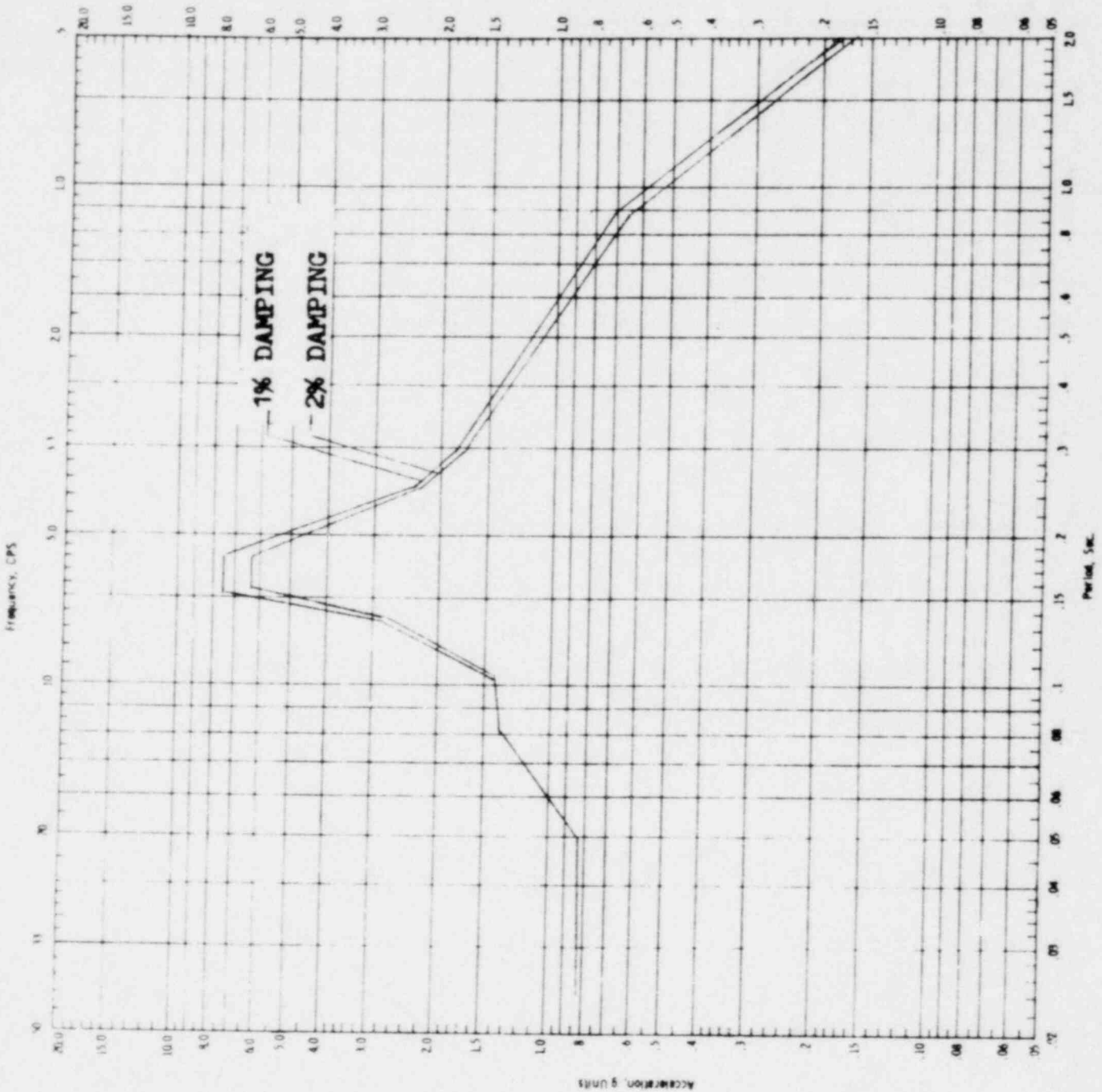


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 9/27/72
CHECKED BY HHS DATE 9/27/72 SHEET 646 OF 120



HORIZONTAL RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
F' 593'-6"
REACTOR CONTAINMENT
EAST - WEST COMPONENT

10-E

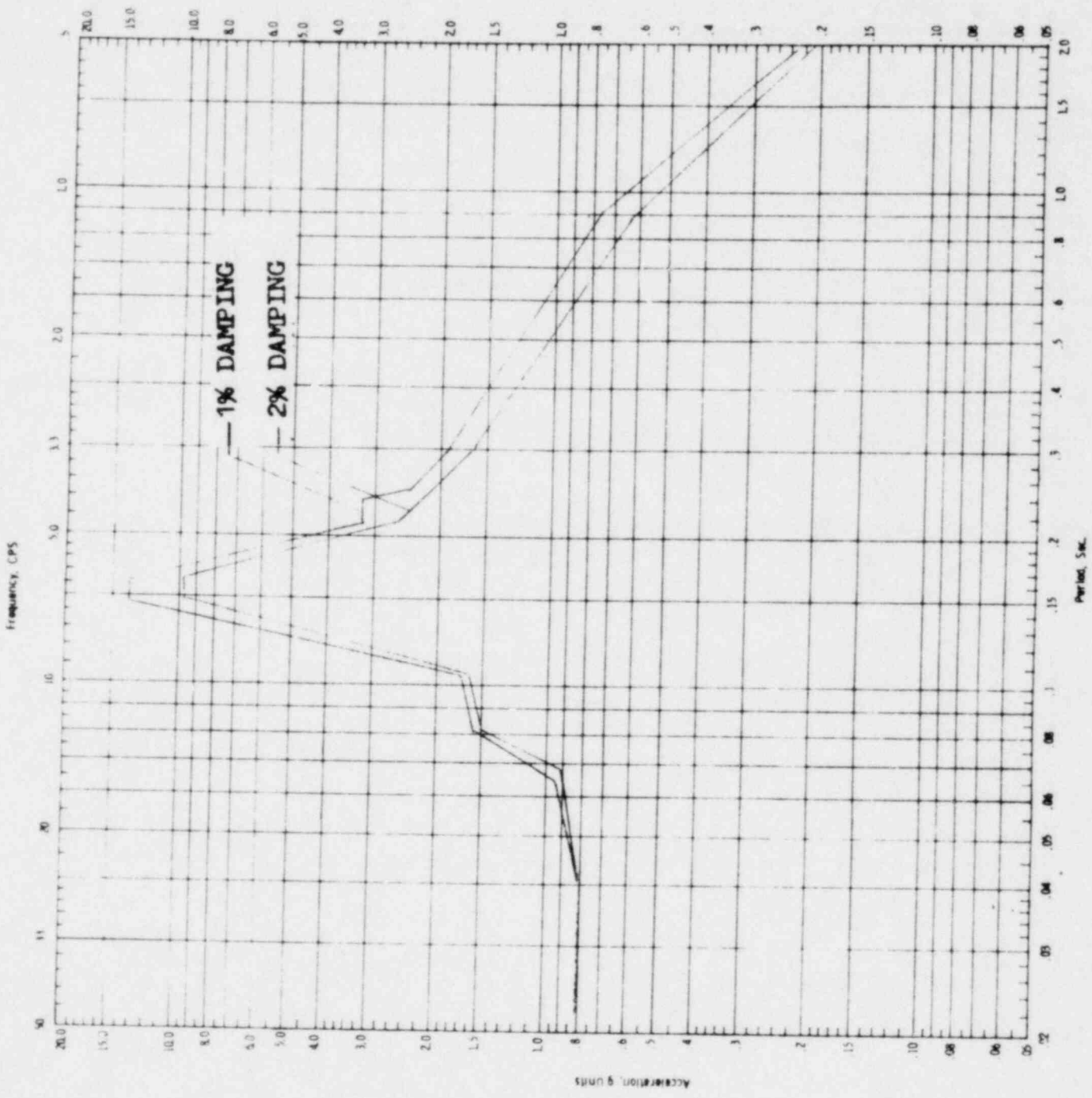


HORIZONTAL RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 EL. 593'-6"
 REACTOR CONTAINMENT
 NORTH - SOUTH COMPONENT

16-C

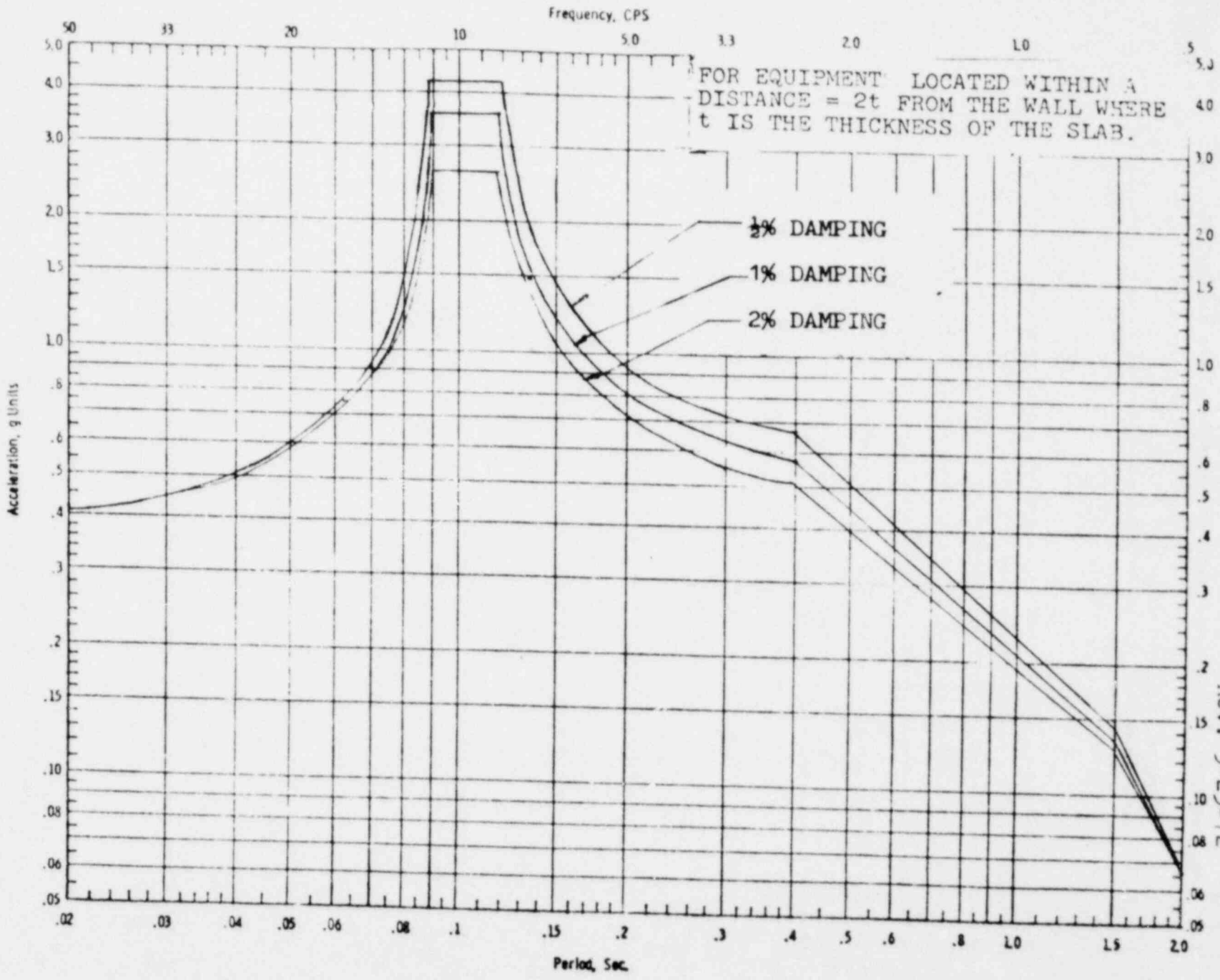


CLIENT CINCINNATI GAS & ELECTRIC CO.
 PROJECT ZIMMER JOB NO. 4130
 DESIGN BY GSE DATE 9/27/72
 CHECKED BY HHS DATE 9/27/72 SHEET 64D OF 120



HORIZONTAL RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 EL. 593'-6"
 REACTOR CONTAINMENT
 EAST - WEST COMPONENT

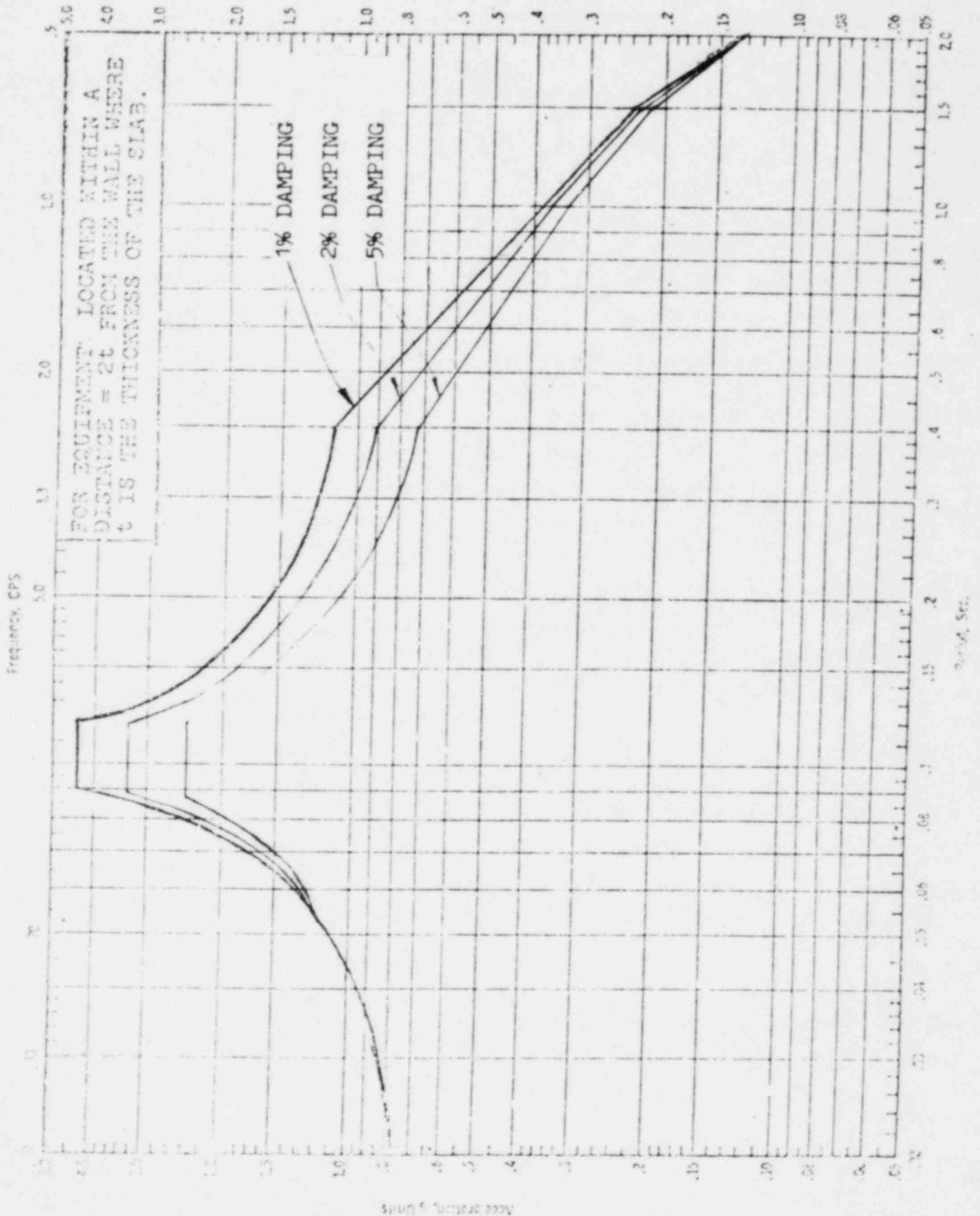
16-D



VERTICAL RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 REACTOR CONTAINMENT SHIELD
 EL. 627'-9", 593'-6", & 570'-6"

15-E

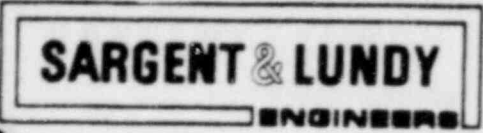
16-E



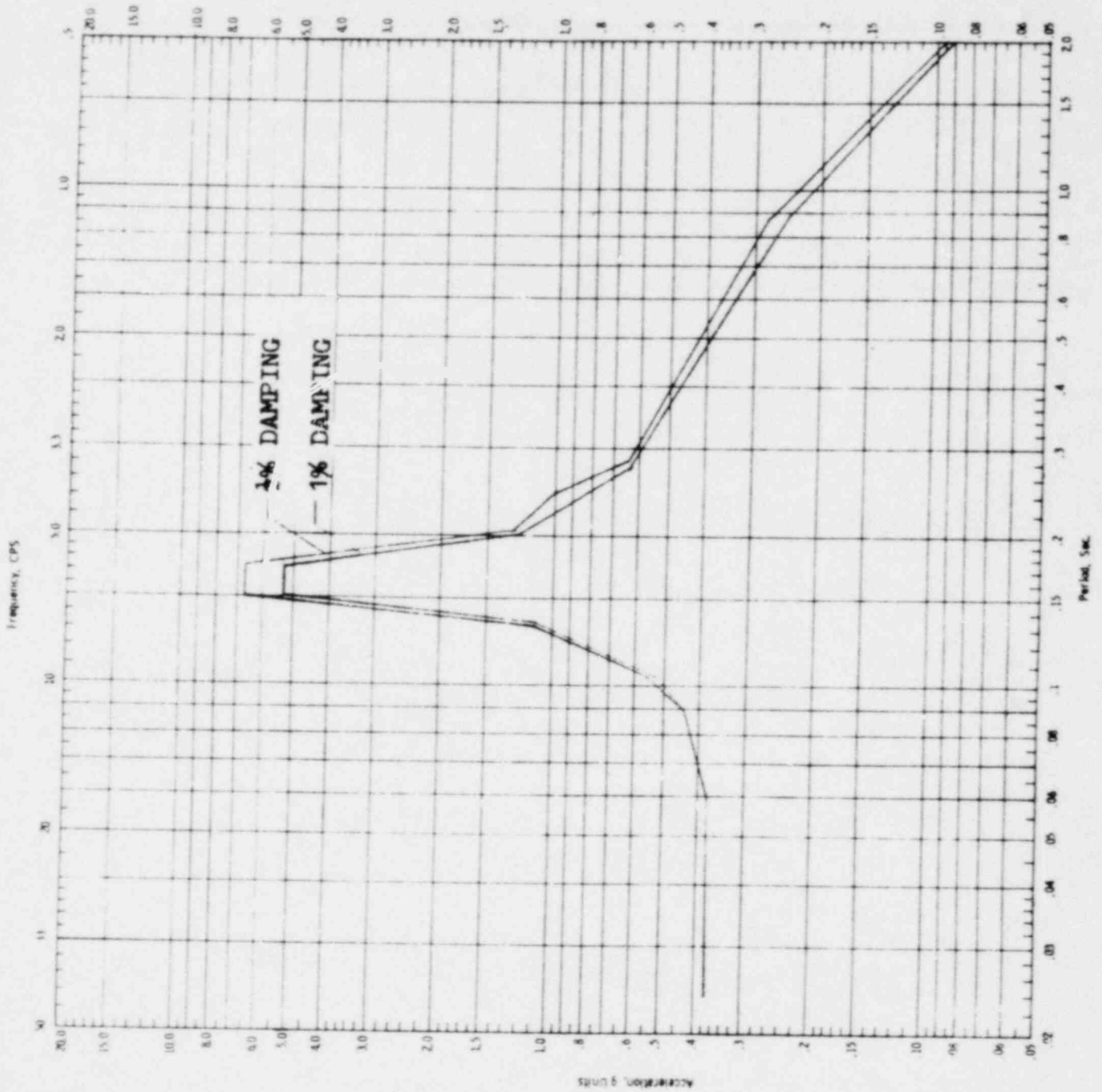
VERTICAL RESPONSE SPECTRA
 (DESIGN BASIS EARTHQUAKE)
 REACTOR CONTAINMENT SHIELD
 EL. 627'-9", 593'-6" & 570'-6"

15-F

16-F



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-10-72
CHECKED BY HHS DATE 5-10-72 SHEET 67 OF 120

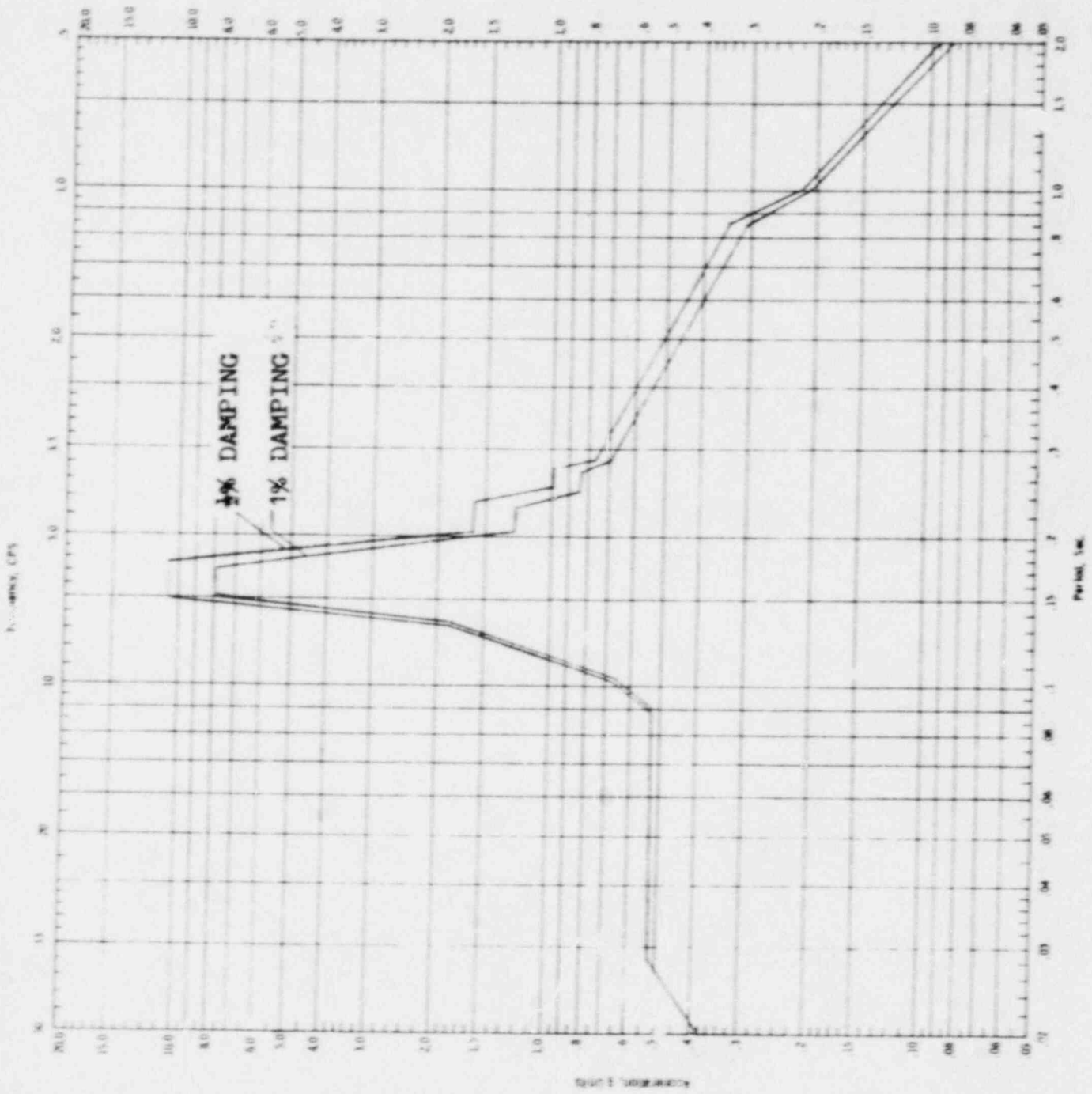


HORIZONTAL RESPONSE SPECTRA
(BIOLOGICAL SHIELD)
OPERATING BASIS EARTHQUAKE
EL. 543'-0"
NORTH - SOUTH COMPONENT

17-A

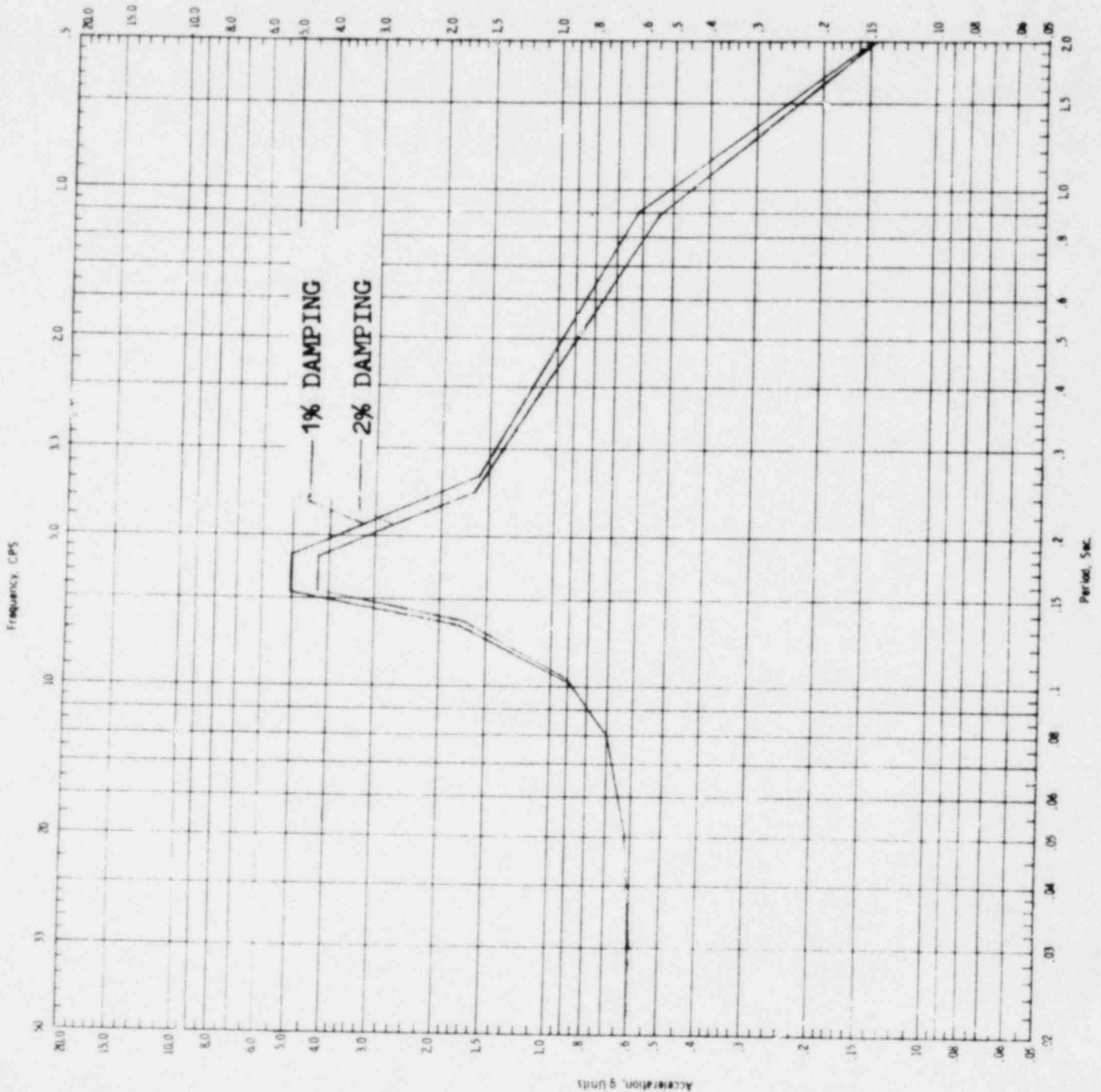


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-10-72
CHECKED BY HRS DATE 5-10-72 SHEET 20 OF 120

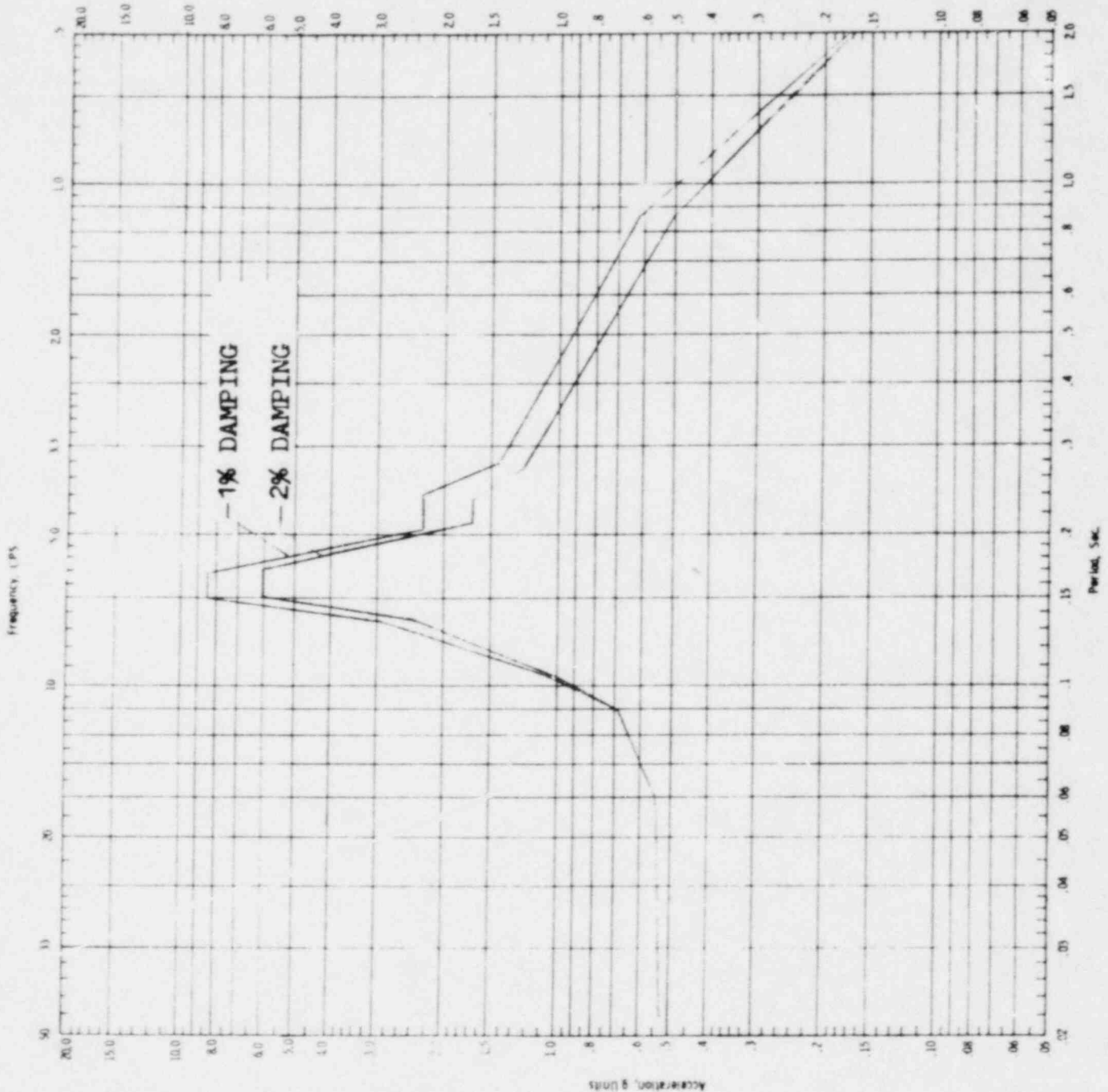


HORIZONTAL RESPONSE SPECTRA
(BIOLOGICAL SHIELD)
OPERATING BASIS EARTHQUAKE
EL. 543'-0"
EAST - WEST COMPONENT

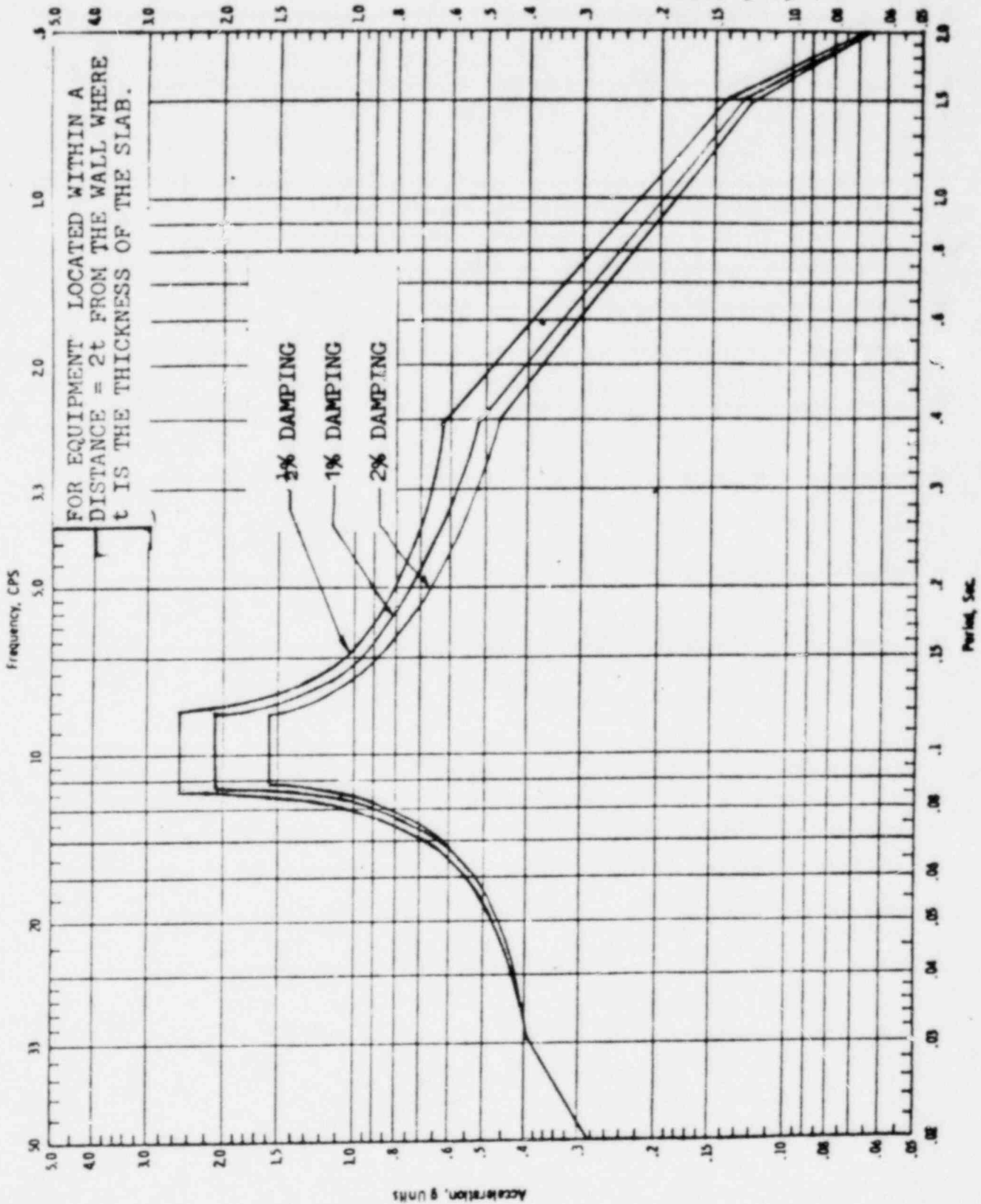
17-B



HORIZONTAL RESPONSE SPECTRA
(BIOLOGICAL SHIELD)
DESIGN BASIS EARTHQUAKE
EL. 543'-0"
NORTH - SOUTH COMPONENT



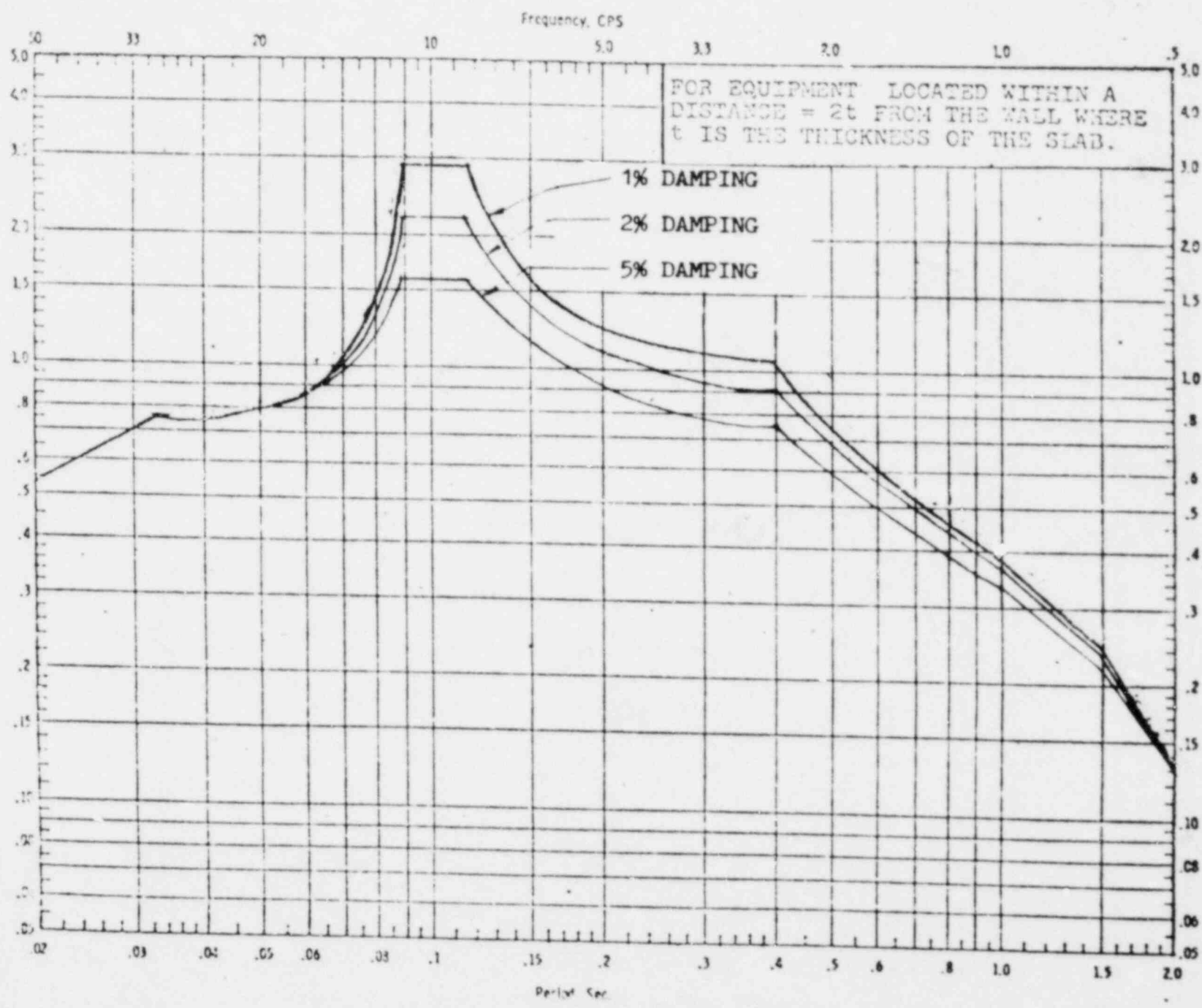
HORIZONTAL RESPONSE SPECTRA
 (BIOLOGICAL SHIELD)
 DESIGN BASIS EARTHQUAKE
 EL. 543'-0"
 EAST - WEST COMPONENT



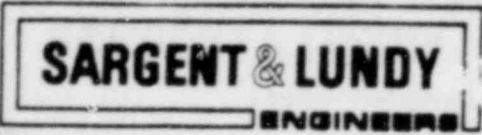
VERTICAL RESPONSE SPECTRA
(OPERATING BASIS EARTHQUAKE)
BIOLOGICAL SHIELD
EL. 543'-0"

17-E

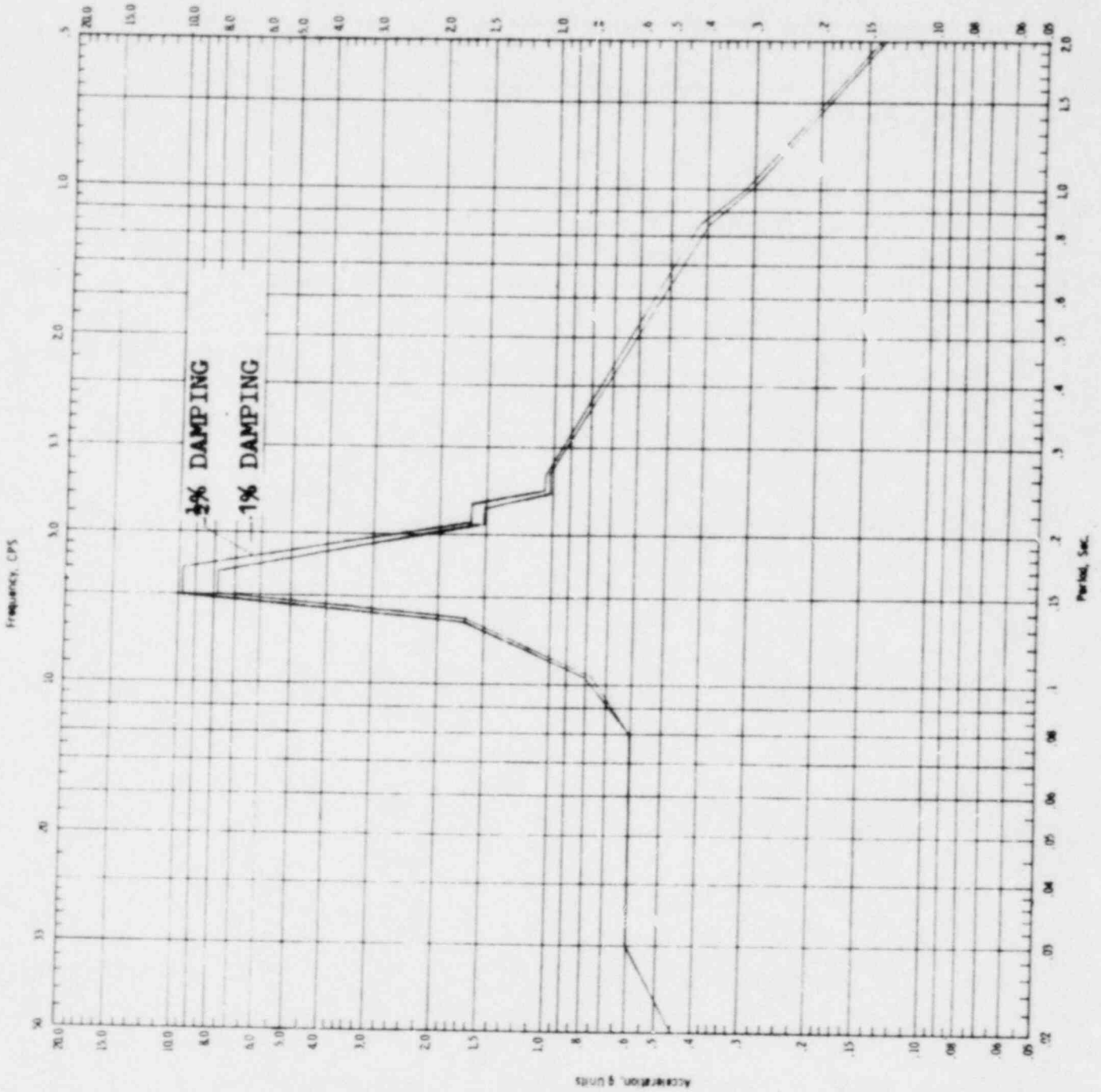
Rev. 5-25-72



VERTICAL RESPONSE SPECTRA
 (DESIGN BASIS EARTHQUAKE)
 BIOLOGICAL SHIELD
 RT 5/1/71 JNH



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSD DATE 5-13-72
CHECKED BY HHS DATE 5-13-72 SHEET 73 OF 120



HORIZONTAL RESPONSE SPECTRA
(BIOLOGICAL SHIELD)
OPERATING BASIS EARTHQUAKE
EL. 565'-0"
NORTH - SOUTH COMPONENT

18-A

SARGENT & LUNDY

ENGINEERS

CLIENT CINCINNATI GAS & ELECTRIC CO.

PROJECT WM. H. ZIMMER

JOB NO. 4130

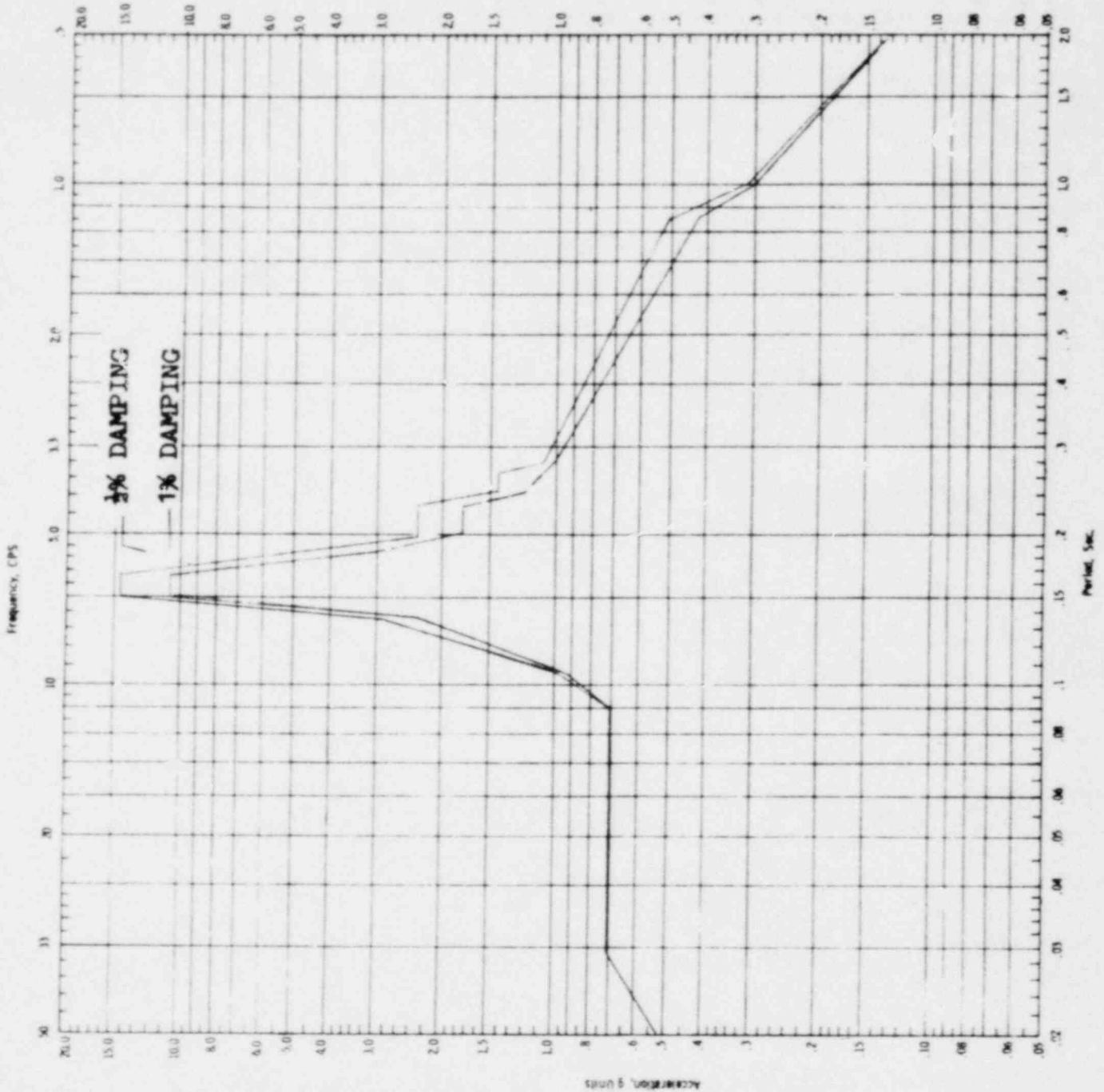
DESIGN BY GSD

DATE 5-13-72

CHECKED BY HHS

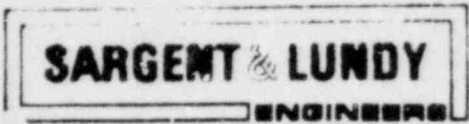
DATE 5-13-72

SHEET 74 OF 120

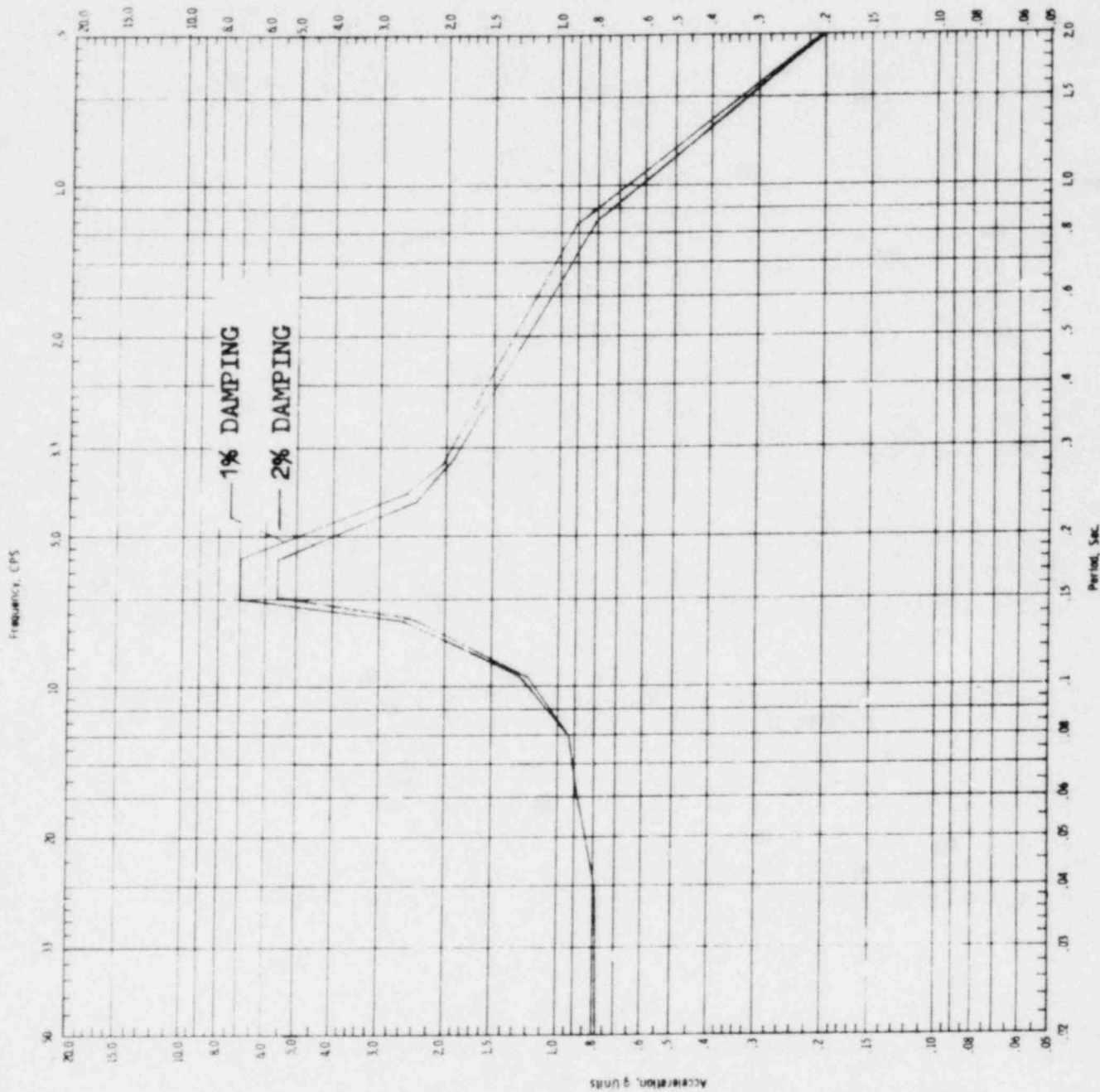


HORIZONTAL RESPONSE SPECTRA
(BIOLOGICAL SHIELD)
OPERATING BASIS EARTHQUAKE
EL. 565'-0"
EAST - WEST COMPONENT

18-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-13-72
CHECKED BY HHS DATE 5-13-72 SHEET 75 OF 120



HORIZONTAL RESPONSE SPECTRA
(BIOLOGICAL SHIELD)
DESIGN BASIS EARTHQUAKE
EL. 565'-0"
NORTH - SOUTH COMPONENT

18-C

SARGENT & LUNDY

ENGINEERS

CLIENT CINCINNATI GAS & ELECTRIC CO.

PROJECT WM. H. ZIMMER

JOB NO. 4130

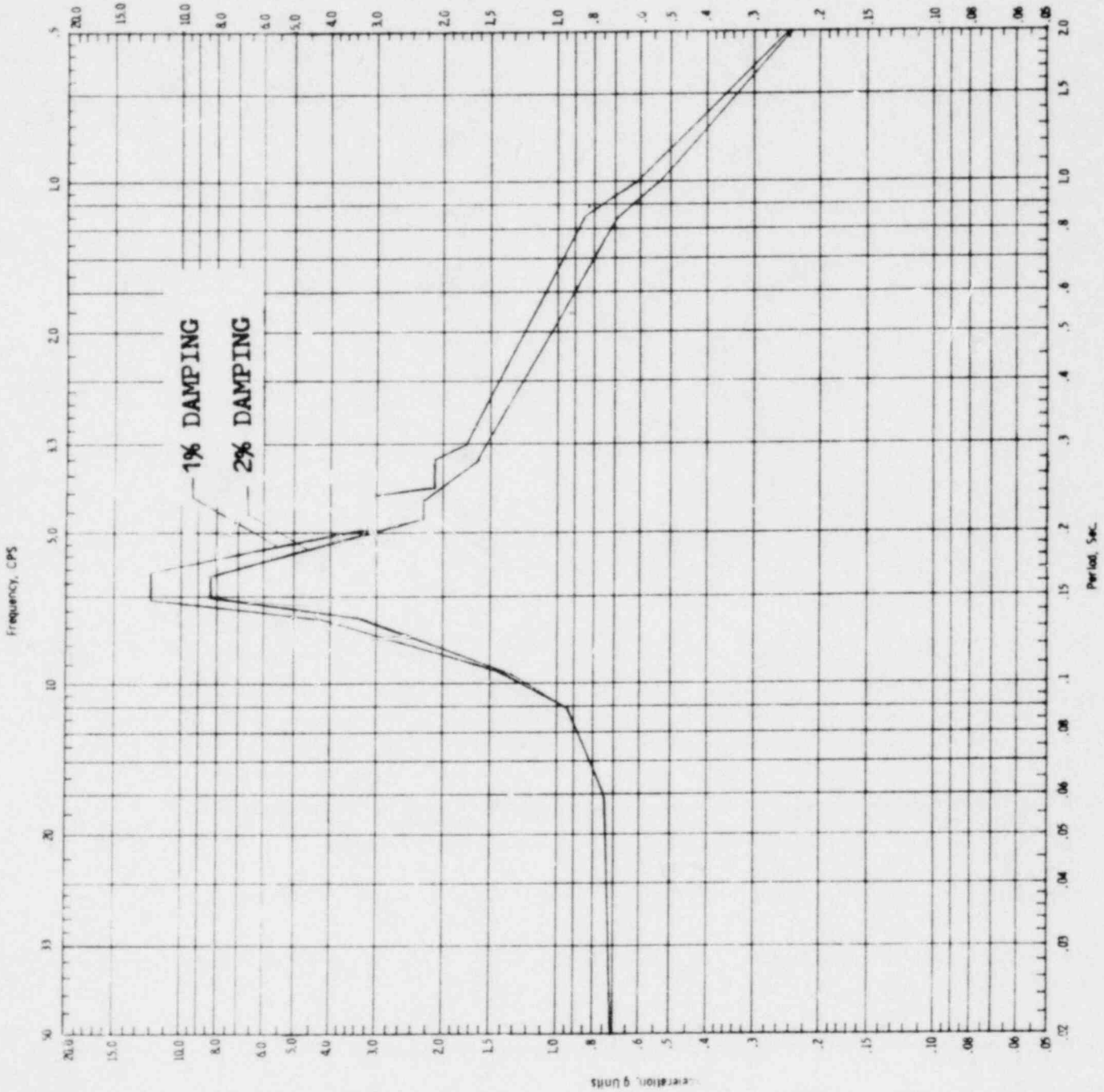
DESIGN BY GSD

DATE 5-13-72

CHECKED BY HHS

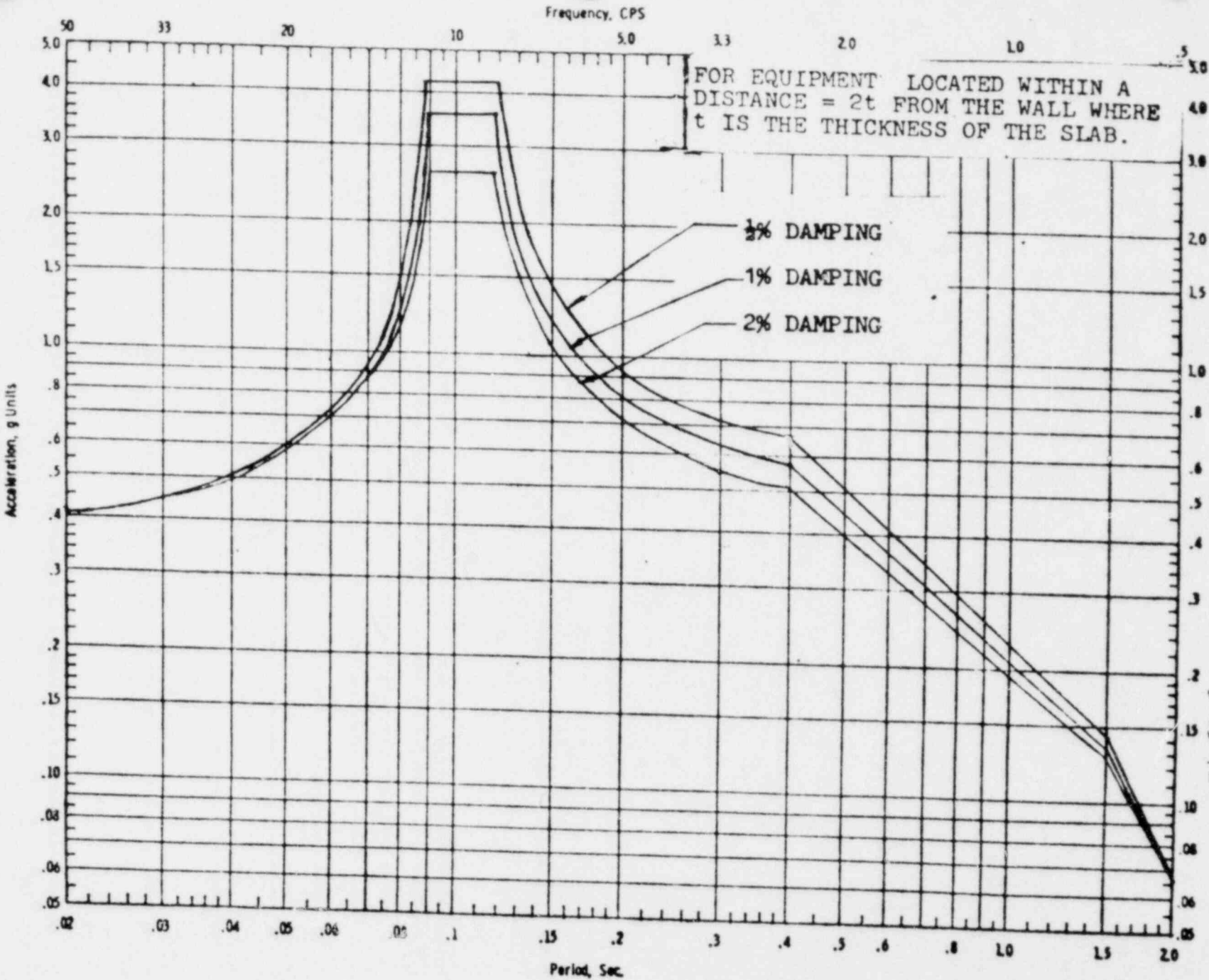
DATE 5-13-72

SHEET 76 OF 120



HORIZONTAL RESPONSE SPECTRA
(BIOLOGICAL SHIELD)
DESIGN BASIS EARTHQUAKE
EL. 565'-0"
EAST - WEST COMPONENT

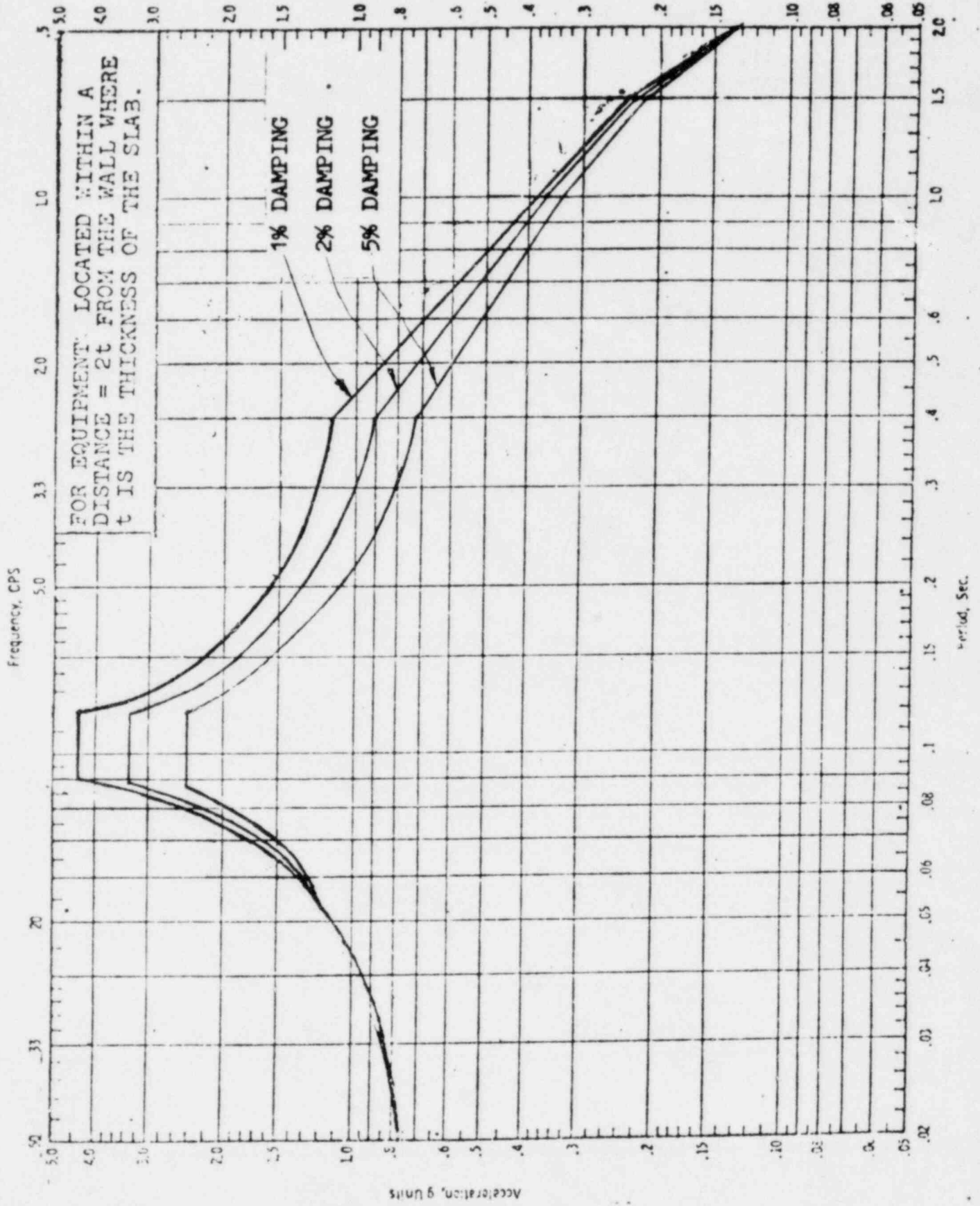
18-D



VERTICAL RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 BIOLOGICAL SHIELD
 E1. 593'-6", & 569'-0"

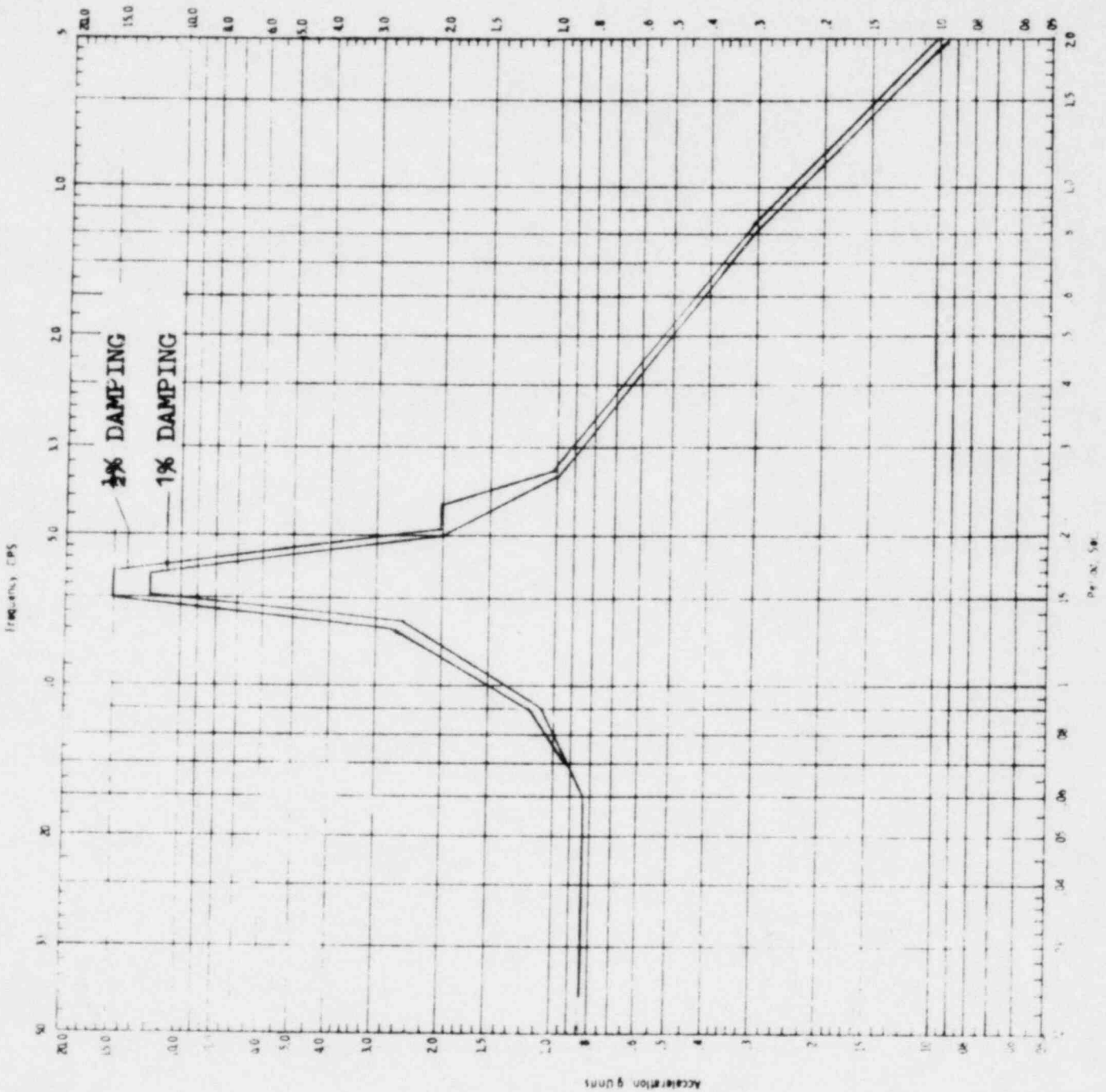
18-E

19-E



VERTICAL RESPONSE SPECTRA
 (DESIGN BASIS EARTHQUAKE)
 BIOLOGICAL SHIELD
 EL. 593'-6", 565'-0"

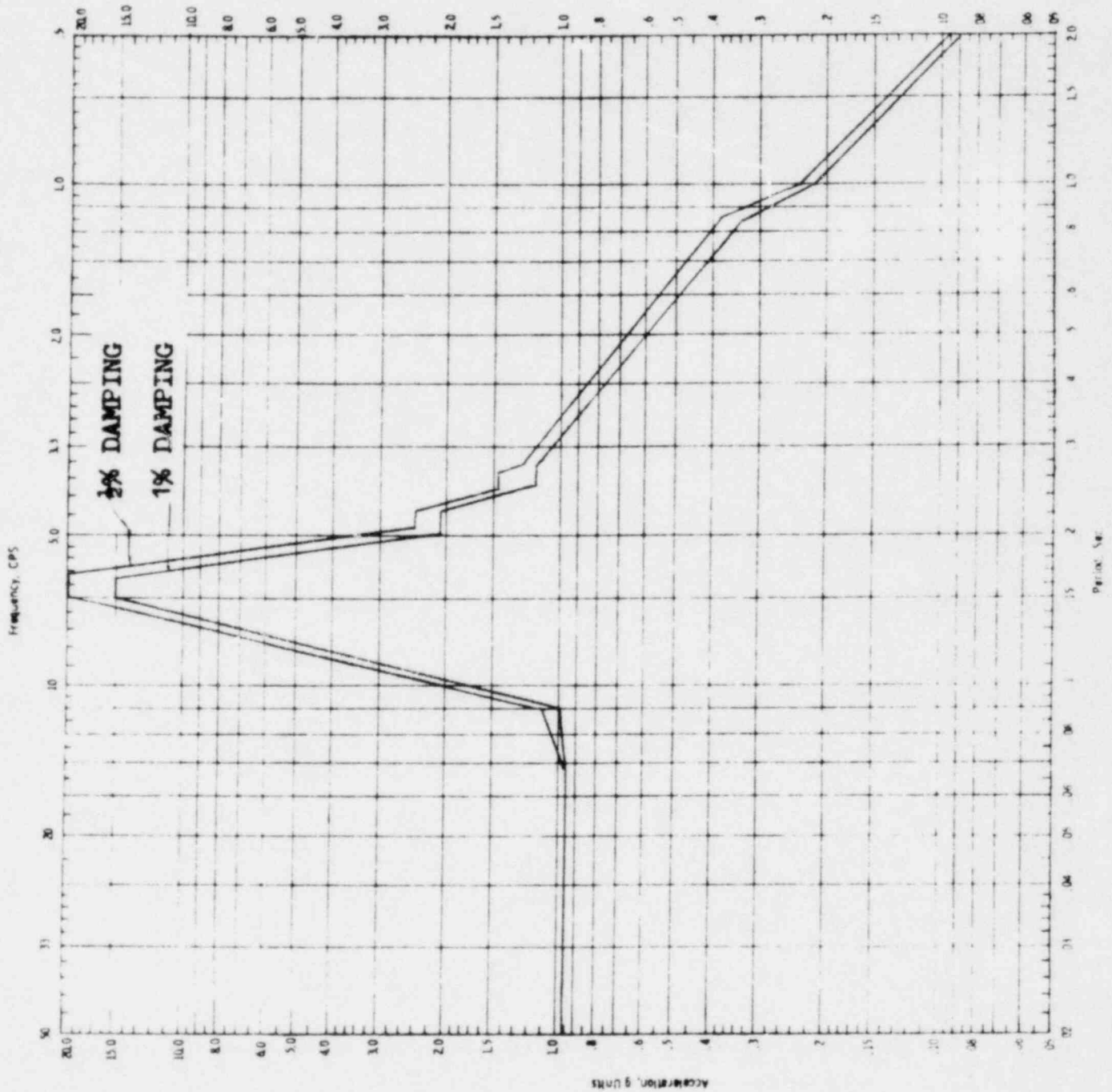
18-F 19-F



HORIZONTAL RESPONSE SPECTRA (RPV)
 OPERATING BASIS EARTHQUAKE
 EL. 615'-3"
 NORTH - SOUTH COMPONENT

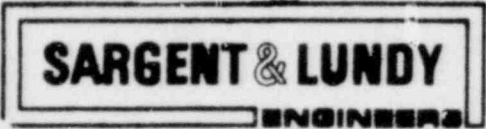


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 3-7-72
CHECKED BY HHS DATE 3-7-72 SHEET 80 OF 120

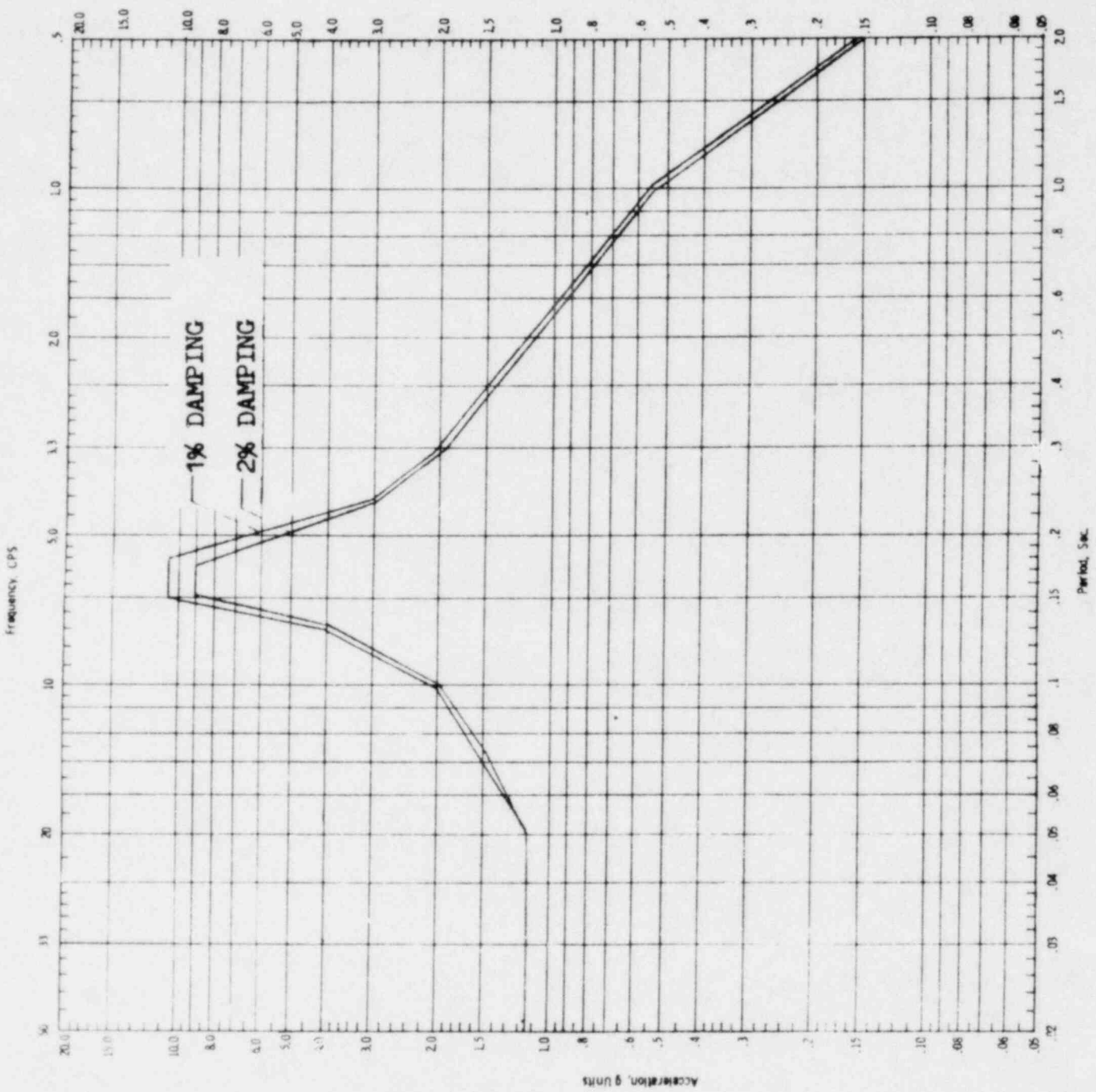


HORIZONTAL RESPONSE SPECTRA (RPV)
OPERATING BASIS EARTHQUAKE
EL. 615'-3"
EAST - WEST COMPONENT

20-B

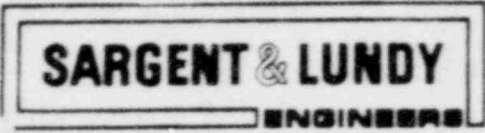


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 21 OF 120

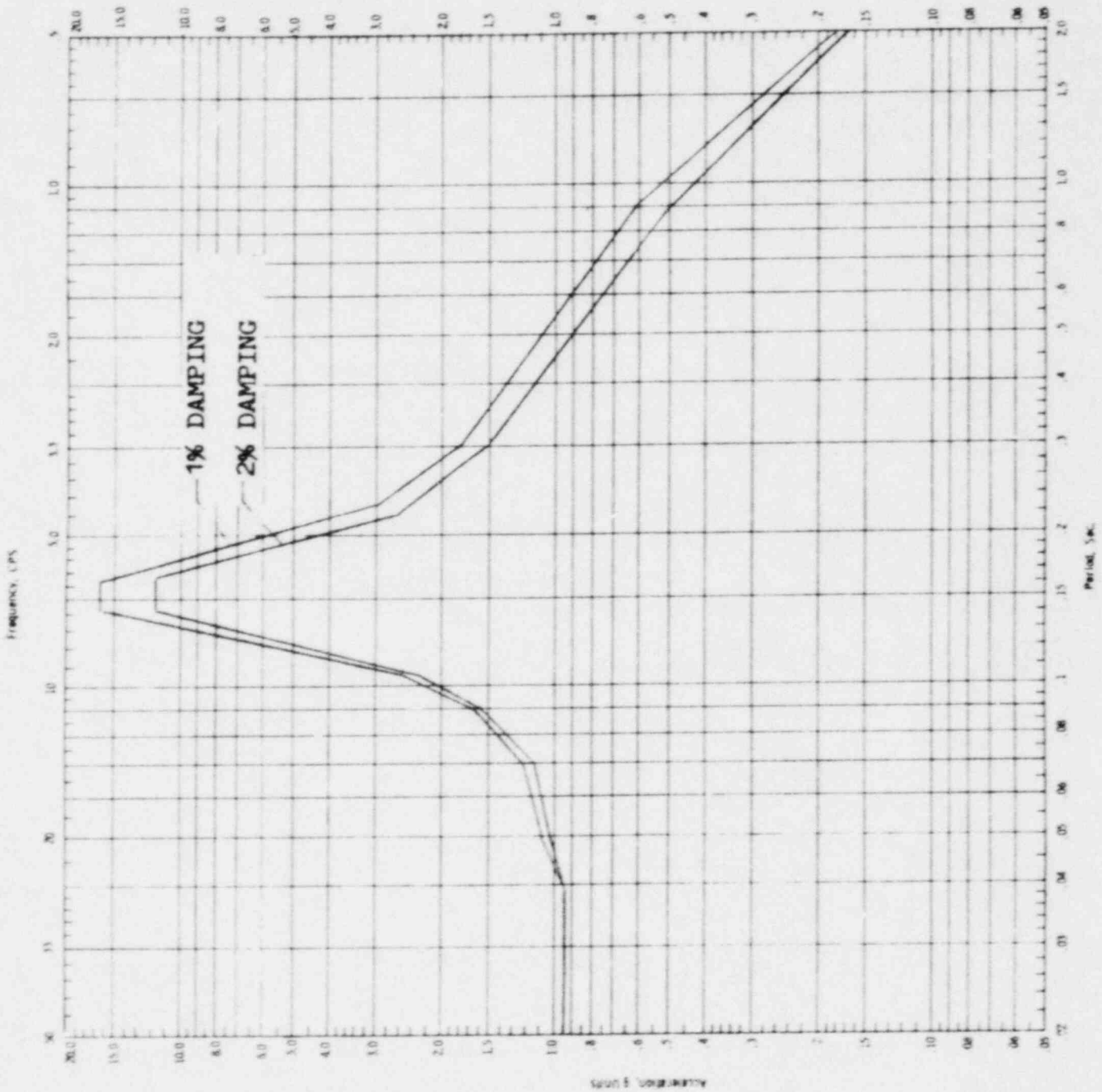


HORIZONTAL RESPONSE SPECTRA (RPS)
DESIGN BASIS EARTHQUAKE
EL. 615'-3"
NORTH - SOUTH COMPONENT

20-C

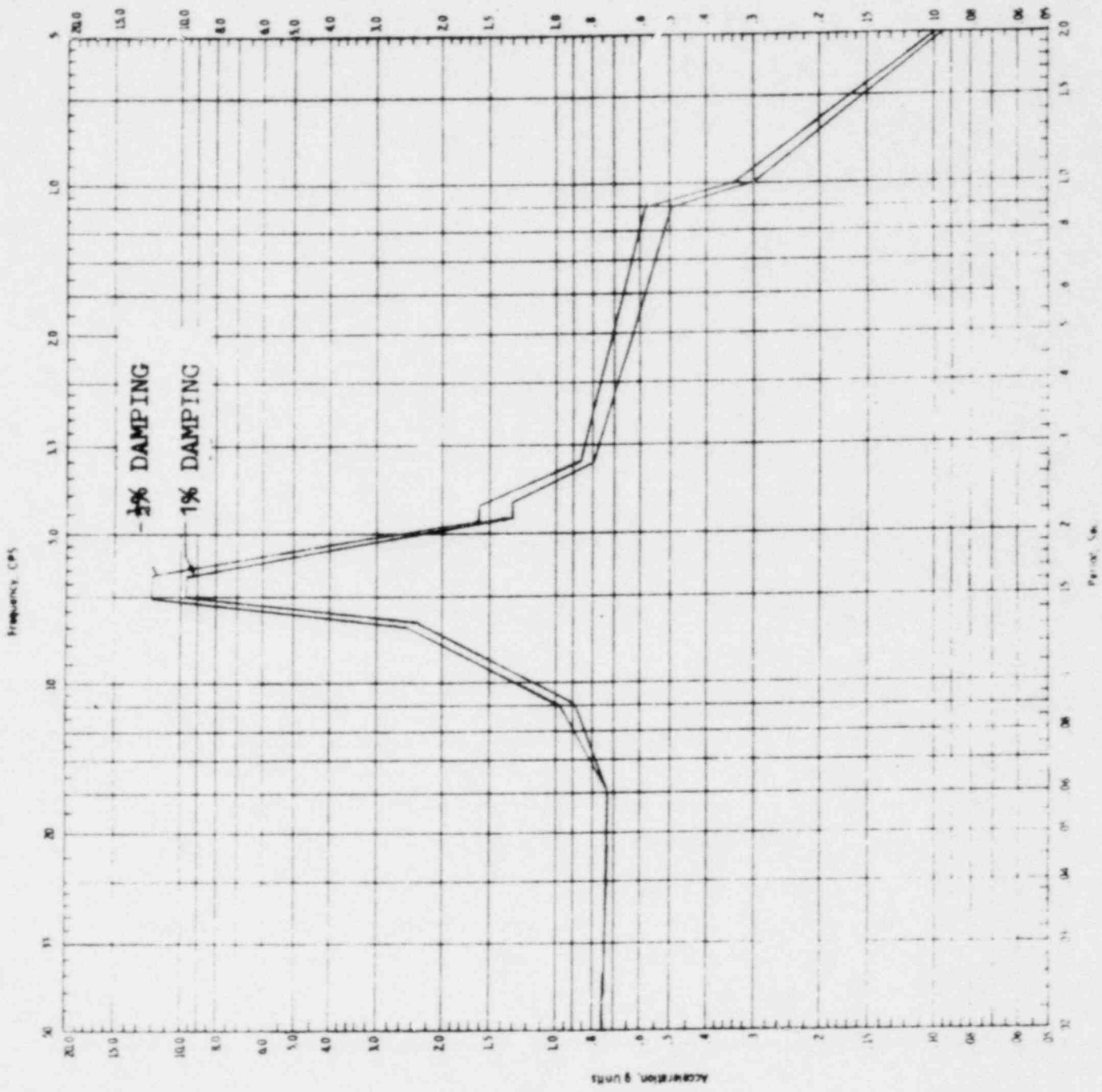


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 2 of 120

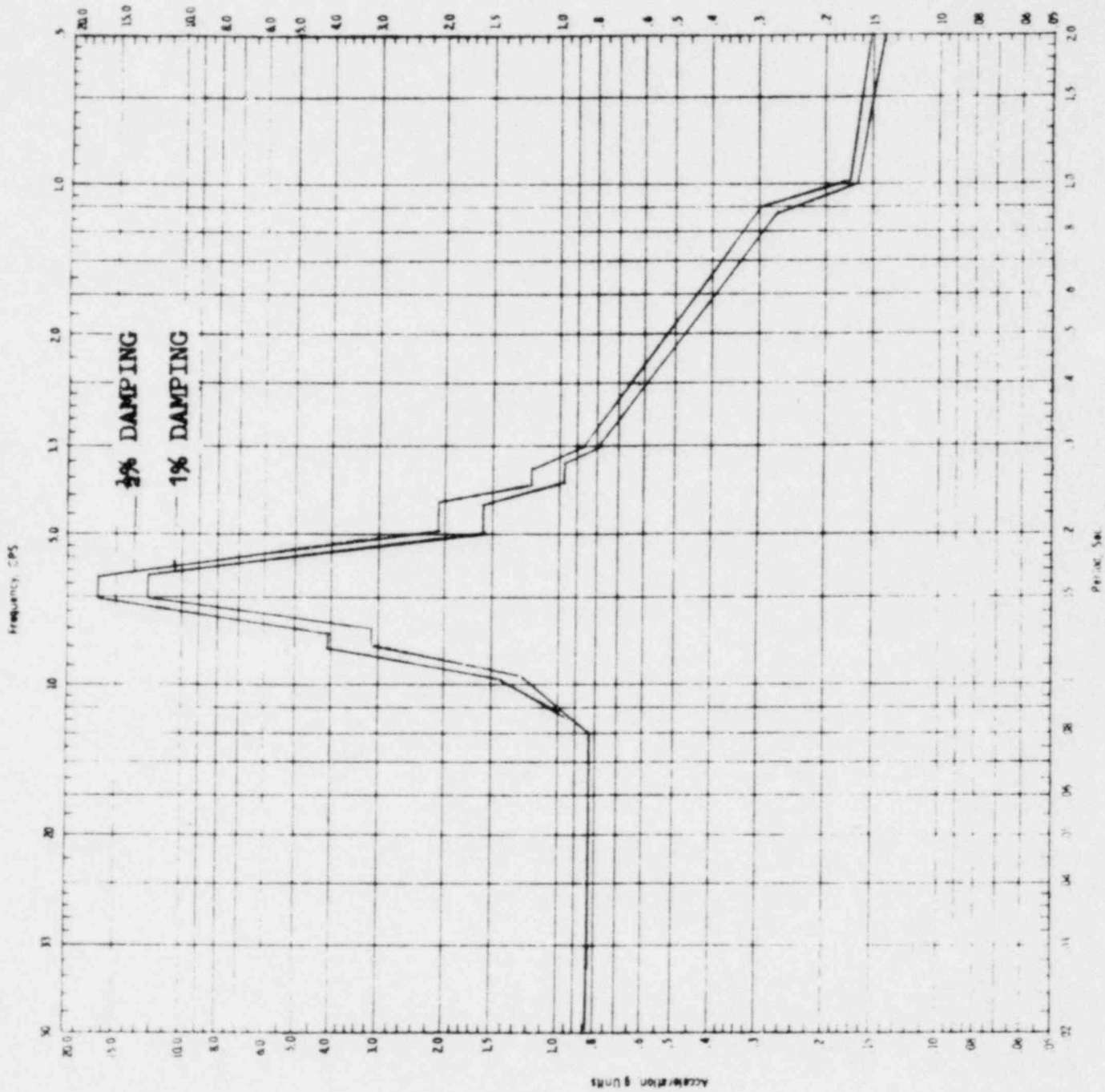


HORIZONTAL RESPONSE SPECTRA (RPV)
DESIGN BASIS EARTHQUAKE
EL. 615'-3"
EAST - WEST COMPONENT

20-D



HORIZONTAL RESPONSE SPECTRA (RPS)
 OPERATING BASIS EARTHQUAKE
 EL. 596'-10"
 NORTH - SOUTH COMPONENT

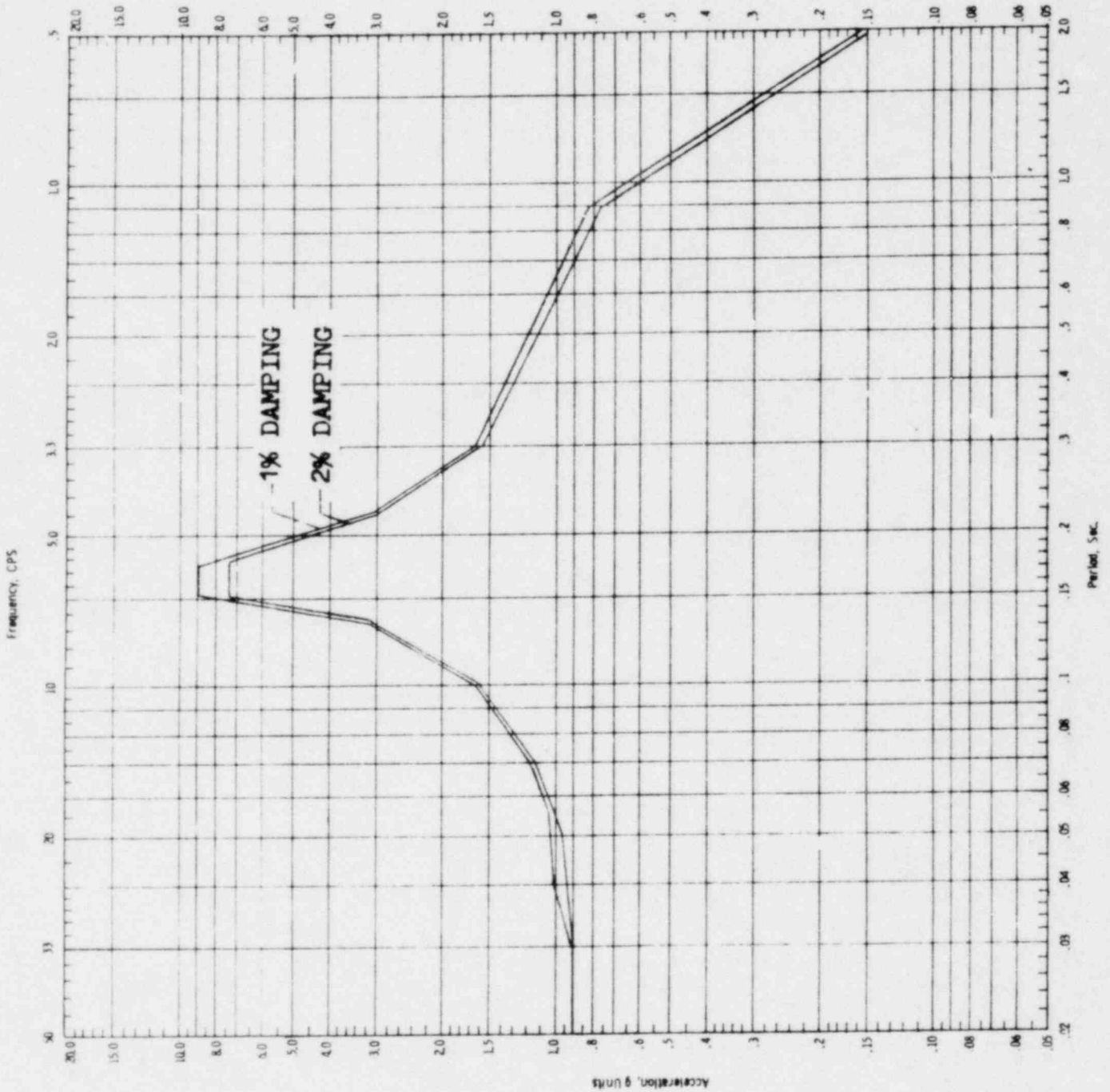


HORIZONTAL RESPONSE SPECTRA (RPV)
 OPERATING BASIS EARTHQUAKE
 EL. 596'-10"
 EAST - WEST COMPONENT

21-B

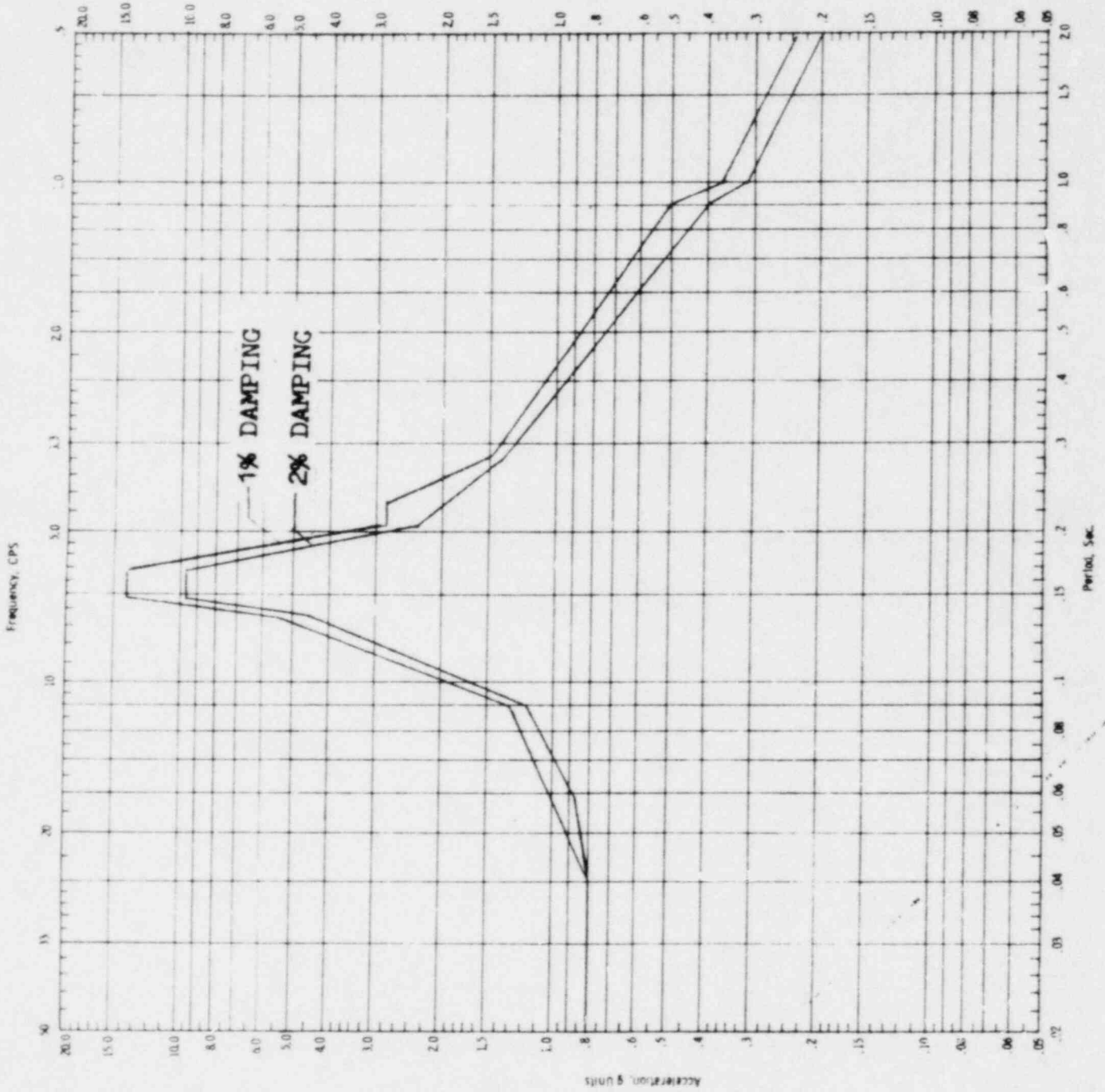


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 25 OF 20



HORIZONTAL RESPONSE SPECTRA (RPS)
DESIGN BASIS EARTHQUAKE
EL. 596'-10"
NORTH - SOUTH COMPONENT

21-C

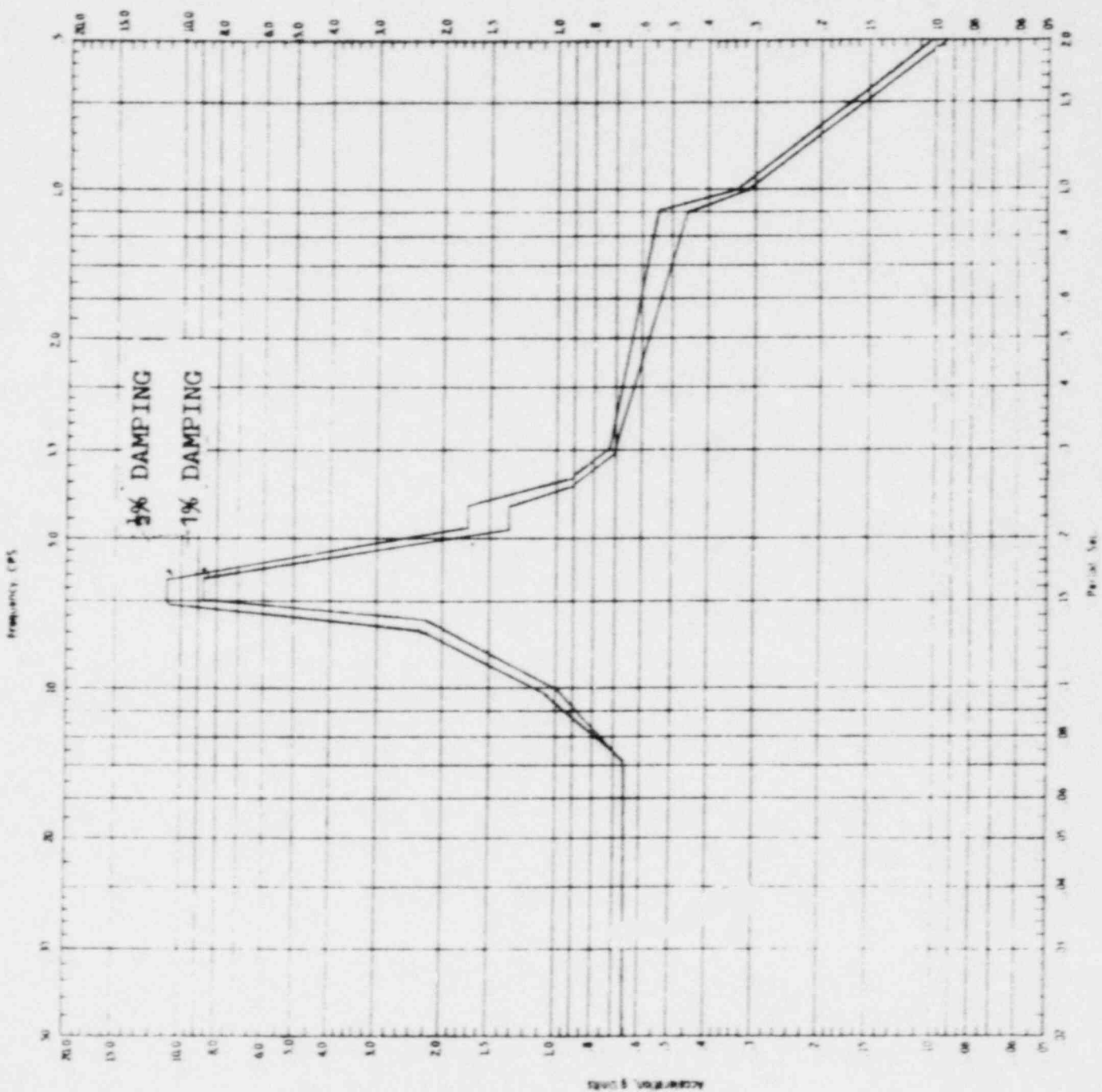


HORIZONTAL RESPONSE SPECTRA (RPV)
 DESIGN BASIS EARTHQUAKE
 EL. 596'-10"
 EAST - WEST COMPONENT

21-D



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 3-7-72
CHECKED BY HHS DATE 3-7-72 SHEET 07 OF 120

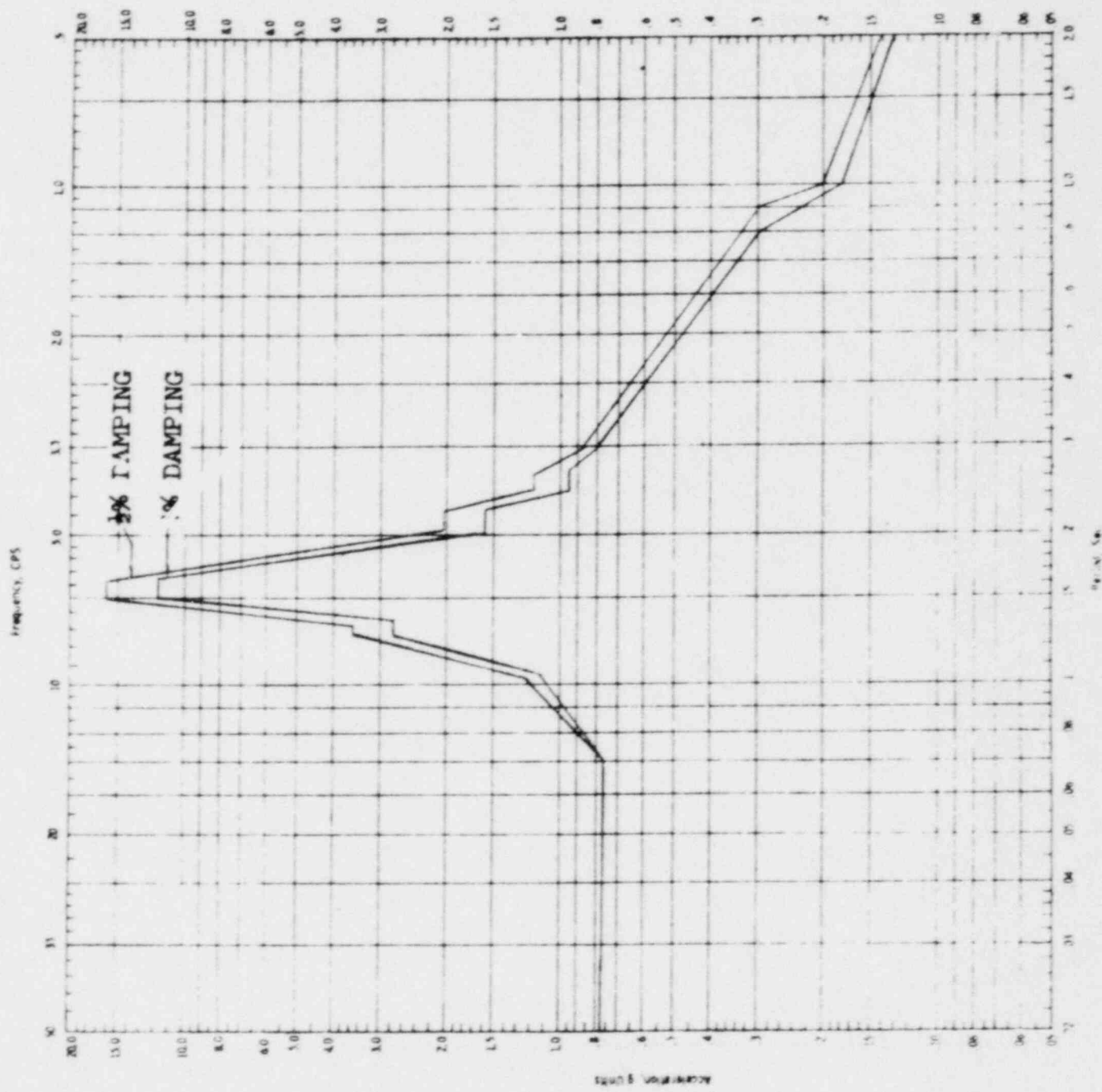


HORIZONTAL RESPONSE SPECTRA (RPV)
OPERATING BASIS EARTHQUAKE
EL. 584'-0 1/2" & 582'-6"
NORTH-SOUTH COMPONENT

22-A

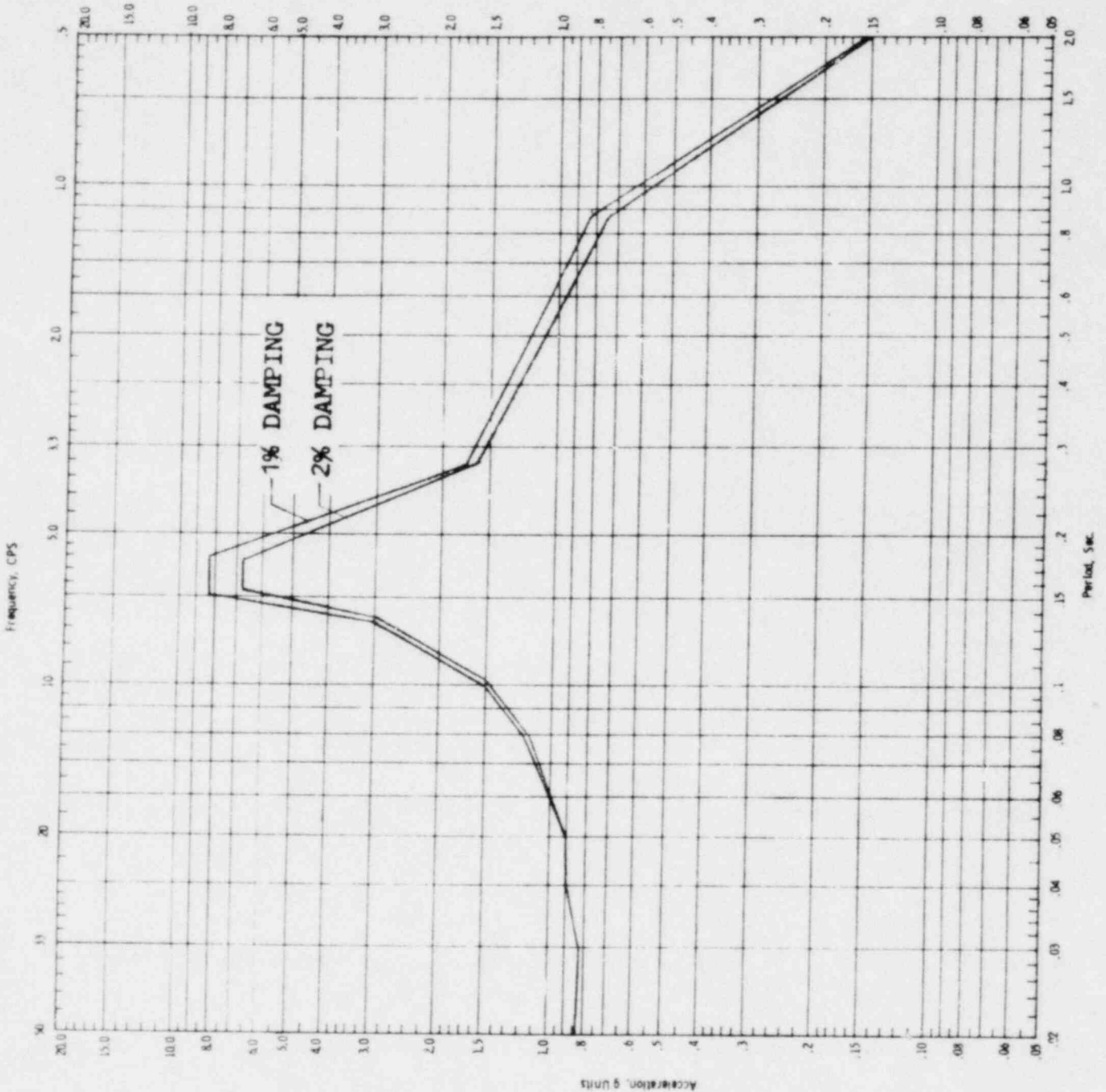


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 3-7-72
CHECKED BY HHS DATE 3-7-72 SHEET 88 OF 120



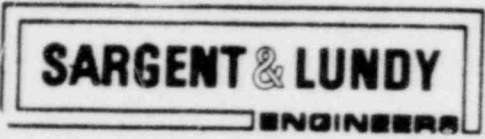
HORIZONTAL RESPONSE SPECTRA (RPS)
OPERATING BASIS EARTHQUAKE
EL. 584'-0 1/2"
582'-6"
EAST - WEST COMPONENT

22-B

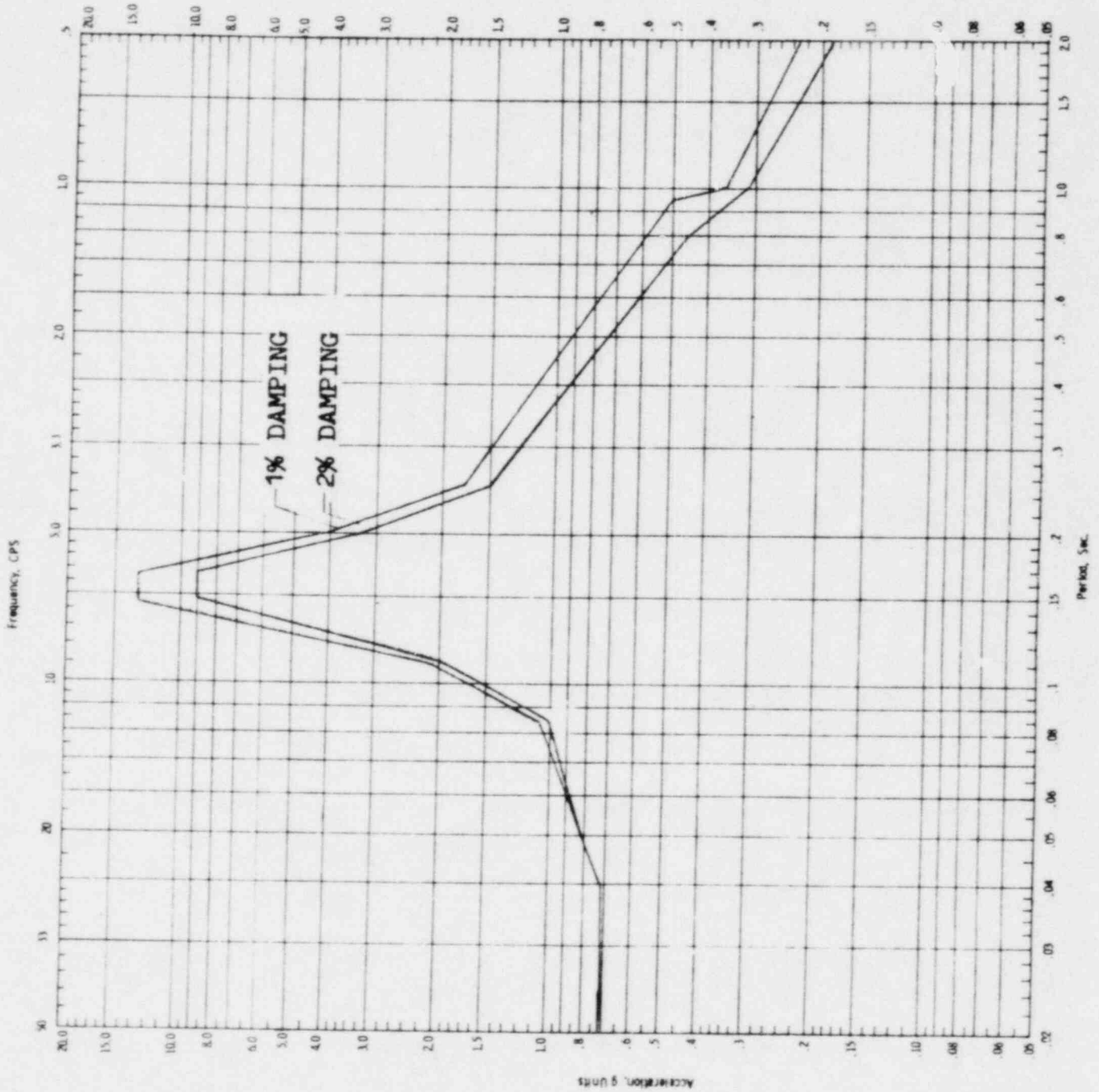


HORIZONTAL RESPONSE SPECTRA (RPV)
 DESIGN BASIS EARTHQUAKE
 EL. 584'-0 $\frac{1}{2}$ " & 582'-6"
 NORTH - SOUTH COMPONENT

22-C



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 90 OF 120

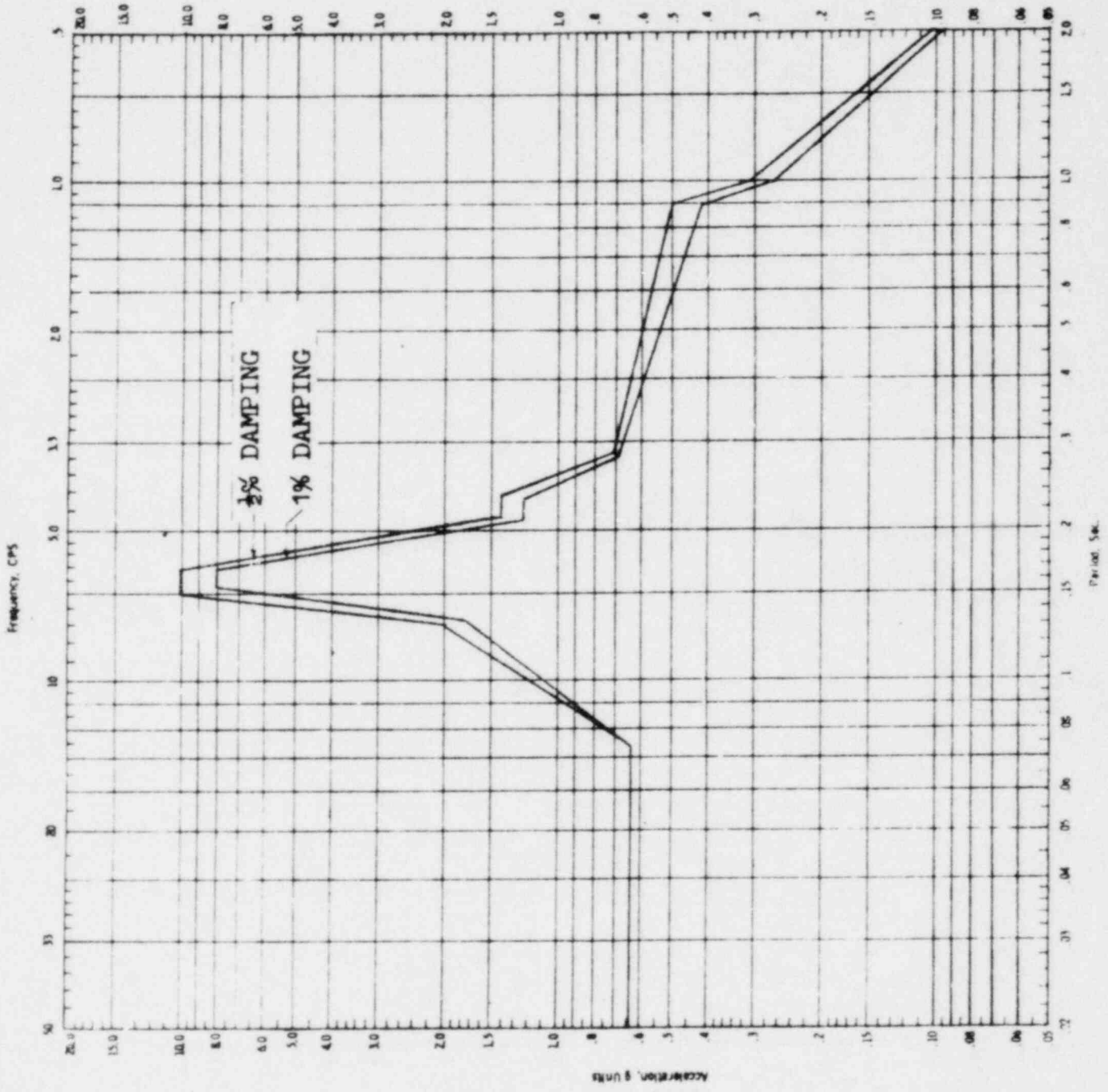


* HORIZONTAL RESPONSE SPECTRA (RPV)
DESIGN BASIS EARTHQUAKE
EL. 584'-0 1/2" & 582'-6"
EAST - WEST COMPONENT

22-D



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 3-7-72
CHECKED BY HHS DATE 3-7-72 SHEET 21 OF 120

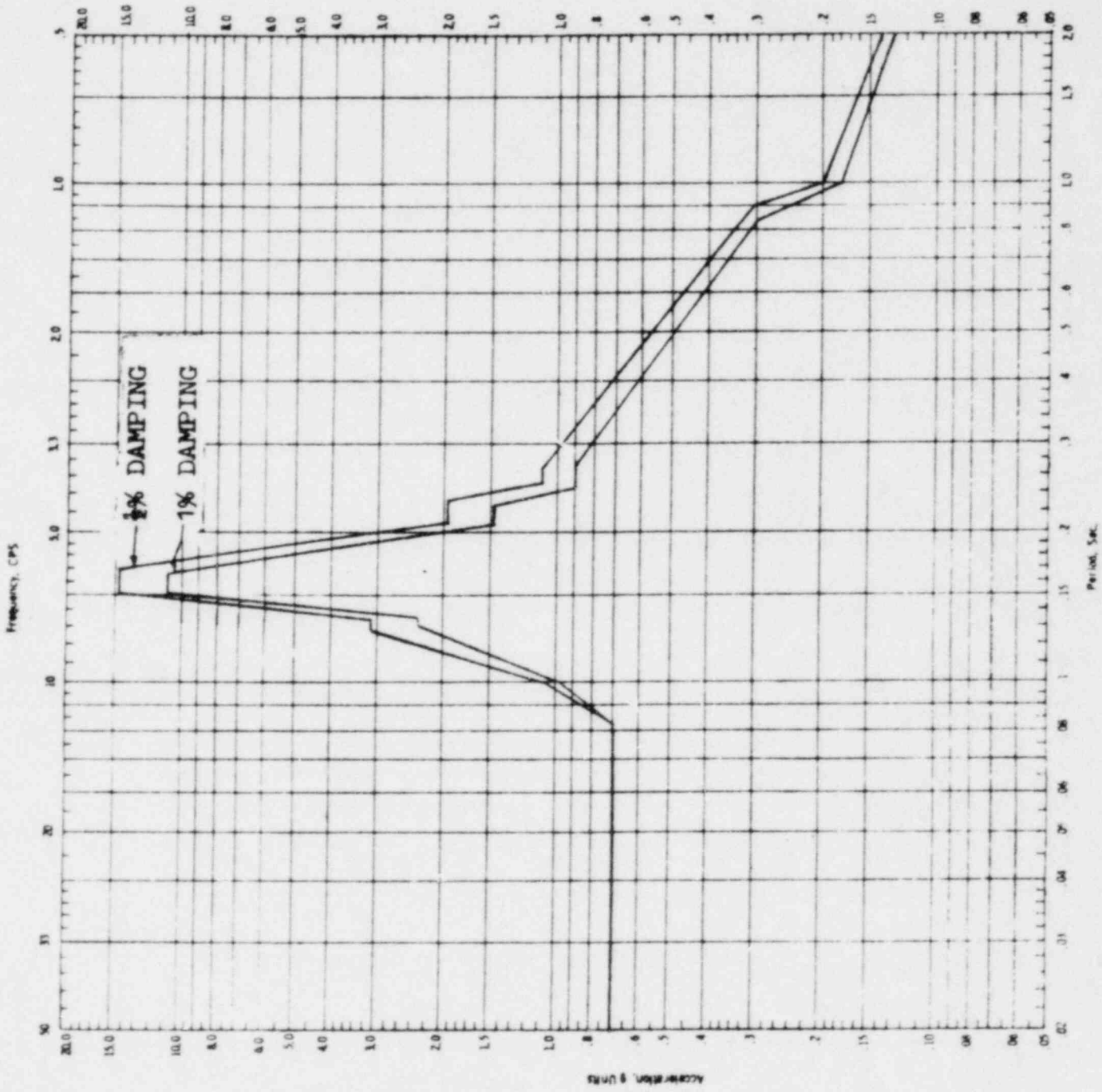


HORIZONTAL RESPONSE SPECTRA (RPV)
OPERATING BASIS EARTHQUAKE
EL. 574'-1 3/4"
NORTH - SOUTH COMPONENT

23-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 3-7-72
CHECKED BY HHS DATE 3-7-72 SHEET 92 OF 120

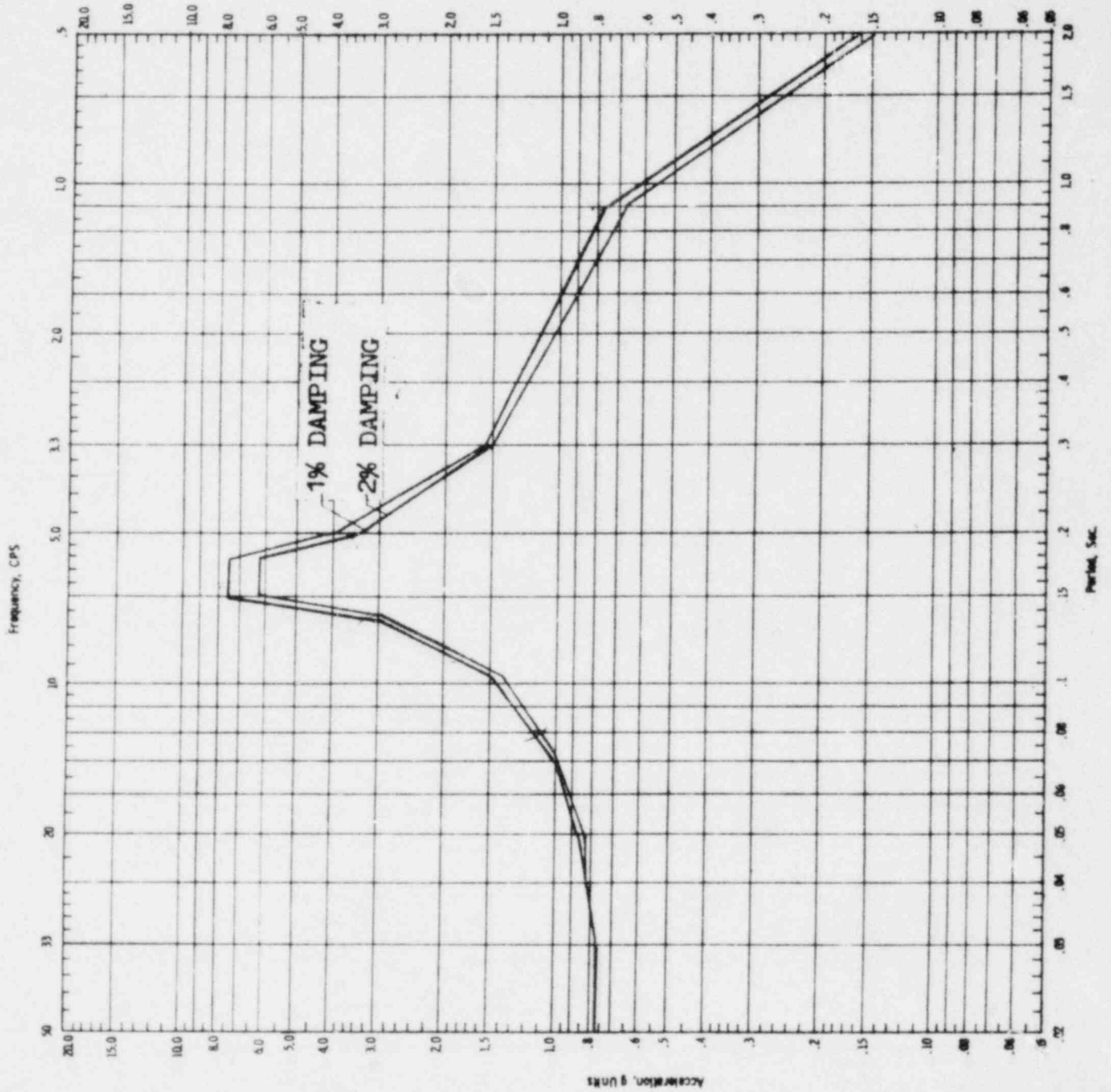


HORIZONTAL RESPONSE SPECTRA (RPV)
OPERATING BASIS EARTHQUAKE
EL. 574'-1 3/4"
EAST - WEST COMPONENT

23-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 93 OF 120

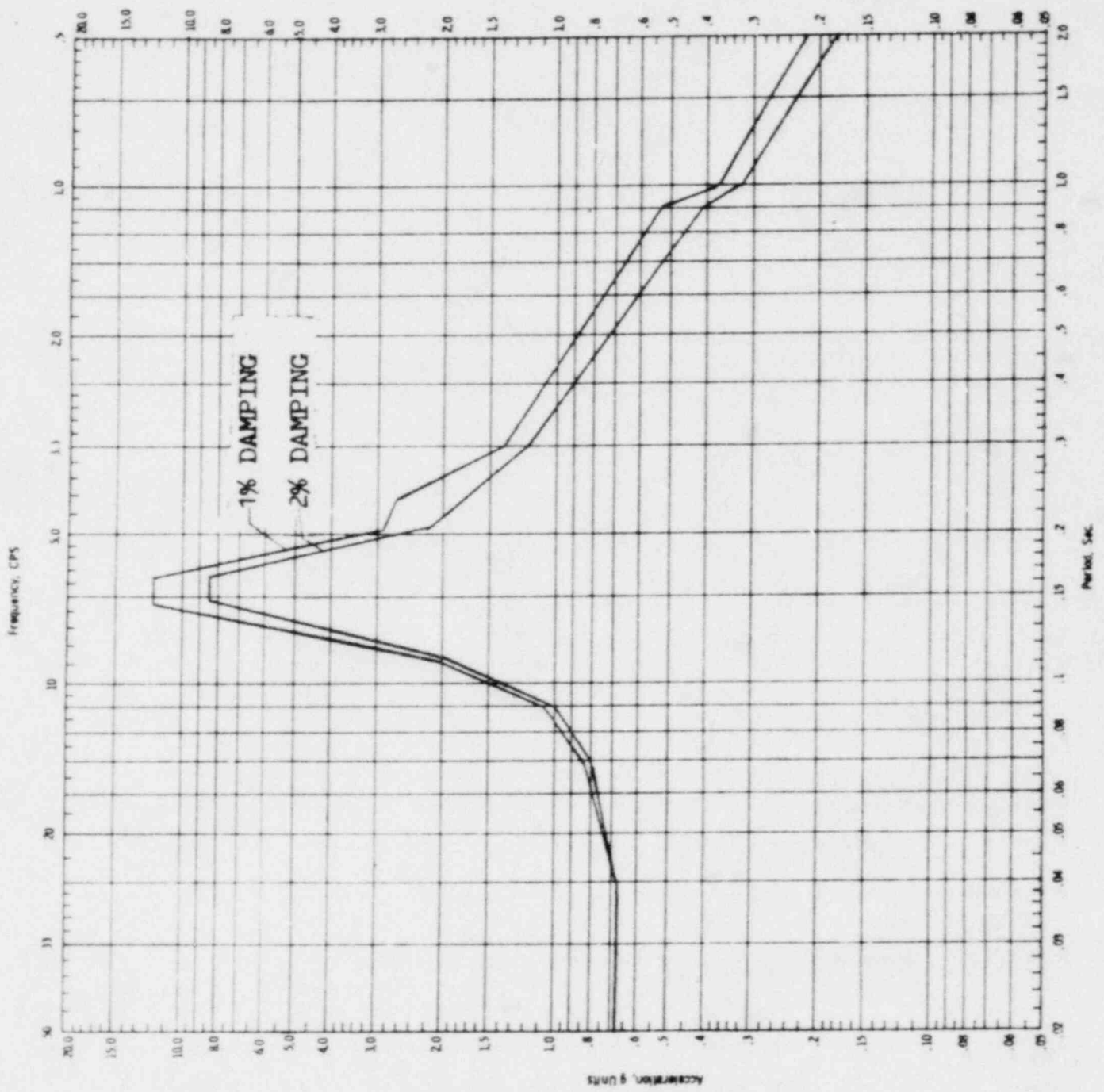


HORIZONTAL RESPONSE SPECTRA (RPV)
DESIGN BASIS EARTHQUAKE
EL. 574'-1 3/4"
NORTH - SOUTH COMPONENT

23-C



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 5-9-72
CHECKED BY HHS DATE 5-9-72 SHEET 94 OF 120

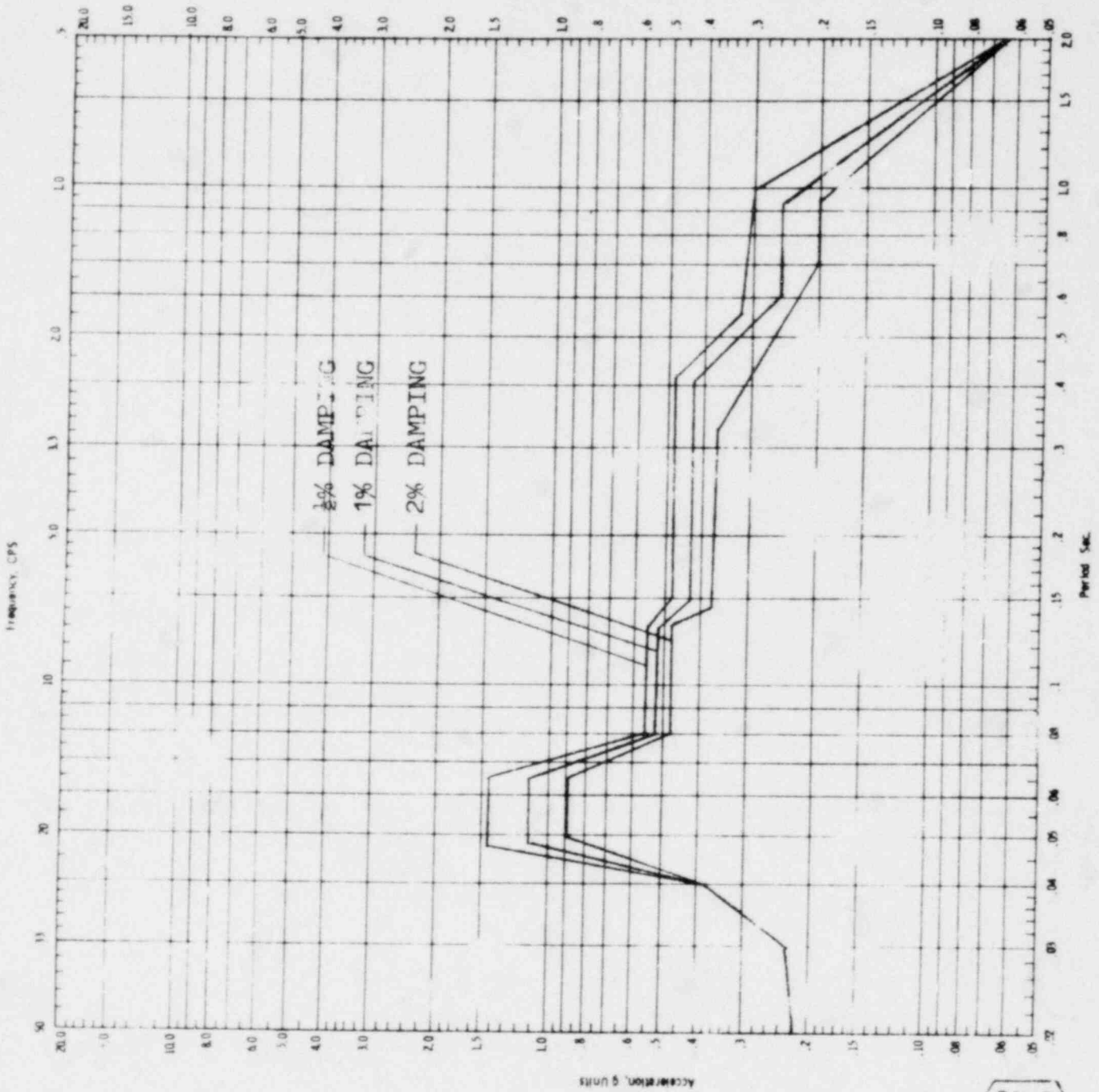


HORIZONTAL RESPONSE SPECTRA (RPV)
DESIGN BASIS EARTHQUAKE
EL. 574'-1 3/4"
EAST - WEST COMPONENT

23-D



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 10-20-72
CHECKED BY HHS DATE 10-20-72 SHEET 94A OF 120

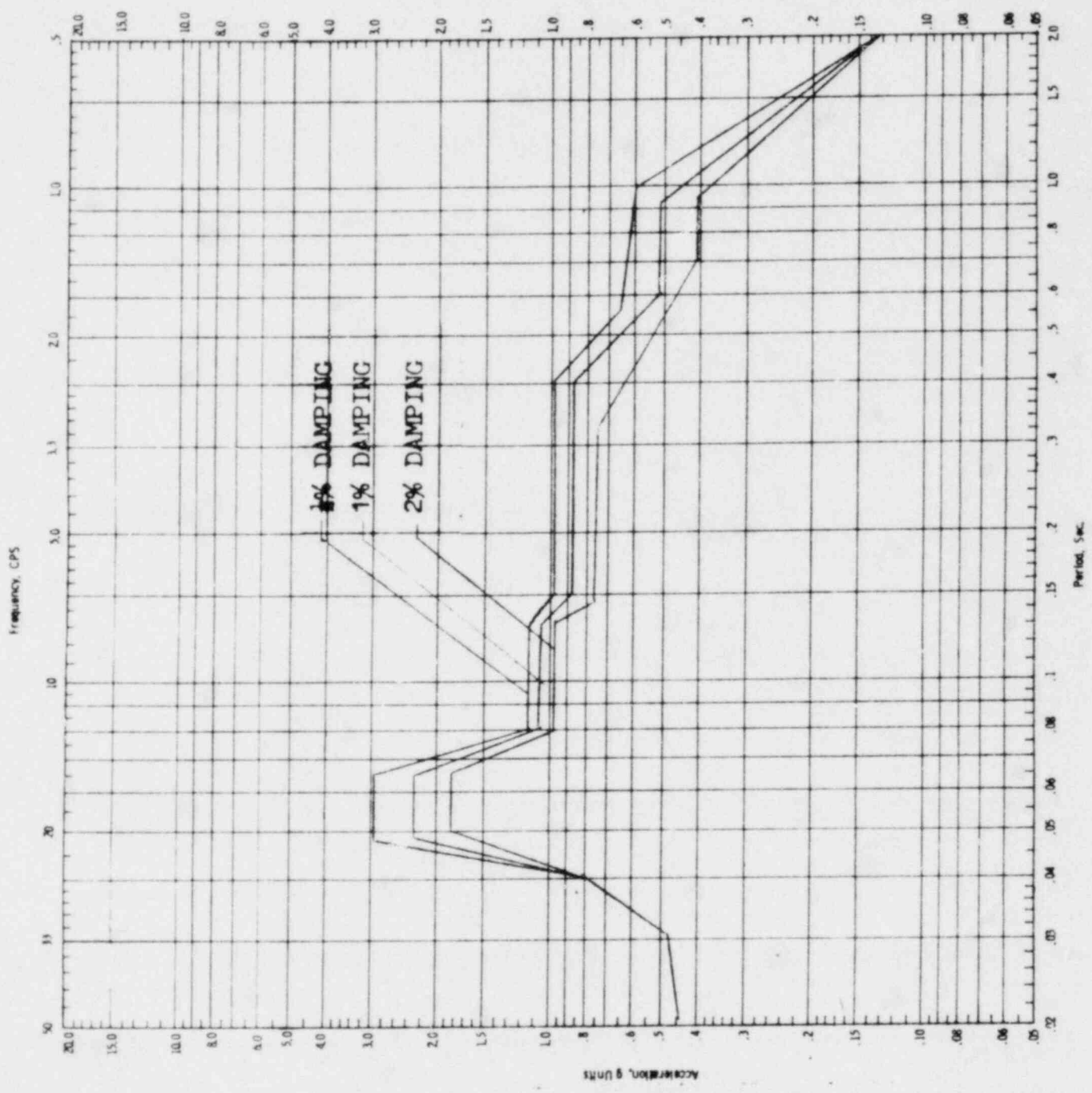


VERTICAL RESPONSE SPECTRA (RPV)
OPERATING BASIS EARTHQUAKE
615'-3", 596'-10", 584'-0 1/2" & 582'-6"

20-E
21-E
22-E
23-E



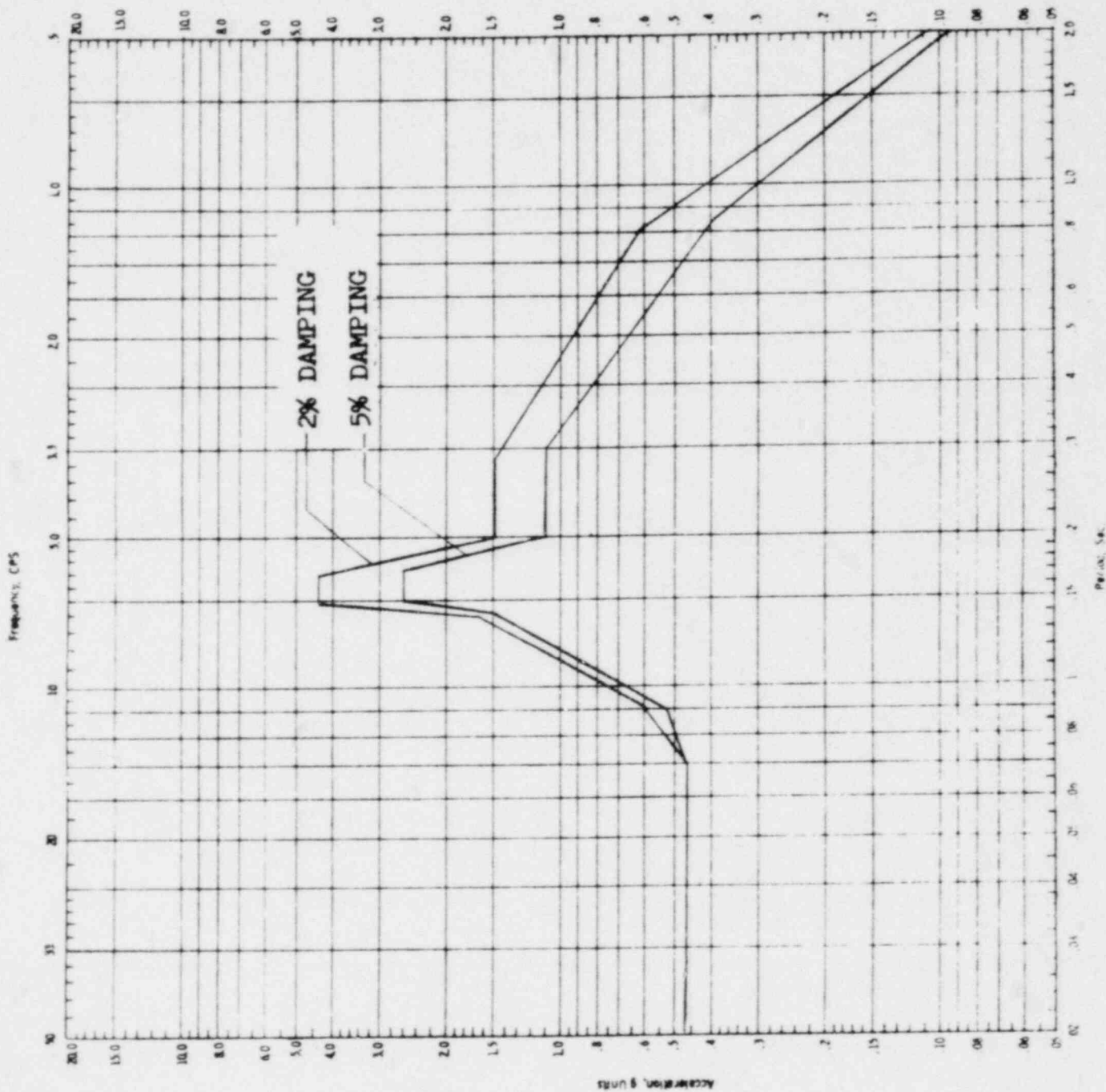
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIPPER JOB NO. 4130
DESIGN BY GSB DATE 10-20-72
CHECKED BY HHS DATE 10-20-72 SHEET 24B OF 120



VERTICAL RESPONSE SPECTRA (RPV)
DESIGN BASIS EARTHQUAKE
EL. 615'-3", 596'-10", 584'-0 1/2" & 582'-6"

- 20-F
- 21-F
- 22-F
- 23-F

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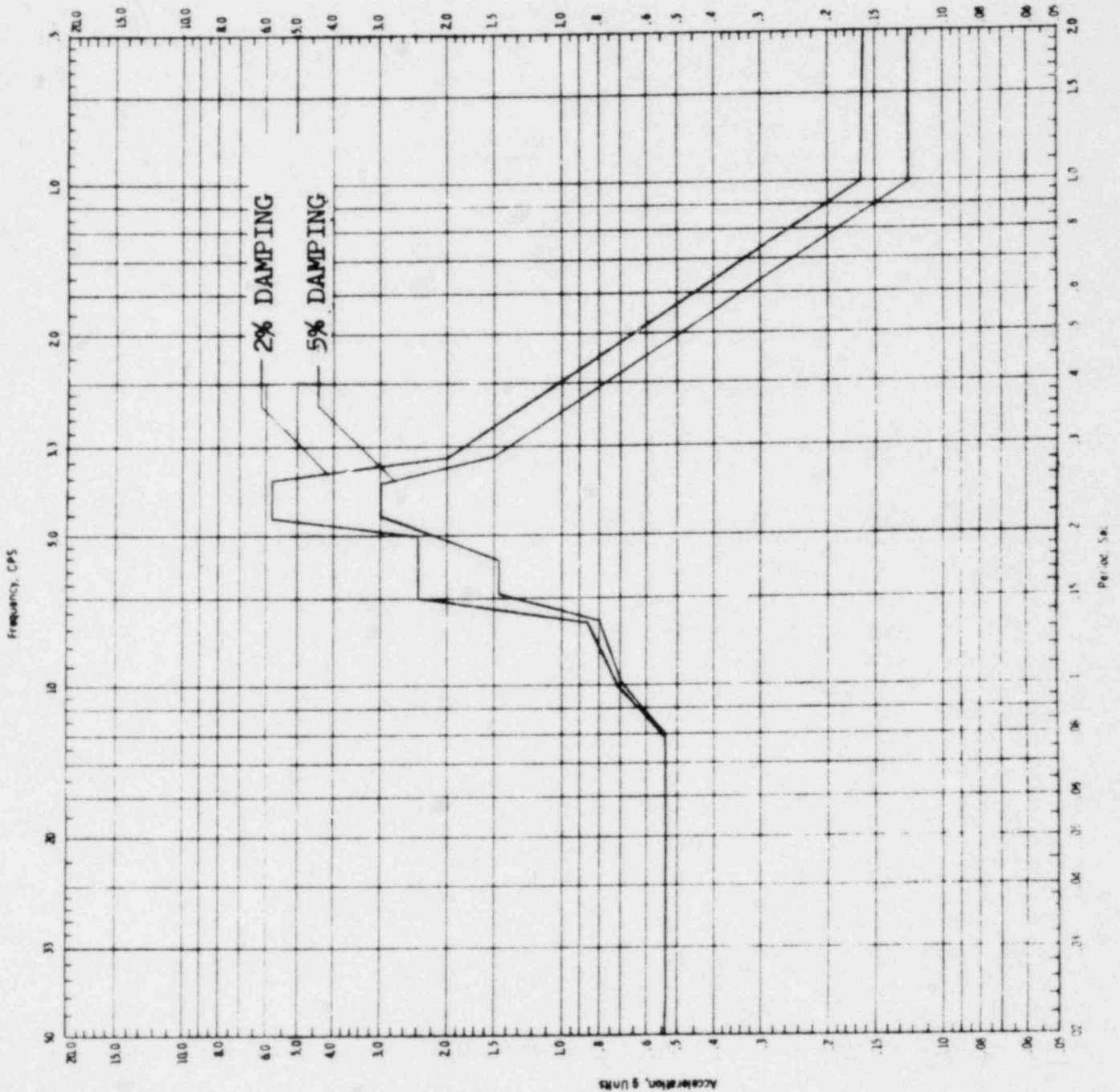
HORIZONTAL CRANE RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 654'-9"
 NORTH - SOUTH COMPONENT

24-A



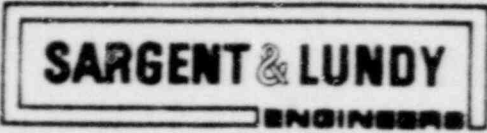
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-1-71
CHECKED BY HHS DATE 4-1-71 SHEET 96 OF 120

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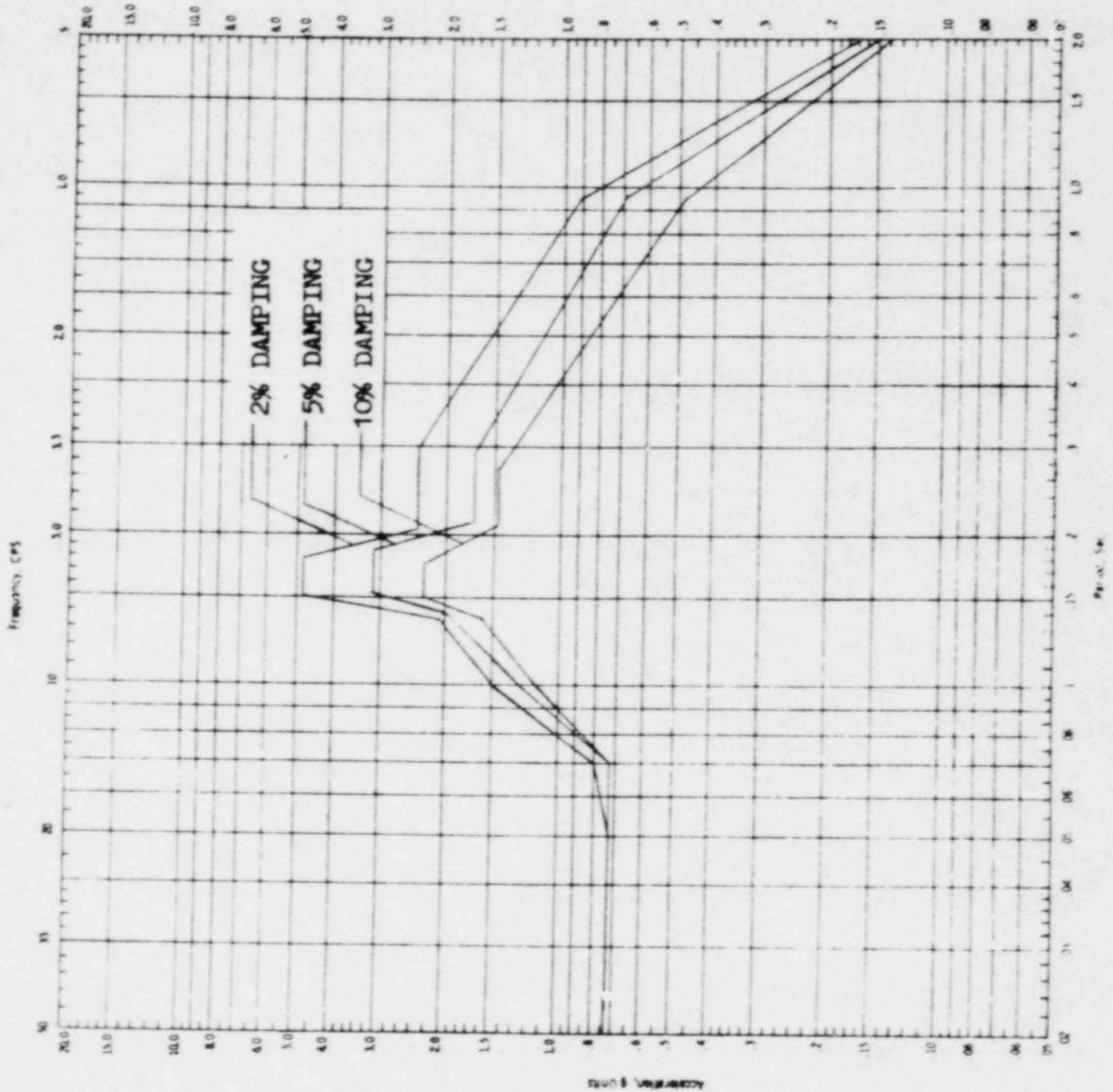
HORIZONTAL CRANE RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 654'-9"
EAST - WEST COMPONENT

24-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-1-71
CHECKED BY HHS DATE 4-1-71 SHEET 97 OF 120

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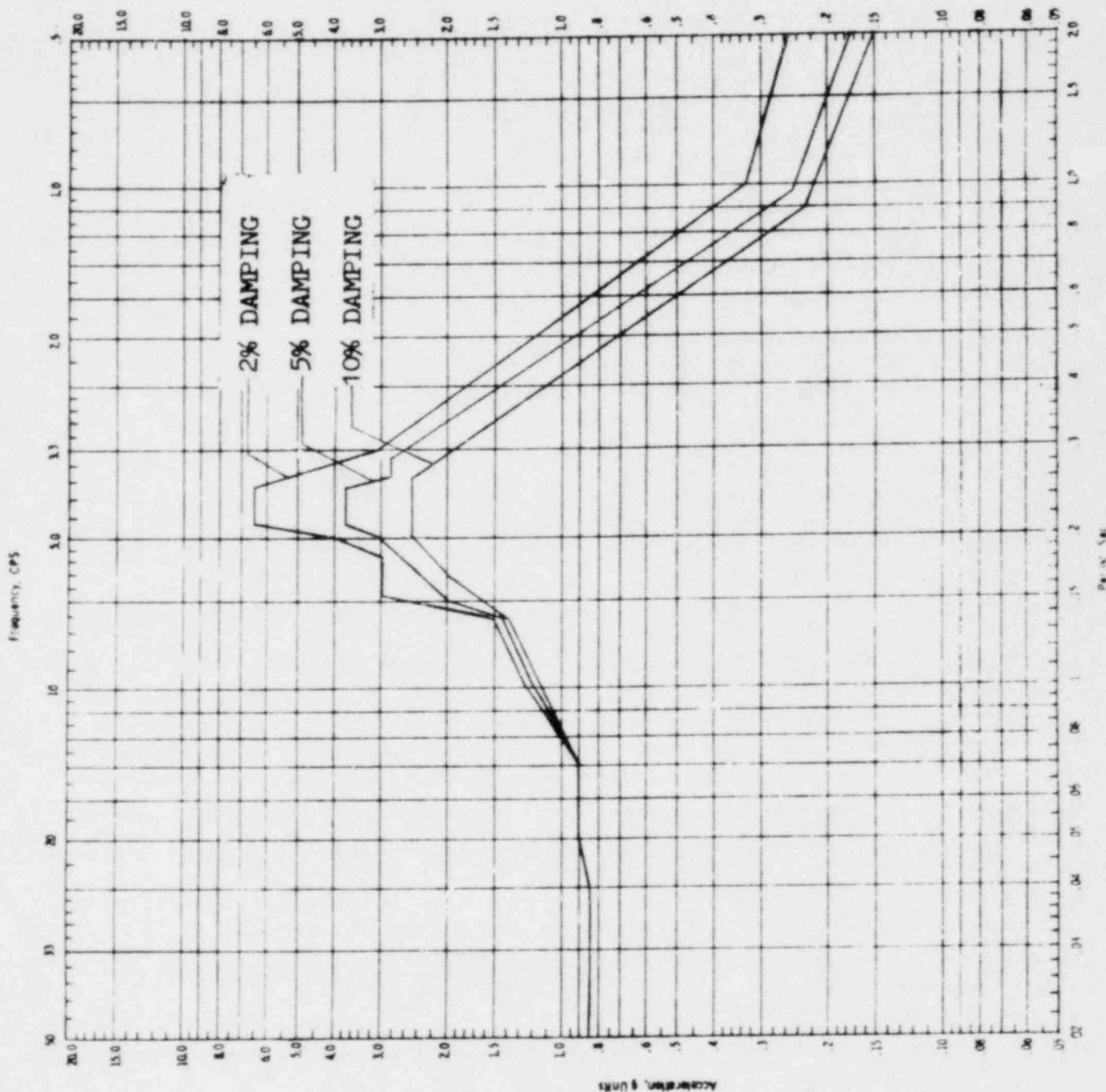
HORIZONTAL CRANE RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 654'-9"
NORTH - SOUTH COMPONENT

24-C



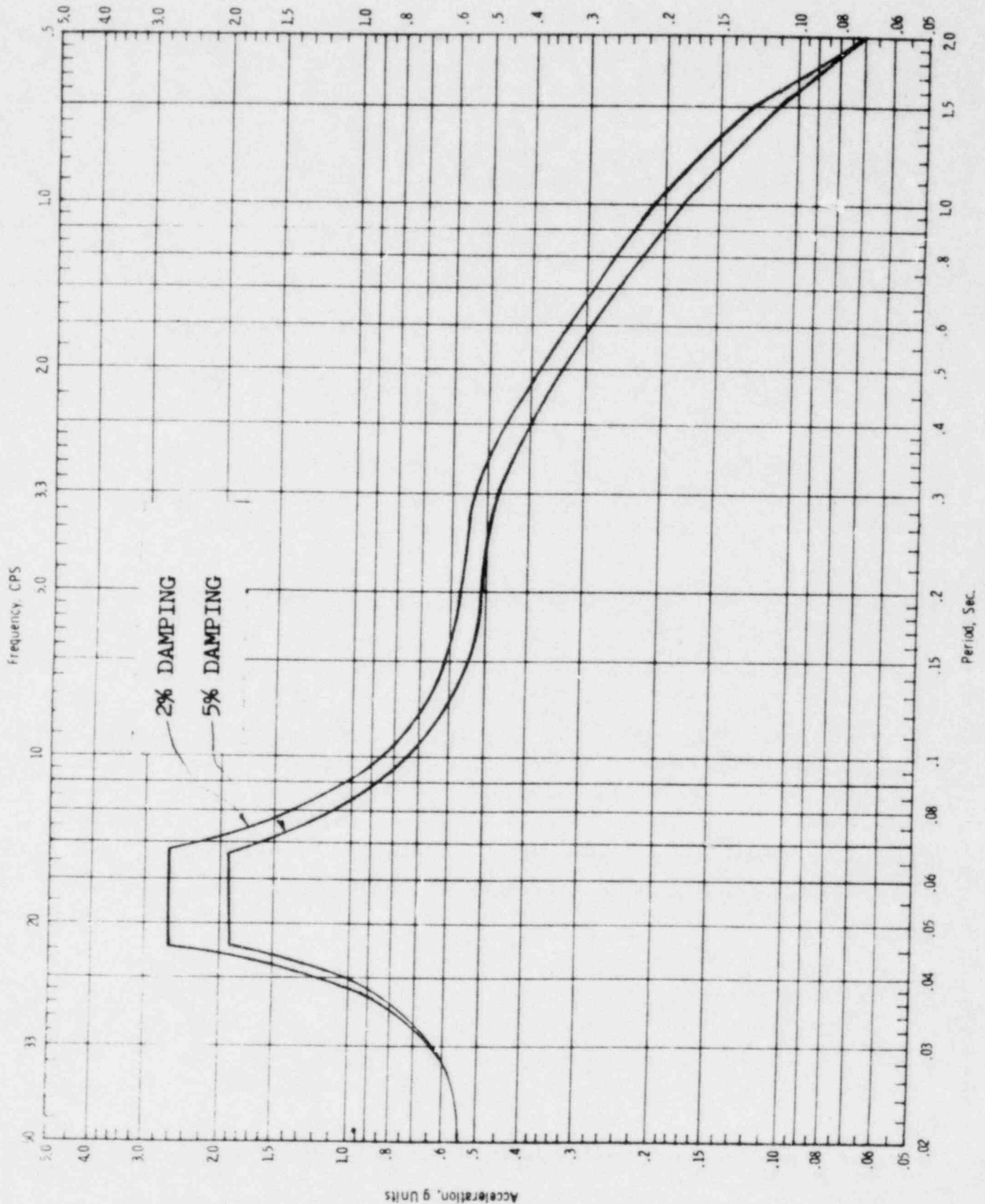
CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-1-71
CHECKED BY HHS DATE 4-1-71 SHEET 96 OF 120

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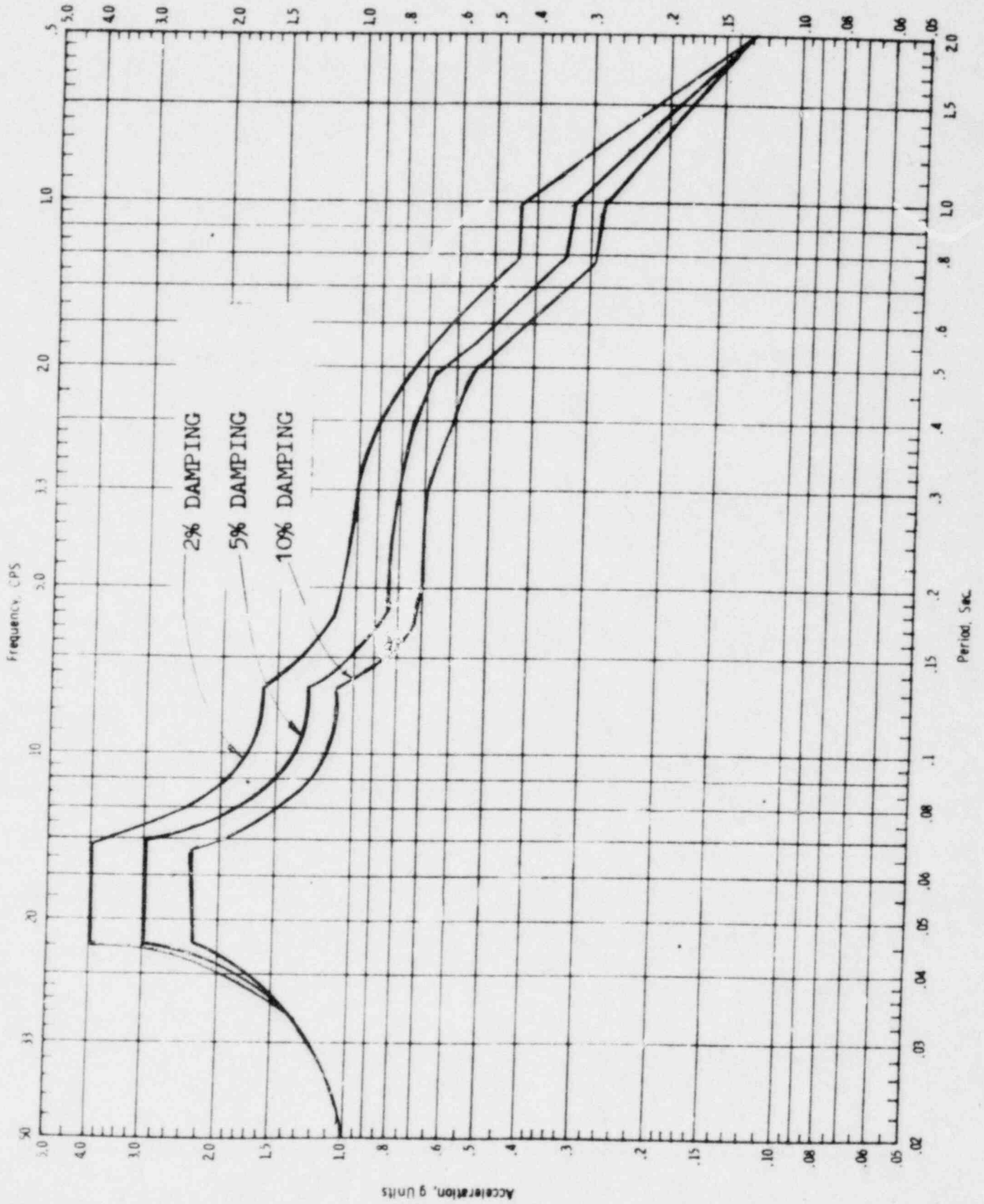


HORIZONTAL CRANE RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 654'-9"
EAST - WEST COMPONENT

24-D

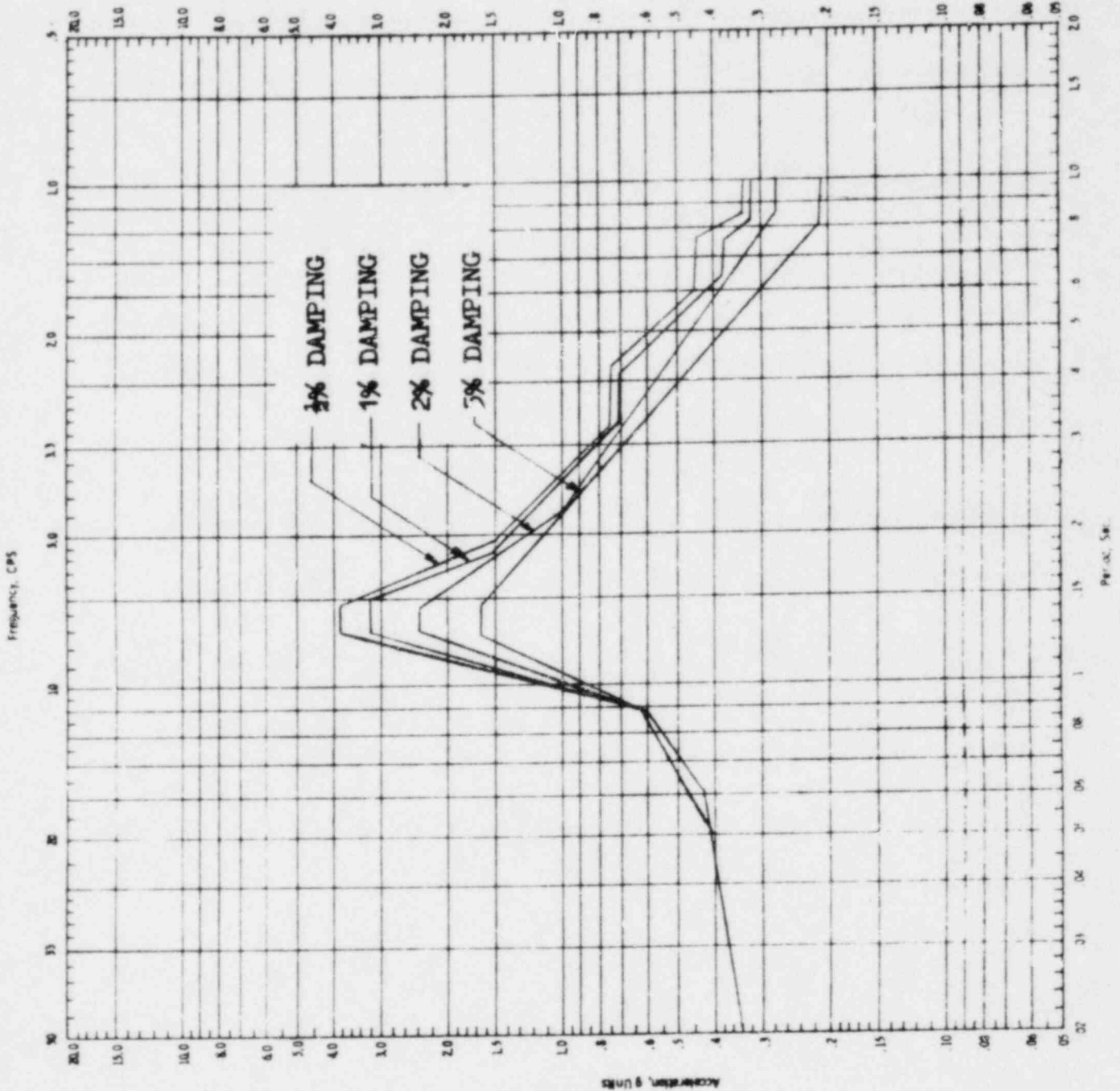


VERTICAL CRANE RESPONSE SPECTRA
 (OPERATING BASIS EARTHQUAKE)
 EL. 654'-9"



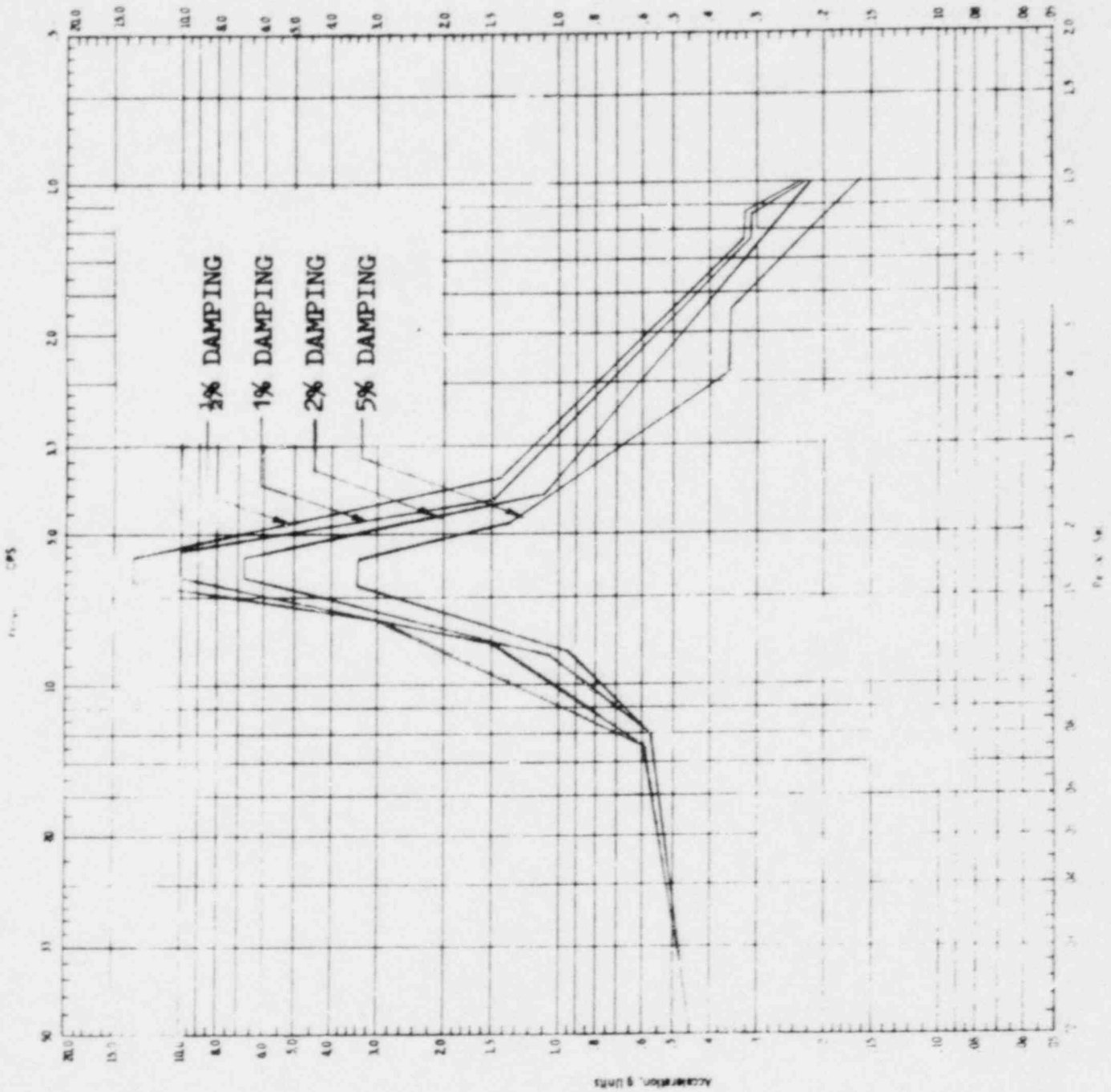
VERTICAL CRANE RESPONSE SPECTRA
 (DESIGN BASIS EARTHQUAKE)
 EL. 654'-9"

24-F



HORIZONTAL RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 546'-0"
 TURBINE FOUNDATION
 NORTH - SOUTH COMPONENT

25-A

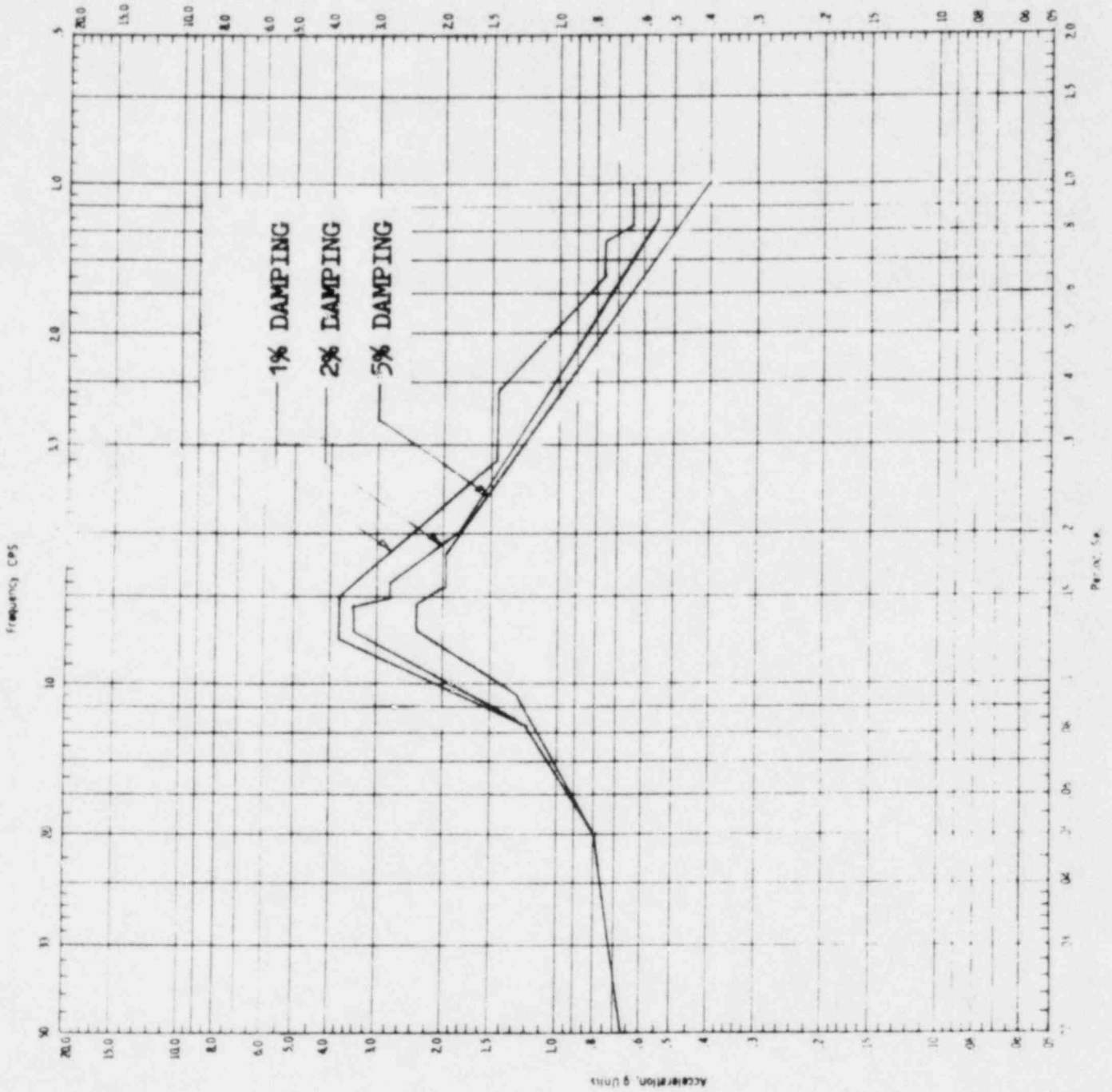


HORIZONTAL RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 EL. 546'-0"
 TURBINE FOUNDATION
 EAST - WEST COMPONENT

25-B

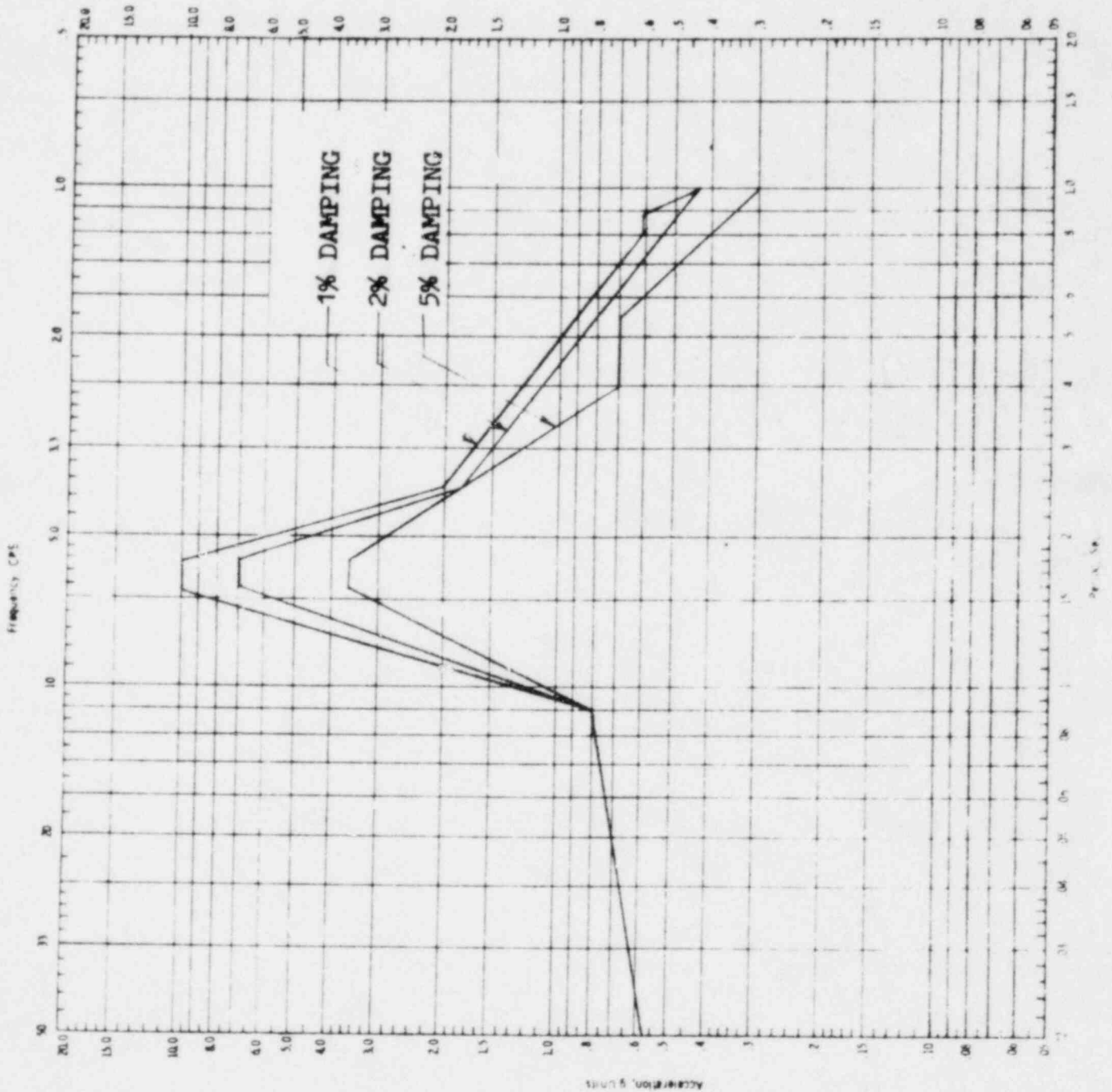


CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY H. LUBBART DATE 2-3-72
CHECKED BY HHS DATE SHEET 103 of 120



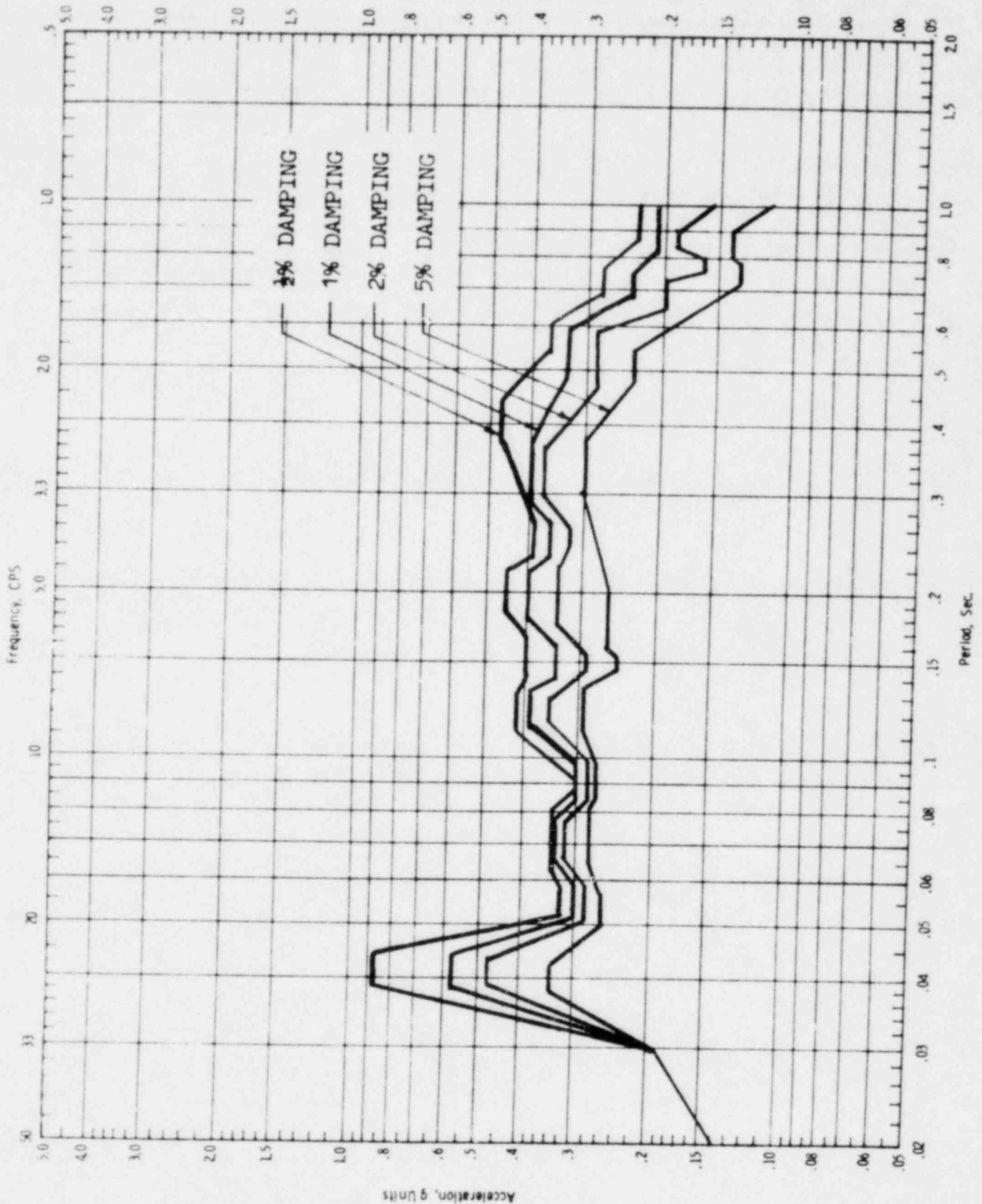
HORIZONTAL RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 546'-0"
TURBINE FOUNDATION
NORTH - SOUTH COMPONENT

25-C

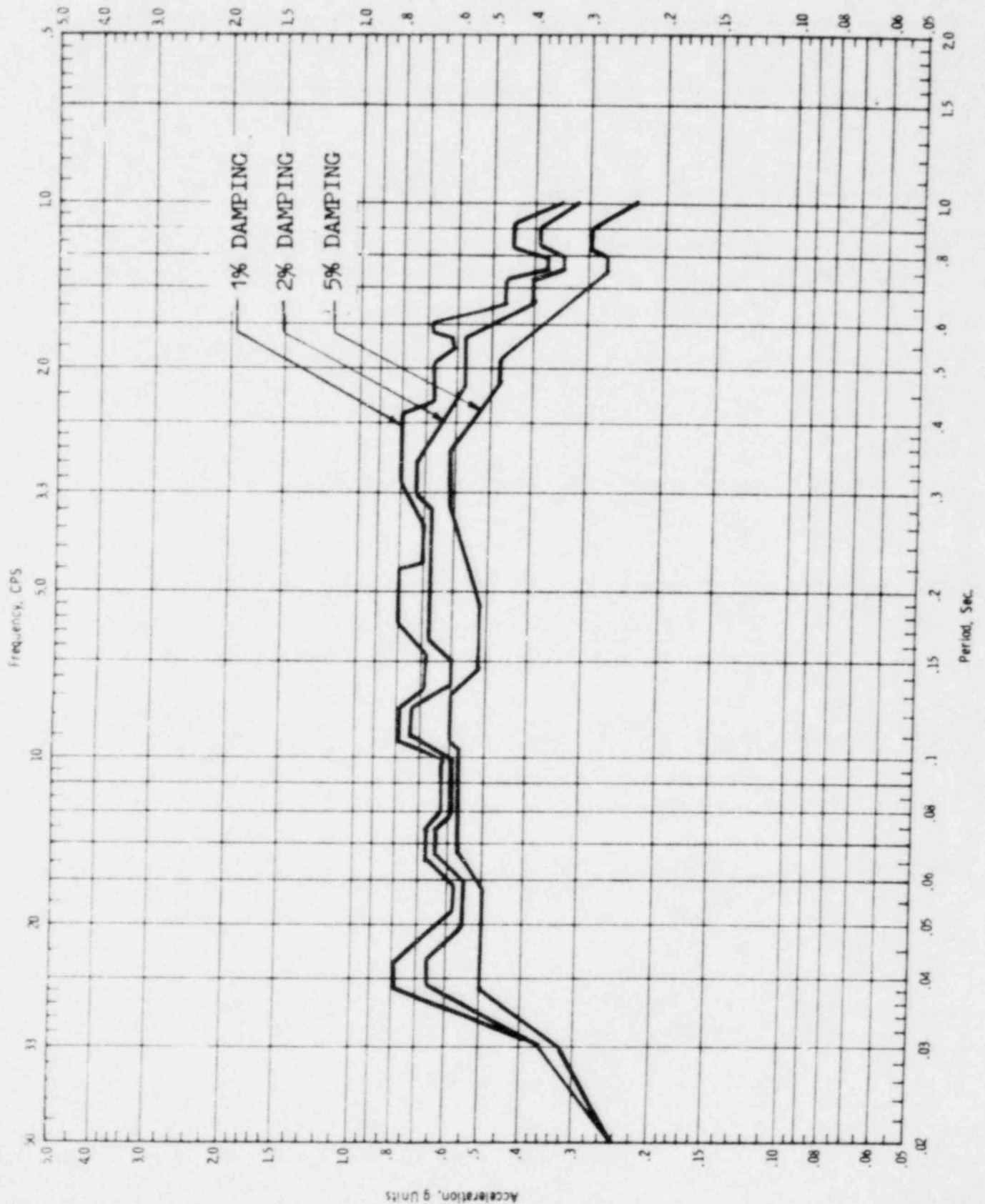


HORIZONTAL RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 EL. 546'-0"
 TURBINE FOUNDATION
 EAST - WEST COMPONENT

25-D



VERTICAL RESPONSE SPECTRA
(OPERATING BASIS EARTHQUAKE)
TURBINE FOUNDATION
EL. 546'-0"

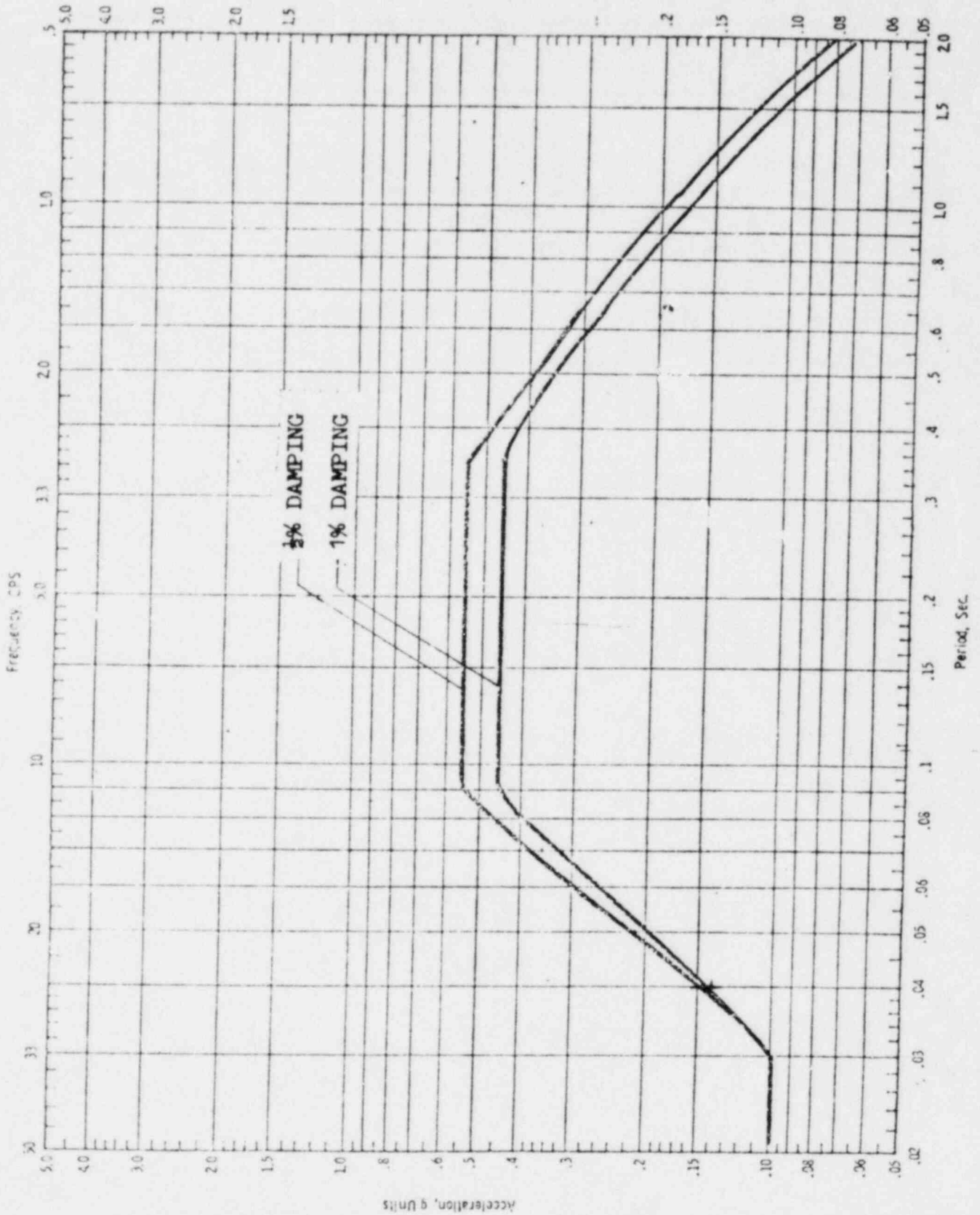


VERTICAL RESPONSE SPECTRA
(DESIGN BASIS EARTHQUAKE)
TURBINE FOUNDATION
EL. 546'-0"

SARGENT & LUNDY

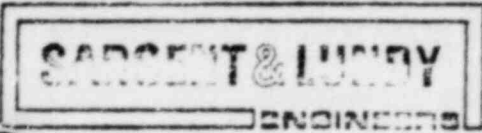
ENGINEERS

CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-5-72
CHECKED BY HHS DATE 6-5-72 SHEET 07 OF 20

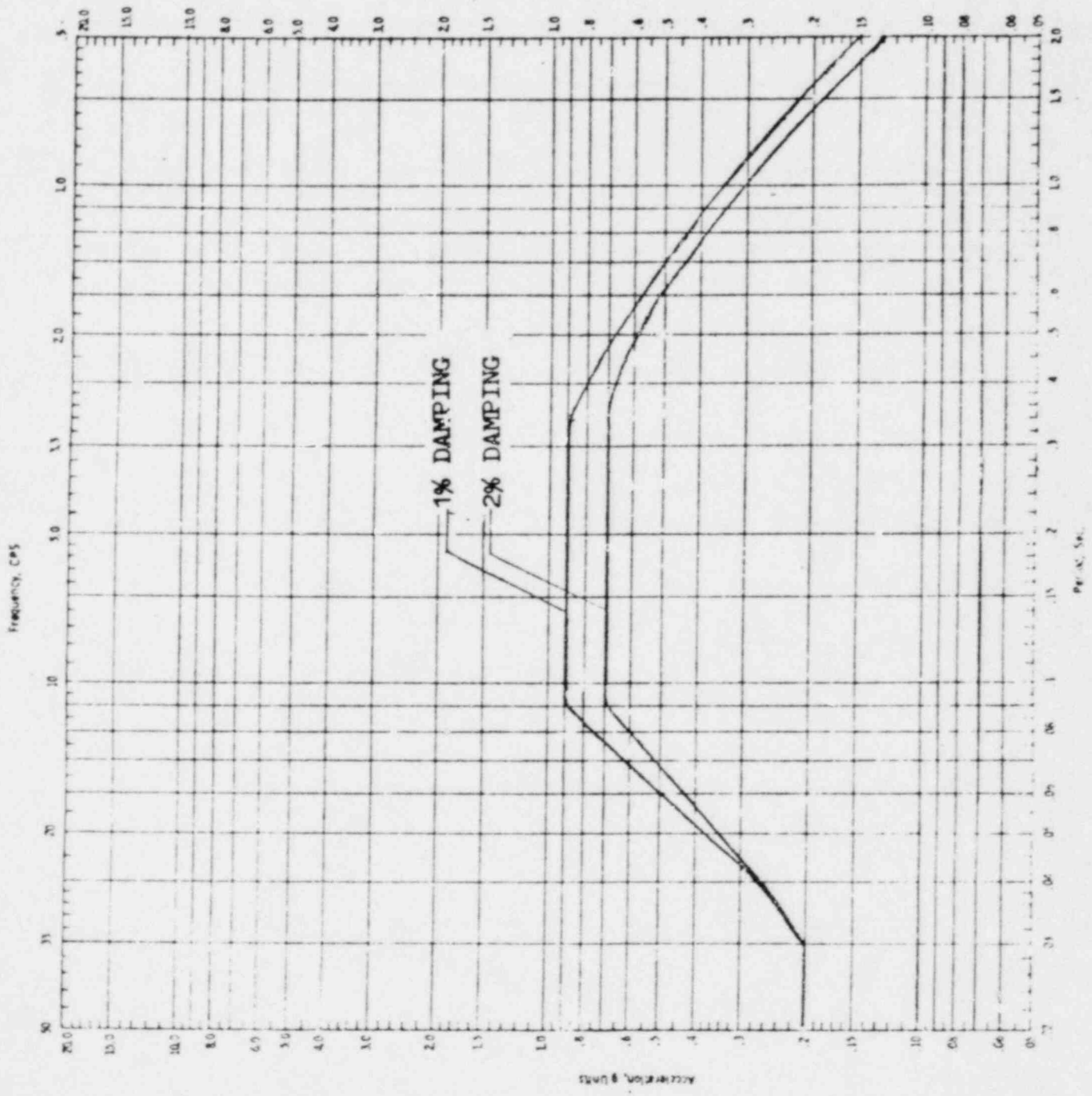


HORIZONTAL RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 435'-0" & 450'-0"
SERVICE WATER PUMP STRUCTURE

26-A 26-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-5-72
CHECKED BY HHS DATE 6-5-72 SHEET 108 OF 120



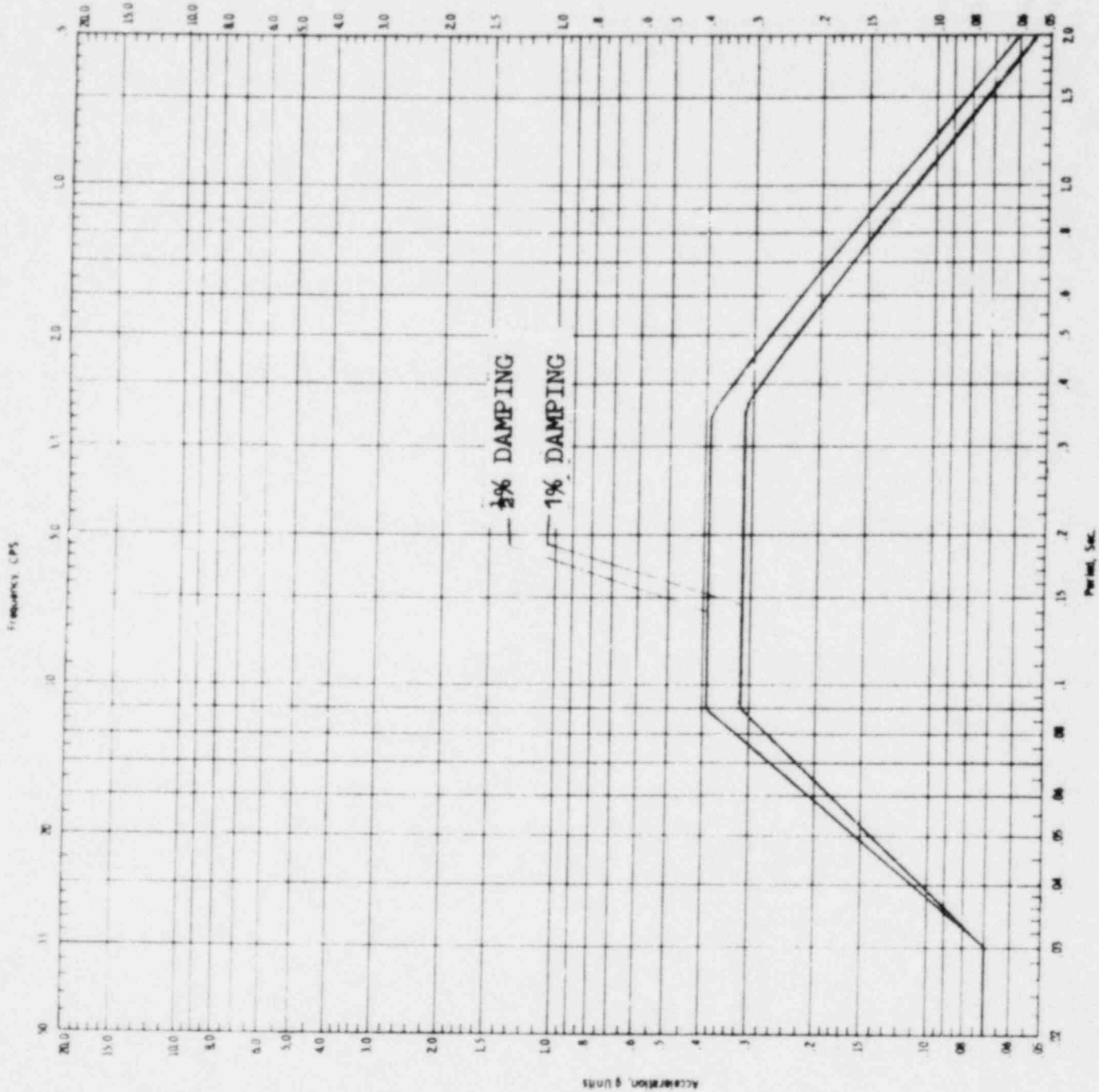
HORIZONTAL FLOOR RESPONSE SPECTRA
(DESIGN BASIS EARTHQUAKE)
EL. +35'-0" & 450'-0"
SERVICE WATER PUMP STRUCTURE
NORTH/SOUTH - EAST/WEST COMPONENT

26-C

26-D



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-7-72
CHECKED BY HHS DATE 6-7-72 SHEET 09 OF 120

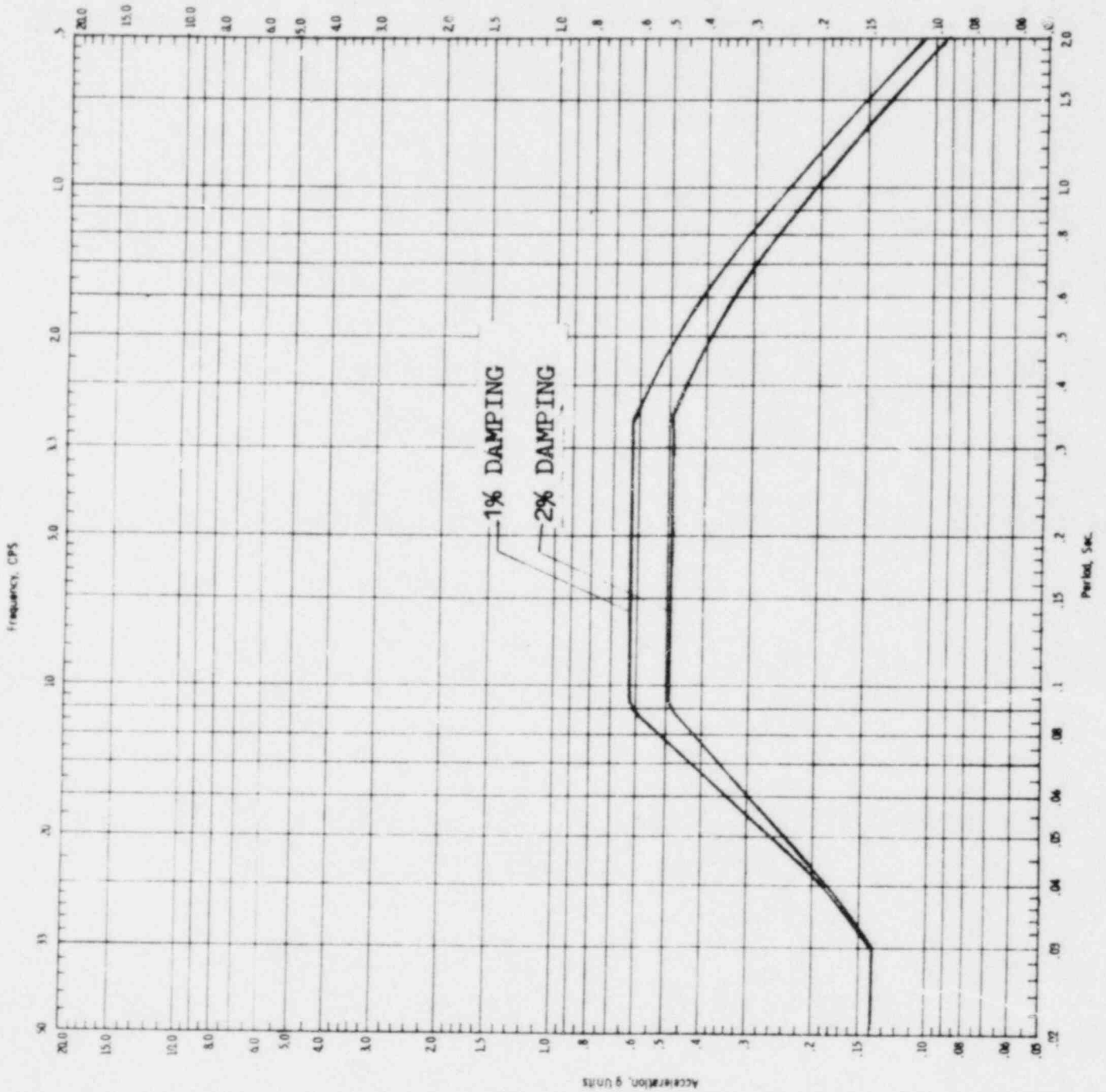


VERTICAL RESPONSE SPECTRA
(OPERATING BASIS EARTHQUAKE)
EL. 435'-0" & 450'-0"
SERVICE WATER PUMP STRUCTURE

26-E



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT WM. H. ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-7-72
CHECKED BY HHS DATE 6-7-72 SHEET 110 OF 120

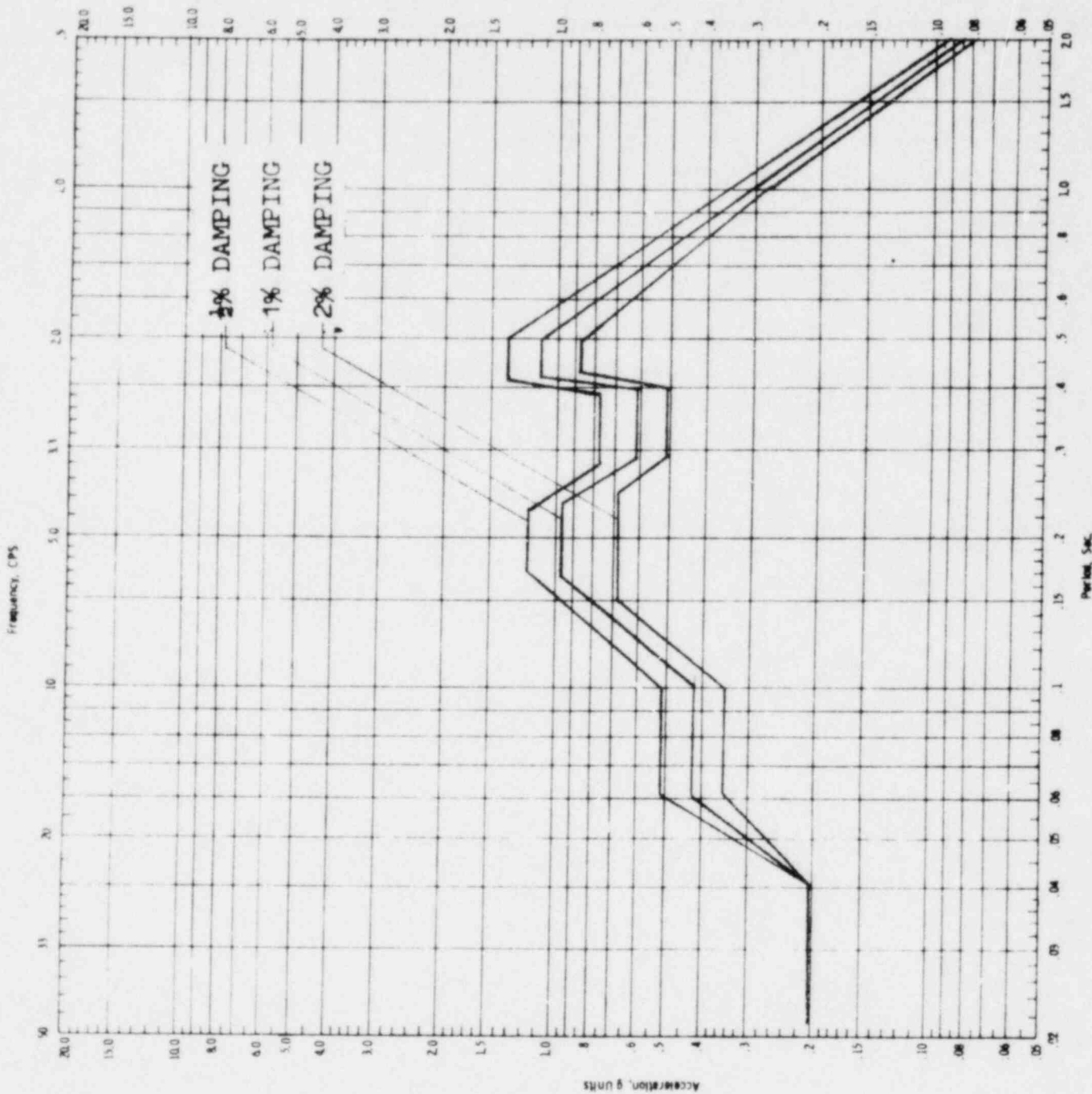


VERTICAL RESPONSE SPECTRA
(DESIGN BASIS EARTHQUAKE)
EL. 435'-0" & 450'-0"
SERVICE WATER PUMP STRUCTURE

26-F



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-7-72
CHECKED BY HHS DATE 6-7-72 SHEET III OF 12
Rev. 8-31-72



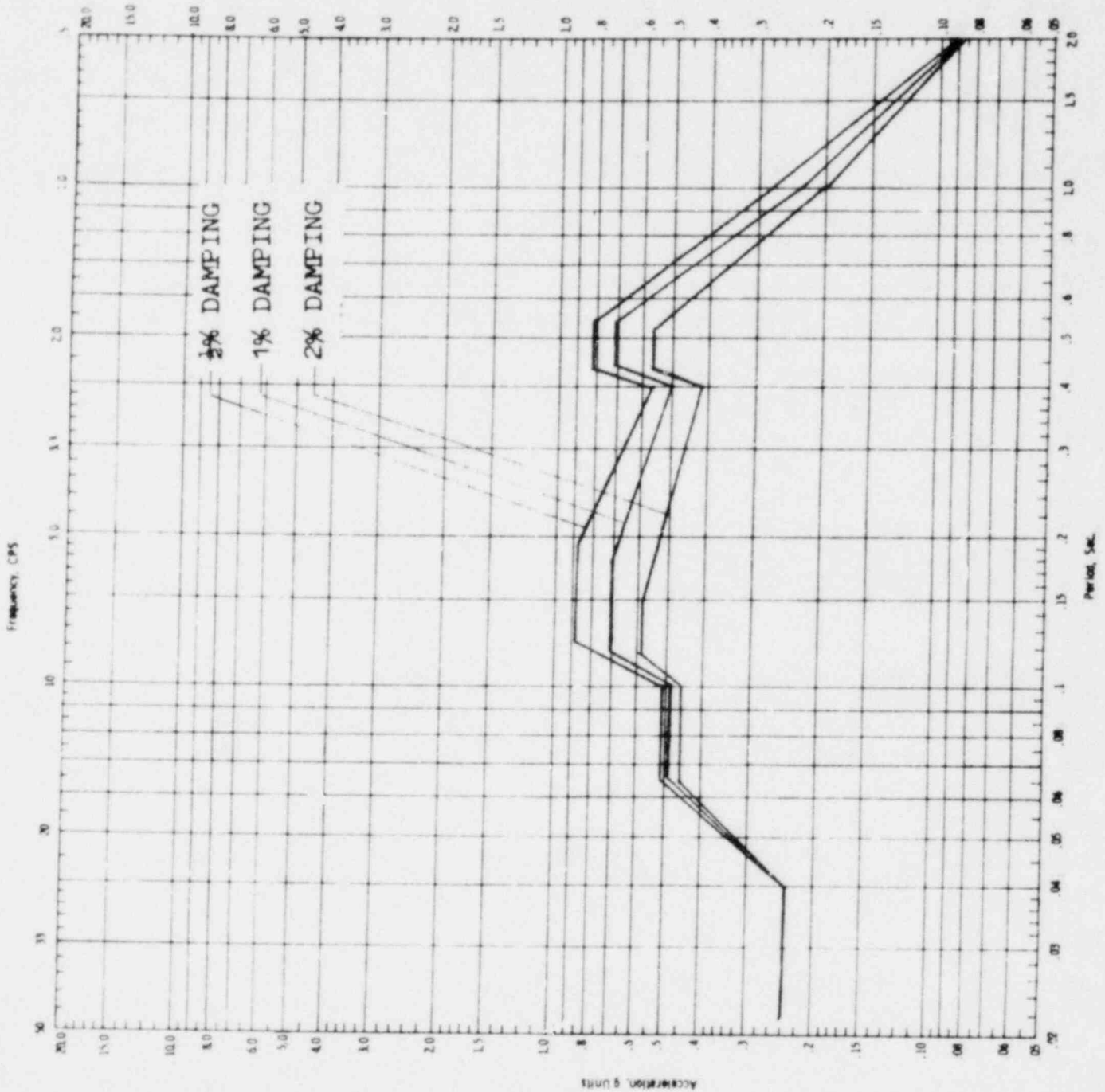
HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
ELEVATION - 490'-0" & 465'-0"
SERVICE WATER PUMP STRUCTURE
NORTH - SOUTH COMPONENT

27-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-7-72
CHECKED BY HHS DATE 6-7-72 SHEET 112 OF 120

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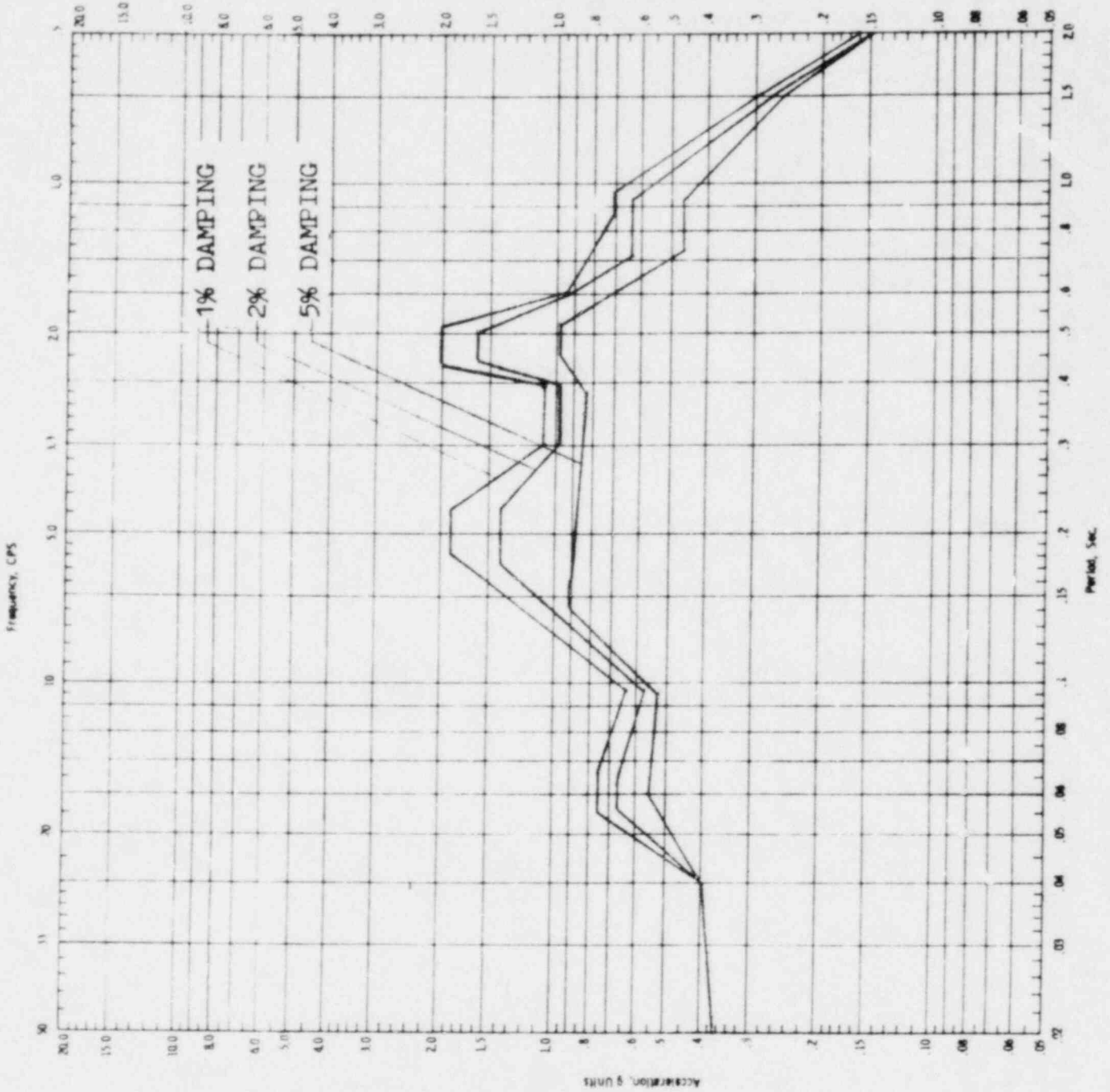
HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
ELEVATION - 490'-0" & 465'-0"
SERVICE WATER PUMP STRUCTURE
EAST - WEST COMPONENT

27-B



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-7-72
CHECKED BY HHS DATE 6-7-72 SHEET 19 OF 120

Rev. 8-31-72



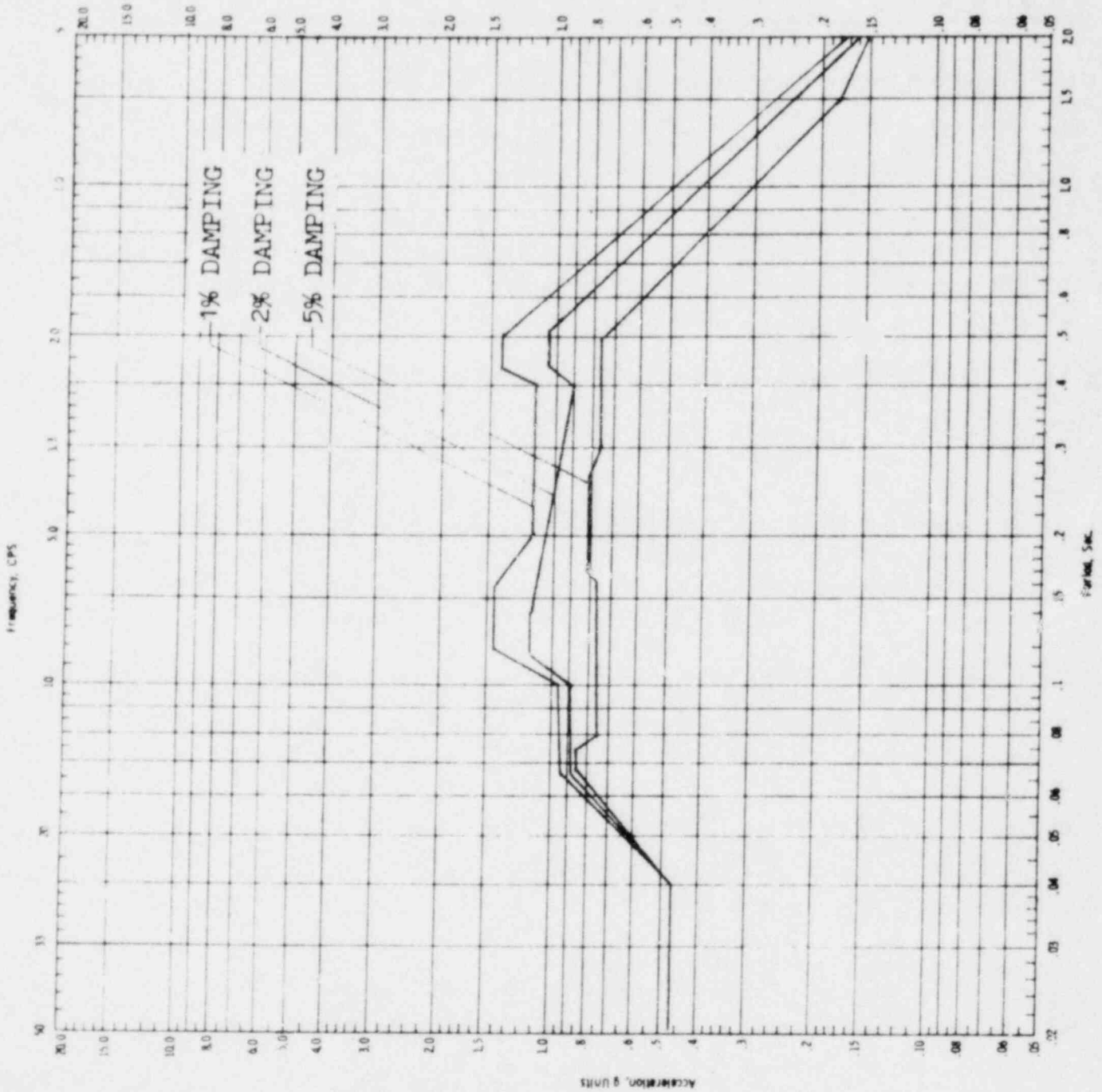
HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION - 490'-0" & 465'-0"
SERVICE WATER PUMP STRUCTURE
NORTH - SOUTH COMPONENT

27-C



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSE DATE 6-7-72
CHECKED BY HHS DATE 6-7-72 SHEET 14 OF 120

Rev. 8-31-72



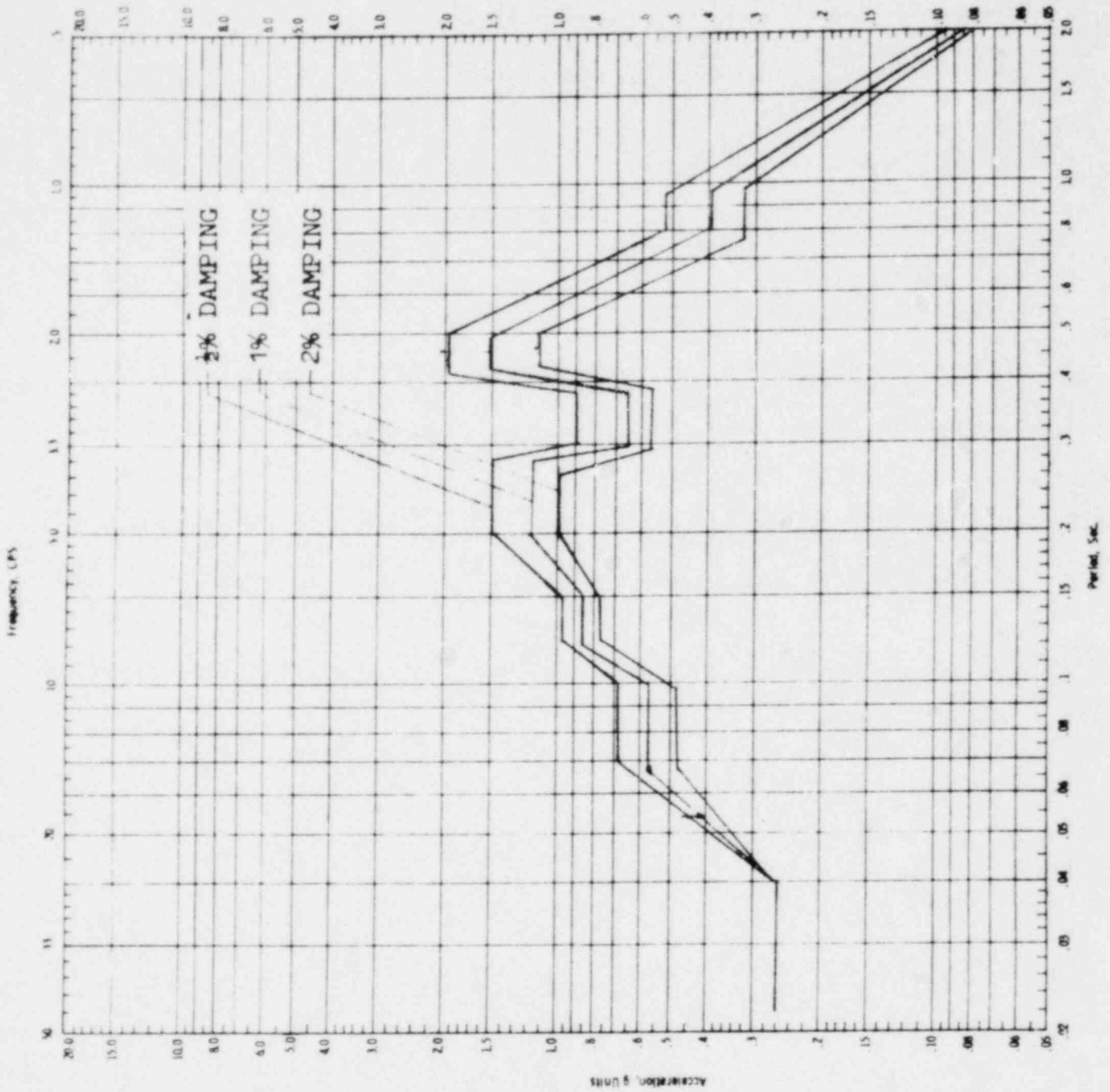
HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION - 490'-0" & 465'-0"
SERVICE WATER PUMP STRUCTURE
EAST - WEST COMPONENT

27-D



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-19-72
CHECKED BY HHS DATE 4-19-72 SHEET 115 OF 120

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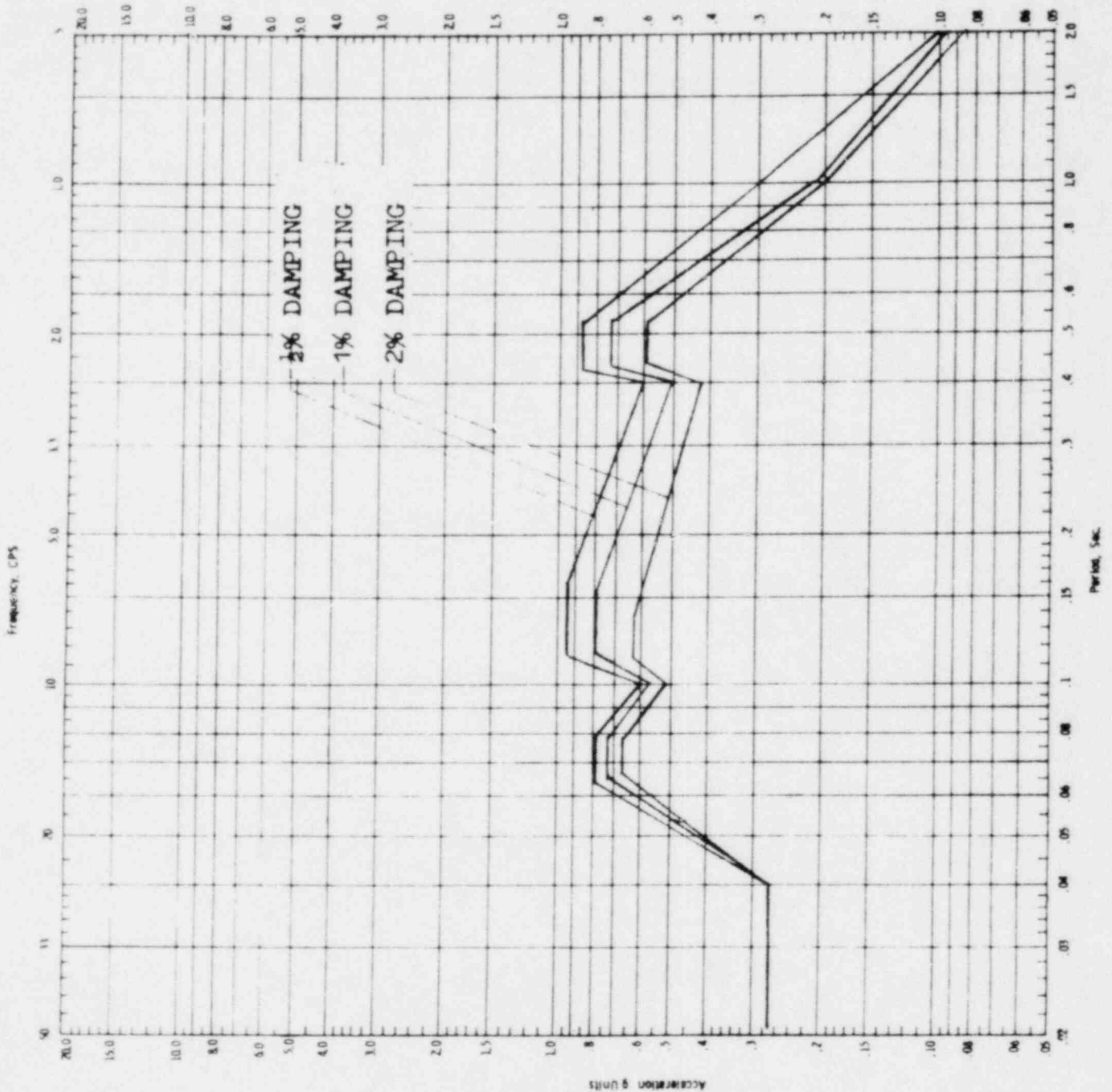
HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
ELEVATION - 521'-0"
SERVICE WATER PUMP STRUCTURE
NORTH - SOUTH COMPONENT

28-A



CLIENT CINCINNATI GAS & ELECTRIC CO.
 PROJECT ZIMMER JOB NO. 4130
 DESIGN BY GSE DATE 4-19-72
 CHECKED BY HHS DATE 4-19-72 SHEET 116 OF 120

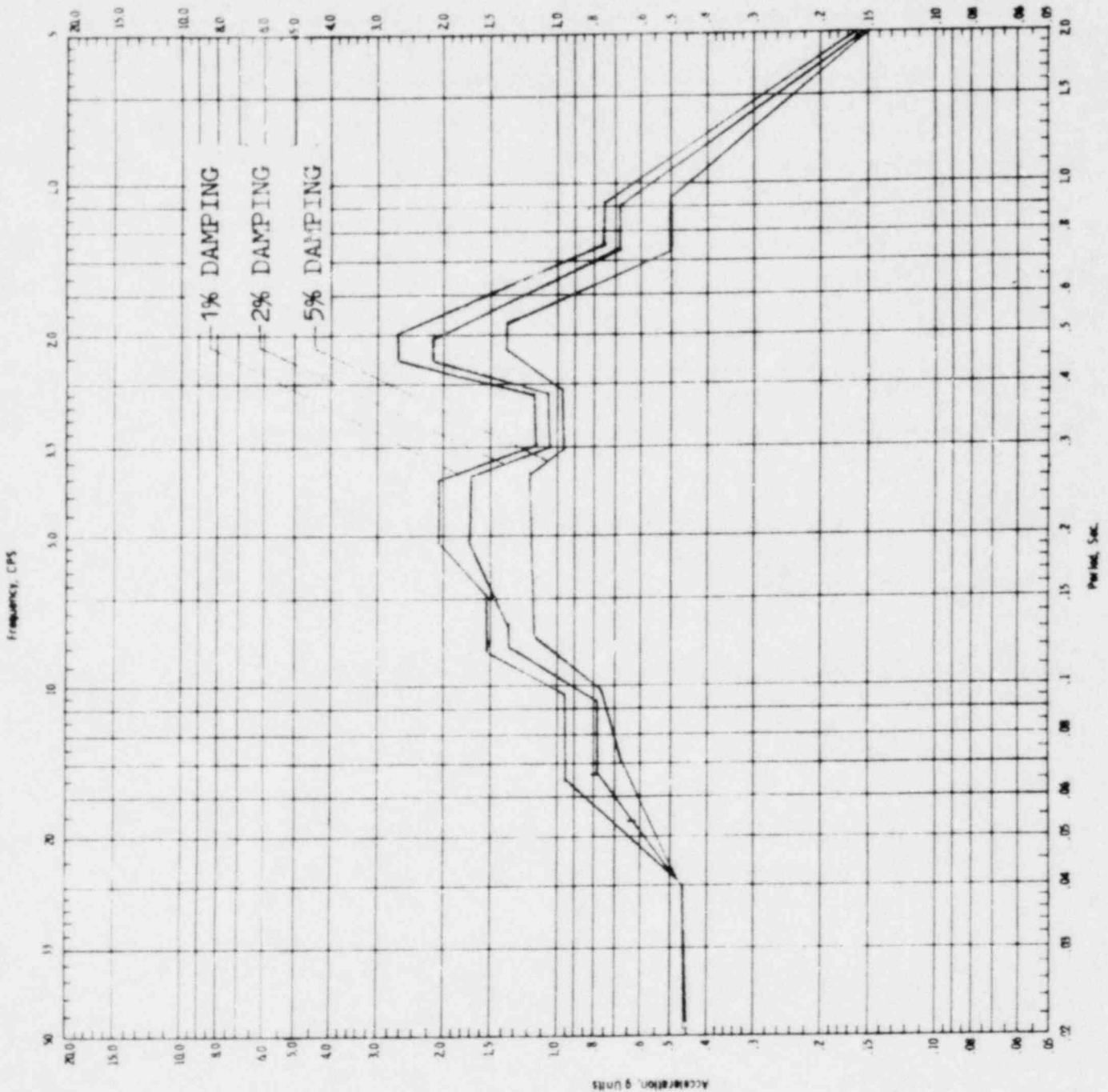
Rev. 8. 31-72



HORIZONTAL FLOOR RESPONSE SPECTRA
 OPERATING BASIS EARTHQUAKE
 ELEVATION - 521'-0"
 SERVICE WATER PUMP STRUCTURE
 EAST - WEST COMPONENT

28-B

Rev. 8-31-72



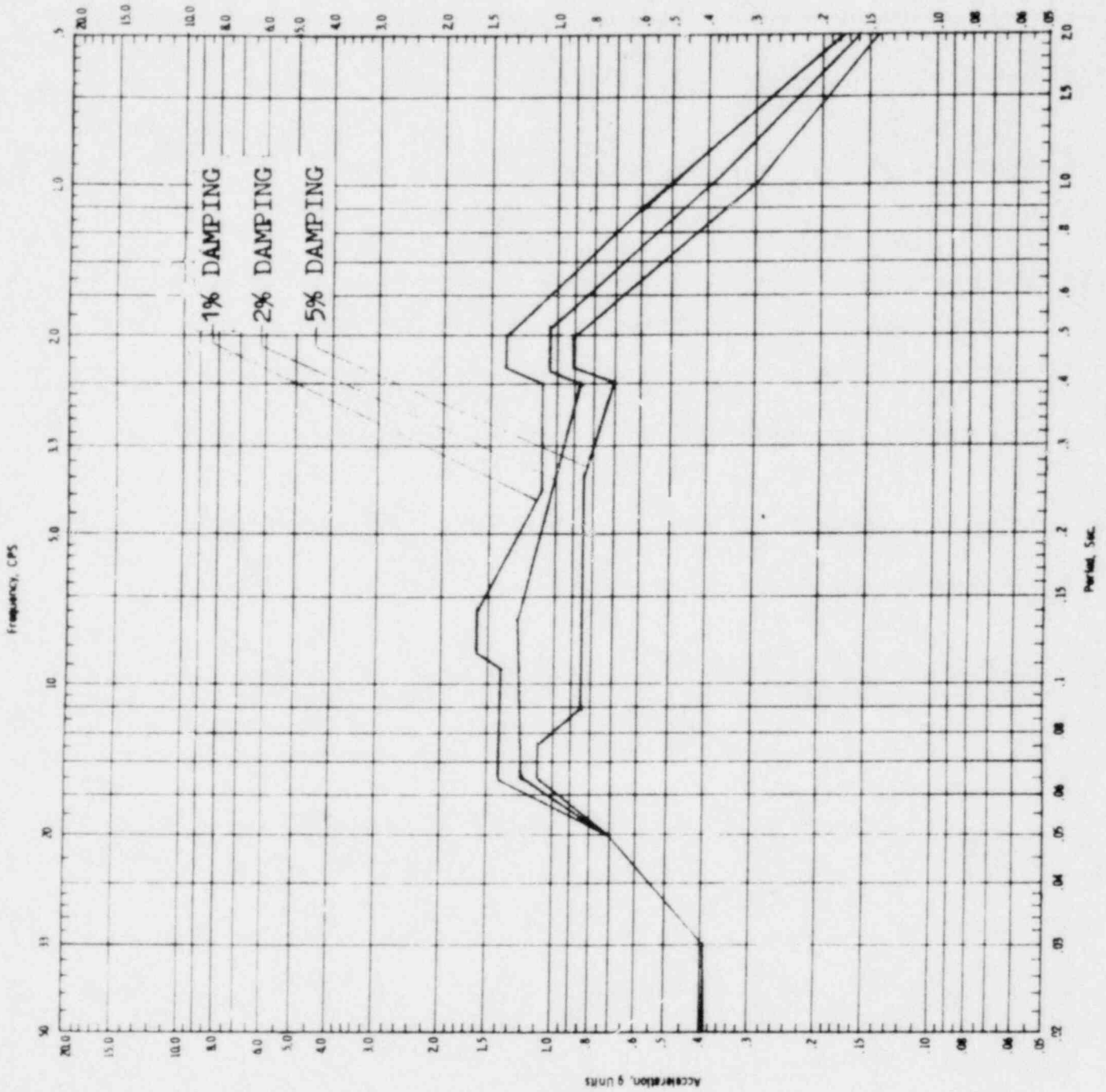
HORIZONTAL FLOOR RESPONSE SPECTRA
 DESIGN BASIS EARTHQUAKE
 ELEVATION - 521'-0"
 SERVICE WATER PUMP STRUCTURE
 NORTH - SOUTH COMPONENT

28-C



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 4-19-72
CHECKED BY HHS DATE 4-19-72 SHEET 13 OF 120

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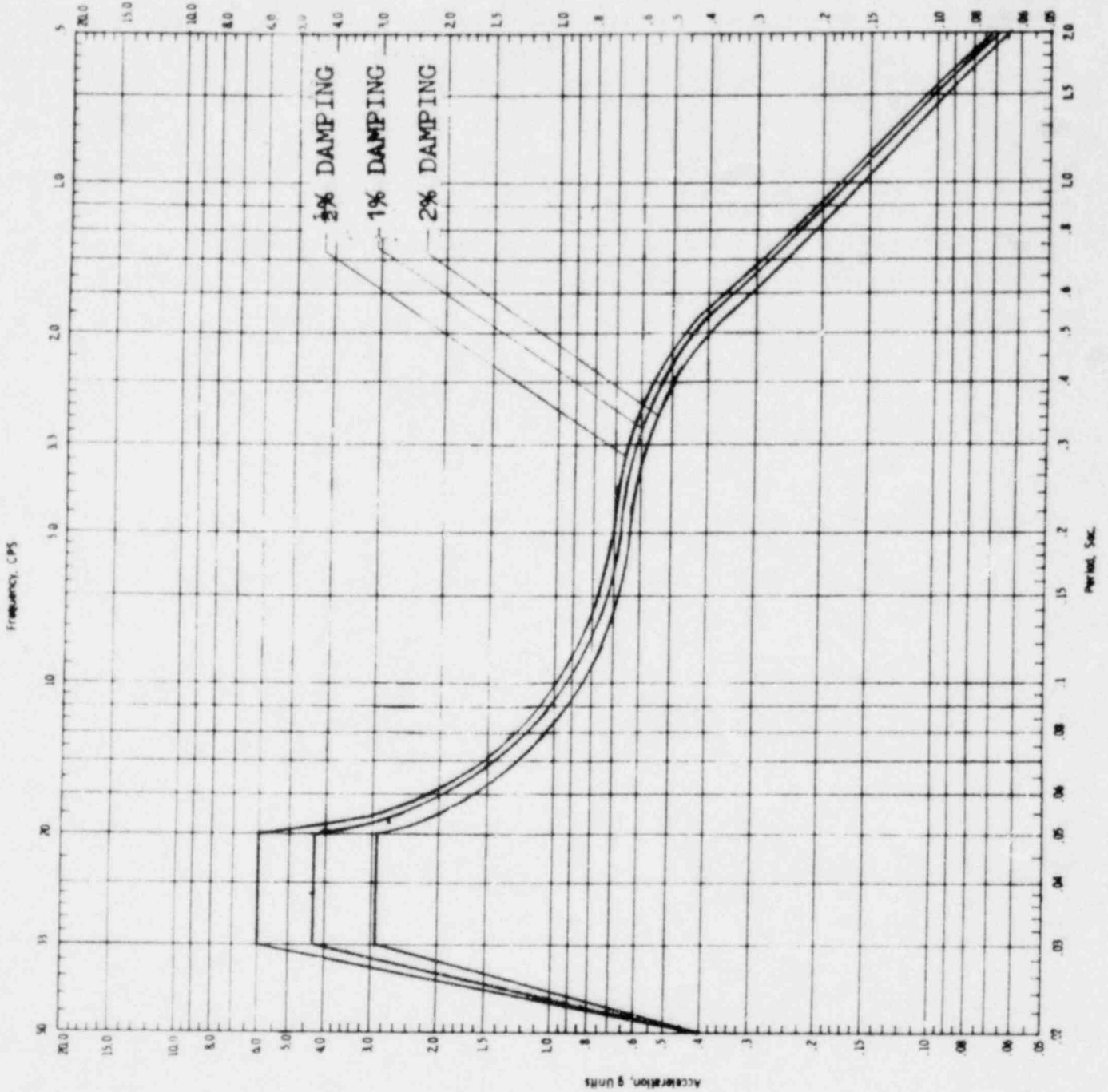
HORIZONTAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
ELEVATION - 521'-0"
SERVICE WATER PUMP STRUCTURE
EAST - WEST COMPONENT

28-D



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-7-72
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VERTICAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
EL. 521'-0", 490'-0" & 465'-0"
SERVICE WATER PUMP STRUCTURE

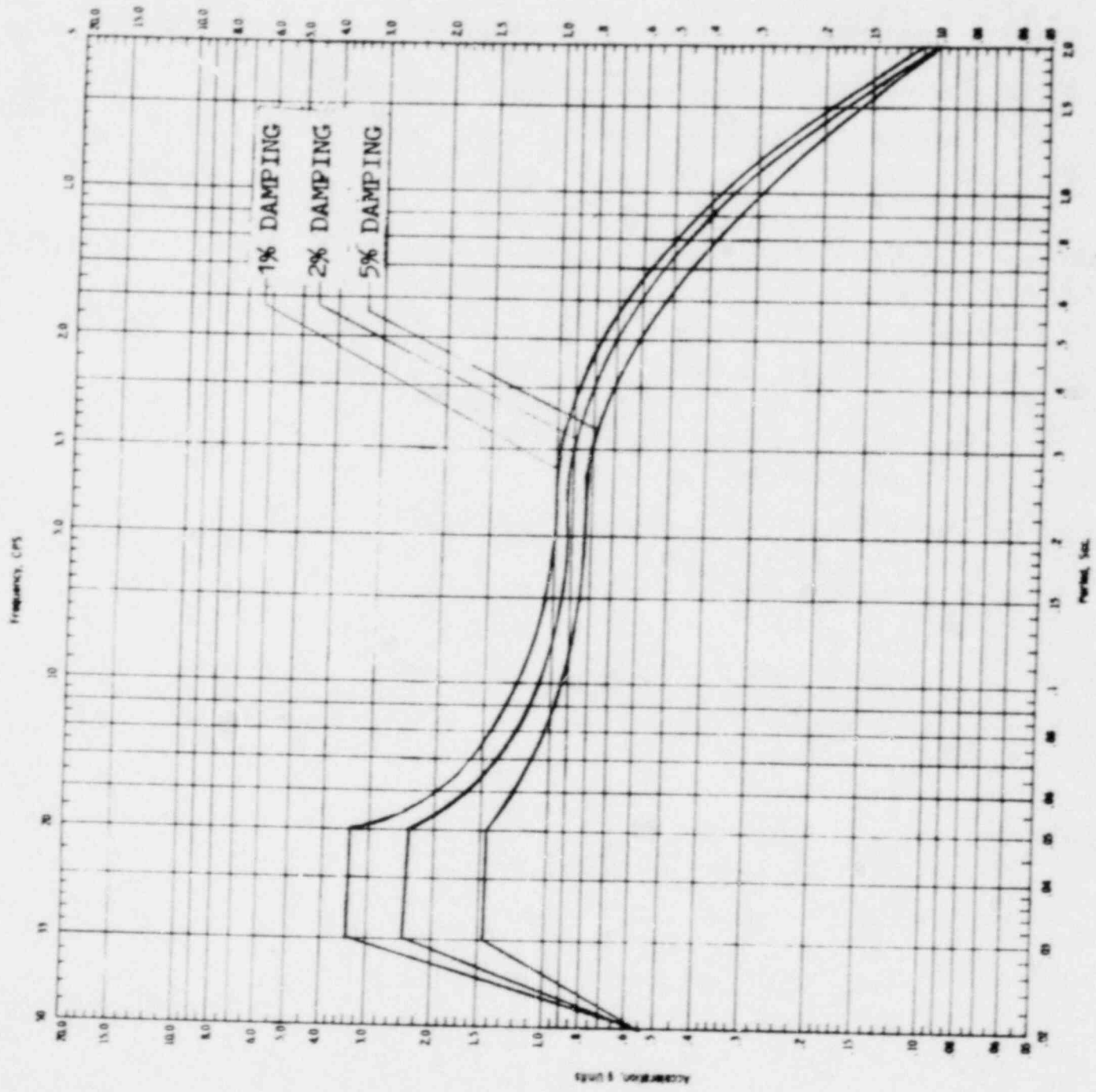
27-E

28-E



CLIENT CINCINNATI GAS & ELECTRIC CO.
PROJECT ZIMMER JOB NO. 4130
DESIGN BY GSB DATE 6-7-72
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VERTICAL FLOOR RESPONSE SPECTRA
DESIGN BASIS EARTHQUAKE
EL. 521'-0", 490'-0" & 465'-0"
SERVICE WATER PUMP STRUCTURE

27-F

28-F

SOIL-STRUCTURE INTERACTION
SEISMIC RESPONSE SPECTRA

THE CINCINNATI GAS & ELECTRIC COMPANY
WM. H. ZIMMER STATION - UNIT 1
PROJECT NO. 4130-15

Prepared by	<u>Oradia Lev</u>	Date	<u>8.13.1976</u>
Reviewed by	<u>B. Jain</u>	Date	<u>8/13/76</u>
Approved by	<u>C.N. Krishnaswamy</u>	Date	<u>Aug. 13, '76</u>

REPORT CODE

REPORT
TITLE

SOIL-STRUCTURE INTERACTION
SEISMIC RESPONSE SPECTRA

a) 973

Design Calculations

b)

Report on Seismic Analysis of the Reactor-
Auxiliary-Turbine Building Complex for
Wm. H. Zimmer Station Unit 1 for CG&E
Company submitted in August 1972.

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I. INTRODUCTION

This report contains the seismic response spectra of Wm. H. Zimmer Station Unit 1 building complex for Operating Basis Earthquake (OBE) and Design Basis Earthquake (DBE). In the calculations of these spectra the soil-structure interaction has been considered, as opposed to the fixed base analysis originally used wherein the effect of the soil-structure interaction was conservatively neglected.

II. ANALYTICAL MODEL

Minor modifications were made in the original analytical models used in Sargent & Lundy Report "Seismic Analysis of the Reactor-Auxiliary-Turbine Building Complex", by G. S. Baloch et al., August 1972 to account for the concrete plug in the reactor pedestal cavity. For vertical seismic analysis three models have been used to generate the spectra at elevations 627'-9", 593'-6" and 546'-0". The time history method of analysis is used to generate the floor and wall response spectra. The horizontal and a typical vertical seismic model are shown in Figures 1 and 2 respectively.

III. DYNAMIC FORCING FUNCTION

The procedure used to derive the foundation time histories takes into account the dynamic interaction between soil and structure, the strain dependent soil properties, and the variability of earthquake motion spectra. The general procedure used is as follows:

1. An earthquake time history is developed to fit the NRC wide band spectrum.
2. The above time history is specified at the free field foundation level and the corresponding rock motion is derived with a one-dimensional wave analysis.

III. DYNAMIC FORCING FUNCTION (cont'd)

3. The rock motion thus obtained is applied to a two-dimensional, plane strain, finite element model consisting of the soil and the structure to obtain the time history at the foundation.

The above procedure is carried out for the North-South, East-West and Vertical components of both earthquakes OBE and DBE. Strain dependent soil properties are obtained in steps two and three for the analysis of North-South component and, for compatibility, the same properties are used in the East-West and Vertical analysis. The input foundation time histories for North-South, East-West and Vertical components are shown on Figures 3 through 8.

IV. RESPONSE SPECTRA INDEXING SCHEME

The response spectra identification numbers used are identical to those used in the original report. The response spectra presented cover a range of frequencies from 0.5 HZ to 50 HZ and damping values of 1/2, 1, 2, and 5 percent of critical damping for OBE and 1, 2, 5, and 10 percent of critical damping for DBE. Damping values associated with each set of curves are noted on the top of the page. The largest damping value corresponds to the lowest curve plotted, and the smallest damping value corresponds to the highest curve plotted, as shown on the first sets of response spectra on pages 18 and 20 for OBE and DBE respectively.

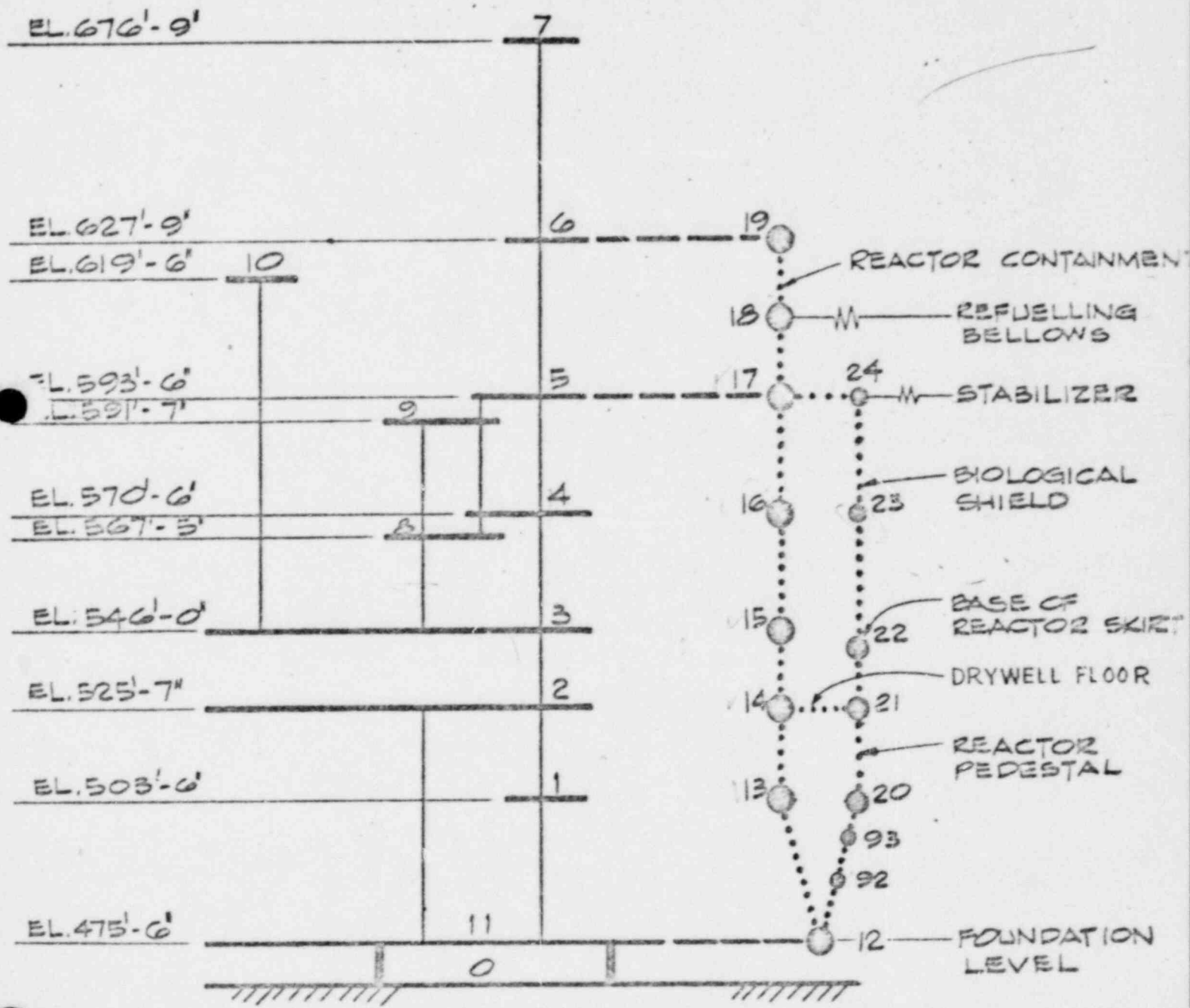


FIGURE - 1
SOIL - STRUCTURE INTERACTION
HORIZONTAL SEISMIC MODEL

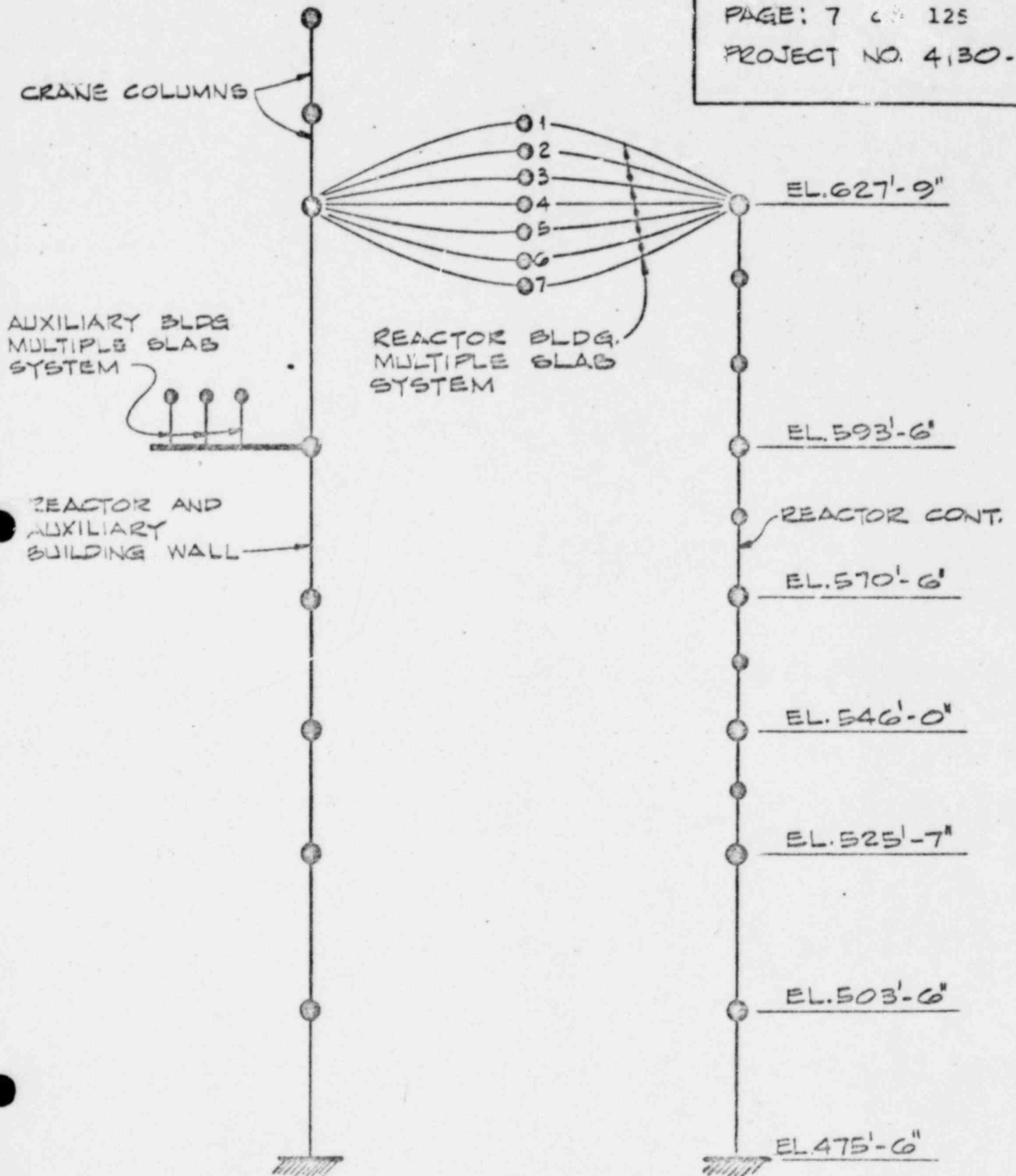
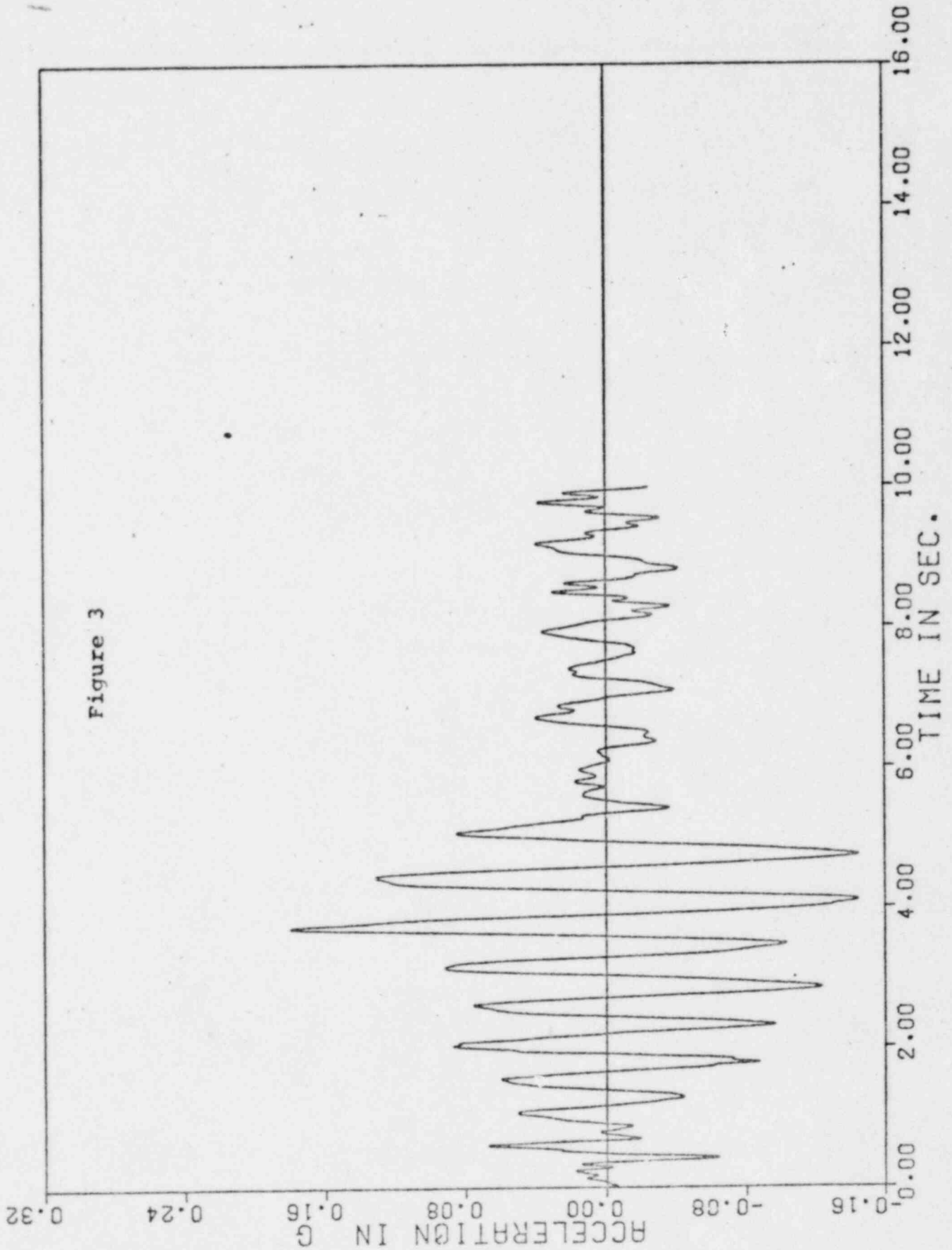


FIGURE-2 VERTICAL MODEL
(FOR GENERATING SPEC. AT EL. 627'-9")



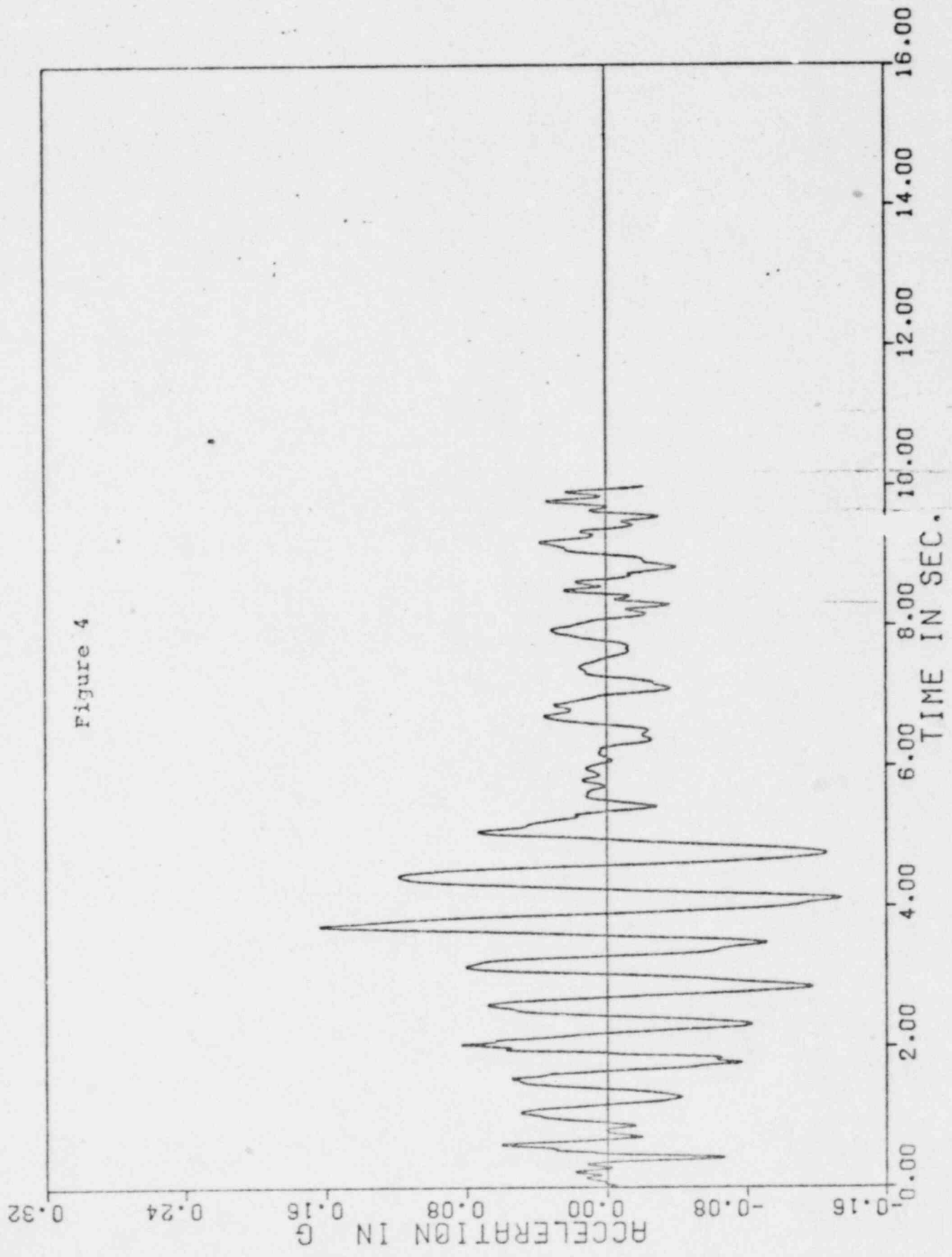
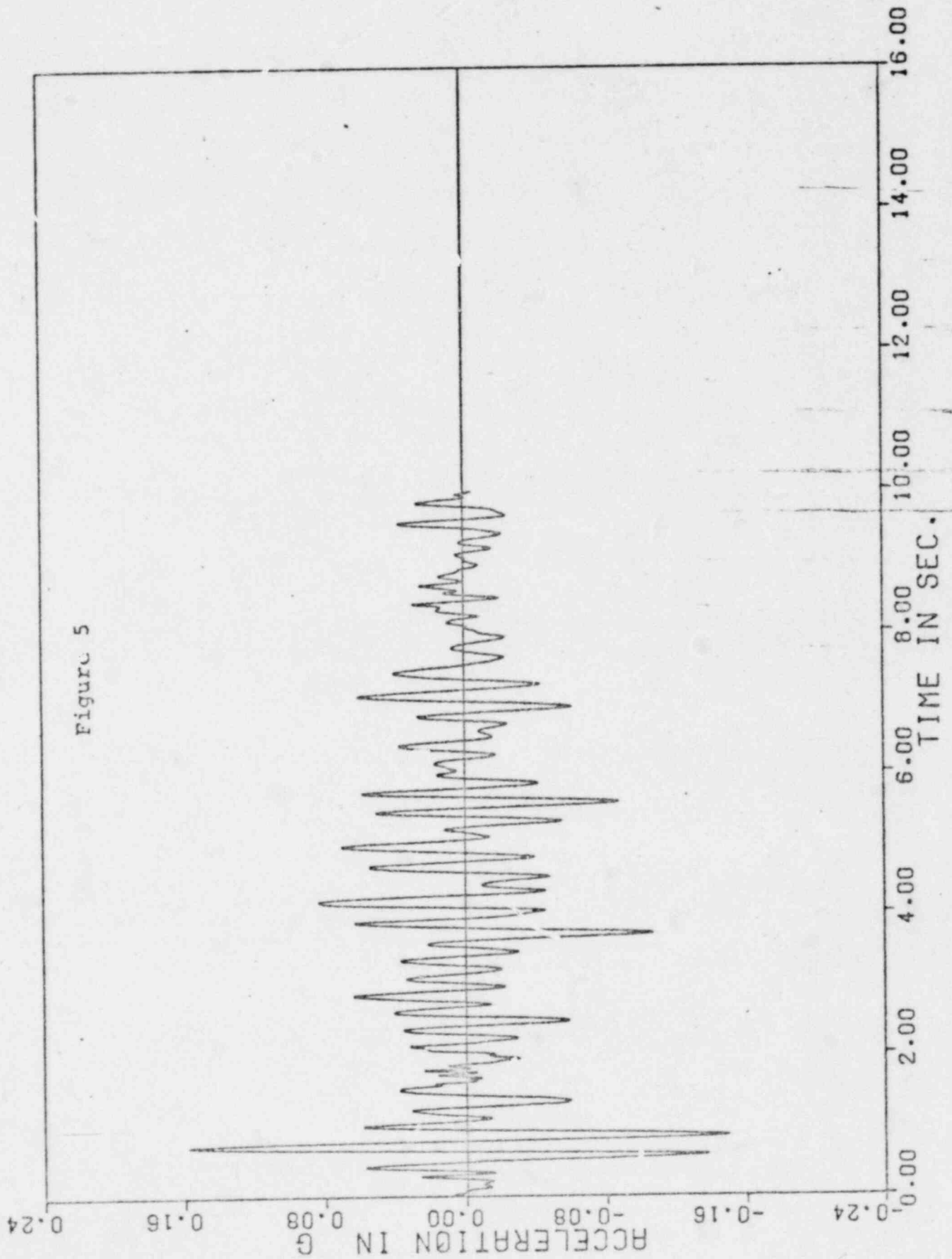
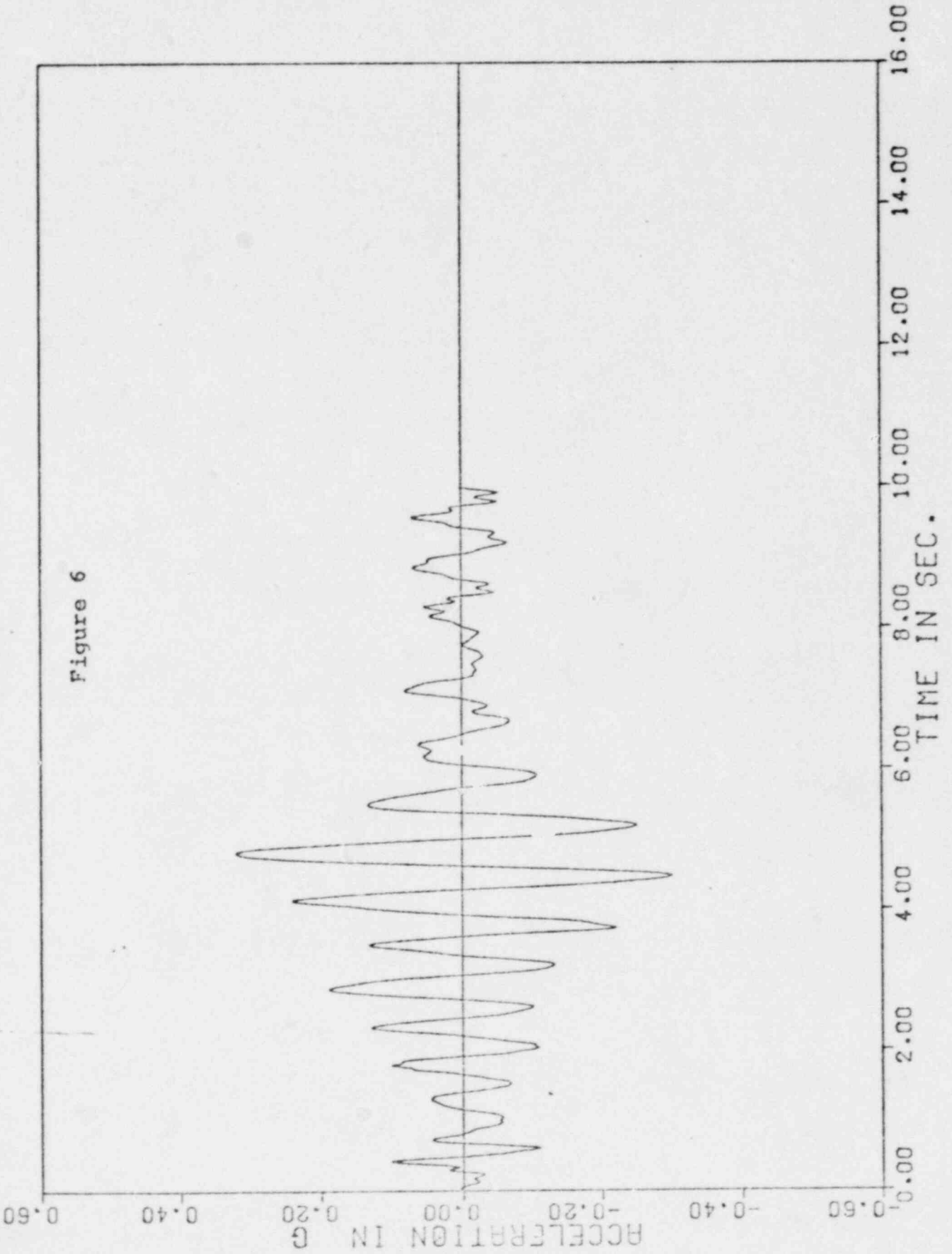


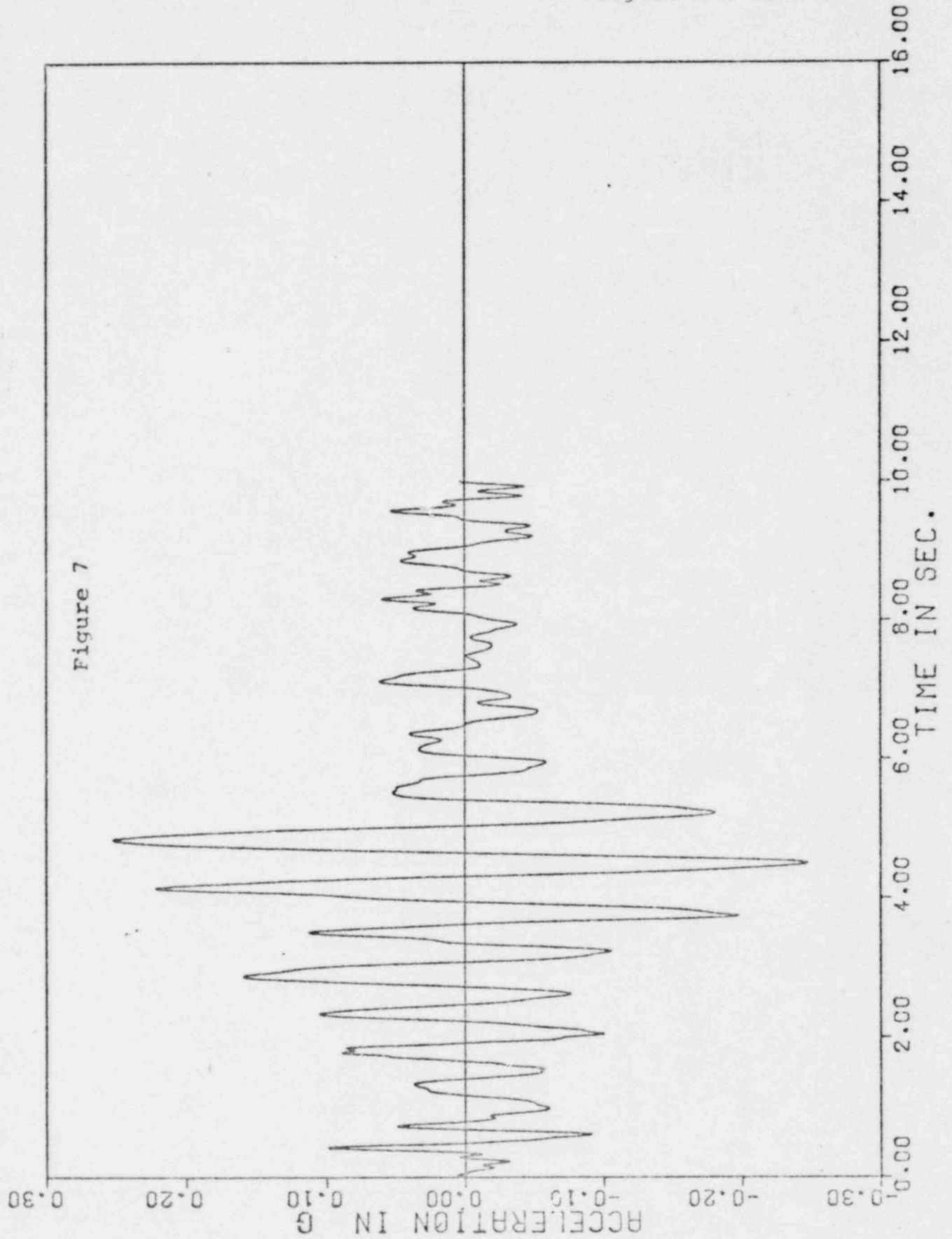
Figure 4

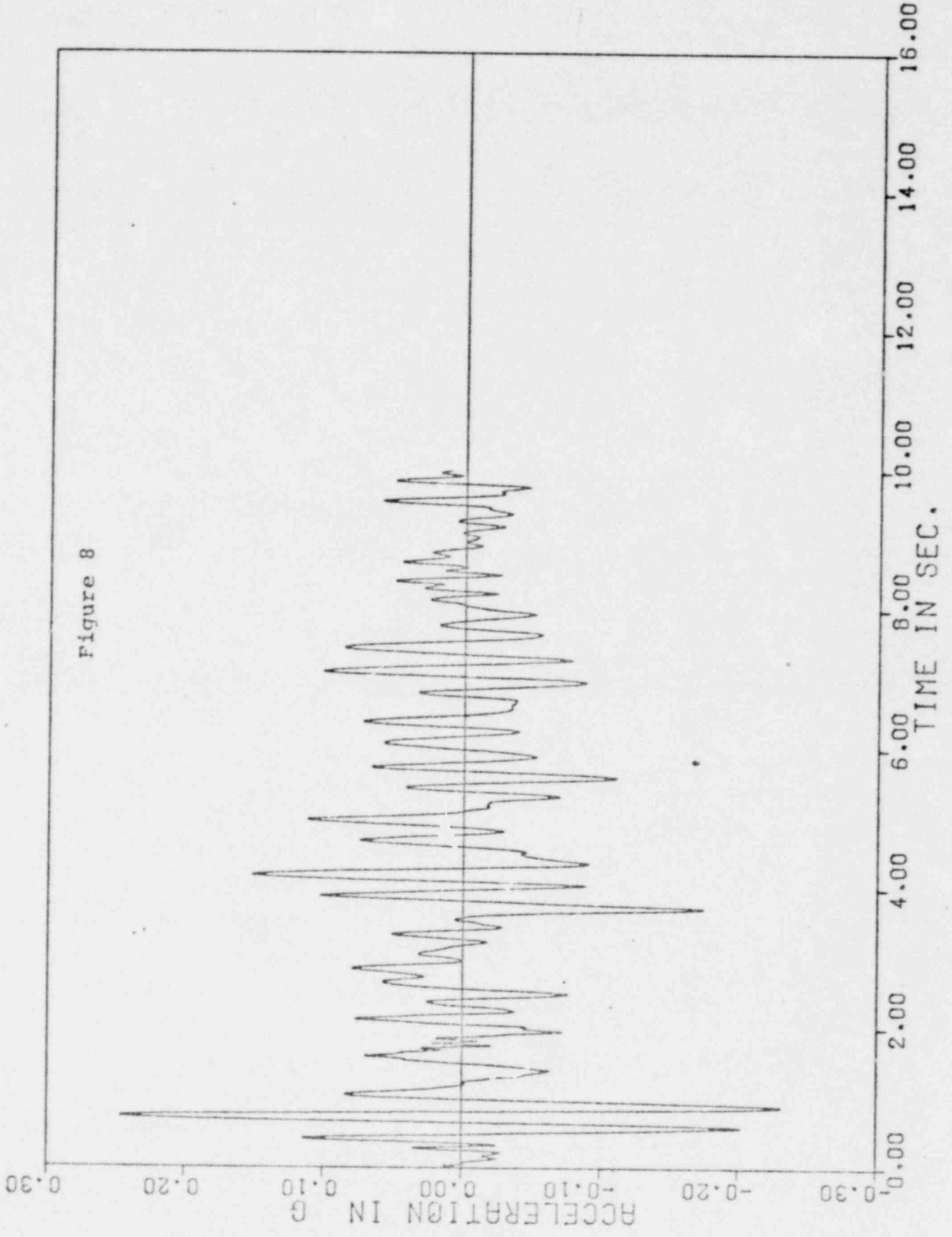
TIMMED 413015 SDD-EMD-030-09



NUMBER 413015 SOIL STRUCTURE VIBRATION







RESPONSE SPECTRA INDEX

<u>Spectra Number</u>		<u>Elevation</u>		<u>Sheet Number</u>
1-A	N-S, O.B.E.	503'-6"	Reactor Building Slab	18
1-B	E-W, O.B.E.	503'-6"	Reactor Building Slab	19
1-C	N-S, D.B.E.	503'-6"	Reactor Building Slab	20
1-D	E-W, D.B.E.	503'-6"	Reactor Building Slab	21
2-A	N-S, O.B.E.	525'-7"	Reactor, Auxiliary, Turbine Building Slab	22
2-B	E-W, O.B.E.	525'-7"	Reactor, Auxiliary, Turbine Building Slab	23
2-C	N-S, D.B.E.	525'-7"	Reactor, Auxiliary, Turbine Building Slab	24
2-D	E-W, D.B.E.	525'-7"	Reactor, Auxiliary, Turbine Building Slab	25
3-A	N-S, O.B.E.	546'-0"	Reactor, Auxiliary, Turbine Building Slab	26
3-B	E-W, O.B.E.	546'-0"	Reactor, Auxiliary, Turbine Building Slab	27
3-C	N-S, D.B.E.	546'-0"	Reactor, Auxiliary, Turbine Building Slab	28
3-D	E-W, D.B.E.	546'-0"	Reactor, Auxiliary, Turbine Building Slab	29
1-E	VERT., O.B.E.	503'-6"	Reactor Building Slab	30
2-E	VERT., O.B.E.	525'-7"	Reactor Building Slab	30
3-E	VERT., O.B.E.	546'-0"	Reactor Building Slab	30
1-F	VERT., D.B.E.	503'-6"	Reactor Building Slab	31
2-F	VERT., D.B.E.	525'-7"	Reactor Building Slab	31
3-F	VERT., D.B.E.	546'-0"	Reactor Building Slab	31
2-E	VERT., O.B.E.	525'-7"	Auxiliary Building Slab	32
3-E	VERT., O.B.E.	546'-0"	Auxiliary Building Slab	32
2-F	VERT., D.B.E.	525'-7"	Auxiliary Building Slab	33
3-F	VERT., D.B.E.	546'-0"	Auxiliary Building Slab	33
4-A	N-S, O.B.E.	570'-6"	Reactor Building Slab	34
4-B	E-W, O.B.E.	570'-6"	Reactor Building Slab	35
4-C	N-S, D.B.E.	570'-6"	Reactor Building Slab	36
4-D	E-W, D.B.E.	570'-6"	Reactor Building Slab	37
5-A	N-S, O.B.E.	593'-6"	Reactor Building Slab	38
5-B	E-W, O.B.E.	593'-6"	Reactor Building Slab	39
5-C	N-S, D.B.E.	593'-6"	Reactor Building Slab	40
5-D	E-W, D.B.E.	593'-6"	Reactor Building Slab	41
6-A	N-S, O.B.E.	627'-9"	Reactor Building Slab	42
6-B	E-W, O.B.E.	627'-9"	Reactor Building Slab	43
6-C	N-S, D.B.E.	627'-9"	Reactor Building Slab	44
6-D	E-W, D.B.E.	627'-9"	Reactor Building Slab	45
4-E	VERT., O.B.E.	570'-6"	Reactor Building Slab	46
-E	VERT., O.B.E.	593'-6"	Reactor Building Slab	46
-E	VERT., O.B.E.	627'-9"	Reactor Building Slab	47
4-F	VERT., D.B.E.	570'-6"	Reactor Building Slab	48
5-F	VERT., D.B.E.	593'-6"	Reactor Building Slab	48
6-F	VERT., D.B.E.	627'-9"	Reactor Building Slab	49

RESPONSE SPECTRA INDEX
(cont'd)

<u>Spectra Number</u>		<u>Elevation</u>		<u>Sheet Number</u>
7-A	N-S, O.B.E.	473'-5"	Reactor, Auxiliary, Turbine Building Slabs	50
7-A	N-S, O.B.E.	496'-0"	Reactor, Auxiliary, Turbine Building Slabs	50 ✓
7-B	E-W, O.B.E.	473'-5"	Reactor, Auxiliary, Turbine Building Slabs	51
7-B	E-W, O.B.E.	496'-0"	Reactor, Auxiliary, Turbine Building Slabs	51
7-C	N-S, D.B.E.	473'-5"	Reactor, Auxiliary, Turbine Building Slabs	52
7-C	N-S, D.B.E.	496'-0"	Reactor, Auxiliary, Turbine Building Slabs	52
7-D	E-W, D.B.E.	473'-5"	Reactor, Auxiliary, Turbine Building Slabs	53
7-D	E-W, D.B.E.	496'-0"	Reactor, Auxiliary, Turbine Building Slabs	53
7-E	VERT., O.B.E.	473'-5"	Reactor, Auxiliary, Turbine Building Slabs	54
7-E	VERT., O.B.E.	496'-0"	Reactor, Auxiliary, Turbine Building Slabs	54
7-F	VERT., D.B.E.	473'-5"	Reactor, Auxiliary, Turbine Building Slabs	55
7-F	VERT., D.B.E.	496'-0"	Reactor, Auxiliary, Turbine Building Slabs	55
8-A	N-S, O.B.E.	567'-5"	Auxiliary Building Slab	56
8-B	E-W, O.B.E.	567'-5"	Auxiliary Building Slab	57
8-C	N-S, D.B.E.	567'-5"	Auxiliary Building Slab	58
8-D	E-W, D.B.E.	567'-5"	Auxiliary Building Slab	59
9-A	N-S, O.B.E.	591'-7"	Auxiliary Building Slab	60
9-B	E-W, O.B.E.	591'-7"	Auxiliary Building Slab	61
9-C	N-S, D.B.E.	591'-7"	Auxiliary Building Slab	62
9-D	E-W, D.B.E.	591'-7"	Auxiliary Building Slab	63
8-E	VERT., O.B.E.	567'-5"	Auxiliary Building Slab	64
9-E	VERT., O.B.E.	591'-7"	Auxiliary Building Slab	64
8-F	VERT., D.B.E.	567'-5"	Auxiliary Building Slab	65
9-F	VERT., D.B.E.	591'-7"	Auxiliary Building Slab	65
10-E	VERT., O.B.E.	503'-6"	Reactor & Auxiliary Building Wall	66
10-E	VERT., O.B.E.	525'-7"	Reactor & Auxiliary Building Wall	66
10-E	VERT., O.B.E.	546'-0"	Reactor & Auxiliary Building Wall	66
10-F	VERT., D.B.E.	503'-6"	Reactor & Auxiliary Building Wall	67
10-F	VERT., D.B.E.	525'-7"	Reactor & Auxiliary Building Wall	67
10-F	VERT., D.B.E.	546'-0"	Reactor & Auxiliary Building Wall	67

RESPONSE SPECTRA INDEX
(cont'd)

<u>Spectra Number</u>		<u>Elevation</u>		<u>Sheet Number</u>
11-E	VERT., O.B.E.	570'-6"	Reactor & Auxiliary Building Wall	68
11-E	VERT., O.B.E.	593'-6"	Reactor & Auxiliary Building Wall	68
11-E	VERT., O.B.E.	627'-9"	Reactor & Auxiliary Building Wall	68
11-F	VERT., D.B.E.	570'-6"	Reactor & Auxiliary Building Wall	69
11-F	VERT., D.B.E.	593'-6"	Reactor & Auxiliary Building Wall	69
11-F	VERT., D.B.E.	627'-9"	Reactor & Auxiliary Building Wall	69
12-A	N-S, O.B.E.	503'-6"	Reactor Containment	70
12-B	E-W, O.B.E.	503'-6"	Reactor Containment	71
12-C	N-S, D.B.E.	503'-6"	Reactor Containment	72
12-D	E-W, D.B.E.	503'-6"	Reactor Containment	73
13-A	N-S, O.B.E.	525'-7"	Reactor Containment	74
13-B	E-W, O.B.E.	525'-7"	Reactor Containment	75
13-C	N-S, D.B.E.	525'-7"	Reactor Containment	76
13-D	E-W, D.B.E.	525'-7"	Reactor Containment	77
14-A	N-S, O.B.E.	546'-0"	Reactor Containment	78
14-B	E-W, O.B.E.	546'-0"	Reactor Containment	79
14-C	N-S, D.B.E.	546'-0"	Reactor Containment	80
14-D	E-W, D.B.E.	546'-0"	Reactor Containment	81
12-E	VERT., O.B.E.	503'-6"	Reactor Containment	82
13-E	VERT., O.B.E.	525'-7"	Reactor Containment	82
14-E	VERT., O.B.E.	546'-0"	Reactor Containment	82
12-F	VERT., D.B.E.	503'-6"	Reactor Containment	83
13-F	VERT., D.B.E.	525'-7"	Reactor Containment	83
14-F	VERT., D.B.E.	546'-0"	Reactor Containment	83
15-A	N-S, O.B.E.	570'-6"	Reactor Containment	84
15-B	E-W, O.B.E.	570'-6"	Reactor Containment	85
15-C	N-S, D.B.E.	570'-6"	Reactor Containment	86
15-D	E-W, D.B.E.	570'-6"	Reactor Containment	87
16-A	N-S, O.B.E.	593'-6"	Reactor Containment	88
16-B	E-W, O.B.E.	593'-6"	Reactor Containment	89
16-C	N-S, D.B.E.	593'-6"	Reactor Containment	90
16-D	E-W, D.B.E.	593'-6"	Reactor Containment	91
15-E	VERT., O.B.E.	570'-6"	Reactor Containment	92
16-E	VERT., O.B.E.	593'-6"	Reactor Containment	93
16-E	VERT., O.B.E.	627'-9"	Reactor Containment	93
15-F	VERT., D.B.E.	570'-6"	Reactor Containment	94
16-F	VERT., D.B.E.	593'-6"	Reactor Containment	95
16-F	VERT., D.B.E.	627'-9"	Reactor Containment	95
7-A	N-S, O.B.E.	543'-0"	Biological Shield	96
7-B	E-W, O.B.E.	543'-0"	Biological Shield	97
7-C	N-S, D.B.E.	543'-0"	Biological Shield	98
17-D	E-W, D.B.E.	543'-0"	Biological Shield	99

RESPONSE SPECTRA INDEX
(cont'd)

<u>Spectra Number</u>		<u>Elevation</u>		<u>Sheet Number</u>
17-E	VERT., O.B.E.	543'-0"	Biological Shield	100
17-F	VERT., D.B.E.	543'-0"	Biological Shield	101
18-A	N-S, O.B.E.	565'-0"	Biological Shield	102
18-B	E-W, O.B.E.	565'-0"	Biological Shield	103
18-C	N-S, D.B.E.	565'-0"	Biological Shield	104
18-D	E-W, D.B.E.	565'-0"	Biological Shield	105
18-E	VERT., O.B.E.	565'-0"	Biological Shield	106
19-E	VERT., O.B.E.	593'-6"	Biological Shield	106
18-F	VERT., D.B.E.	565'-0"	Biological Shield	107
19-F	VERT., D.B.E.	565'-0" ^{596'-6"}	Biological Shield	107
20-A	N-S, O.B.E.	615'-3"	Reactor Pressure Vessel	108
20-B	E-W, O.B.E.	615'-3"	Reactor Pressure Vessel	109
20-C	N-S, D.B.E.	615'-3"	Reactor Pressure Vessel	110
20-D	E-W, D.B.E.	615'-3"	Reactor Pressure Vessel	111
21-A	N-S, O.B.E.	596'-10"	Reactor Pressure Vessel	112
21-B	E-W, O.B.E.	596'-10"	Reactor Pressure Vessel	113
21-C	N-S, D.B.E.	596'-10"	Reactor Pressure Vessel	114
21-D	E-W, D.B.E.	596'-10"	Reactor Pressure Vessel	115
22-A	N-S, O.B.E.	584'-0 1/2"	Reactor Pressure Vessel	116
22-A	N-S, O.B.E.	582'-6"	Reactor Pressure Vessel	116
22-B	E-W, O.B.E.	584'-0 1/2"	Reactor Pressure Vessel	117
22-B	E-W, O.B.E.	582'-6"	Reactor Pressure Vessel	117
22-C	N-S, D.B.E.	584'-0 1/2"	Reactor Pressure Vessel	118
22-C	N-S, D.B.E.	582'-6"	Reactor Pressure Vessel	118
22-D	E-W, D.B.E.	584'-0 1/2"	Reactor Pressure Vessel	119
22-D	E-W, D.B.E.	582'-6"	Reactor Pressure Vessel	119
23-A	N-S, O.B.E.	574'-1 3/4"	Reactor Pressure Vessel	120
23-B	E-W, O.B.E.	574'-1 3/4"	Reactor Pressure Vessel	121
23-C	N-S, D.B.E.	574'-1 3/4"	Reactor Pressure Vessel	122
23-D	E-W, D.B.E.	574'-1 3/4"	Reactor Pressure Vessel	123
20-E	VERT., O.B.E.	615'-3"	Reactor Pressure Vessel	124
21-E	VERT., O.B.E.	596'-10"	Reactor Pressure Vessel	124
22-E	VERT., O.B.E.	584'-0 1/2"	Reactor Pressure Vessel	124
22-E	VERT., O.B.E.	582'-6"	Reactor Pressure Vessel	124
23-E	VERT., O.B.E.	574'-1 3/4"	Reactor Pressure Vessel	124
20-F	VERT., D.B.E.	615'-3"	Reactor Pressure Vessel	125
21-F	VERT., D.B.E.	596'-10"	Reactor Pressure Vessel	125
22-F	VERT., D.B.E.	584'-0 1/2"	Reactor Pressure Vessel	125
22-F	VERT., D.B.E.	582'-6"	Reactor Pressure Vessel	125
23-F	VERT., D.B.E.	574'-1 3/4"	Reactor Pressure Vessel	125

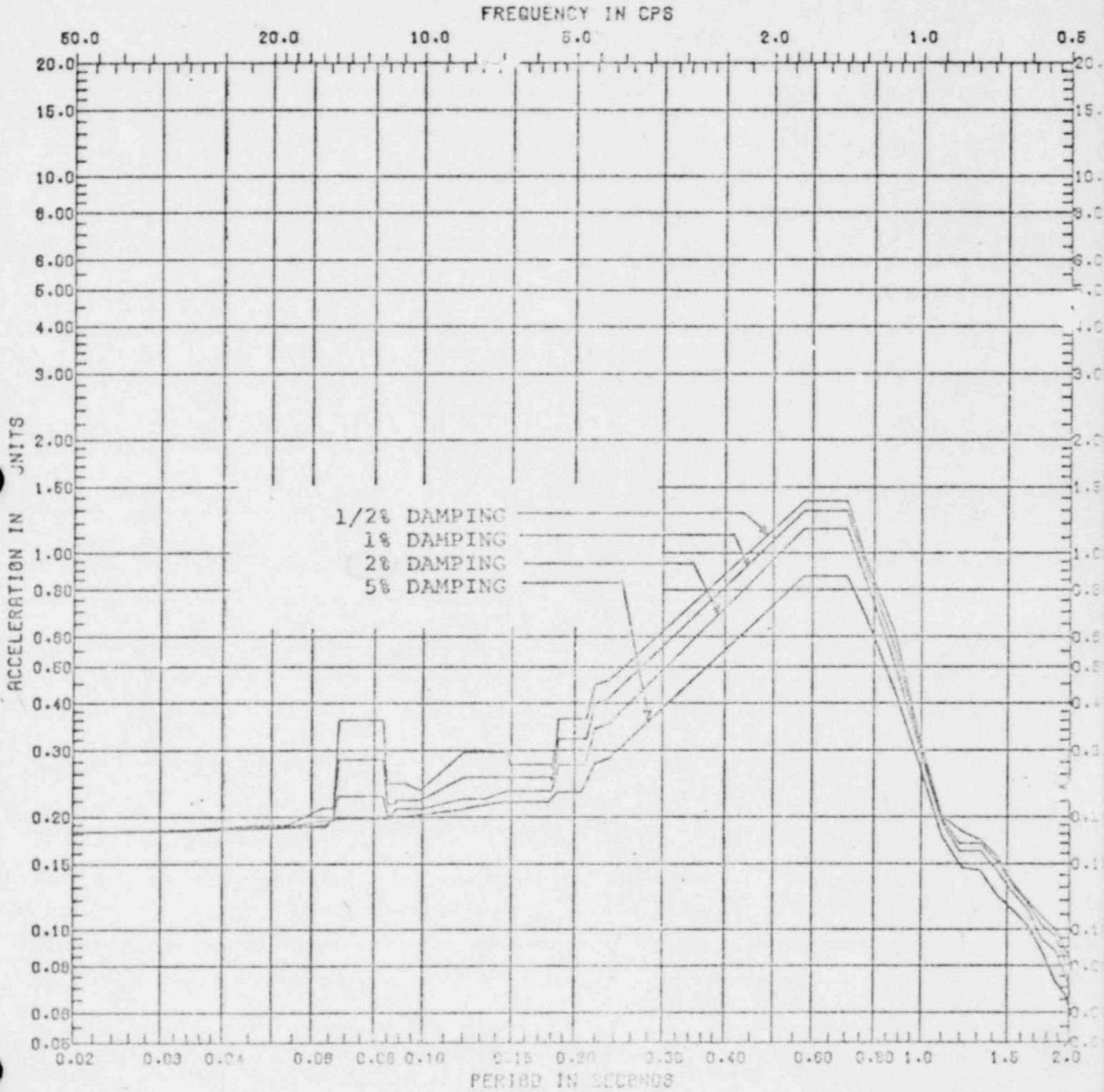
SARGENT & LUNDY

ENGINEERS

14 JUL 76

SL180

ZIMMERI SOIL-STRUCT, HOR, OBE, SLAB 1 X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PERKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 18 8F 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 1-A

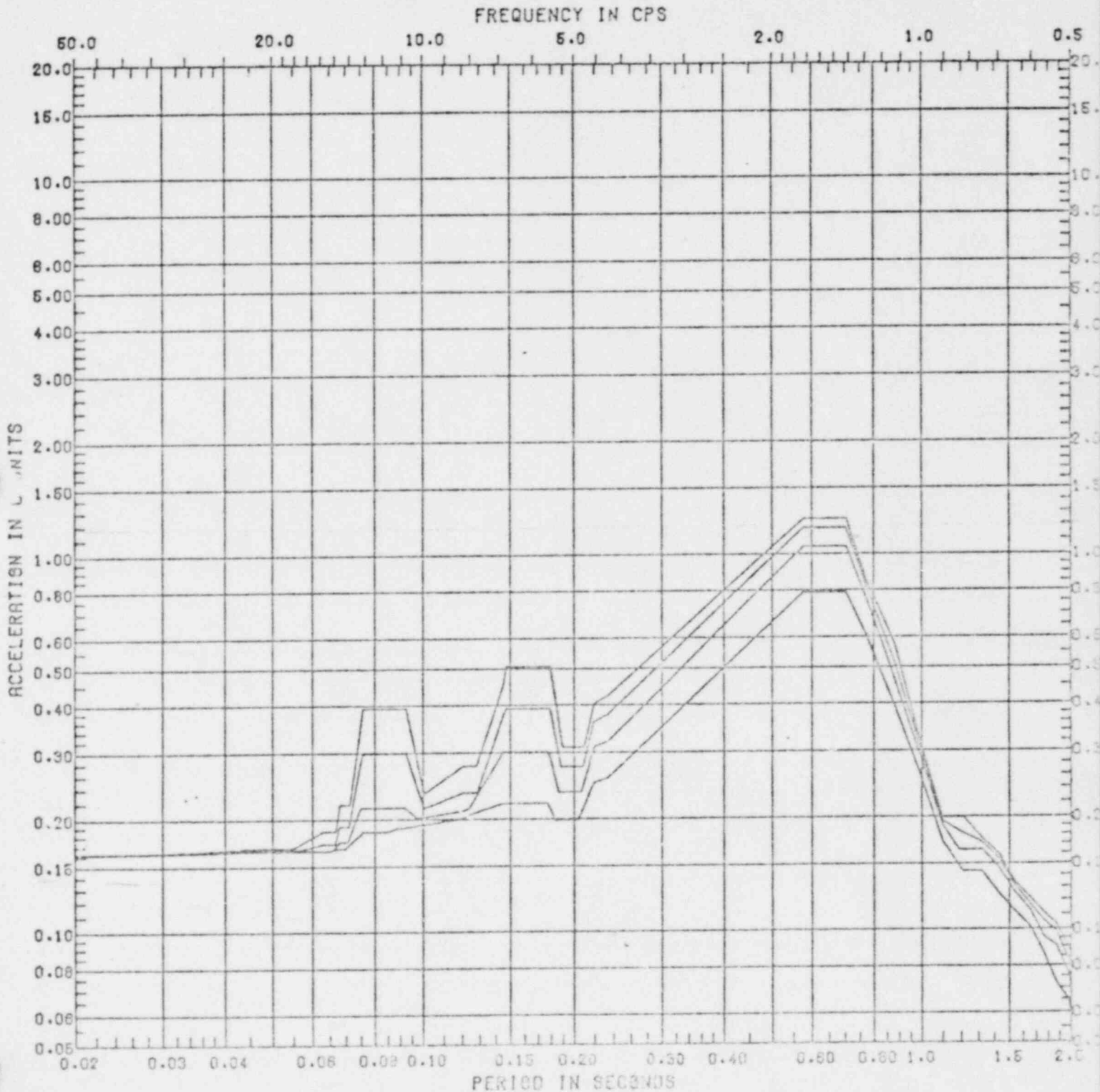
ELEVATION 503'-6"

LOCATION Reactor Building Slab

REVISION NO. 0

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT.HOR.03E.SLAB 1 Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 19 OF 125



O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 1-B

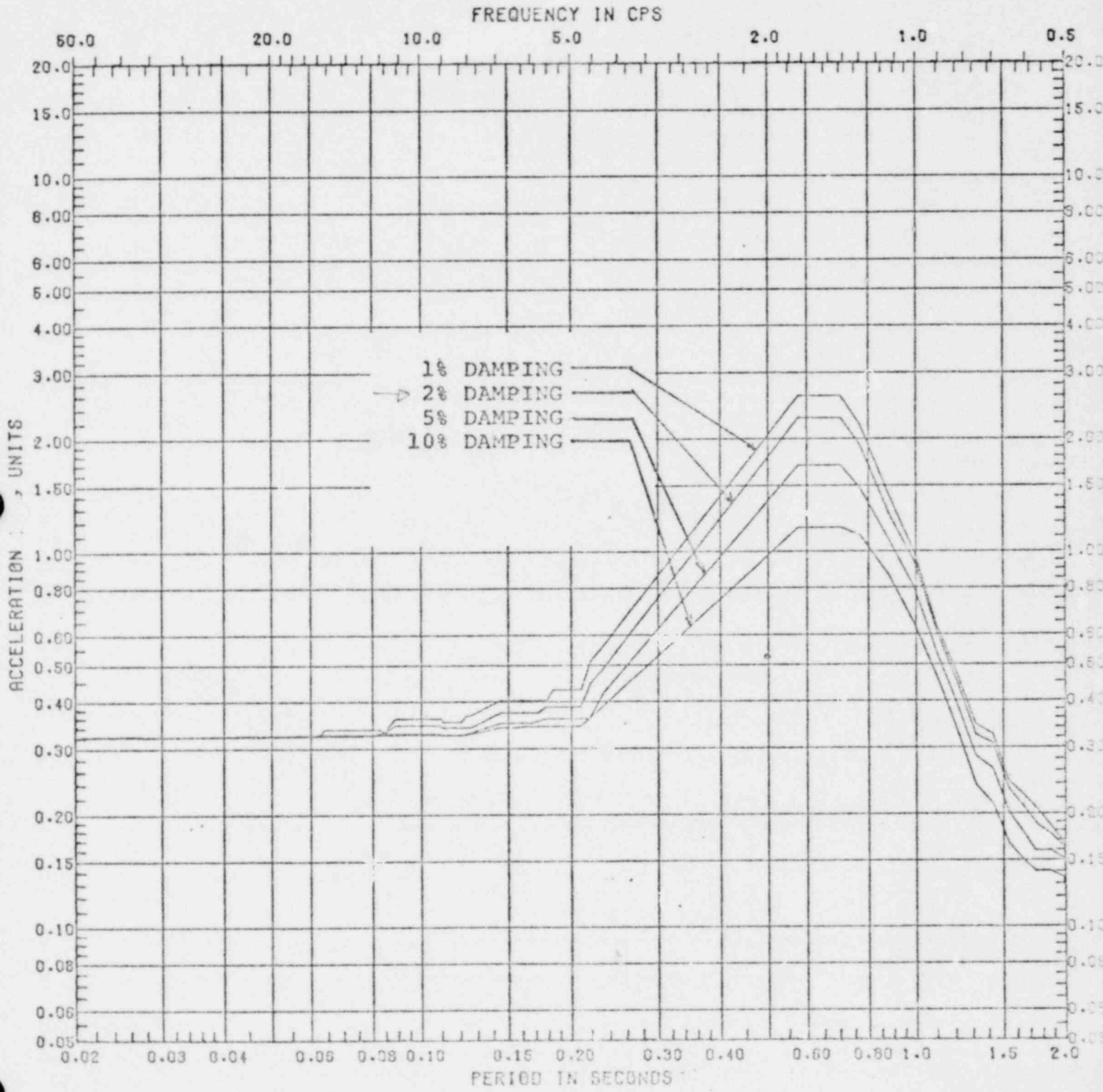
ELEVATION 503'-6"

LOCATION Reactor Building Slab

REVISION NO. 0

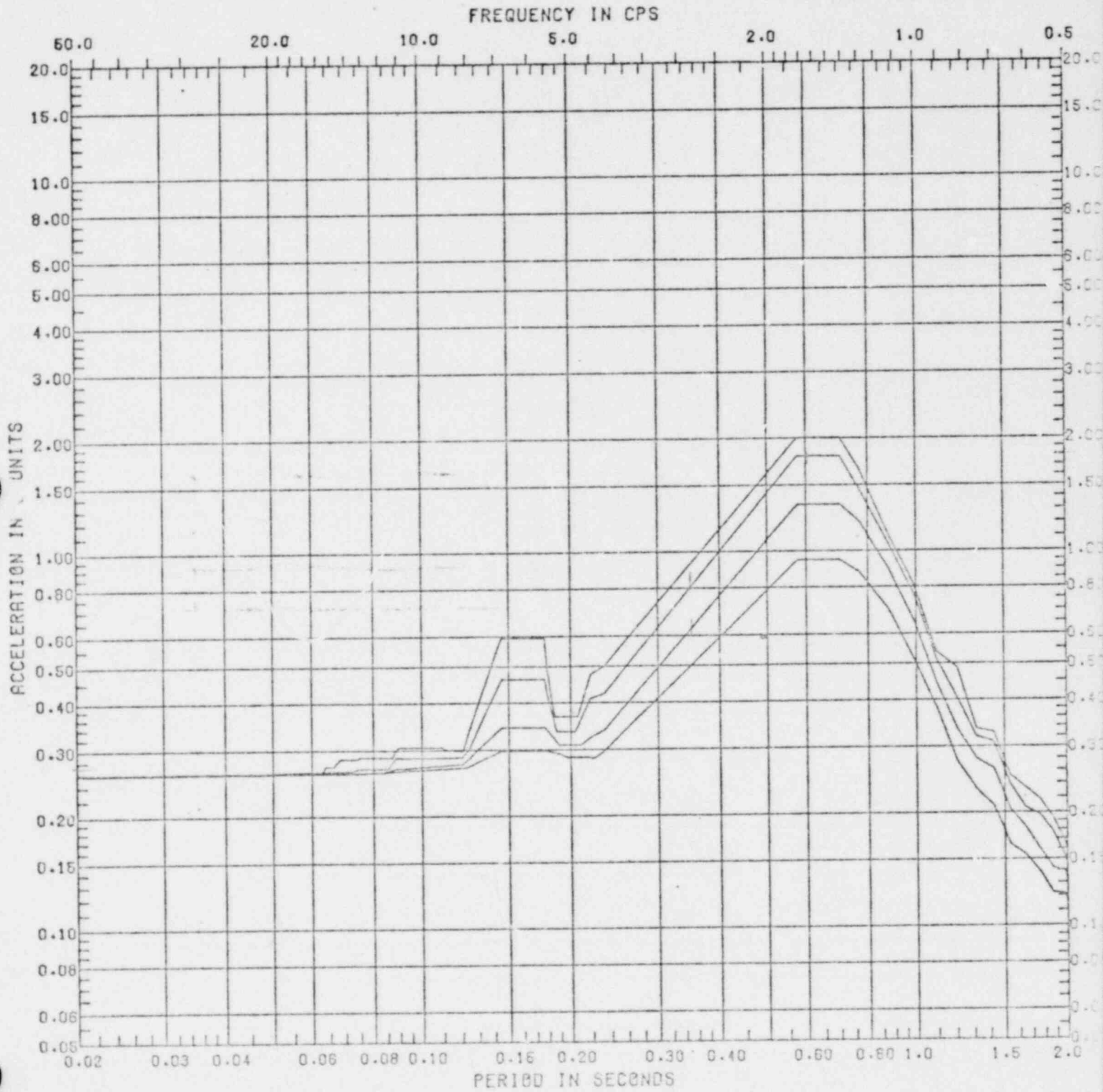
28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 1 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 20 OF 125



D.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 1-C
ELEVATION 503'-6"
LOCATION Reactor Building Slab REVISION NO. 0

28 JUL 76
8290EL



L.S.E. Horiz. Response Spectra E-W Component

SPECTRA NO. 1-D

ELEVATION 503'-6"

LOCATION Reactor Building Slab

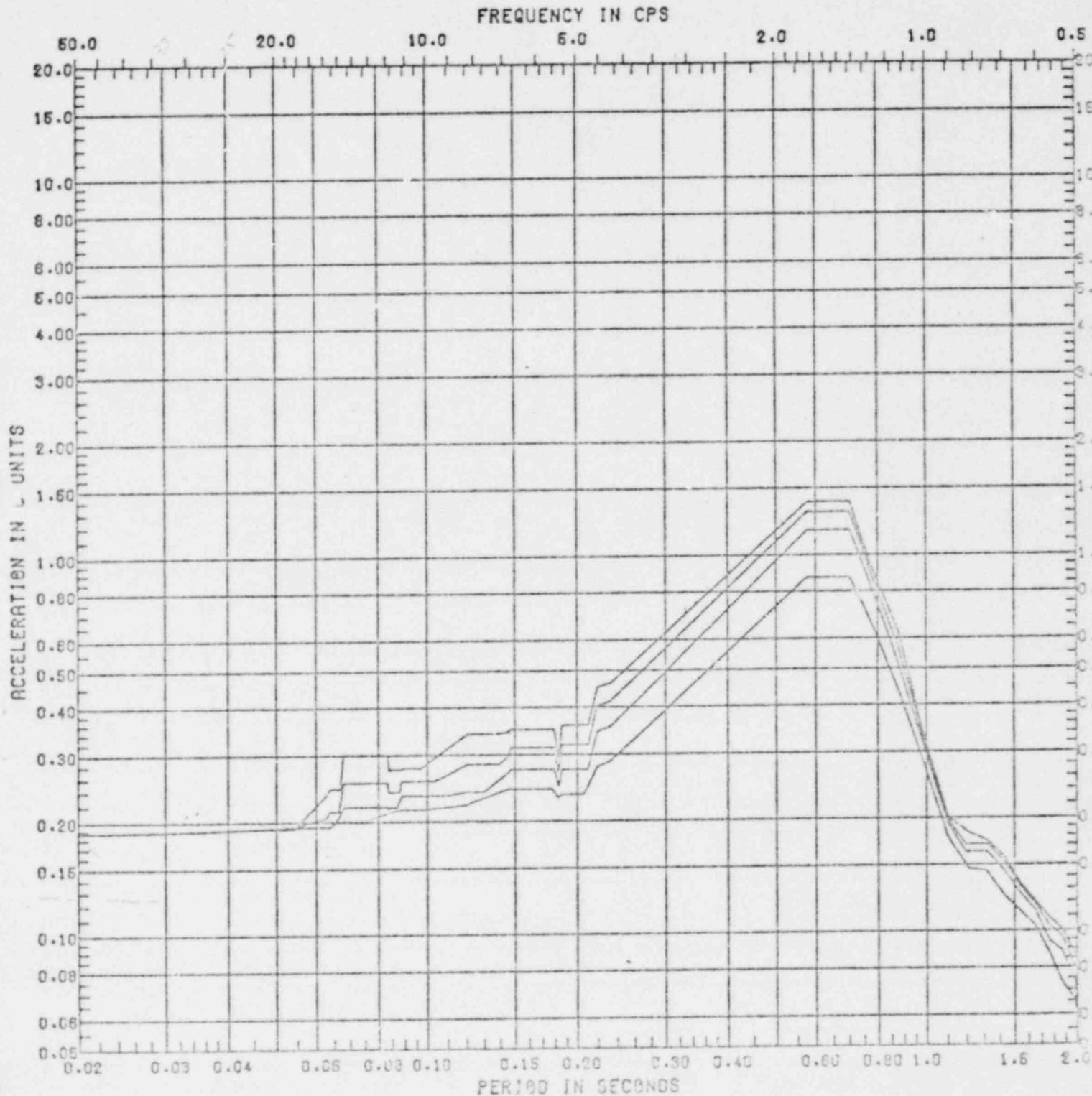
REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT.HOR.08E.SLAB 2 X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 22 OF 125

170

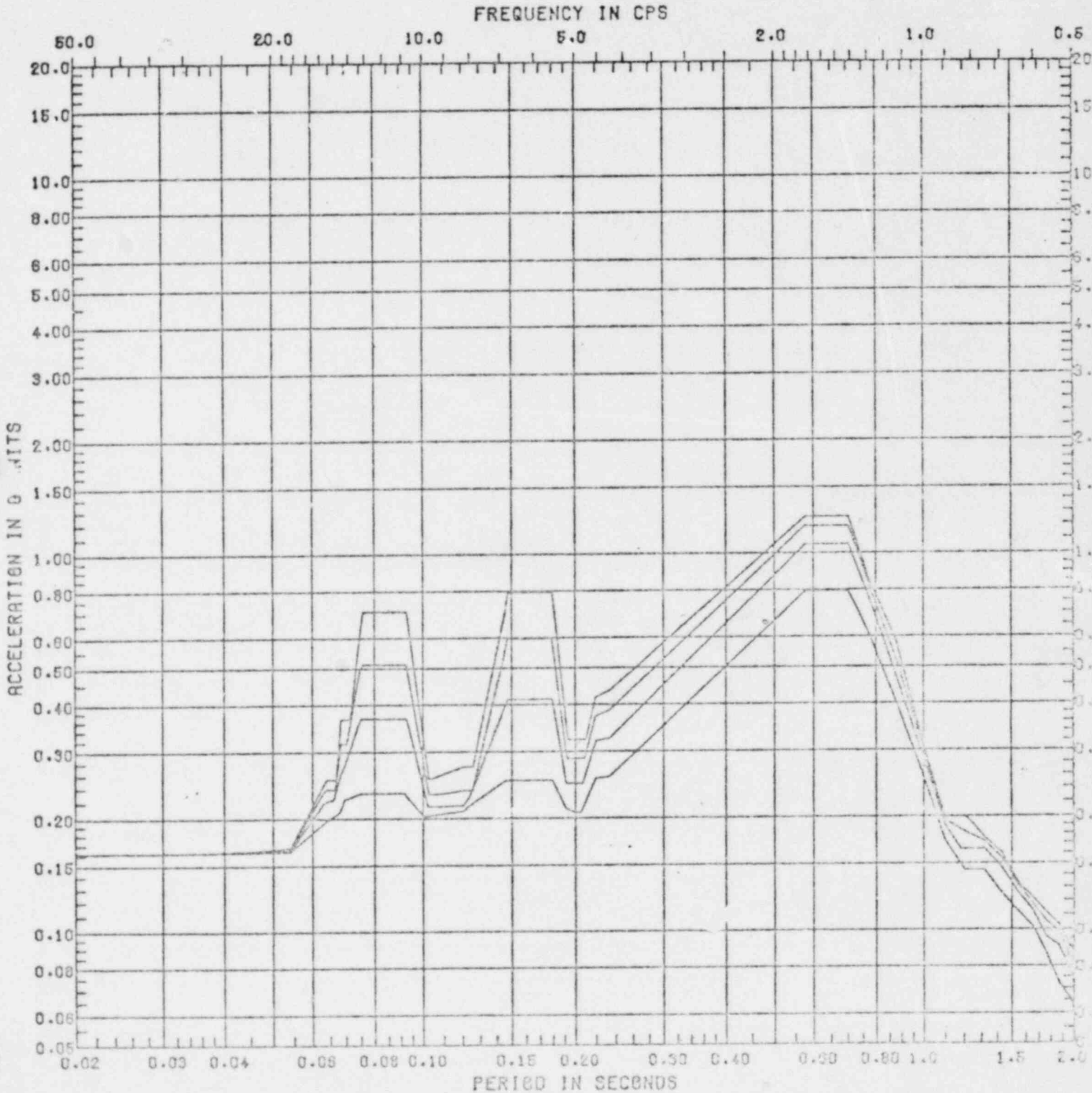


O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 2-A
ELEVATION 525'-7"
LOCATION Reactor, Auxiliary, Turbine Buildings Slab REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT, HOR, OBE, SLAB 2 Y
DESIGNER O. E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 23 OF 125

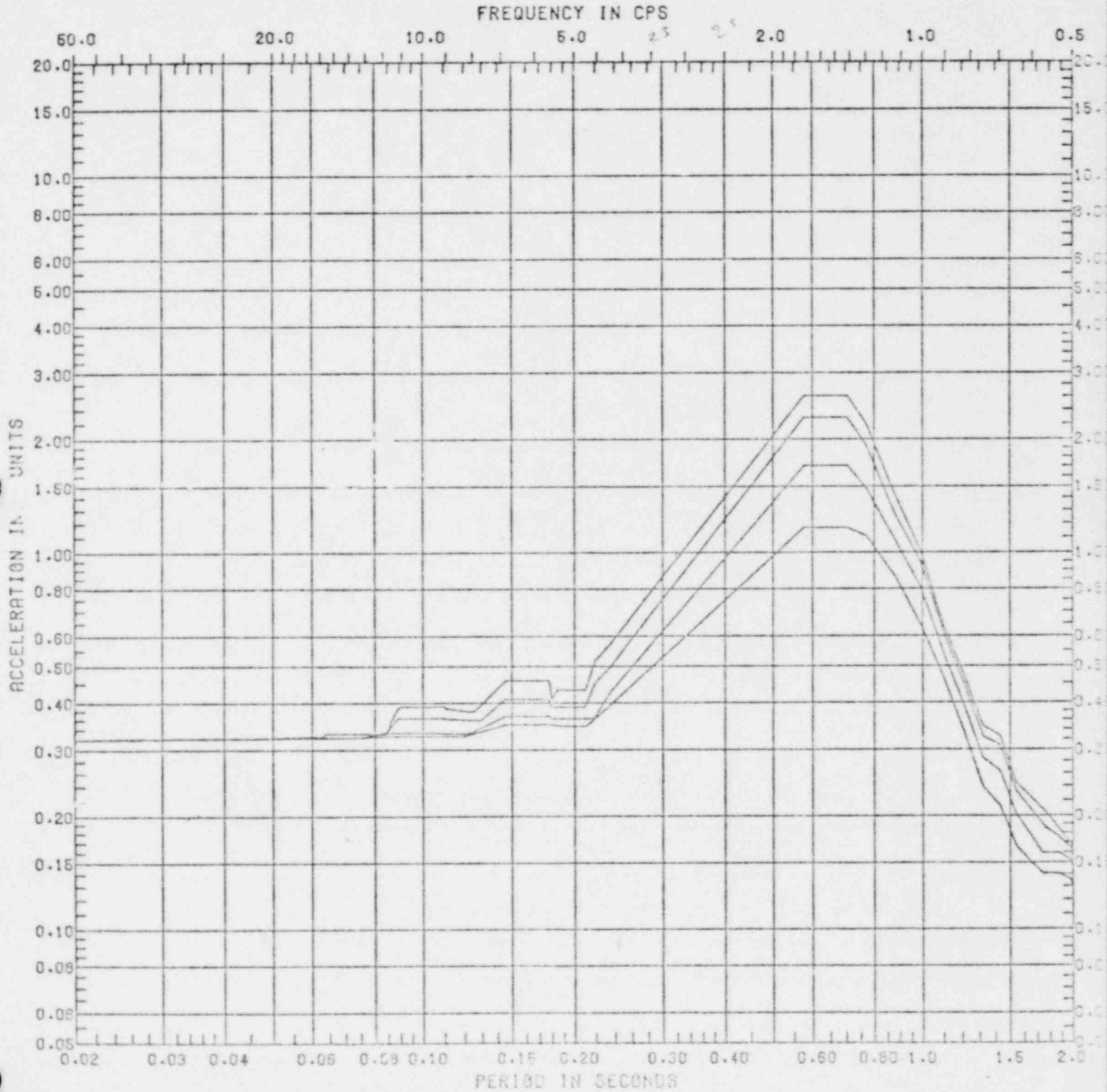


O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 2-B
ELEVATION 525'-7"
LOCATION Reactor, Auxiliary, Turbine REVISION No. 0

28 JUL 76
8290EL

27

ZIMMER.413015,SOIL-STRUCT,HORIZ,08E
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 2 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 24 OF 125



D.B.E. Horiz. Response Spectra N-S Component

ELEVATION 525'-7"

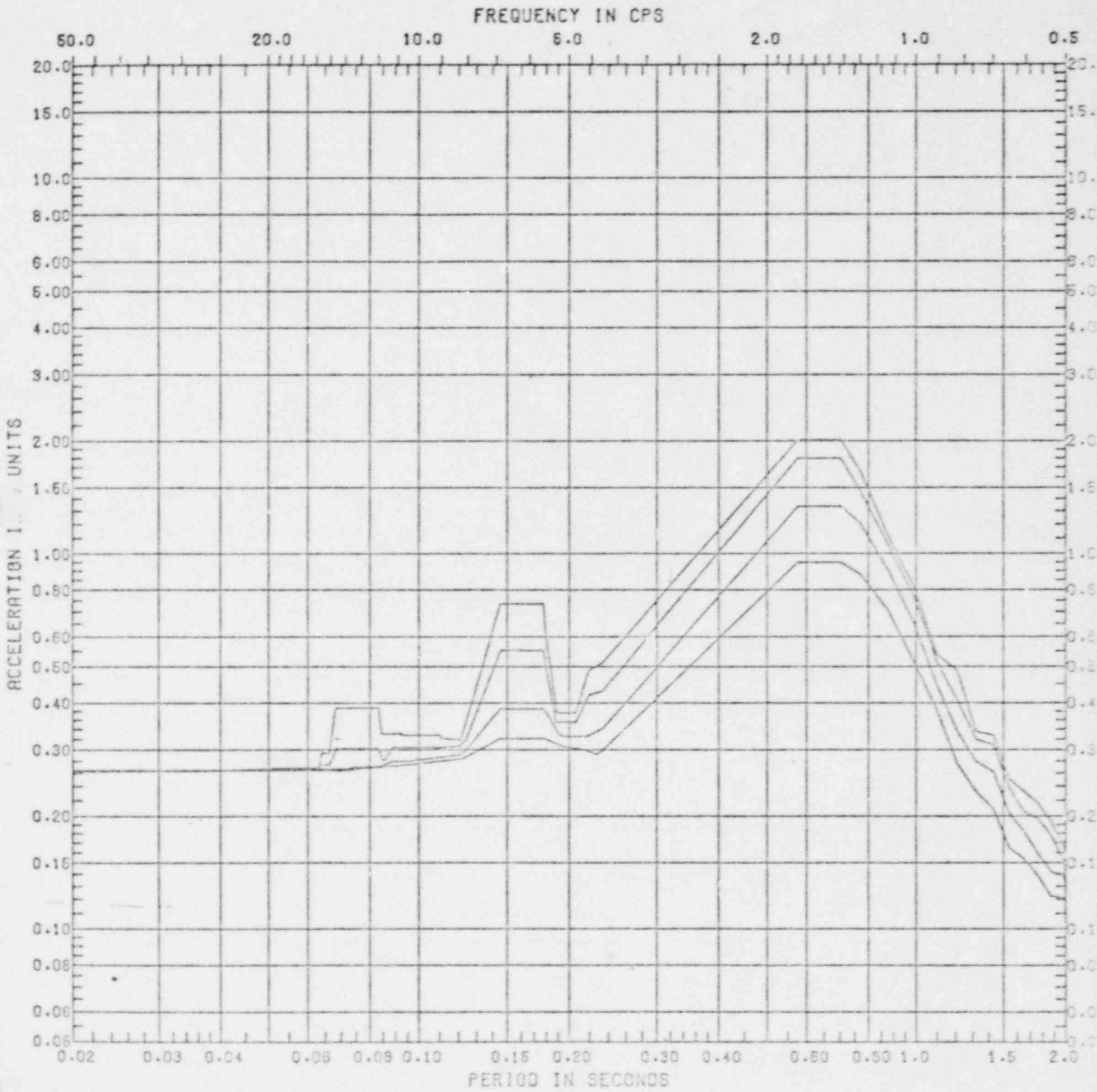
LOCATION Reactor, Auxiliary, Turbine Building Slab

SPECTRA NO. 2-C

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.F. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 2 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 25 OF 125



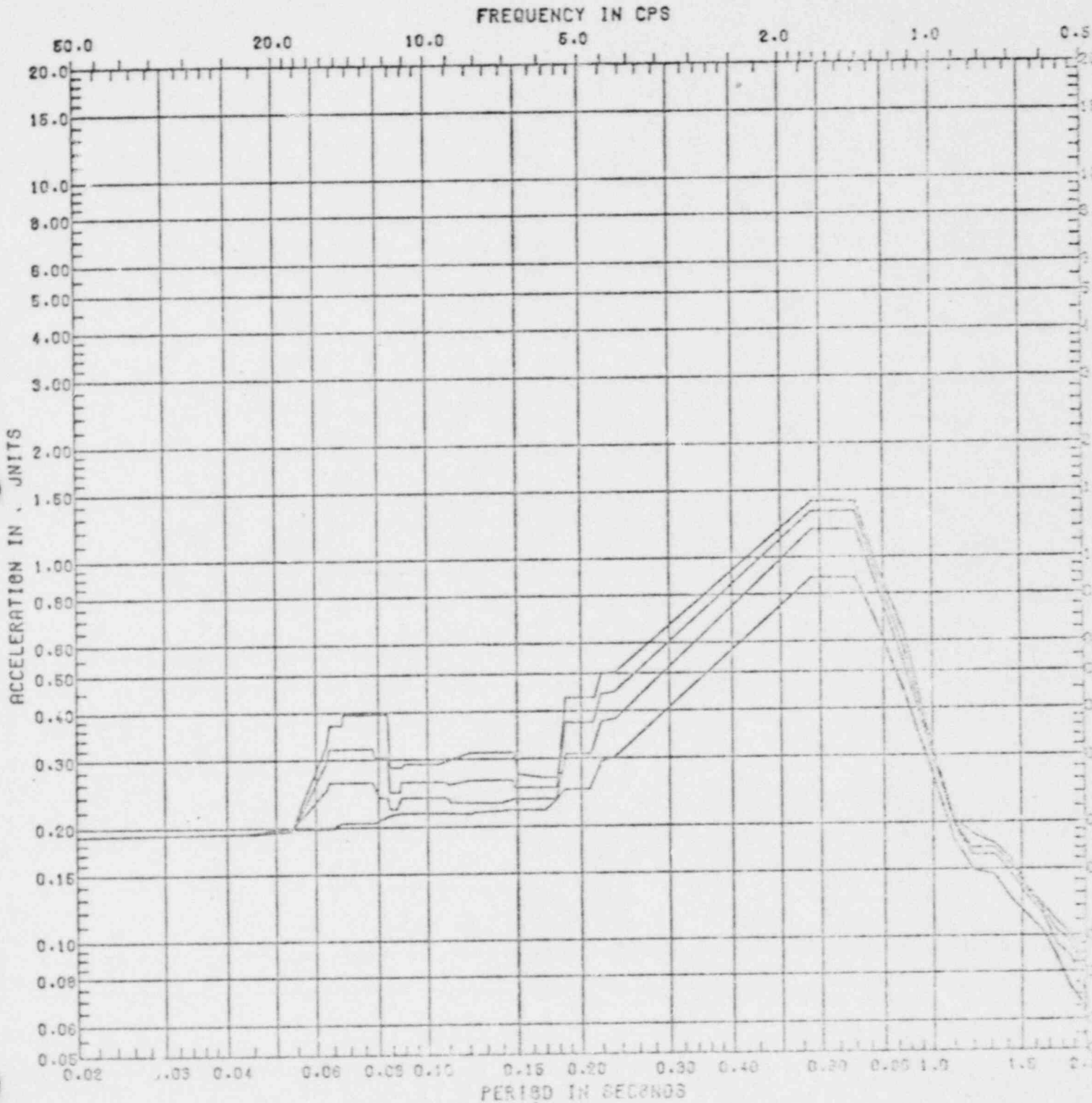
D.P.E. Horiz. Response Spectra E-W Component SPECTRA NO. 2-D
ELEVATION 525'-7"
LOCATION Reactor, Auxiliary, Turbine REVISION NO. 0
Buildings Slab

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

273

ZIMMERI SOIL-STRUCT.HOR,OSE,SLAB 3 X
DESIGNER O.E. Lev CHECKER R. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 26 OF 125



O.B.E. Horiz. Response Spectra N-S Component

SPECTRA NO. 3-A

ELEVATION 546'-0"

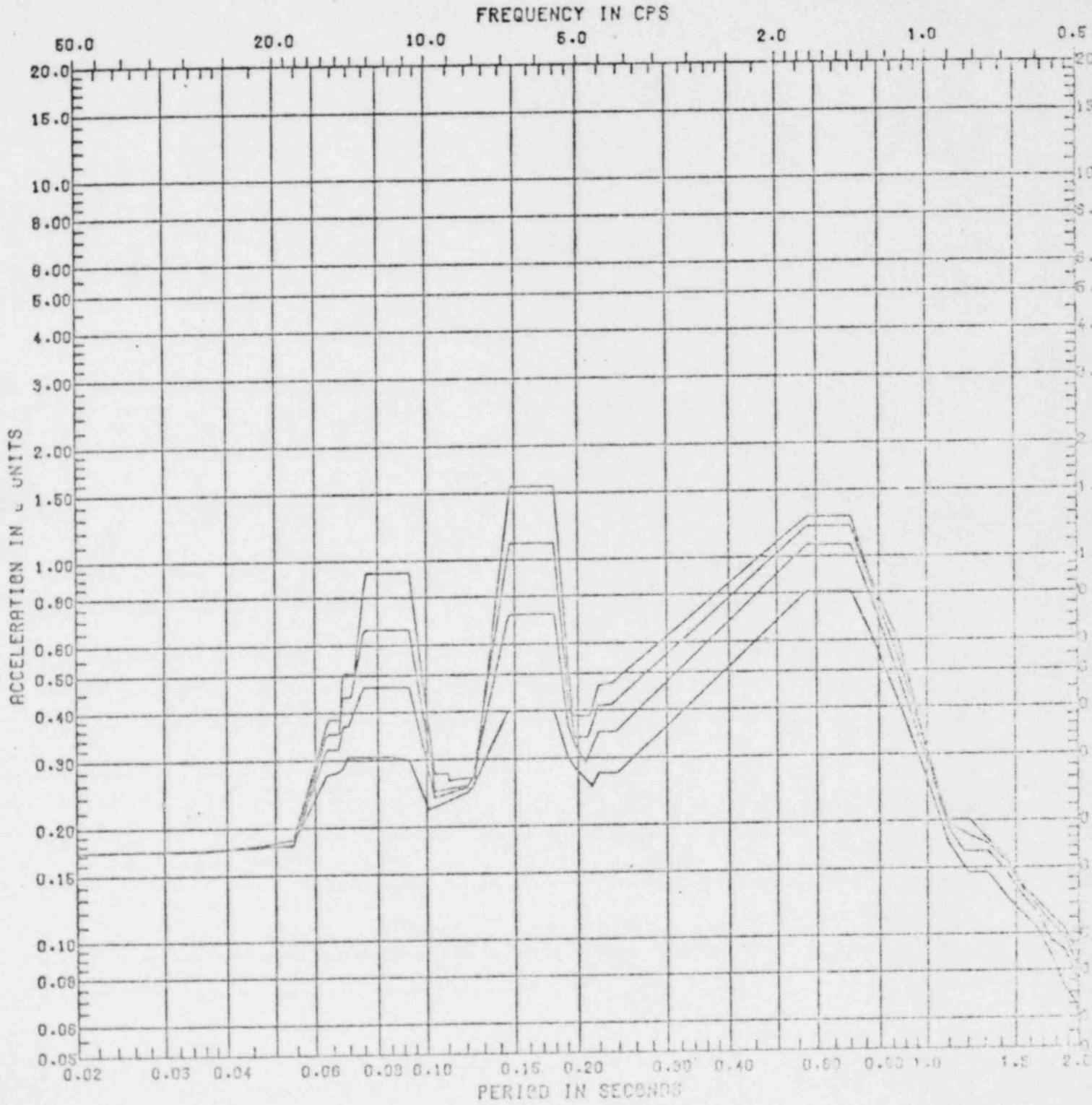
LOCATION Reactor, Auxiliary, Turbine
Buildings Slab

REVISION NO. 0

14 JUL 76
SL180

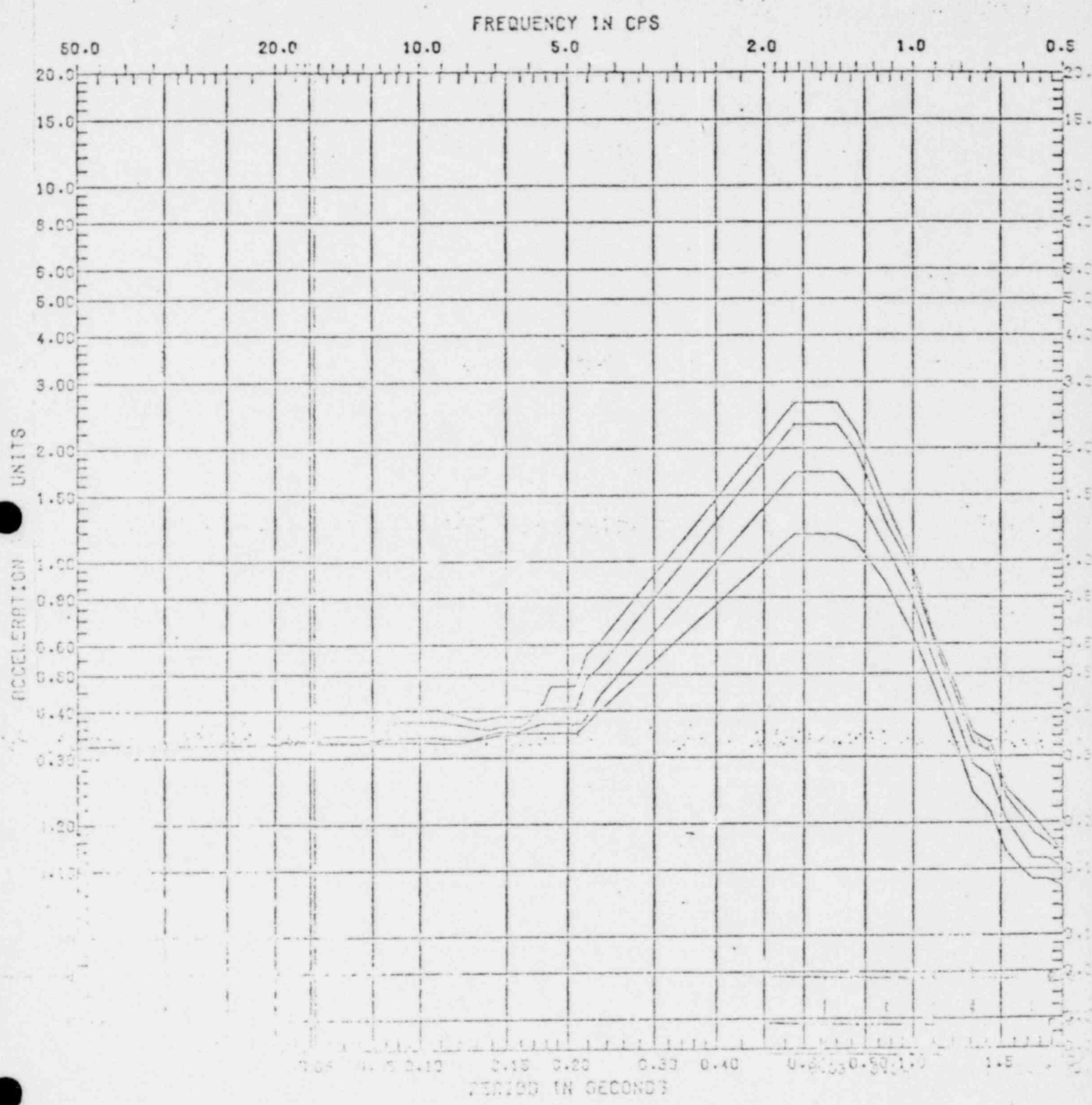
20%

ZIMMER1 SOIL-STRUCT.HOR.OSE.SLAB 3 Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 27 OF 125



O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 3-B
ELEVATION 546'-0"
LOCATION Reactor, Auxiliary, Turbine Buildings Slab REVISION NO. 0

28 JUL 76
8290EL



D. B. E. (Horizontal)

N-S Component

SPECTRA - Response Spectra D. B. E.

546 -0 "

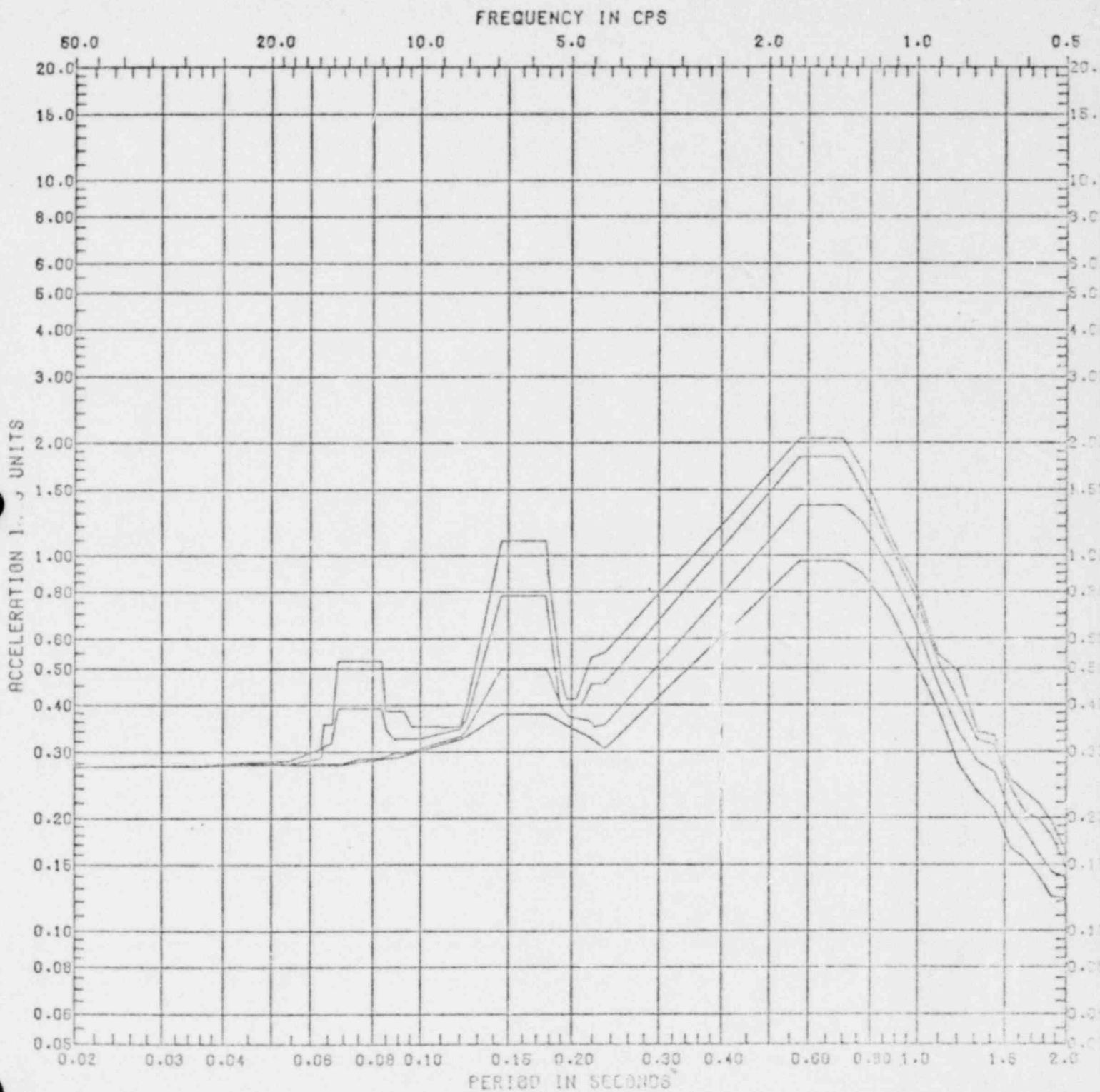
ELEVATION

Generator, Auxiliary, Turbine
Buildings Slab

REVISION NO. 3

28 JUL 76
8290EL

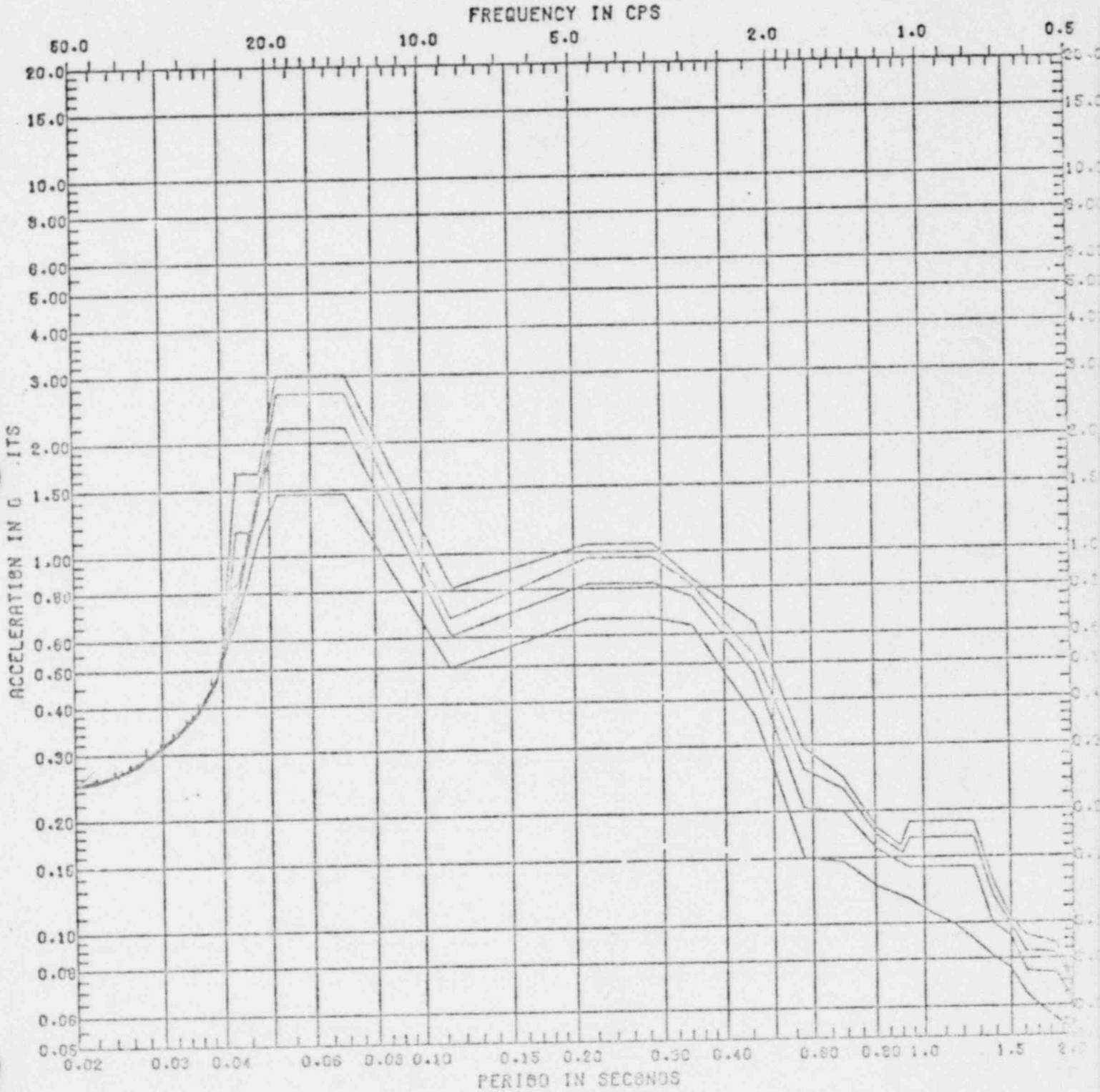
ZIMMER, 41301S, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 3 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 29 OF 125



D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 3-D
ELEVATION 546'-0"
LOCATION Reactor, Auxiliary, Turbine Buildings Slab REVISION NO. 0

16 JUL 76
2170EL

ZIMMER 1.413015, SOIL-STRUCT. V, S 3.08E
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 23 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 30 OF 125

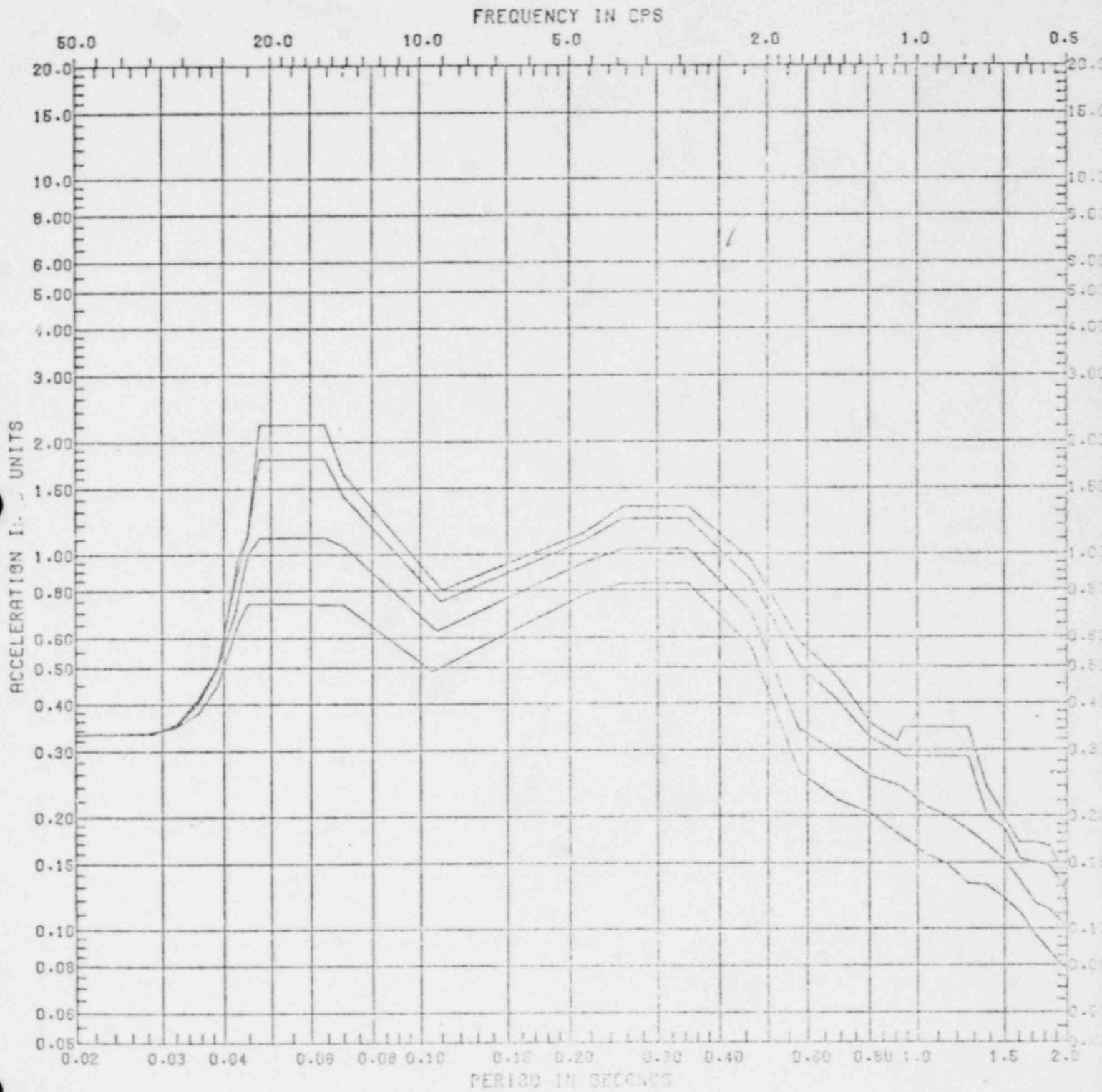


O.B.E. Vert. Response Spectra
ELEVATION 546'-0", 525'-7", 503'-6"
LOCATION Reactor Bldg. Slab

SPECTRA NO. 1-E, 2-E, 3-E
REVISION NO. 0

01 AUG 76
6730EL

ZIMMER, 413015, 501L-STRUCT, V.S 3, DBE
DESIGNER D.P. Dev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 23 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 31 OF 125



D.B.E. VERT RESPONSE SPECTRA
ELEVATION 546'-0", 525'-7", 503'-6"
LOCATION Reactor Bldg. Slab

SPECTRA NO. 1-P, 2-P, 3-P
REVISION NO. 0

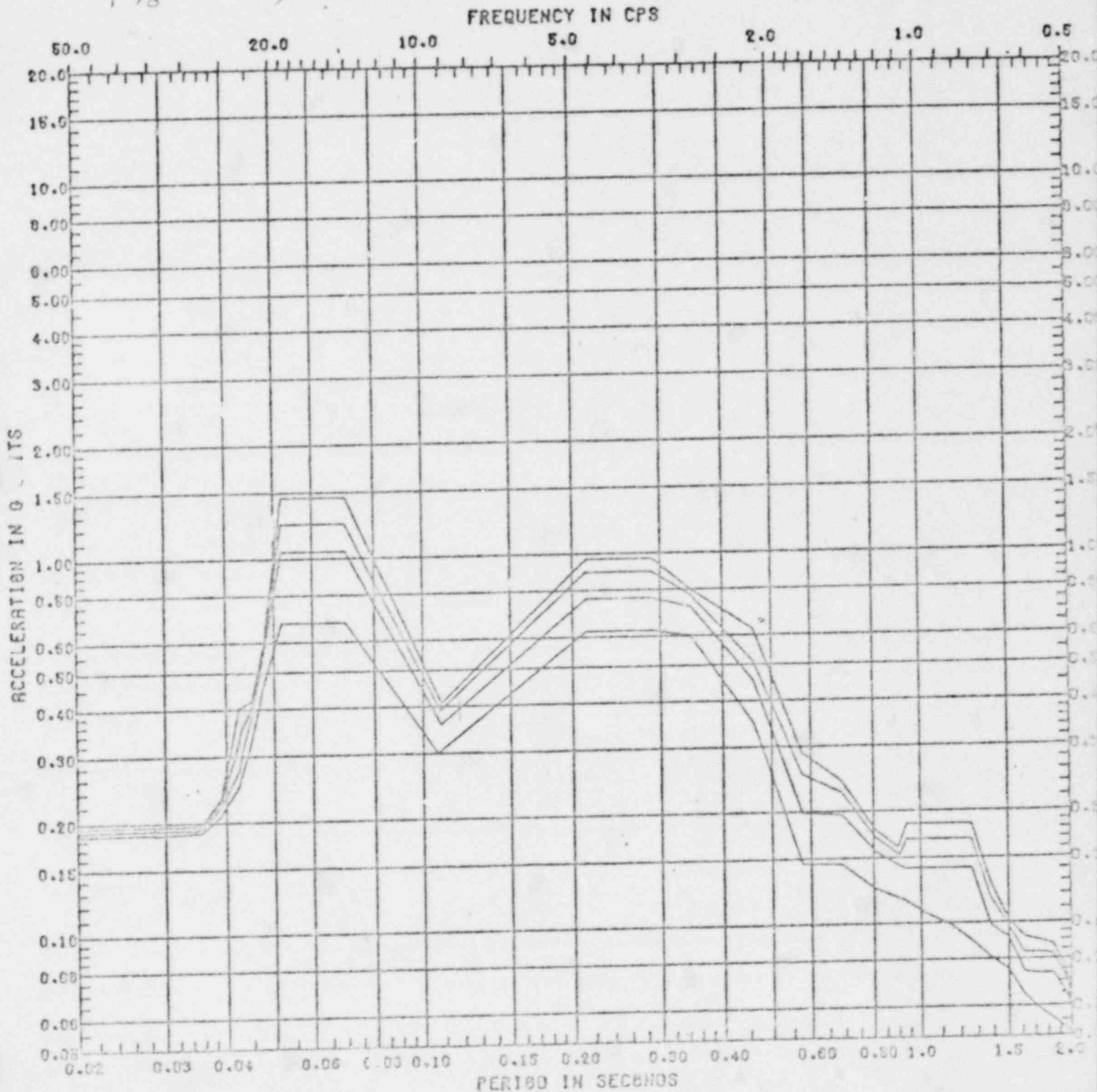
SARGENT & LUNDY
ENGINEERS

16 JUL 76
2170EL

ZIMMER 1.413015. SOIL-STRUCT. V.S 3.08E
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 31 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 32 OF 125

15

17%
55.7



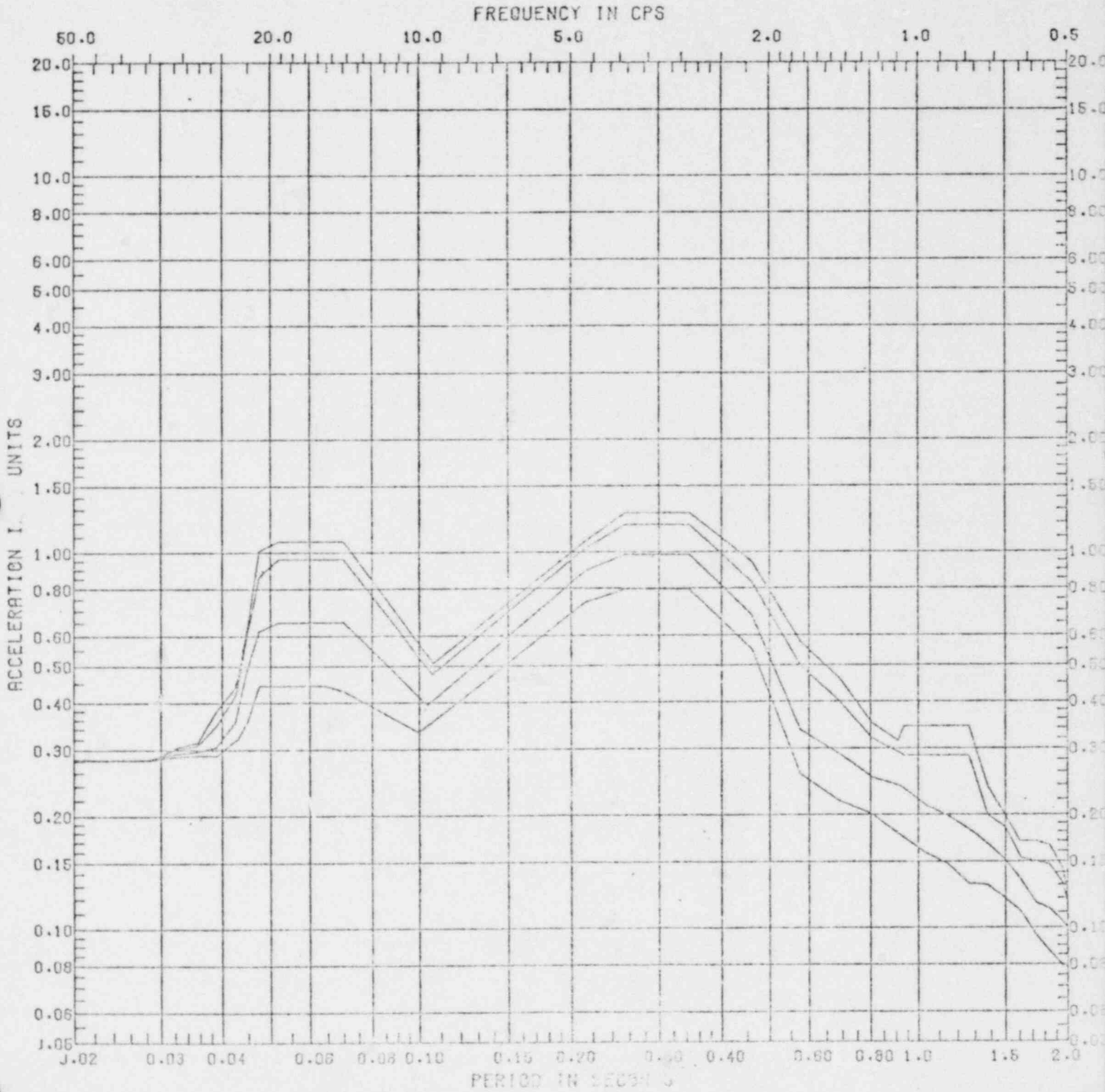
O.B.E. Vert. Response Spectra
ELEVATION 546'-0", 525'-7"
LOCATION Auxiliary Bldg. Slab

SPECTRA NO. 2-E, 3-E

REVISION NO. 0

01 AUG 76
6730EL

ZIMMER 1.413015, SOIL-STRUCT. V.S 3, DBE
DESIGNER O.E. Joy CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 31 X-COMP
PEAKS WIDENED BY 15% ON EAC SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 33 OF 125



D.B.E. VERT RESPONSE SPECTRA

ELEVATION 546'-0", 525'-7"

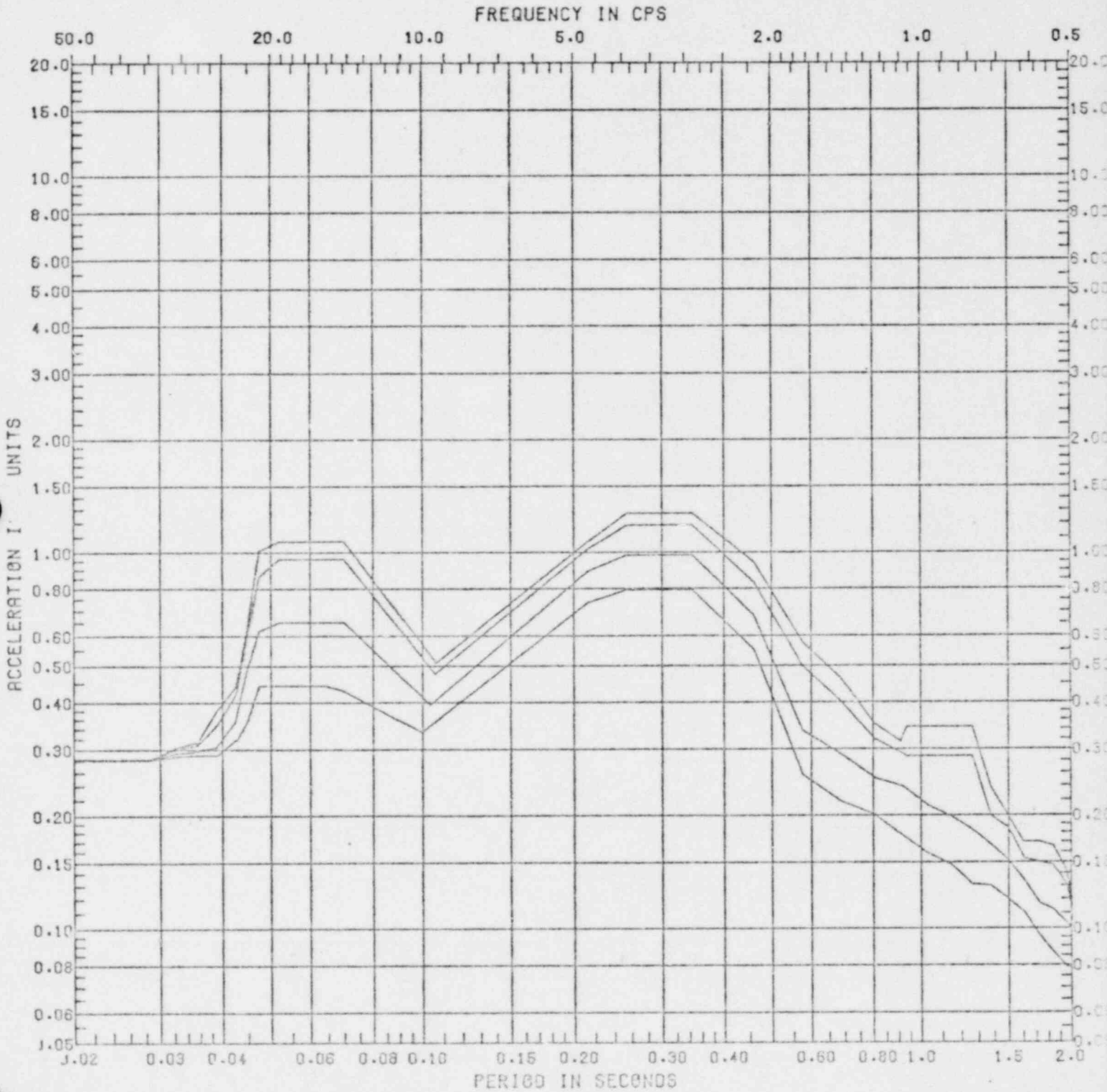
LOCATION Auxiliary Bldg. Slab

SPECTRA NO. 2-F, 3-F

REVISION NO. 0

01 AUG 76
6730EL

27



D.B.E. VERT RESPONSE SPECTRA

ELEVATION 546'-0", 525'-7"

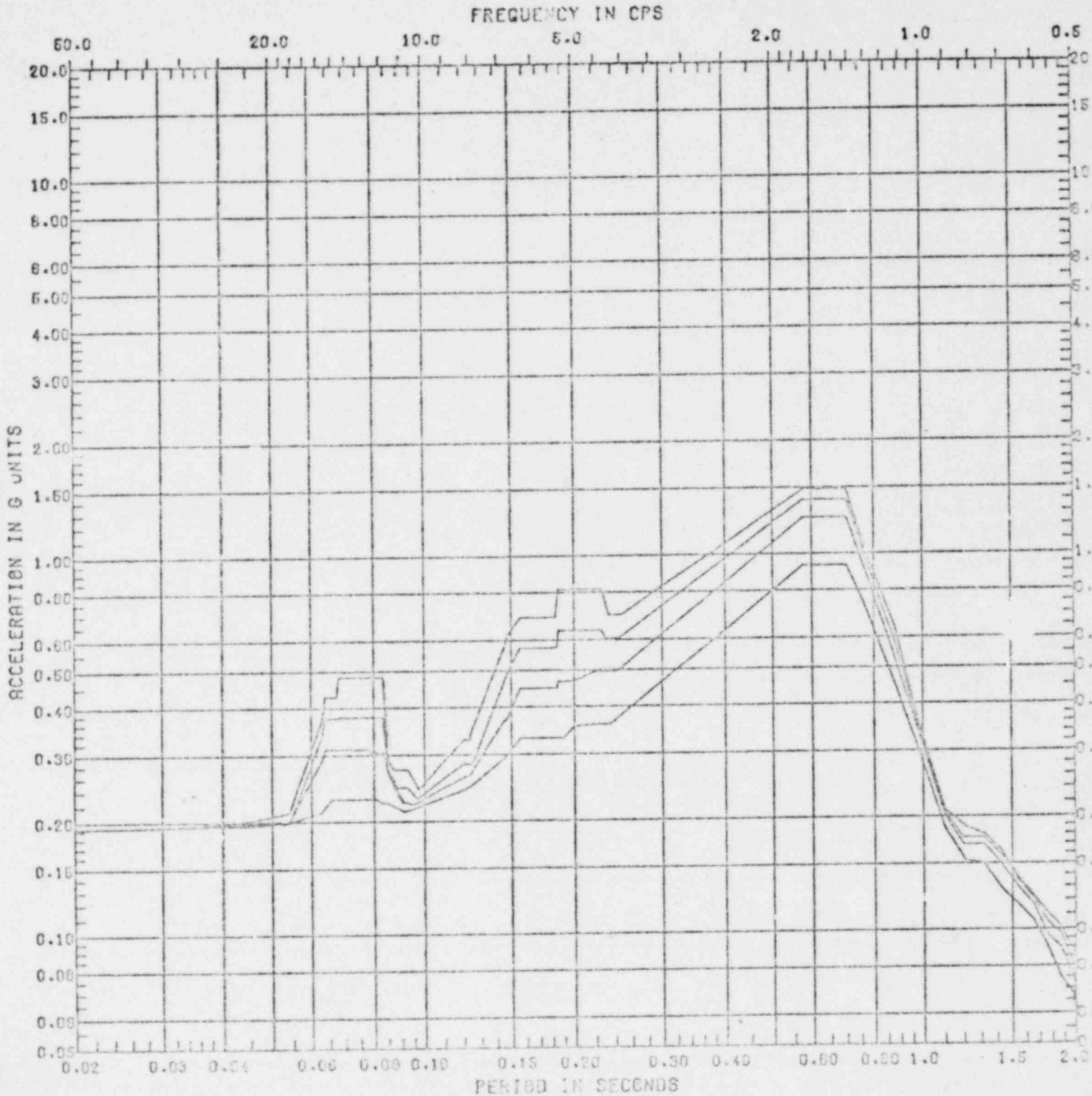
LOCATION Auxiliary Bldg. Slab

SPECTRA NO. 2-F, 3-F

REVISION NO. 0

14 JUL 76
SL180

ZIMMERI SOIL-STRUCT.HOR.OBE.SLAB 4 X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 34 OF 125



O.B.E. Horiz. Response Spectra N-S Component

SPECTRA NO. 4-A

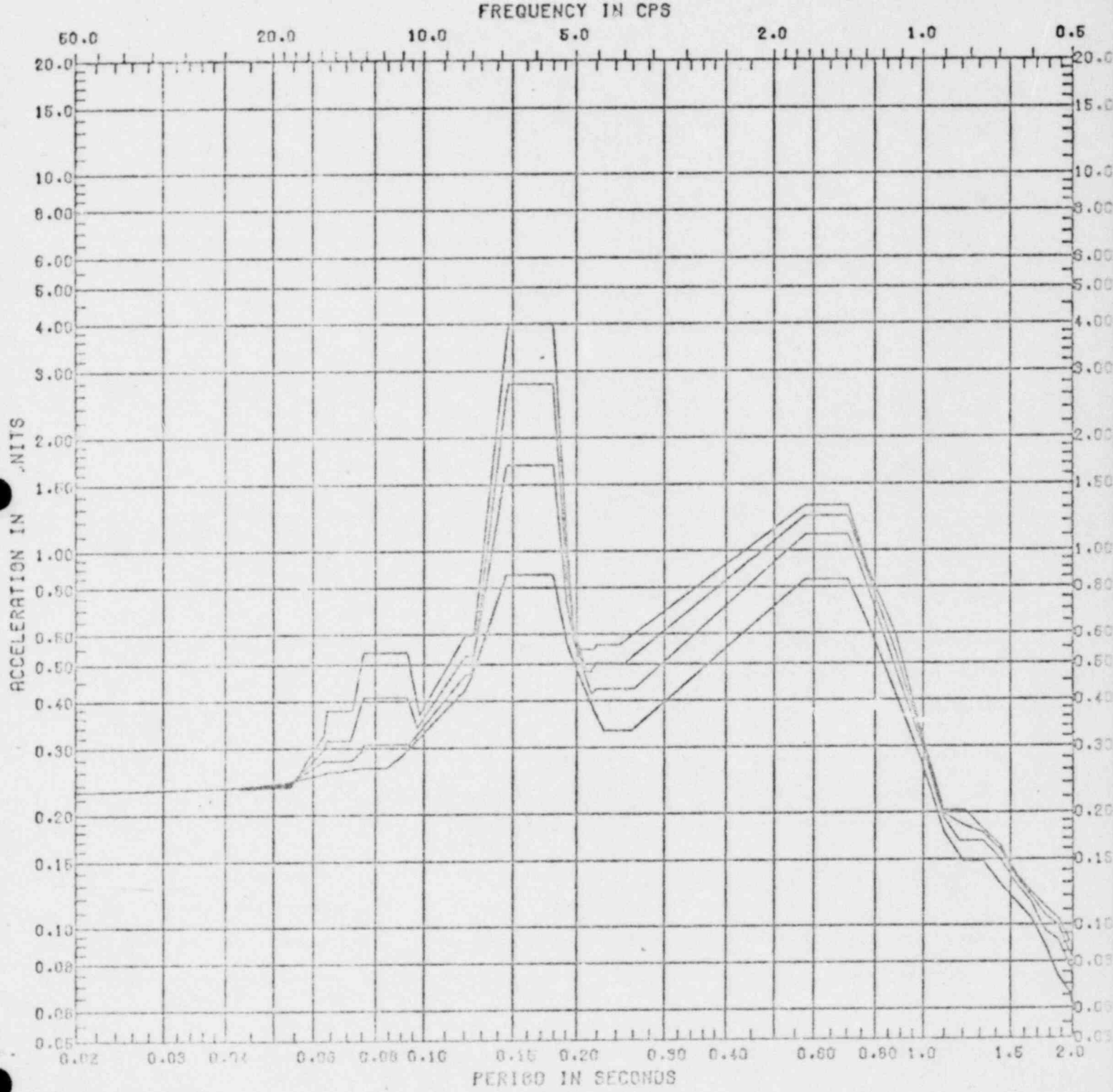
ELEVATION 570'-6"

LOCATION Reactor Building Slab

REVISION NO. 0

14 JUL 76
SL180

ZIMMER1 SGIL-STRUCT.HOR.OBE.SLAB 4 Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 35 OF 125

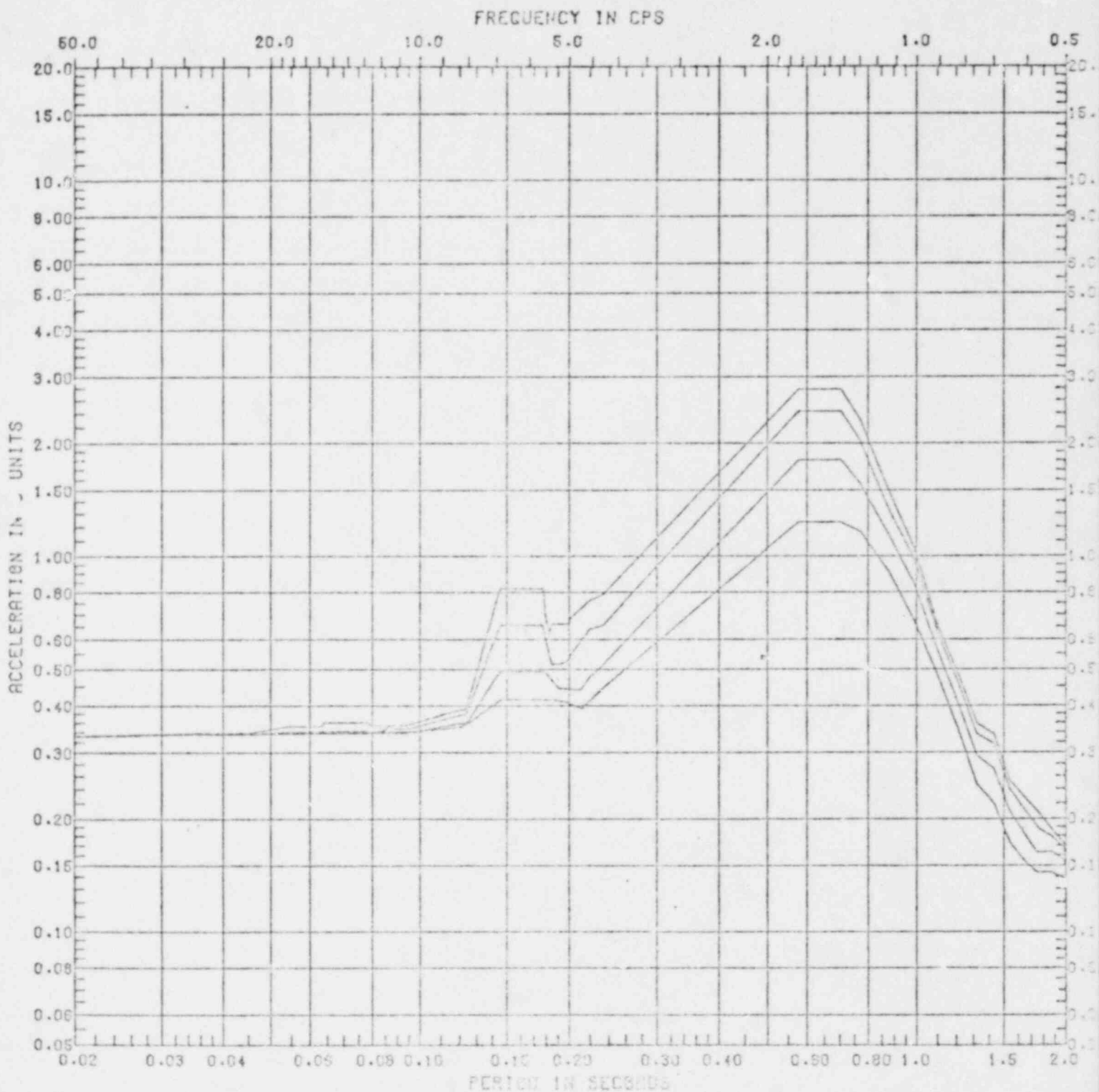


O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 4-B
ELEVATION 570'-6"
LOCATION Reactor Bldg. Slab REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT. HORIZ. DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 4 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 36 OF 125

7



O.E. Horiz. Response Spectra N-S Component

SPECTRA NO. 4-C

ELEVATION 570'-6"

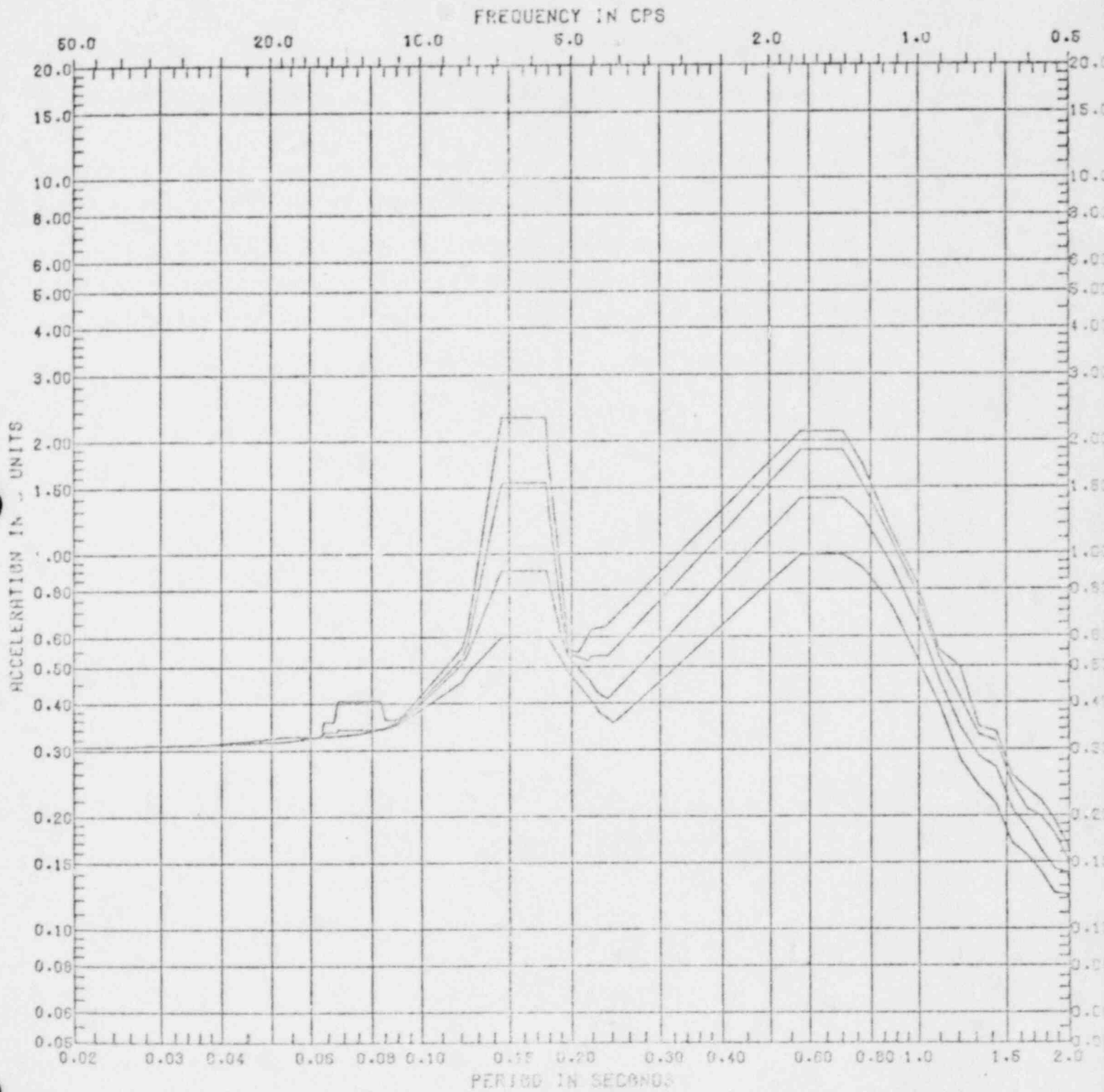
LOCATION Reactor Building Slab

REVISION NO. 0

P

28 JUL 76
8290EL

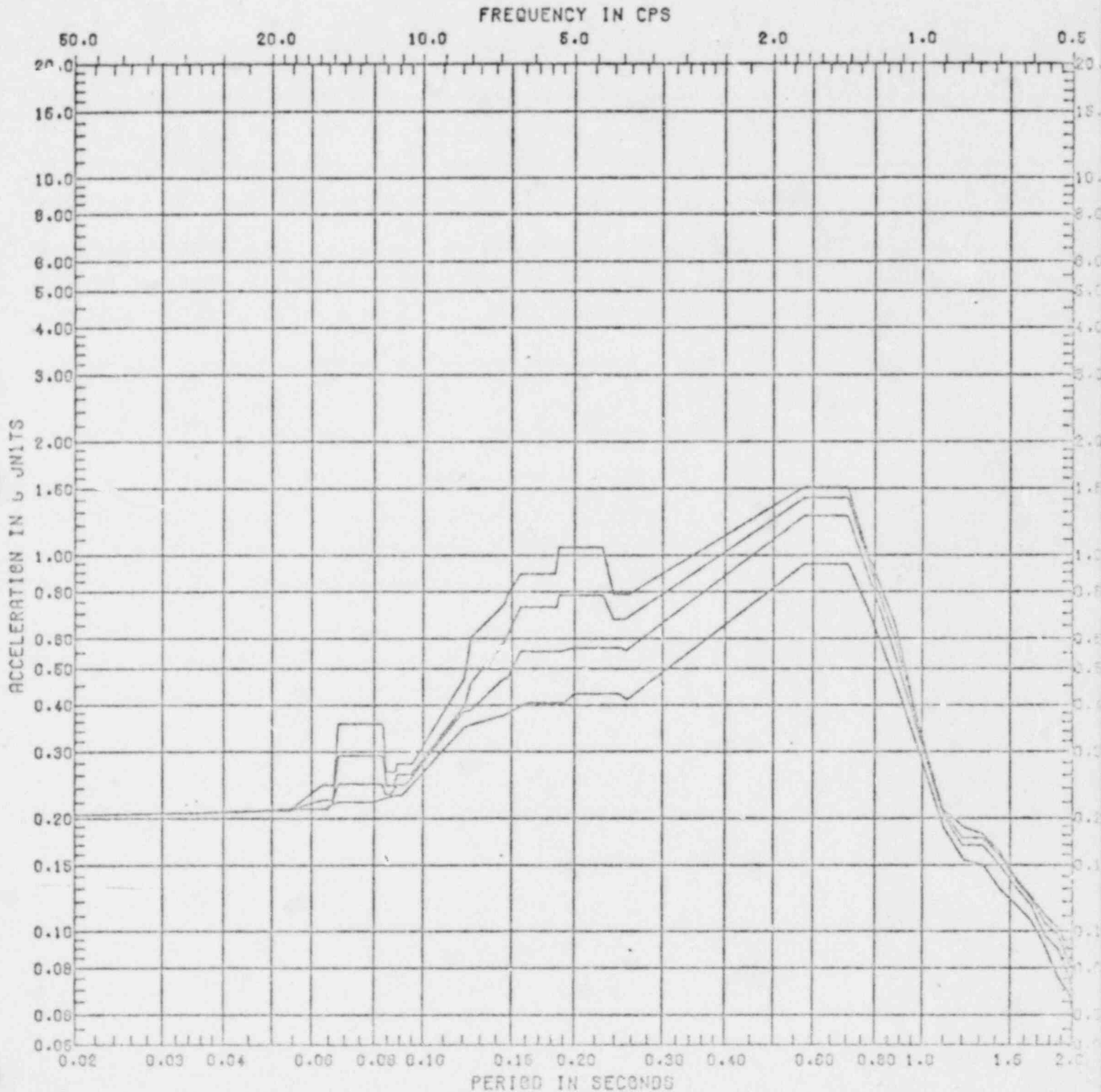
ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 4 Y-COMP
FERKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 37 OF 125



O.E. Horiz. Response Spectra E-W Component SPECTRA NO. 4-D
ELEVATION 570'-6"
LOCATION Reactor Bldg. Slab REVISION NO. 0

14 JUL 76
SL180

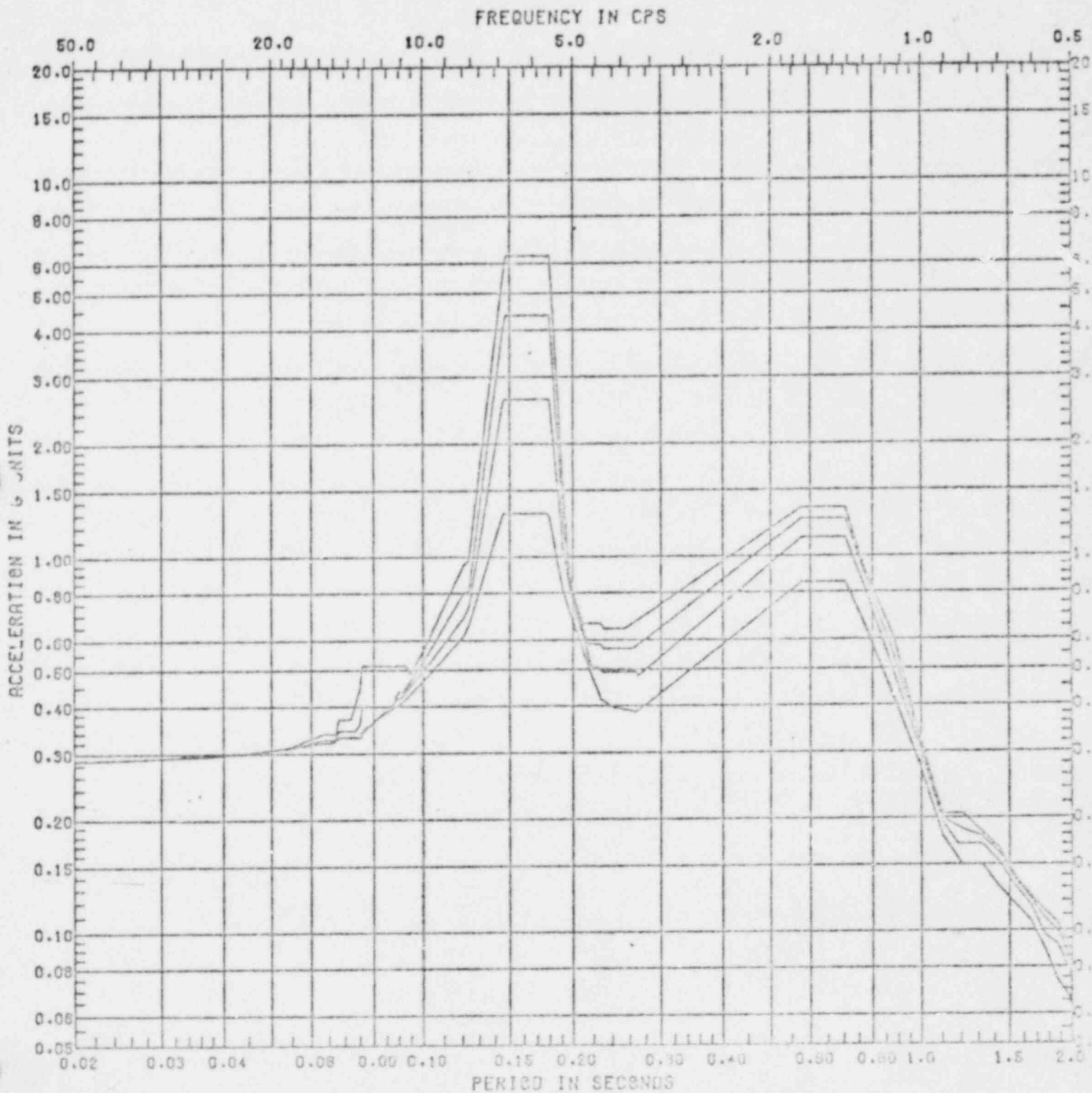
ZIMMER: SOIL-STRUCT, HOR, OBE, SLAB 5 X
DESIGNER O.F. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 38 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 5-A
ELEVATION 593'-6"
LOCATION Reactor Building Slab REVISION NO. 0

14 JUL 76
SL180

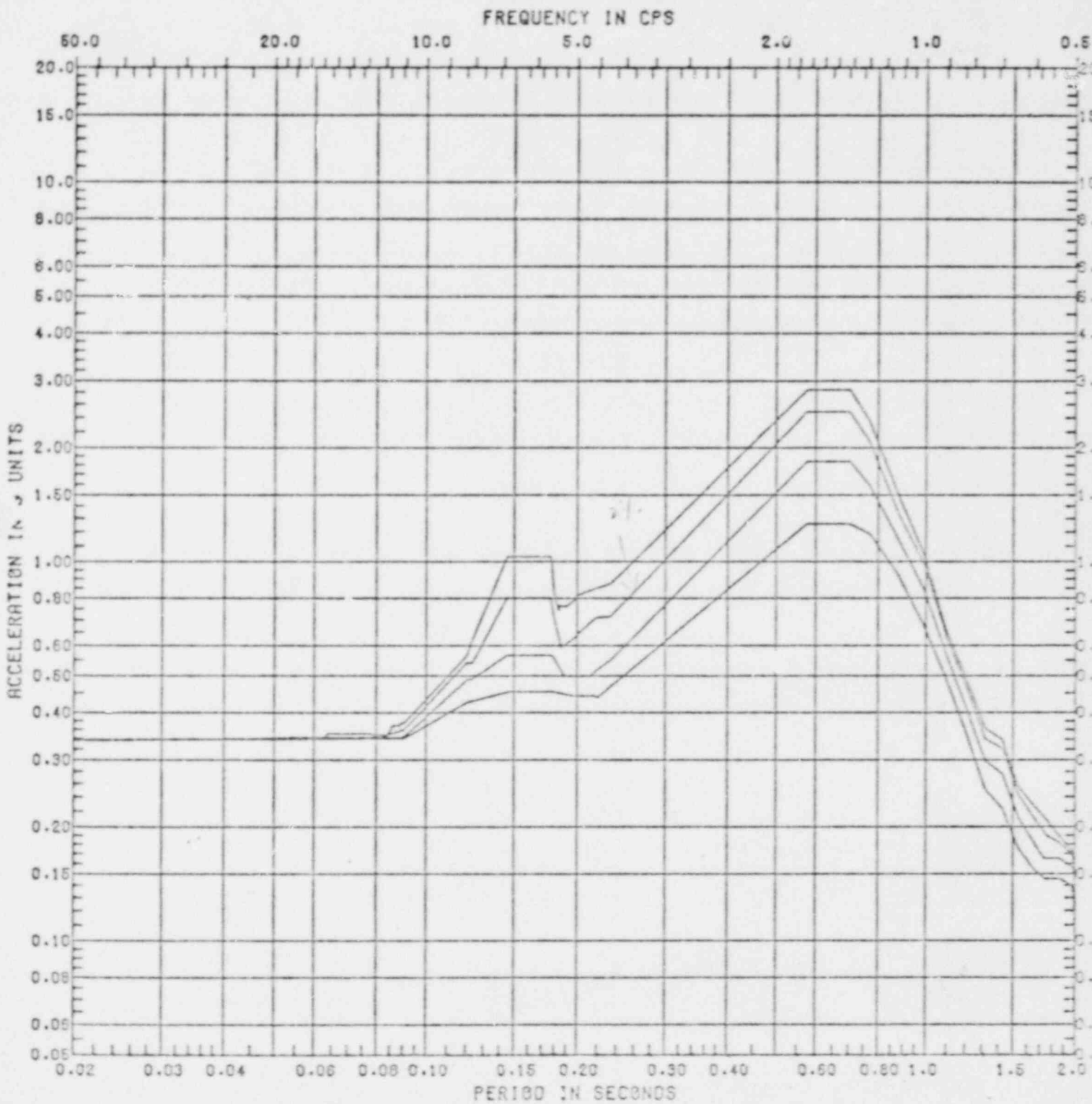
ZIMMERI SBIL-STRUCT.HOR.38E.SLAB 5 Y
DESIGNER O.E. LevCHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 39 OF 125



O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 5-B
ELEVATION 593'-6"
LOCATION Reactor Building Slab REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT. HORIZ. DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 5 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 40 of 125

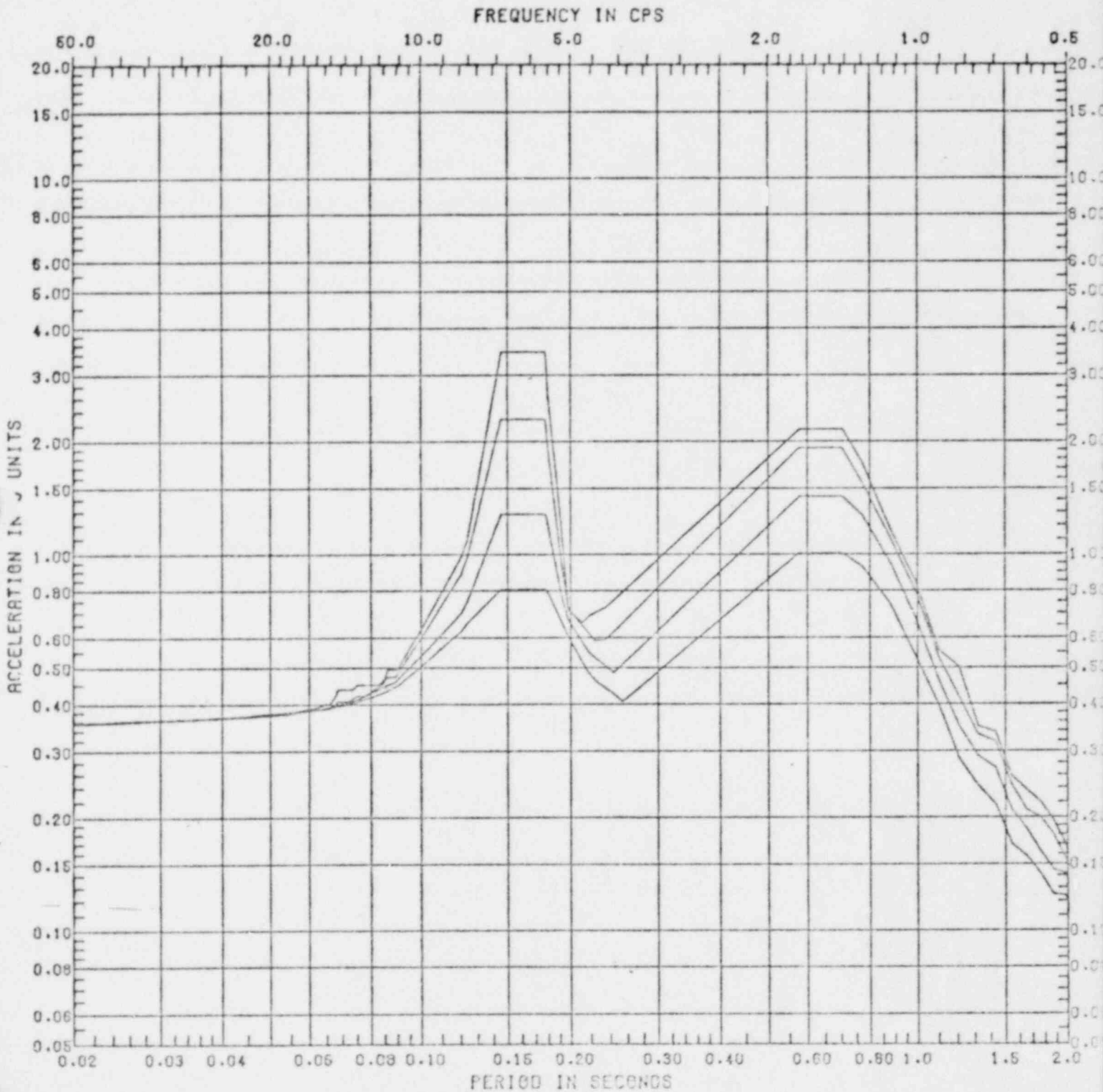


D.B.E. Horiz. Response Spectra N-S Component
ELEVATION 593'-6"
LOCATION Reactor Building Slab

SPECTRA NO. 5-C
REVISION NO. 0

R

28 JUL 76
8290EL



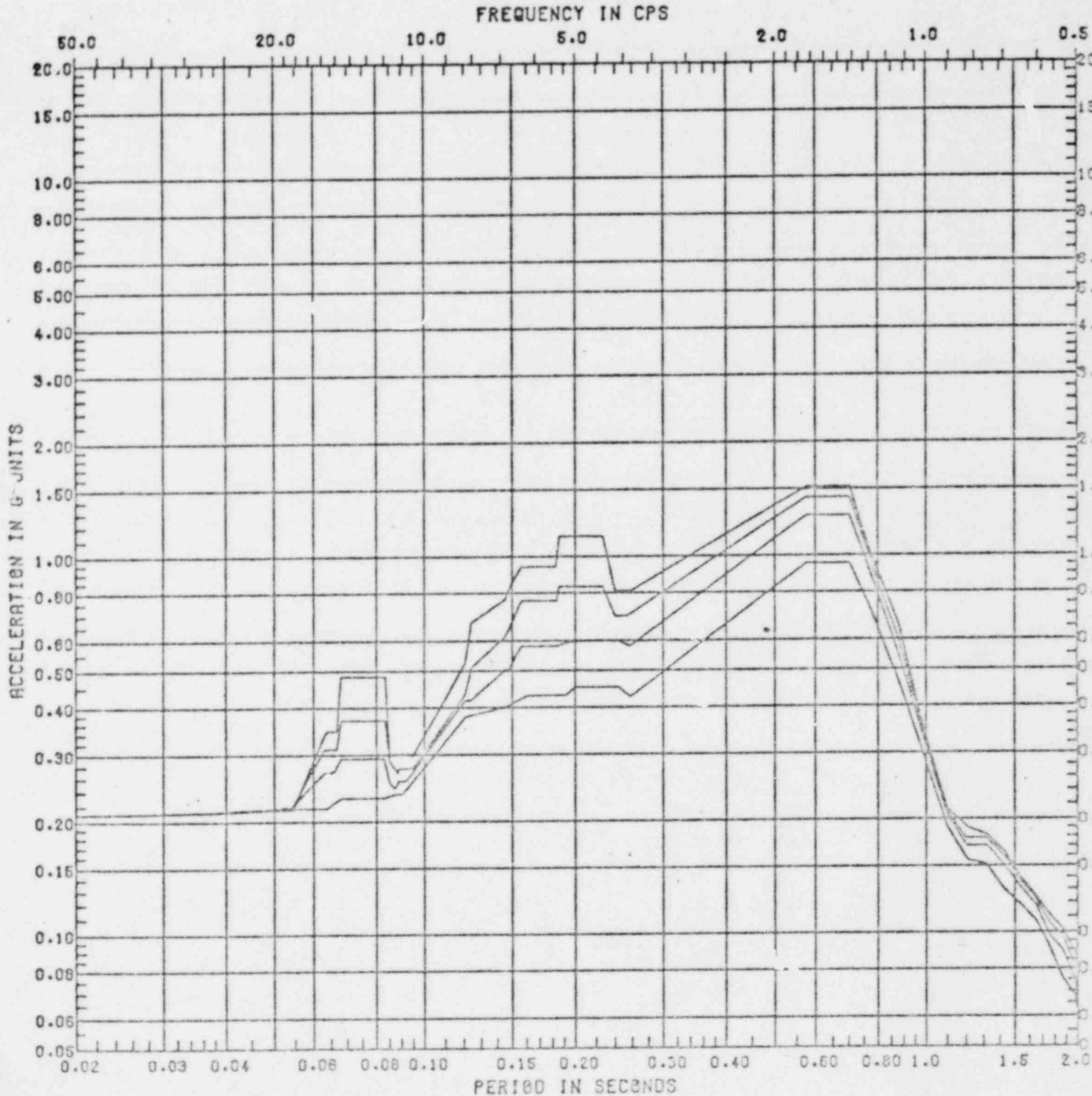
D.B.E. Horiz. Response Spectra E-W Component
ELEVATION 593'-6"
LOCATION Reactor Building Slab

SPECTRA NO. 5-D
REVISION NO. 0

5

14 JUL 76
SL180

ZIMMERI SOIL-STRUCT.HOR.OBE.SLAB 6 X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 42 OF 125

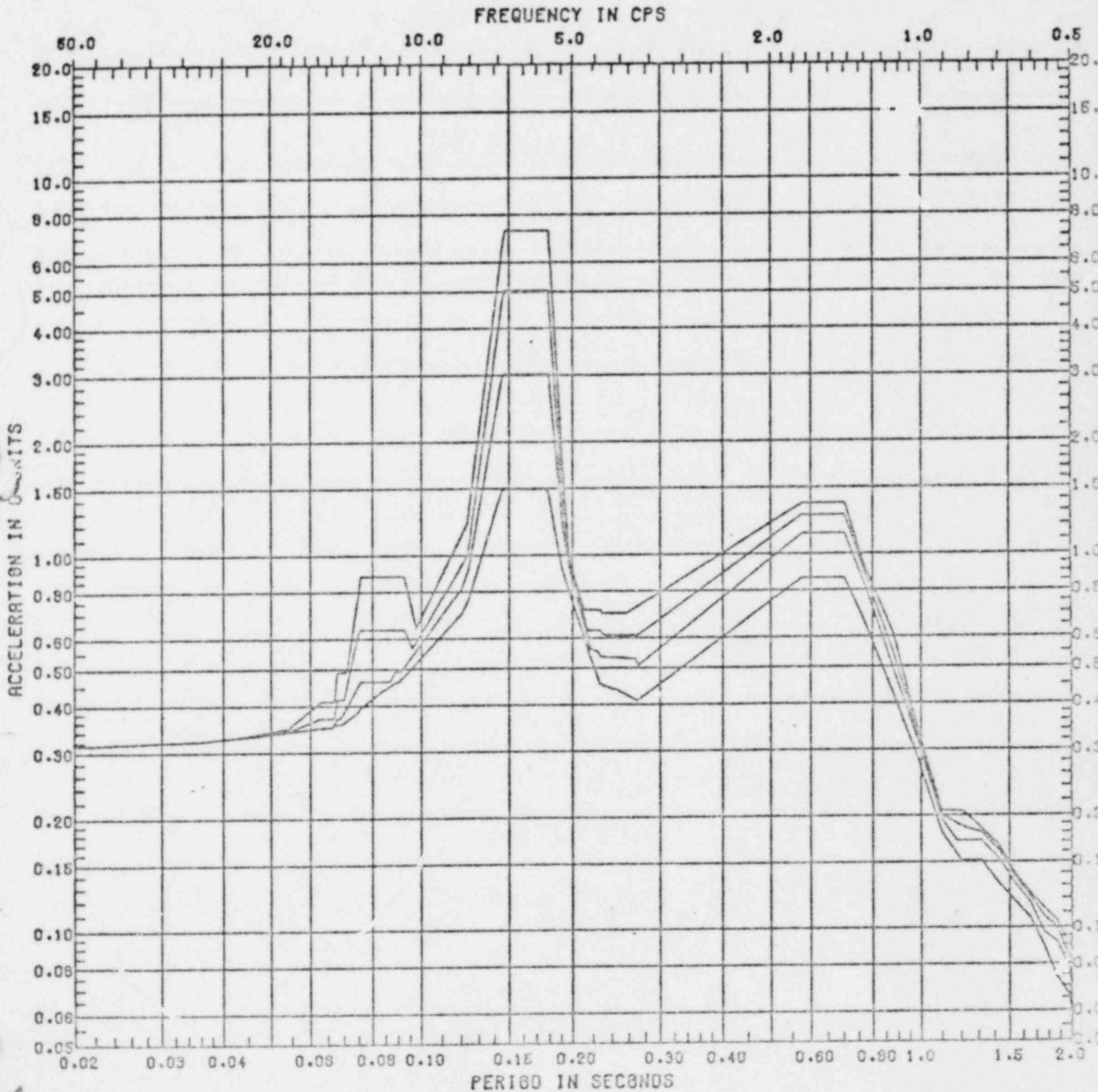


O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 6-A
ELEVATION 627'-0"
LOCATION Reactor Building Slab REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT.HOR.08E.SLAB 6 Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 43 OF 125



O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 6-B

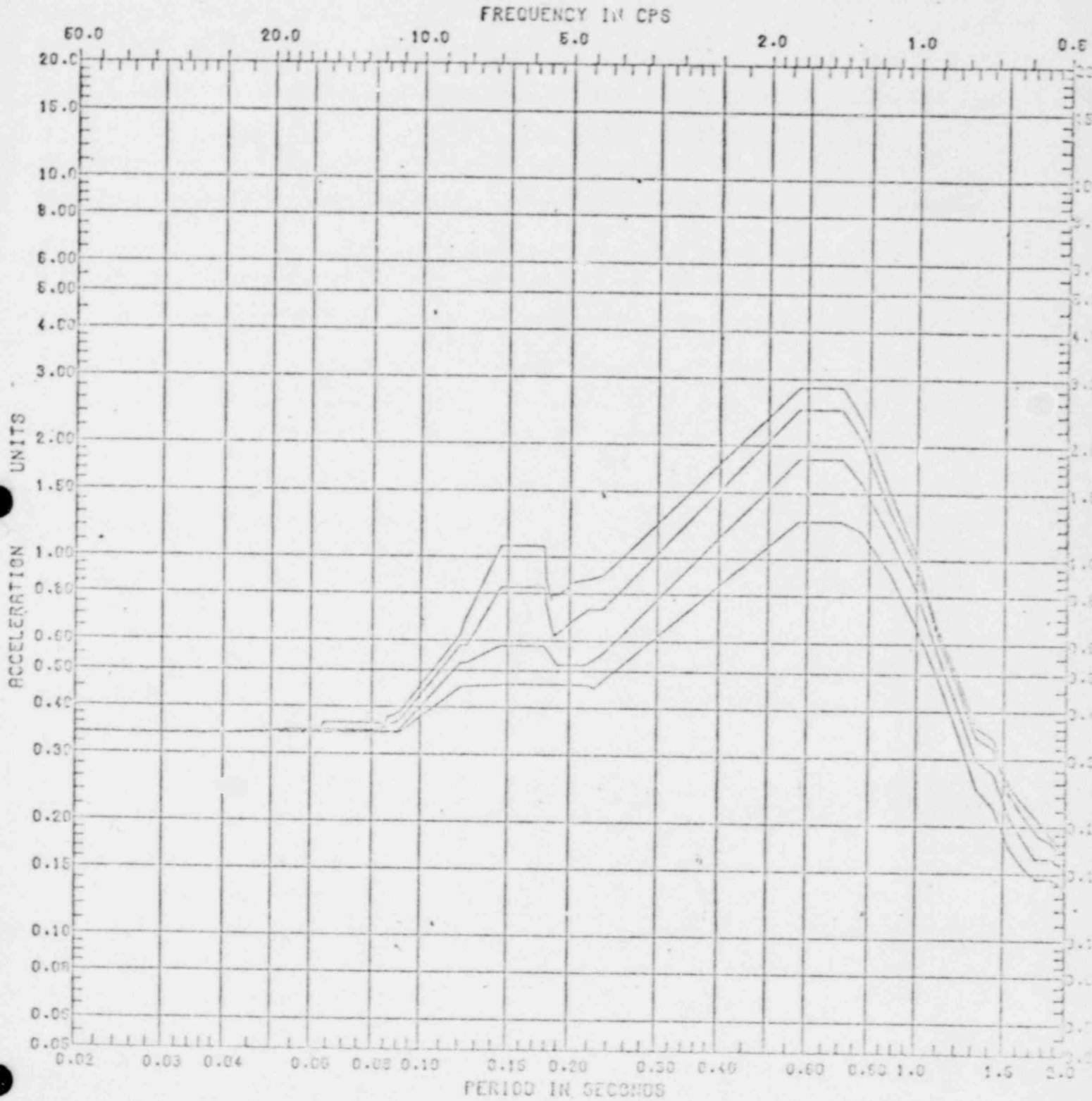
ELEVATION 627'-9"

LOCATION Reactor Building Slab

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT. HORIZ. DDE
DESIGNER O.E. LOY CHECKER B.P. JAIN
DESIGN SPECTRA AT JOINT/SLAB 6 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 44 OF 125



U.S.E. Horiz. Response Spectra N-S Component

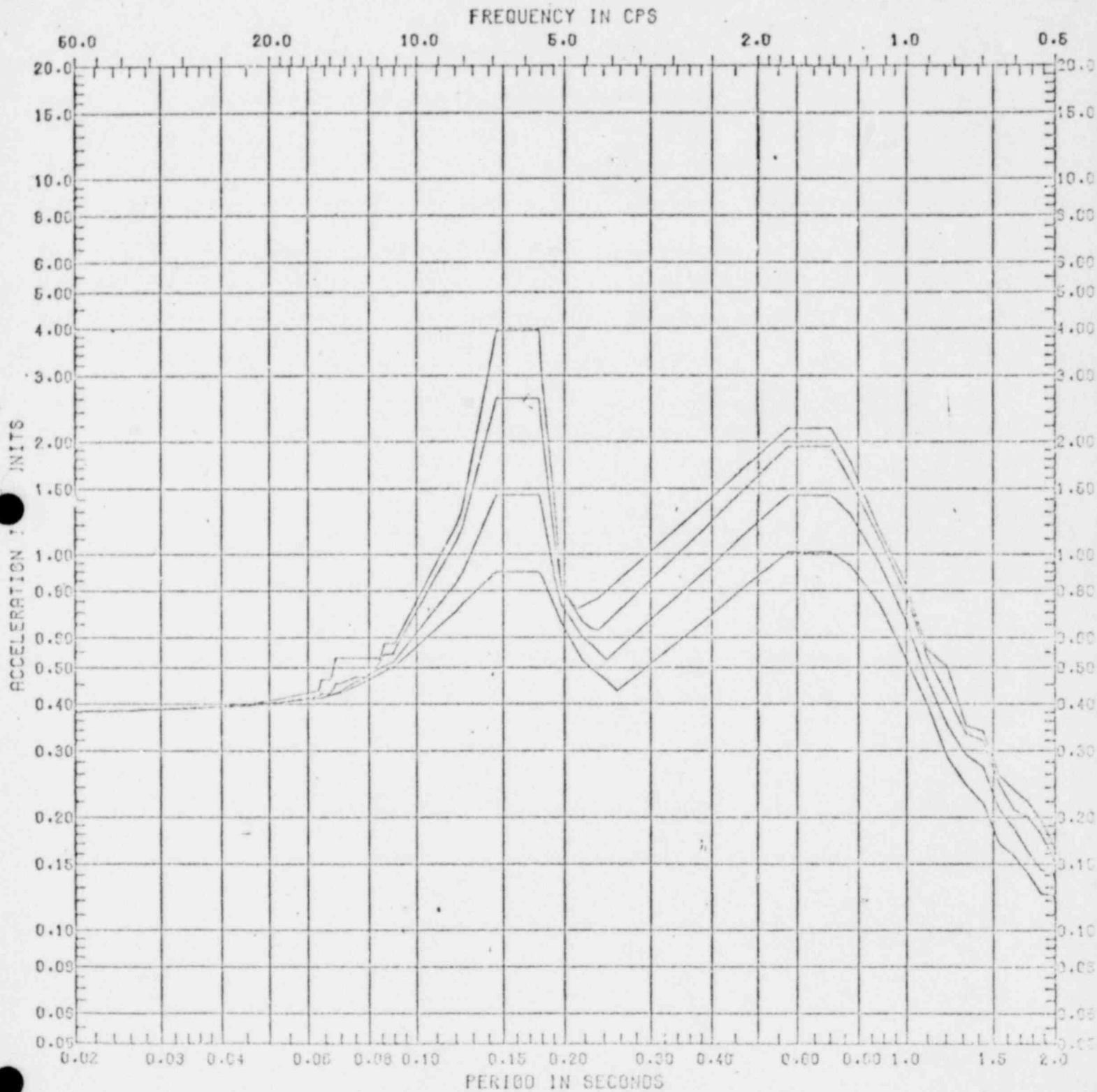
SPECTRA NO. G-C

ELEVATION 627'-9"

LOCATION Reactor Building Slab

REVISION NO. 0

28 JUL 76
8290EL

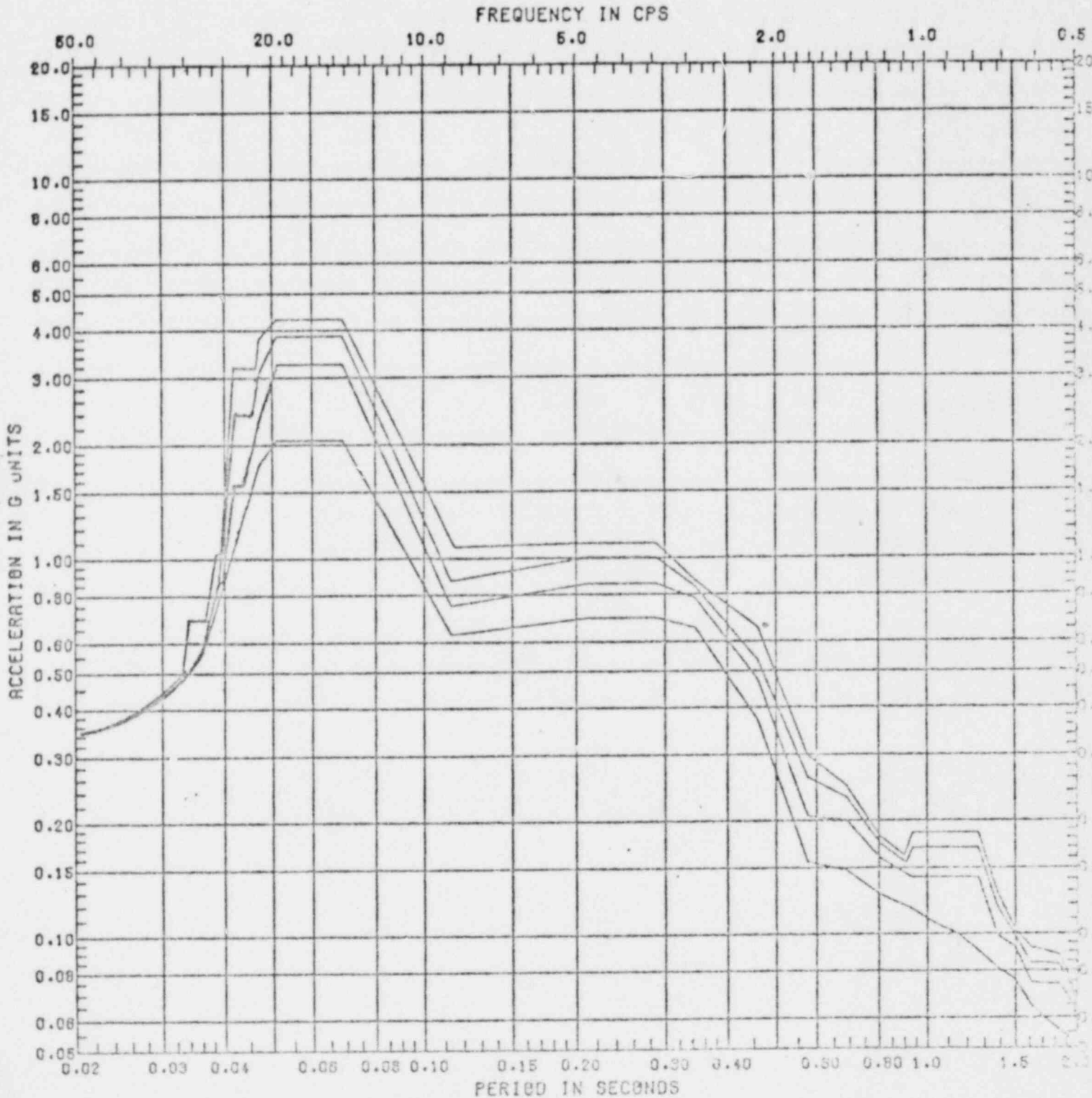


D.E. Horiz. Response Spectra E-W Component
ELEVATION -627'-9"
LOCATION Reactor Building Slab

SPECTRA NO. 6-D
REVISION NO. 0

15 JUL 76
2180EL

ZIMMER1,413015,SOIL-STRUCT,V,S 5,0BE
DESIGNER O.E.Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 27 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 46 OF 125

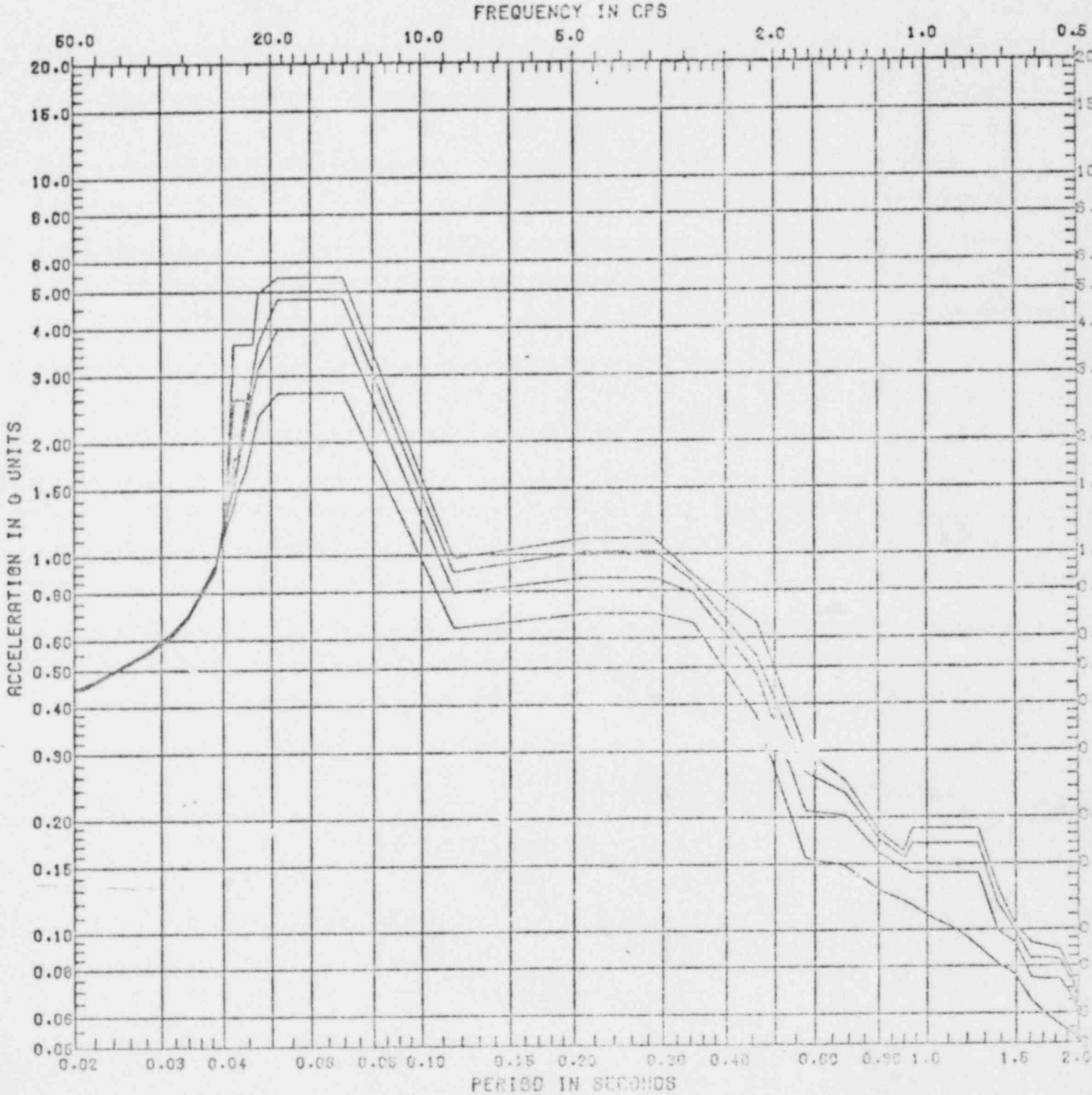


O.B.E. Vert. Response Spectra
ELEVATION 593'-6", 570'-6"
LOCATION Reactor Bldg. Slab

SPECTRA NO. 4-E, 5-E
REVISION NO. 0

15 JUL 76
9440EL

ZIMMER 1,413015, 301L-STRUCT. V.S 6.08E
DESIGNER O.W. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 24 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 47 OF 125

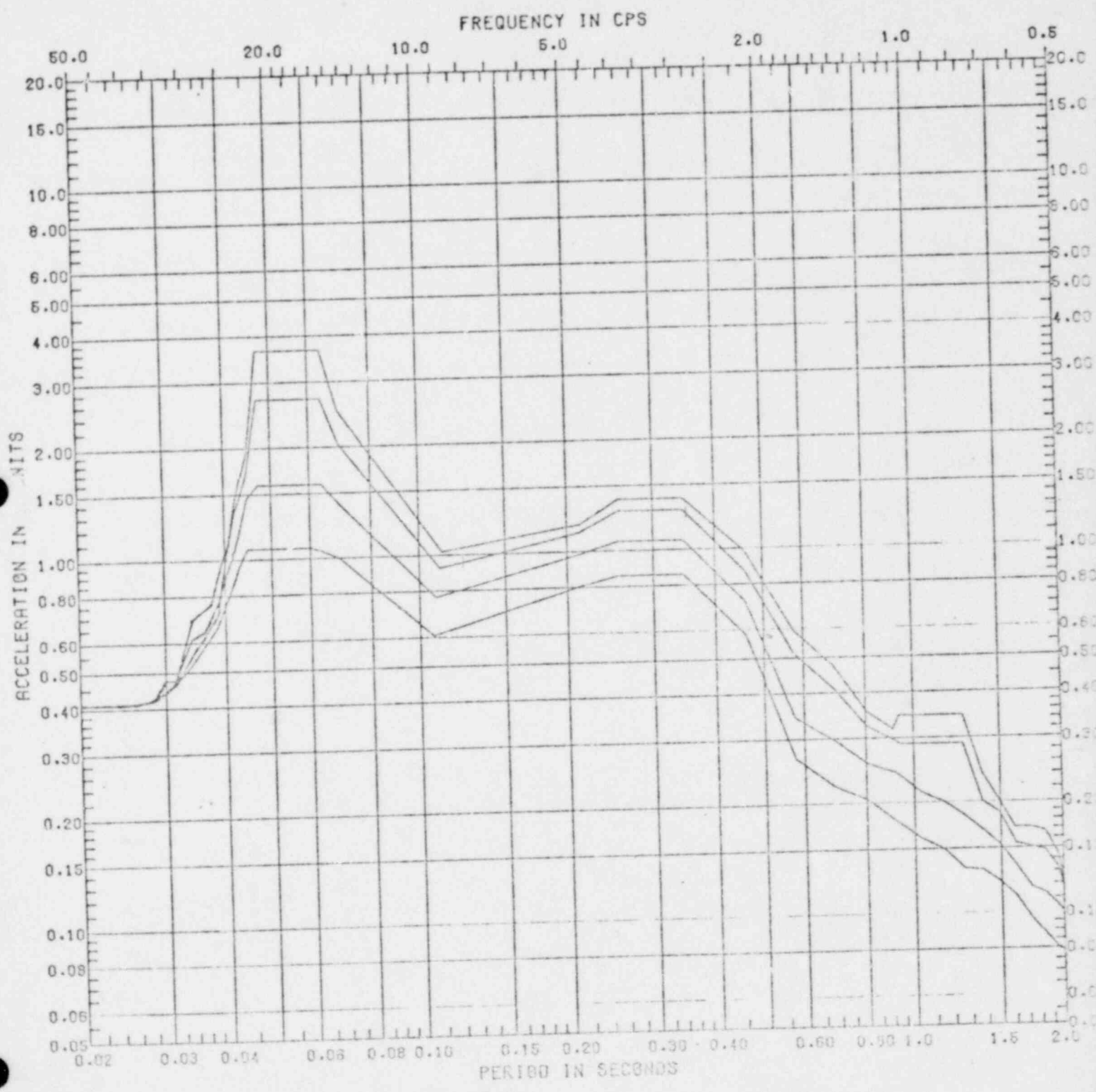


O.B.E. Vert. Response Spectra
ELEVATION 627'-9"
LOCATION Reactor Bldg. Slab

SPECTRA NO. 6-E
REVISION NO. 0

01 AUG 76
6740EL

ZIMMER 1.413015 SOIL-STRUCT.V.S 5.DBE
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 27 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 48 OF 125

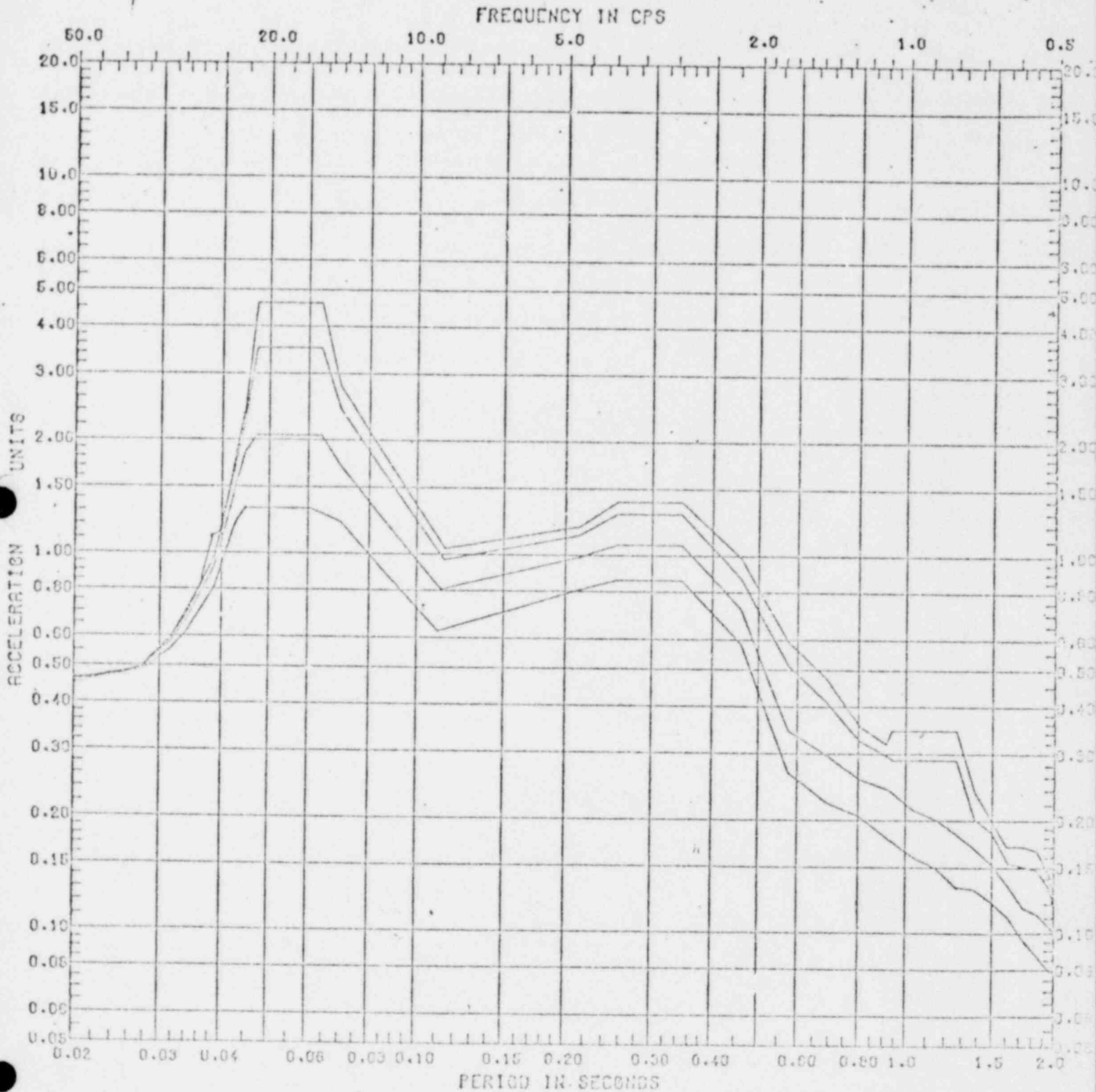


D.B.E. VERT RESPONSE SPECTRA
ELEVATION 593'-6", 570'-6"
LOCATION Reactor Bldg. Slab

SPECTRA NO. 4-F, 5-F
REVISION NO. 0

29 JUL 76
3860EL

ZIMMER 1.413015, SOIL-STRUCT, V.S 0.08E
DESIGNER O.E. LOW CHECKER H.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 24 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 49 OF 125

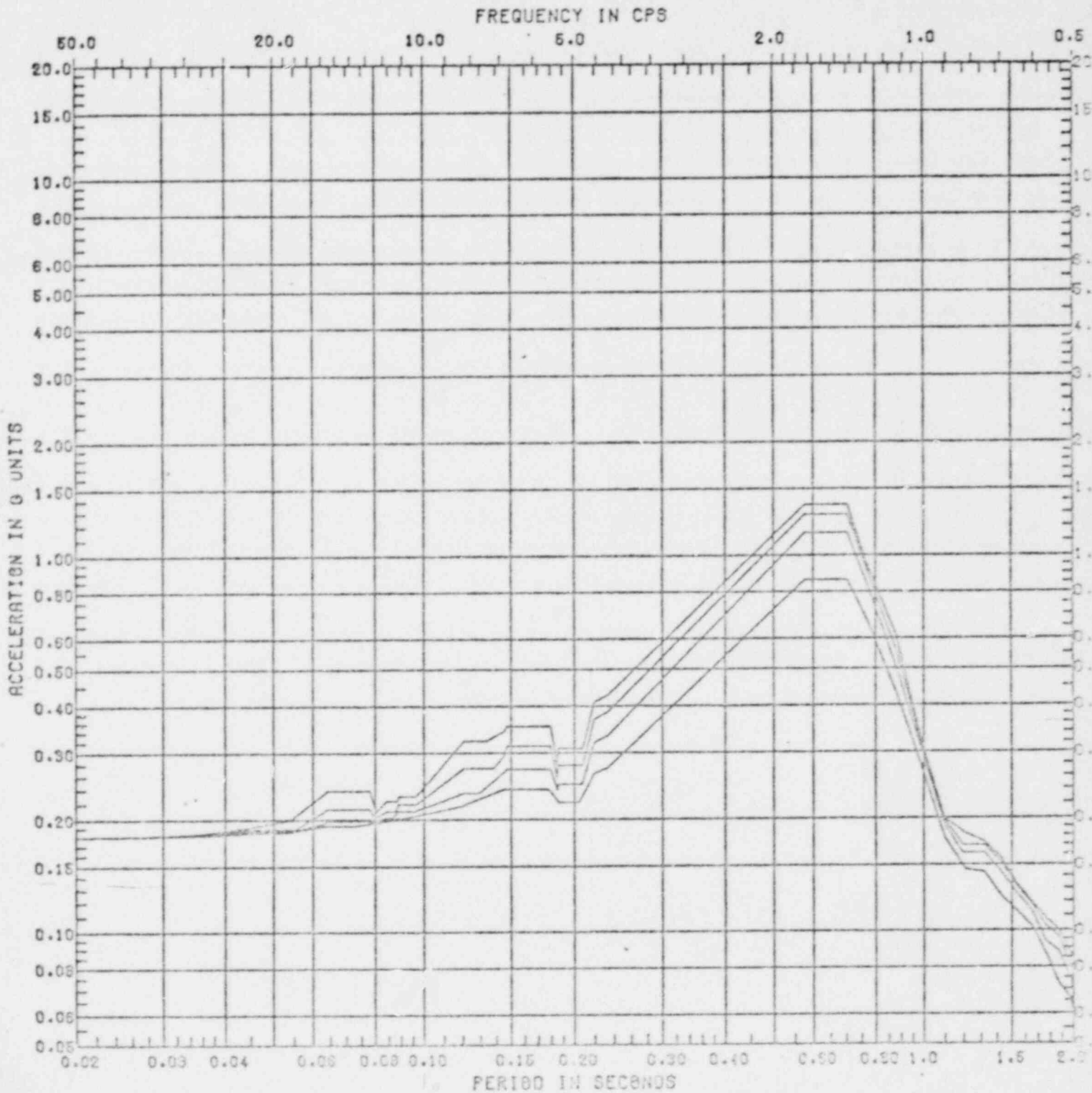


D.B.E. VERT RESPONSE SPECTRA
ELEVATION 627'-9"
LOCATION Reactor Bldg. Slab

SPECTRA NO. 6-F
REVISION NO. 0

14 JUL 76
SL180

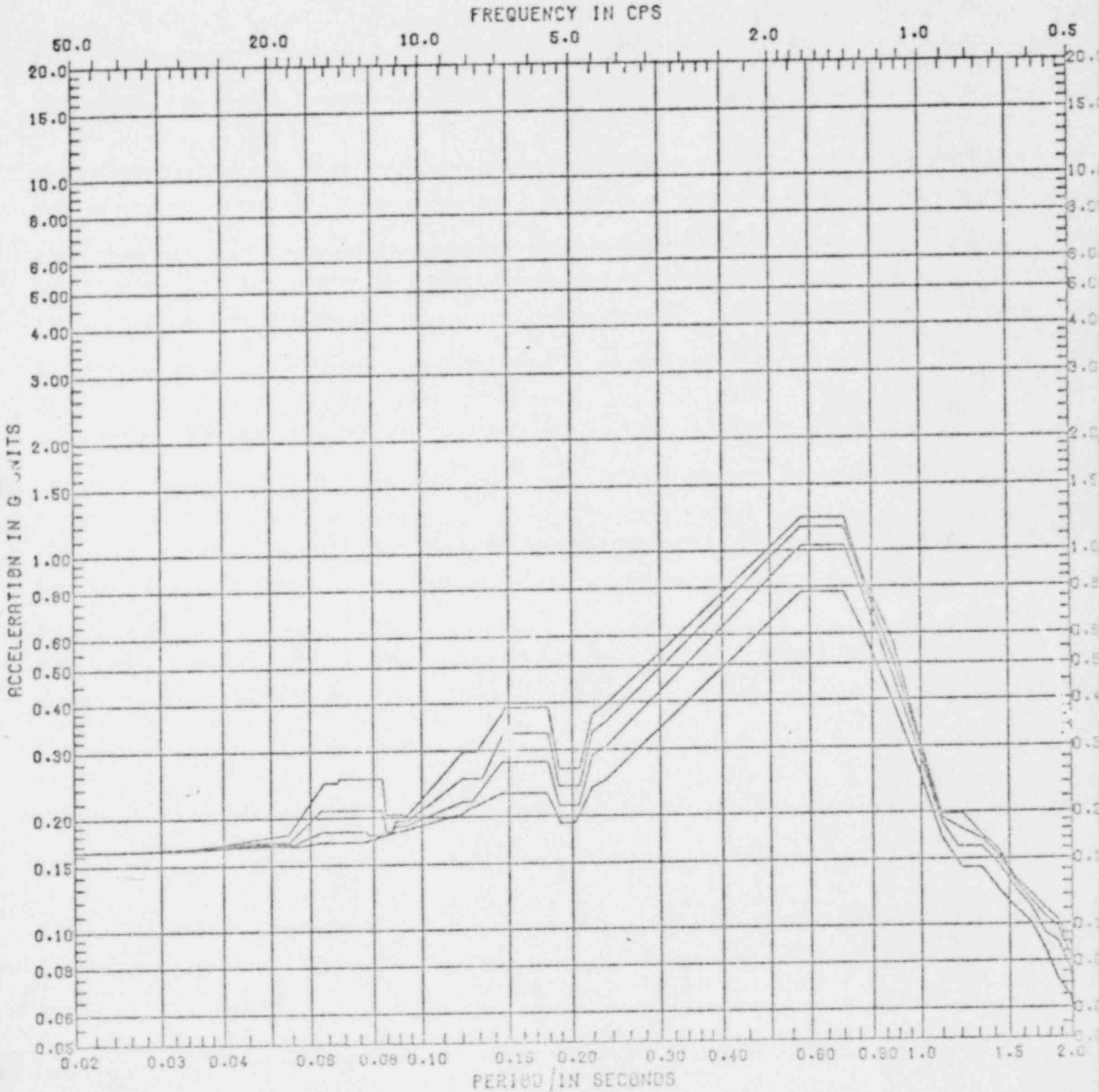
ZIMMER1 SOIL-STRUCT.HOR.08E.SLAB 11X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 50 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 7-A
ELEVATION 473'-5", 496'-0"
LOCATION Reactor, Auxiliary, Turbine Building Slabs REVISION NO. 0

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT, HOR, GBE, SLAB 11Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 51 OF 125



O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 7-B

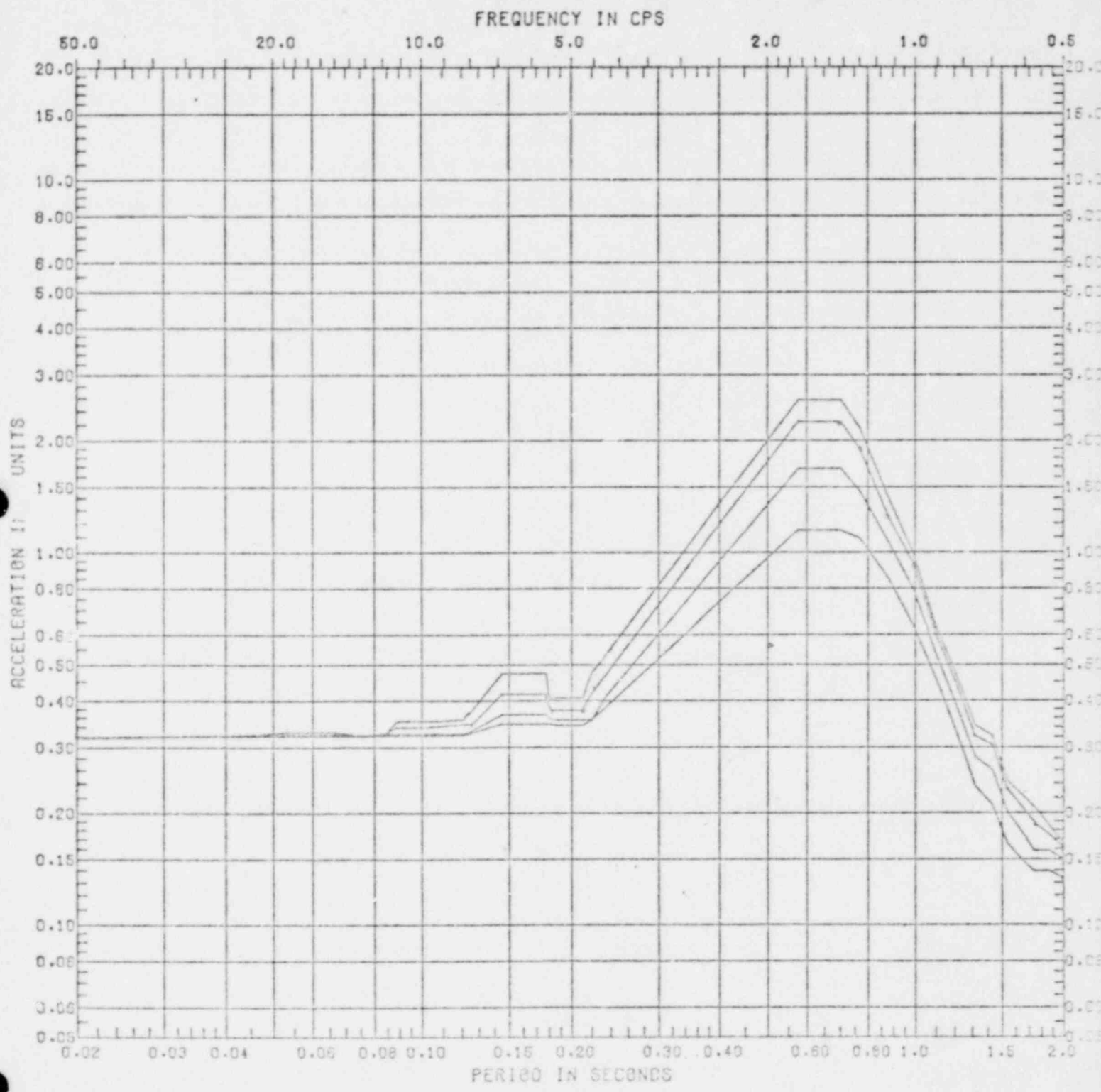
ELEVATION 496'-0", 473'-5"

LOCATION Reactor, Auxiliary, Turbine
Building Slabs

REVISION NO. 0

28 JUL 76
8290EL

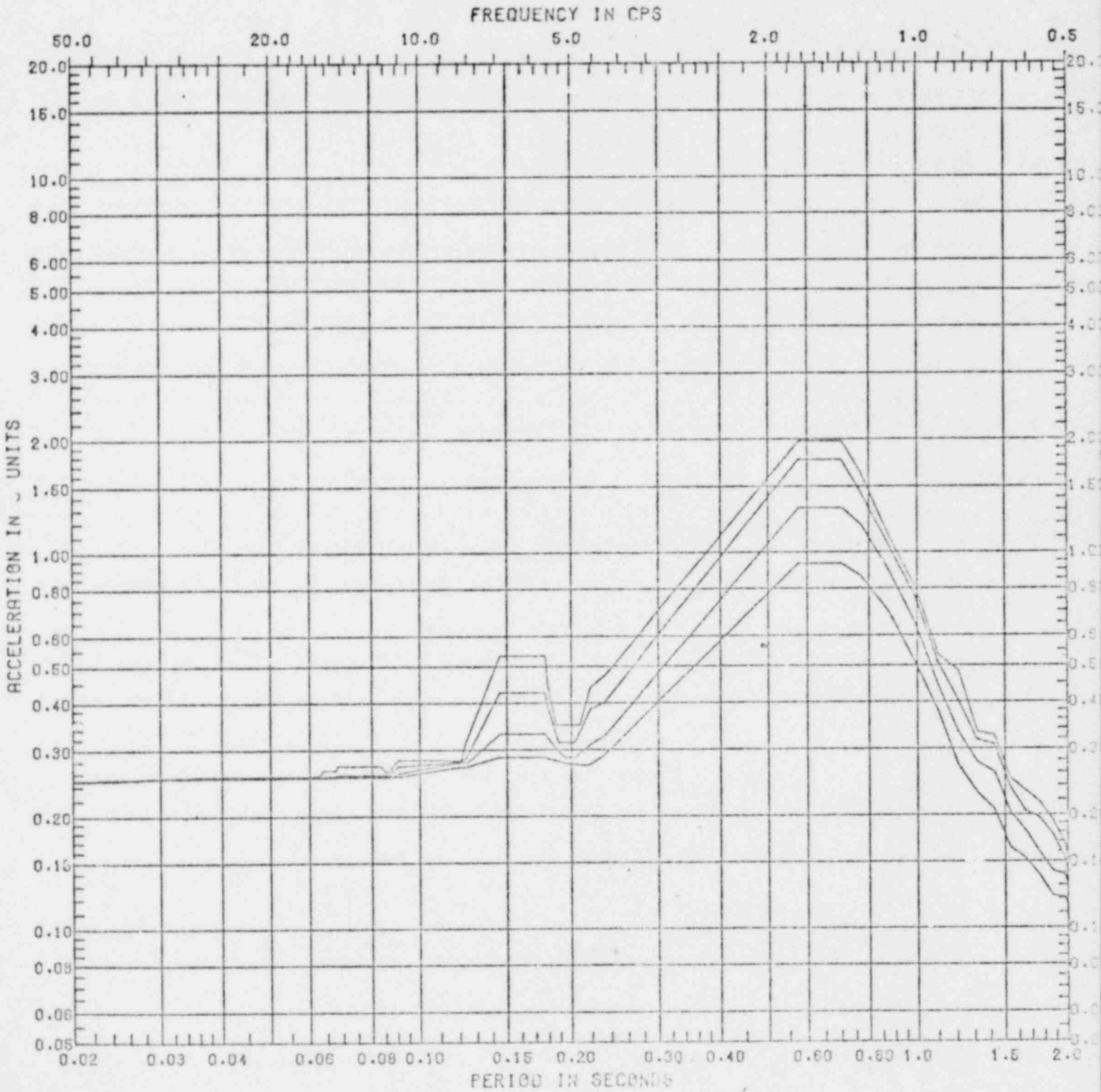
ZIMMER, 413015, SOIL-STRUCT. HORIZ. DBE
DESIGNER O.P. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 11 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 52 OF 125



D.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 7-C
ELEVATION 473'-5", 496'-0"
LOCATION Reactor, Auxiliary, Turbine Building Slabs REVISION NO. 0

28 JUL 76
8290EL

ZIMMER. 413015. SOIL-STRUCT. HORIZ. DBE
DESIGNER O.E. LOVCHER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 11 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 53 OF 125



D.B.E. Horiz. Response Spectra E-W Component

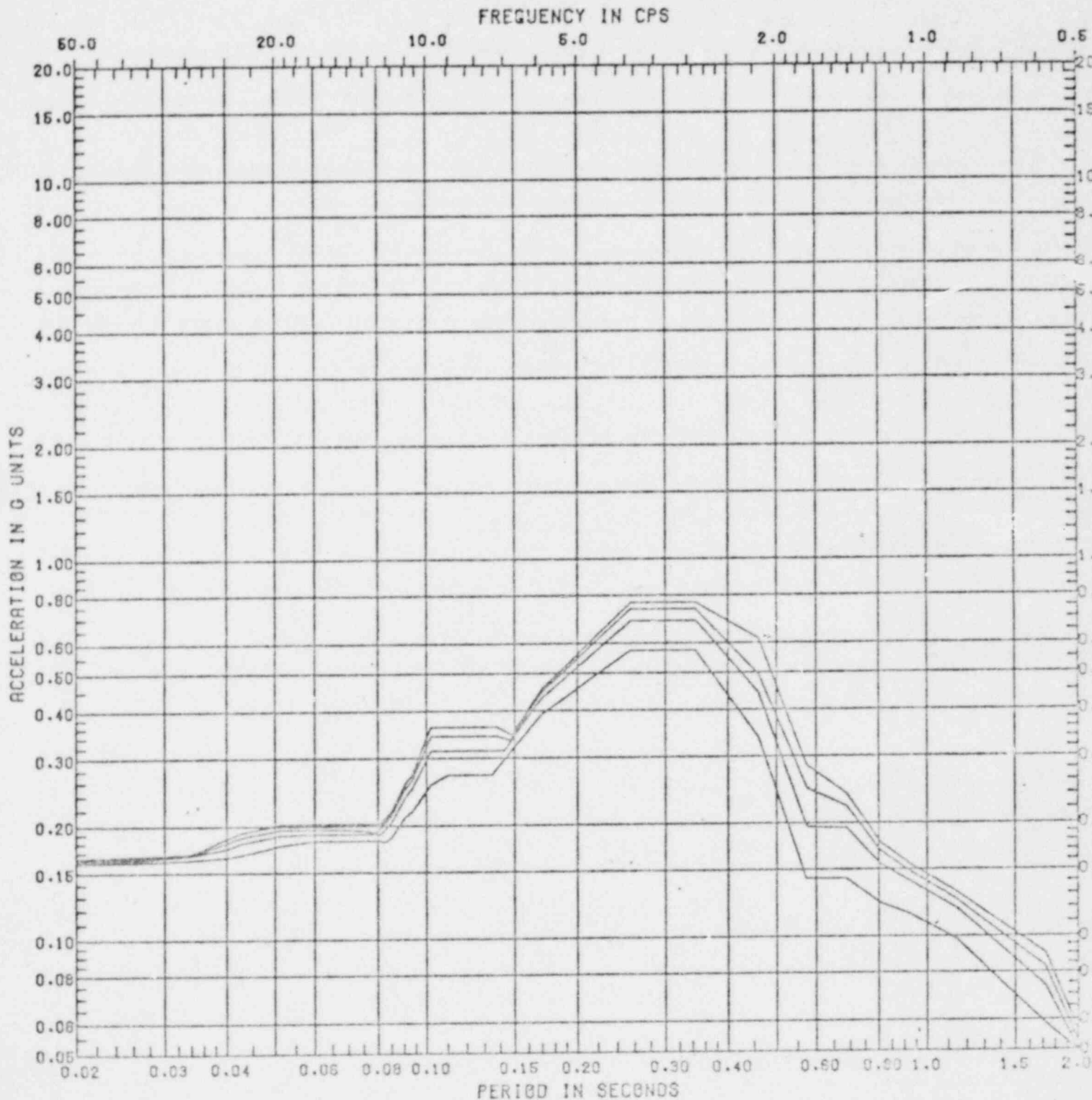
SPECTRA NO. 7-D

ELEVATION 496'-0", 473'-5"

LOCATION Reactor, Auxiliary, Turbine
Building Slabs

REVISION NO. 0

12 JUL 76
309SKN



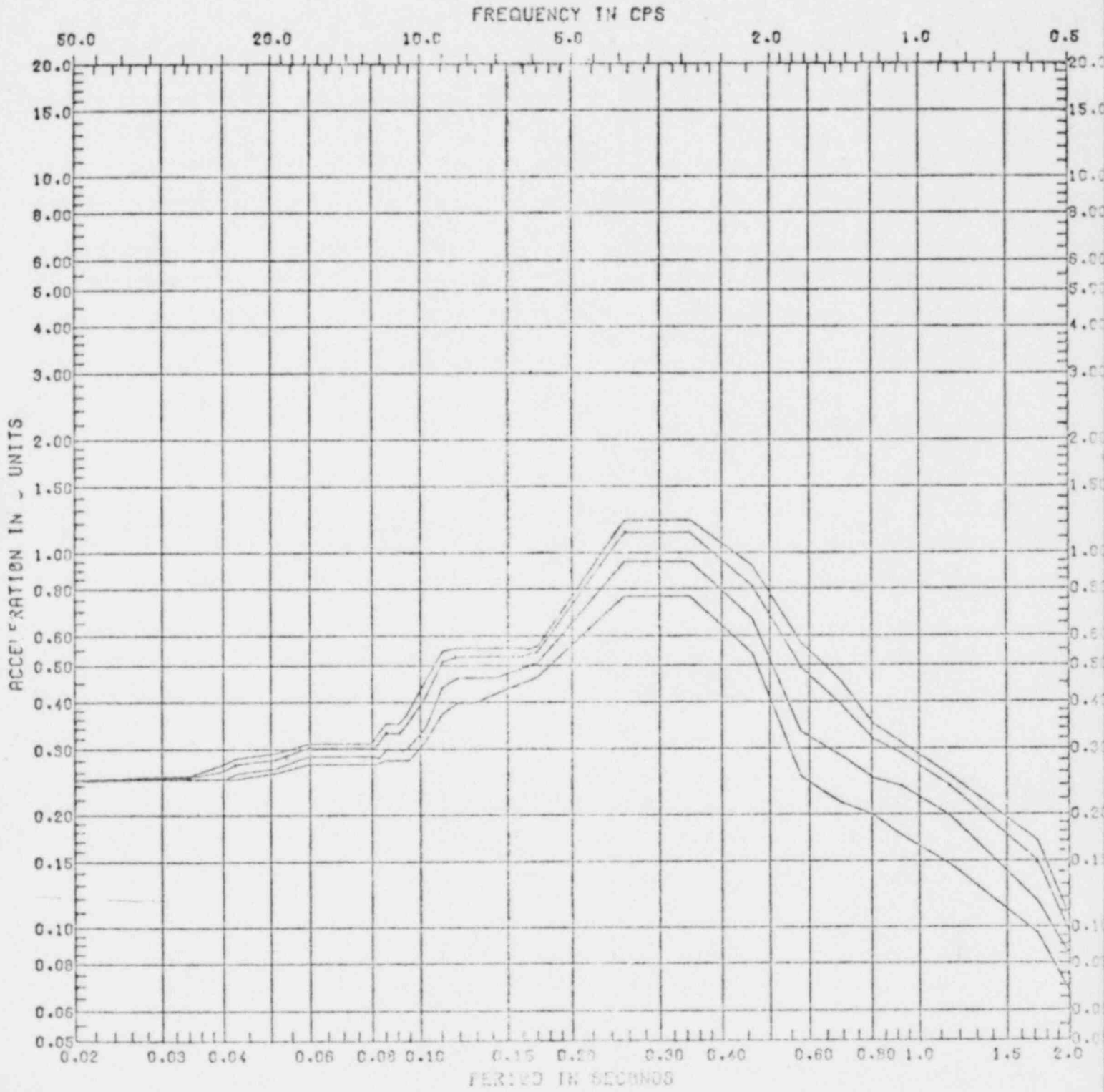
O.B.E. Vert. Response Spectra SPECTRA NO. 7-E

ELEVATION 473'-5", 496'-0" REVISION NO. 0

LOCATION Reactor, Aux. Turbine
Bldg. Slab

05 AUG 76
7930EL

4150-15.ZIMMER.RPV-PED.SOILSTR.V.0BE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 1 Y-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 55 OF 125

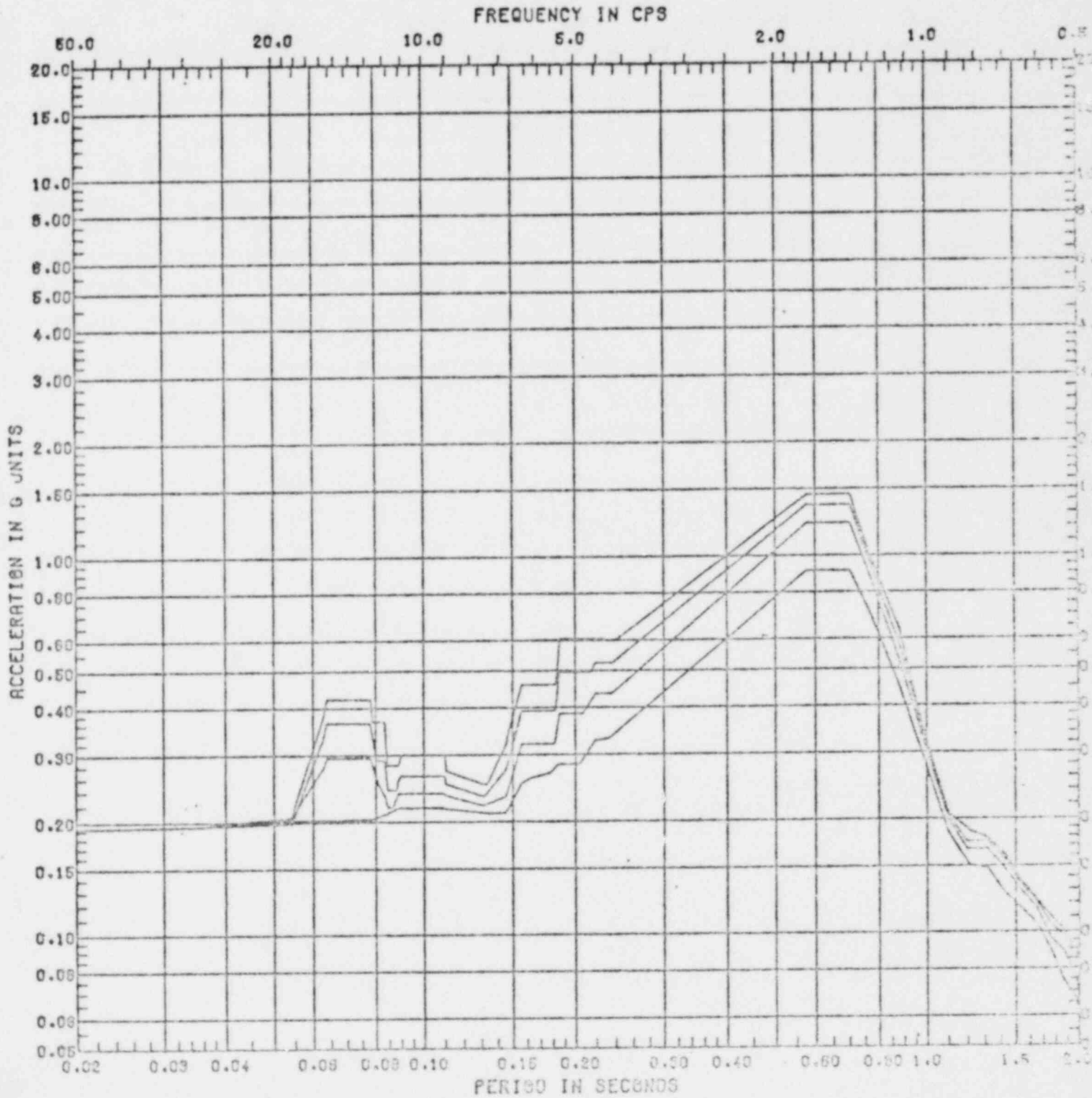


D.B.E. VERT RESPONSE SPECTRA
ELEVATION 473'-5", 496'-0"
LOCATION Reactor, Aux., Turbine
Bldg. Slab

SPECTRA NO. 7-F
REVISION NO. 0

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT.HOR.P3E.SLAB 9 X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 56 OF 125



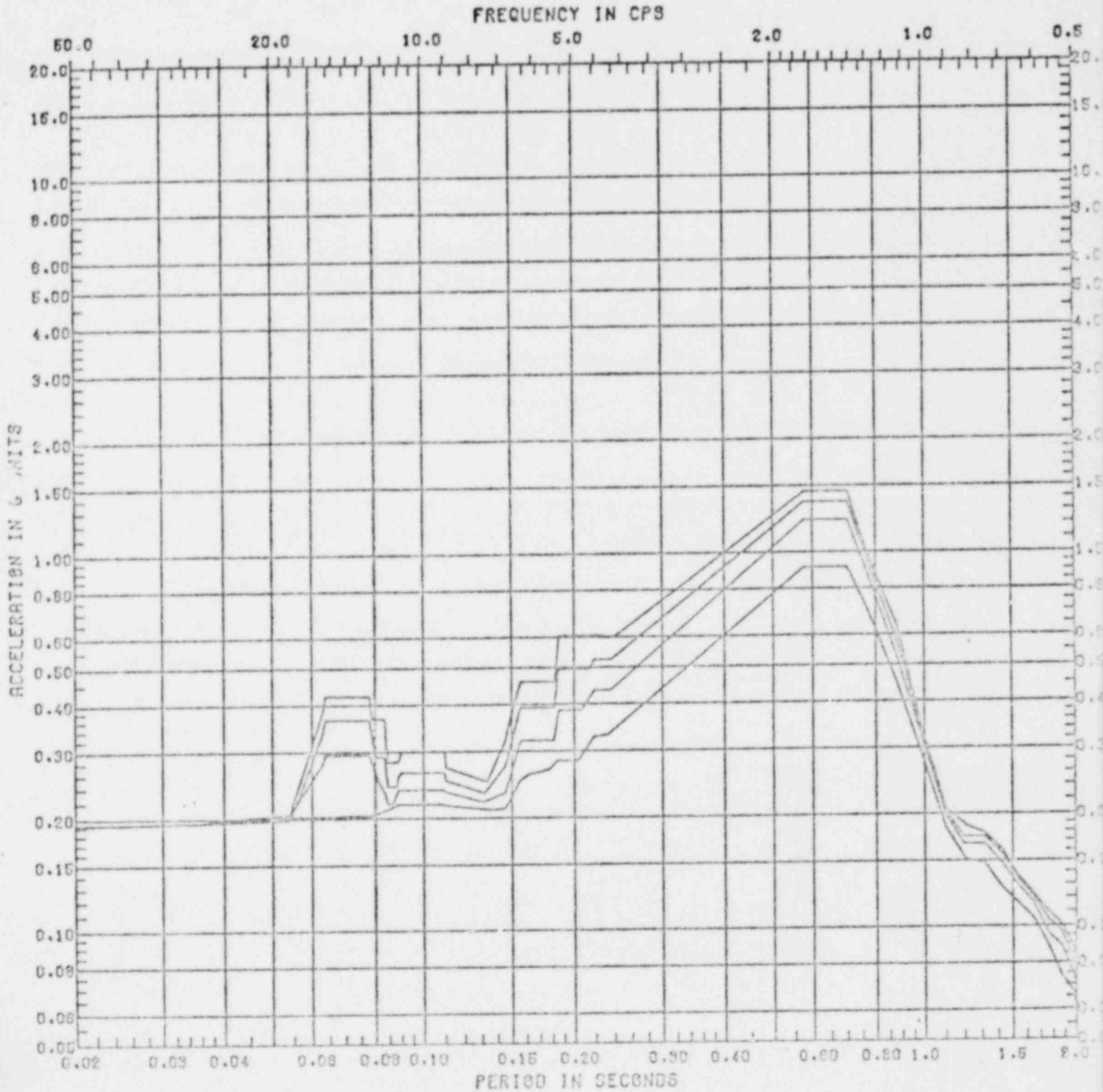
O.B.E. Horiz. Response Spectra N-S Component
ELEVATION 567'-5"
LOCATION Auxiliary Building Slab

SPECTRA NO. S-A
REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

ZIMMERI SOIL-STRUCT.HOR.08E.SLAB 8 X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 56 of 125

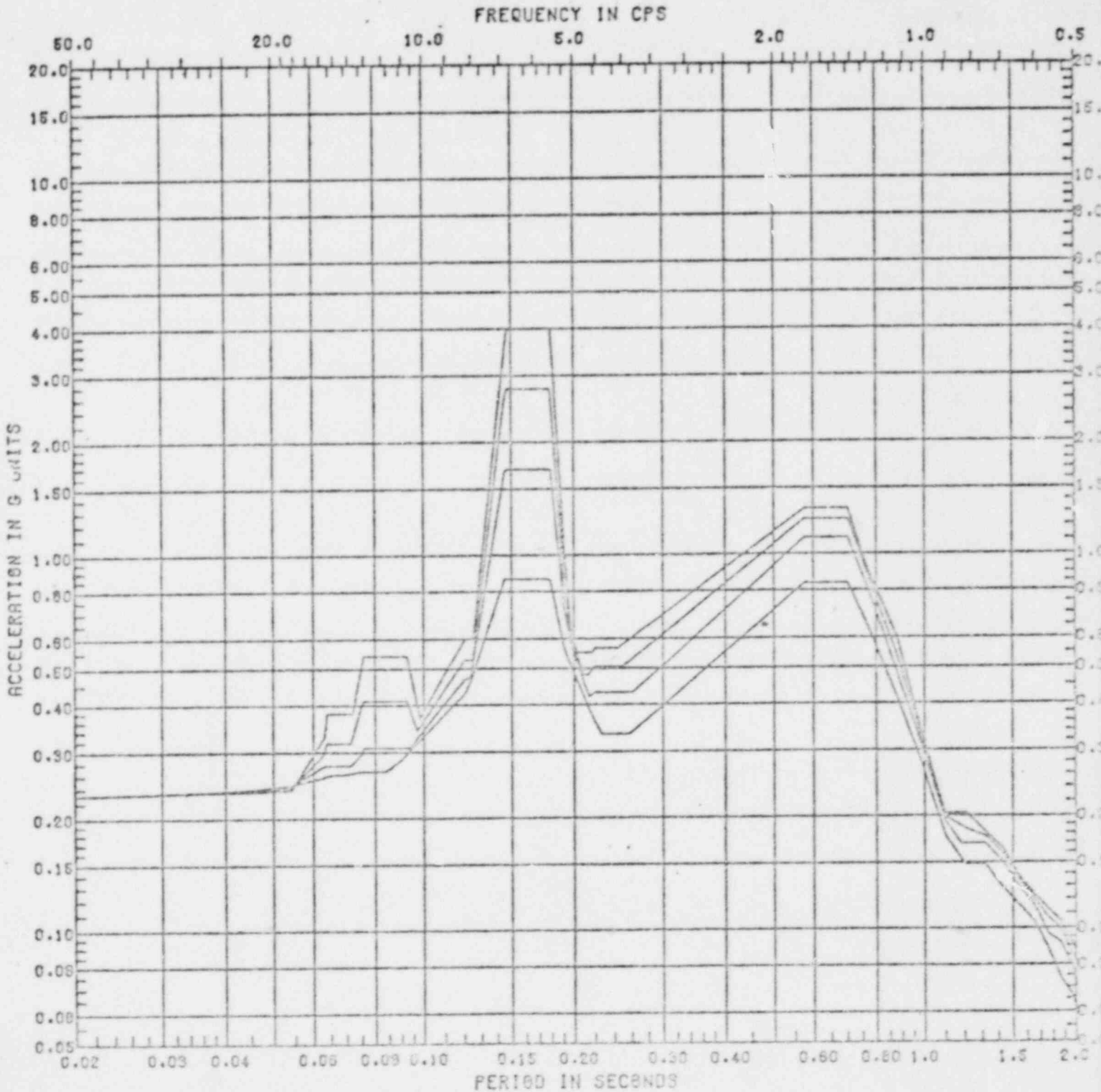


O.B.E. Horiz. Response Spectra N-S Component
ELEVATION 567'-5"
LOCATION Auxiliary Building Slab

SPECTRA NO. 8-A
REVISION NO. 0

14 JUL 76
SL180

ZIMMERI SOIL-STRUCT.HOR.09E.SLAB 8 Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 57 OF 125



O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 8-B

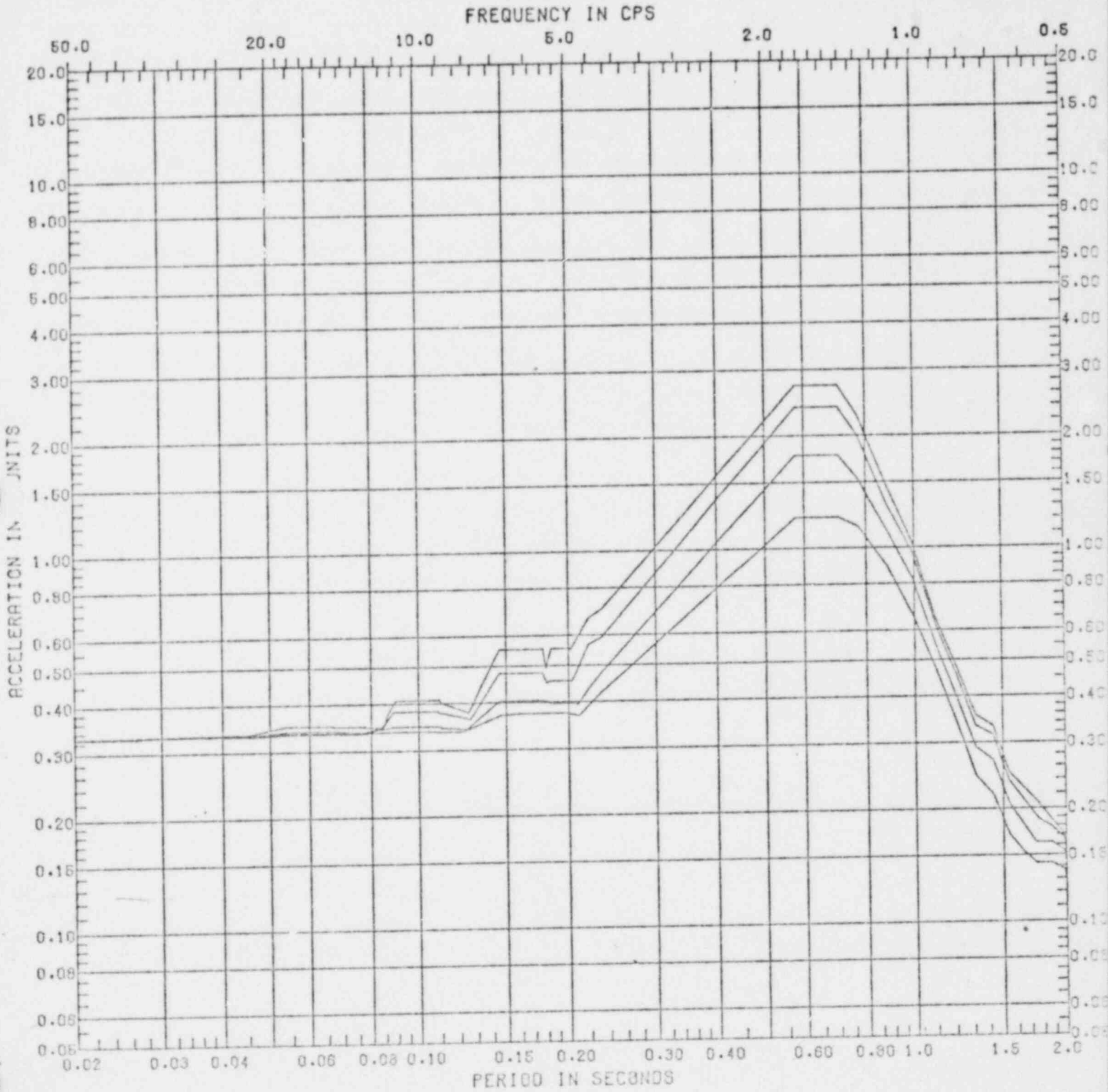
ELEVATION 567'-5"

LOCATION Auxiliary Building Slab

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Jey CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 8 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 58 OF 125

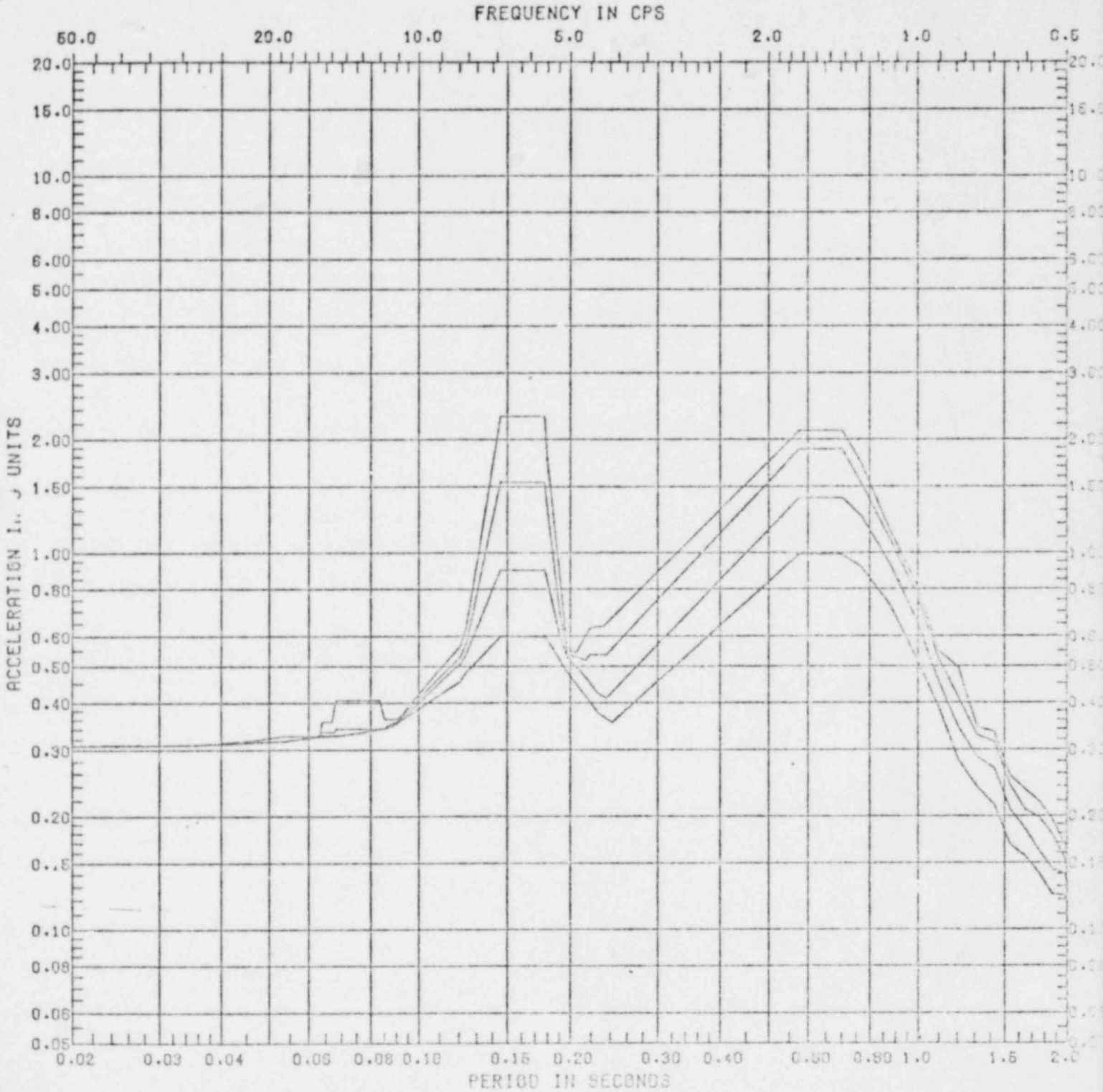


D.B.E. Horiz. Response Spectra N-S Component
ELEVATION 567'-5"
LOCATION Auxiliary Building Slab

SPECTRA NO. 8-C
REVISION NO. 0

28 JUL 76
8290EL

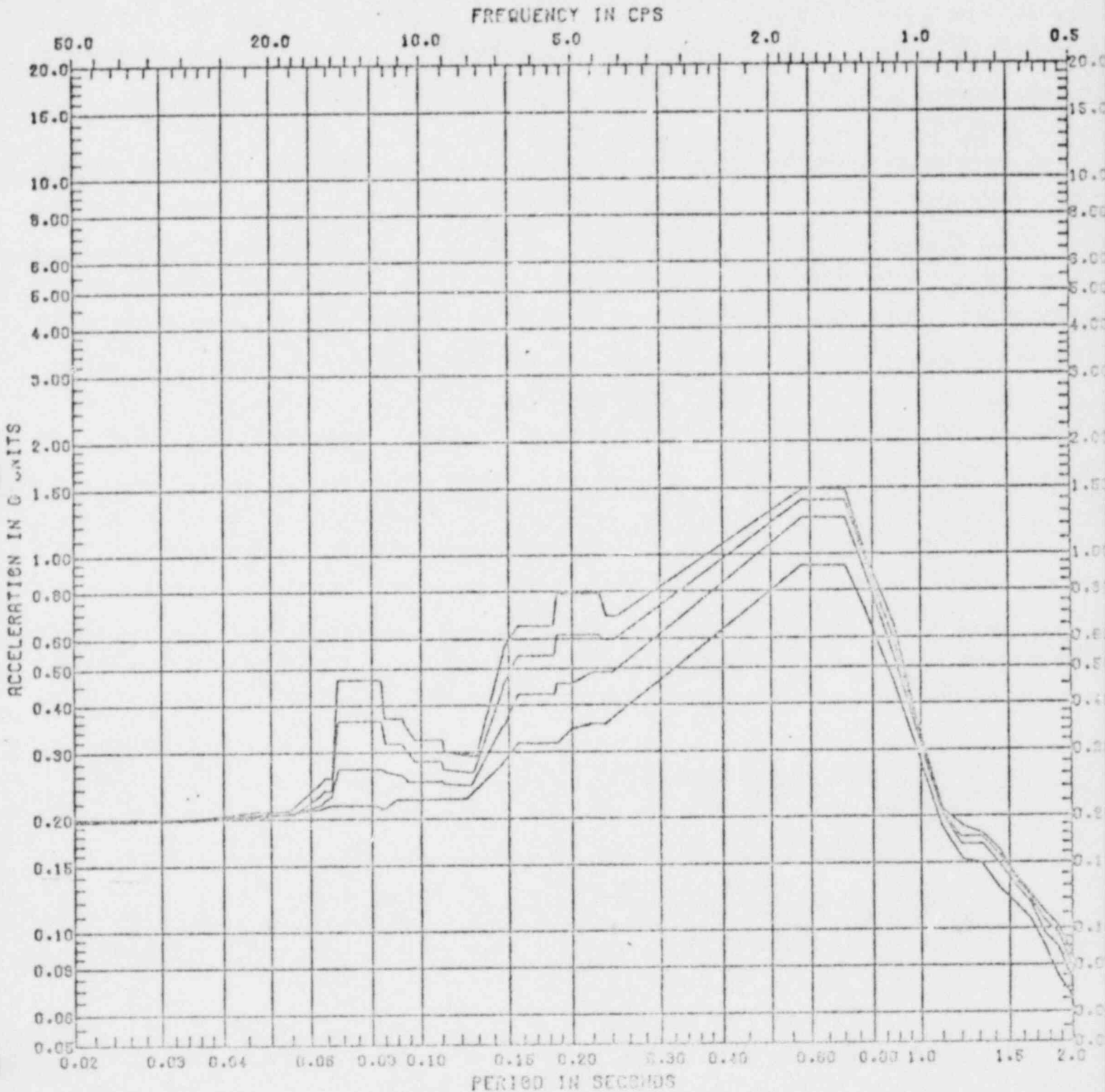
ZIMMER, 413015, SOIL-STRUCT. HORIZ. 0.05E
DESIGNER O.E. Lev CHECKER R.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 8 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 59 OF 125



D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 2-D
ELEVATION 567'-5"
LOCATION Auxiliary Building Slab REVISION NO. 0

14 JUL 76
SL180

ZIMMERI SOIL-STRUCT.HOR.BSE.SLAB 9 X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 60 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 9-A
ELEVATION 591'-7"
LOCATION Auxiliary Building Slab REVISION NO. 0

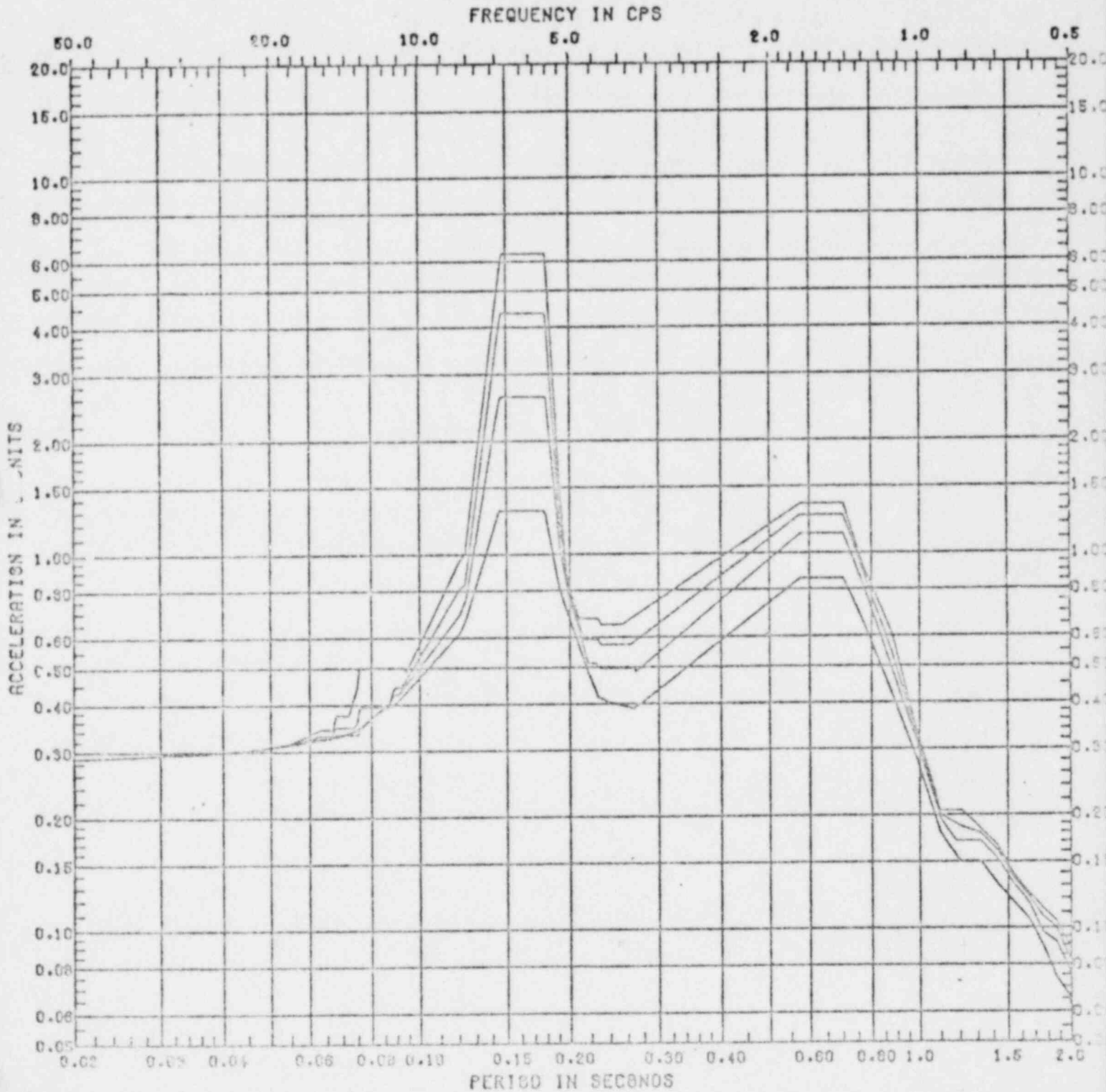
SARGENT & LUNDY

ENGINEERS

14 JUL 76

SL180

ZIMMER1 SBIL-STRUCT, HOR, 8BE, SLAB 9 Y
DESIGNER O.F. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 61 OF 125



O.B.E. Horiz. Response Spectra, E-W Component

SPECTRA NO. 9-B

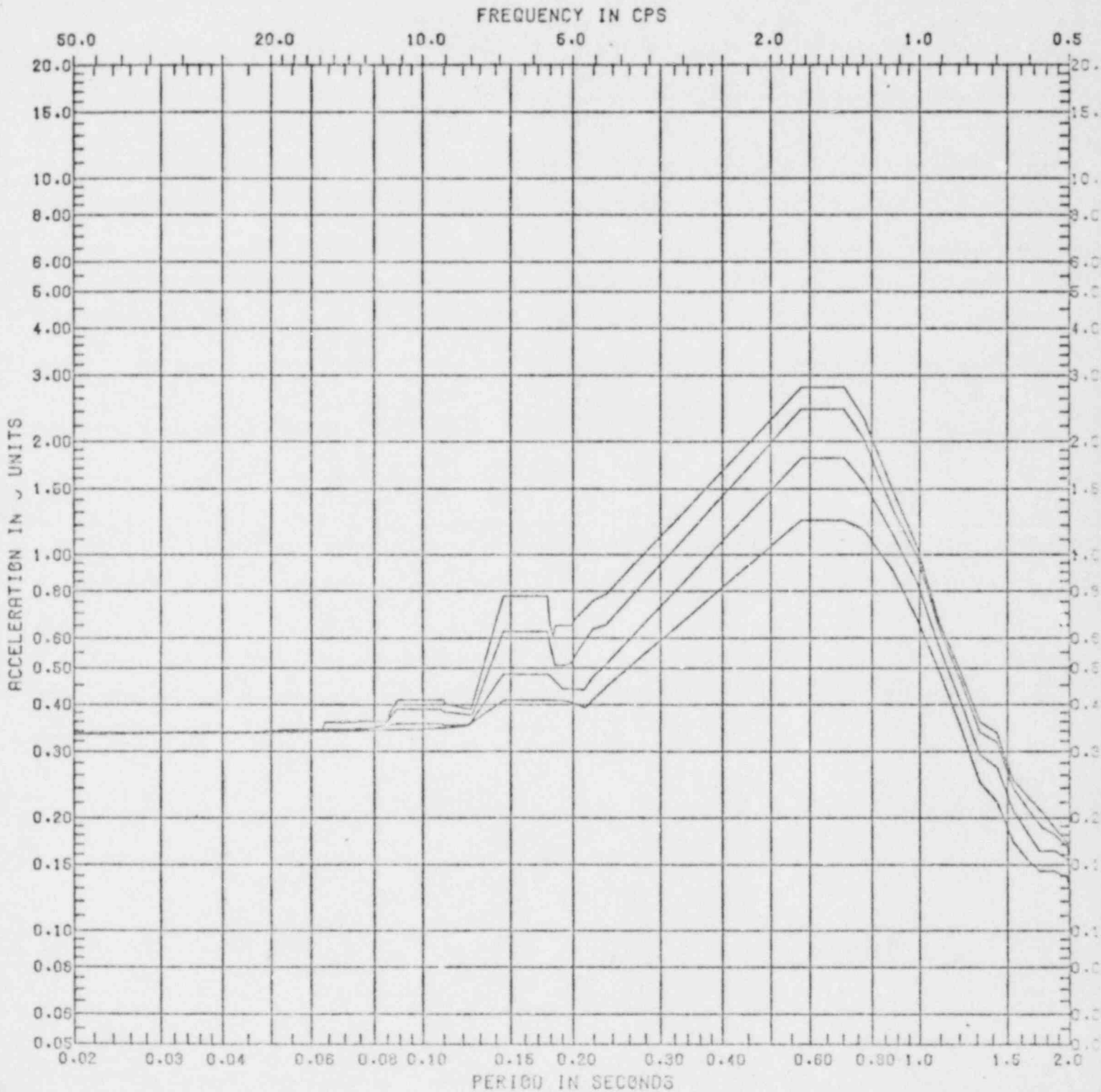
ELEVATION 591'-7"

LOCATION Auxiliary Building Slab

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 9 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 62 OF 125



D.B.E. Horiz. Response Spectra N-S Component

SPECTRA NO. 9-C

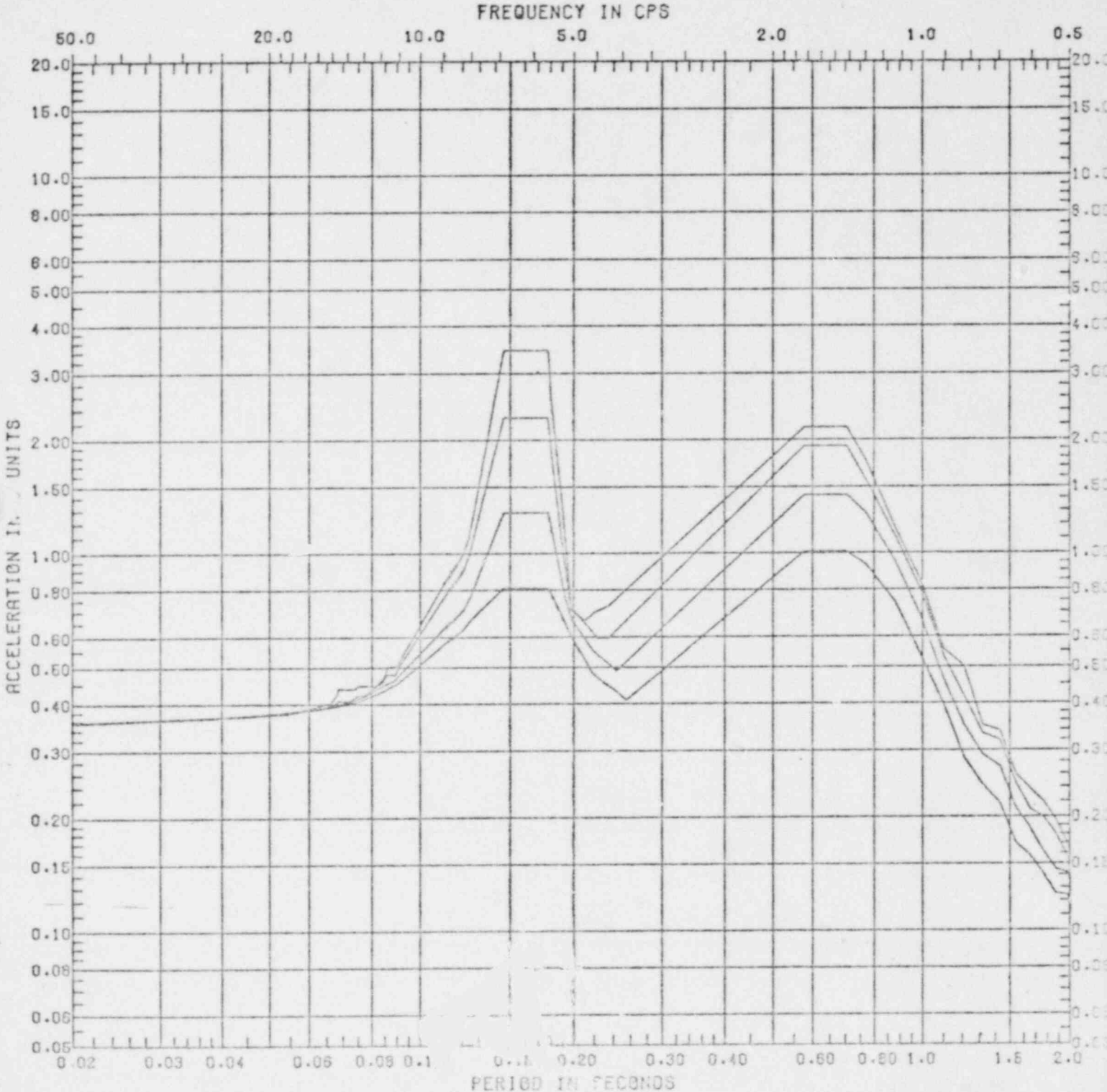
ELEVATION 591'-7"

LOCATION Auxiliary Building Slab

REVISION NO. 0

28 JUL 76
8290EL

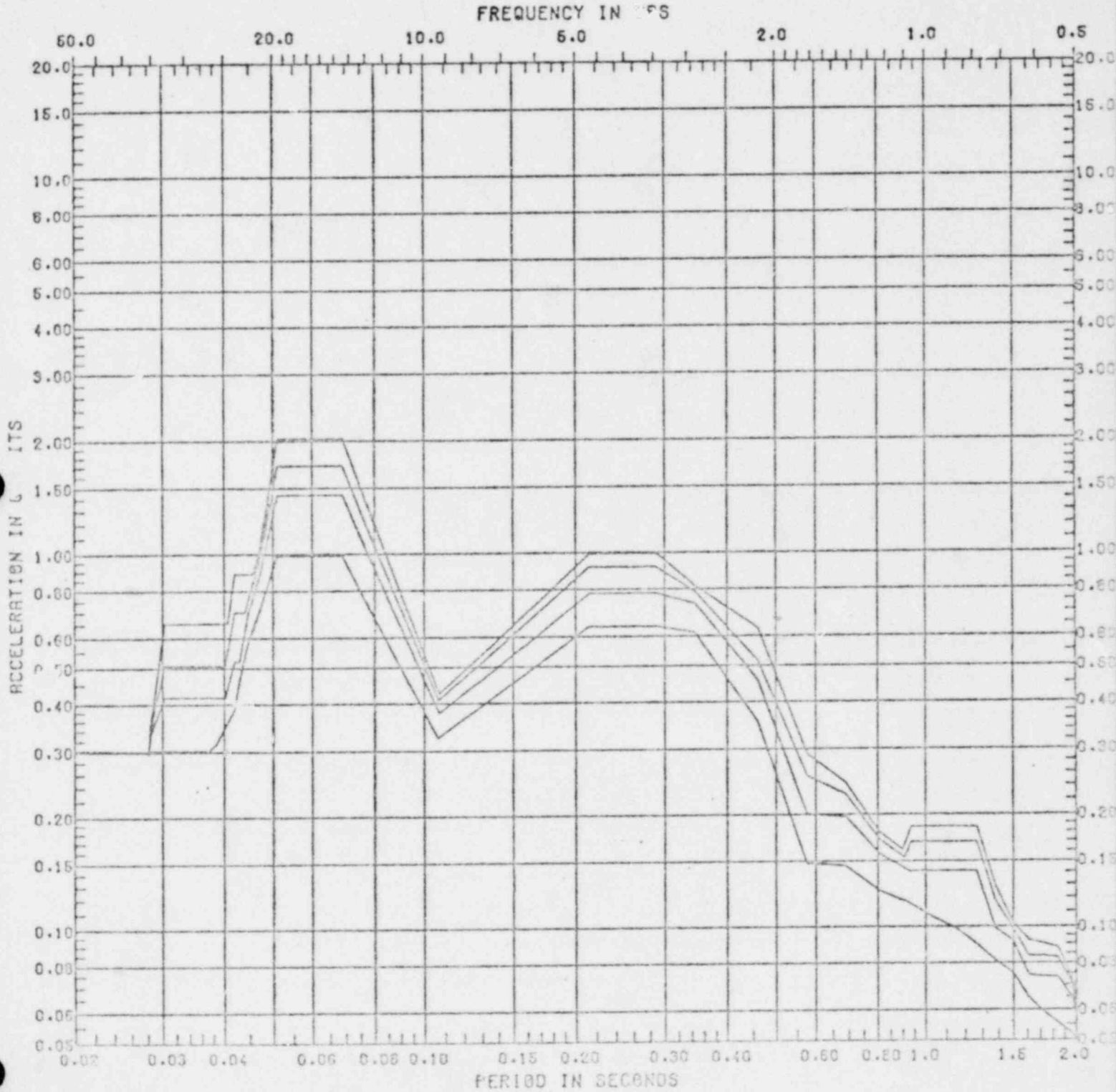
ZIMMER, 413015, SOIL-STRUCT. HORIZ. DBE
DESIGNER O.E. Lev CHECKER R.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 9 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 63 OF 125



D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 9-D
ELEVATION 591'-7"
LOCATION Auxiliary Building Slab REVISION NO. 0

15 JUL 76
2180EL

ZIMMER1,413015.SOIL-STRUCT.V.S 5.08E
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 30 X-CGMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 64 OF 125

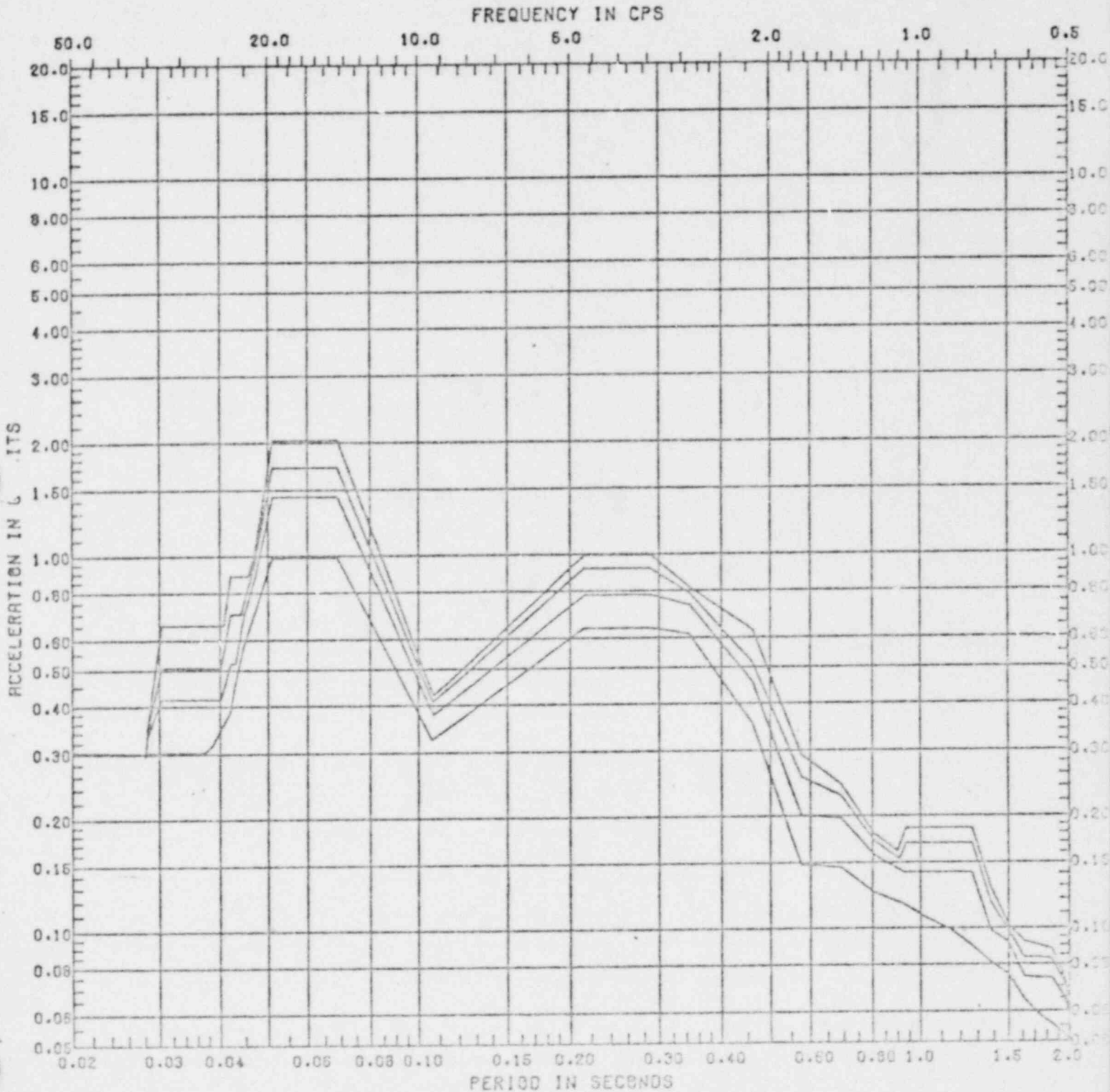


O.B.E. Vert. Response Spectra
ELEVATION 591'-7", 567'-5"
LOCATION Auxiliary Bldg. Slab

SPECTRA NO. 8-E, 9-E
REVISION NO. 0

15 JUL 76
2180EL

ZIMMER1,413015,SOIL-STRUCT.V.S 5.08E
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 30 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 64 OF 125



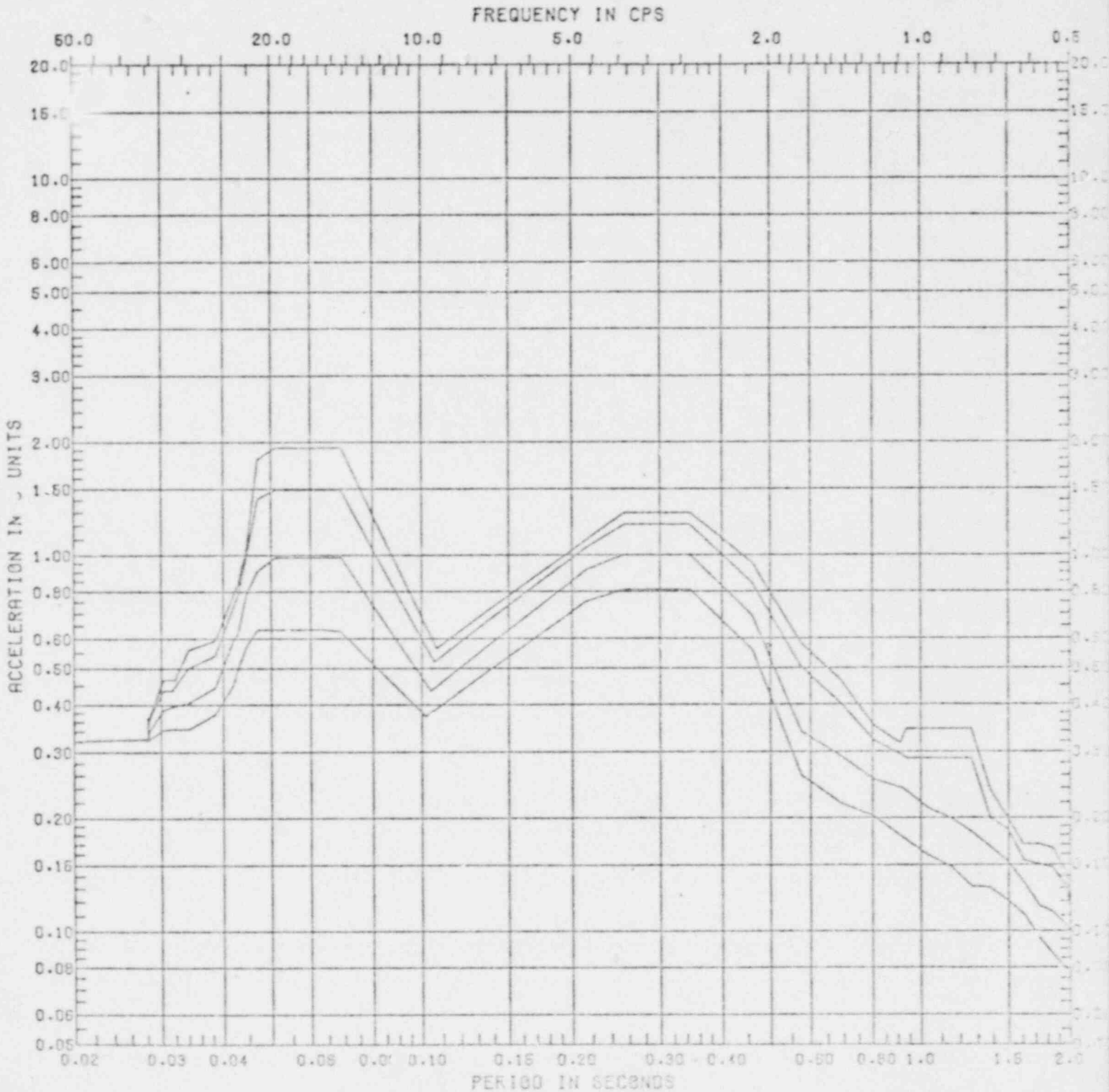
O.B.E. Vert. Response Spectra
ELEVATION 591'-7", 567'-5"
LOCATION Auxiliary Bldg. Slab

SPECTRA NO. 9-E

REVISION NO. 0

01 AUG 76
6740EL

ZIMMER 1.413015, SOIL-STRUCT. V.S 5.0BE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 30 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 65 OF 125

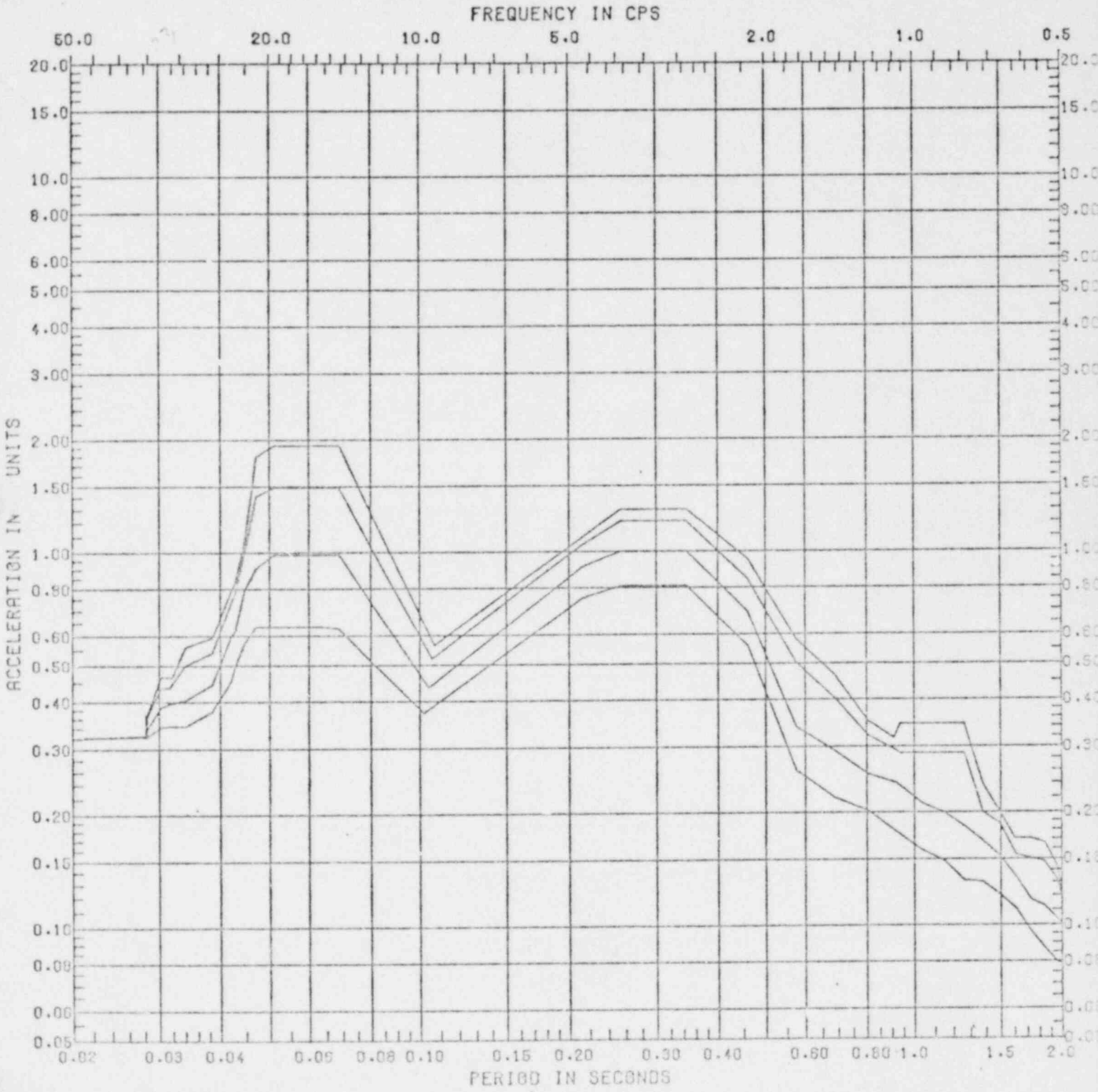


D.B.E. VERT RESPONSE SPECTRA
ELEVATION 591'-7", 567'-5"
LOCATION Auxiliary Bldg. Slab

SPECTRA NO. 9-F
REVISION NO. 0

01 AUG 76
6740EL

ZIMMER1.413015,SOIL-STRUCT.V.S 5.0BE
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 30 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 65 OF 125



D.B.E. VERT RESPONSE SPECTRA
ELEVATION 591'-7", 567'-5"
LOCATION Auxiliary Bldg. Slab

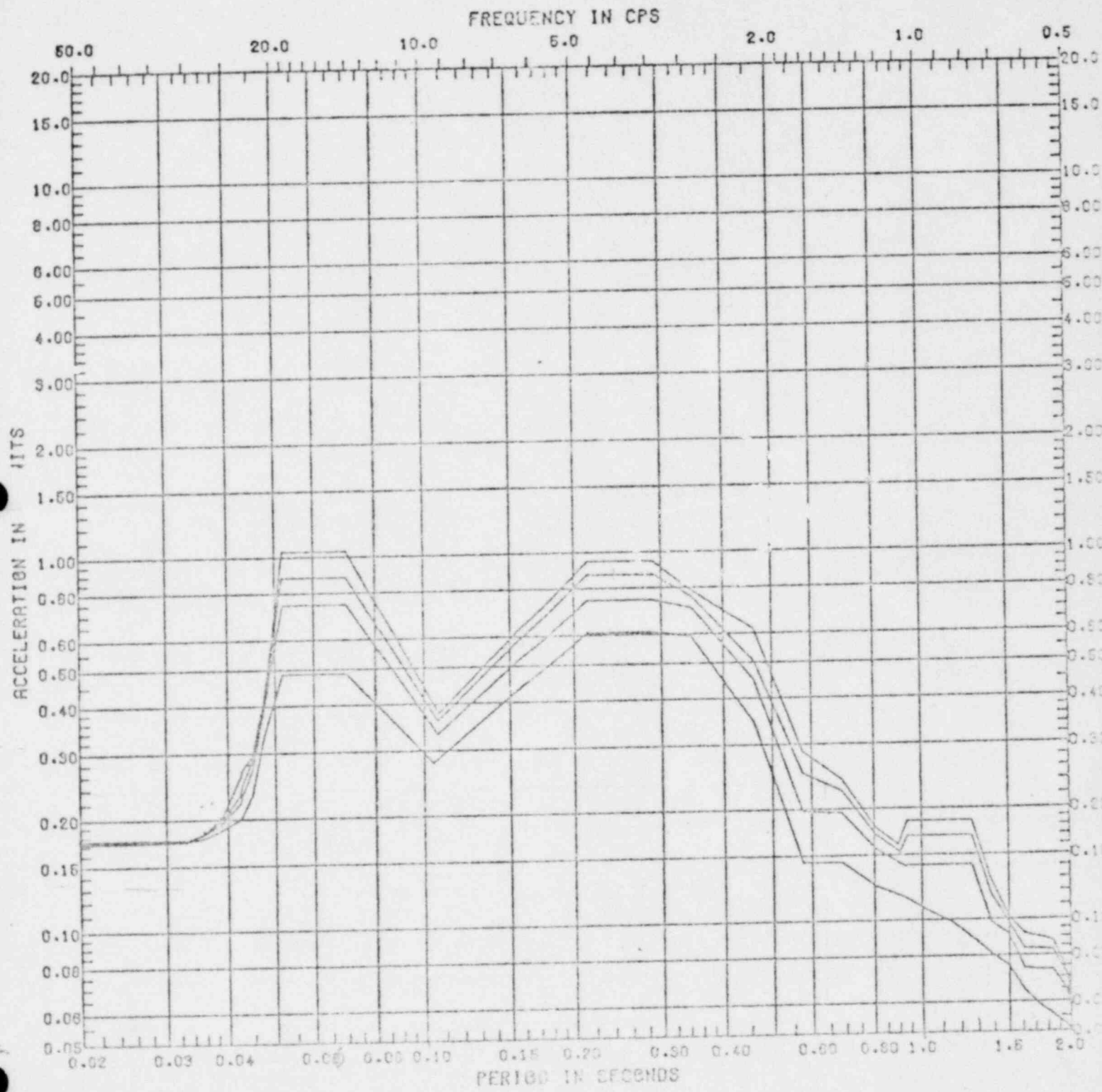
SPECTRA . . . 8-P, 9-P
REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

16 JUL 76
2170EL

ZIMMER 1.413015, SOIL-STRUCT. V.S 3.08E
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 8 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 66 OF 125

5

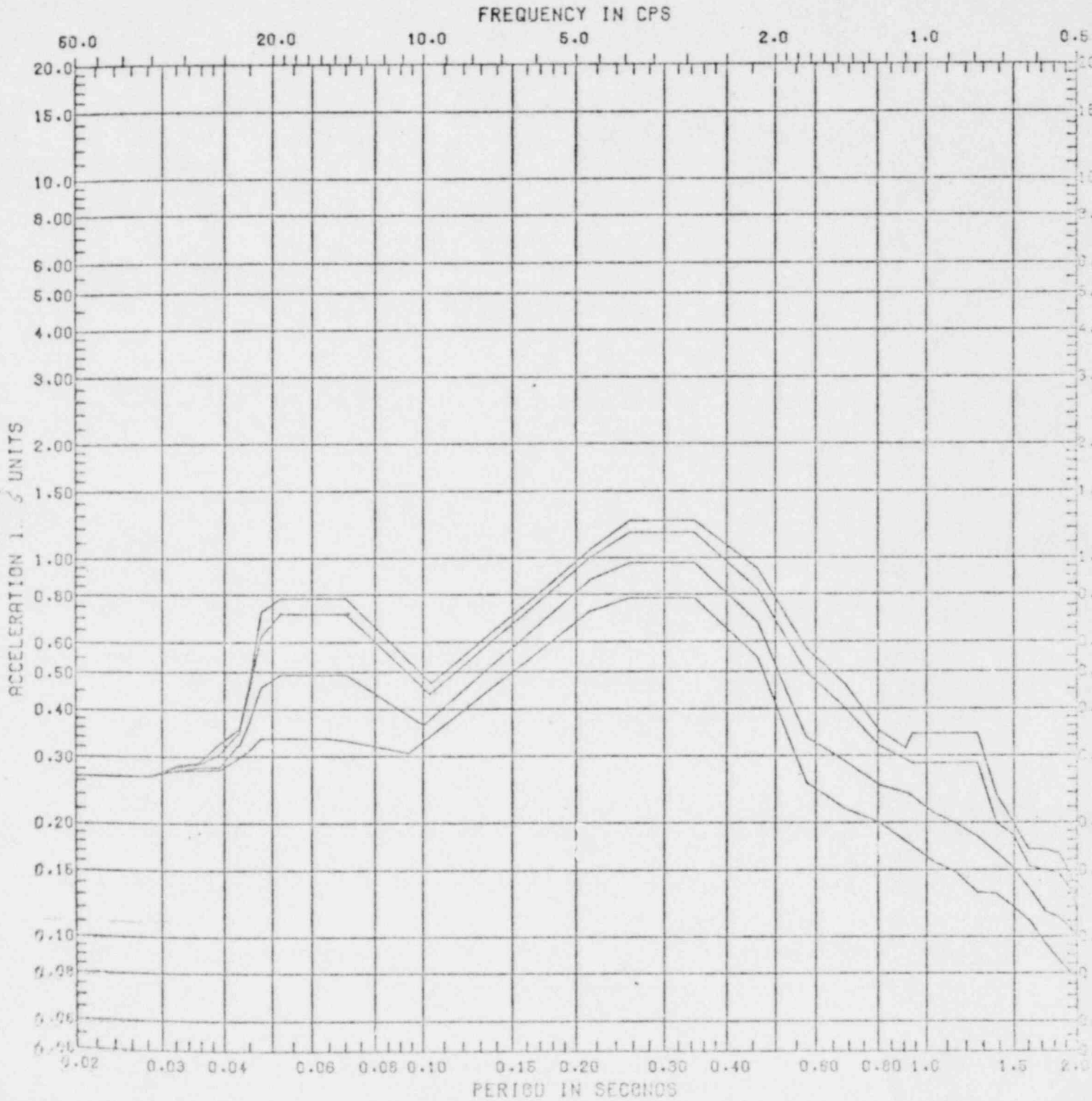


O.B.E. Vert. Response Spectra
ELEVATION 546'-0", 525'-7", 503'-6"
LOCATION Reactor & Aux. Bldg. Wall

SPECTRA NO. 10-E
REVISION NO. 0

01 AUG 76
6730EL

ZIMMER1.413015,SOIL-STRUCT,V,S 3.0SE
DESIGNER O.E. Lov CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 8 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 67 OF 125

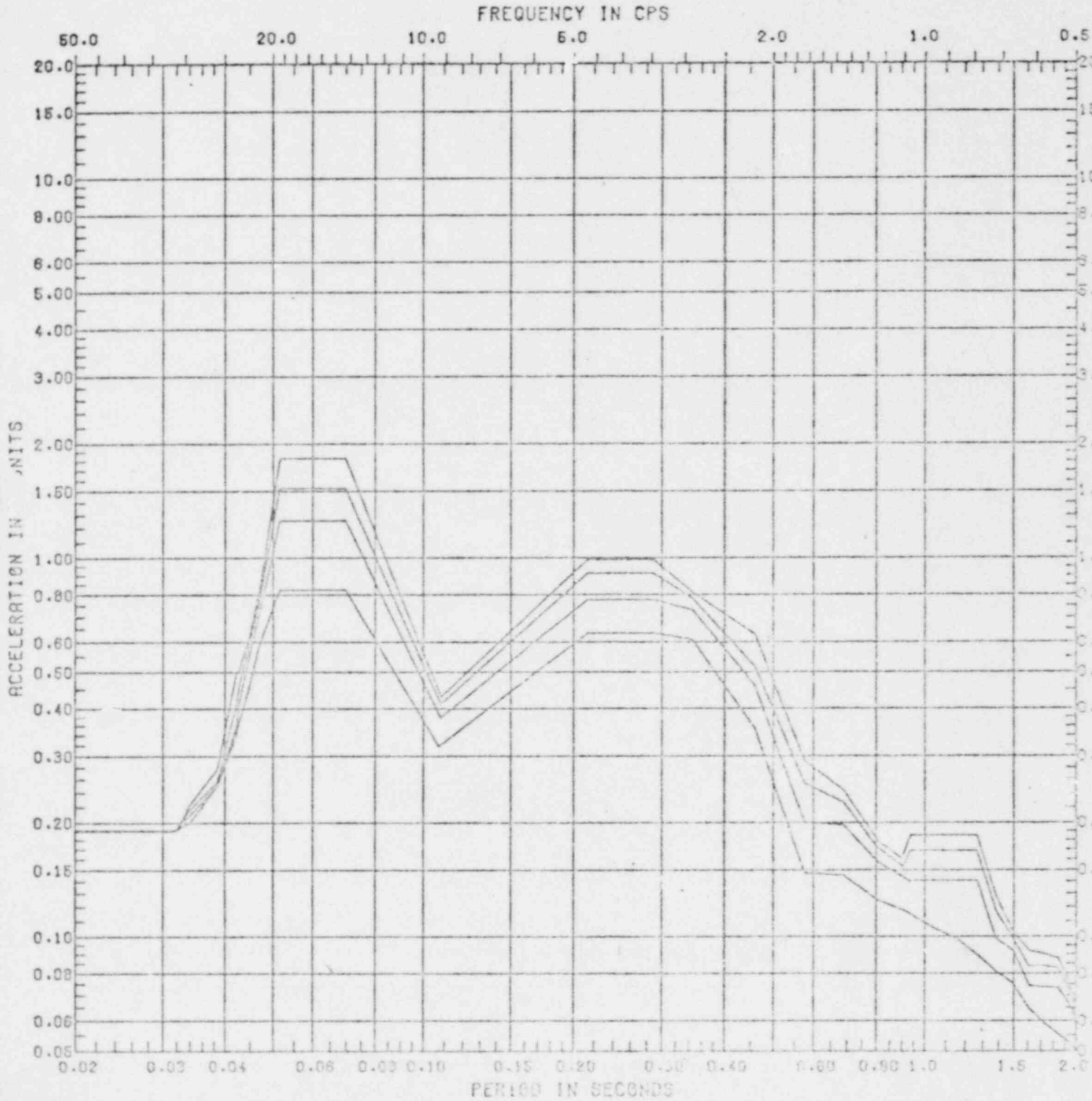


D.D.E. VERT RESPONSE SPECTRA
ELEVATION 546'-0", 525'-7", 503'-6"
LOCATION Reactor & Aux. Bldg. Wall

SPECTRA NO. 10-F
REVISION NO. 0

15 JUL 76
9440EL

ZIMMERI.413015.S01L-STRUCT.V.S 6.08E
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 18 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 68 OF 125

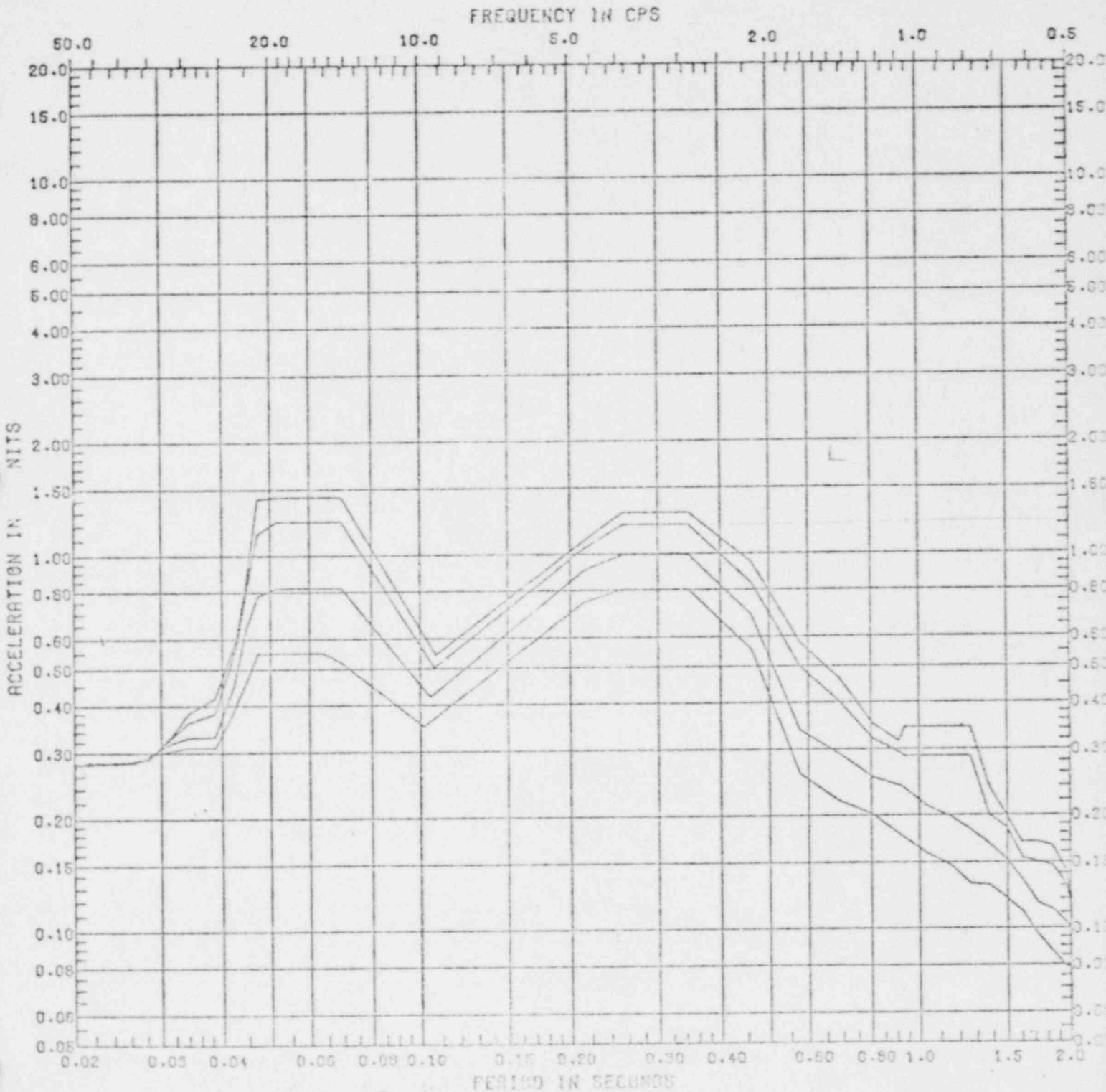


O.B.E. Vert. Response Spectra
ELEVATION 627'-9", 593'-6", 570'-6"
LOCATION Reactor & Aux. Bldg. Wall

SPECTRA NO. 11-Z
REVISION NO.0

29 JUL 76
3860EL

ZIMMER 1.413015, SOIL-STRUCT, V.S 6.0BE
DESIGNER O.E. LOV CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 18 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 69 OF 125



D.B.E. VERT RESPONSE SPECTRA

SPECTRA NO. 11-F.

ELEVATION 627'-9", 593'-6", 570'-6"

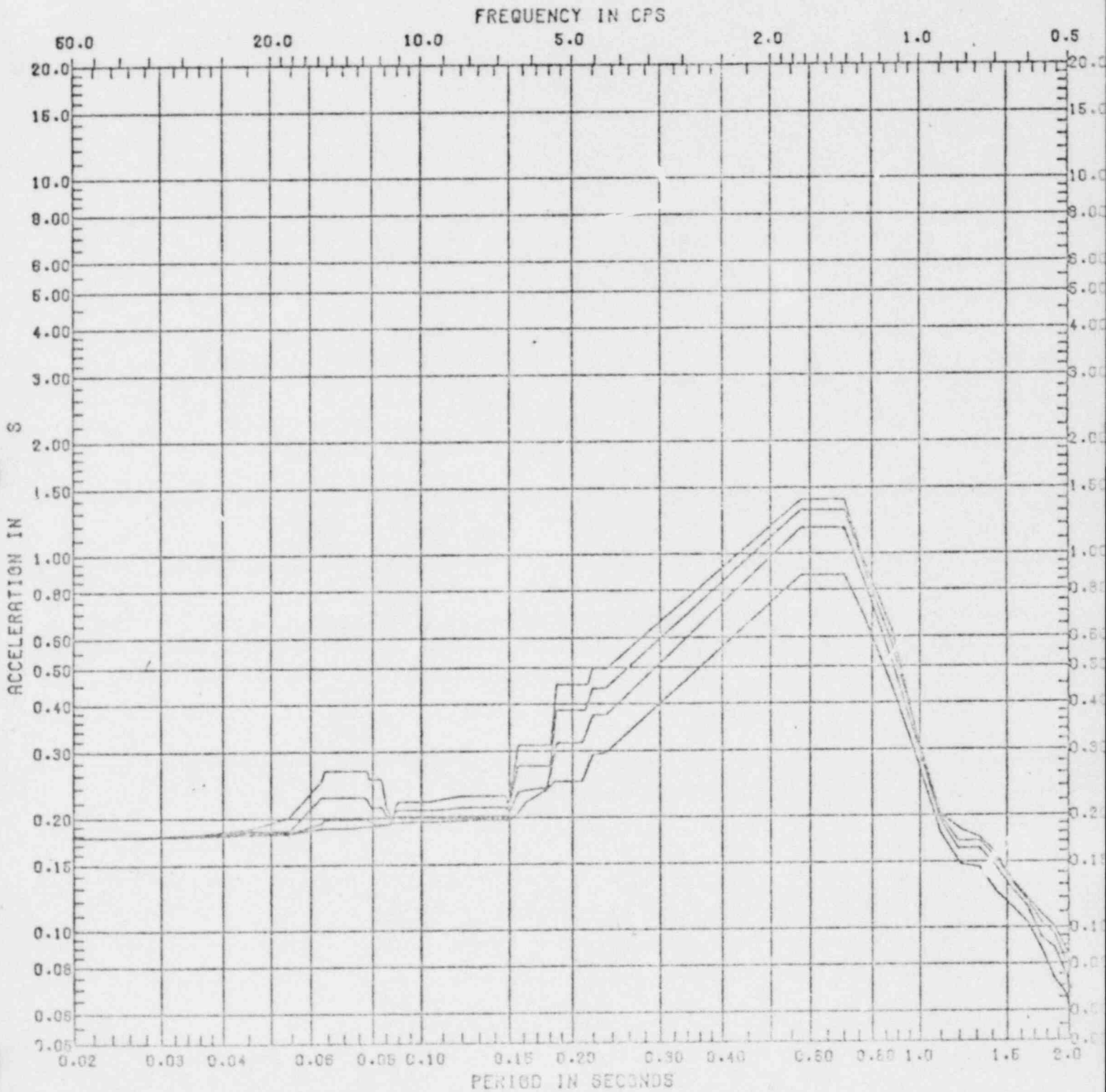
LOCATION Reactor & Aux. Bldg. Wall

REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

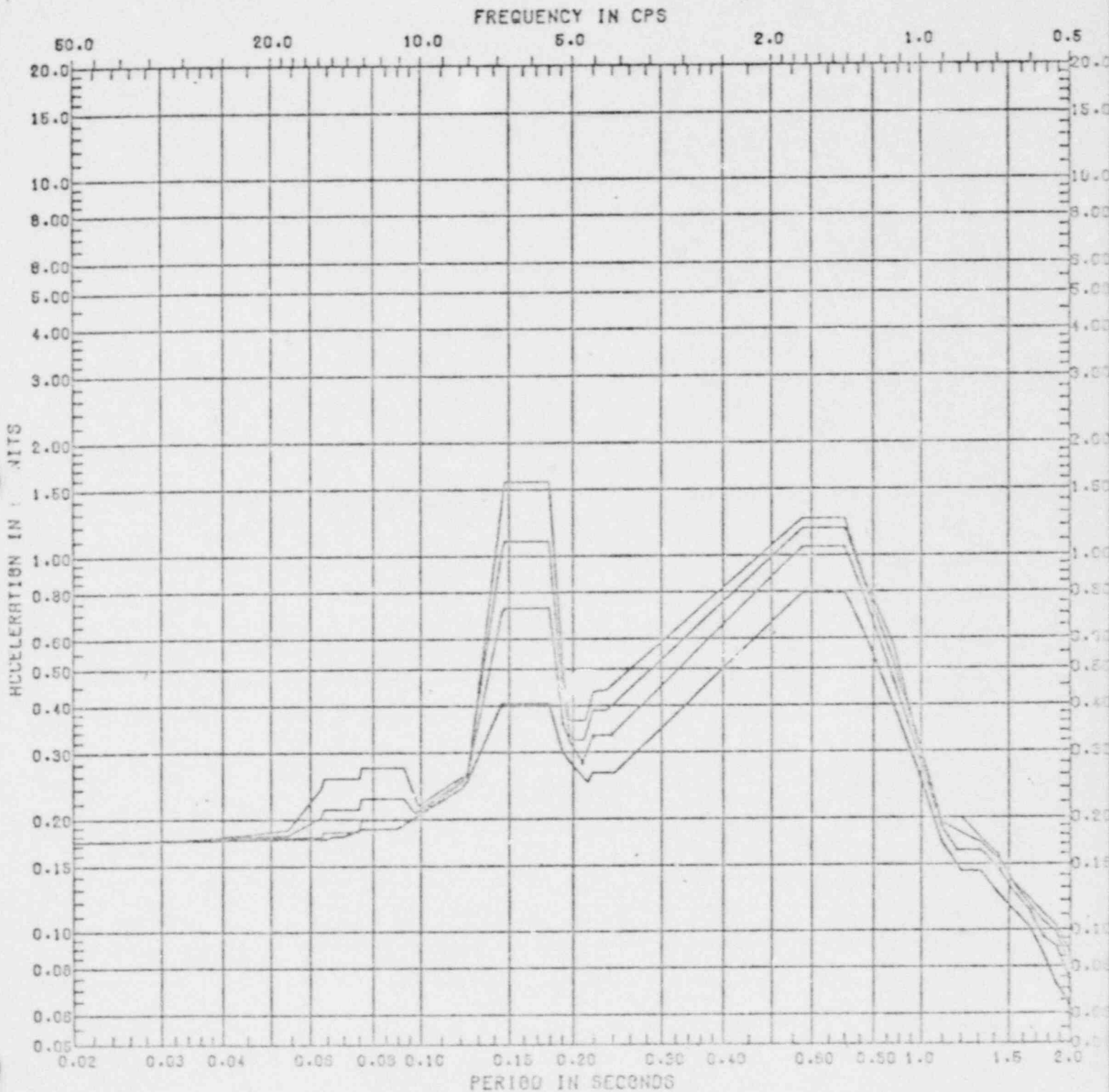
ZIMMERI SOIL-STRUCT.HOR.OBE.SLAB 13X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 70 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 12-A
ELEVATION 503'-6"
LOCATION Reactor Containment REVISION NO. 0

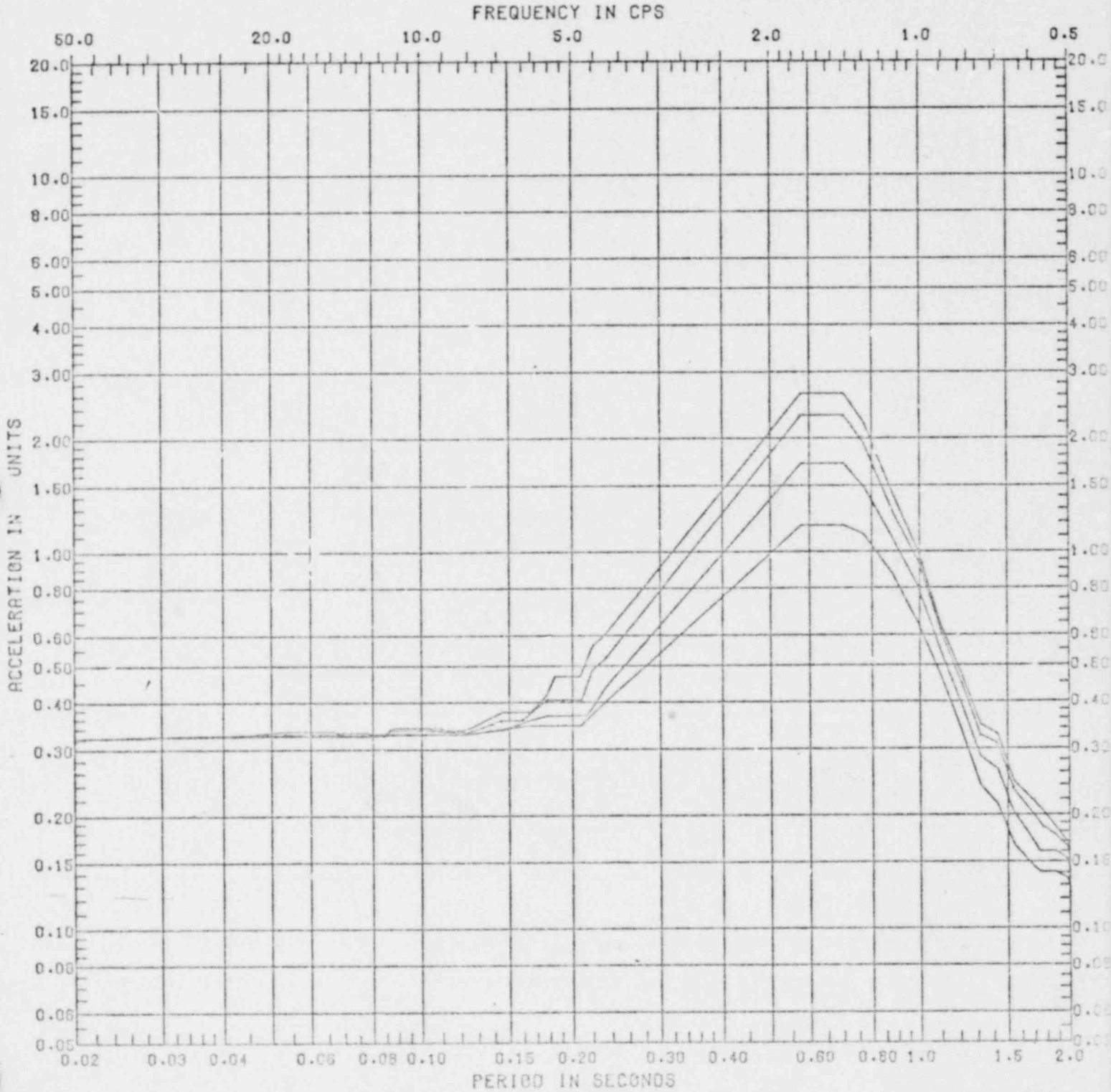
14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT.HOR.08E.SLAB 13Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 71 OF 125



28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 13 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 72 OF 125



D.B.E. Horiz. Response Spectra

N-S Component

SPECTRA NO. 12-C

ELEVATION 503'-6"

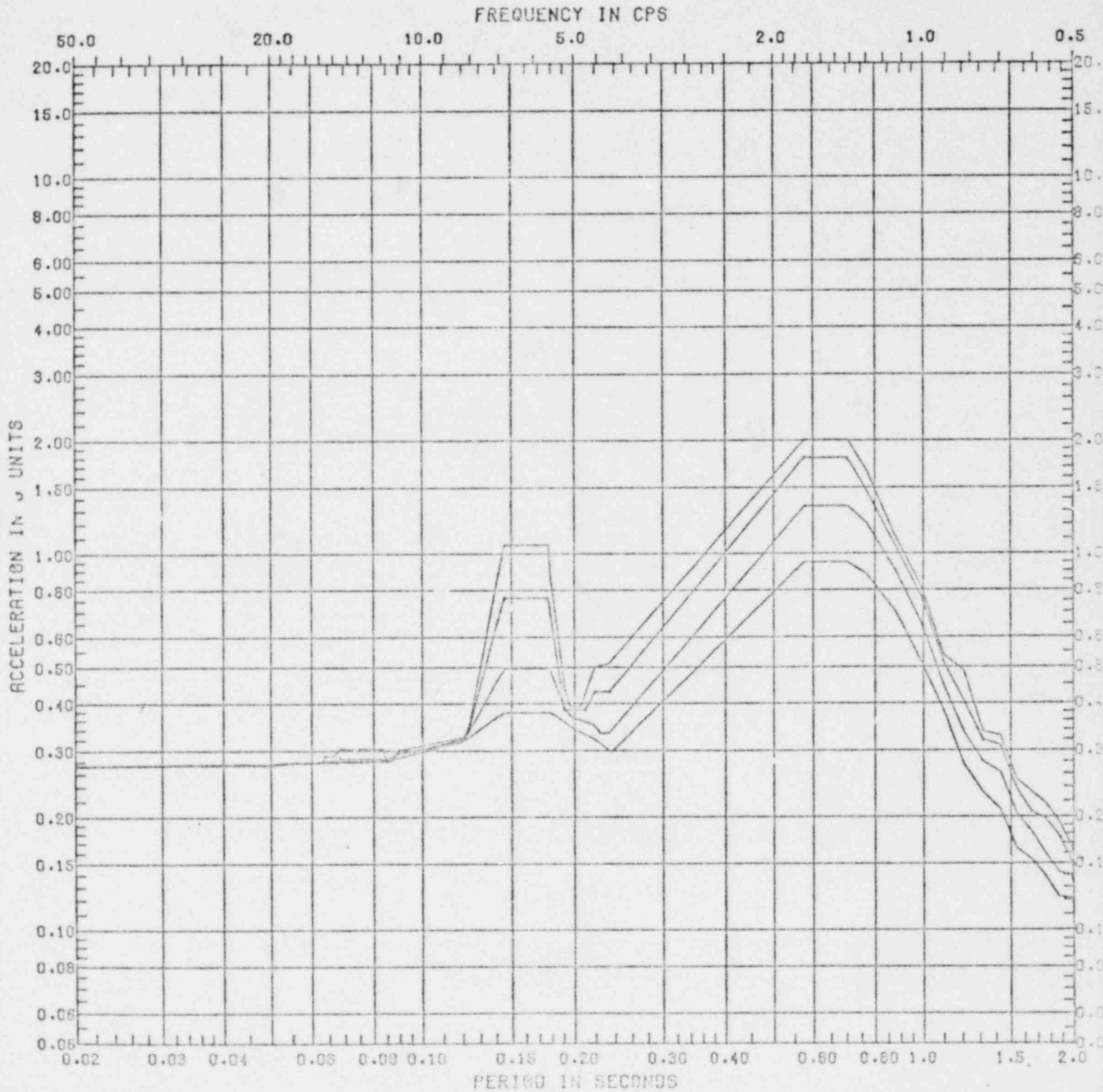
LOCATION Reactor

ainment

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DSE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 13 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 73 OF 125



D.B.E. Horiz. Response Spectra
ELEVATION 503'-6"

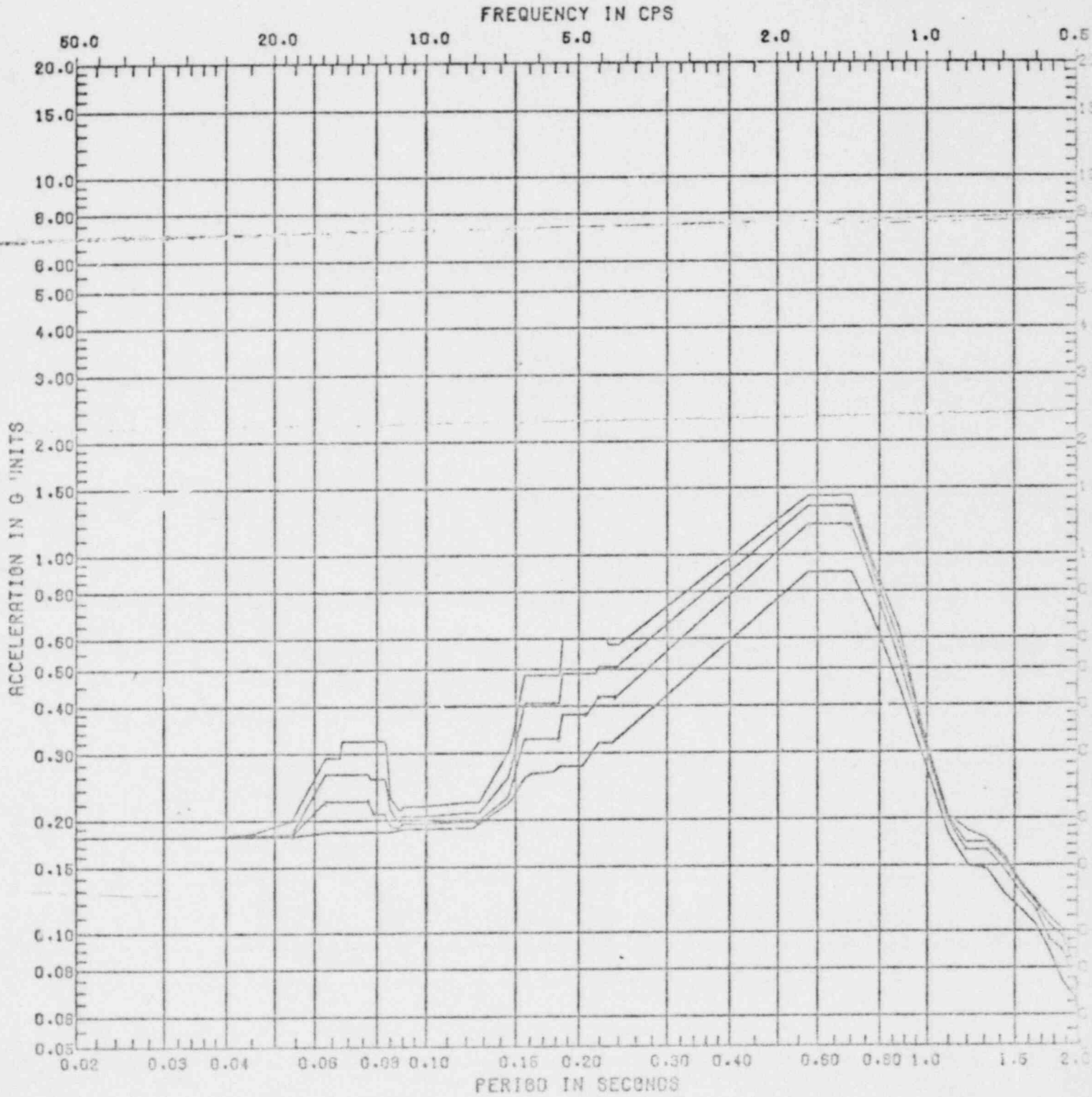
E-W Component SPECTRA NO. 12-D

LOCATION Reactor Containment

REVISION NO. 0

14 JUL 76
SL180

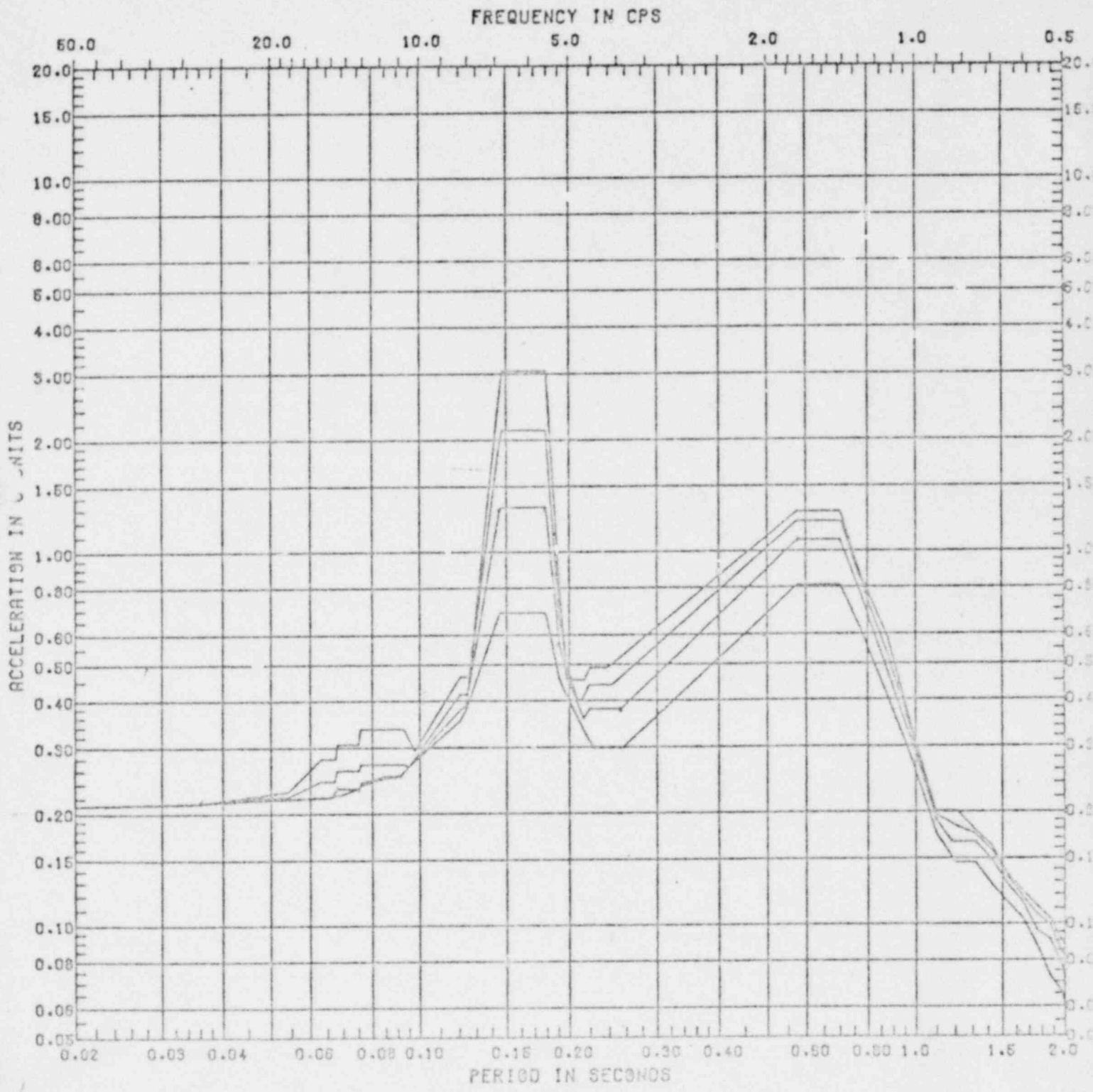
ZIMMER1 SOIL-STRUCT.HOR.08E.SLAB 14X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 74 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 13-A
ELEVATION 525'-7"
LOCATION Reactor Containment REVISION NO. 0

14 JUL 76
SL180

ZIMMERL SOIL-STRUCT.HOR.08E.SLAB 14Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 75 OF 125

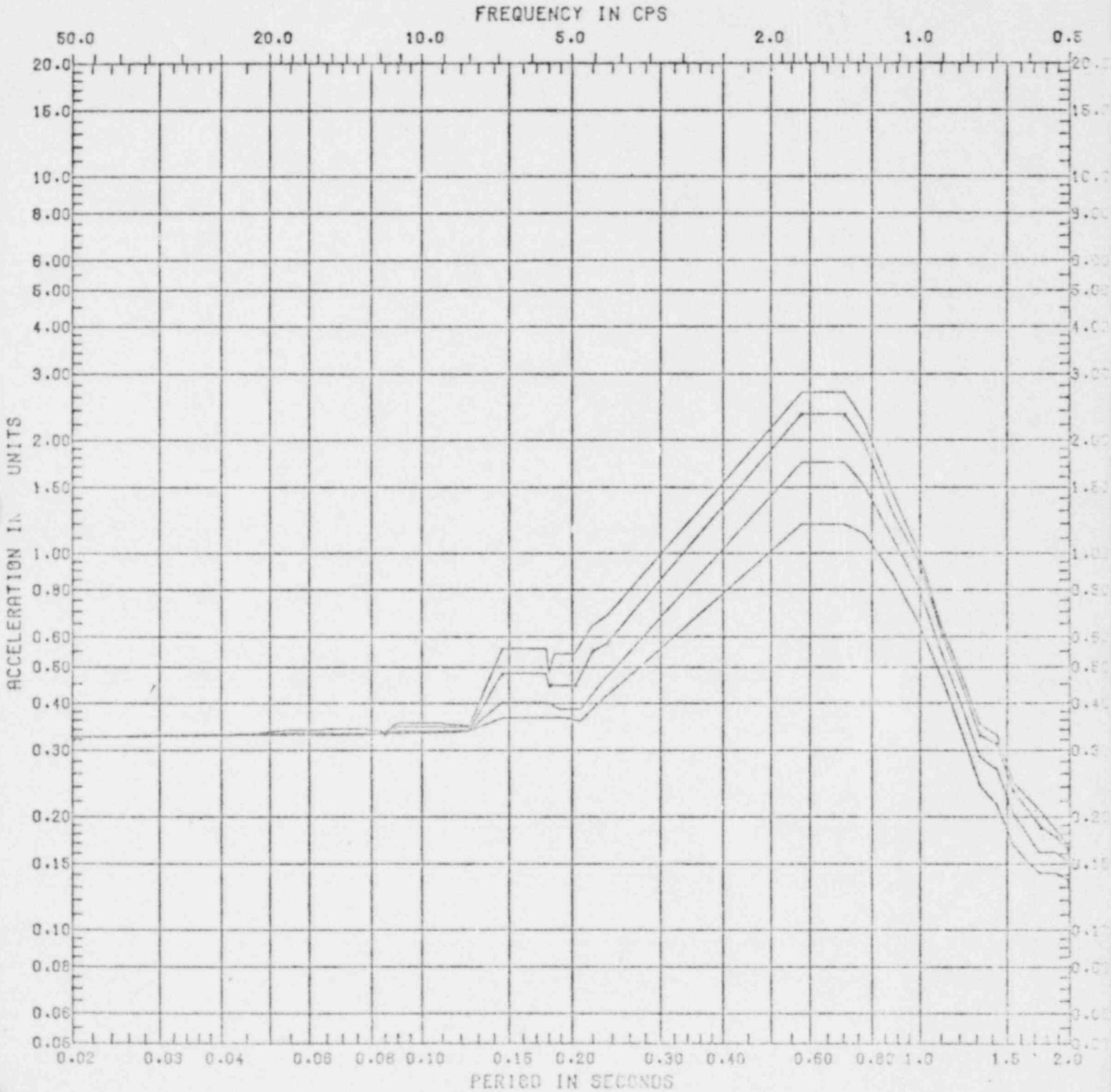


O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 13-B
ELEVATION 525'-7"
LOCATION Reactor Containment REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, 080
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 14 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 76 OF 125

2

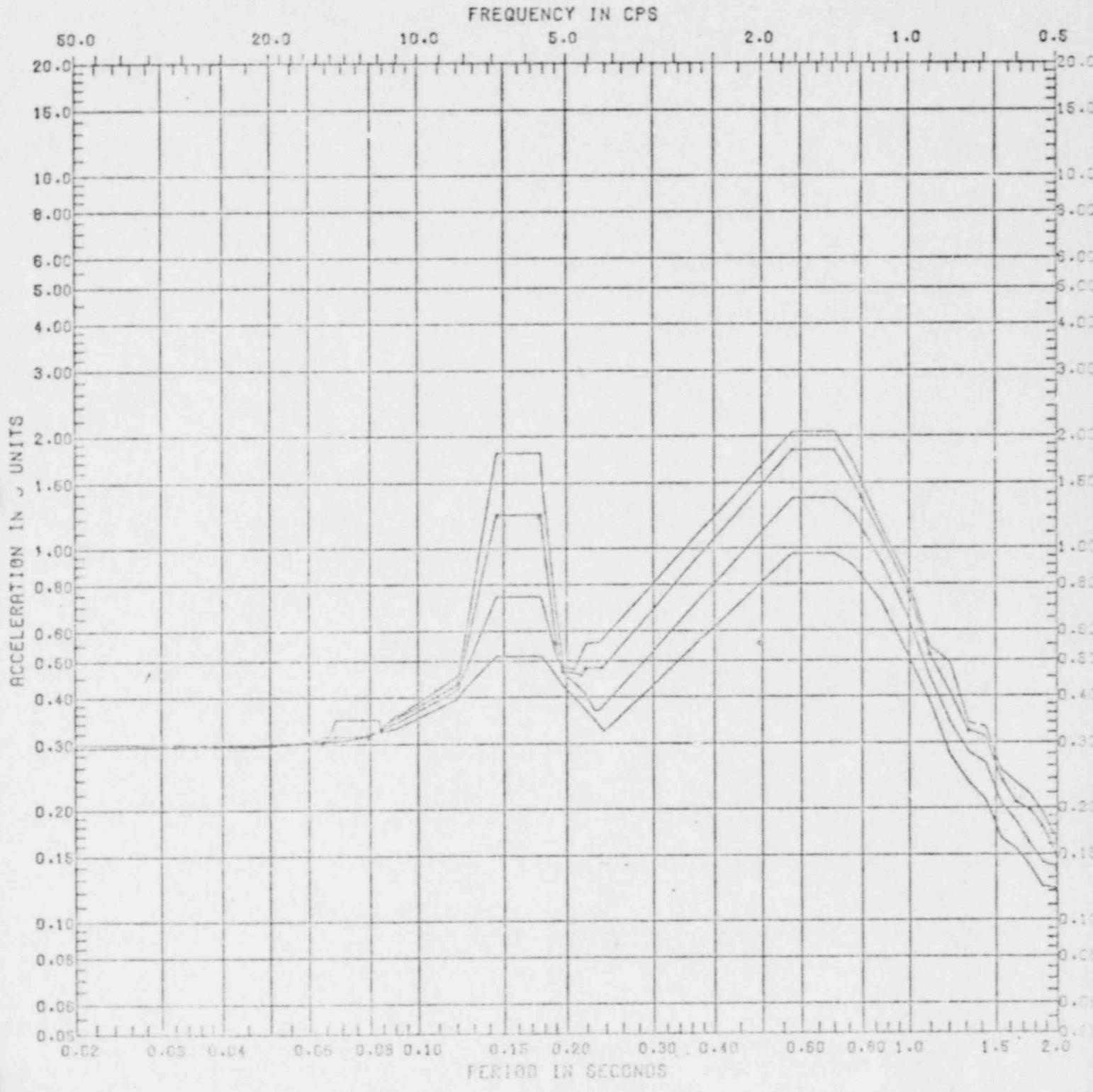


D.B.E. Horiz. Response Spectra N-S Component
ELEVATION 525'-7"
LOCATION Reactor Containment

SPECTRA NO. 13-C
REVISION NO. 0

28 JUL 76
8290EL

ZIMMER.413015.SOIL-STRUCT.HORIZ.DBE
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 14 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 77 OF 125



D.B.E. Horiz. Response Spectra

E-W Component SPECTRA NO. 13-D

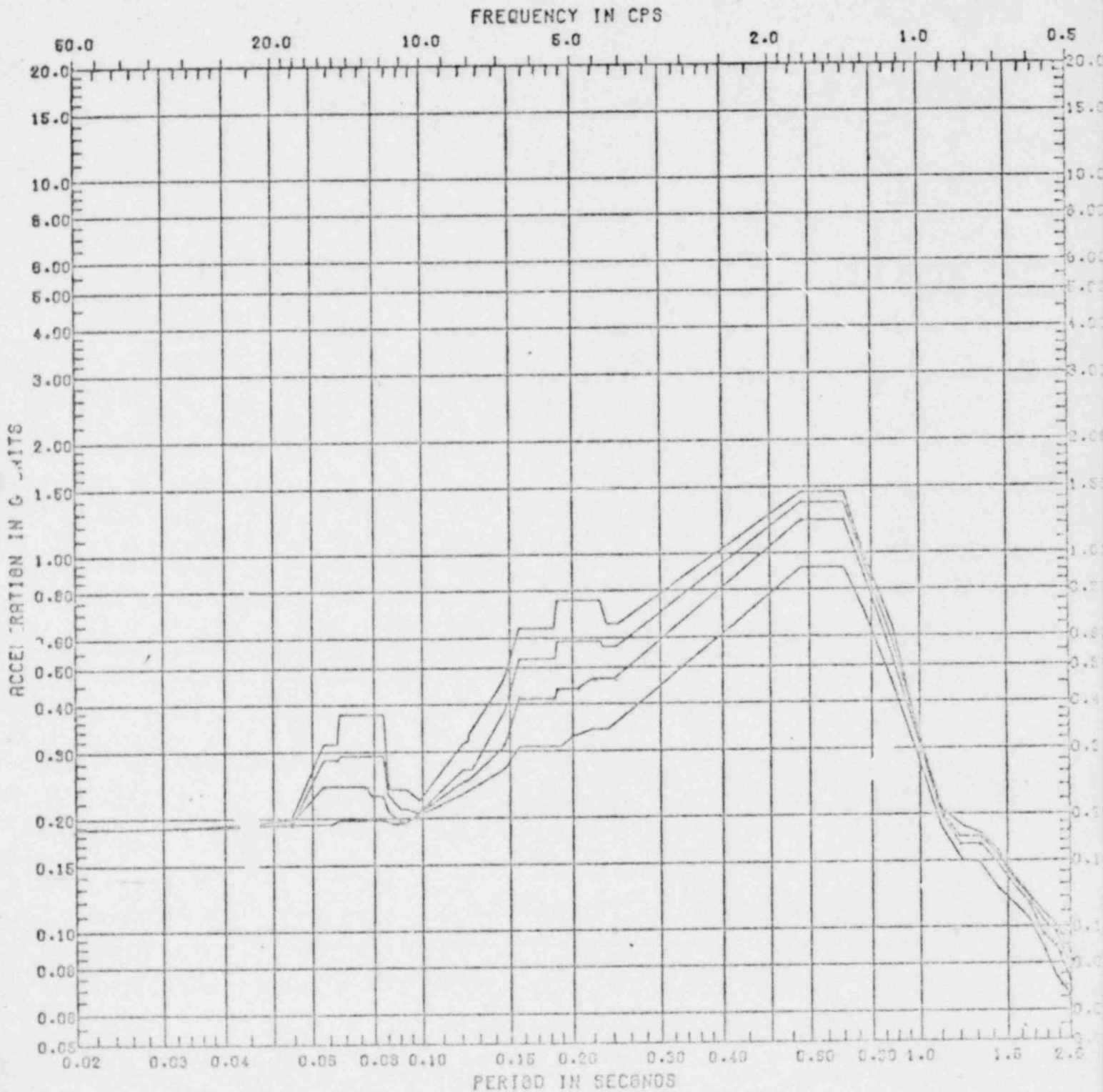
ELEVATION 525'-7"

LOCATION Reactor Containment

REVISION NO. 0

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT.HOR.08E.SLAB 15X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 78 OF 125

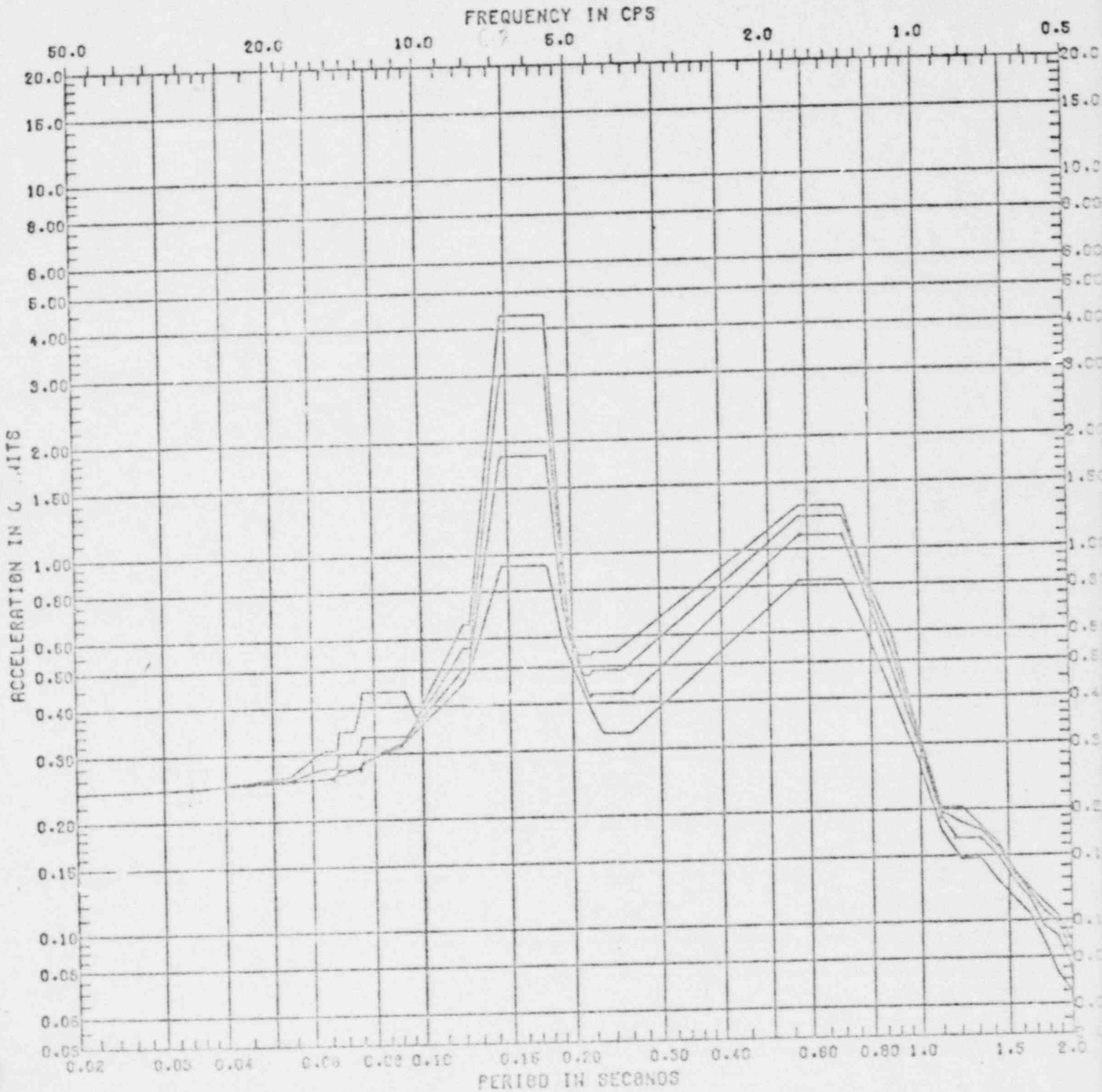


O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 14-A
ELEVATION 546'-0"
LOCATION Reactor Containment REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

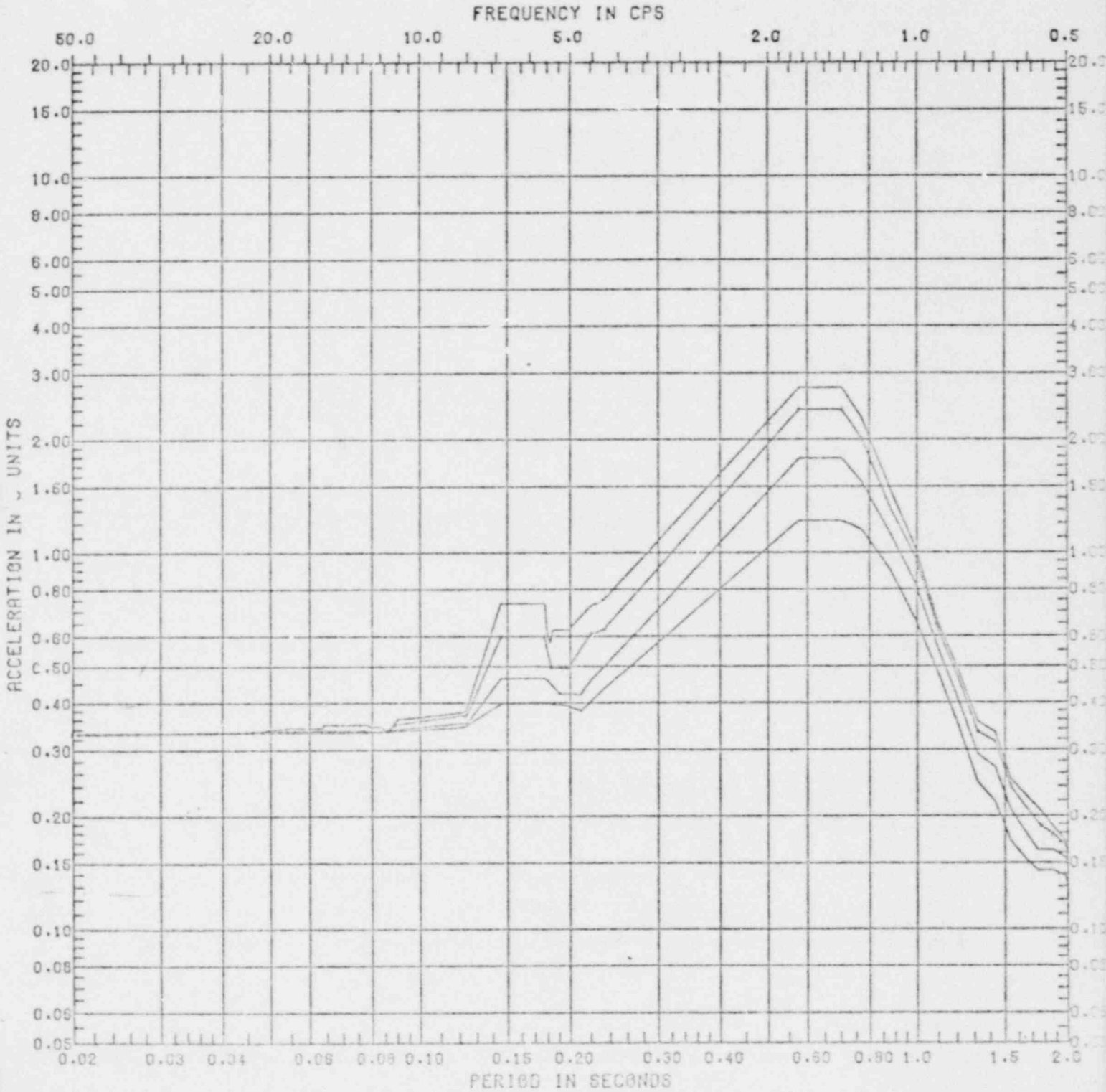
14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT.HOR.OBE.SLAB 15Y
DESIGNER O.E. LevCHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
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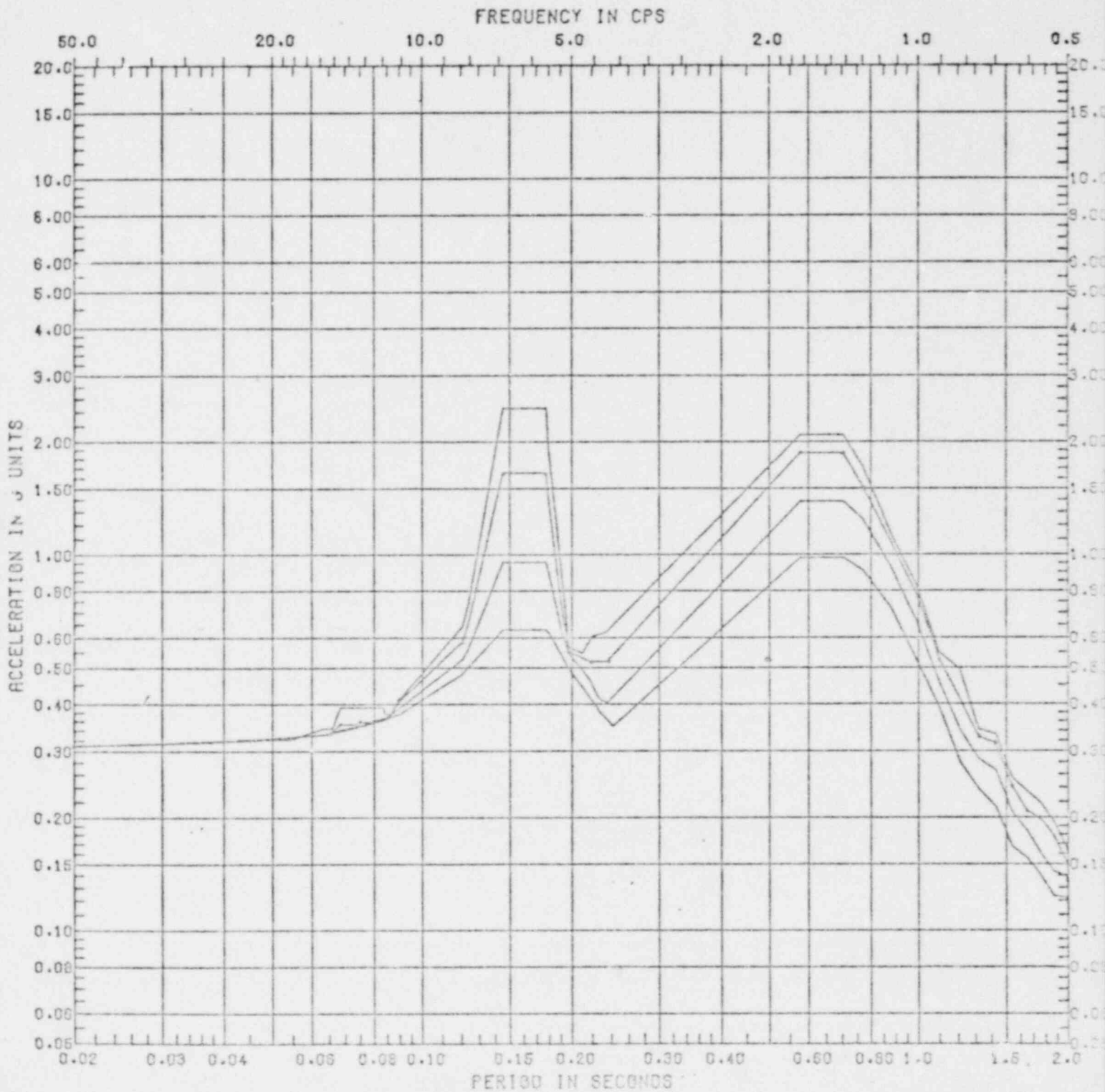
O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 14-B
ELEVATION 546'-0"
LOCATION Reactor Containment REVISION NO. 0

28 JUL 76
8290EL



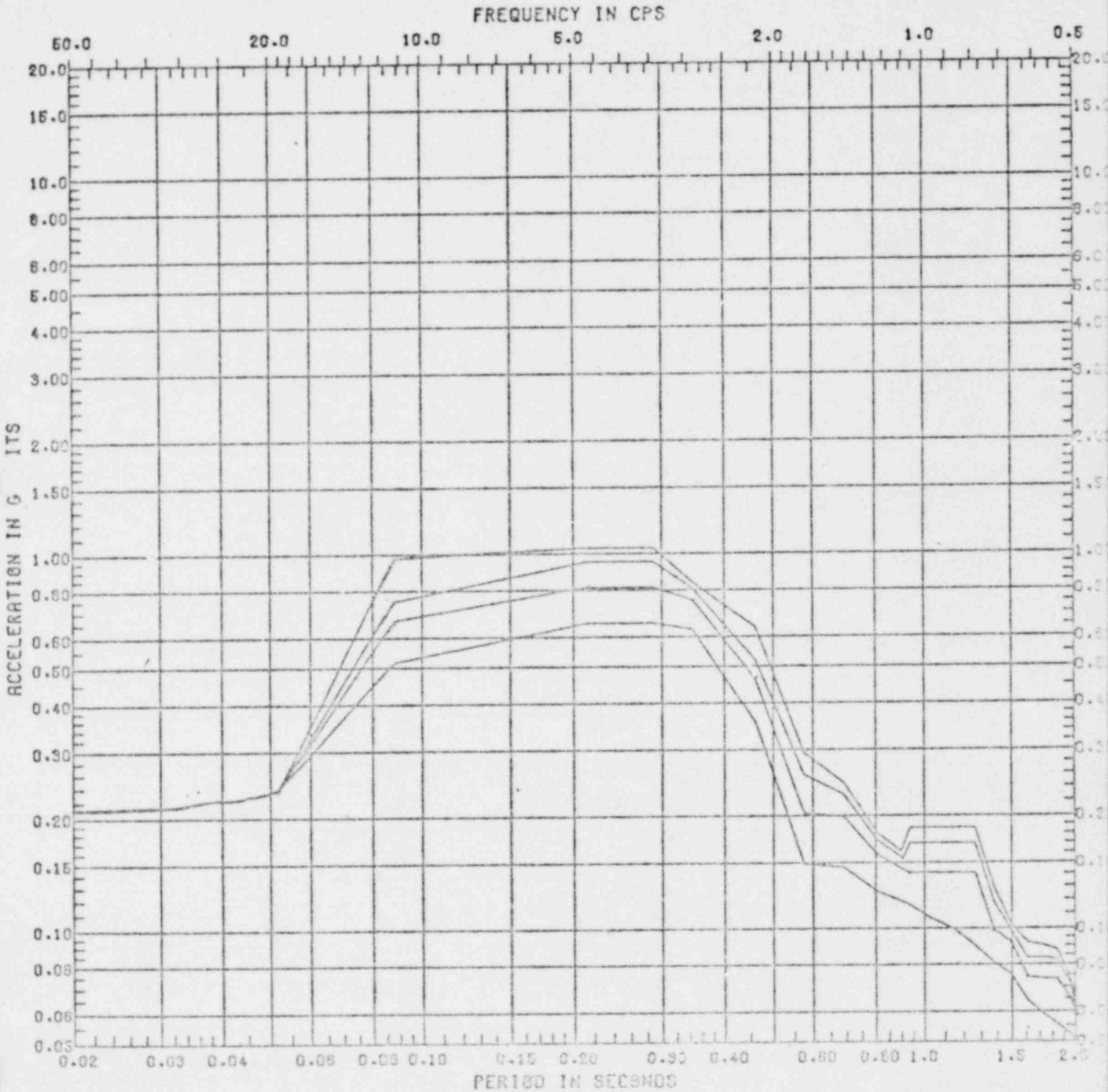
28 JUL 76
8290EL

ZIMMER.413015.SOIL-STRUCT.HORIZ.DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 15 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 81 OF 125



D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 14-D
ELEVATION 546'-0"
LOCATION Reactor Containment REVISION NO. 0

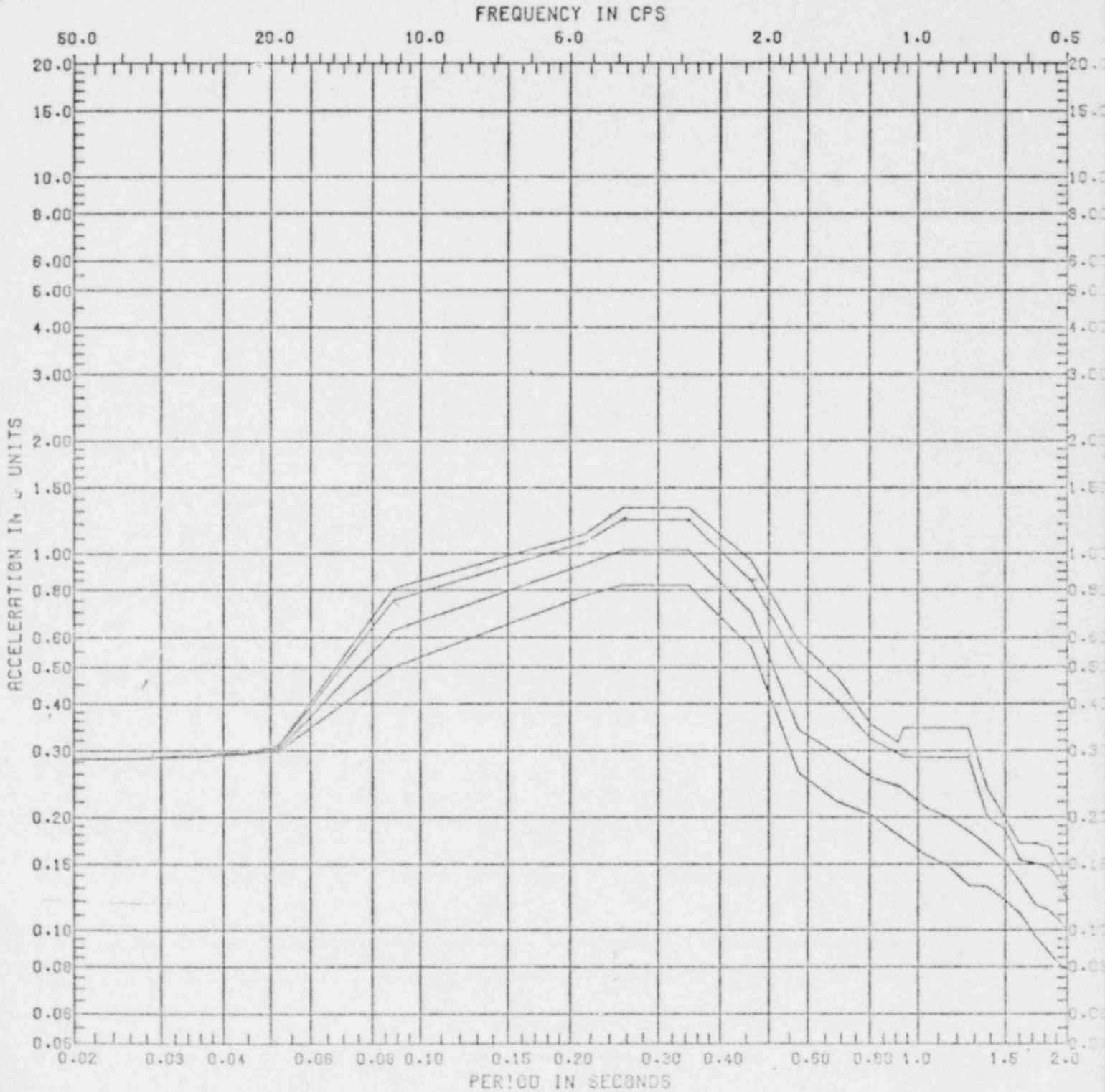
16 JUL 76
2170EL



O.B.E. Vert. Response Spectra
ELEVATION 546'-0", 525'-7", 503'-6"
LOCATION Reactor Containment

SPECTRA NO. 12-E, 13-E, 14-E
REVISION NO. 0

01 AUG 76
6730EL

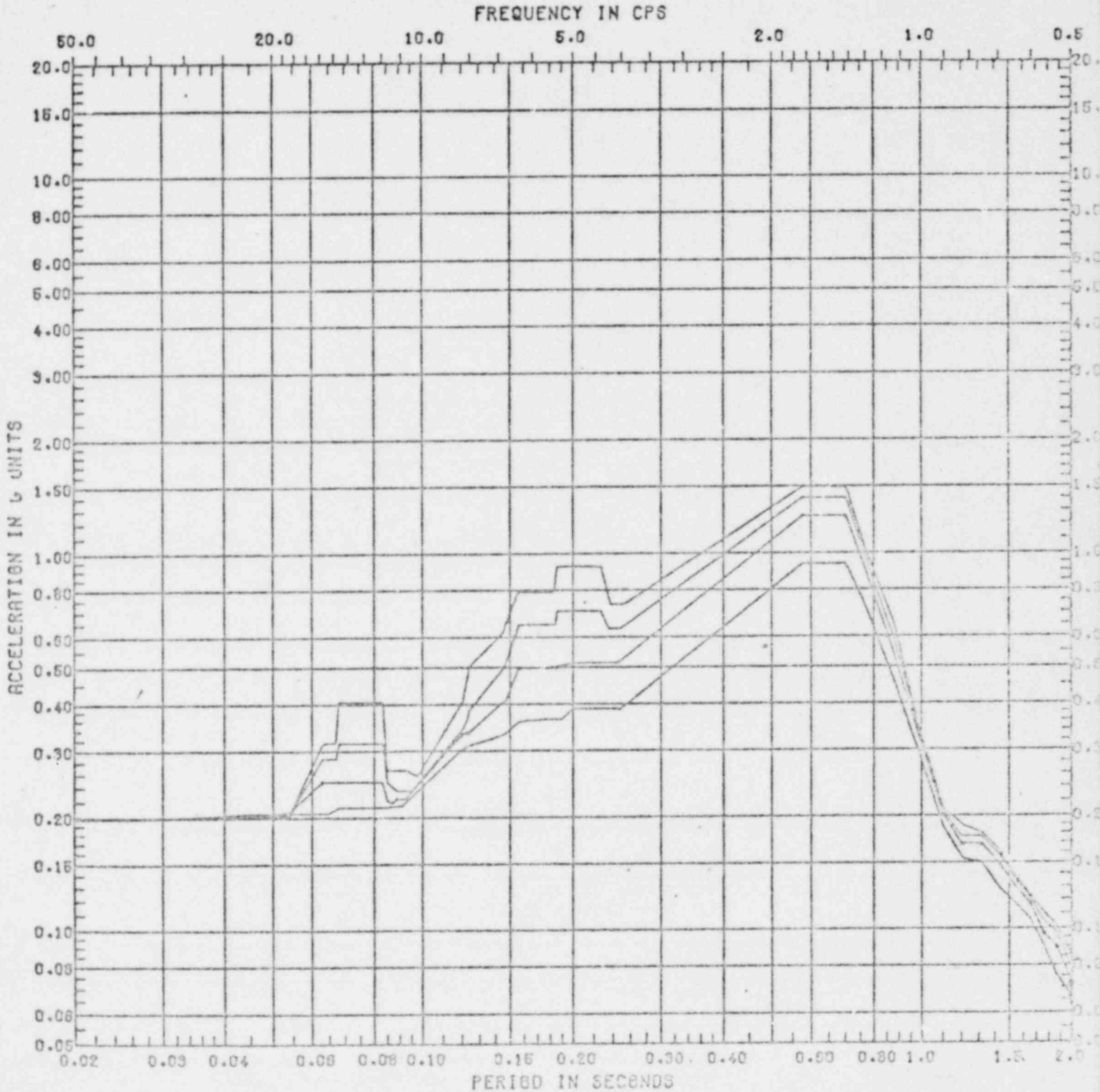


D.B.E. VERT RESPONSE SPECTRA
ELEVATION 546'-0", 525'-7", 503'-6"
LOCATION Reactor Containment

SPECTRA NO. 12-F, 13-F, 14-F
REVISION NO. 0

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT. HOR. OBE, SLAB 16X
DESIGNER O.E. Lev CHECKER D. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 84 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 15-A
ELEVATION 570'-6"
LOCATION Reactor Containment REVISION NO. 0

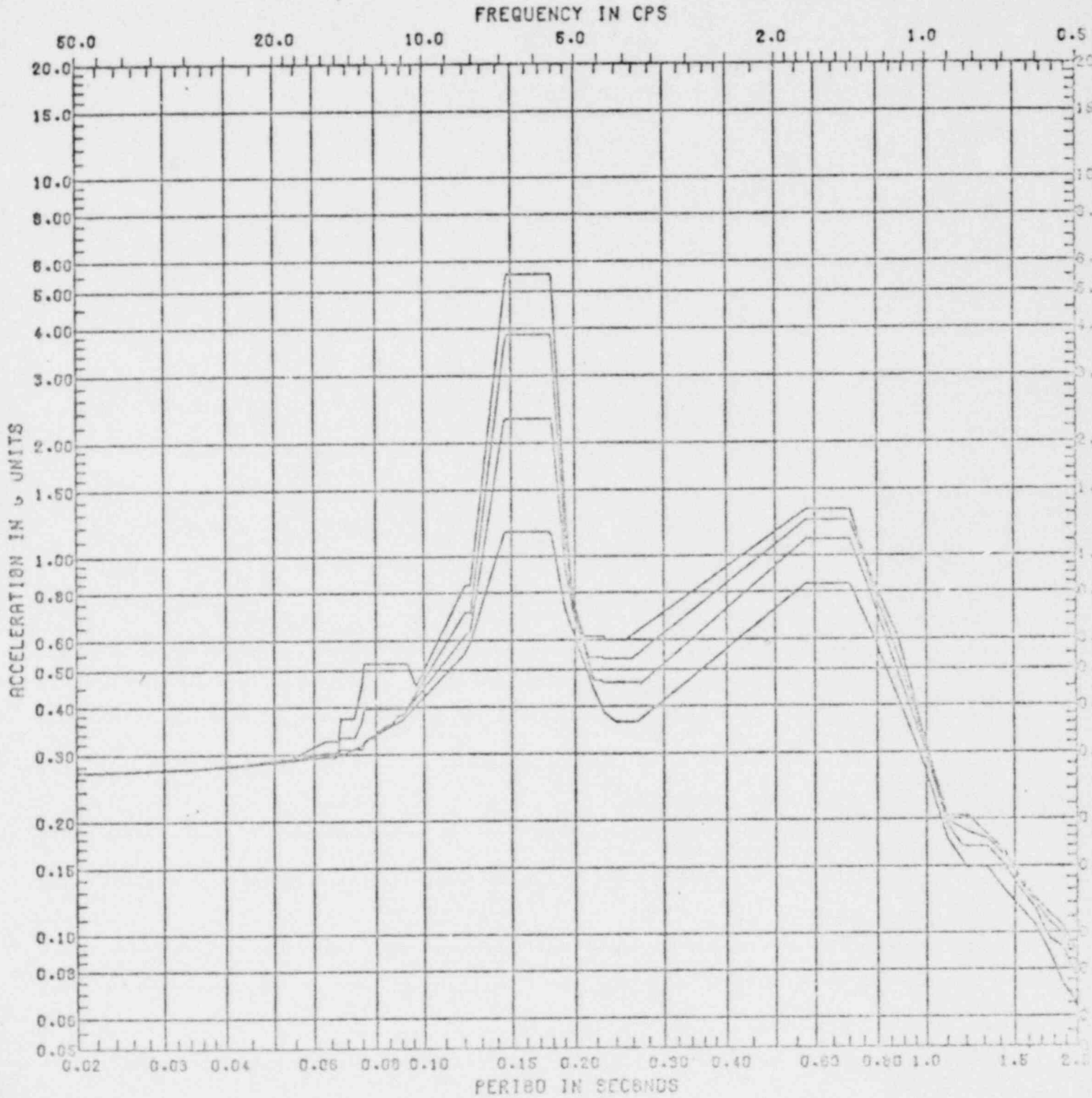
SARGENT & LUNDY

ENGINEERS

14 JUL 76

SL180

ZIMMER1 SOIL-STRUCT.HOR.OBE.SLAB 15Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 85 OF 125

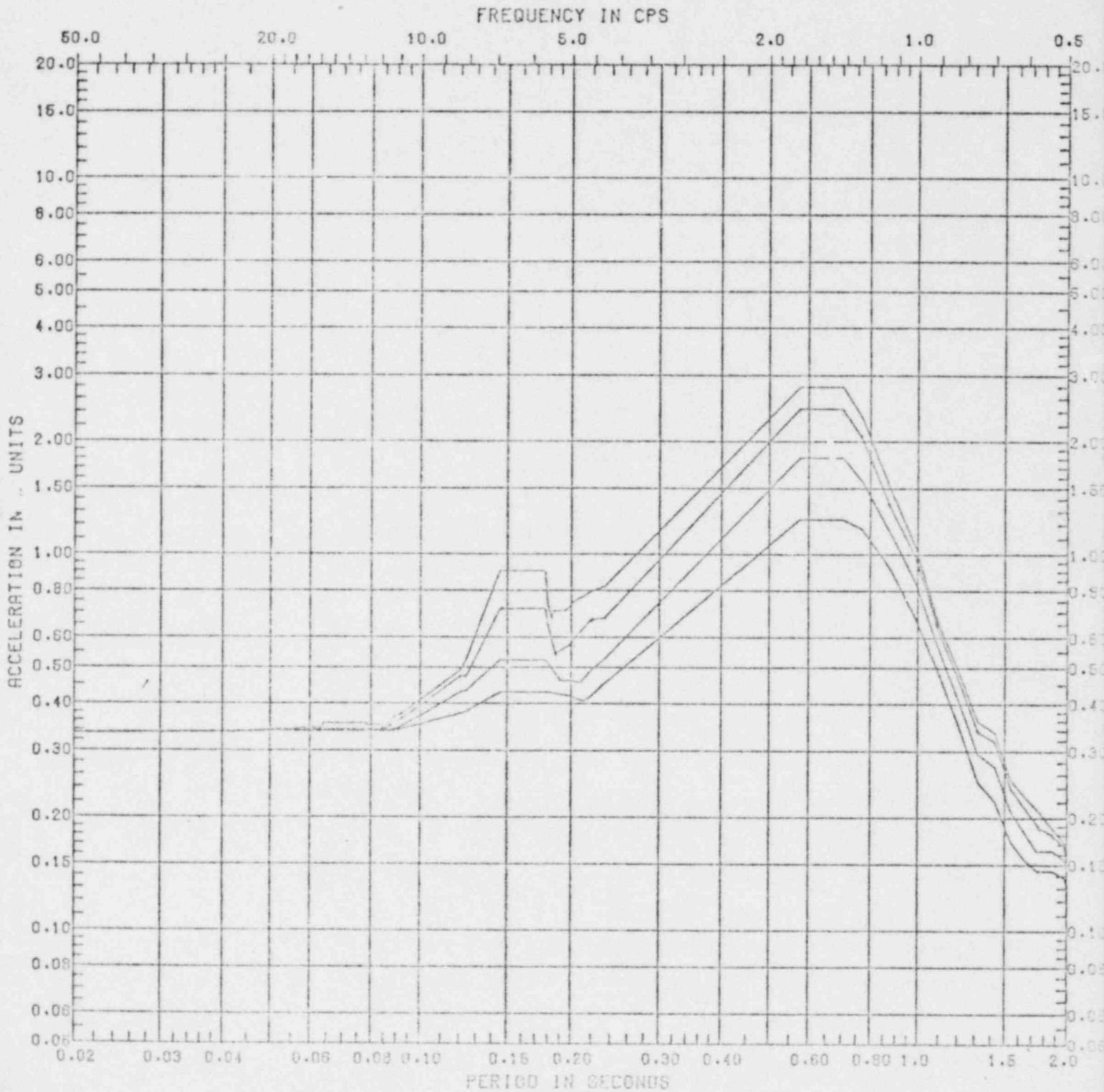


O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 15-B
ELEVATION 570'-6"
LOCATION Reactor Containment REVISION NO. 0

28 JUL 75
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.P. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 16 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 86 OF 125

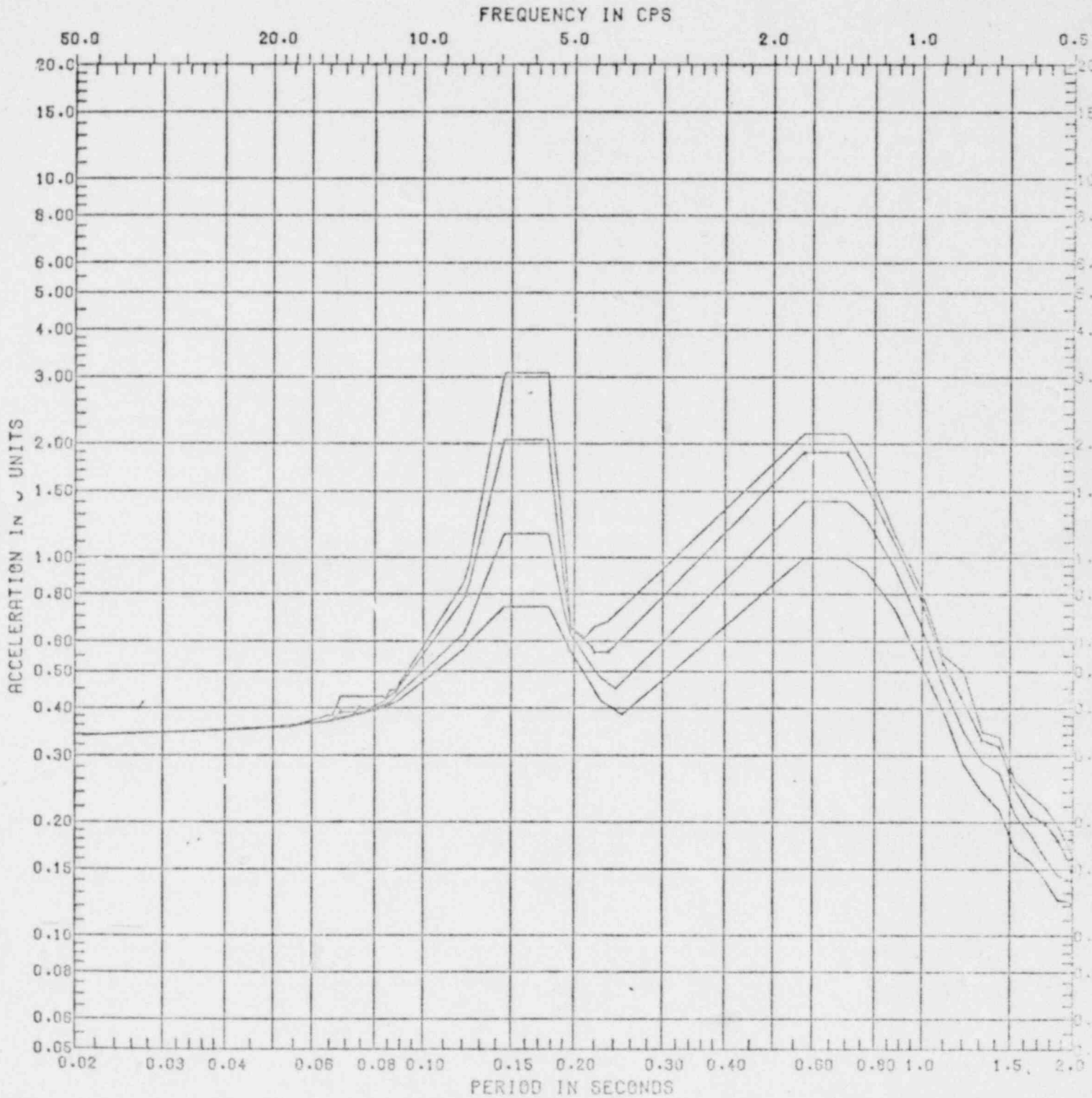
25



D.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 15-C
ELEVATION 570'-6"
LOCATION Reactor Containment REVISION NO. 0

28 JUL 76
8290EL

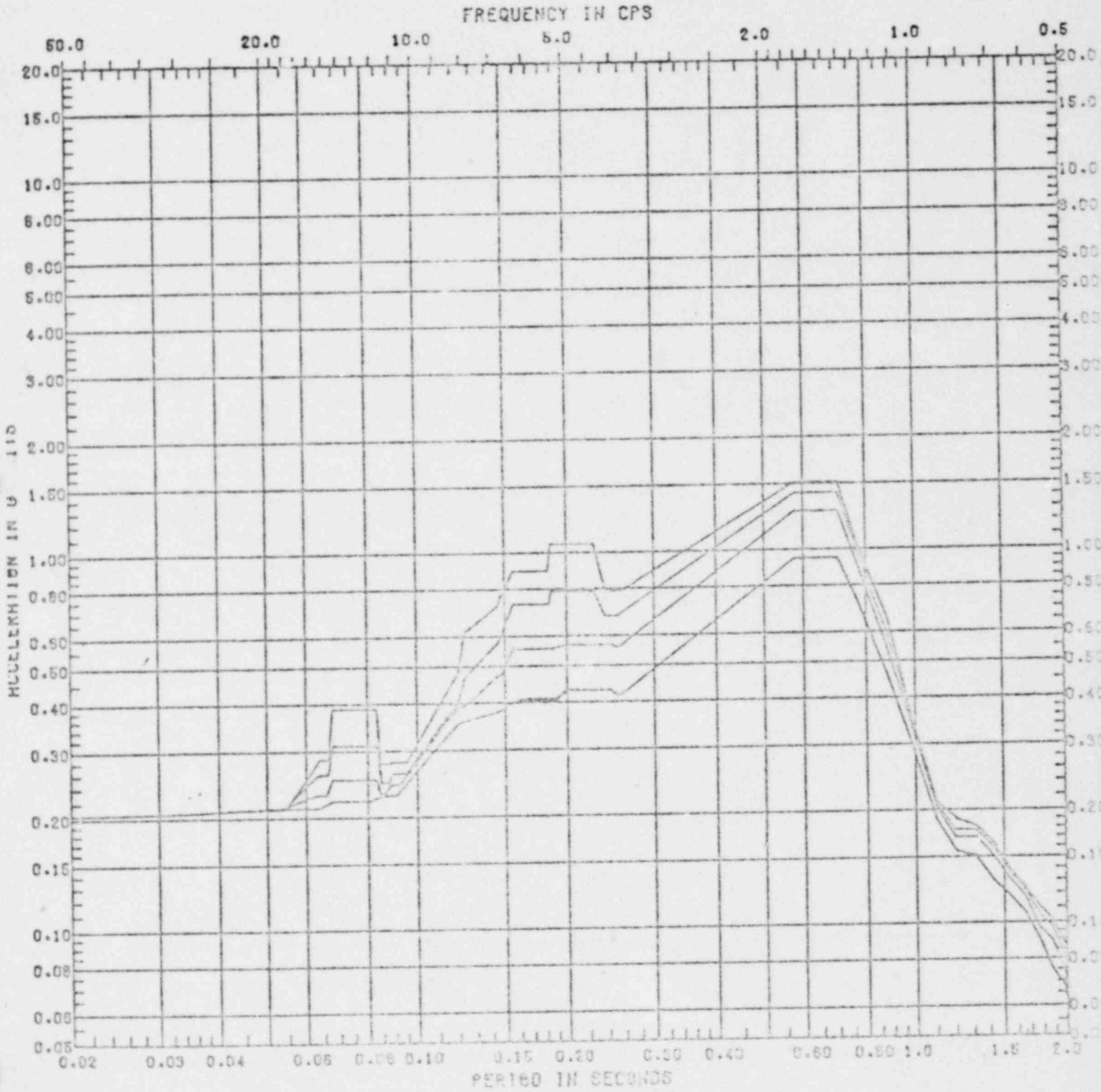
ZIMMER.413015,SOIL-STRUCT,HORIZ.08E
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 16 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 87 OF 125



D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 15-D
ELEVATION 570'-6"
LOCATION Reactor Containment REVISION NO. 0

14 JUL 76
SL180

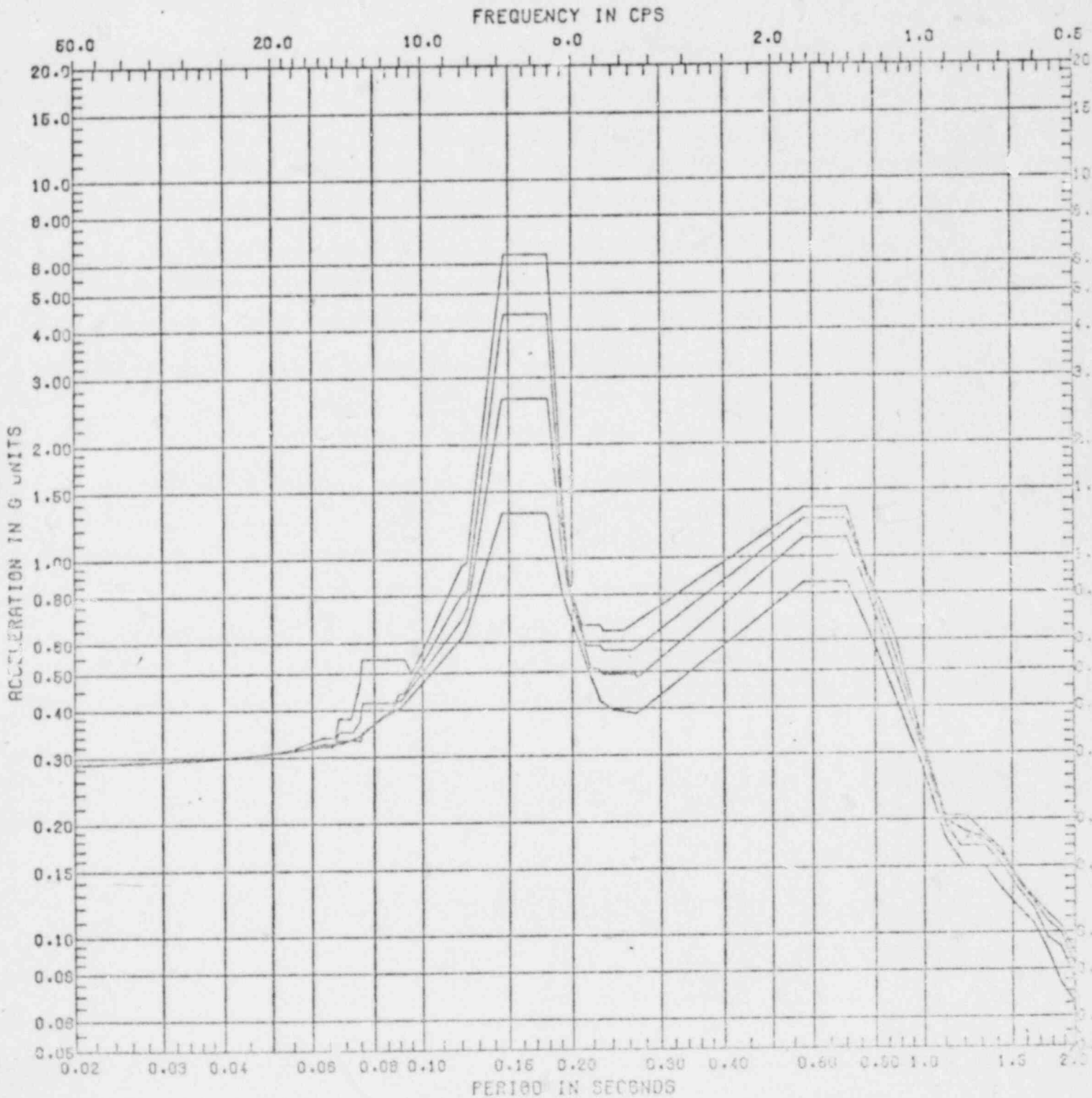
ZIMMER: SOIL-STRUCT.HOR.08E.SLAB 17X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 88 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 16-A
ELEVATION 593'-6"
LOCATION Reactor Containment REVISION NO. 0

14 JUL 76
SL180

ZIMMERL SOIL-STRUCT, HOR, 33E, SLAB 17Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 89 OF 125



O.B.E. Horiz. Response Spectra ; E-W Component

SPECTRA NO. 16-B

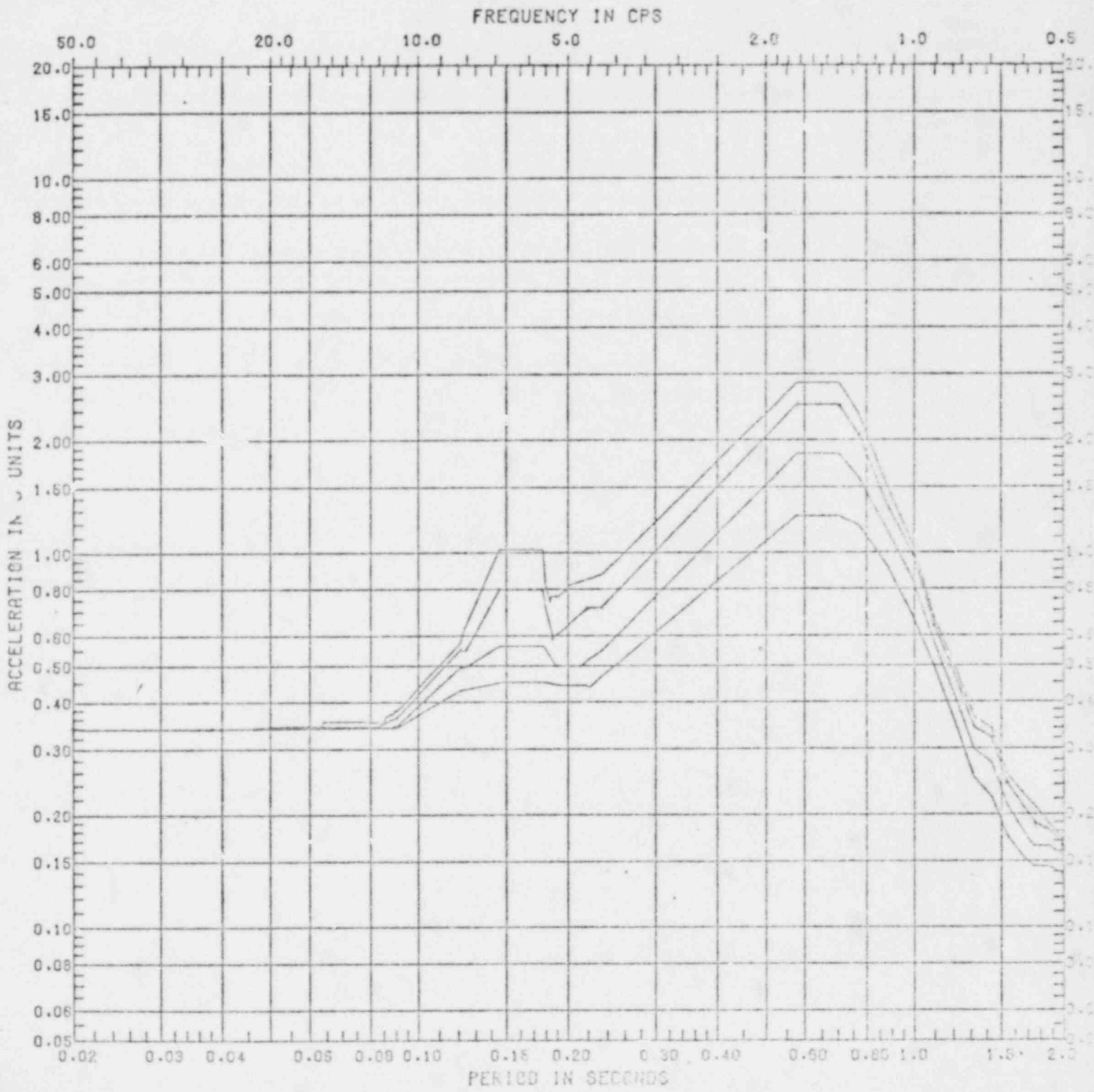
ELEVATION 593'-6"

LOCATION Reactor Containment

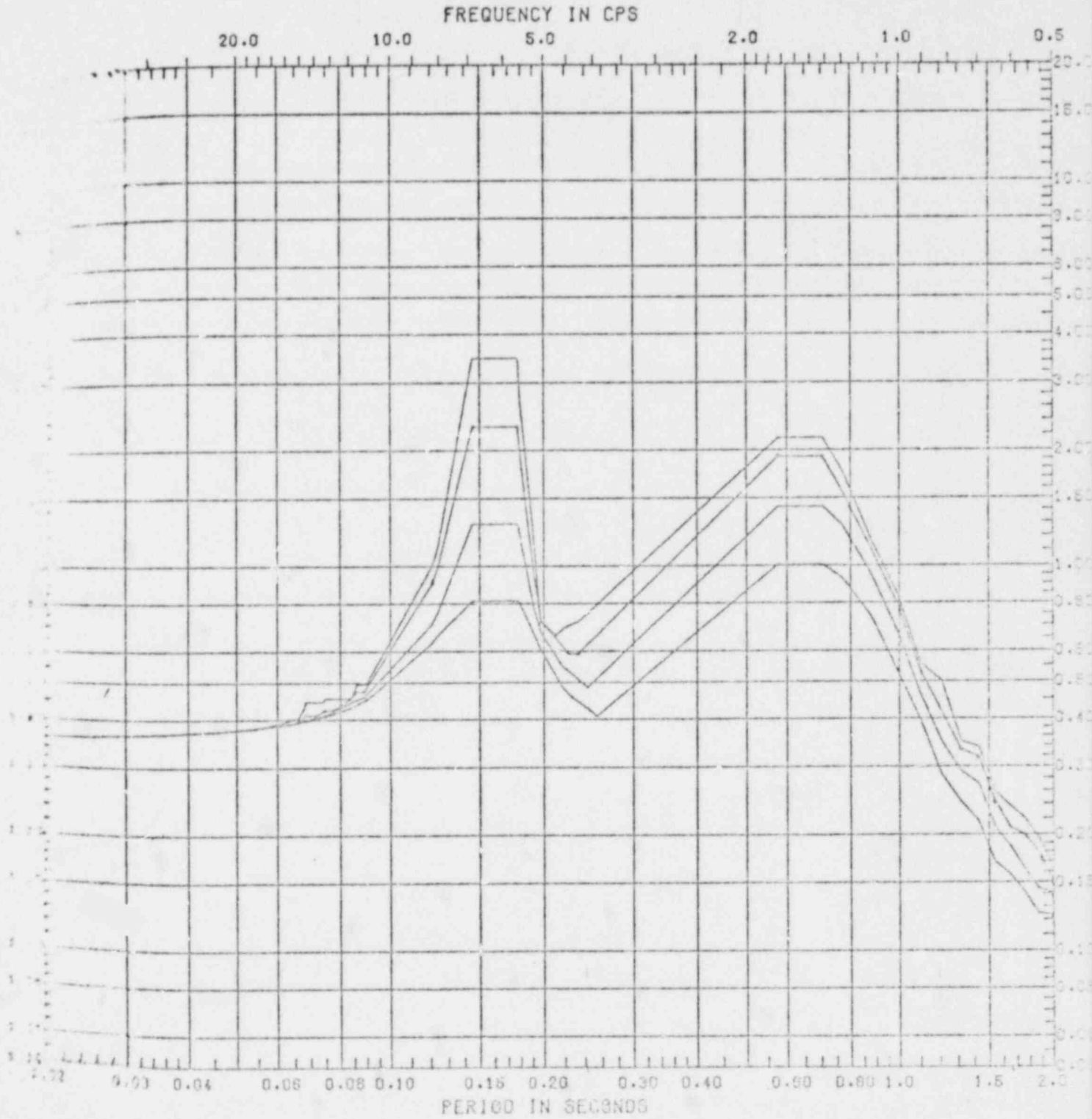
REVISION NO. 0

28 JUL 76
8290EL

ZIMMER.413018,SBIL-STRUCT.HORIZ.OME
DESIGNER D.P. LUV CHECKER D.P. JAIN
DESIGN SPECTRA AT JOINT/SLAB 17 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 90 OF 125



D.B.E. Horiz. Response Spectra N-S Component: SPECTRA NO. 16-C
ELEVATION 593'-6"
LOCATION Reactor Containment REVISION NO. 0



Horiz. Response Spectra E-W Component

SPECTRA NO. 16-D

ELEVATION 593'-6"

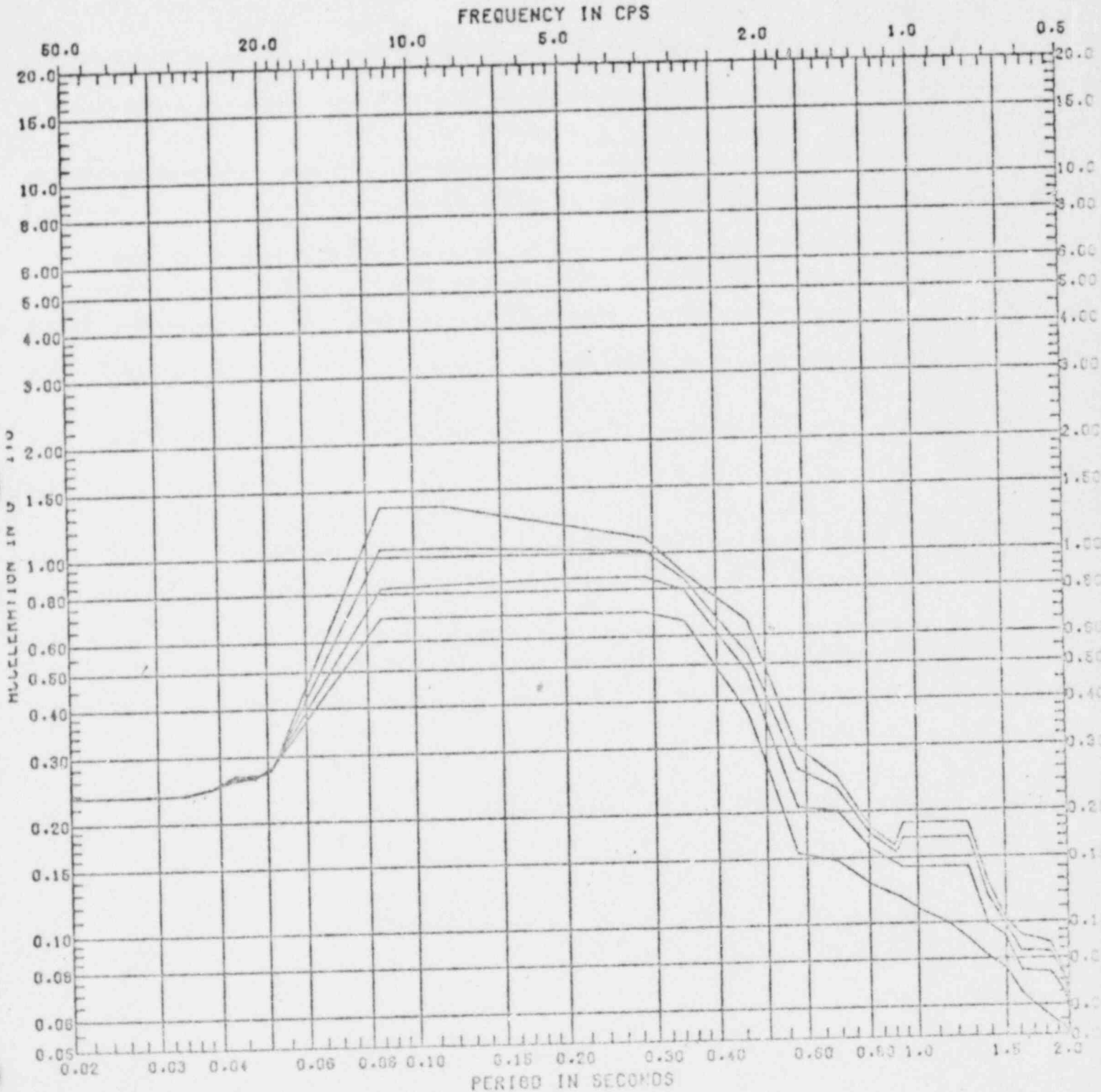
LOCATION Reactor Containment

REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

15 JUL 76
2180EL

ZIMMER 1.413015, S3IL-STRUCT, V.S 5, 032
DESIGNER O.E. Lev CHECKER B.P. Jain 4
DESIGN SPECTRA AT JOINT/SLAB 15 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 92 OF 125



O.B.E. Vert. Response Spectra

ELEVATION 570'-6"

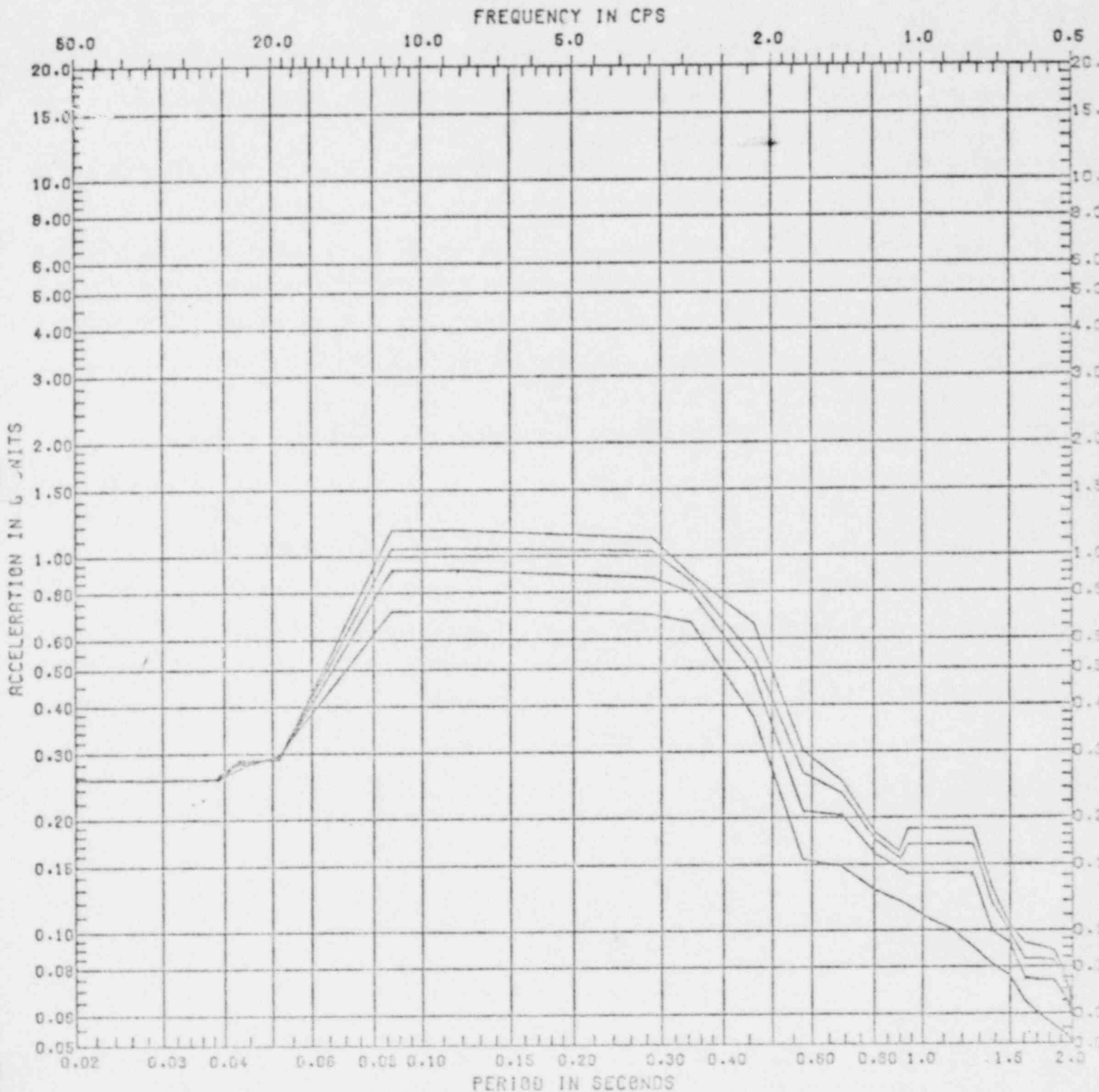
LOCATION Reactor Containment

SPECTRA NO. 15-E

REVISION NO. 0

15 JUL 76
9440EL

ZIMMER1.413015.SOIL-STRUCT.V.S 6.0BE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 19 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 93 OF 125



O.B.E. Vert. Response Spectra

SPECTRA NO. 16-E

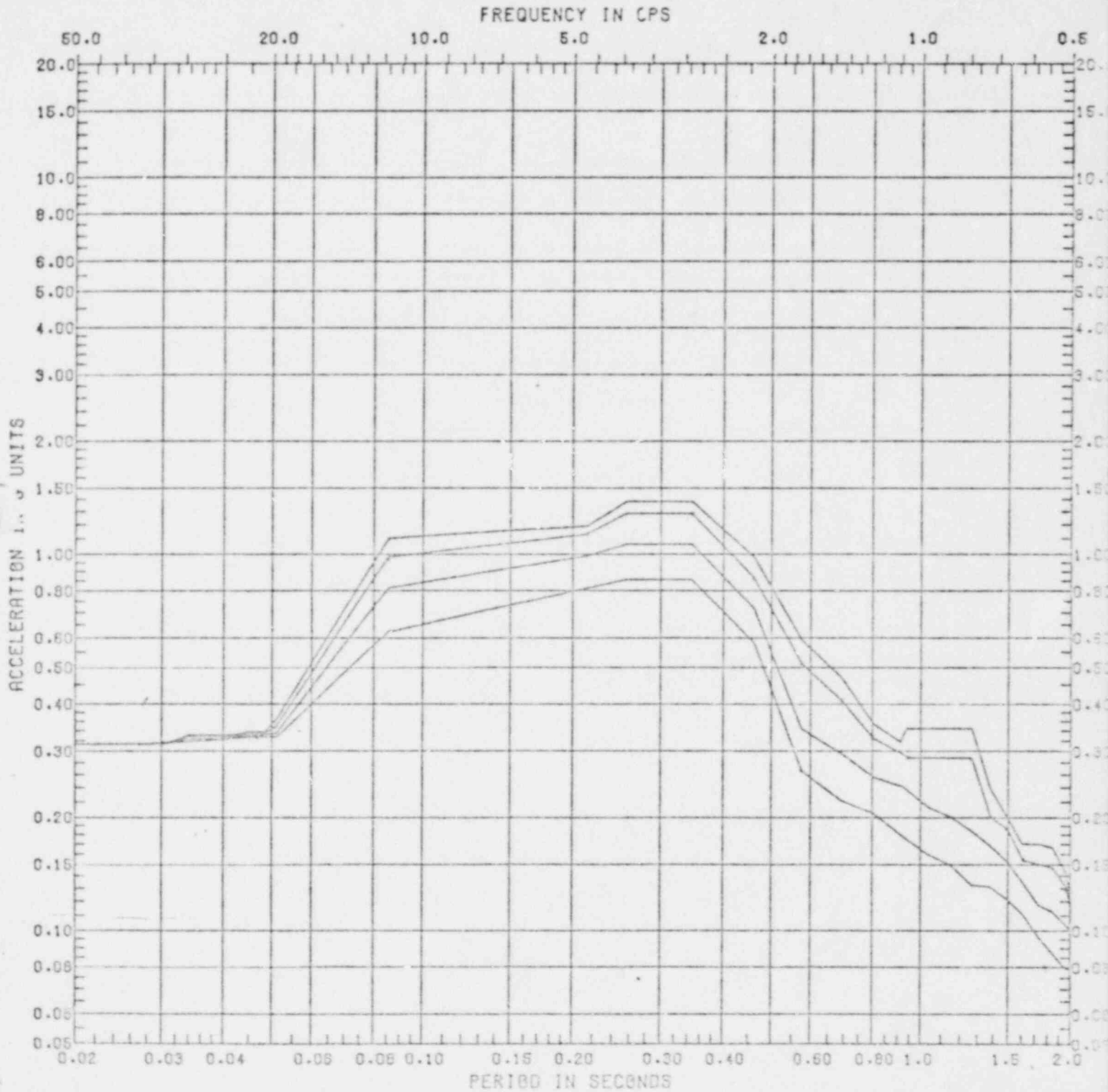
ELEVATION 627'-9", 593'-6"

LOCATION Reactor Containment

REVISION NO. 0

01 AUG 76
6740EL

ZIMMER 1.413015, SOIL-STRUCT. V.S 5.0BE
DESIGNER O.D. LAY CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 15 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 94 OF 125



D.B.E. VERT RESPONSE SPECTRA

ELEVATION 570'-6"

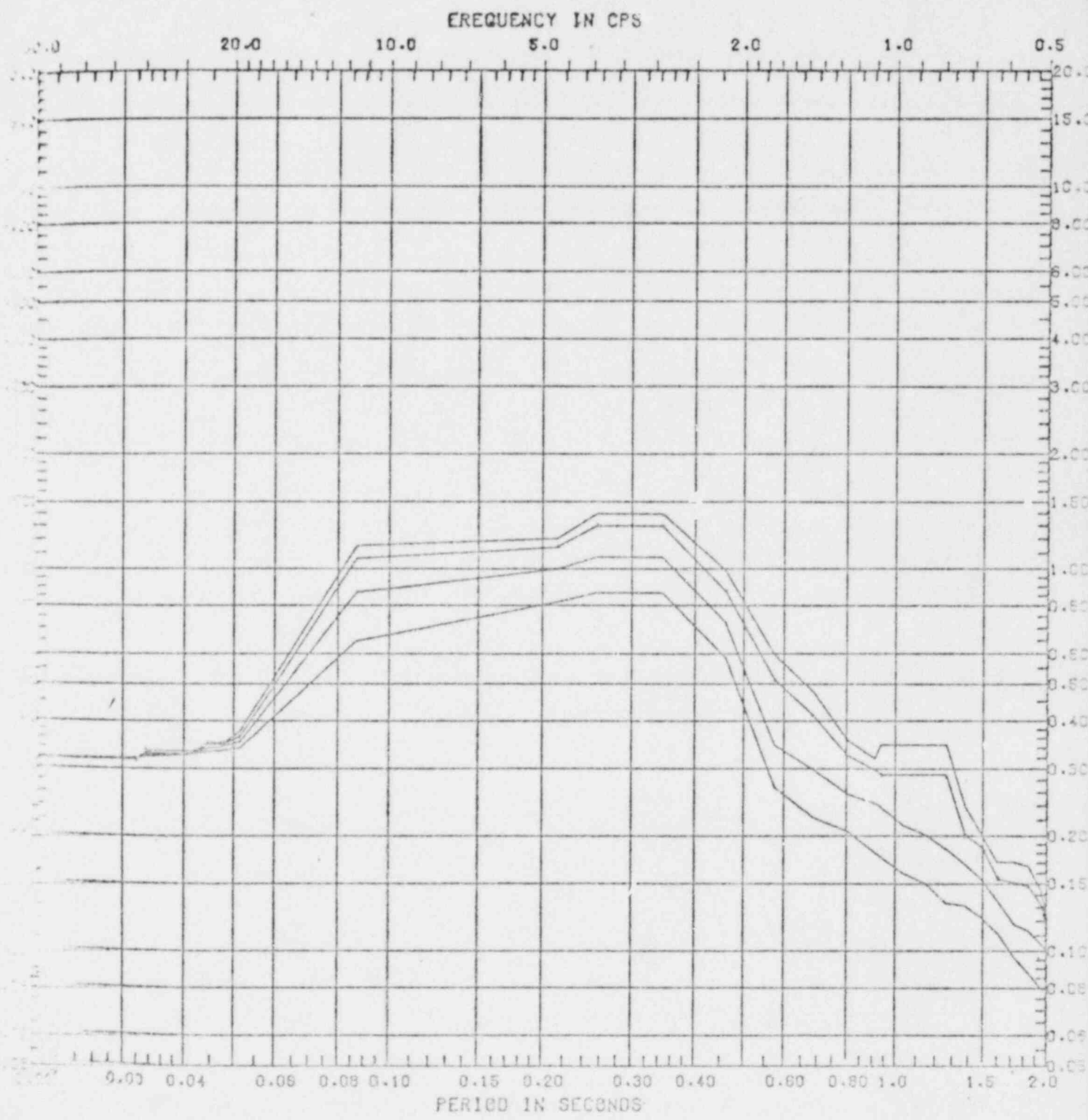
LOCATION Reactor Containment

SPECTRA NO. 15-F

REVISION NO. 0

29 JUL 76
3860EL

ZIMMER 1.413015, SOIL-STRUCT. V.S 6.0SE
DESIGNER O.P. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 19 X-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 95 OF 125

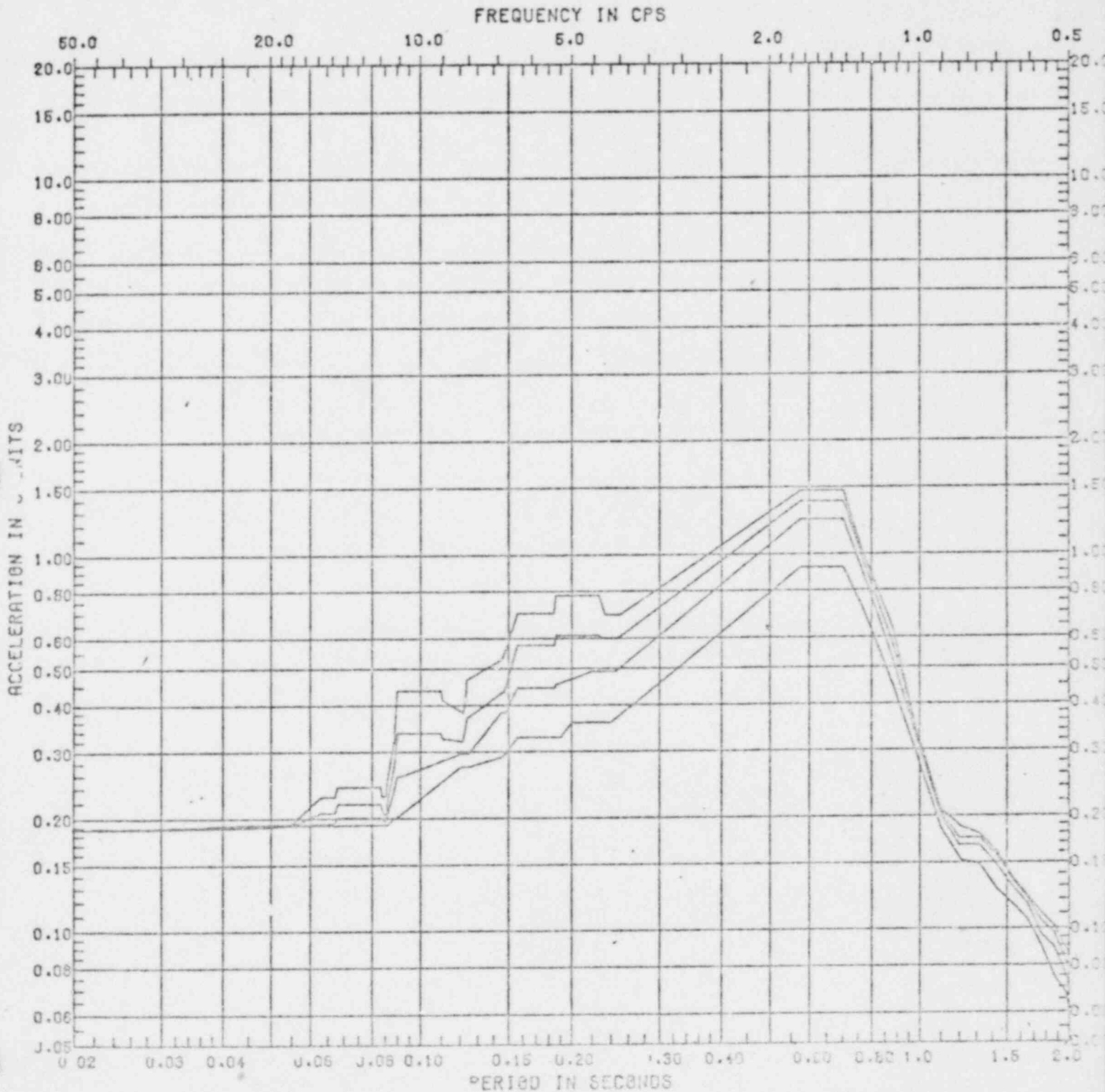


D.B.E. VERT RESPONSE SPECTRA
ELEVATION 627'-9", 593'-6"
LOCATION Reactor Containment

SPECTRA NO. 16-F
REVISION NO. 0

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCTURE, OBE, SLAB 22X
DESIGNER O. E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
-EAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 96 OF 125



O.B.E. Horiz. Response Spectra N-S Component

SPECTRA NO. 17-A

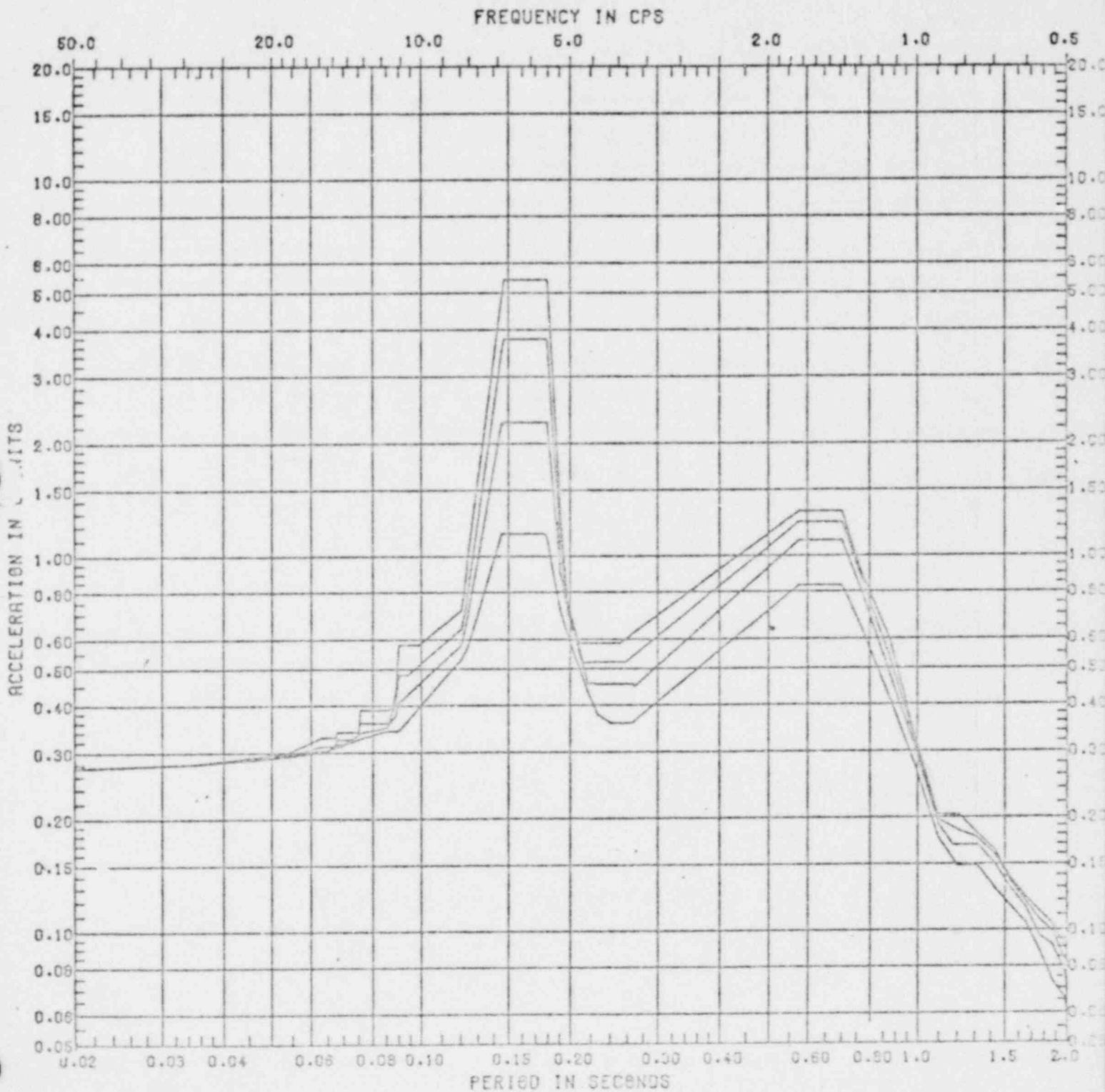
ELEVATION 543'-0"

LOCATION Biological Shield

REVISION NO. 0

14 JUL 76
SL180

ZIMMER1 SOIL-STRUCT.HOR.08E.SLAB 22Y
DESIGNER O.E. Lev HECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 97 OF 125



O.B.E. Horiz. Response Spectra | E-W Component

SPECTRA NO. 17-B

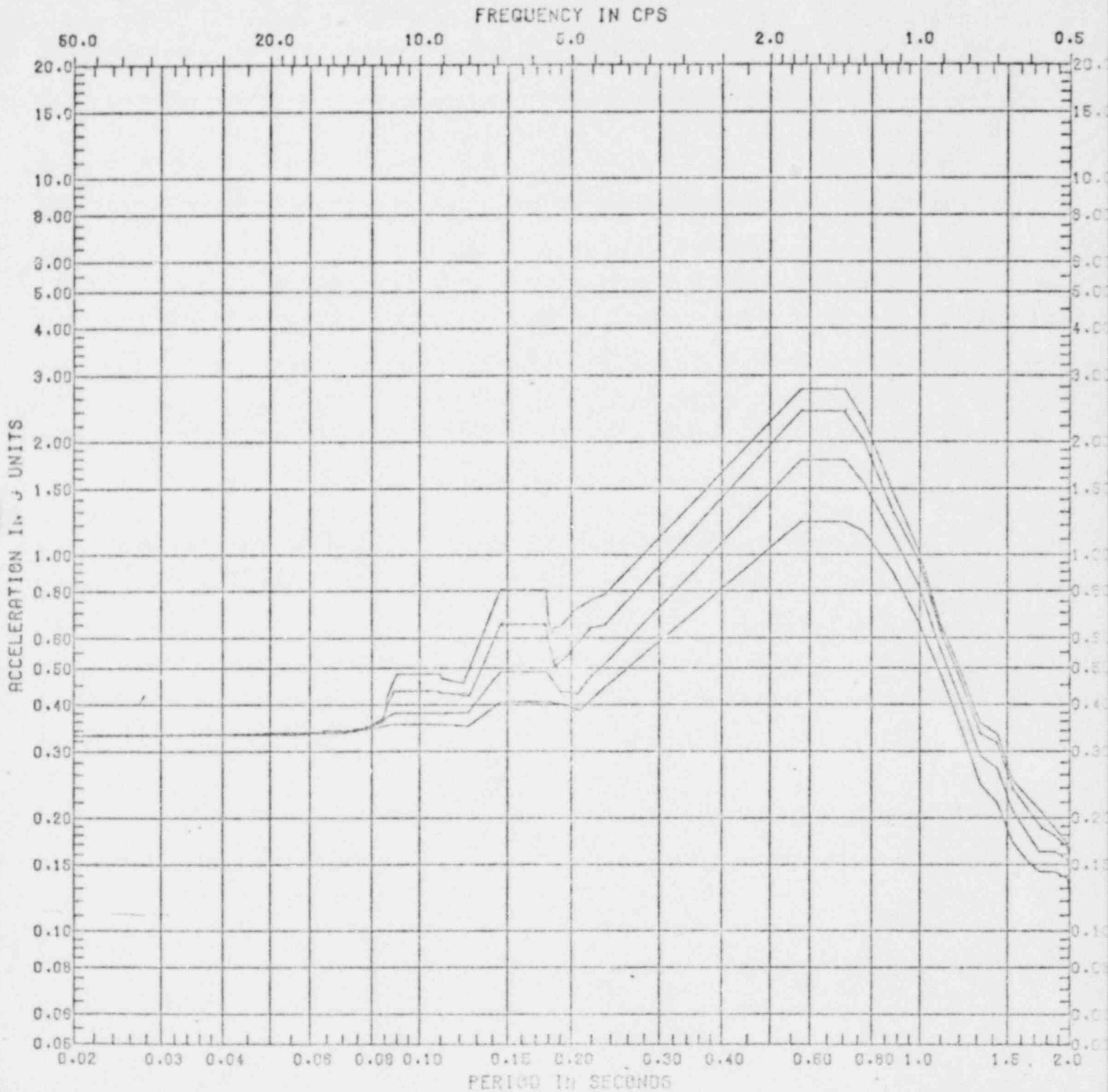
ELEVATION 543'-0"

LOCATION Biological Shield

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413016, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Lev CHECKER B.D. Jain
DESIGN SPECTRA AT JOINT/SLAB 22 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 98 OF 125



D.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 17-C

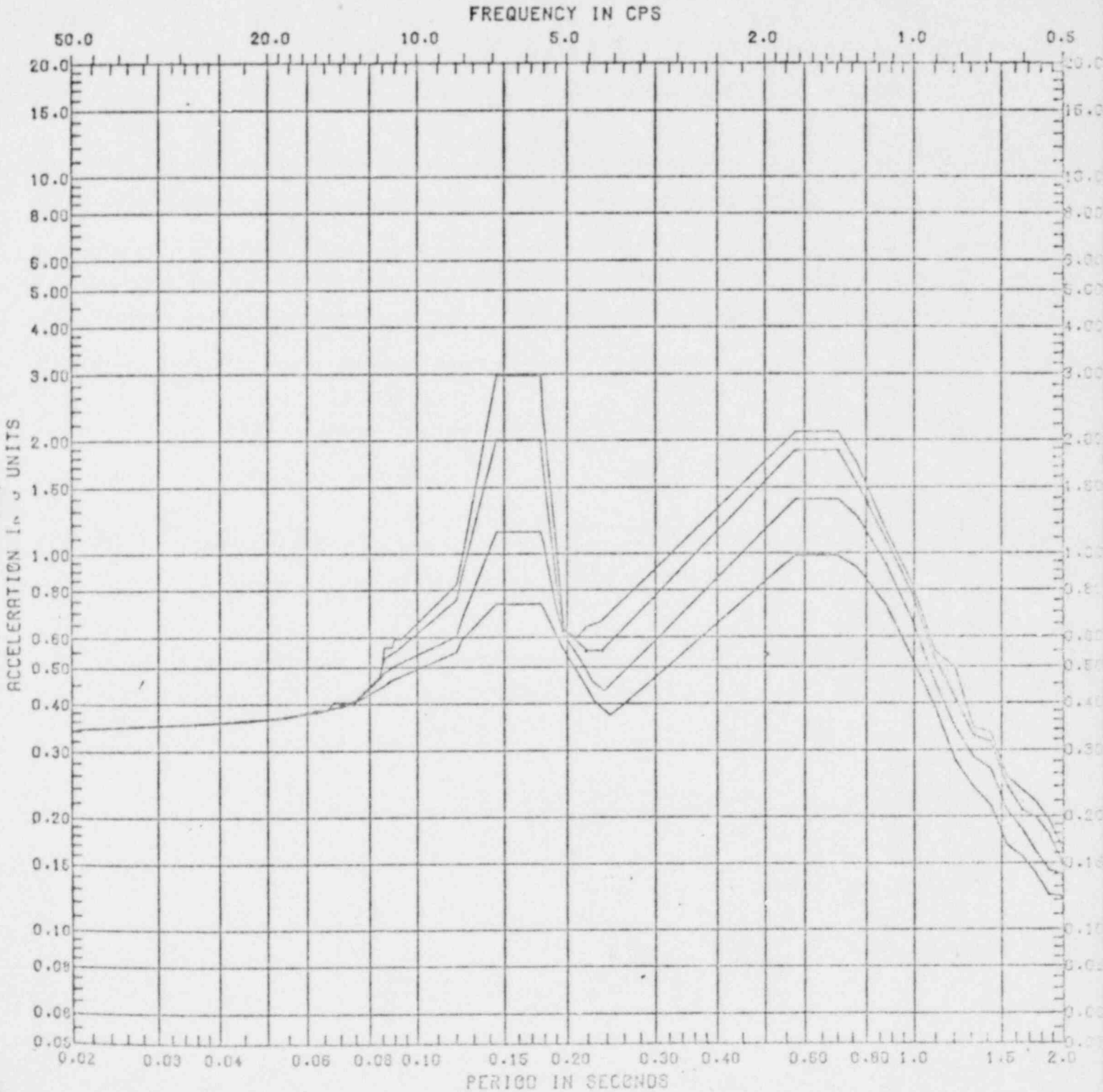
ELEVATION 543'-0"

LOCATION Biological Shield

REVISION NO. 0

28 JUL 76
8290EL

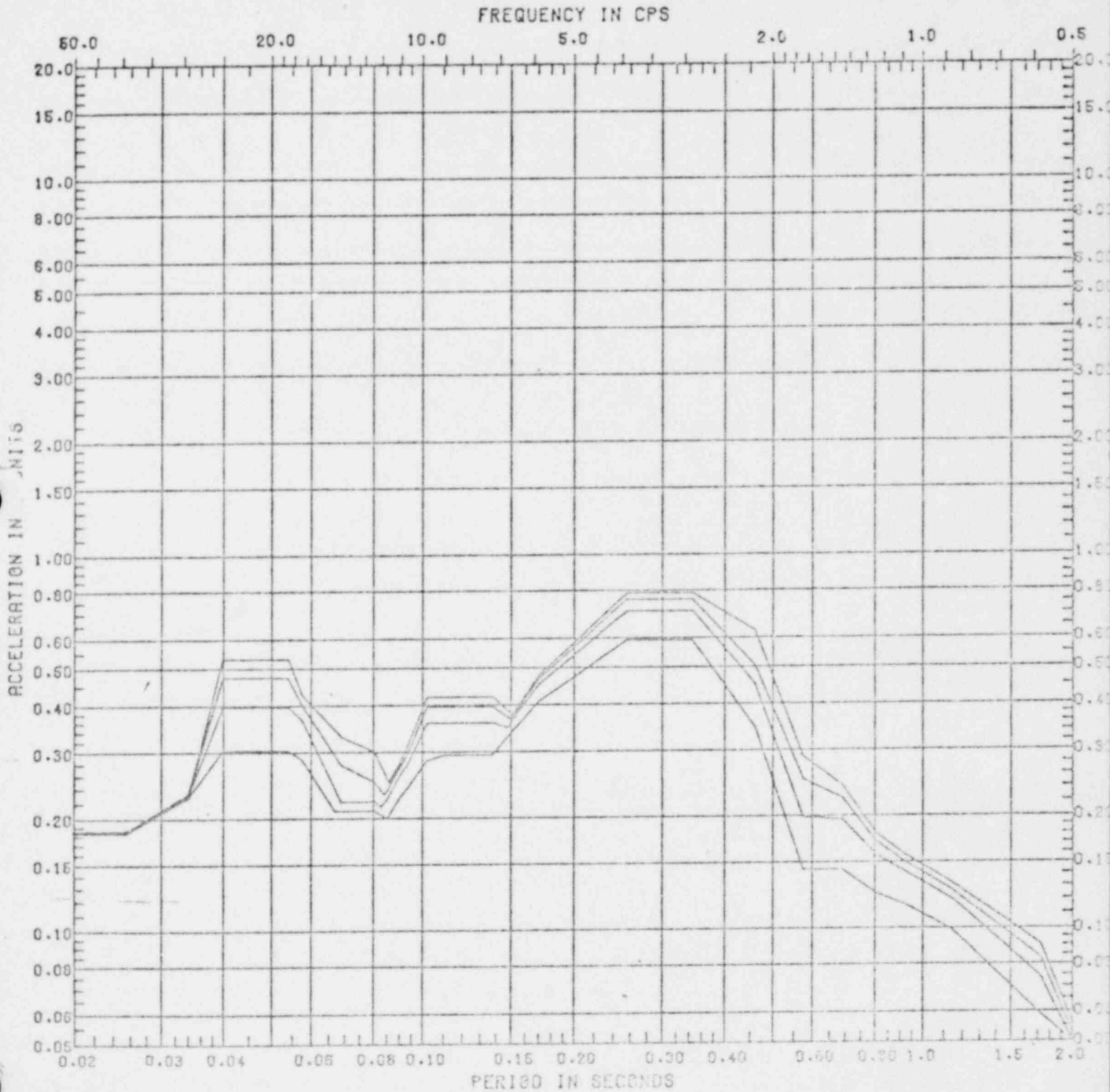
ZIMMER, 413015, SOIL-STRUCT. HORIZ. GBE
DESIGNER O.E. Lev CHECKER P.W. Jain
DESIGN SPECTRA AT JOINT/SLAB 22 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 99 OF 125



O.E. Horiz. Response Spectra E-W Component SPECTRA NO. 17-D
ELEVATION 543'-0"
LOCATION Biological Shield REVISION NO. 0

12 JUL 76
309SKN

4130-15. ZIMMER RPV&ED VERTICAL OBE
DESIGNER'S NIKKARJAM CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT 10 Y-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 100 OF 125



O.B.E. Vert. Response Spectra

SPECTRA NO. 17-E

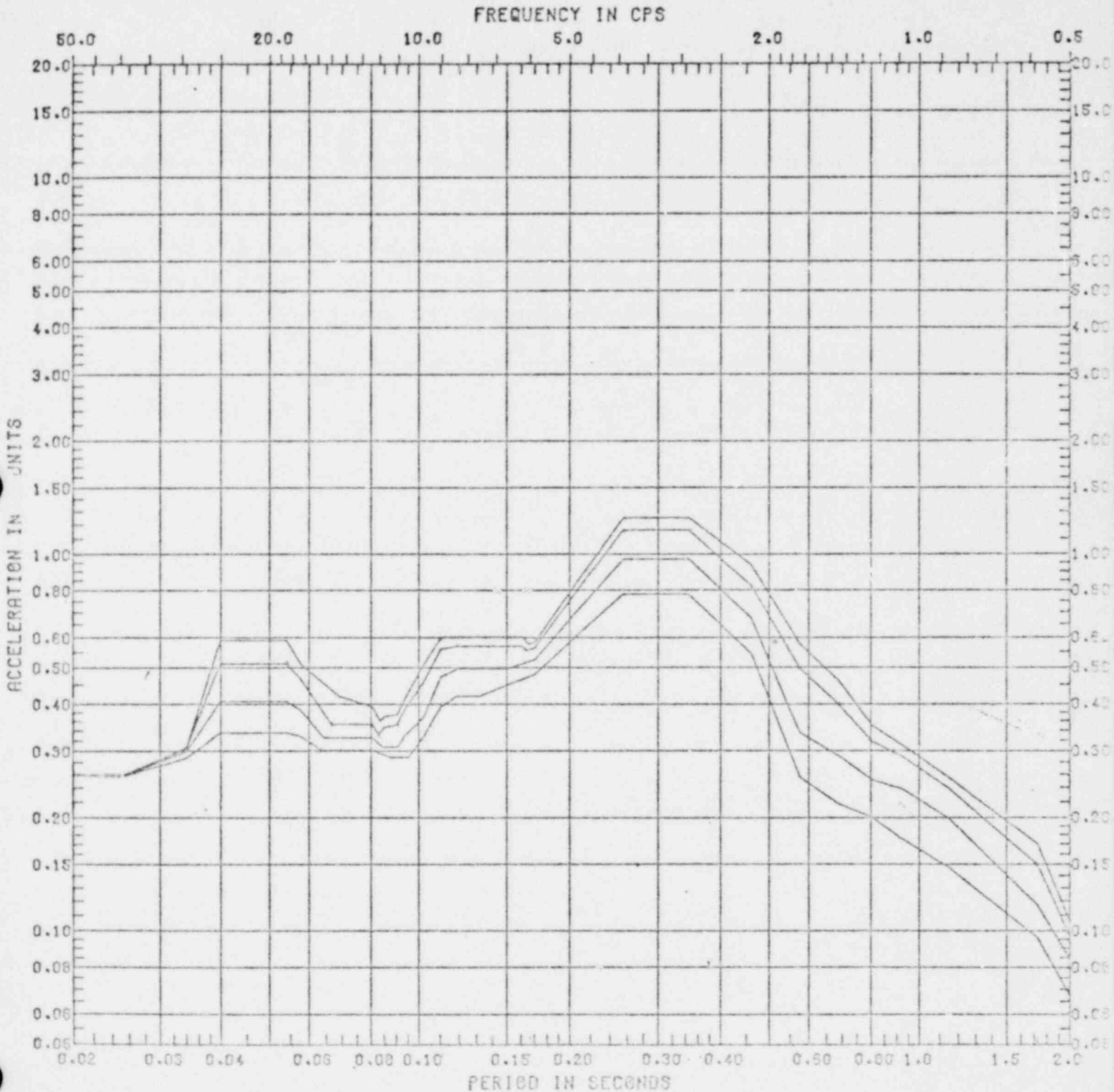
ELEVATION 543'-0"

LOCATION Biological Shield

REVISION NO. 0

05 AUG 76
7930EL

4130-15, ZIMMER, RPV-PED, SOILSTR, V, DBE
DESIGNER O.E. LevCHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 10 Y-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 101 OF 125



DBE
O.B.E. VERT RESPONSE SPECTRA

SPECTRA NO. 17-F

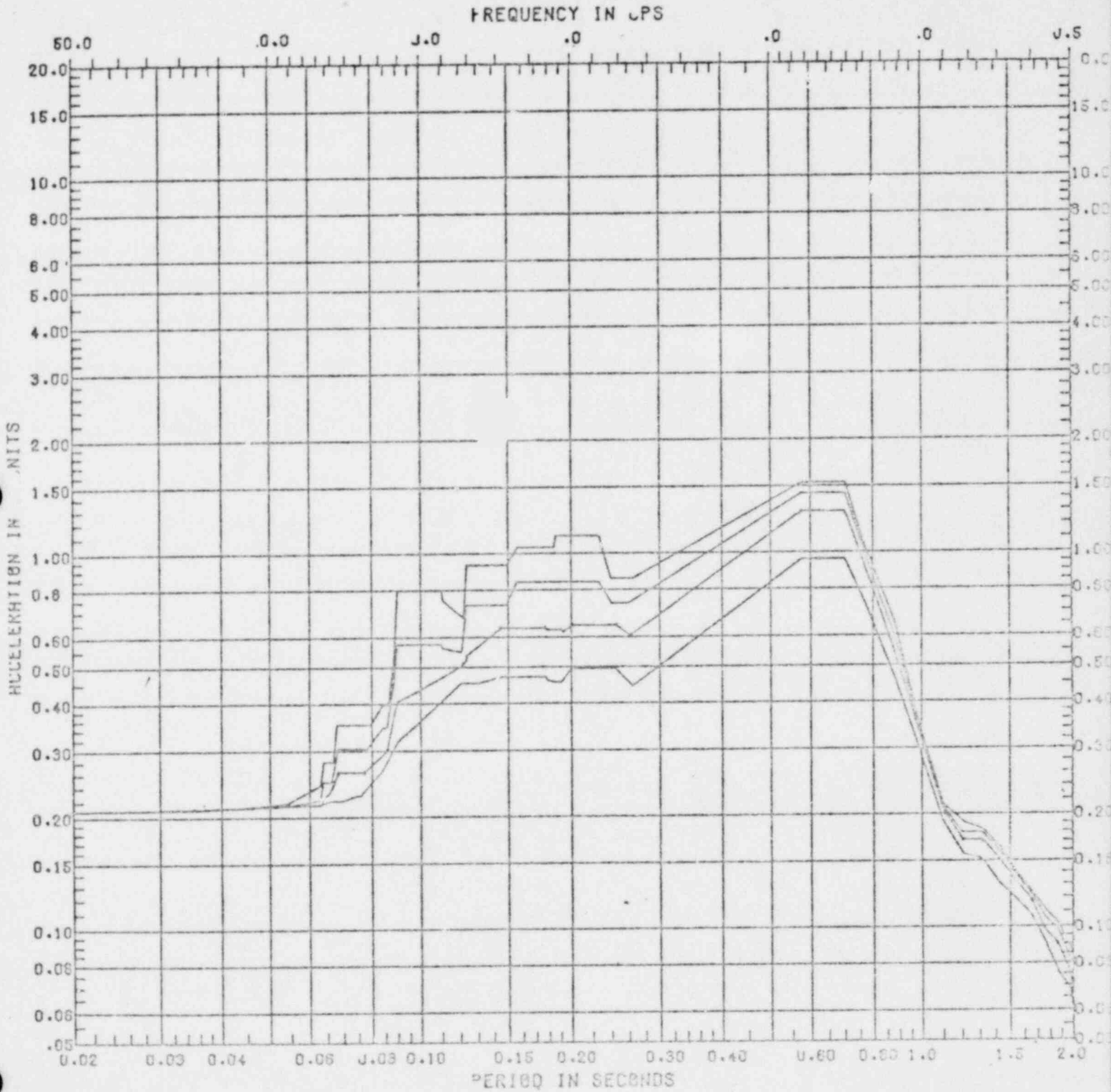
ELEVATION 543'-0"

LOCATION Biological Shield

REVISION NO. 0

14 JUL 76
SL180

ZIMMERI SOIL-STRUCT.HOR.OBE.SLAB 23X
DESIGNER O.E. Lev HECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 102 OF 125



O.B.E. Horiz. Response Spectra N-S Component

SPECTRA NO. 18-A

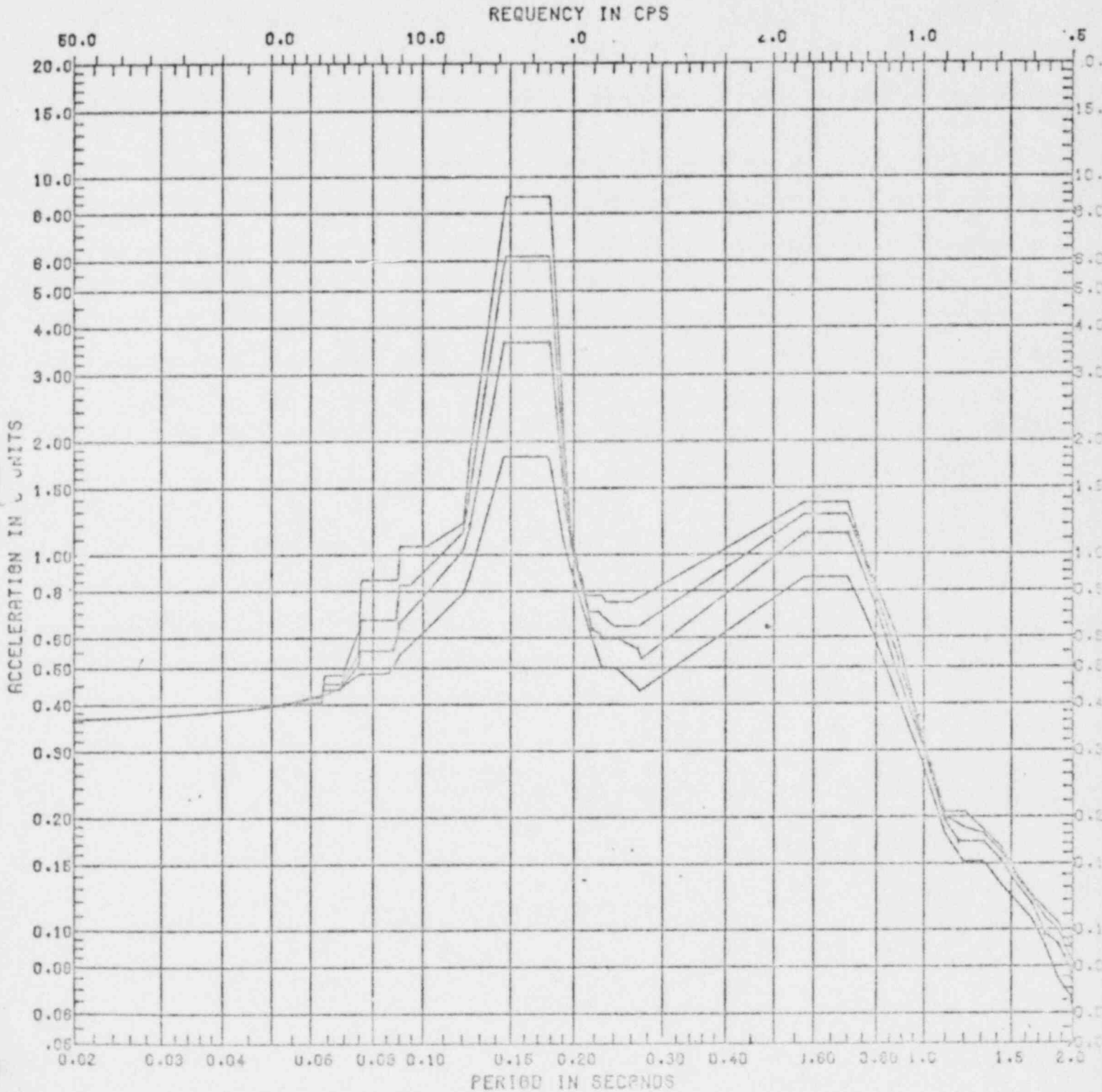
ELEVATION 565'-0"

LOCATION Biological Shield

REVISION NO. 0

14 JUL 76
SL18J

ZIMMERI SOIL-STRUCT.HOR.OEE.SLAB 23Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 103 OF 125



B.E. Horiz. Response Spectra

E-W Component

SPECTRA NO. 18-B

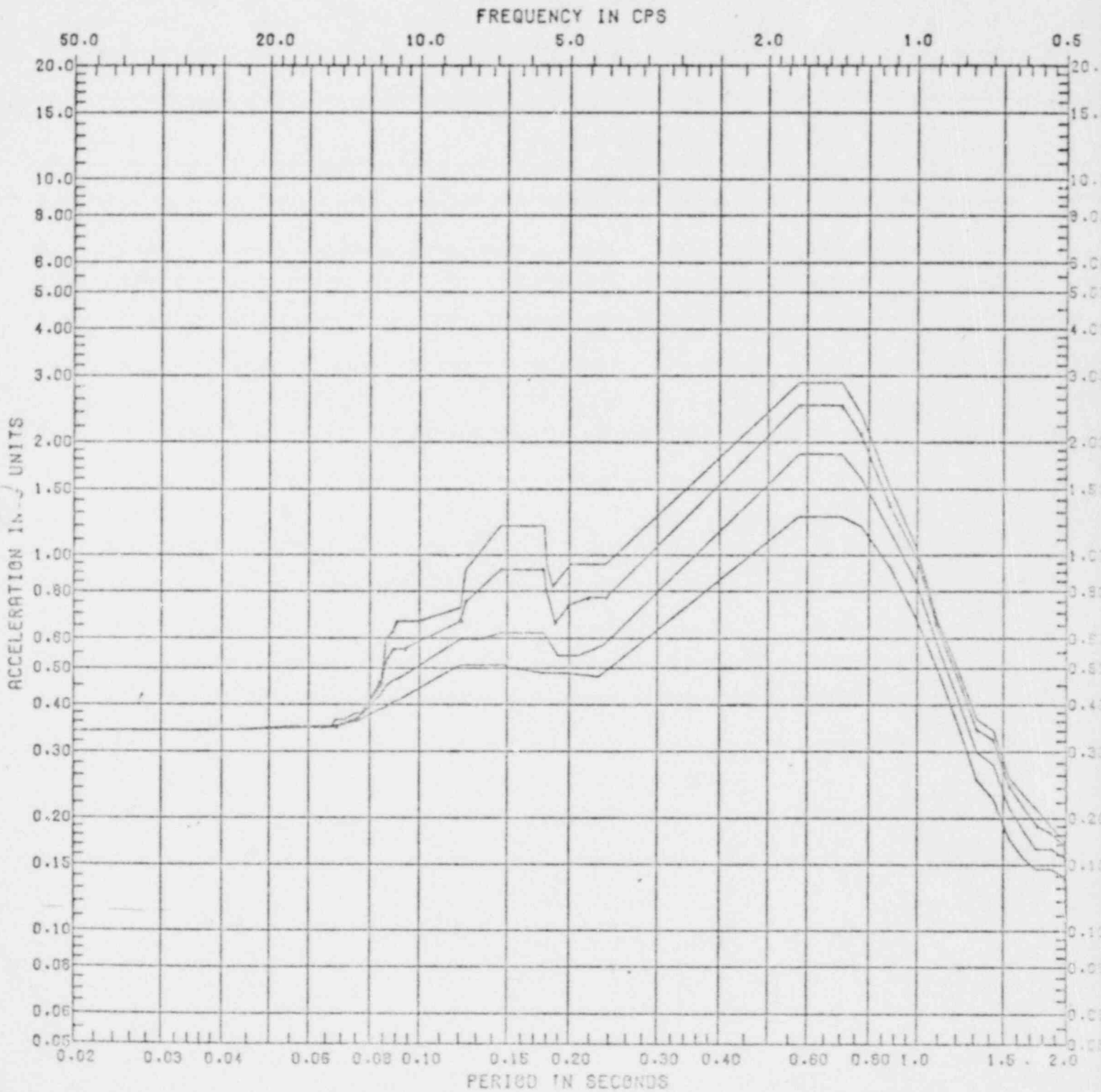
ELEVATION 565'-0"

LOCATION Biological Shield

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.F. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 23 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 104 OF 125



D.B.E. Horiz. Response Spectra N-S Component

SPECTRA NO. 18-C

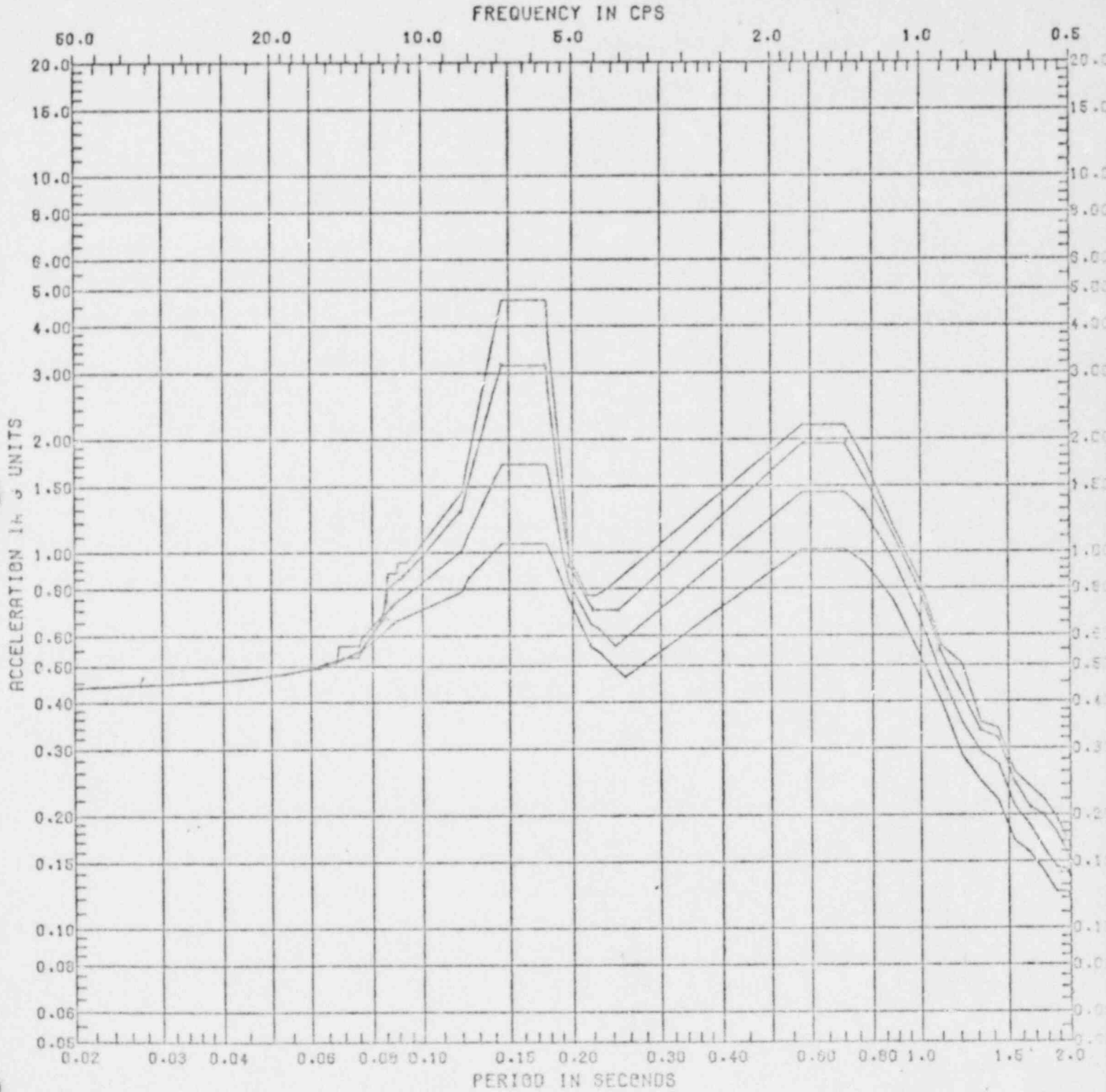
ELEVATION 565'-0"

LOCATION Biological Shield

REVISION NO. 0

28 JUL 76
8290EL

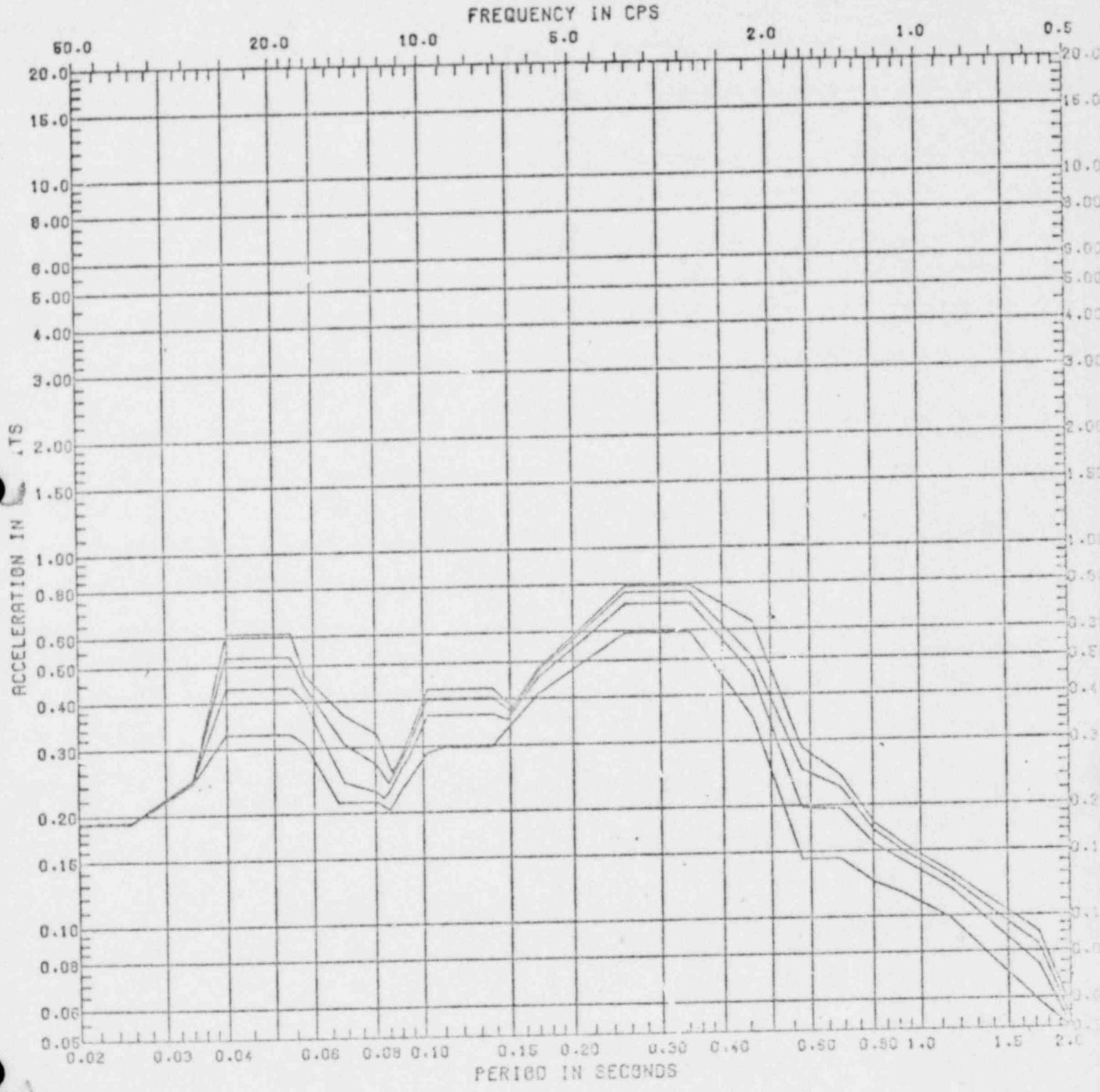
ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 23 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 105 OF 125



D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 18-D
ELEVATION 565'-0"
LOCATION Biological Shield REVISION NO. 0

12 JUL 76
309SKN

4130-15, ZIMMER RPV&PED VERTICAL OBE
DESIGNER S. NIKFARIAN CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT 14 Y-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 106 OF 125

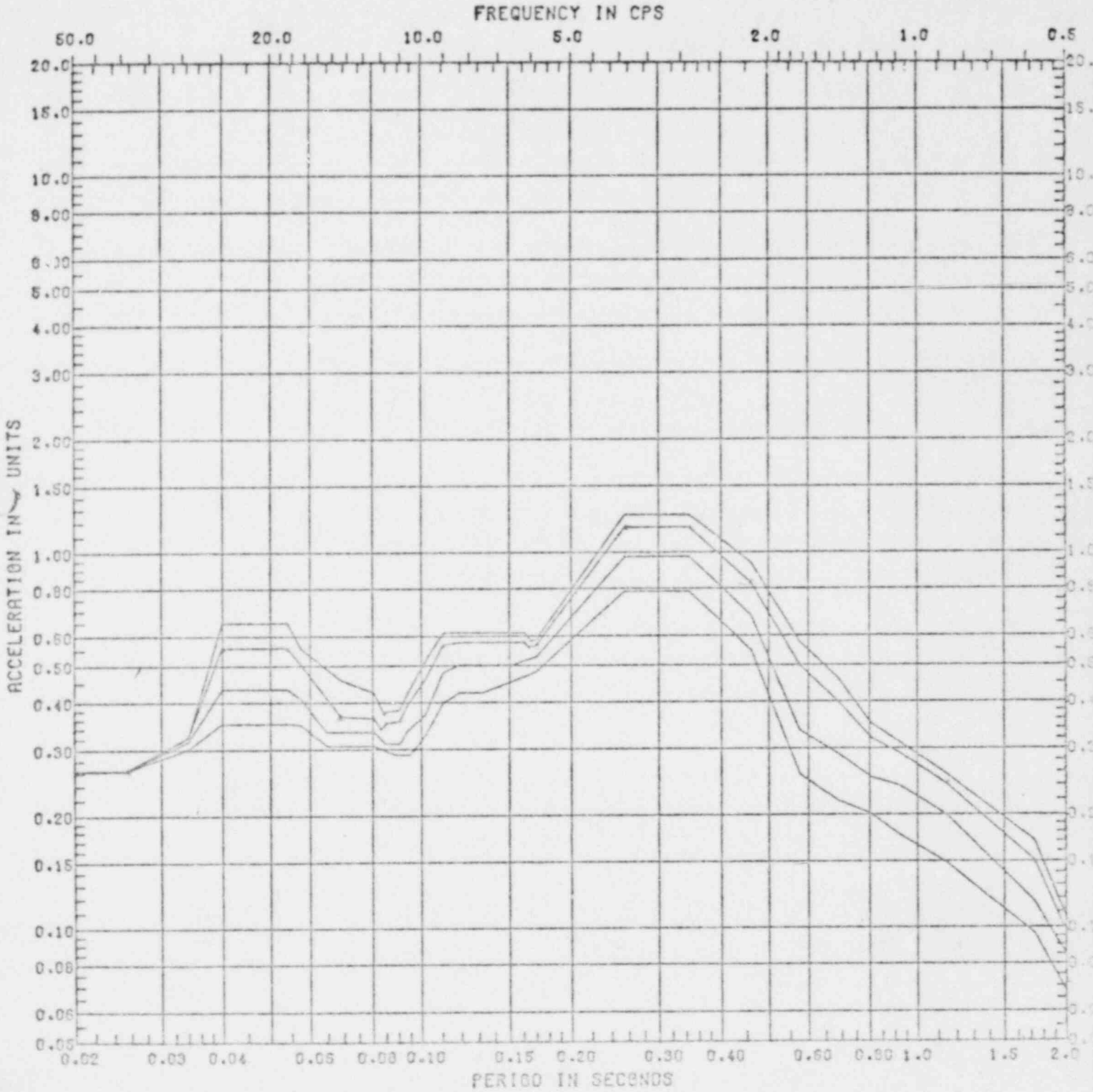


O.B.E. Vert. Response Spectra
ELEVATION 596'-6" & 565"-0"
LOCATION Biological Shield

SPECTRA NO. 18-E 19-E
REVISION NO. 0

05 AUG 76
7930EL

4130-15.ZIMMER.RPV-PED.SOILSTR.V.OBE
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB 14 Y-CORP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 107 OF 125



D.B.E. VERT RESPONSE SPECTRA
ELEVATION 596'-6" & 656'-0"
LOCATION Biological Shield

should be 505'

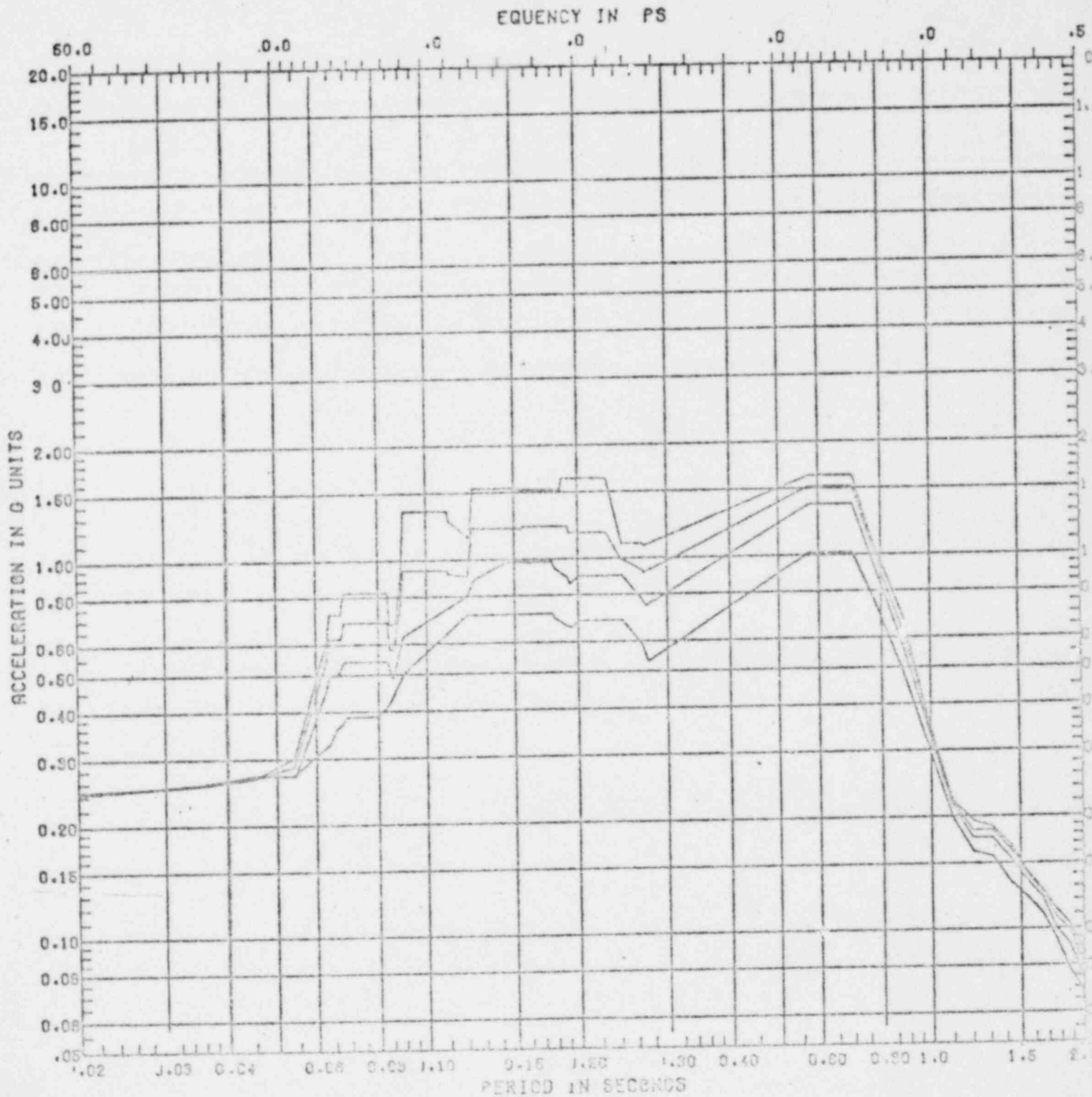
SPECTRA NO. 18-F, 19-F

REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

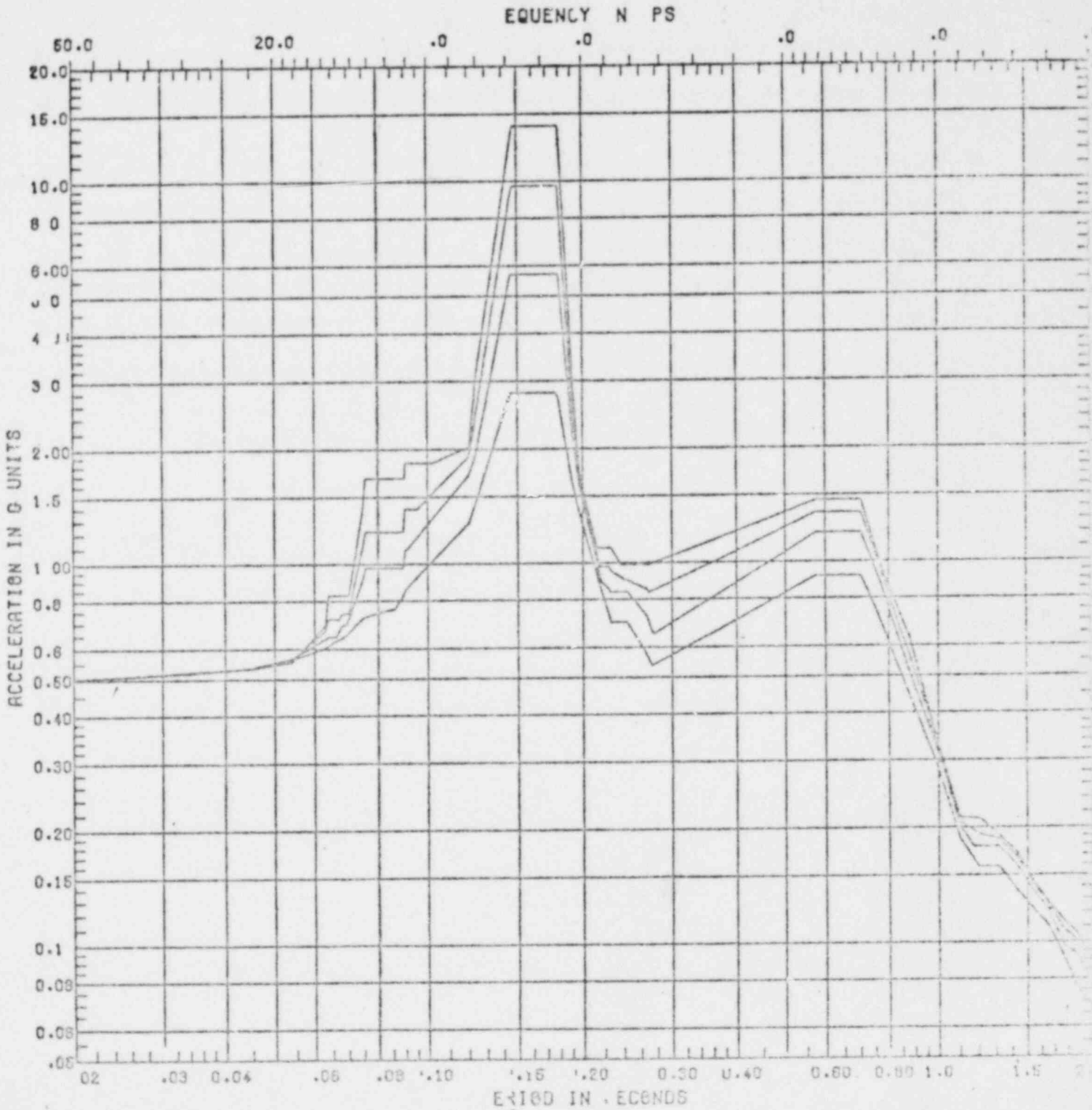
ZIMMERI SOIL-STRUCT.HOR.OBE.SLAB 55X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING .005 0.010 .020 0.050
PAGE 108 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 20-A
ELEVATION 615'-3"
LOCATION R.P.V. REVISION NO. 0

14 JUL 76
SL 180

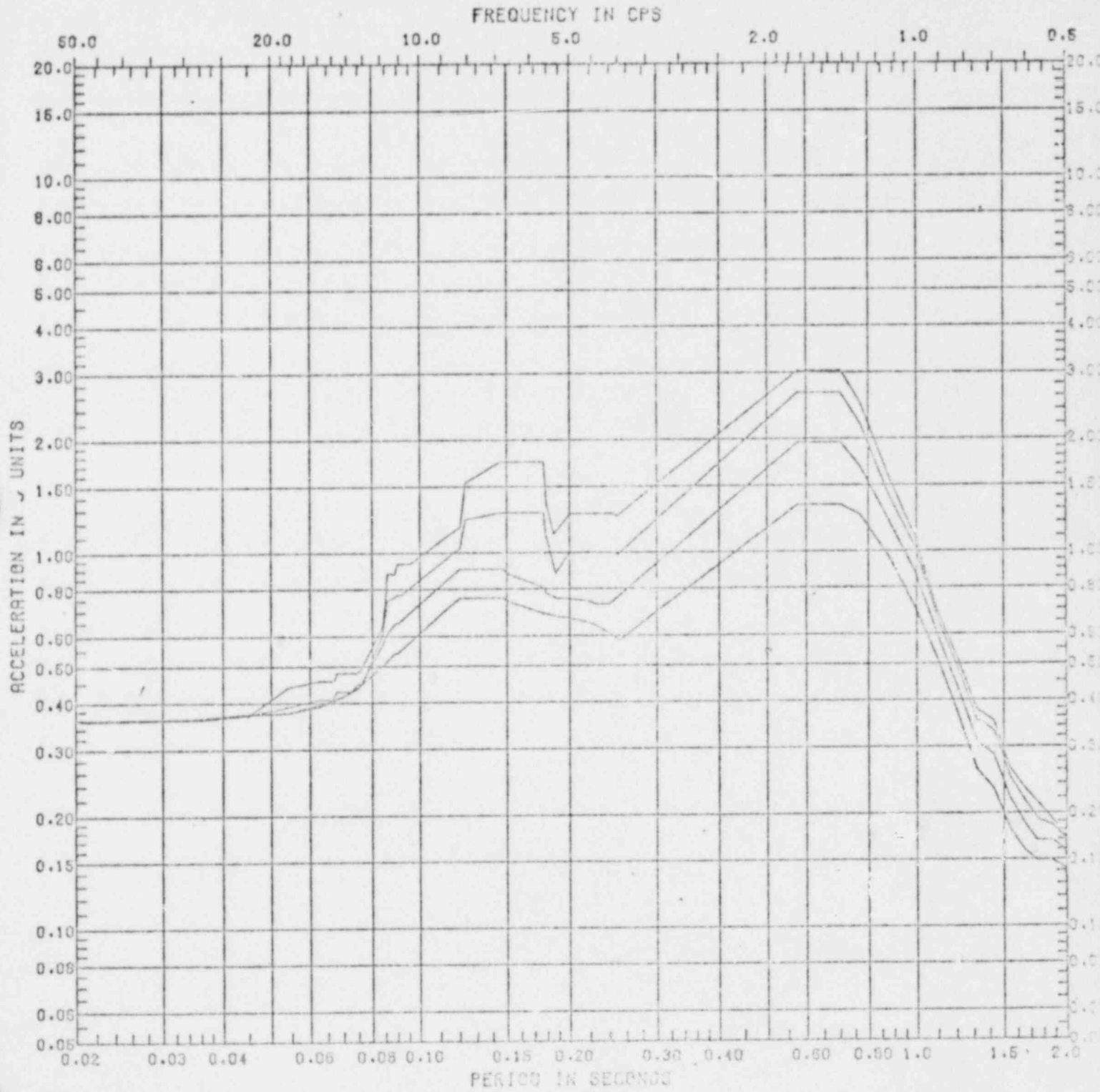
ZIMMERI SOIL-STRUCT.HOR.CBF.SLAB 55'
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPIN 0.005 0.010 0.020 0.050
PAGE 109 OF 125



O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 20-B
ELEVATION 615'-3"
LOCATION R.P.V. REVISION NO. 0

28 JUL 76
8290EL

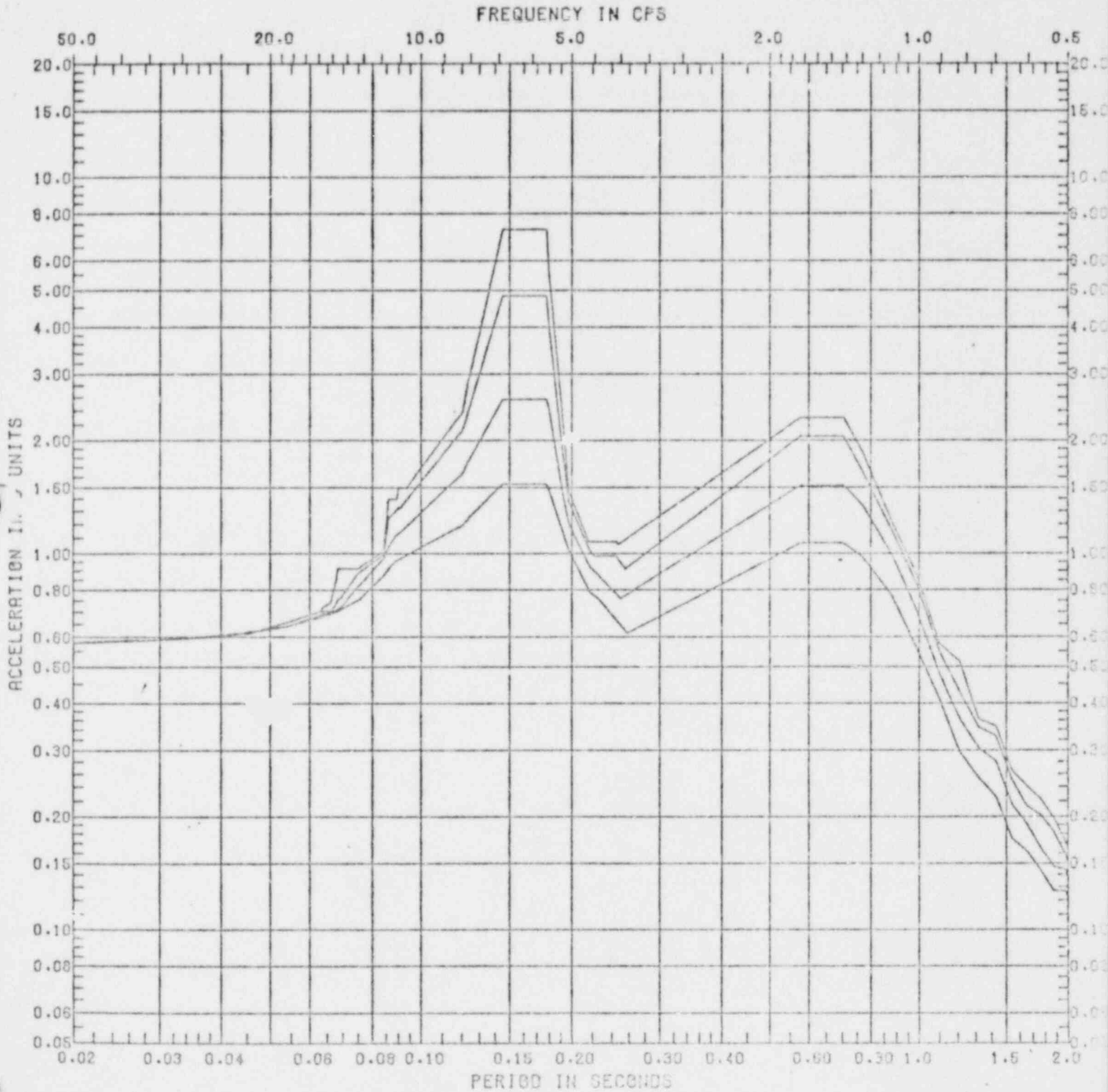
ZIMMER, 413015, SOIL-STRUCT. HORIZ. DBE
DESIGNER O.E. Lev CHECKER R.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 55 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 110 OF 125



D.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 20-C
ELEVATION 615'-3"
LOCATION R.P.V. REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, 821L-STRUCT, HORIZ, DBE
DESIGNER O.E. Day CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 55 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 111 OF 125

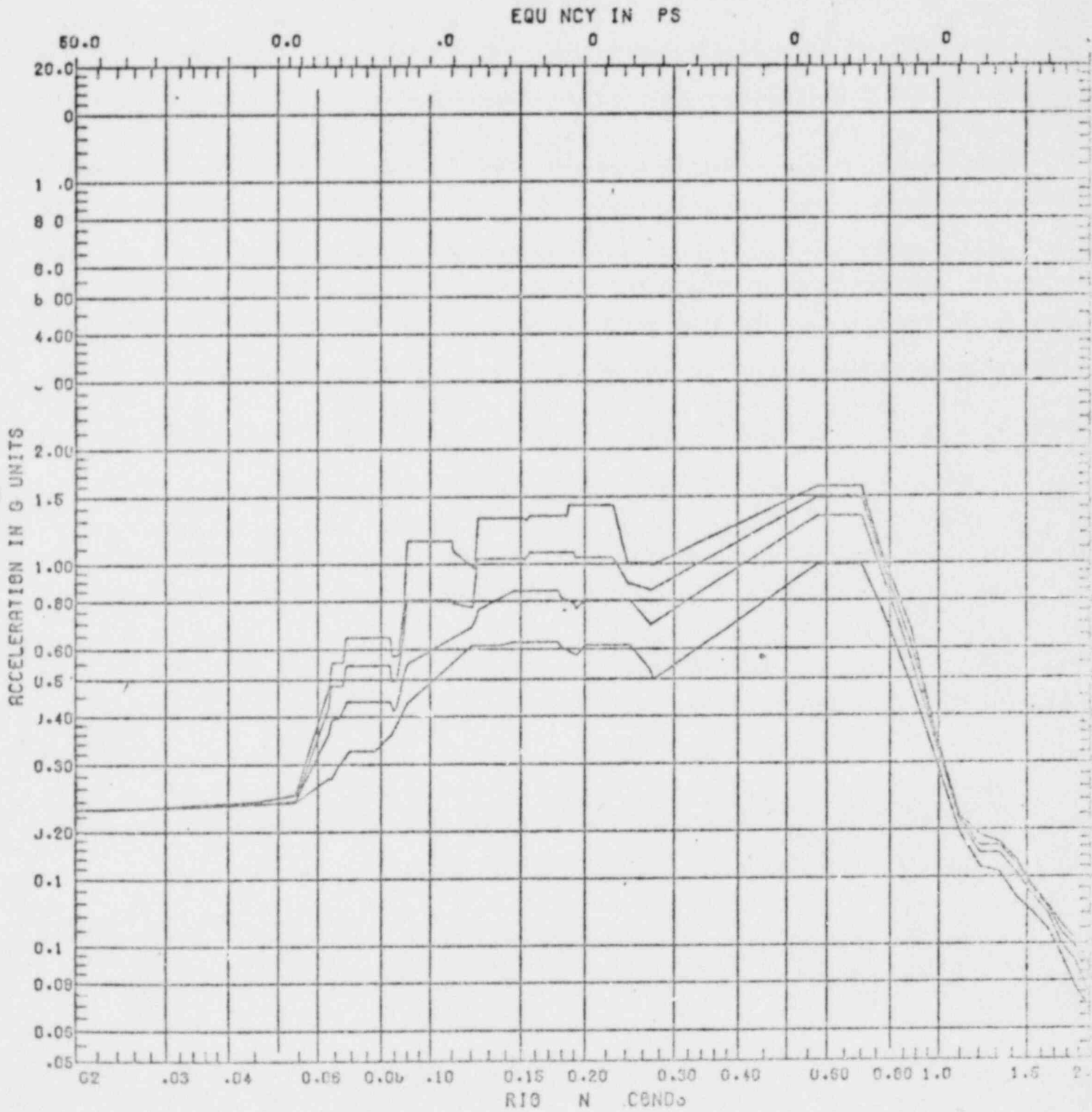


D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 20-D
ELEVATION 615'-3"
LOCATION R.P.V. REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

ZIMMER 501 -STRUCT.HOR.OBE.SLAB BOX
DESIGNER O.E. LEVINSKY B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING .005 .010 0.020 0.050
PAGE 112 of 125



O.B.E. Horiz. Response Spectra N-S Component
ELEVATION 596'-10"
LOCATION R.P.V.

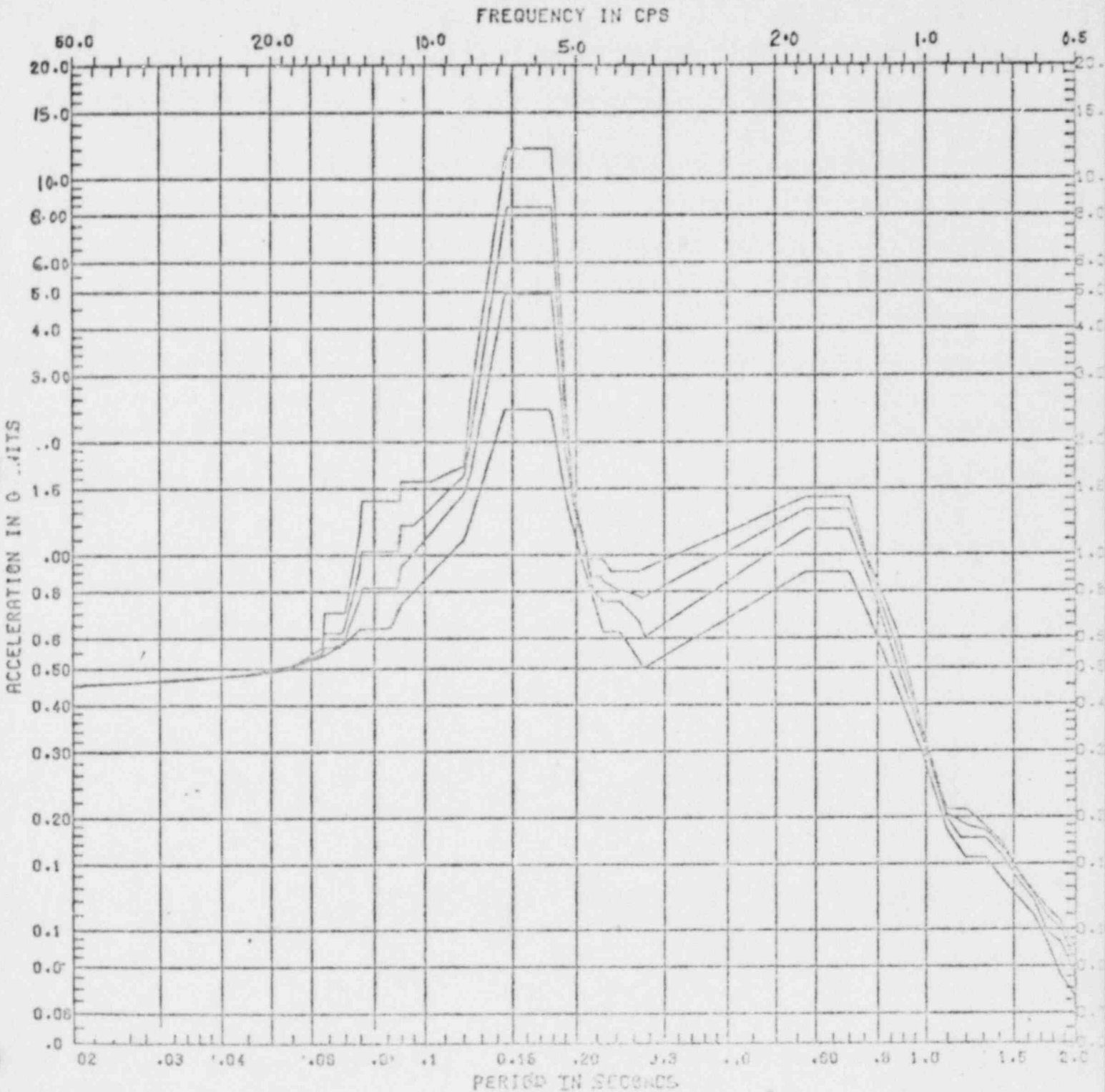
SPECTRA NO. 21-A

REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

ZIMMERI SOIL-STRUCT.HOR.GBE.SLAB 60Y
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA FT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 113 OF 125



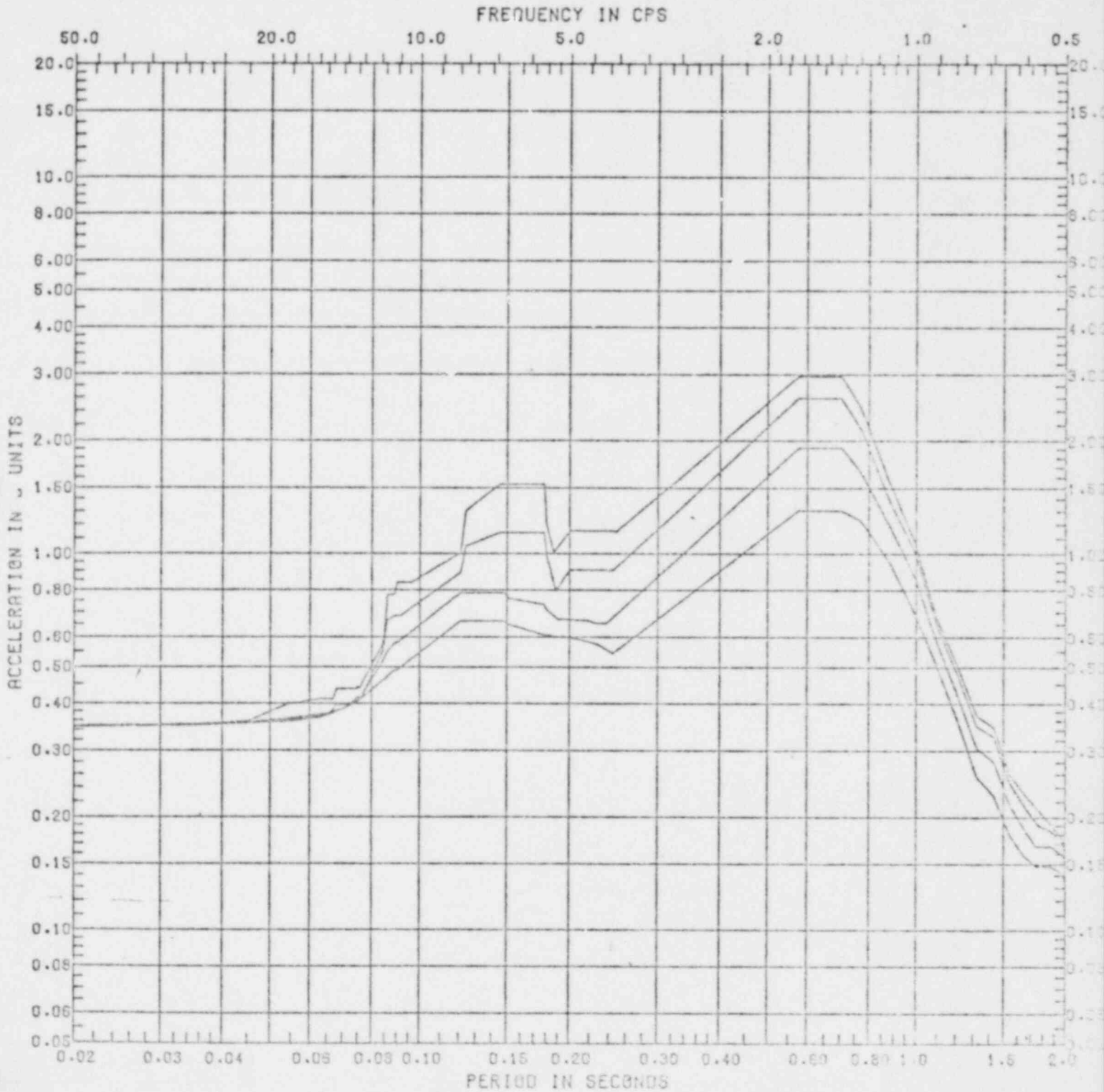
O.B.E. Horiz. Response Spectra E-W Component
ELEVATION 596'-10"
LOCATION R.P.V.

SPECTRA NO. 21-B

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT. HORIZ. DBC
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 60 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 114 OF 125



D.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 21-C

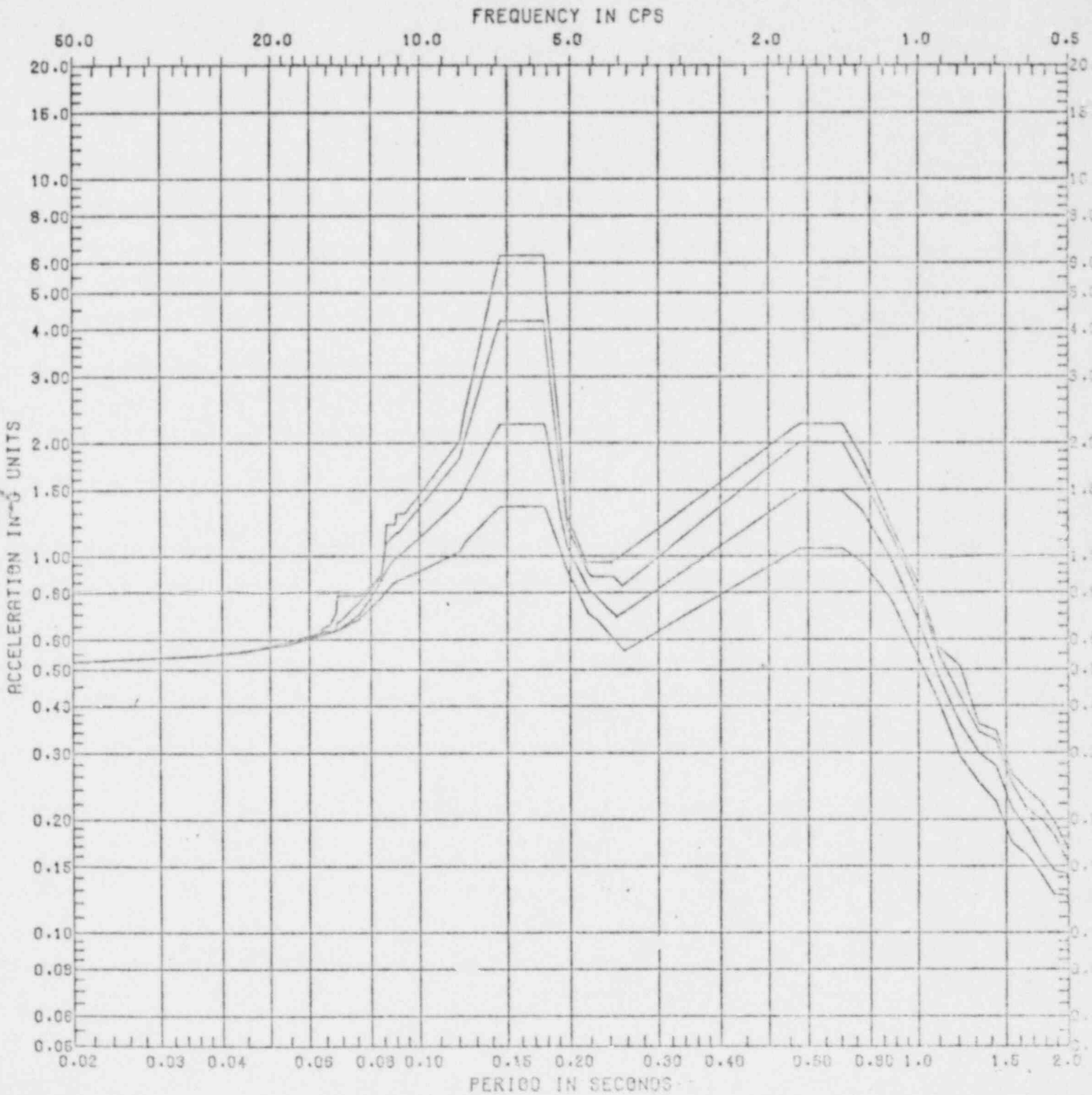
ELEVATION 596'-10"

LOCATION R.P.V.

REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT. HORIZ. DBE
DESIGNER O.E. NEW CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 80 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 115 OF 125

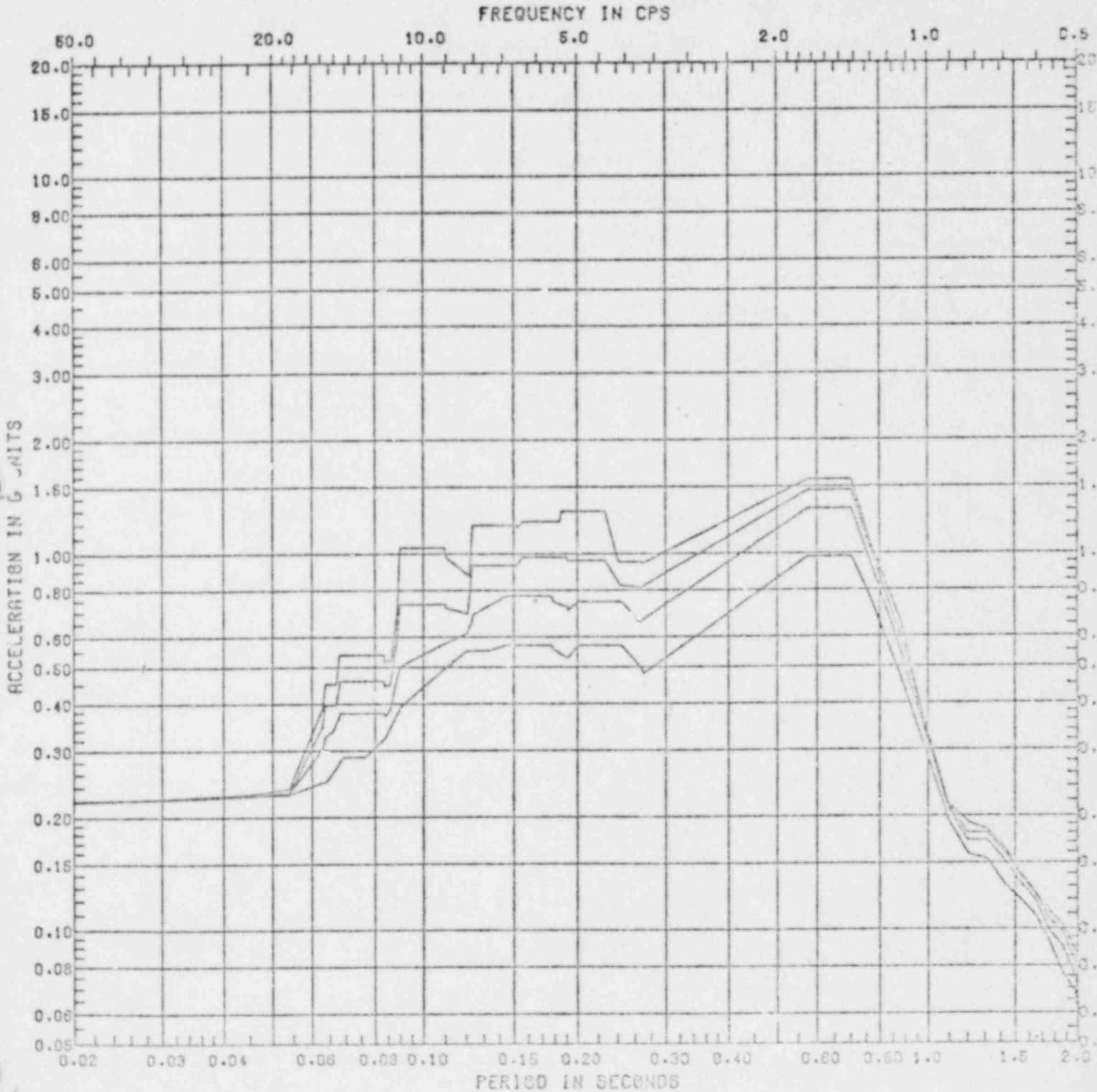


D.B.E. Horiz. Response Spectra E-W Component
ELEVATION 596'-10"
LOCATION R.P.V.

SPECTRA NO. 21-D
REVISION NO. 0

14 JUL 76
SL180

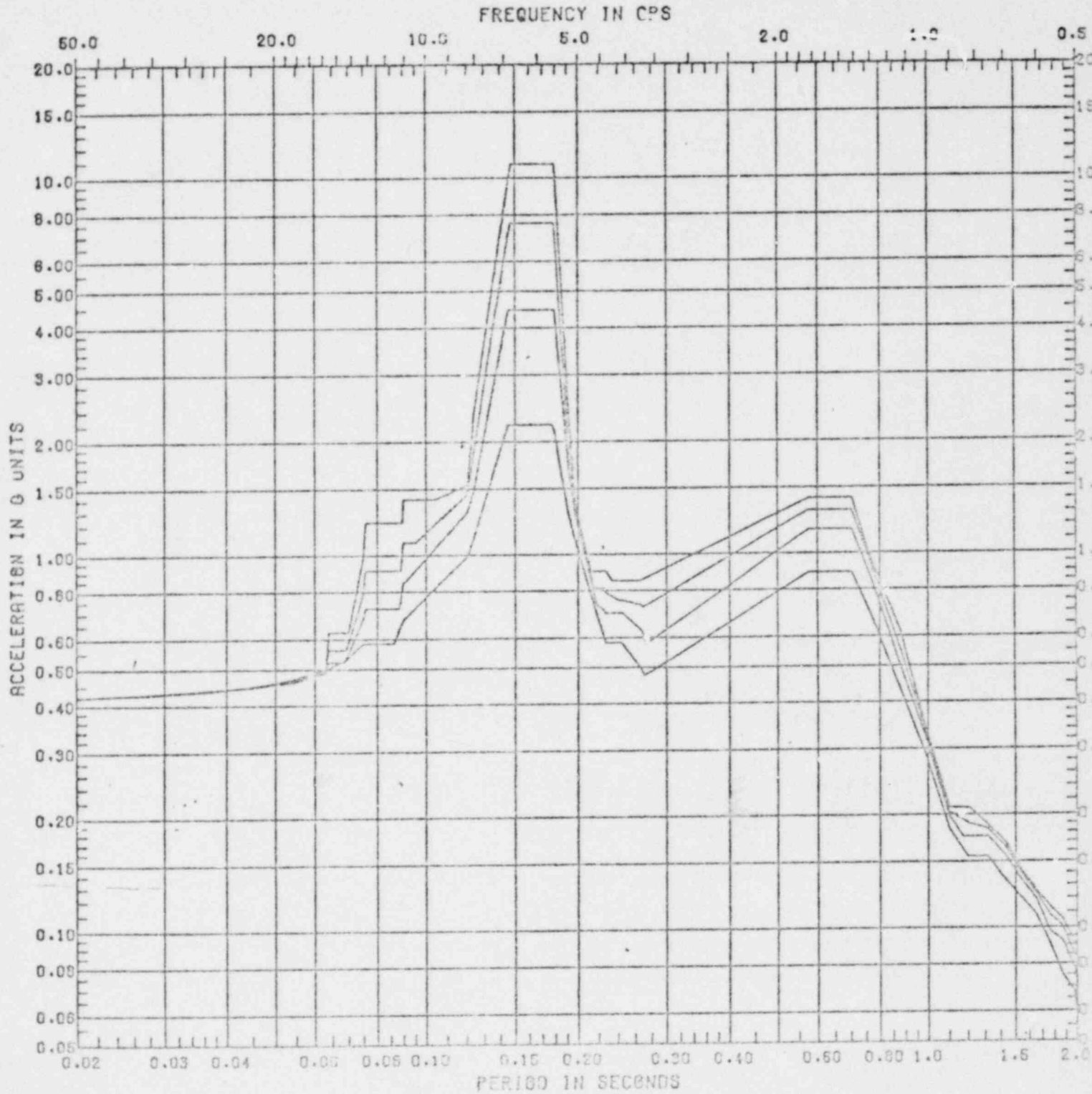
ZIMMERI SOIL-STRUCT.HOR.OBE.SLAB 63X
DESIGNER O.E. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 116 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 22-A
ELEVATION 564'-0 1/2" & 582'-6"
LOCATION R.P.V. REVISION NO. 0

14 JUL 76
SL180

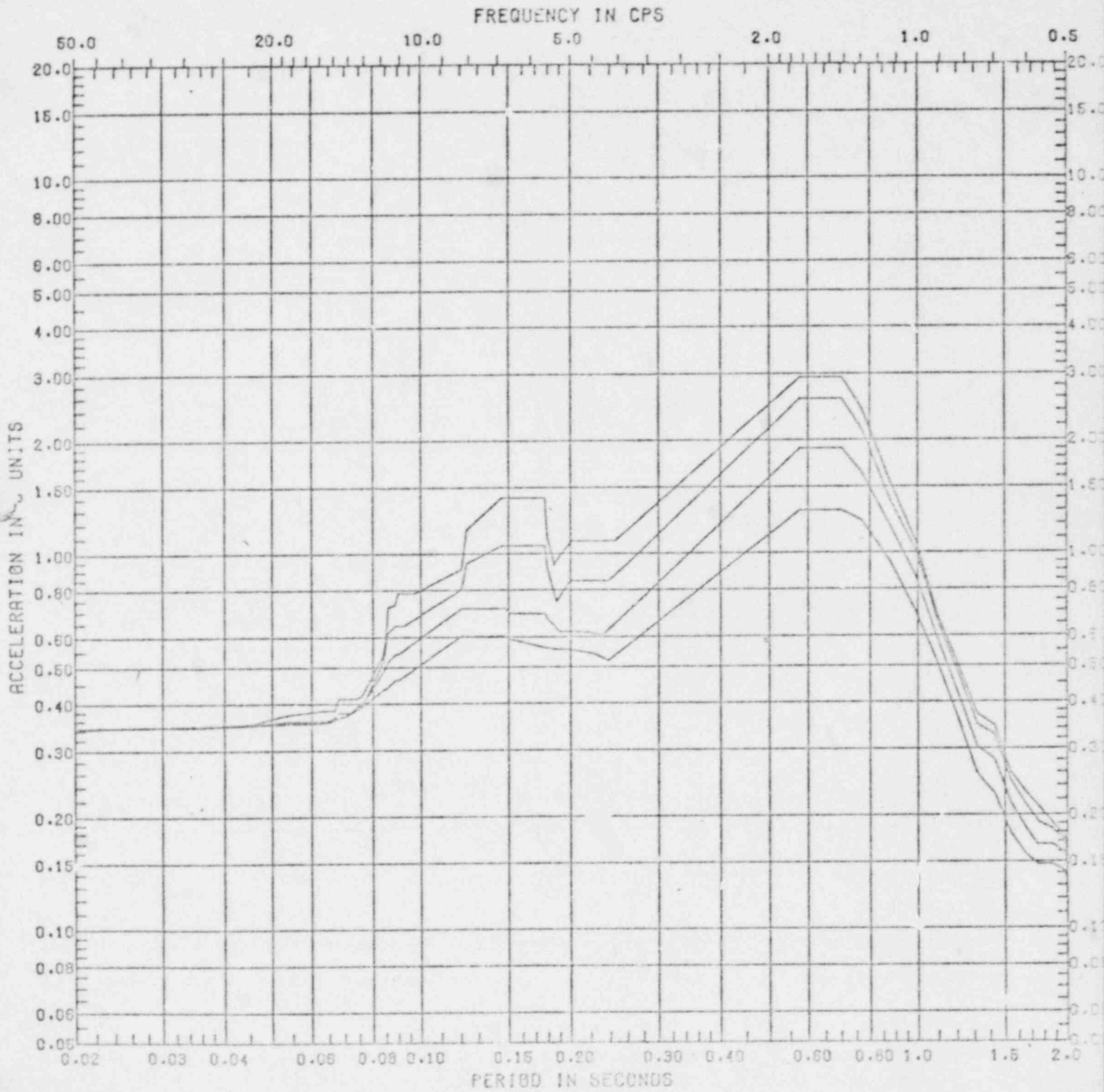
ZIMMER1 SOIL-STRUCT.HOR.OBE.SLAB 63Y
DESIGNER O.F. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 117 OF 125



O.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 22-B
ELEVATION 584'-0 1/2", 582'-6"
LOCATION R.P.V. REVISION NO. 0

28 JUL 76
8290EL

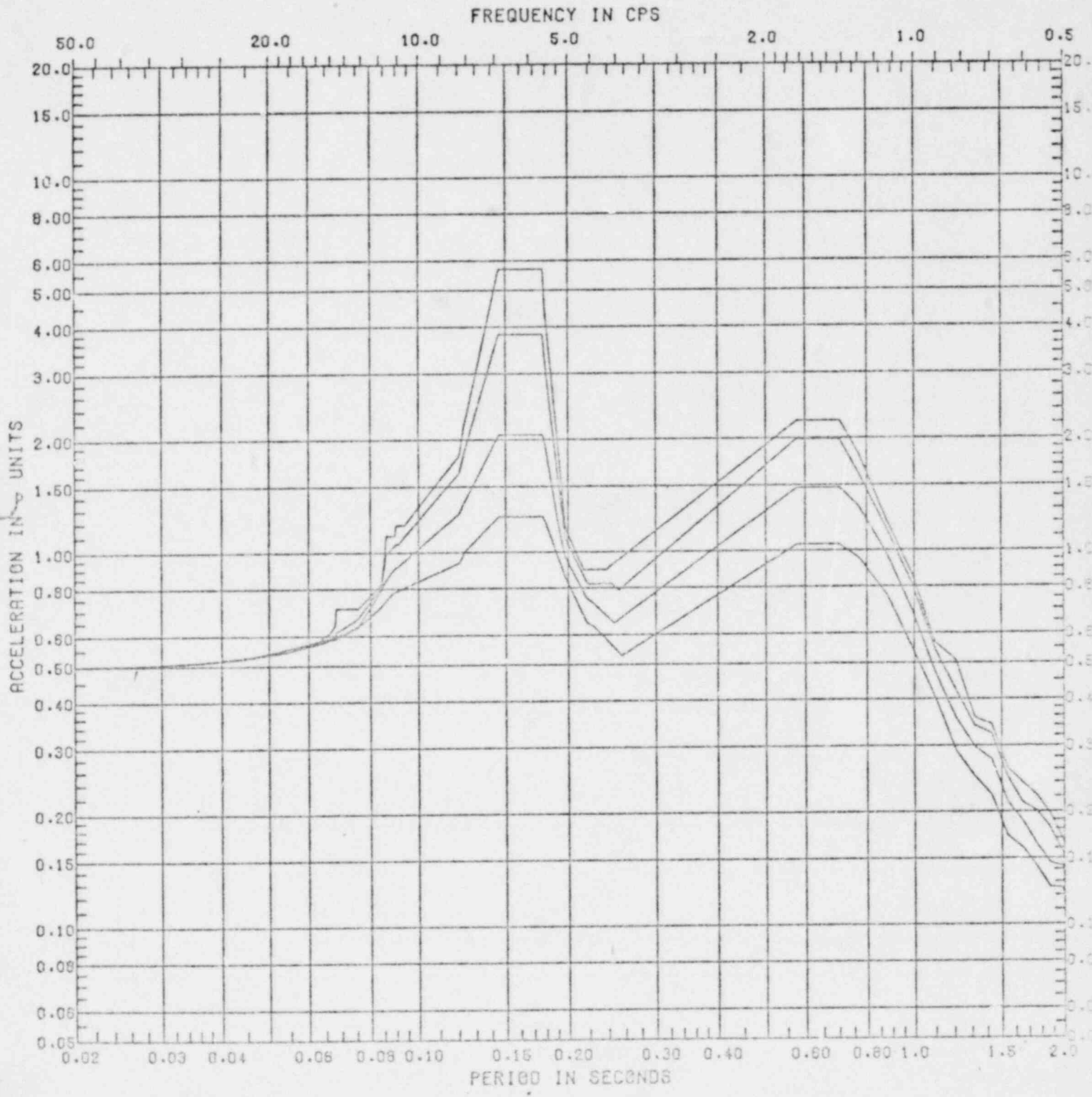
ZIMMER, 413015, SOIL-STRUCT, HORIZ, DSE
DESIGNER O.D. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 63 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 118 OF 125



D.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 22-C
ELEVATION 584'-0 1/2" & 582'-6"
LOCATION R.P.V. REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, 0BE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 63 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 119 OF 125

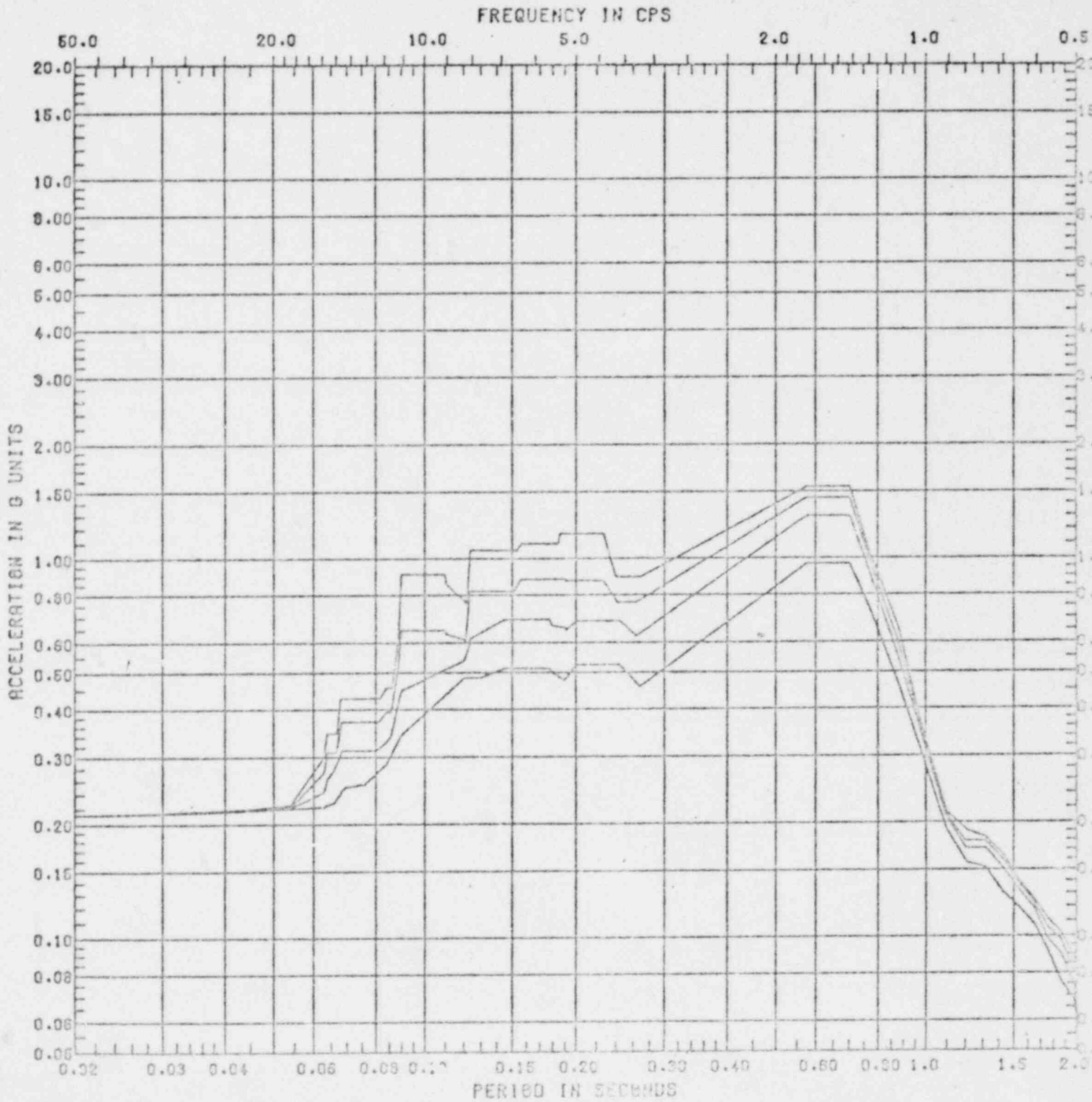


D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 22-D
ELEVATION 584'-0 1/2" & 582'-6"
LOCATION R.P.V. REVISION NO. 0

SARGENT & LUNDY
ENGINEERS

14 JUL 76
SL180

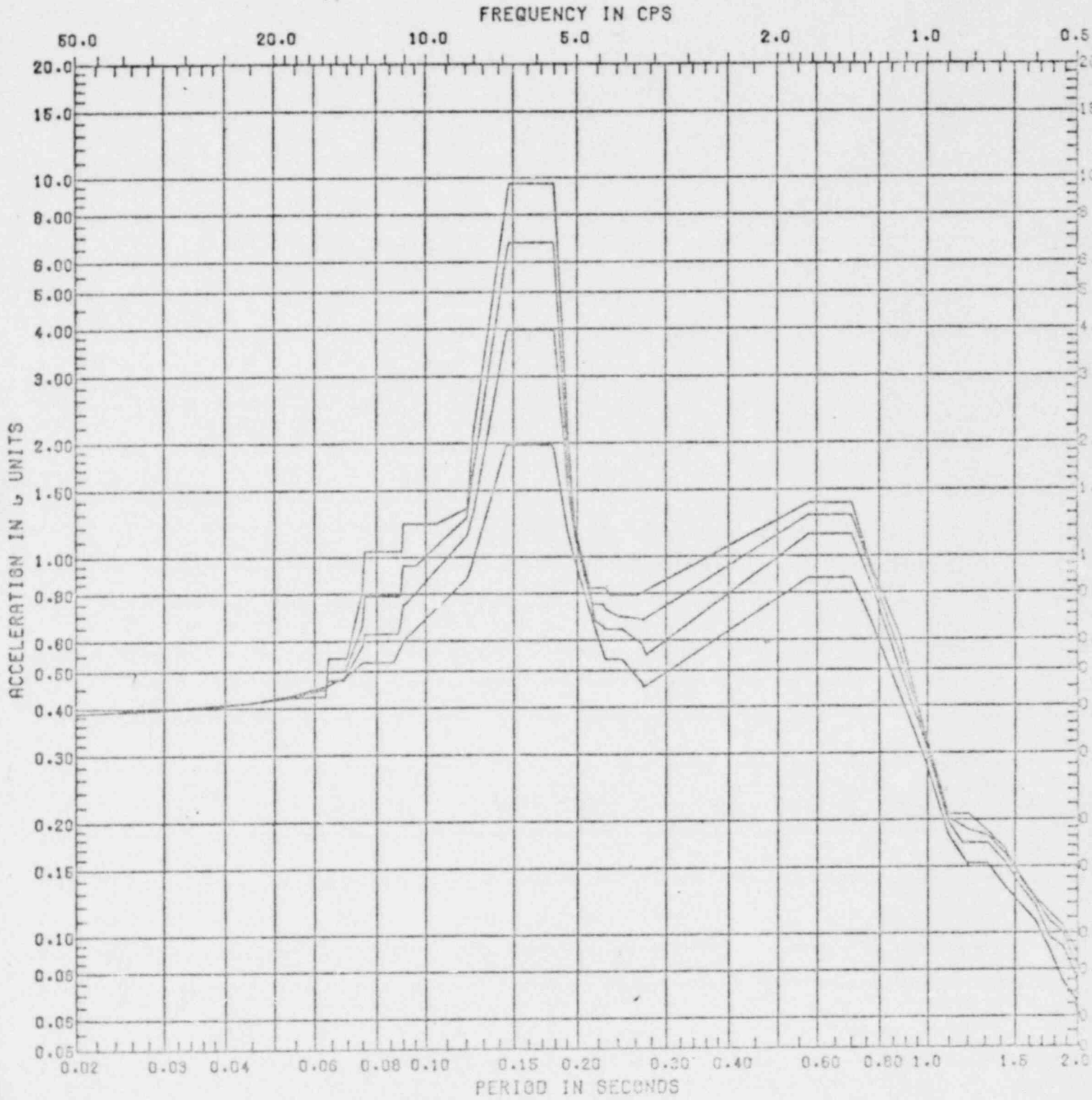
ZIMMER1 SOIL-STRUCT.HOR.OBE.SLAB 66X
DESIGNER O.F. Lev CHECKER B. P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 120 OF 125



O.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 23-A
ELEVATION 574'-1 3/4"
LOCATION R.P.V. REVISION NO. 0

15 JUL 76
104WTL

ZIMMER: SOIL-STRUCT, HOR, OBE, SLAB 66Y
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.005 0.010 0.020 0.050
PAGE 121 OF 125



O.P.E. Horz. Response Spectra E-W Component SPECTRA NO. 23-B

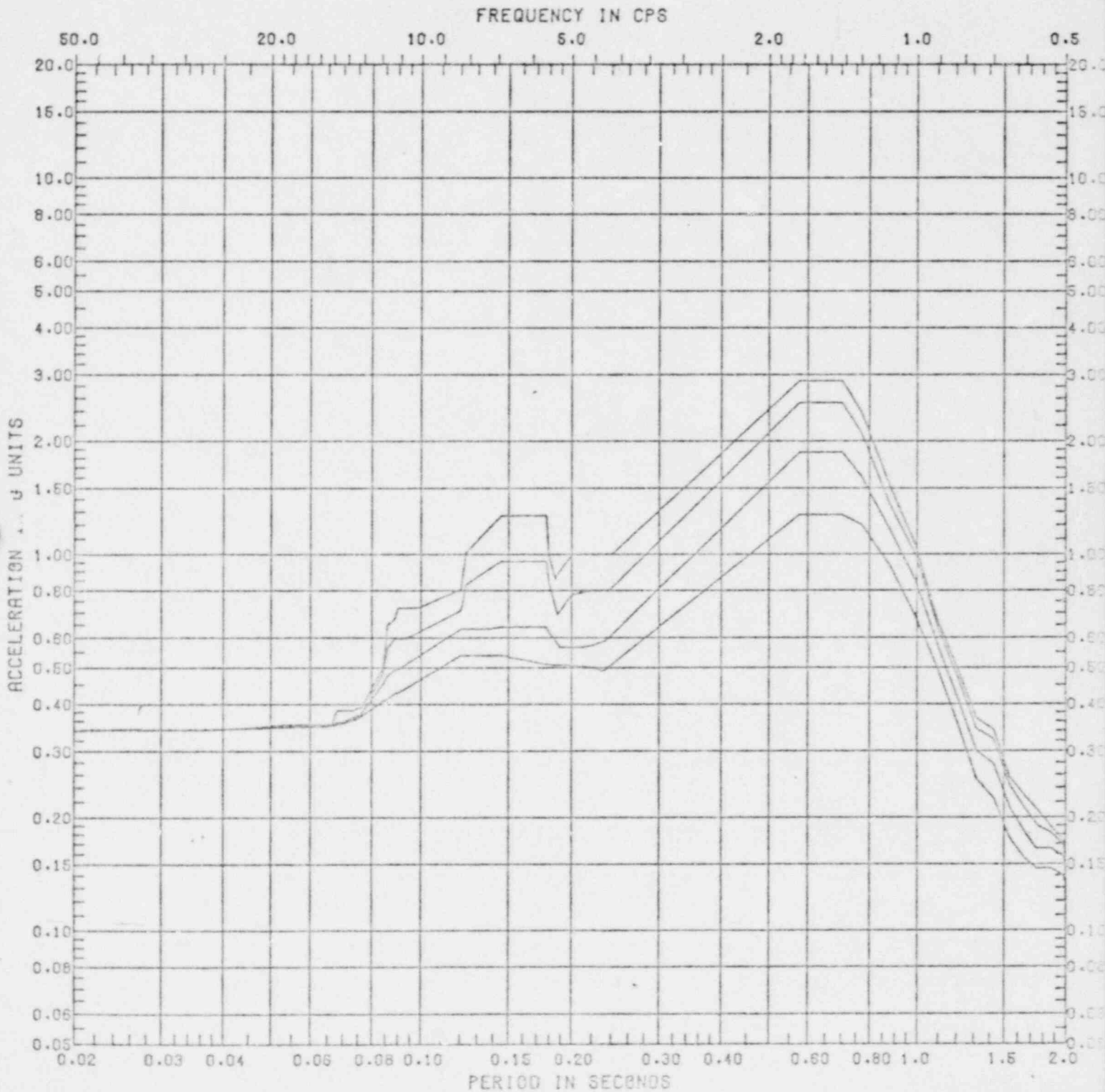
ELEVATION 574'-1 3/4"

LOCATION RPV

REVISION NO. 0

28 JUL 76
8290EL

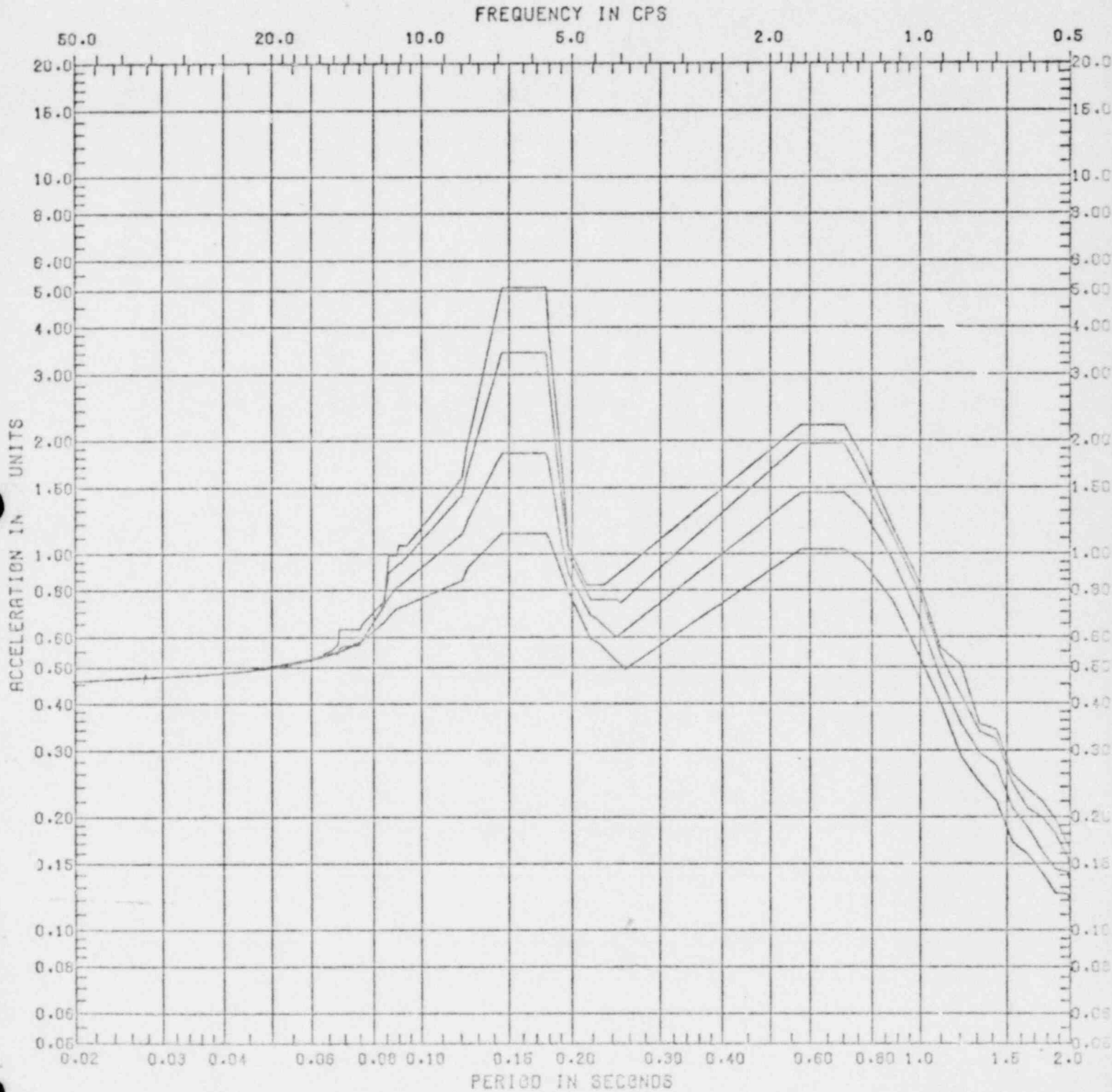
ZIMMER, 413015, SOIL-STRUCT. HORIZ. DSE
DESIGNER O.E. Lev CHECKER D.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 66 X-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 122 OF 125



D.B.E. Horiz. Response Spectra N-S Component SPECTRA NO. 23-C
ELEVATION 574'-1 3/4"
LOCATION R.P.V. REVISION NO. 0

28 JUL 76
8290EL

ZIMMER, 413015, SOIL-STRUCT, HORIZ, DBE
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 66 Y-COMP
PEAKS WIDENED BY 10% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 123 OF 125

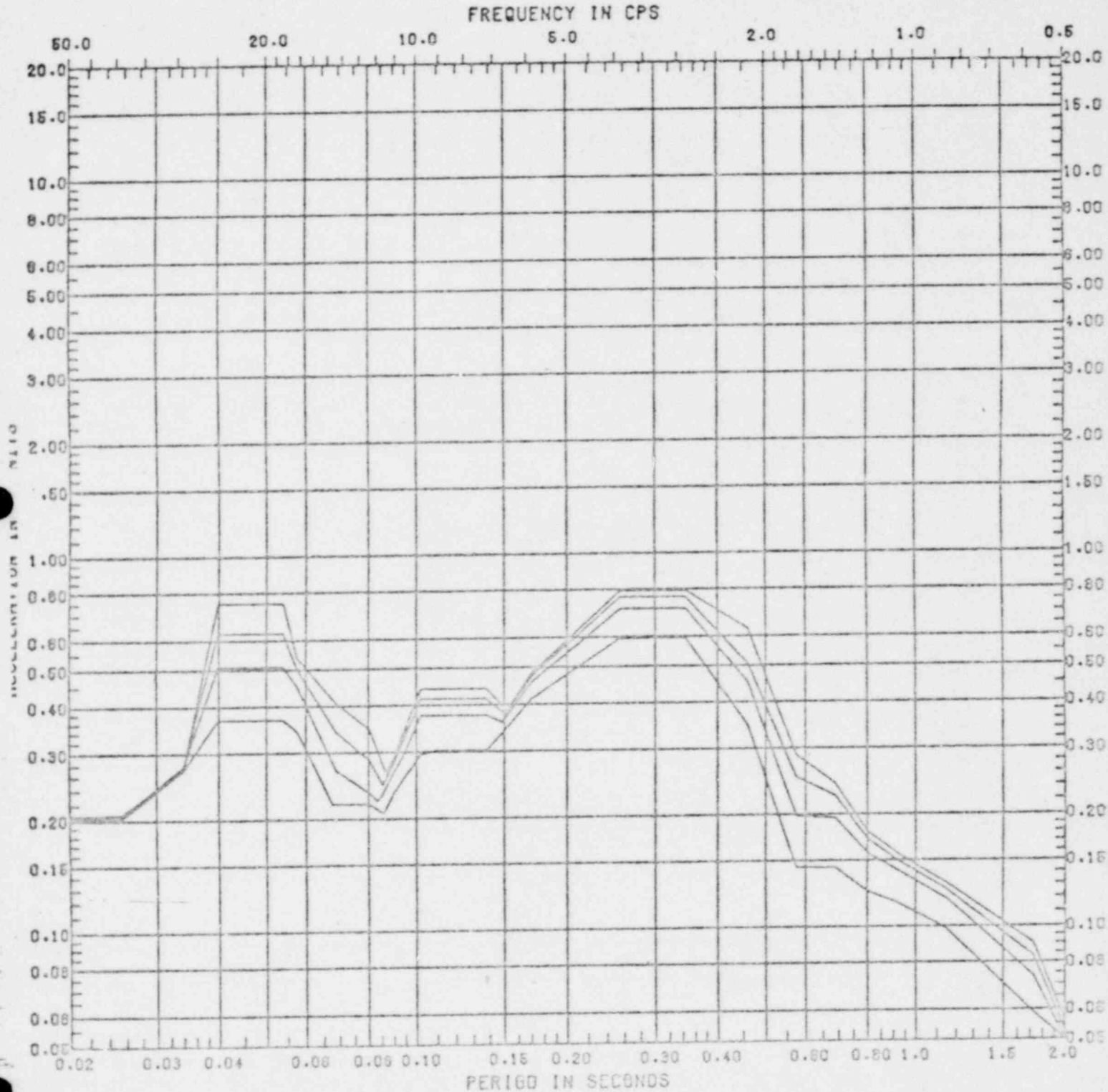


D.B.E. Horiz. Response Spectra E-W Component SPECTRA NO. 23-D
ELEVATION 574'- 1 3/4"
LOCATION R.P.V. REVISION NO. 0

12 JUL 76

309SKN

4130-15. ZIMMER RPV&PED VERTICAL OBE
 DESIGNER ~~S. N. SINGH~~ CHECKER B. P. Jain 5
 DESIGN SPECTRA AT JOINT 28 Y-COMP
 PEAKS WIDENED BY 15% ON EACH SIDE
 DAMPING 0.005 0.010 0.020 0.050
 PAGE 124 OF 125



O.B.E. Vert. Response Spectra

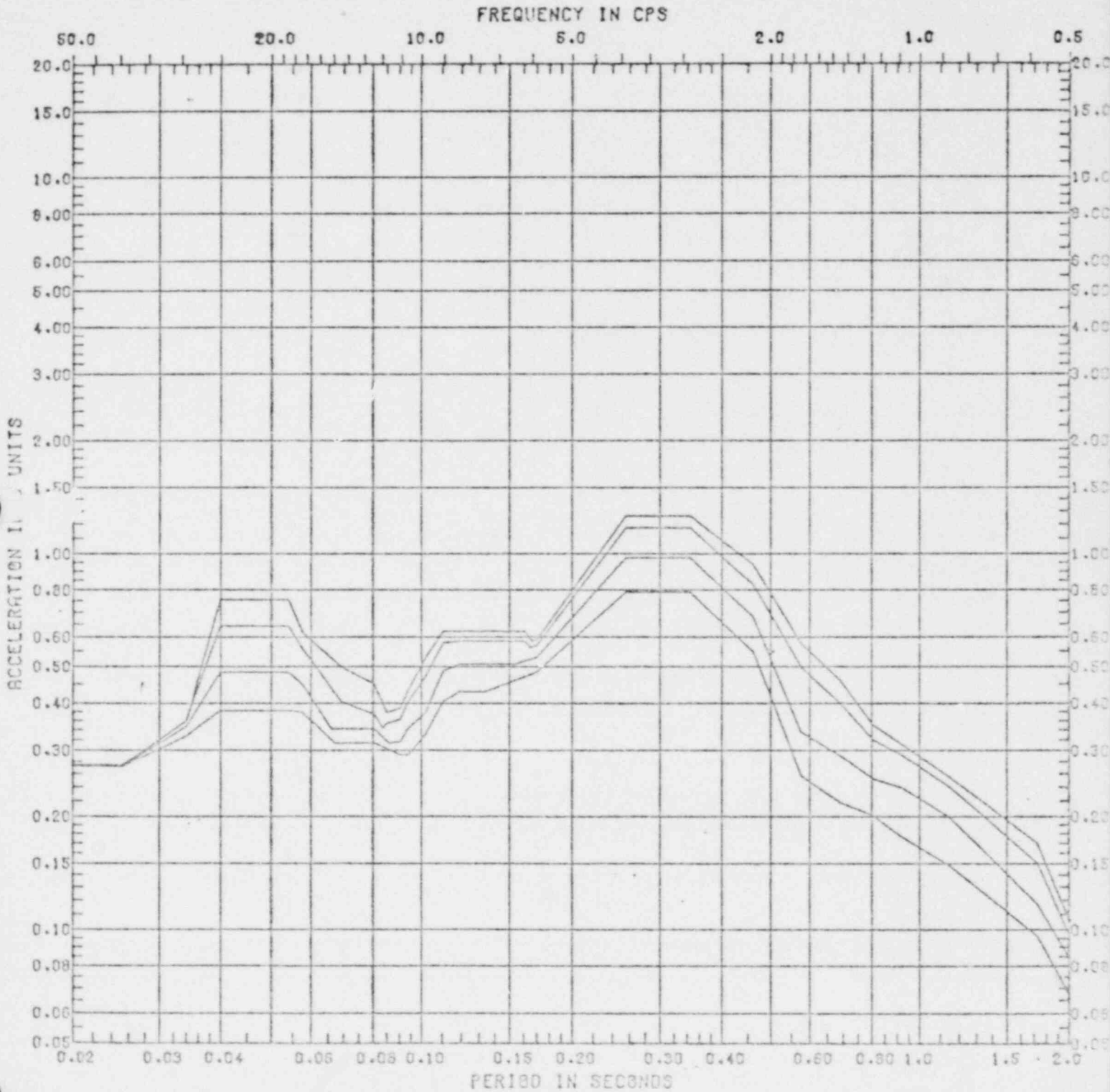
ELEVATION 615'-3", 596'-10"
 LOCATION 584'-0 1/2" & 582'-6",
 R.P.V. 574'-1 3/4"

SPECTRA NO. 20-E, 21-E,
 22-E, 23-E

REVISION NO. 0

05 AUG 76
7930EL

4130-15.ZIMMER.RPV-PED.SAILSTR.V.08E
DESIGNER O.E. Lev CHECKER B.P. Jain
DESIGN SPECTRA AT JOINT/SLAB 28 Y-COMP
PEAKS WIDENED BY 15% ON EACH SIDE
DAMPING 0.010 0.020 0.050 0.100
PAGE 125 OF 125



D.B.E. VERT RESPONSE SPECTRA

ELEVATION 15'-3", 596'-10"
LOCATIONS 584'-0 1/2", 582'-6" &
R.P.V. 574'-1 3/4"

SPECTRA NO. 20-F, 21-F,
22-F, 23-F

REVISION NO. 0

Calc No.: EMD-024252

Date : July 8, 1980

Revision: 0

Safety-Related

REACTOR BUILDING
T-QUENCHER POOL DYNAMIC SPECTRA GENERATION
for EQUIPMENT ASSESSMENT DUE TO SRV
ACTUATIONS IN VARIOUS LOAD COMBINATIONS

The Cincinnati Gas & Electric Company

Wm. H. Zimmer Station Unit 1

Project: 4130-15

Prepared by: Bruce M Lory Date: 7/8/80

Reviewed by: Jon Papadopoulos Date: 7-8-80

Approved by: V. Hassaballe Date: 7-8-80

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Reactor Building T-Quencher Response Spectra Index

T-Quencher Pool Dynamic Load Combination Response Spectra .

Telephone Memorandums

Microfiche 1 COM

INTRODUCTION:

The purpose of this report is to document the generation of the T-Quencher Pool Dynamic SRV/LOCA Load Combination Response Spectra required within EMD division for usage in the process of equipment qualification. As agreed upon via an adaptation of the specifications in EMD File #021339; 1/30/80, the T- Quencher spectra combinations have now been limited to five with the omission of the $C_{\emptyset_{2-7Hz}}$ (Condensation Oscillation) load. These five combinations are intended to satisfy existing NRC regulations while also satisfying Sargent & Lundy SRV/LOCA seismic load design criteria. The T-Quencher combinations have been abbreviated C_1 thru C_5 to specify the exact type of combinations that exist on any one graph.

PROCEDURE:

The process of producing the T-Quencher spectra involved four steps in general. A few excpetions needed to be considered before the final curve combinations could be performed.

The first step involved the coding of the Soil-Structure Interaction spectra of the Operating Basis Earthquake (\emptyset BE) type at 2% damping for both Reactor Building and Containment Building, and also 1% damping for the Containment Building. All other required SSI spectra were previously coded by EMD division for prior T-Quencher curve combinations.

Secondly, the SRV/LOCA seismic response spectra, supplied by SDD division, that were required for the final combinations had to be selected. This resulted in the selection and usage of five SDD response spectra. A list of the SDD response spectra utilized is supplied with their corresponding filenames.

The latest revision to the SRV/LOCA response spectra has incorporated spectra supplied by General Electric Company. The G.E. spectra are intended for use at the supplied locations within the Containment Building at the RPV locations. Subsequently the G.E. spectra shall not be used for any of the Reactor Building T-Quencher curve combinations.

Also the latest revision to the Annulus Pressurization (AP) spectra have individual curves for only Containment Building locations, only in the horizontal direction. Thus, the final T-Quencher curve combination, $C_5 = (SSE)^2 + (AP)^2$, is not considered for Reactor Building locations.

The third step involved the insertion of data points into the enveloped spectra combinations. These points are intersection points between two curves, having been considered to be significant in the envelope of the two spectra. At present, EMD divisions envelope program (ENV22615504D) does not account for these intersection points. In order to achieve a true set of enveloped spectra, the individual curves were first overlapped on the graph and then the intersection selected. The enveloped spectra are then put on file with the UNIVAC 1100.

A few instances existed where deviations occurred from the general procedure. The first instance involved the establishing of final curve combinations for 1% and 2% damping at elevation 475'-6". No spectra had been provided for the SSI vertical wall location. Thus, the vertical slab SSI curve at 475'-6" was used twice, once in place of the aforementioned missing curve (telephone memo 1/30/80).

The second instance involved the absence of horizontal chugging spectra for elevation 570'-6" at 2% damping. As per telephone memo on 6/13/80, the 1% damping spectra was utilized for the 2% T-Quencher curve combinations instead of the 2% spectra, simply because no 2% damping spectra existed on file with the computer.

The fourth step consisted of generating the final T-Quencher curve combinations and putting all output data on disk file with the UNIVAC 1100. At present the final combinations (labeled C_1 thru C_5) have been stored as these individual combinations. The curve combination C_1 is stored on file with a corresponding file name; ZIM-BML-REV1*TQ-SPECT-ØBE. The other four SSE T-Quencher combinations are called up from the computer by the file name; ZIM-BML-REV1*TQ-SPECT-SSE. Each individual combination (EW, NS, VW or VS direction) at one particular elevation is denoted by the file elements as follows:

475-6/NS = T-Quencher Curve C_1 at 475'-6", North-South direction

475-6/VW = T-Quencher Curve C_1 at 475'-6", Vertical Wall direction

475-6/VS = T-Quencher Curve C_1 at 475'-6", Vertical Slab direction

475-6/NS2 = T-Quencher Curve C_2 at 475'-6", North-South direction
475-6/EW3 = T-Quencher Curve C_3 at 475'-6", East-West direction
525-7/VW4 = T-Quencher Curve C_4 at 525'-7" Vertical Wall direction

The final T-Quencher Pool Dynamic Response Spectra combinations are specified in this EMD File in the following pages of this report. It should be noted that the one OBE combination was generated at 1% damping while the other four SSE combinations were generated at 2% damping.

CONCLUSION:

Once all final T-Quencher spectra combinations had been performed, certain characteristics developed within the components of each major curve combination (C_1 , C_2 , C_3 or C_4). The enveloping of the Soil-Seismic Interaction spectra at 2% damping, upon examination, revealed the dominant behavior of the Emergency condition (SSE) spectra in the horizontal North-South direction from elevation 525'-7" on up to the 627'-9" level. The SSE spectra also enveloped their respective OBE spectra at elevation 475'-6" in all four modes. In almost all other cases the two SSE curves intersected and therefore, required the envelope of the two spectra.

The enveloping at 2% damping of SRV-ADS-TQ with SRV-ASY3-TQ (3 valve) yielded only four enveloped spectra to be stored on the UNIVAC 1100. These four enveloped spectra happen to be the horizontal and vertical slab directions at elevations 475'-6" and 503'-6".

The spectra saved for the envelope of 0.6xSRV-ALL(ADS)-TQ with SRV-ASY3-TQ (3 valve) amounted to eighteen individual file elements. The two lowest elevations in the Reactor Building accounted for eight of these enveloped spectra and for the other five elevations the vertical spectra accounted for the remaining ten enveloped spectra. It was also evident that only the SRV-ASY3-TQ horizontal spectra existed at these five elevations while the horizontal spectra for SRV-ADS-TQ was considered by SDD division to be insignificant in its acceleration "g" values.

These T-Quencher Pool Dynamic Load Combinations have incorporated the latest revisions of the selected SDD-supplied SRV/LOCA response spectra. This set of Reactor Building T-Quencher spectra are of revision 01 status and are safety-related in its content.

ZIMMER UNIT-1 4130-15
 PREPARED BY *George M. Fry* DATE *7/7/80*
 REVIEWED BY *J. J. Neufel* CALIBRATION DATE *7-7-80*
 CALC # *EMD-024252* PAGE *1* OF *52*
 RESPONSE SPECTRA
 UPSET CONDITION - *12* DAMPING
 OBE • ENVELOPE SRV ALL-TQ • SRV ALL-TQ

CALC NO. *EMD-024252*
 REV. *01* DATE *7/9/80*
 FILE NO. *4130-15*
 NO. *32* EMD # *024252*
 PAGE *32* OF *96*



PERIOD IN SECONDS
 H0-NS DF-1% ABSV(OBE+ENV..(SRV-ALL-TQ+SRV-RSY3-TQ)) ZIM REACTOR BLDG. 475'-6"
 K&E NEUFEL & ESSER CO. LEVEL 20, USA. FILE # 4130-15-32

Run 10:304 BML 07/07/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Gray DATE: 7/7/80

REVIEWED BY: J. S. [unclear] DATE: 7-7-80

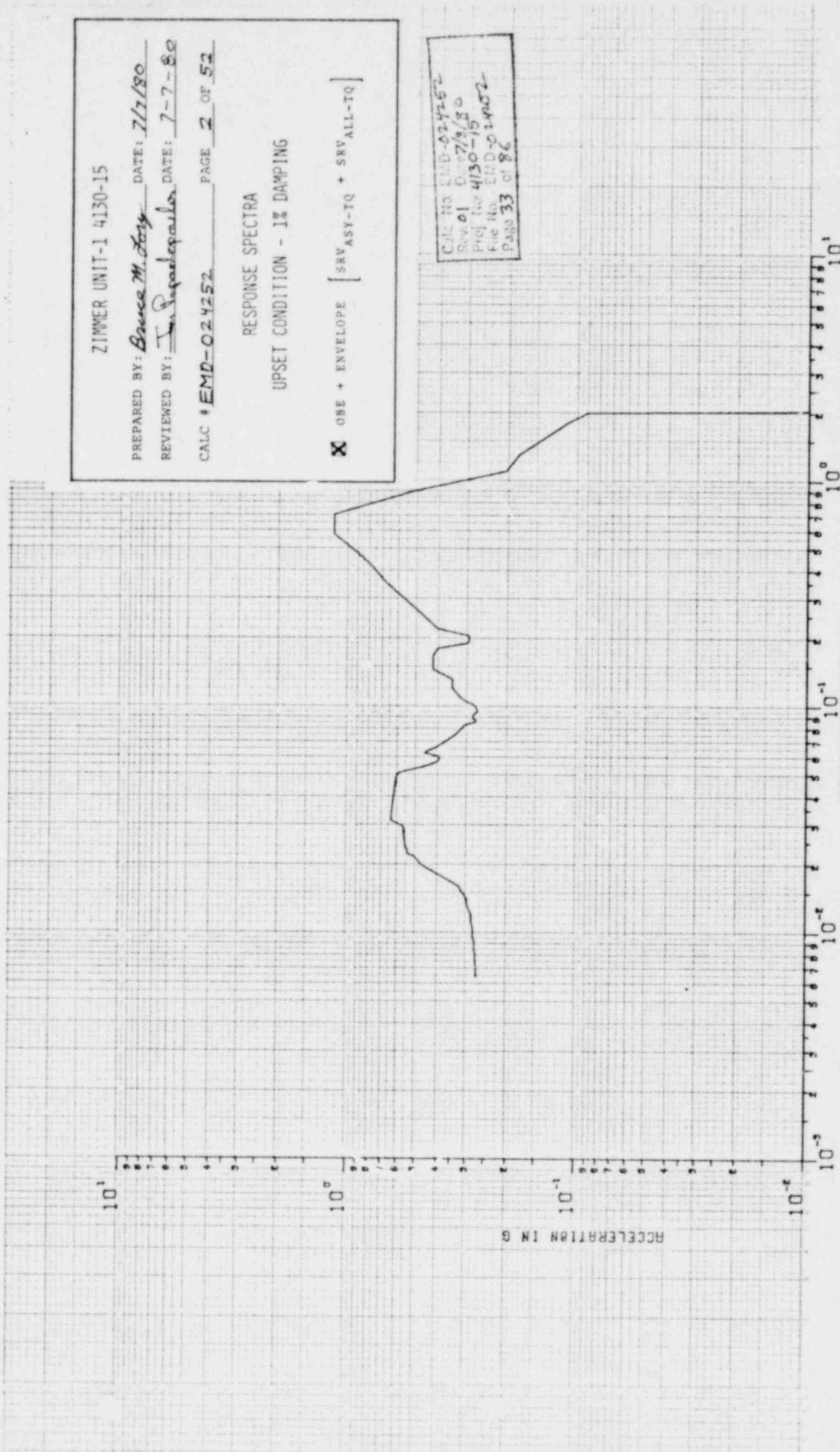
CALC # EMD-024252 PAGE 2 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

CALC NO. EMD-024252
REV. 01 D. 07/9/80
PROJ. NO. 4130-15
FILE NO. EMD-024252
PAGE 33 OF 86



PERIOD IN SECONDS

HQ-EW OF-1% ABSV(OBE+ENV..(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM REACTOR BLDG. 475'-6''

K&E KEUFFEL & ESSER CO. PRINTED IN U.S.A.

RUN 10:304 BML 07/07/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 7/7/80

REVIEWED BY: Jim Papadimitrakis DATE: 7-7-80

CALC # EMD-024252 PAGE 3 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

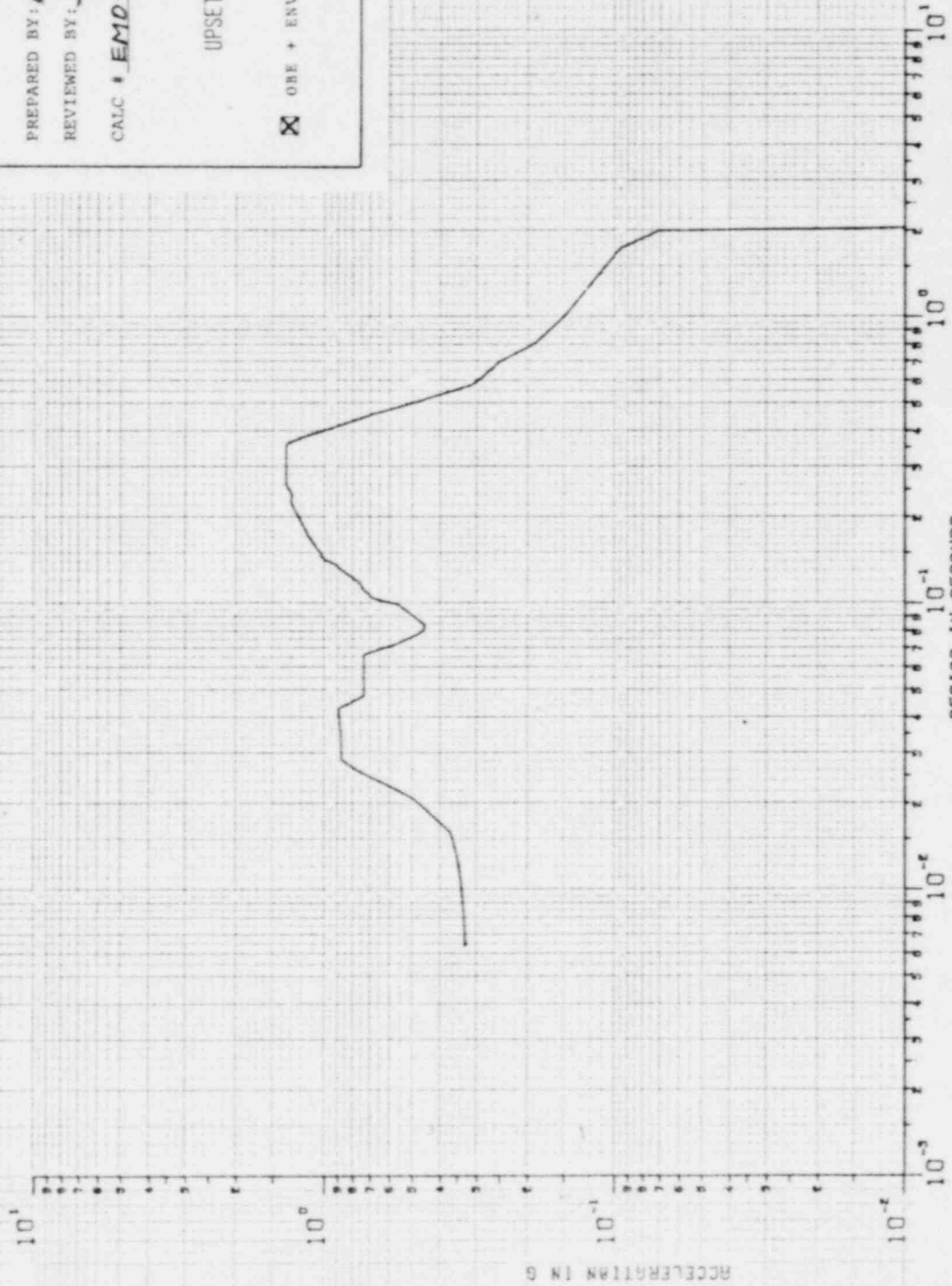
CALC # EMD-024252

SRV # 01 DATE 7/9/80

TRIAL NO 4130-15

TRIAL NO EMD-024252

PAGE 34 OF 85



VS-VS DF-1% ABSV(OBE+ENV..(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM REACTOR BLDG. 475'-6"

K&E KEUFFEL & ESSER CO. PRINTED IN U.S.A. PHOTOGRAPHIC REPRODUCTION

RUN ID: 304 BML 07/07/80

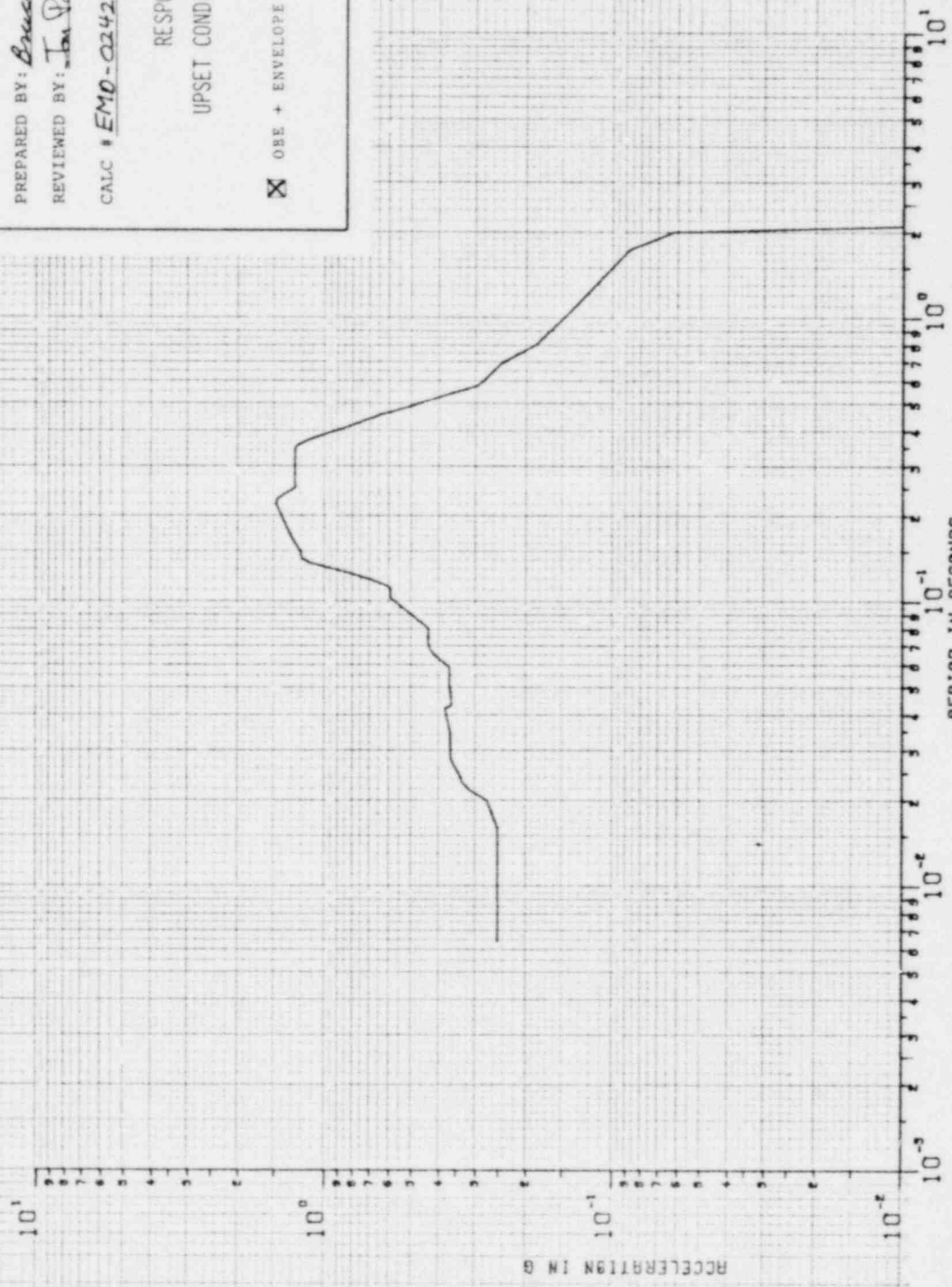
ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 7/1/80
REVIEWED BY: Tom Papadopoulos DATE: 7-7-80
CALC # EMD-024252 PAGE 4 OF 52

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

CALC NR EMD-024252
REV 01 7/8/80
REV 02 7/30/80
REV 03 EMD-024252
PAGE 35 OF 52



K&E KEUFFEL & ESSER CO. MADE IN U.S.A.
VW-VW DF-1% ABSV(OBE+ENV) . (SRV-ALL-TQ+SRV-ASY3-TQ) ZIM REACTOR BLDG. 475'-6''

RUN 10:304 PML 07/07/80

ZIMMER UNIT-1 4130-15

PREPARED BY Bruce M. Long DATE: 6/10/80

REVIEWED BY Tom O. Postupalski DATE: 6-27-80

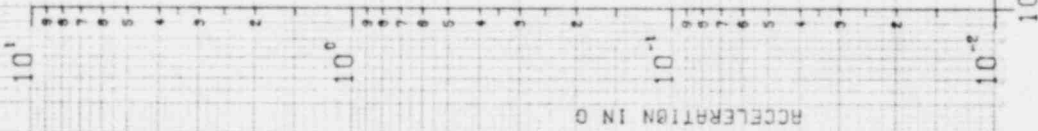
CALC # EMD-024252 PAGE 5 OF 52

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (DR & 551) * ENV (ENV 451-70 & ENV 452-70) * ENV
- ENV (DR & 551) * ENV (ENV 451-70 & 0.5 ENV 452-70) * ENV
- ENV (DR & 551) * ENV (ENV 451-70 & ENV 452-70) * CO. 2
- $\sqrt{551^2 + 40^2}$

Calc. No. EMD-024252
 Rev. 0 / Date: 2/28/80
 Proj. No. H150-CO
 Page 36 OF 385



PERIOD IN SECONDS

H0-NS COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 475'-6" REV. 01

K&E KEUFFELESSER CO. PRINTED IN U.S.A.

FILE NO. 679BML-2-REV. 01

RUN ID 679 BML 06/10/80

679BML 06/10/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Long* DATE: *6/10/80*

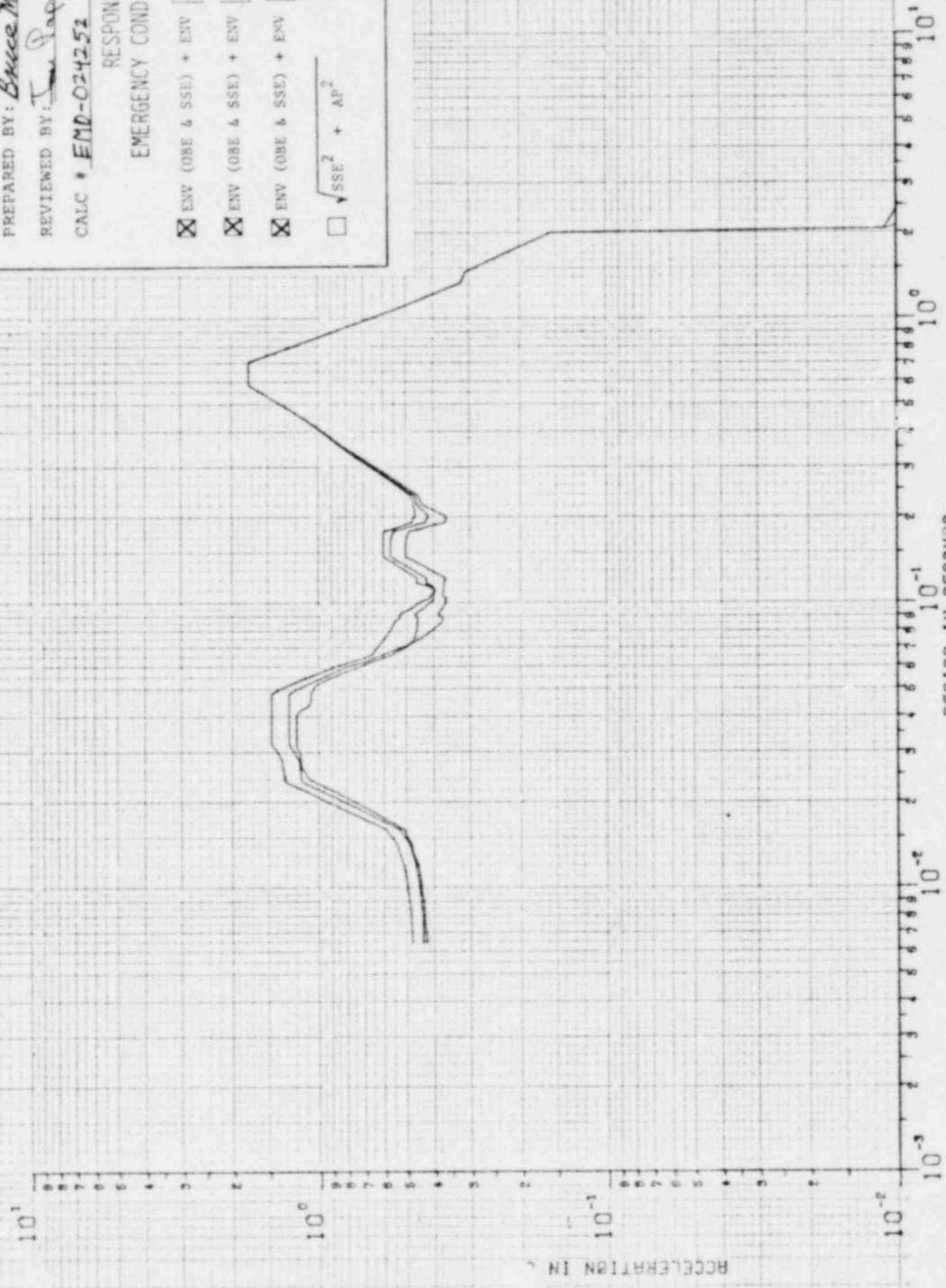
REVIEWED BY: *Tom Papadopoulos* DATE: *6-27-80*

CALC # *EMD-024252* PAGE *6* OF *52*

RESPONSE SPECTRA
EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CRG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc. No. *EMD-024252*
 Rev. *01* Date *7/2/80*
 Proj. No. *4130-15*
 Page *32* of *52*



HQ-EV COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. OF-2% 475'-6" REV. 01
HE NEUFLEESSER CO. MADE IN U.S.A. SEE LICENSE FOR PATENT RIGHTS

RUN 10 679 BML 06/10/80

679BML END OF PLOT

TIME: 0.13

ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Fry* DATE: *6/10/80*

REVIEWED BY: *Jim Papadopoulos* DATE: *6-27-80*

CALC # *EMO-024252* PAGE *7* OF *52*

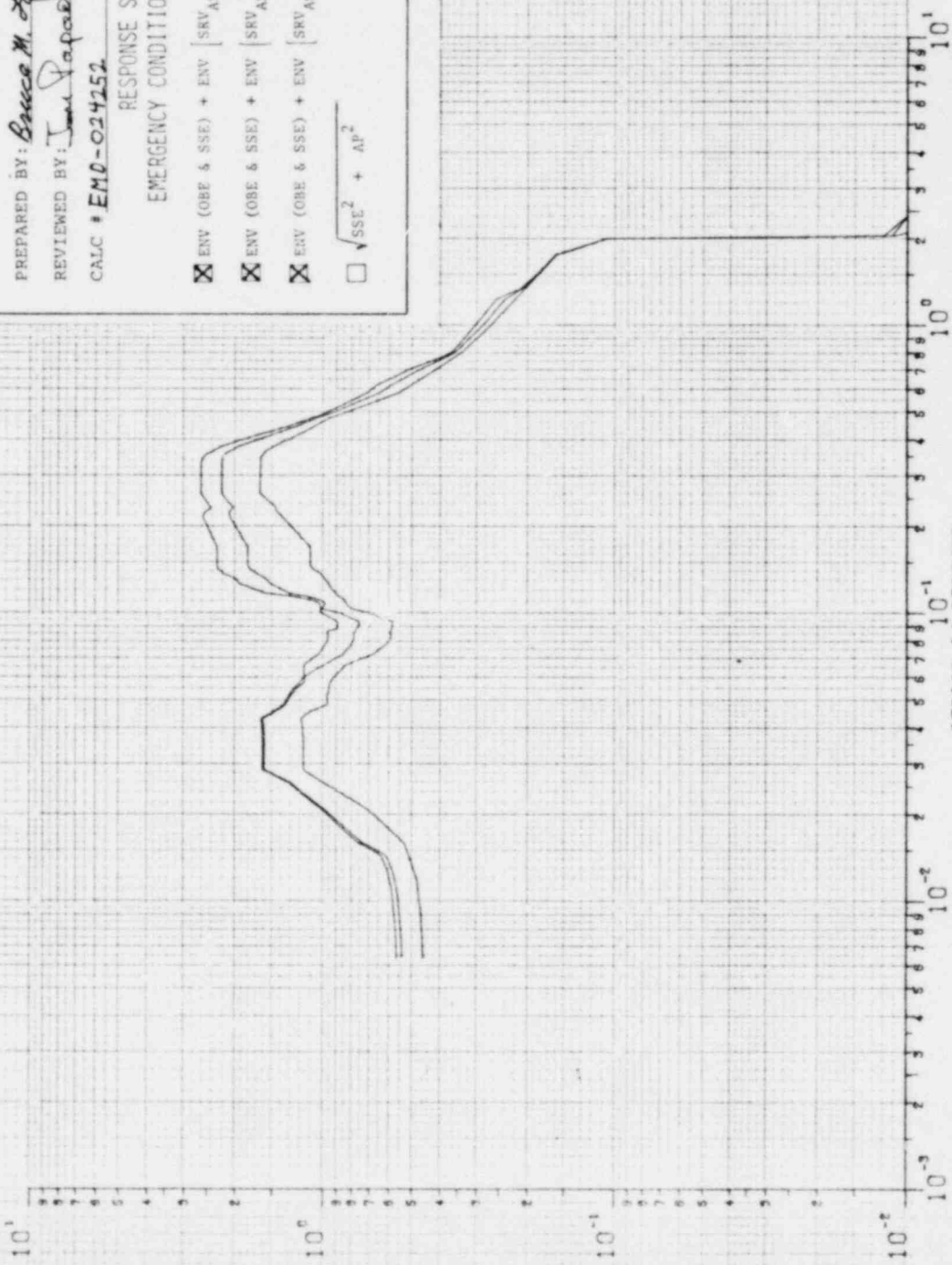
RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CHG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2

$\sqrt{SSE^2 + AP^2}$

Calc. No. *EMO-024252*
 Rev. *01* Date *7/2/80*
 Proj. No. *4130-15*
 Page *38* of *38*



VS-VS COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 475'-6" REV. 01

Run ID 679 BML 06/10/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Day DATE: 6/10/50

REVIEWED BY: Tom S. [unclear] DATE: 6-27-80

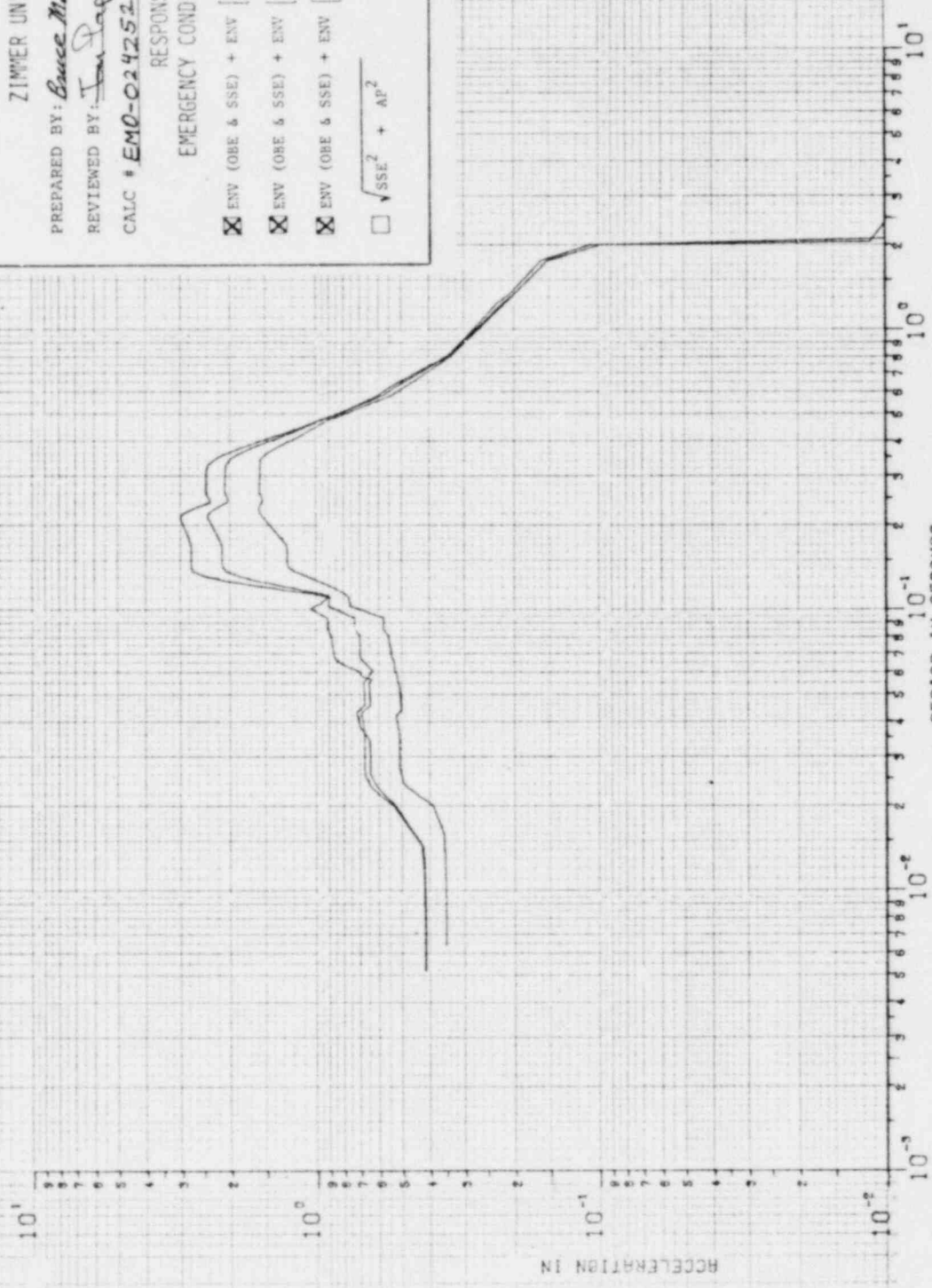
CALC # EM0-024252 PAGE 8 OF 52

RESPONSE SPECTRA
EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CHG
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CO 2

$\sqrt{SSE^2 + AP^2}$

Calc. No. EM0-024252
 Rev: 0 Date: 7/2/50
 Proj. No. 4130-15
 Pgs. 39 of 52

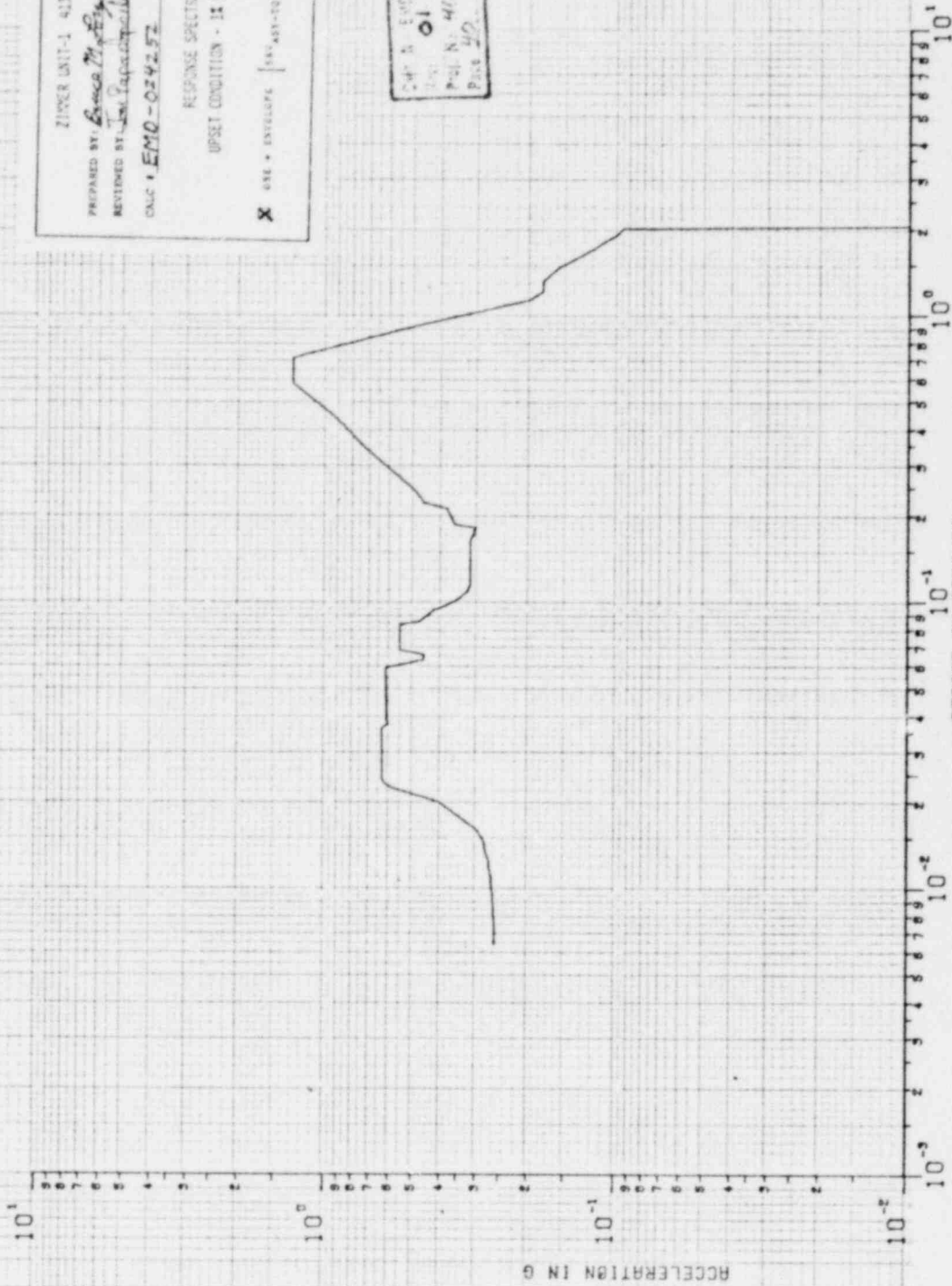


VW-VW COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 475'-6" REV. 01
 KE KEUFFELBESSER CO. PRINTED IN U.S.A. PERIOD IN SECONDS

Rev ID 679 BML 06/10/50

ZIMMER UNIT-1 4110-15
 PREPARED BY: *George M. P. Ely* DATE: *6/20/80*
 REVIEWED BY: *W. J. ...* DATE: *6-22-80*
 CALC # *EMD-0342.52* PAGE *9* OF *52*
 RESPONSE SPECTRA
 UPSET CONDITION - *14 DOWING*
 X ONE ENVELOPE [SRV-ASY-TQ + SRV-ALL-TQ]

EMD - 0342.52
 01 018 22.00
 PUL N. 4130-15
 PAGE 40 OF 52

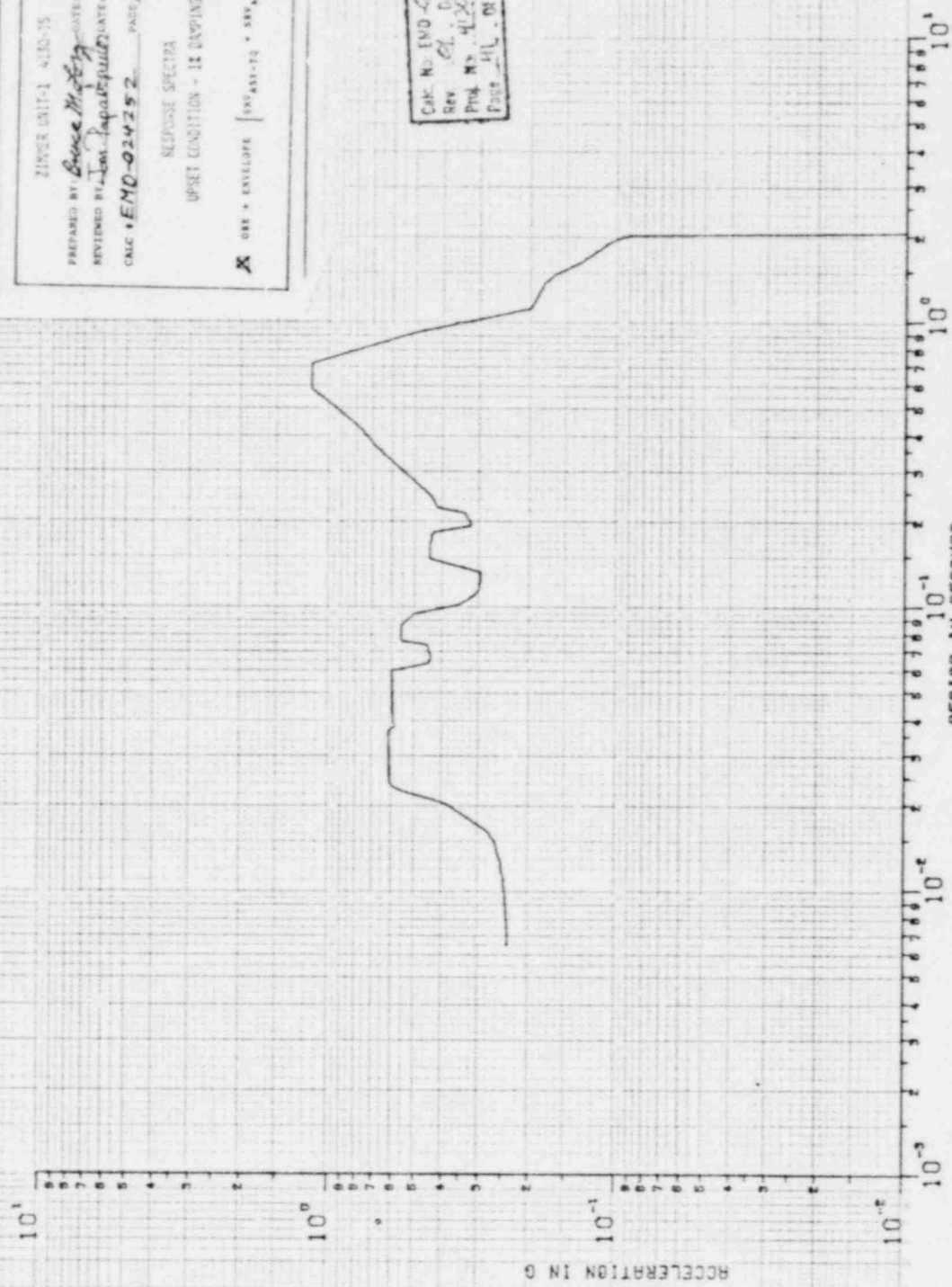


NS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAR. BLDG. DF-1% 503'-6" REV 01

RUN ID: 936 BMI 06/20/80

ZINGER UNIT-1 ALSO-35
 PREPARED BY *Bruce M. King* DATE: *6/24/80*
 REVISIONS BY *Tom Papadimitriou* DATE: *6-27-80*
 CALC # *EMD-024252* PAGE *10* OF *52*
 RESPONSE SPECTRA
 UPSET CONDITION - 12 DAMPERS
 X OBE + ENVELOPE [SRV, ASY-TQ + SRV, ALL-TQ]

CALC. NO. *EMD-024252*
 REV. *01*, DATE: *6/24/80*
 PROJ. NO. *4120-01*
 FILE *HL, DL, SF*



EM COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 503'-6" REV 01
 RUN ID: 179 FML 06/24/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/20/80

REVIEWED BY: [Signature] DATE: 6-27-80

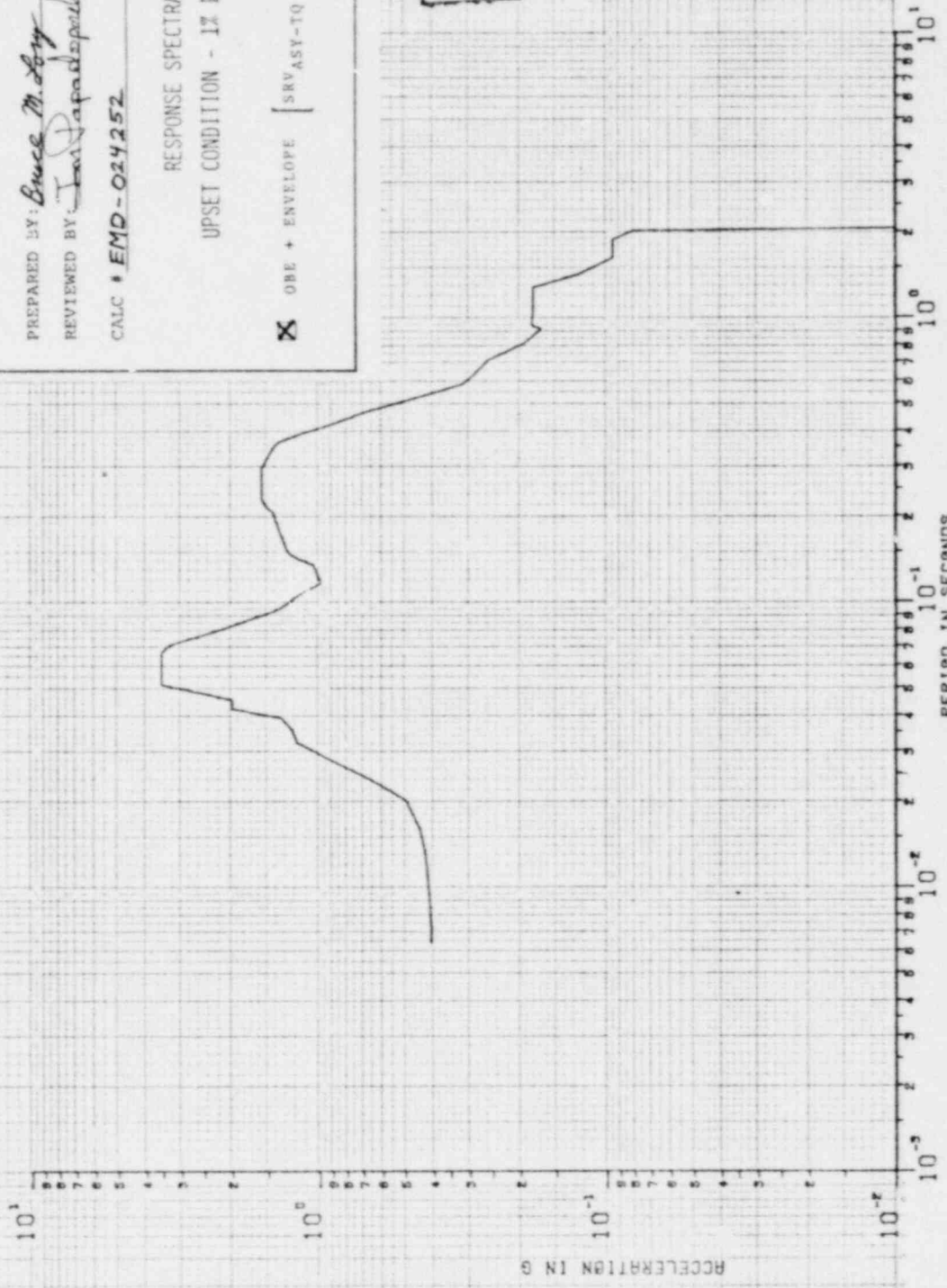
CALC # EMD-024252 PAGE 11 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No.	EMD-024252
Rev.	01 - Date: 7/2/80
Proj. No.	4130-15
Page	11 of 52



VS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 503'-6" REV 01

RUN ID: 936 BAL 6/20/80

KEUFFEL & ESSER CO

ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Long* DATE: *5/20/80*

REVIEWED BY: *Tom Lapadula* DATE: *6-27-80*

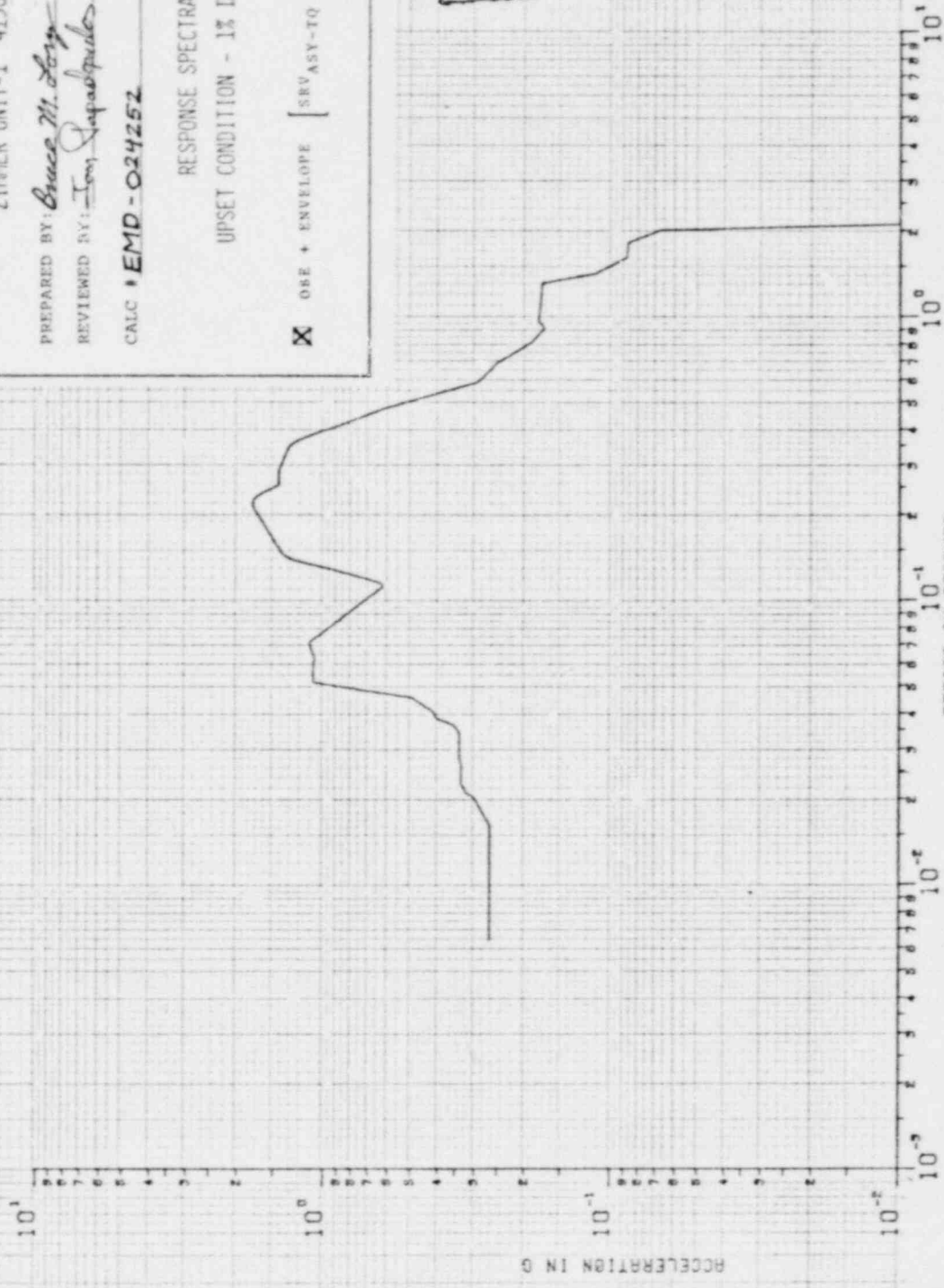
CALC # **EMD-024252** PAGE **12** OF **52**

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No.	EMD-024252
REV.	01
DATE	5/20/80
Proj. No.	4130-15
PAGE	12 OF 52



VW COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 503'-6" REV 01

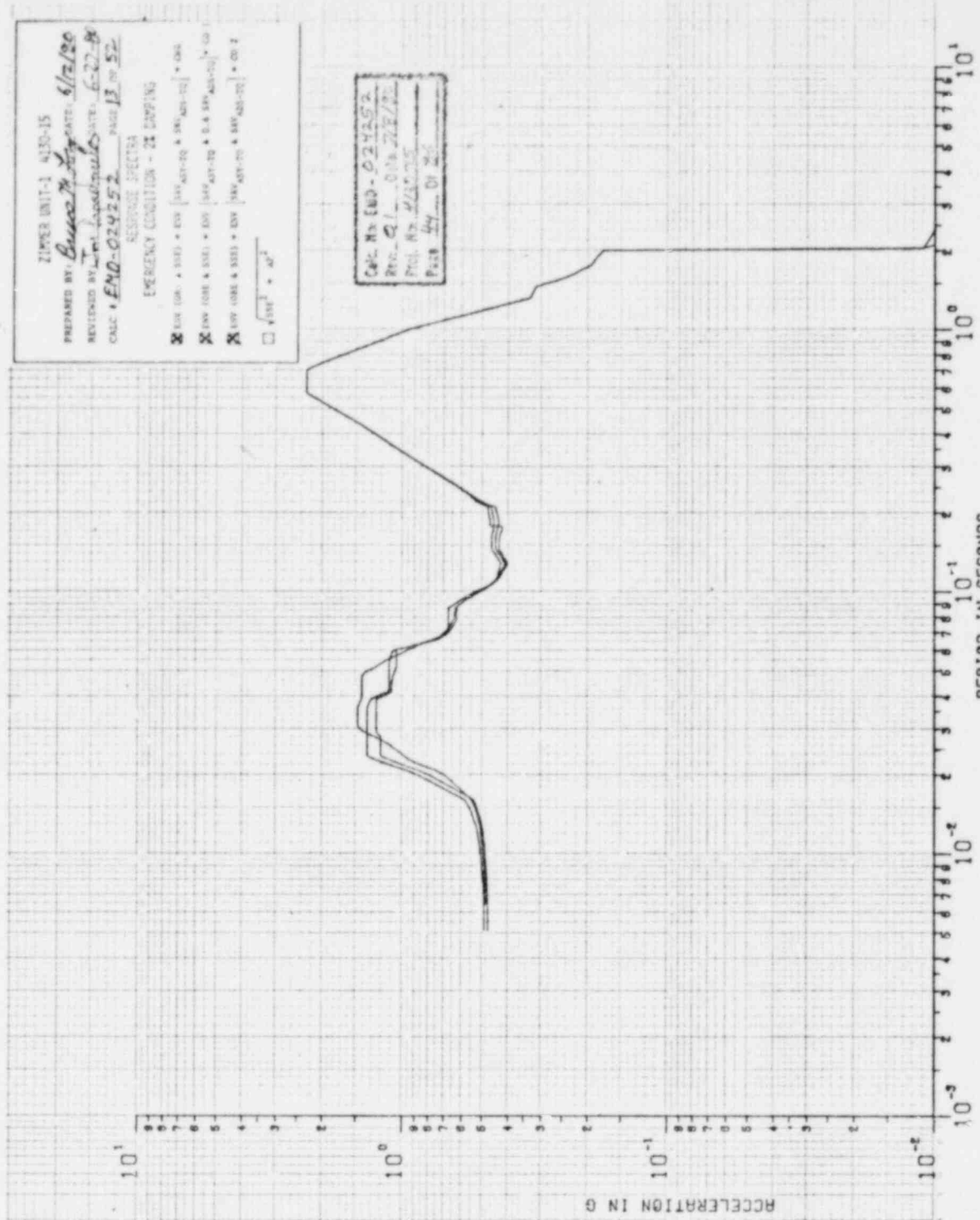
IN-5 REIFFERISSER CO

RUN ID: 936 BML 06/20/80

ZIMMER UNIT-1 4350-15
 PREPARED BY: *Bruce M. King* DATE: *6/12/80*
 REVIEWED BY: *John L. ...* DATE: *6-22-80*
 CALC: *END-024752* PAGE *13* OF *52*

RESONANCE SPECTRA
 EMERGENCY CONDITION - 21 SHAKING
 ENV (08) + ENV (10) + ENV (15) + ENV (20) + ENV (25) + ENV (30) + ENV (35) + ENV (40) + ENV (45) + ENV (50) + ENV (55) + ENV (60) + ENV (65) + ENV (70) + ENV (75) + ENV (80) + ENV (85) + ENV (90) + ENV (95) + ENV (100)
 ENV (08) + ENV (10) + ENV (15) + ENV (20) + ENV (25) + ENV (30) + ENV (35) + ENV (40) + ENV (45) + ENV (50) + ENV (55) + ENV (60) + ENV (65) + ENV (70) + ENV (75) + ENV (80) + ENV (85) + ENV (90) + ENV (95) + ENV (100)
 ENV (08) + ENV (10) + ENV (15) + ENV (20) + ENV (25) + ENV (30) + ENV (35) + ENV (40) + ENV (45) + ENV (50) + ENV (55) + ENV (60) + ENV (65) + ENV (70) + ENV (75) + ENV (80) + ENV (85) + ENV (90) + ENV (95) + ENV (100)
 $\sqrt{ENV^2 + a^2}$

CALC No: *END-024752*
 Rev: *01* Date: *2/22/79*
 Proj. No: *M23075*
 Page *14* of *01*



HQ-NS COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 503'-6'' REV. 01
 KEUFFEL & ESSER CO. MADE IN U.S.A.

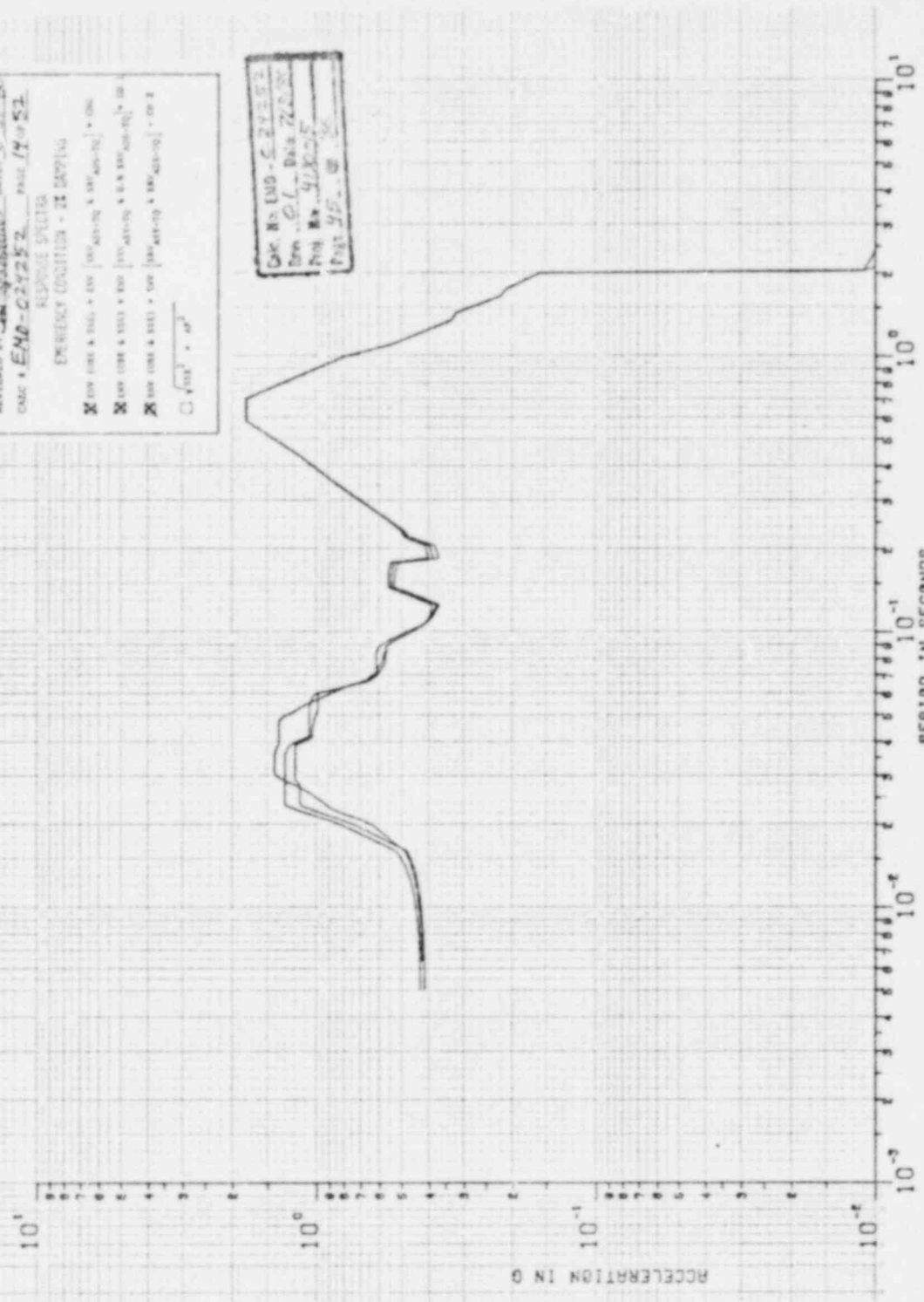
Run ID 716 BML 06/12/80

ZIMMER UNIT-1 4130-15
 PREPARED BY *George M. [unclear]* DATE: *6/12/52*
 REVIEWED BY *Tom [unclear]* DATE: *6-22-52*
 CMC # *END-22252* PAGE *14* OF *52*

RESPONSE SPECTRA
 FREQUENCY POSITION - 22 DARTING

- 100 CMR & 1000 & 10000 [unclear] & 100000 [unclear] & 1000000 [unclear]
- 1000 CMR & 10000 & 100000 [unclear] & 1000000 [unclear] & 10000000 [unclear]
- 10000 CMR & 100000 & 1000000 [unclear] & 10000000 [unclear] & 100000000 [unclear]

CMR No. *END-5-22252*
 Date *6/12/52*
 Run No. *4130-15*
 Page *14* of *52*



H0-EW COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 503*-6*- REV. 01

RUN ID 716 BML 6/12/52

ZIMMER UNIT-1 A130-15

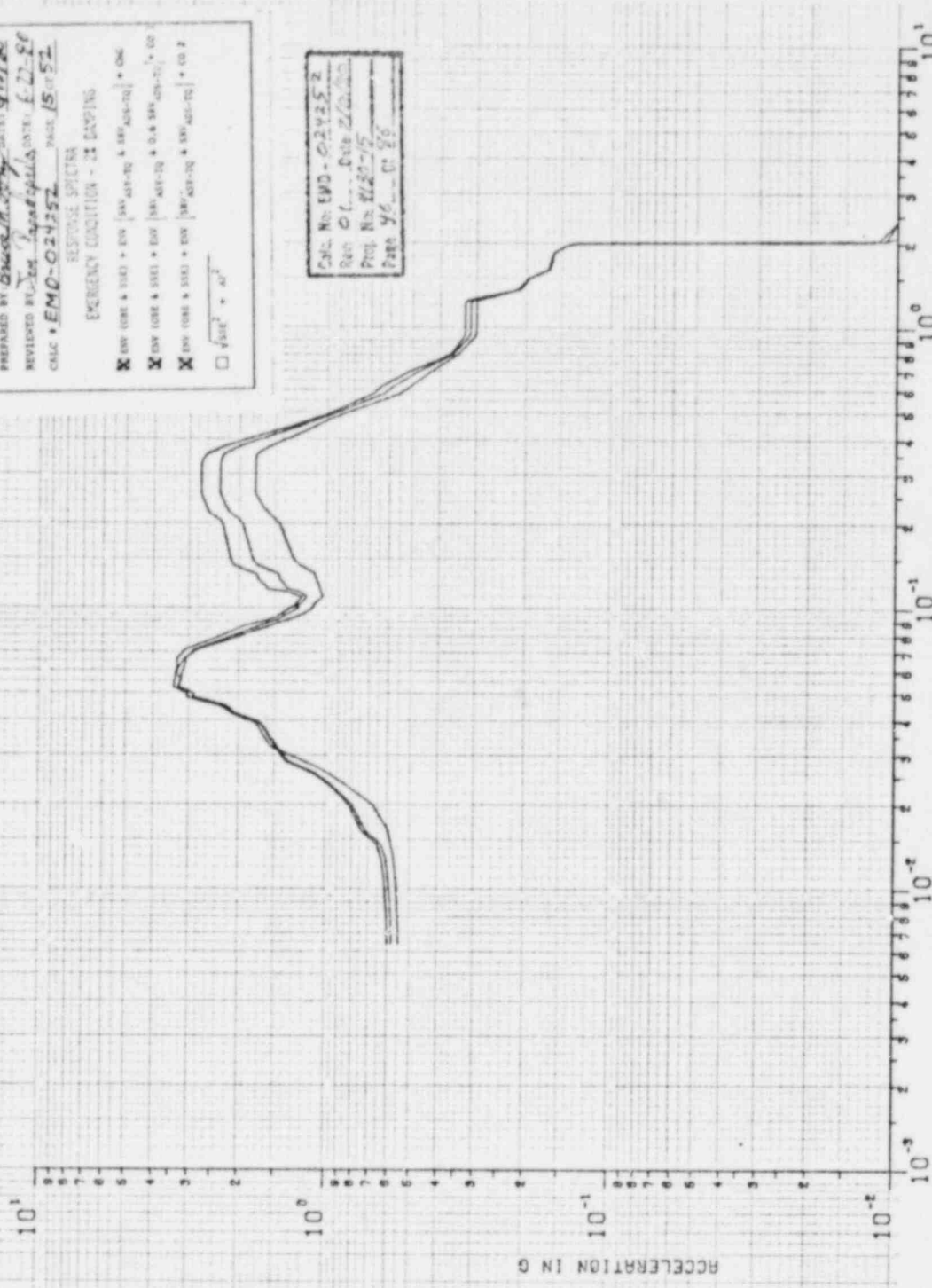
PREPARED BY *Bruce M. Fry* DATE *8/12/80*
REVIEWED BY *Don J. Hagadone* DATE *8-22-80*
CALC. # *EMD-024252* PAGE *15* OF *52*

RESPONSE SPECTRA

EMERGENCY CONDITION - 25 DAMPING

- DRY (08K + 55K) + ENV (30V) (40V-70) + ENV (40V-70) + COM
- DRY (08K + 55K) + ENV (30V) (40V-70) + 0.4 30V (40V-70) + CO
- DRY (08K + 55K) + ENV (30V) (40V-70) + ENV (40V-70) + CO 2
- $\sqrt{S_1^2 + S_2^2}$

CALC. NO. *EMD-024252*
 REV. *01* DATE *12/20/80*
 PROJ. NO. *4120-15*
 PAGE *15* OF *52*



PERIOD IN SECONDS

VS-VS COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 503*-6** REV. 0:

NE NEUFELDESER CO

RUN ID 716 BML 06/12/80

ZIMMER UNIT-1 AL30-15

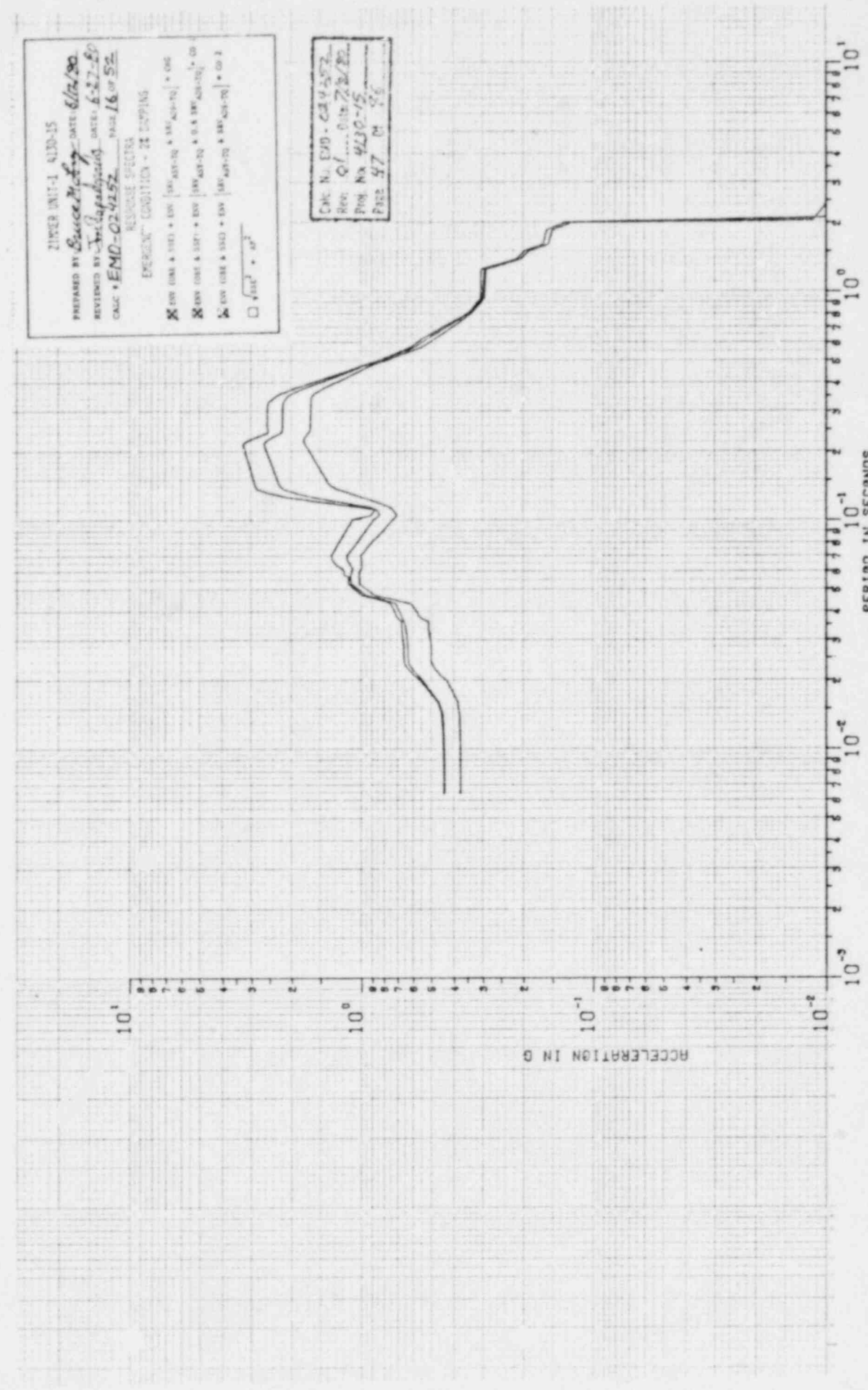
PREPARED BY *Emcey* DATE *8/12/50*
REVIEWED BY *J. J. ...* DATE *8-2-50*
CALC. # *EMD-02-4252* PAGE *16 of 52*

RESPONSE SPECTRA

EXCITATION CONDITION - *22* DAMPING

- 500 CYCLES & 10% DAMPING
- 1000 CYCLES & 10% DAMPING
- 5000 CYCLES & 10% DAMPING
- $\sqrt{1000} \times 10^2$

CALC. N. # *EMD - 02-4252*
 REV. *01* DATE *7/28/50*
 PROJ. NO. *4210-15*
 PAGE *47* OF *56*



PERIOD IN SECONDS

VW-VH COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 503'-6" REV. 01

K&E KEUFFELESSER CO. MADE IN U.S.A. FILE NO. 4210-15-16

RUN ID *716 BML exp/12/50*

ZIMMER UNIT-1 4130-15

PREPARED BY: *Russ M. Day* DATE: *6/20/80*
REVIEWED BY: *Tom Sapich* DATE: *6-27-80*
CALC #: *EMD-024152* PAGE *17* OF *52*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

CALC. NO. *EMD-024152*
REV. *01* DATE *7/2/80*
PROJ. NO. *4130-15*
PAGE *17* OF *52*



PERIOD IN SECONDS

NS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 525'-7" REV 01

DATE KEUFFEL & ESSER CO

RUN ID: 931 BMB 06/20/80

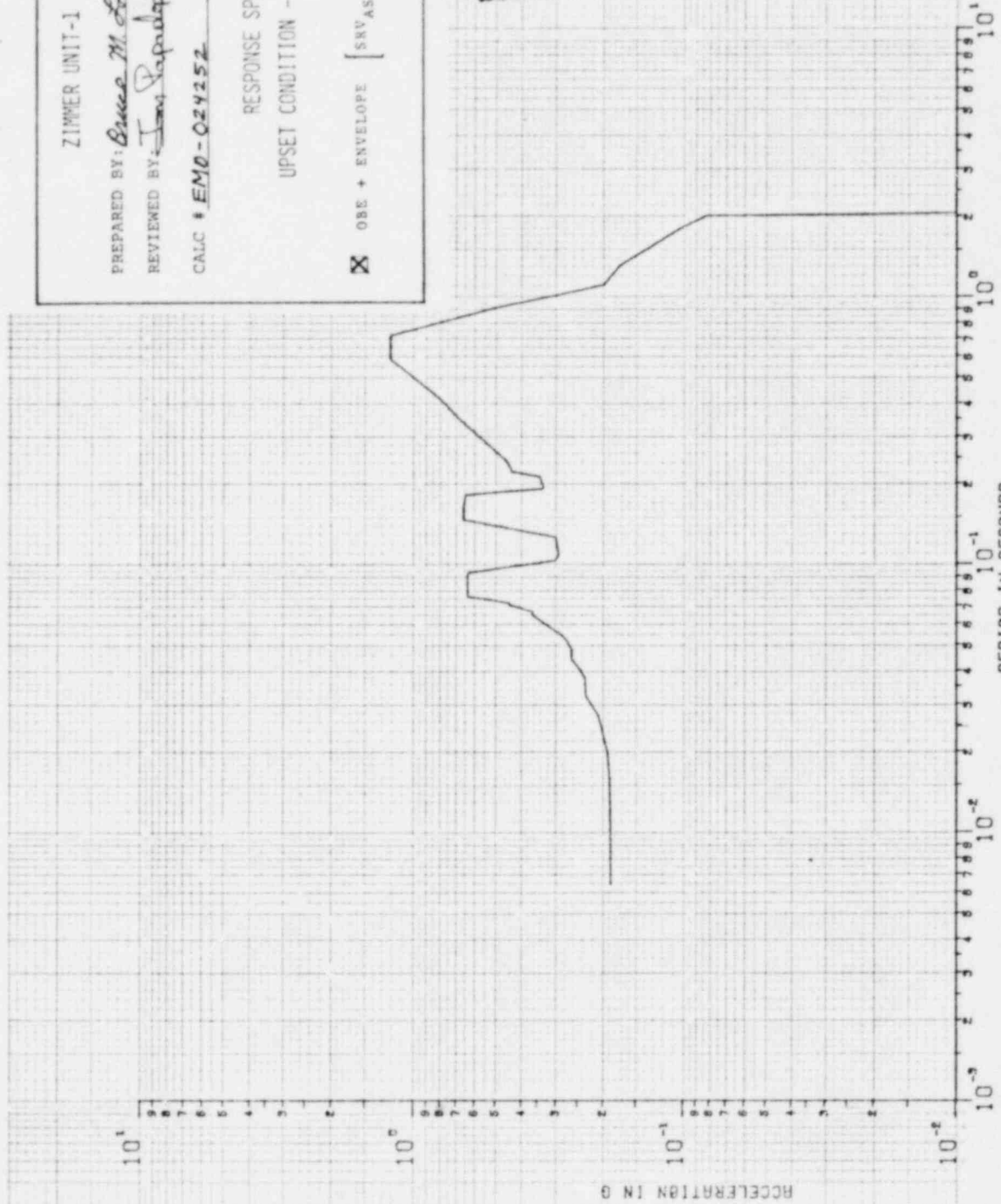
ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/10/80
REVIEWED BY: Tom Papadopoulos DATE: 6-27-80
CALC # EM0-024252 PAGE 18 OF 52

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No. EM0-024252
Rev: 01 Date: 7/12/80
Proj. No. 4130-15
Page 18 of 52



EW COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 525*-7** REV 01

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/20/80

REVIEWED BY: Tom Papadopoulos DATE: 6-27-80

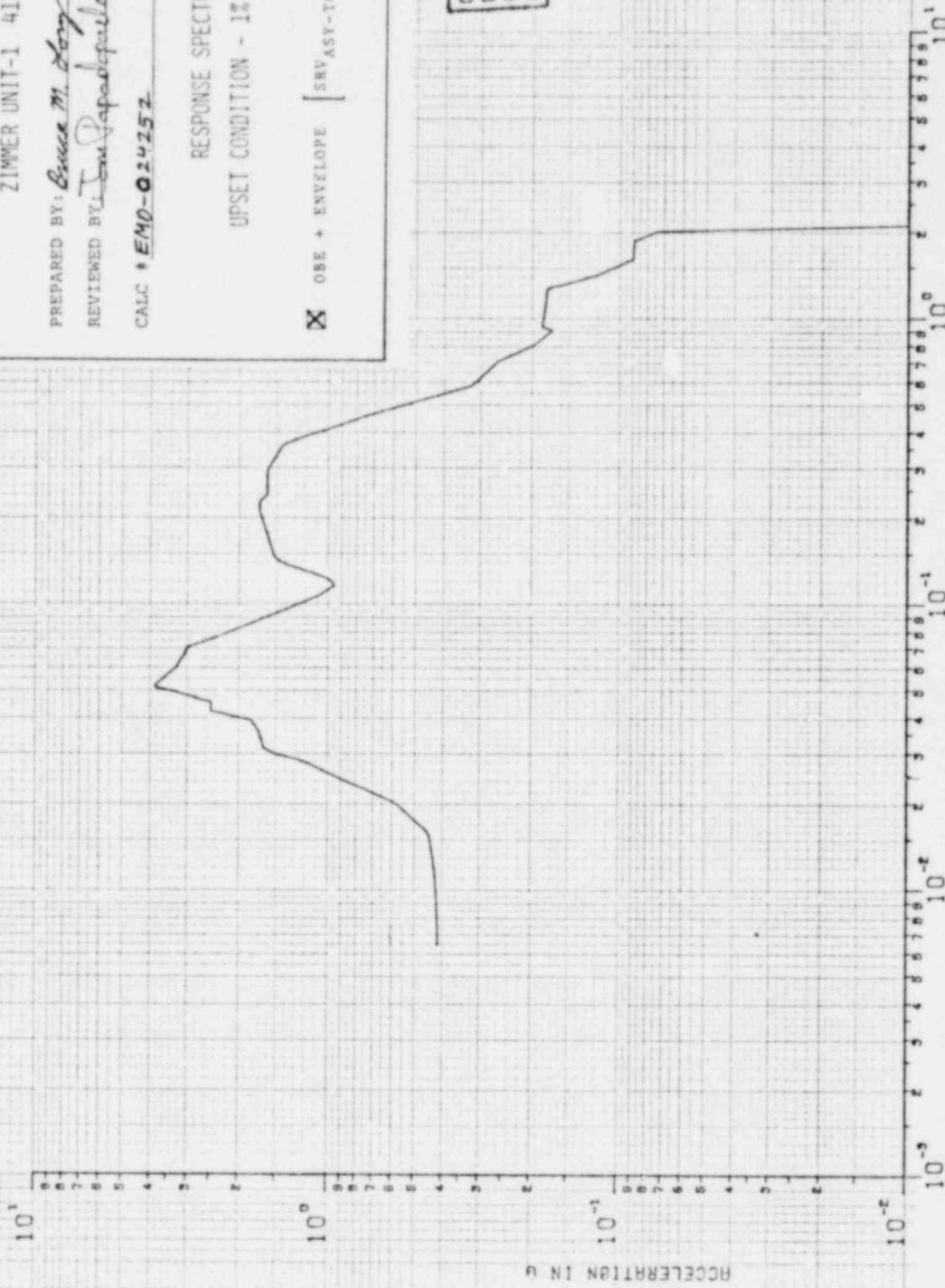
CALC # EMO-024257 PAGE 19 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

CALC. NO. EMO-024257
REV. 01 DATE 7/2/80
PLOT NO. 4130-15
PAGE 50 OF 52



PERIOD IN SECONDS

VS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 525*-7** REV 01

RUN ID: 936 BML 06/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Day DATE: 6/20/80

REVIEWED BY: Jim Papadopoulos DATE: 6-27-80

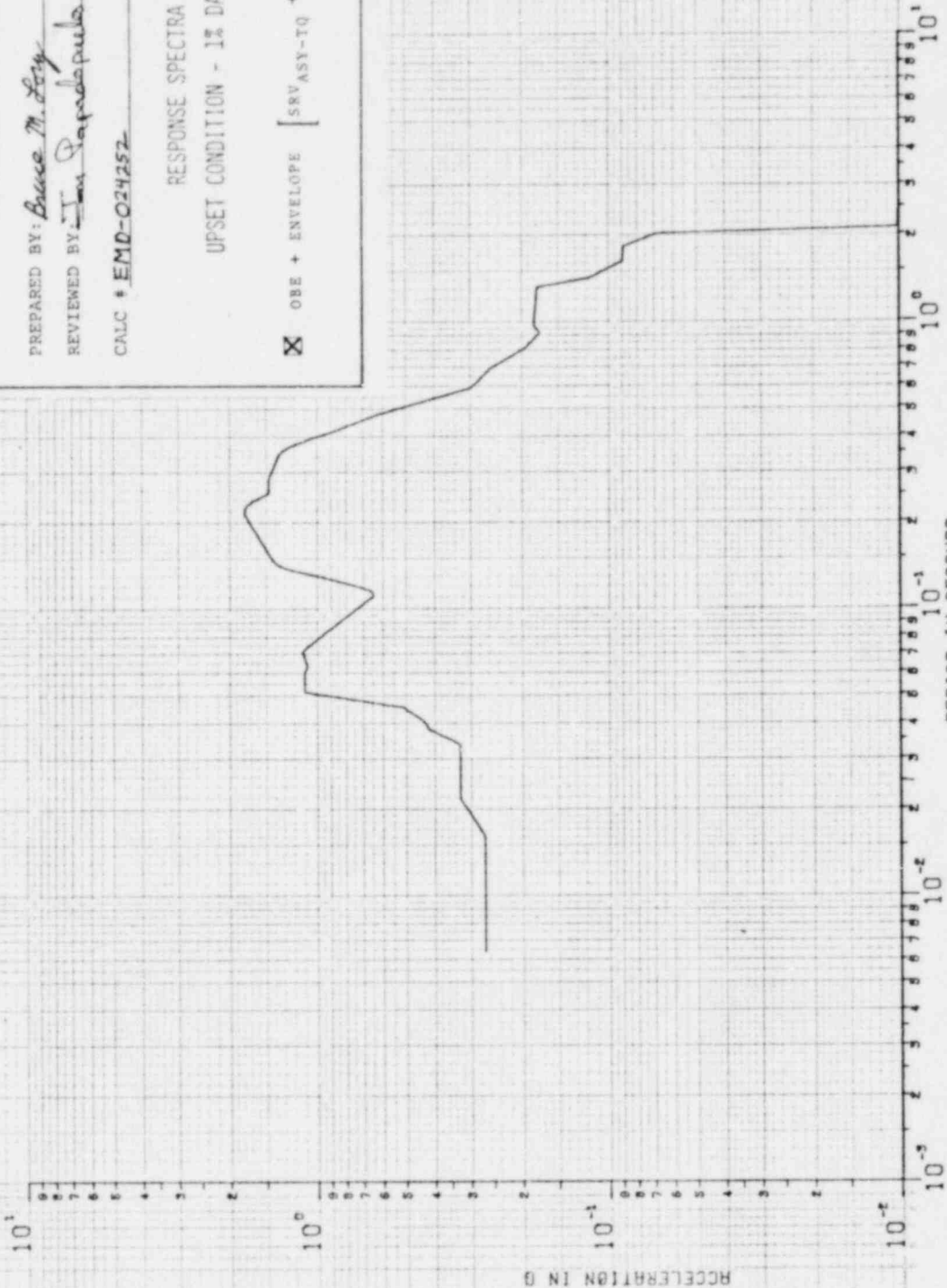
CALC # EMD-024252 PAGE 20 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc No	EMD-024252
Rev	01
Date	7/2/83
Proj No	4130-15
Page	21 of 52



PERIOD IN SECONDS

VW COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-17. 525*-7** REV 01

RUN ID: 4th BML 06/20/80

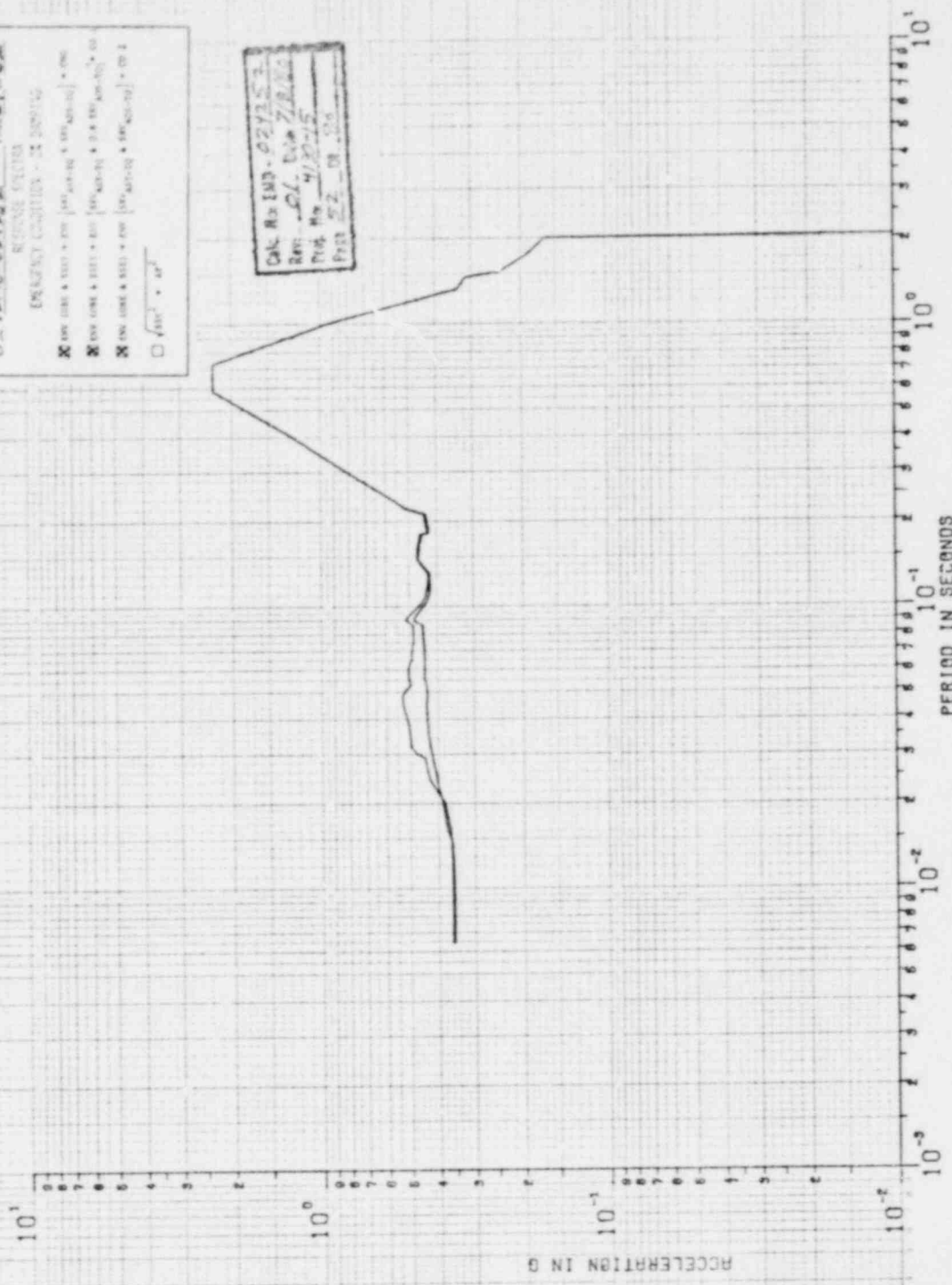
ZIMMER UNIT-3 410-15
 PREPARED BY Bruce M. Day DATE: 6/12/80
 REVISIONS BY: [Signature] DATE: 6-27-80
 C. C. FEMO-024352 PAGE 21 OF 52

RESONANCE FACTORS

EMERGENCY CONDITION - 33 SHOCKING

100 CMRS & 1000 & 100 [100, 100, 100, 100, 100] * 100
 100 CMRS & 1000 & 100 [100, 100, 100, 100, 100] * 100
 100 CMRS & 1000 & 100 [100, 100, 100, 100, 100] * 100
 100 * 100

Calc. No. 100-024352
 Rev: 01 Date: 7/12/80
 Proj. No. 410-15
 Page 21 of 52



HQ-NS COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 525*-7** REV. 01

RUN ID 717 BML 6/17/80

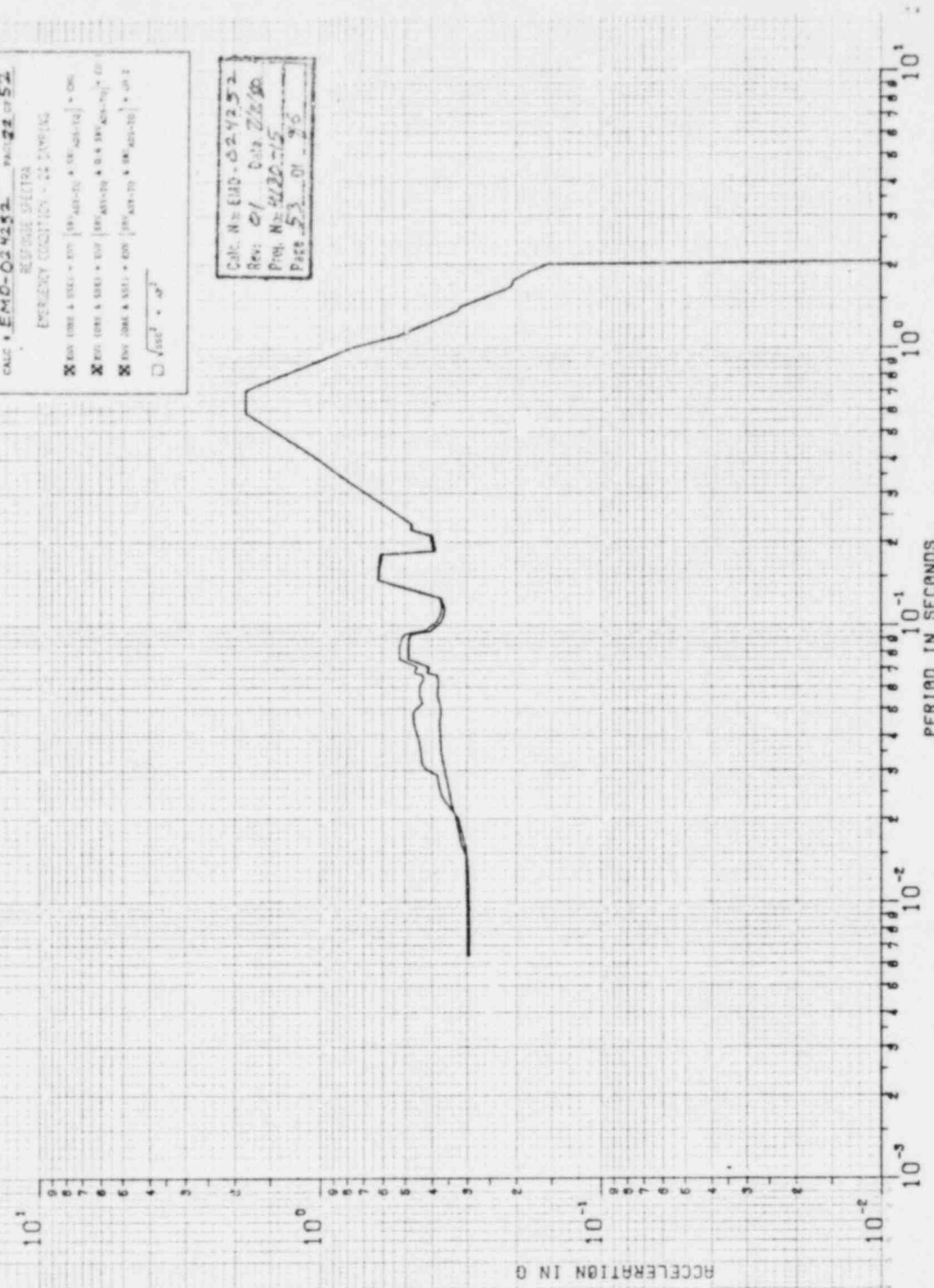
717BML 06/12/80 227

ZIMMER UNIT-1 4130-25
 PREPARED BY *George R. Fry* DATE: *6/12/80*
 REVIEWED BY *Tom Scuderi* DATE: *6-27-80*
 CALC: *EMD-024252* PAGE: *2* OF *52*

RESPONSE SPECTRA
 ENERGY CONDITION - 44 DAMPING

EMD (0.05 & 0.10) & 0.20 (0.05, 0.10, 0.20) & 0.40 (0.05, 0.10) & 0.80
 EMD (0.05 & 0.10) & 0.20 (0.05, 0.10, 0.20) & 0.40 (0.05, 0.10) & 0.80
 EMD (0.05 & 0.10) & 0.20 (0.05, 0.10, 0.20) & 0.40 (0.05, 0.10) & 0.80
 $\sqrt{150^2 + \omega^2}$

CALC. N: *EMD-024252*
 REV: *01* DATE: *2/20/80*
 PROJ. N: *4130-25*
 PAGE: *53* OF *26*



H0-EW COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 525'-7" REV. 01

K&E NEUFELDER ASS'N CO. FORT CO., ILL.

RUN 10 717 FAIL 6/12/80

ZIMMER UNIT-1, 4130-15

PREPARED BY *George M. King* DATE *6/12/50*
REVIEWED BY *Lawrence* DATE *6-27-50*
CALC. # *EMD-71252* PAGE *23* OF *52*

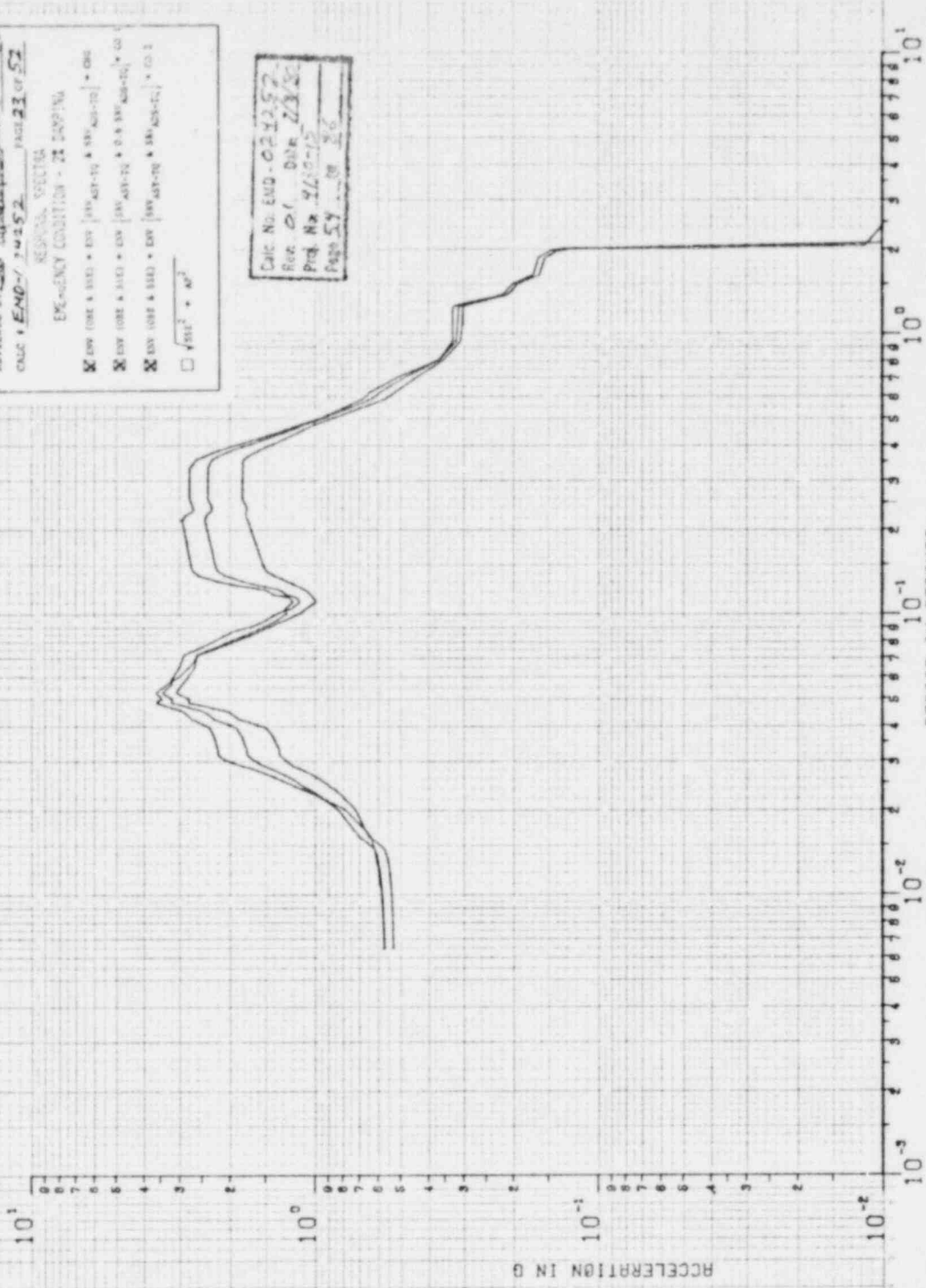
RESPONSE SPECTRA

EFFECTIVE CONDITION - 3 DAMPING

- X $\text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD})$
- X $\text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD})$
- X $\text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD}) \cdot \text{DOX} (100 \times 1 \text{SD})$

$\square \text{ } f_{\text{RES}}^2 \cdot 40^2$

Calc. No. *EMD-71252*
 Rec. Of *DOX* DATE *7/15/50*
 Proj. No. *7115-15*
 Page *54* OF *56*



PERIOD IN SECONDS

VS-VS COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 525*-7** REV. 01

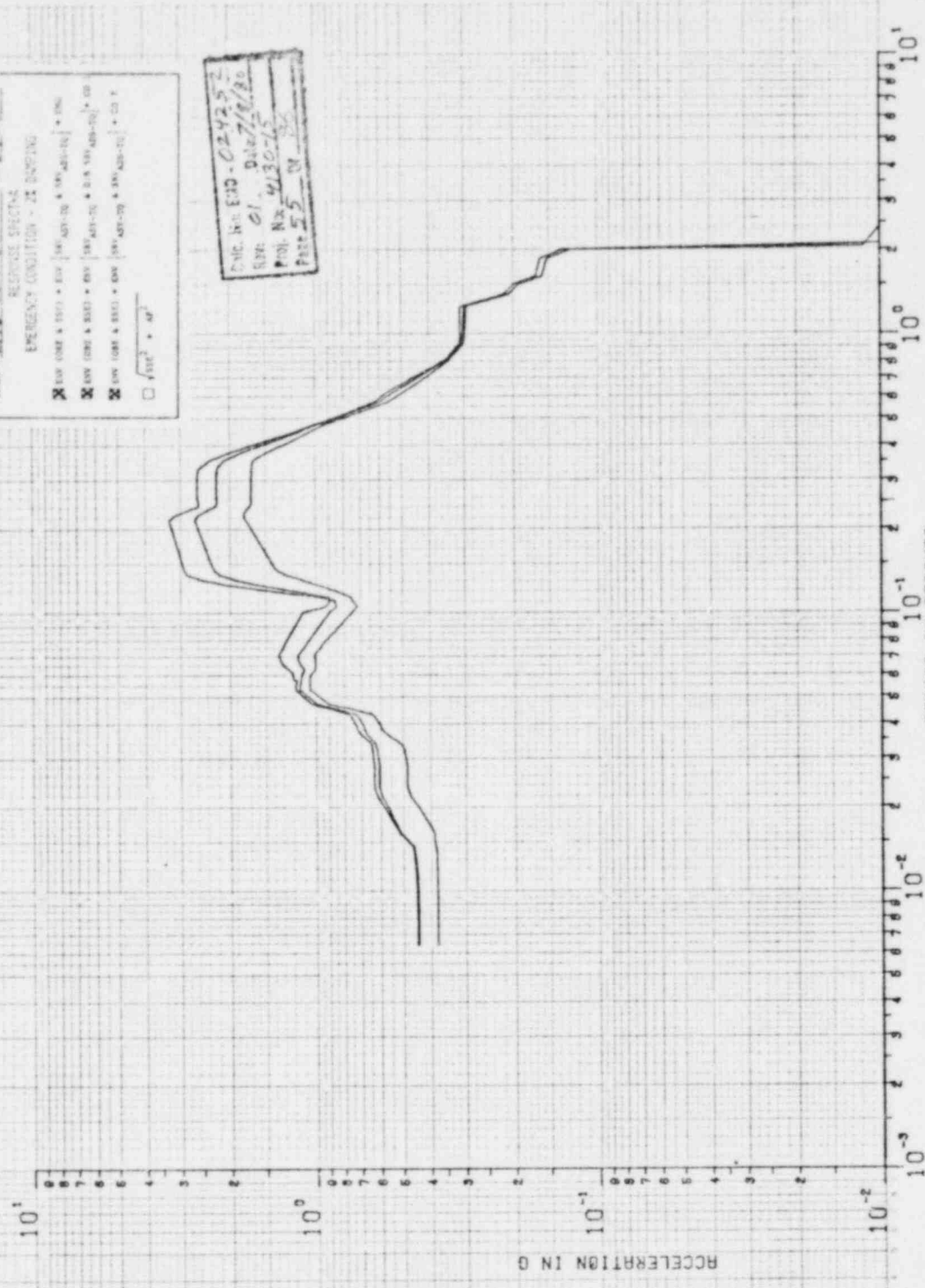
NEUFELDERCO

RUN 10 717 PNL 6/12/50

ZIMMER UNIT-1 4130-15
 PREPARED BY: *Blaise M. Kelly* DATE: *6/13/80*
 REVIEWED BY: *Tom Carls* DATE: *6-27-80*
 CALC: *EMO-02425Z* PAGE: *21* OF *52*
 RESPONSE SPECTRA
 EXPERIMENT CONDITION: *22 SHAKING*

ENV 1000 & 1001 ENV 1002 & 1003 ENV 1004 & 1005 ENV 1006 & 1007
 ENV 1008 & 1009 ENV 1010 & 1011 ENV 1012 & 1013 ENV 1014 & 1015
 ENV 1016 & 1017 ENV 1018 & 1019 ENV 1020 & 1021 ENV 1022 & 1023
 ENV 1024 & 1025 ENV 1026 & 1027 ENV 1028 & 1029 ENV 1030 & 1031

CALC. NO. *EMO-02425Z*
 REV: *01* DATE: *7/10/80*
 PROJ. NO.: *4130-15*
 PAGE: *55* OF *70*



VW-VW COMB(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 525'-7" REV. 01
 INE NEUTEL & BLESSER CO. MADE IN U.S.A. FILE NO. 4130-15

RUN 10 717 BAIL 6/12/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/20/80

REVIEWED BY: Tom Papadopoulos DATE: 6-27-80

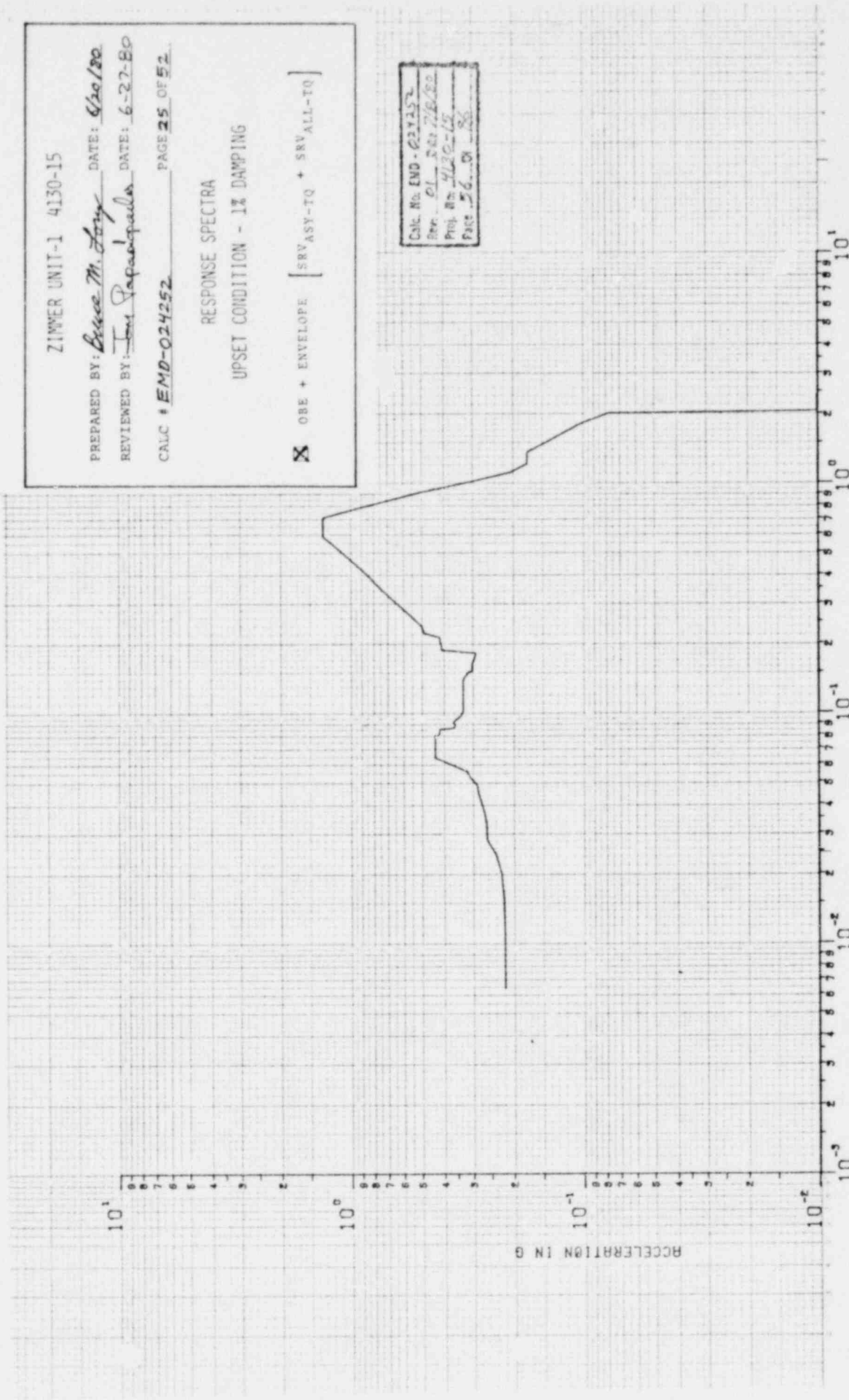
CALC # EMD-024252 PAGE 25 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc. No. EMD-024252
Rev. 01 Rev. 7/6/80
Proj. No. 4130-15
Page 56 of 58



PERIOD IN SECONDS

NS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 546'-0" REV 01

RUN ID: 936 BML 06/20/80

NSC NEUFFELSEN CO

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/20/80

REVIEWED BY: Tom Papadopoulos DATE: 6-27-80

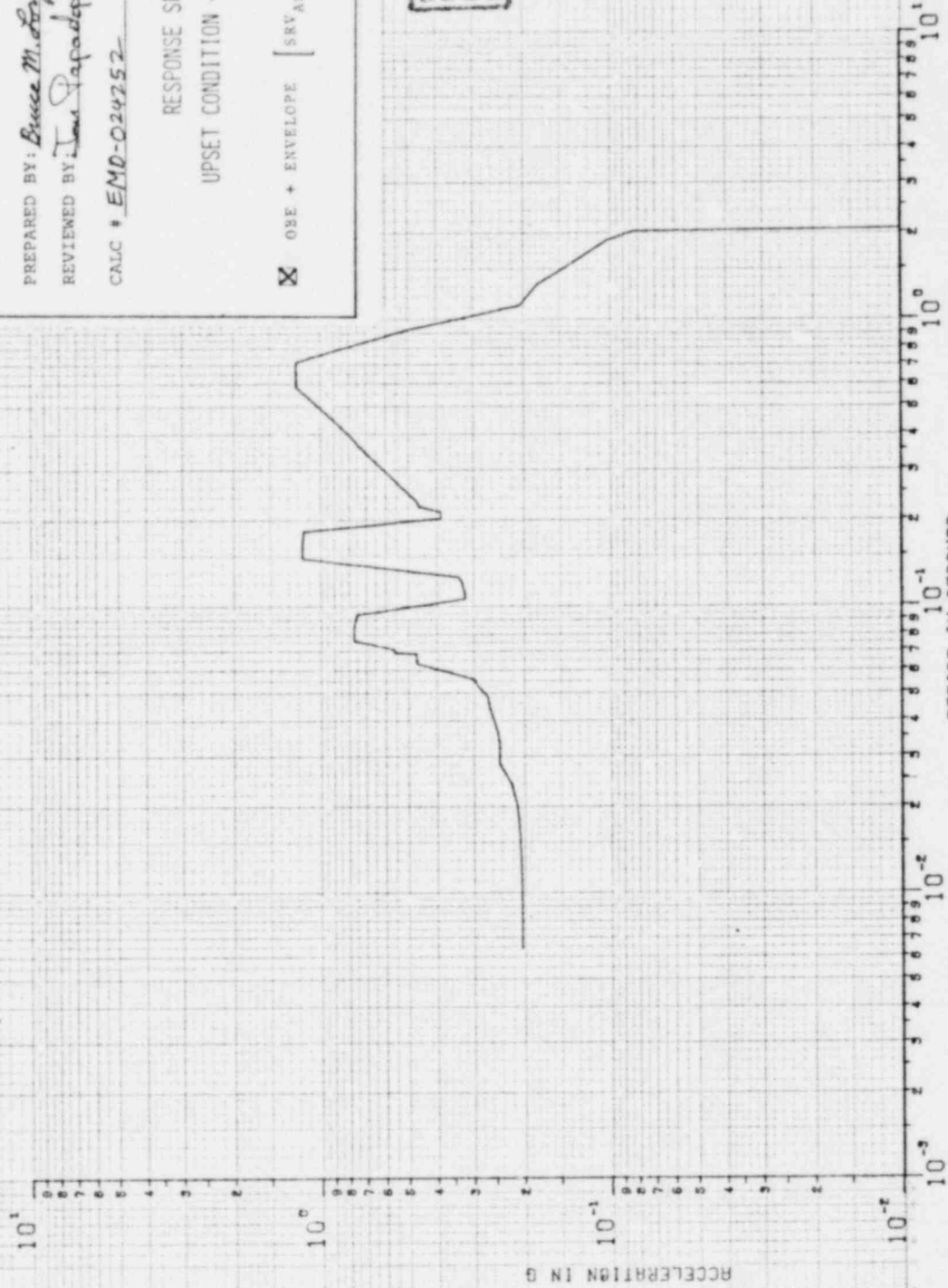
CALC # EMD-024252 PAGE 26 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

08E + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

CMC RELEASE - 024252
SERIAL NO. 27580
PUB. NO. 4130-15
PAGE 27 OF 52



EW COMB(08E+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAR. BLDG. DF-1% 546*-0** REV 01

RUN ID: 936 B01L 06/20/80

JOE NEUFELDER CO

100% U.S.A. FULLY QUALIFIED PERSONNEL

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Gray DATE: 6/30/80

REVIEWED BY: Tom Sapadipala DATE: 6-27-80

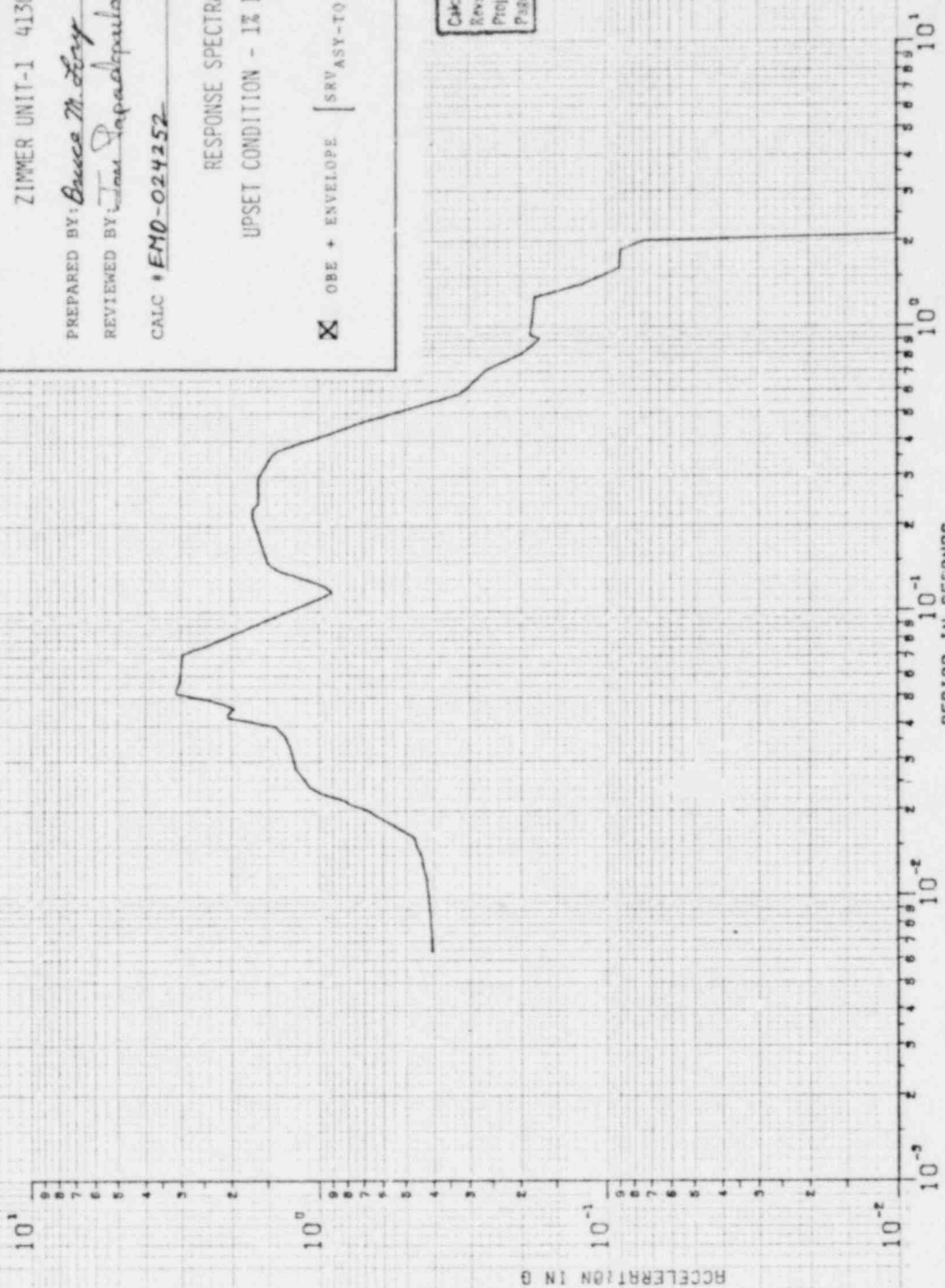
CALC # EMO-024252 PAGE 27 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No. EMO-024252
Rev: 01 Date: 7/9/80
Proj. No. 4130-15
Page 58 of 56



PERIOD IN SECONDS

VS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 546'-0" REV 01

RUN ID: 936 BML 06/21/80

K&E KEUFFEL & ESSER CO

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Fry DATE: 6/20/80

REVIEWED BY: Tom Papadopoulos DATE: 6-27-80

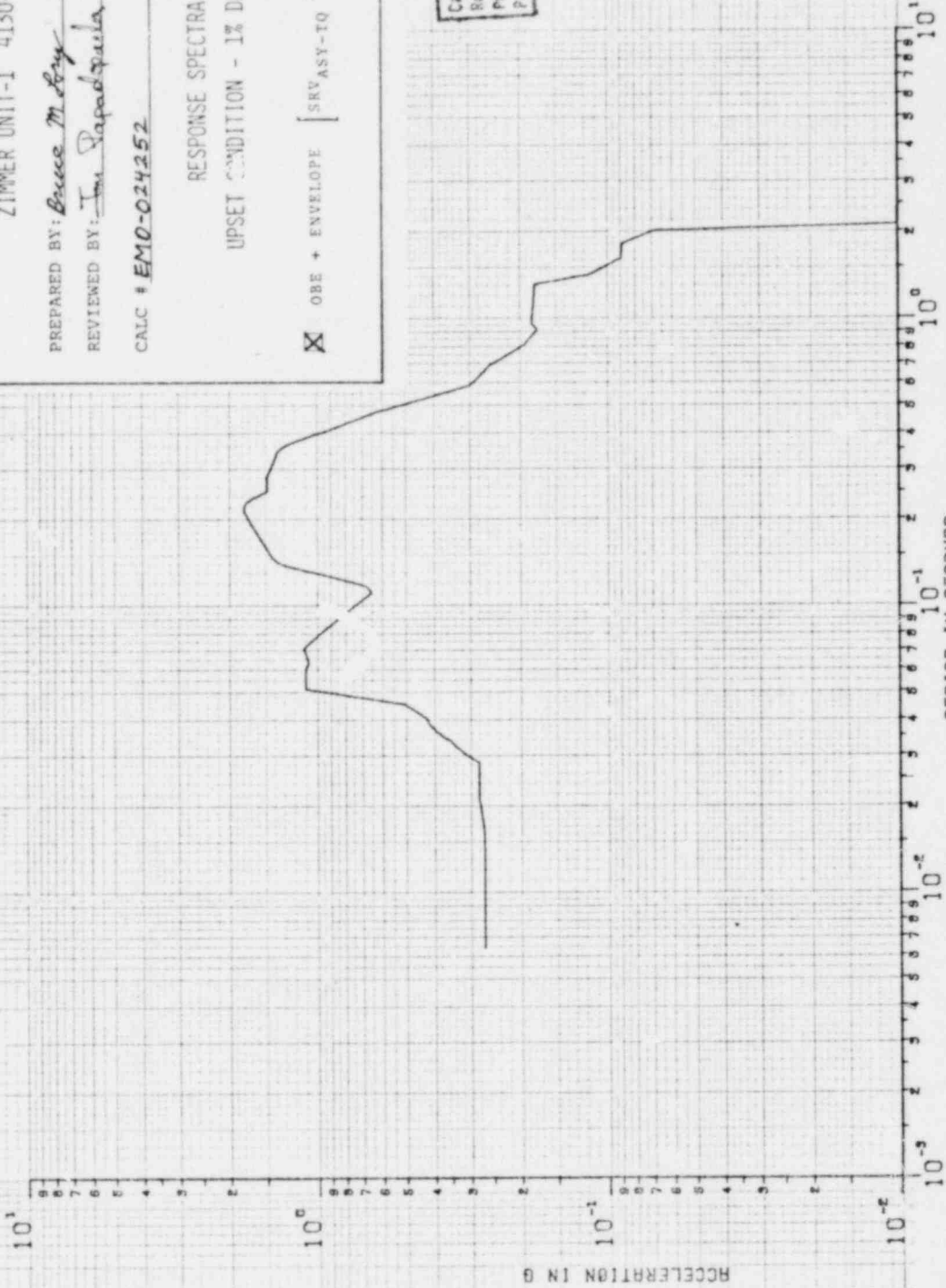
CALC # EMD-024252 PAGE 28 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No: EMD-024252
Rev: 02 Date: 7/2/80
Proj. No: 4130-15
Page: 51 of 52



PERIOD IN SECONDS

VW COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 546'-0" REV 01

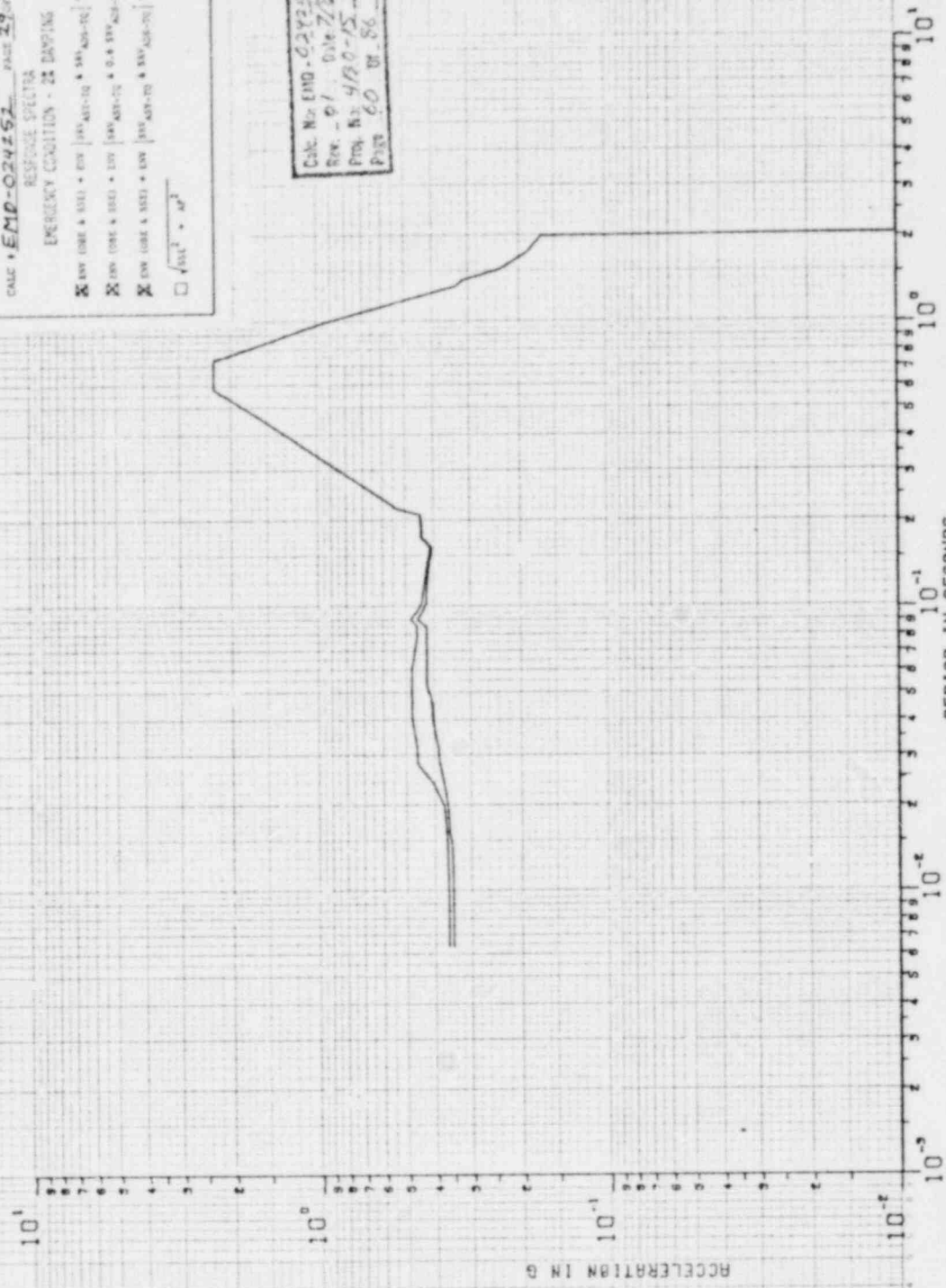
RVN ID: 936 BAIL 06/20/80

100% KEUFFELBERGER CO.

MADE IN U.S.A. FULL SCALE 2.5 INCHES

ZIMMER UNIT-1, 4130-15
 PREPARED BY *George M. Kelly* DATE: *6/11/80*
 REVISION BY *Tom S. ...* DATE: *6-22-80*
 CALC: *EMD-024157* PAGE *29* OF *52*
 RESPONSE SPECTRA
 EMERGENCY CONDITION - 22 BANGING
 ENV (0.8K & 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K)
 ENV (0.8K & 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K)
 ENV (0.8K & 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K) & ENV (0.5K, 0.8K, 1.0K)
 $\sqrt{ENV^2} \cdot M^2$

Calc No: EMD-024157
 Rev: 01 Date: 7/2/80
 Proj No: 4130-15
 Page 60 of 86



H0-NS ABSV(C2 + C3 + C1) ZIMMER REACTOR BLDG. OF-2% 546'-0" REV. 01
 NE NEUFEL-ESSECO
 RUN ID: 161BML 06/13/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Fry DATE: 6/13/80

REVIEWED BY: Tom Repachula DATE: 6-27-80

CALC # EMD-024252 PAGE 30 OF 52

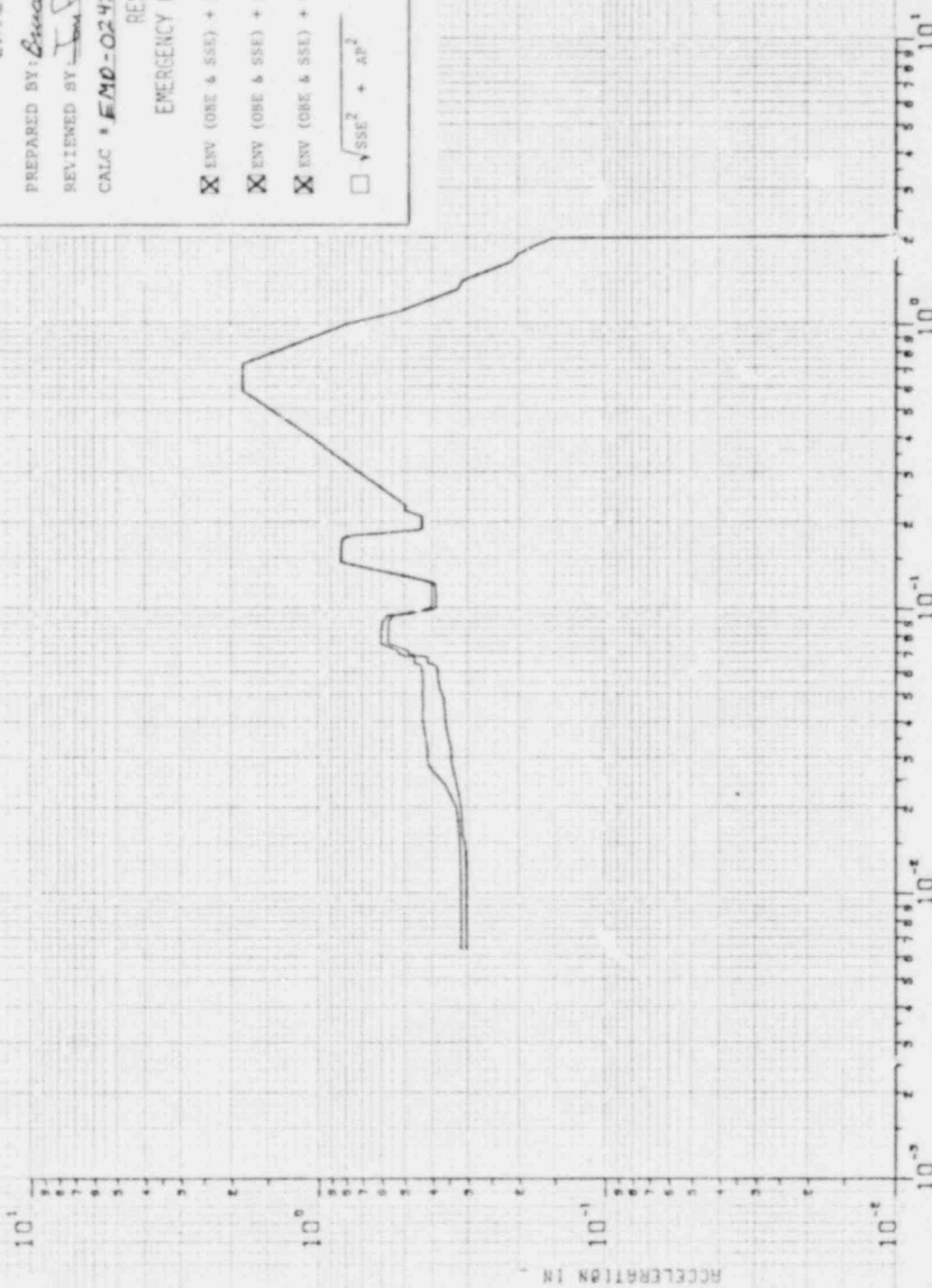
RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CRG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2

$\sqrt{SSE^2 + AP^2}$

Calc. No. EMD-024252
 Rev. 01 Date: 7/5/80
 Proj. No. 4130-15
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HQ-EW ABSV(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 546'-0" REV. 01

WSE SEUFFEL & ESSER CO.

RUN 20 161 BAIL 6/13/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/13/80

REVIEWED BY: Tom Papadopoulos DATE: 6-22-80

CALC # EMO-02425Z PAGE 31 OF 52

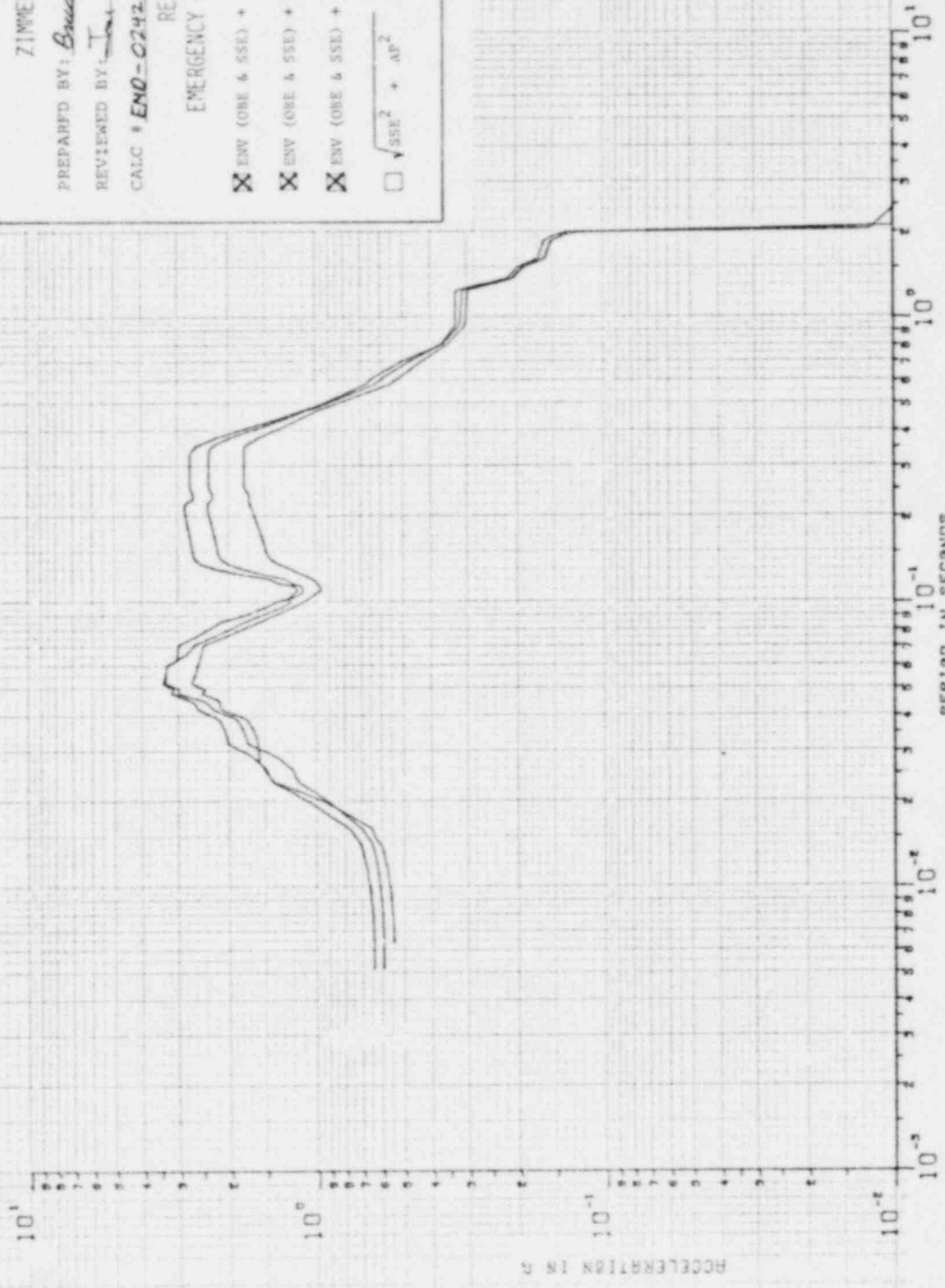
RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV SRV ASY-TQ & SRV ADS-TQ + CHG
- ENV (OBE & SSE) + ENV SRV ASY-TQ & 0.6 SRV ADS-TQ + CO 1
- ENV (OBE & SSE) + ENV SRV ASY-TQ & SRV ADS-TQ + CO 2

$\sqrt{SSE^2 + AP^2}$

Calc. No: EMO-02425Z
 Rev: 01 Date: 7/2/80
 Proj. No: 4130-15
 Page 31 of 52



VS-VS ABSV(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 546'-0" REV. 01
 HSE KEUFFELESSER CO. STAMPAID IN U.S.A. KEUFFELESSER CO. STAMPAID IN U.S.A.

Rev ID 161 BML 6/13/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Fry DATE: 6/13/80

REVIEWED BY: Jim Papadopoulos DATE: 6-27-80

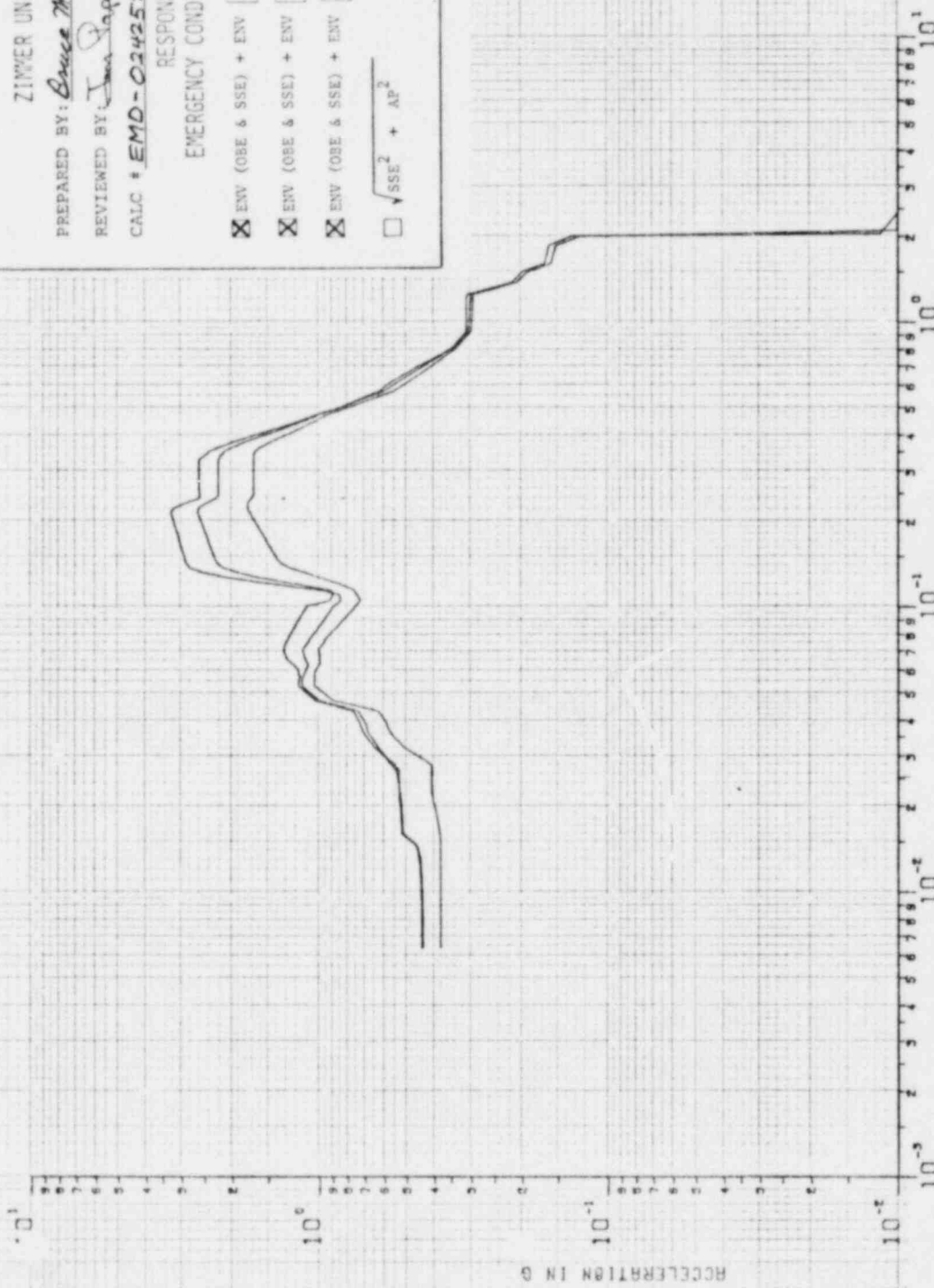
CALC # EMD-024252 PAGE 32 OF 52

RESPONSE SPECTRA
EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CHG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2

$\sqrt{SSE^2 + AP^2}$

Calc. No. EMD-024252
 Rev. 01 Date: 7/26/80
 Proj. No. 4130-15
 Page 63 of 26



VW-VW ABSV(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 546'-0" REV. 01
 H&E NEUFFELS ESSER CO. 10000 N. 15th Ave. Aurora, CO 80015

RUN ID 161 BML 6/13/80

ZIMMER UNIT-1 4120-15

PREPARED BY: Bruce M. [Signature] DATE: 6/20/80

REVIEWED BY: [Signature] DATE: 6/22/80

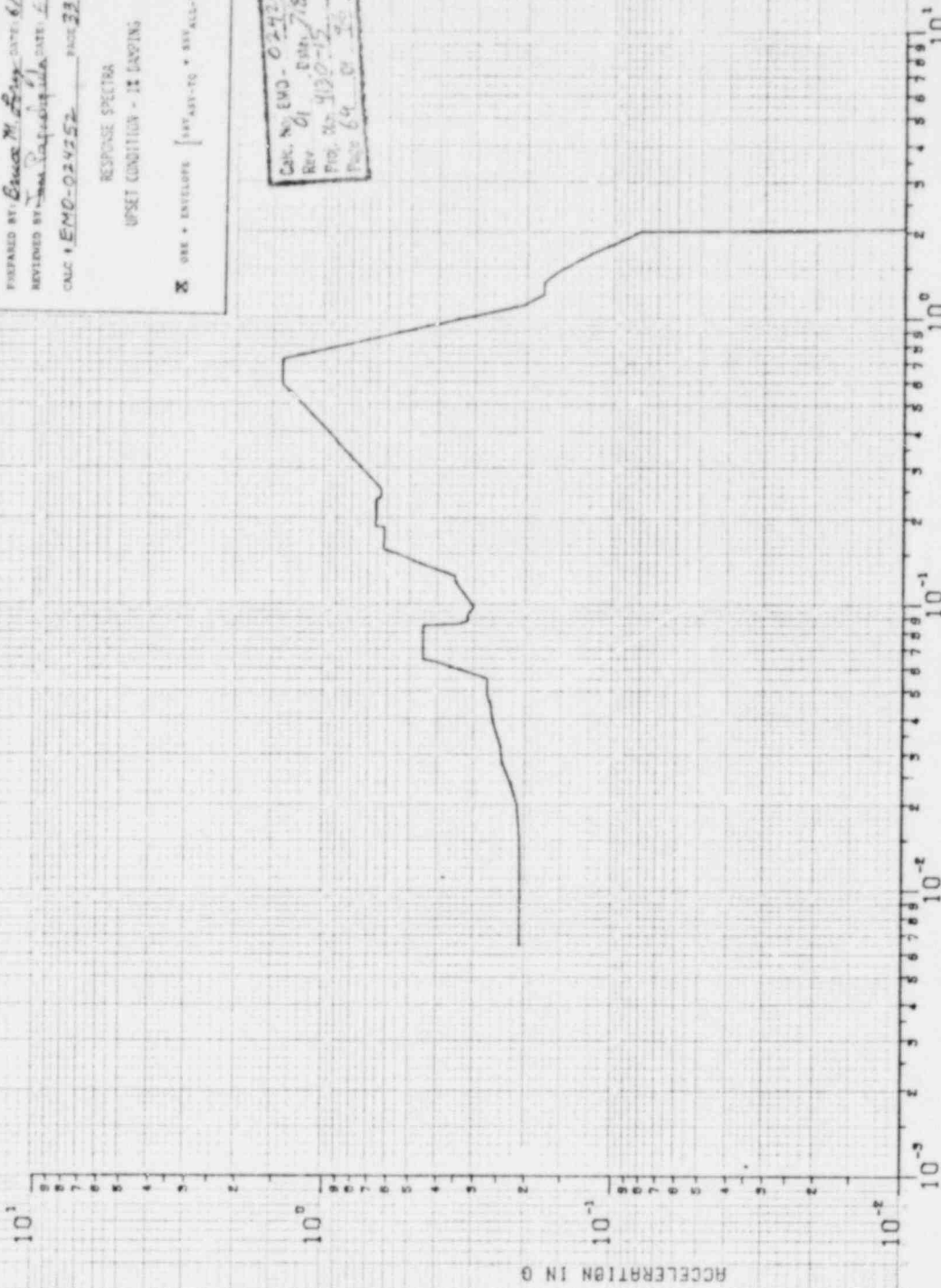
CALC: EMO-024252 PAGE 22 OF 52

RESPONSE SPECTRA

UPSET CONDITION - II DAWING

ONE - ENVELOPE [SY-ASY-TQ * SYV-ALL-TQ]

CALC. NO. EMO-024252
REV 01 E.M. 7/8/80
PRO. NO. 400-15
PAGE 64 OF 80



PERIOD IN SECONDS

NS COMB(OBE+ENV).(SRV-ASY3-TQ+SRV-ALL-TQ) ZIM REAR. BLDG. DF-1% 570'-6''

H.C. SCUFFLESSE CO

RUN ID: 932 BML 06/20/80

932BML 06/20/80 759

ZIMMER UNIT-1 4130-15

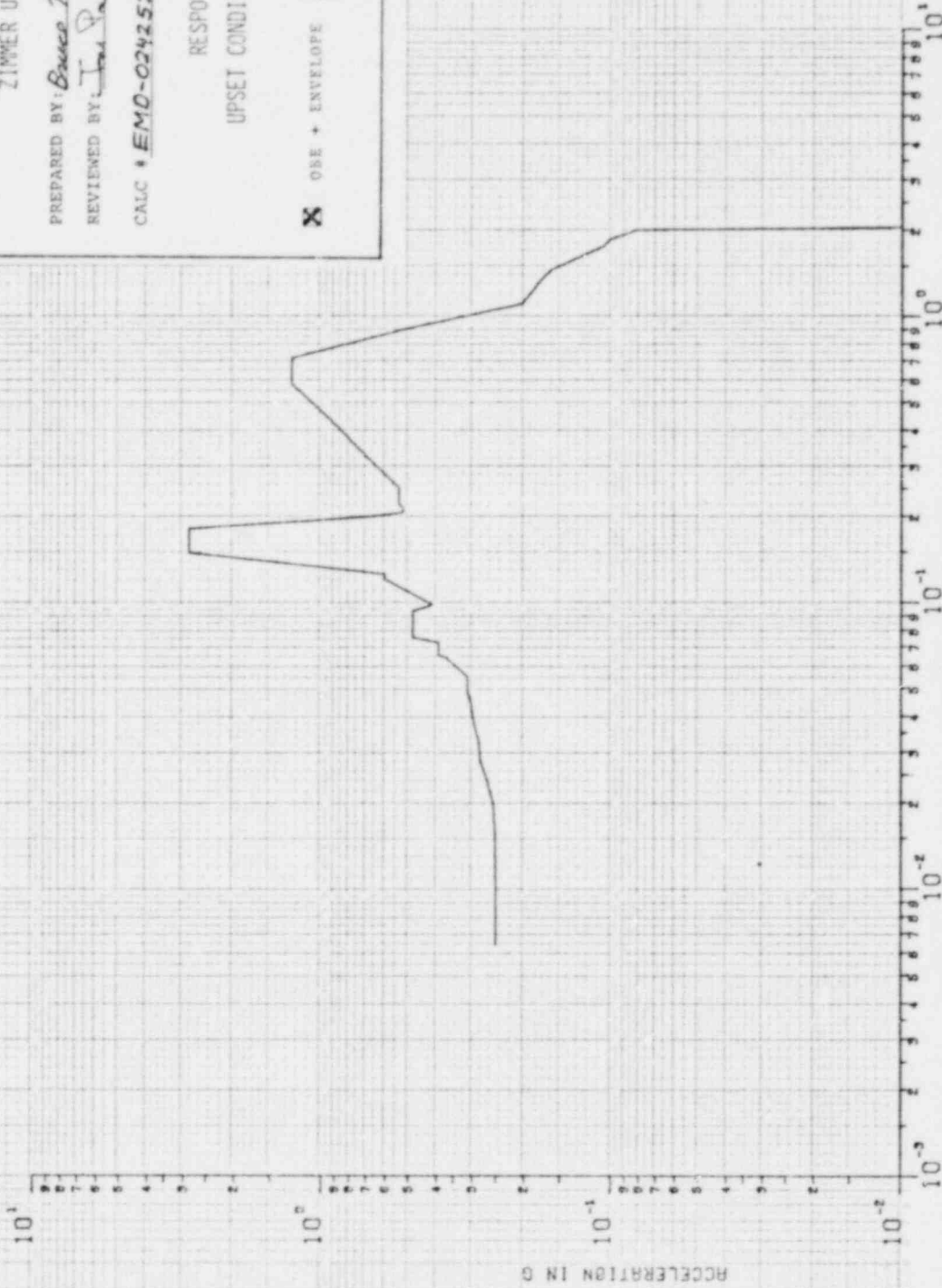
PREPARED BY: Bruce M. Long DATE: 6/20/80
REVIEWED BY: Tom Papadopoulos DATE: 6-27-80
CALC # EMO-024252 PAGE 34 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

CHK. NO. END - 621337
REV. 01 DATE: 3/9/80
PLOT NO. 4130-15
PAGE 65 OF 36



EW COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAR. BLDG. DF-1% 570'-6" REV 01
K&E ENGINEERS INC. PORTLAND, OREGON

RUN ID: 932 BML 06/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Day DATE: 6/20/80

REVIEWED BY: Tom S. Saperstein DATE: 6-27-80

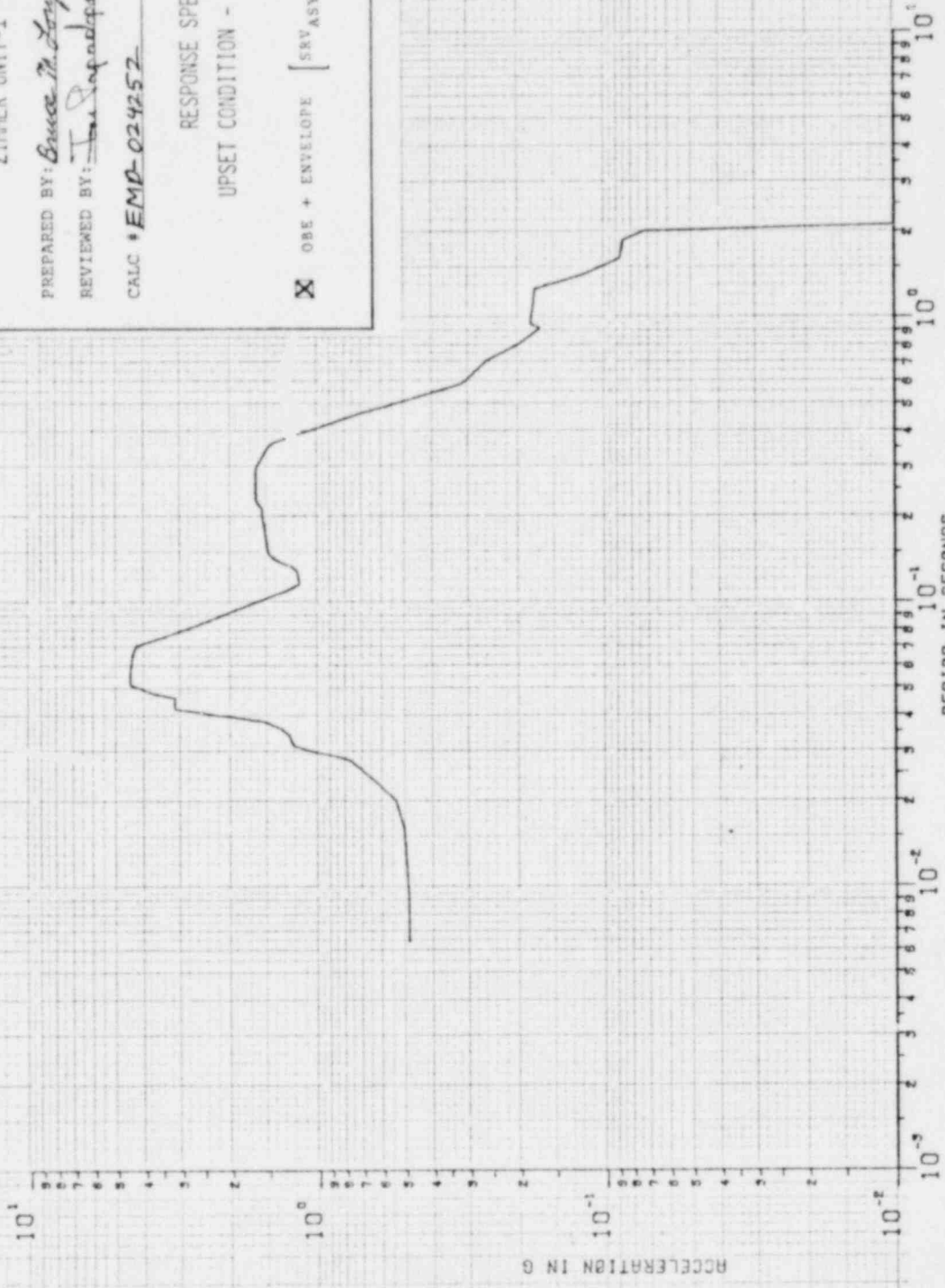
CALC # EMP-024252 PAGE 35 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_ASY-TQ + SRV_ALL-TQ]

Calc. No. EMP-024252
Rev. 2 Date: 7/8/80
Proj. No. 4130-15
Page 35 of 52



VS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 570'-6'' REV 01

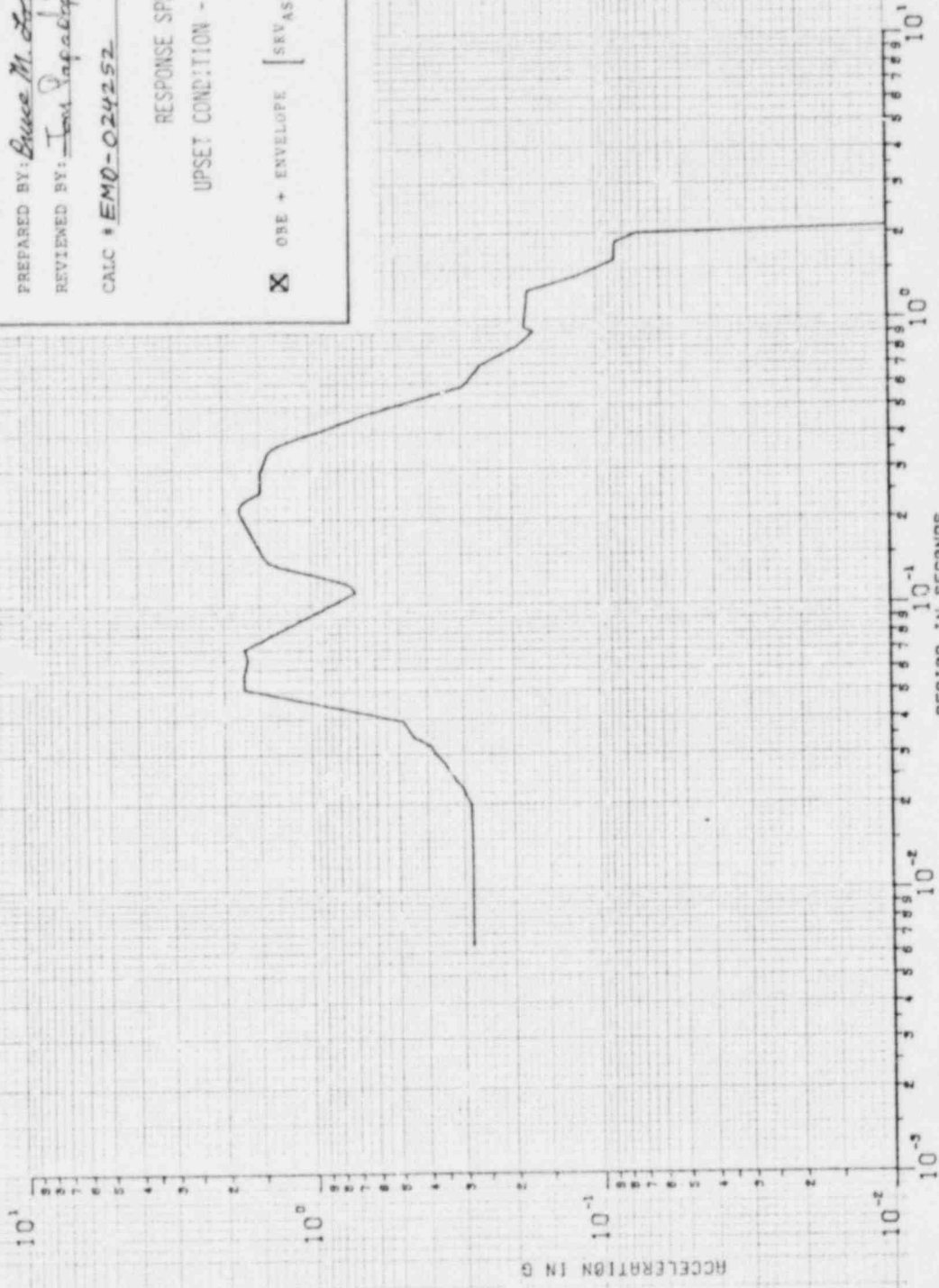
RUN ID: 932 BML 06/20/80

ZIMMER UNIT-1 4130-15
 PREPARED BY: Bruce M. Stary DATE: 6/20/80
 REVIEWED BY: Tom S. Safford DATE: 6-27-80
 CALC: EMQ-024252 PAGE 76 OF 52

RESPONSE SPECTRA
 UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc. No. EMQ-024252
 Rev. 01 Date 7/25/80
 Proj. No. 4130-15
 Page 67 of 58



VW COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAR. BLDG. DF-1% 570'-6" REV 01
 M-E KENNEDY ASSOC. ENGINEERS, INC.

RUN ID: 932 BML 06/20/80

TYPE: DIT-1, 4130-35

PREPARED BY: Bruce T. Kelly DATE: 6/30/80
REVISIONS BY: James S. ... DATE: 6-30-80
CALC: EMD-C2-4852 PAGE 37 OF 52

RESPONSE SPECTRA

EXCITATION CONDITION: 22 DURING

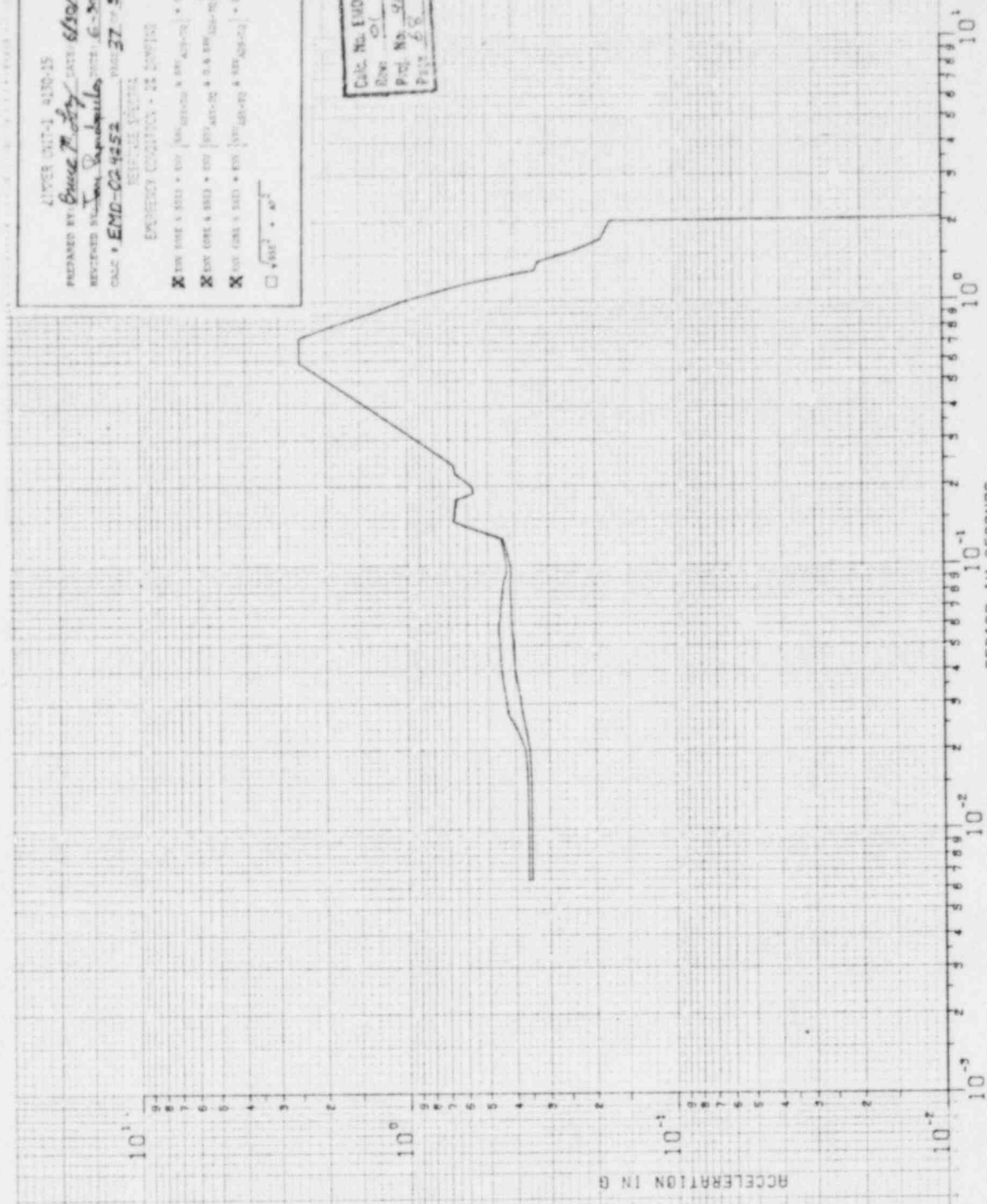
X 100 CM/S + 100 CM/S (100 CM/S + 100 CM/S) * CO 1

X 100 CM/S + 100 CM/S (100 CM/S + 100 CM/S) * CO 2

X 100 CM/S + 100 CM/S (100 CM/S + 100 CM/S) * CO 3

$\sqrt{X^2 + Y^2}$

CALC. NO. EMD-C2-4852-37
REV. OF DATE 7/1/80
PAGE NO. 4130-35
PAGE 37 OF 52



PERIOD IN SECONDS

HQ-NS OF -2% ABSV(C2 + C3 + C4) ZIMMER REACTOR BLDG. ELEV. 570'-6" REV. 0

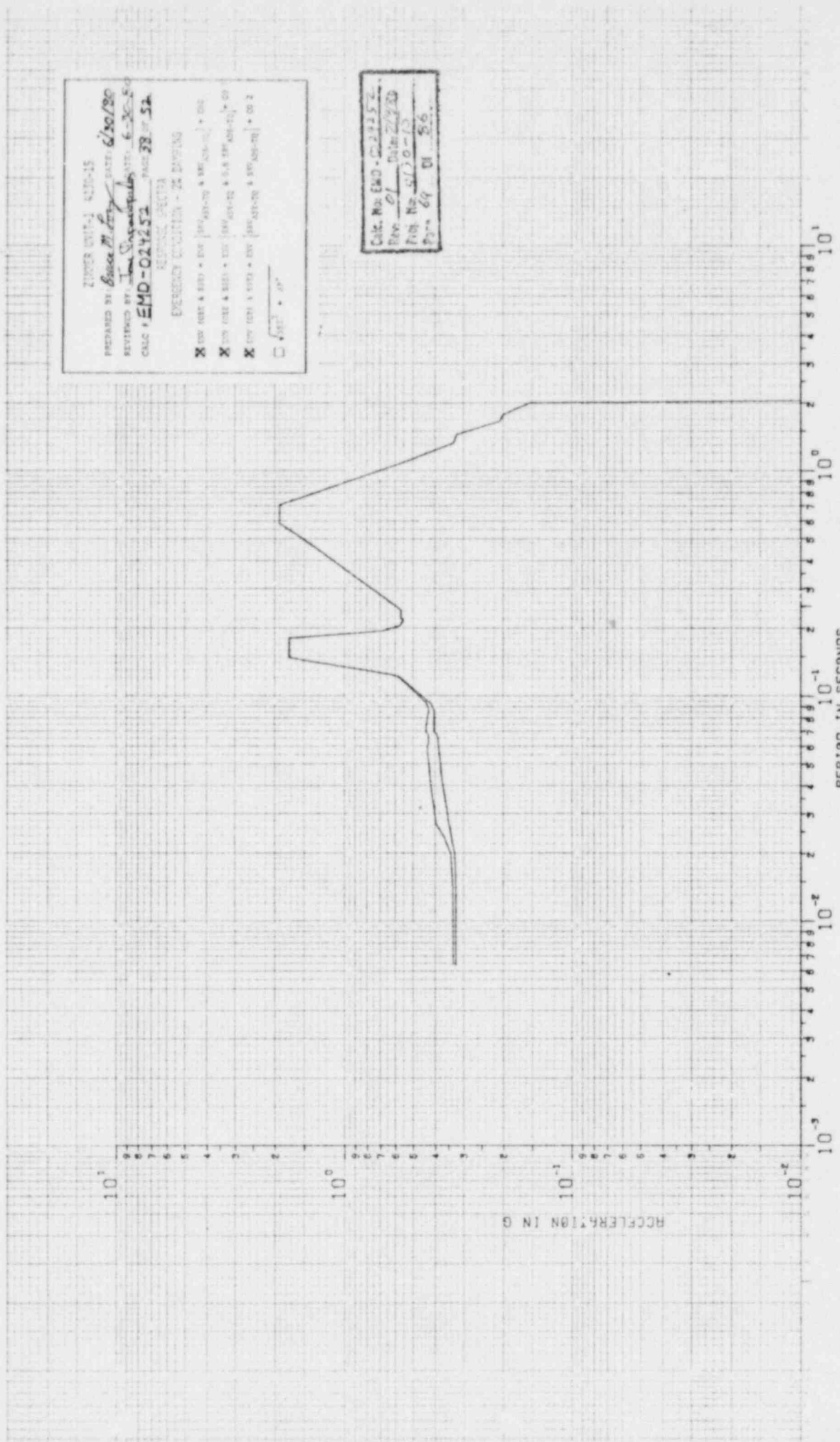
KE KEUFELLESERCO PRINTED IN USA

RUN ID: 185 BML 06/30/80

185BML 06/30/80

ZIMMER UNIT-1 4270-25
 PREPARED BY *George M. Fry* DATE: 6/30/60
 REVIEWED BY: *Tom S. ...*
 CALC: EMD-027252 PAGE 22 OF 52
 RESPONSE SPECTRA
 EXERCISE CONDITION - 2% DRIVING
 X 100 (100 + 100) + 100 (100 + 100) + 100 (100 + 100) + 100
 X 100 (100 + 100) + 100 (100 + 100) + 100 (100 + 100) + 100
 X 100 (100 + 100) + 100 (100 + 100) + 100 (100 + 100) + 100
 □ $\sqrt{100^2 + 100^2}$

Calc. No: EMD-027252
 Rev: 01 Date: 2/2/60
 Proj. No: 5730-13
 Pgs: 69 Of 56



H0-EW DF-2% ABSV (C2 + C3 + C4) ZIMMER REACTOR BLDG. ELEV. 570'-6" REV. 01
 KEUFFEL & ESSER CO. MADE IN U.S.A.

RUN 10:185 BML 06/30/60

85BML END OF PLOT

ZIMMER UNIT-1 4130-15

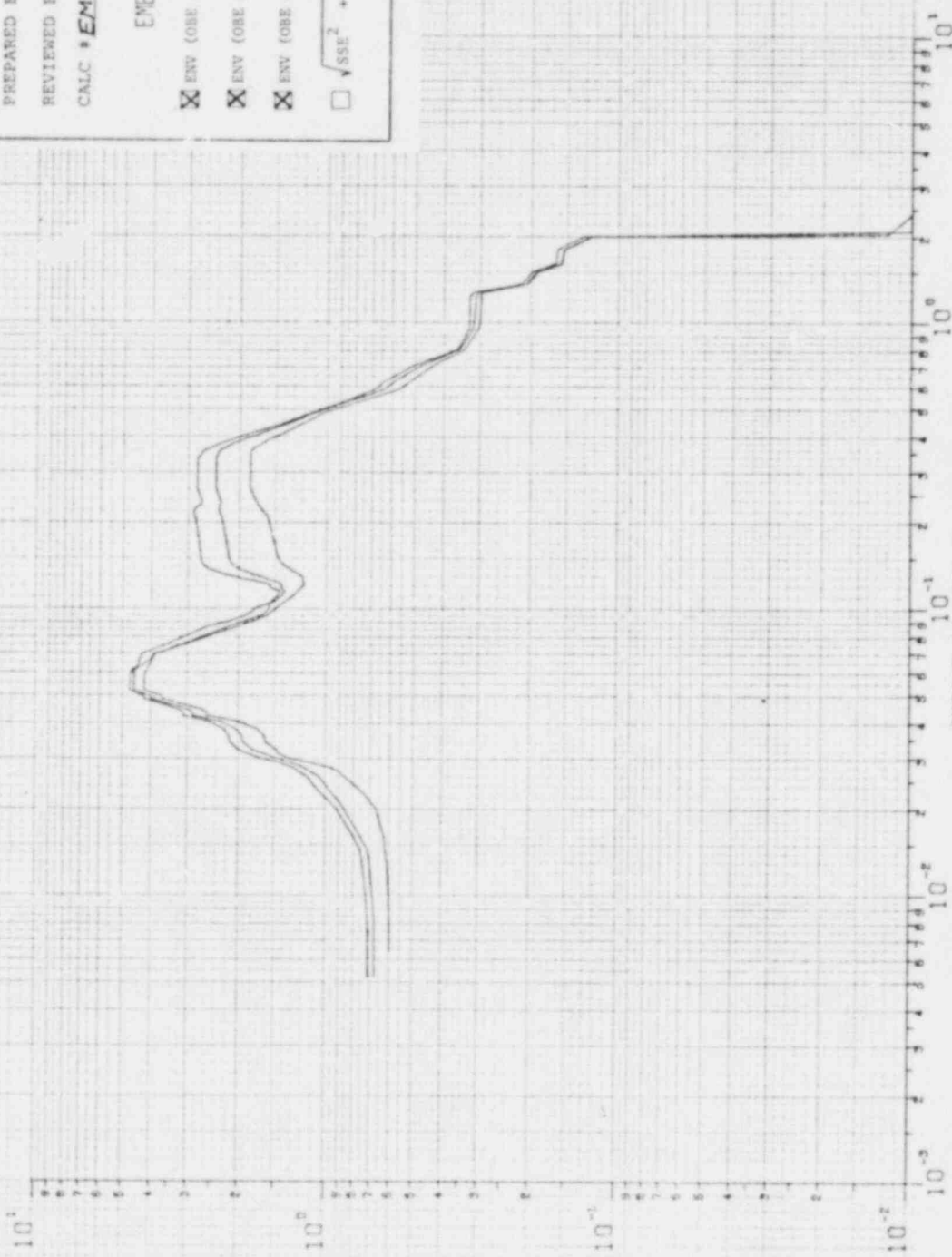
PREPARED BY: Bruce M. Long DATE: 6/30/80
REVIEWED BY: Tom Papadopoulos DATE: 6-30-80
CALC # EMD 024252 PAGE 39 OF 52

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{AST-TQ} & SRV_{ADS-TQ}] + CRG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{AST-TQ} & SRV_{ADS-TQ}] + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc. No. EMD-024252
 Rev. of. Date 7/2/80
 Proj. No. 4130-15
 Page 70 of 85



VS-VS DF-2% ABSV(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 570'-6" REV. 01
 K-E NEUTREX/ESSERCO PROJECT: MUSA

RUN ID: 185 BML 06/30/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/30/80

REVIEWED BY: Tom Papadopoulos DATE: 6-30-80

CALC # EMD-024252 PAGE 40 OF 52

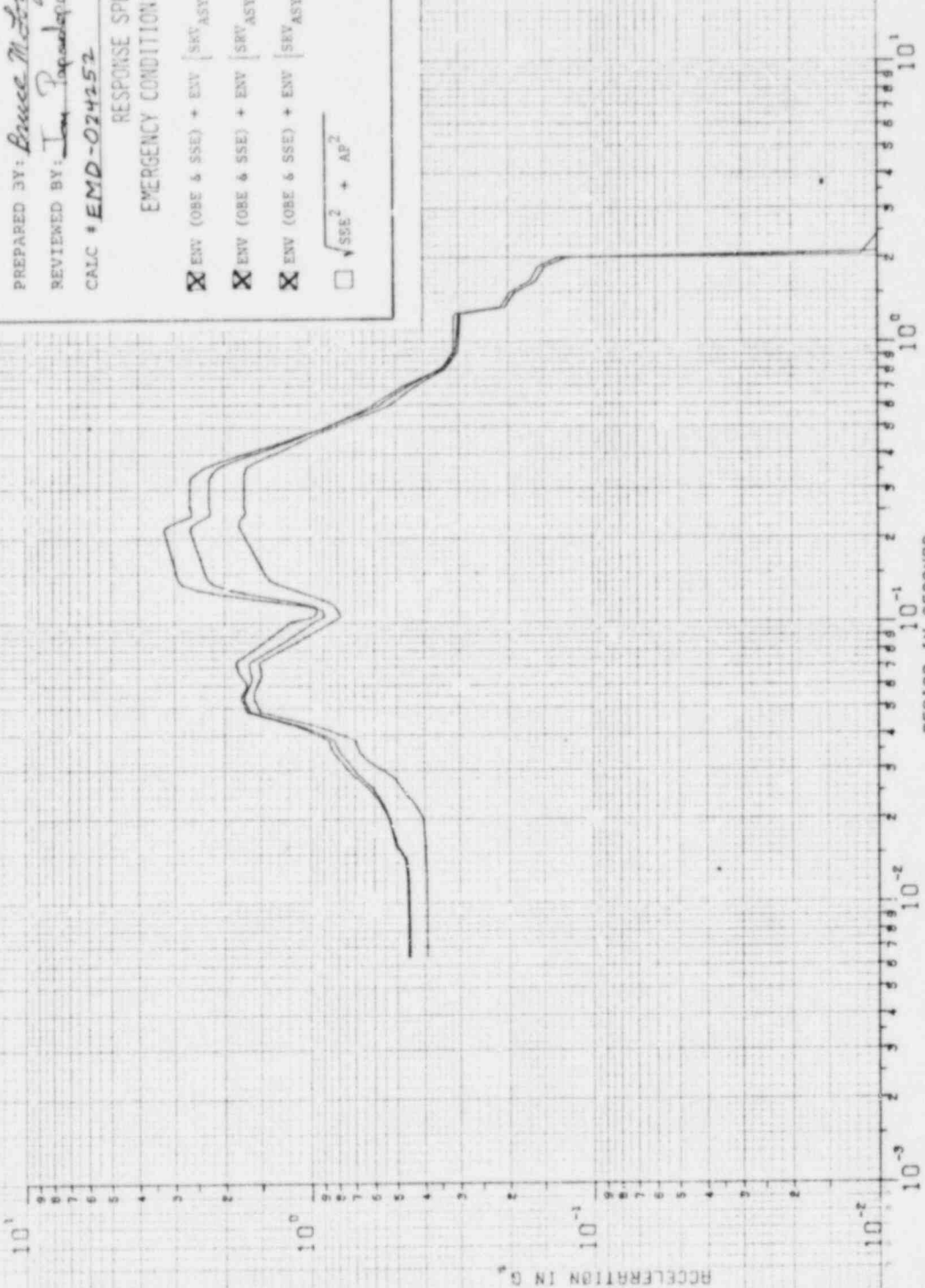
RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CRG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2

$\sqrt{SSE^2 + AP^2}$

Calc. No. C13 - C2 7057
 Date: 6/1/80
 Proj. No. 4130-15
 Page 71 of 105



VW-VW DF-2% RSV(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 570'-6" REV. 01
 PERIOD IN SECONDS
 ACCELERATION IN G

NE NEUFFER ESSLER CO. MADE IN U.S.A. REFERENCE: 4-14-11-3334

RUN ID: 185 BML 06/30/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Fry DATE: 6/20/80

REVIEWED BY: Tom Sapozniko DATE: 6-27-80

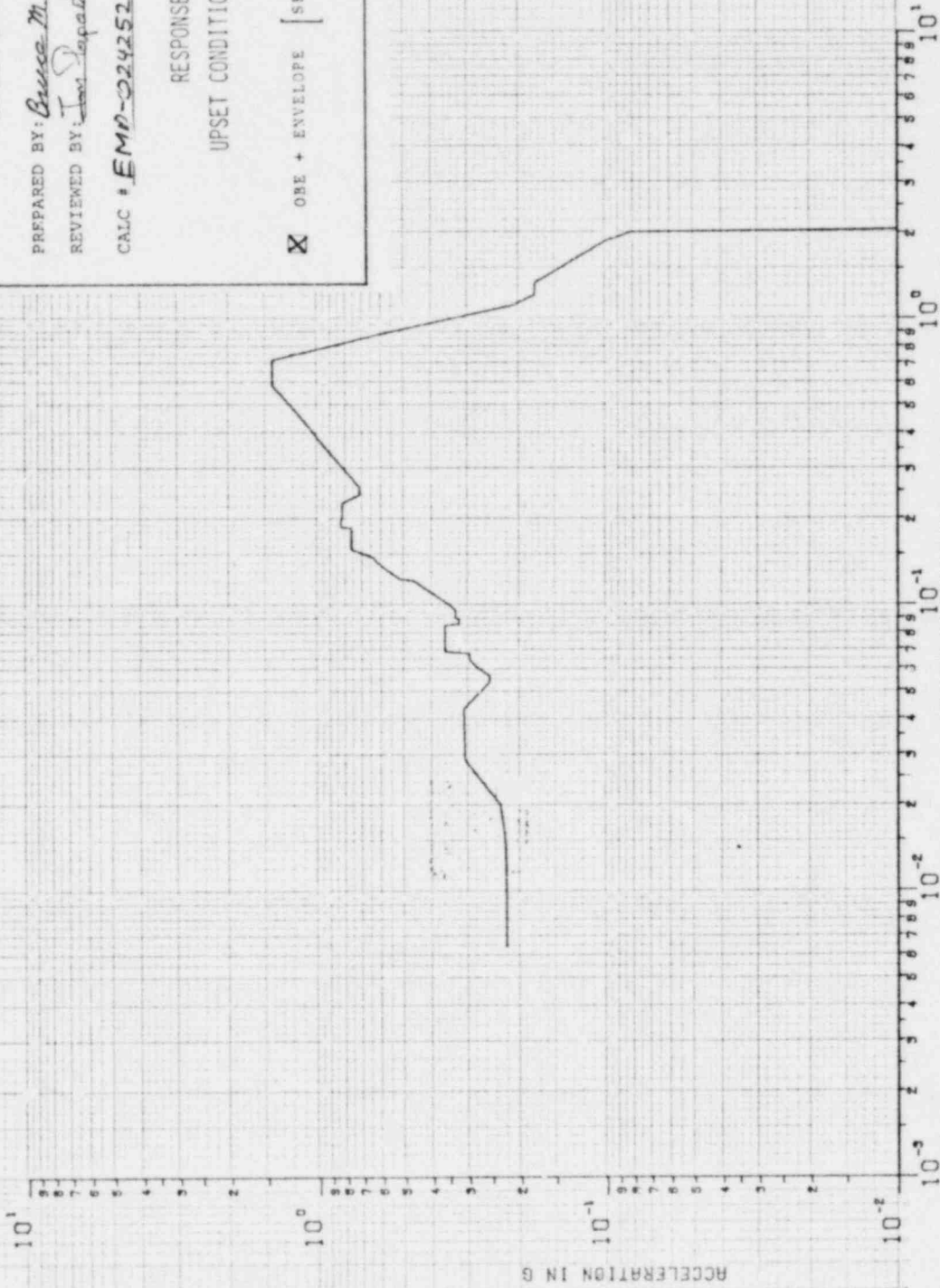
CALC # EMP-024252 PAGE 41 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc. No.	EMP-024252
Rev.	61
Date	11/5/80
Proj. No.	4130-15
Page	41 of 52



NS COMB(OBE+ENV).(SRV-ASY3-TQ+SRV-ALL-TQ) ZIM REAC. BLDG. DF-1% 593'-6" REV 01

KE KEUFFEL & ESSER CO. MADE IN U.S.A.

RUN ID: 432 BML 06/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Gray DATE: 6/20/80

REVIEWED BY: Tom Papadopoulos DATE: 6-22-80

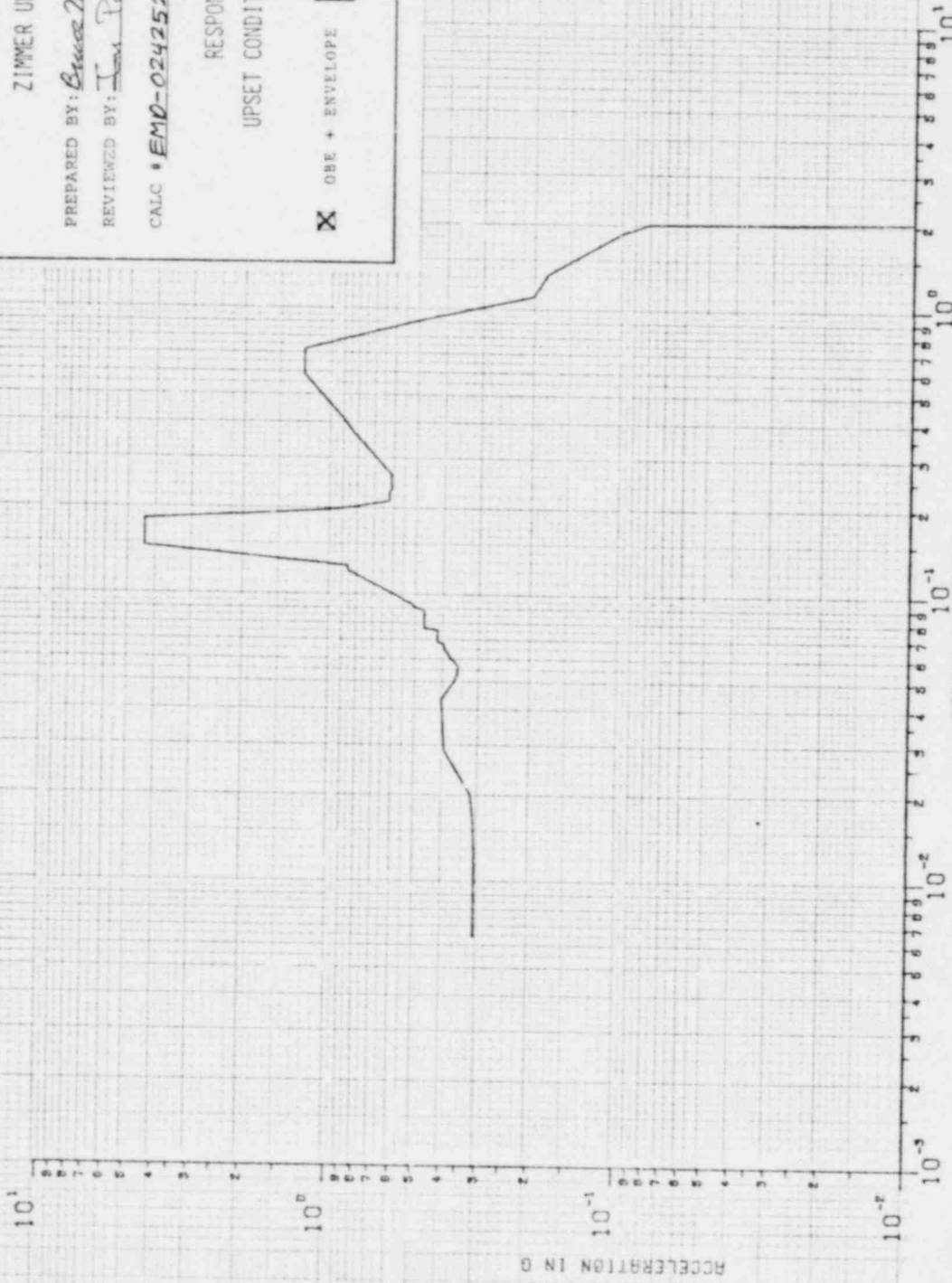
CALC # EMD-024252 PAGE 42 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc. No. EMD-024252
Rev. 01 Date: 7/20/80
Proj. No. 4130-15
Page 42 of 52



PERIOD IN SECONDS

EW COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 593'-6" REV 01

RVN 7D: 932 BOLL 06/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Gray* DATE: *6/20/80*

REVIEWED BY: *Tom Papadopoulos* DATE: *6-27-80*

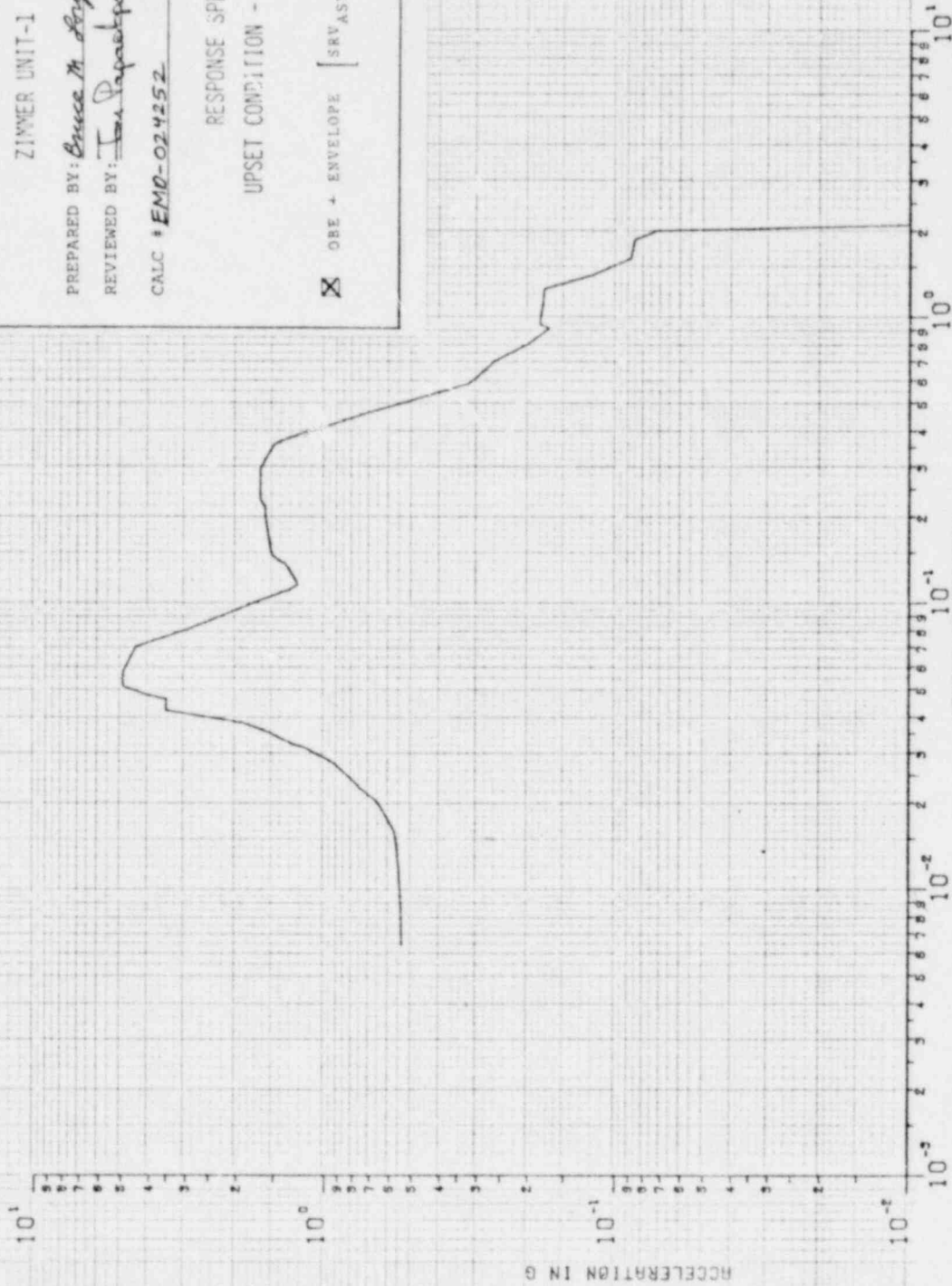
CALC # *EMD-024252* PAGE *43* OF *52*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_ASY-TQ + SRV_ALL-TQ]

Calc. No. EMD-024252-1
 Date: 6/20/80
 Proj. No. 4130-15
 Page 74 of 86



VS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 593'-6" REV 01

NEE KEMPTEL & SELLERCO INCORPORATED
 1000 UNIVERSITY BLVD. S. SUITE 1000
 SAN JOSE, CALIF. 95128

RUN ID: 932 BML 06/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Fry DATE: 6/20/80

REVIEWED BY: Tom Papadopoulos DATE: 6-22-80

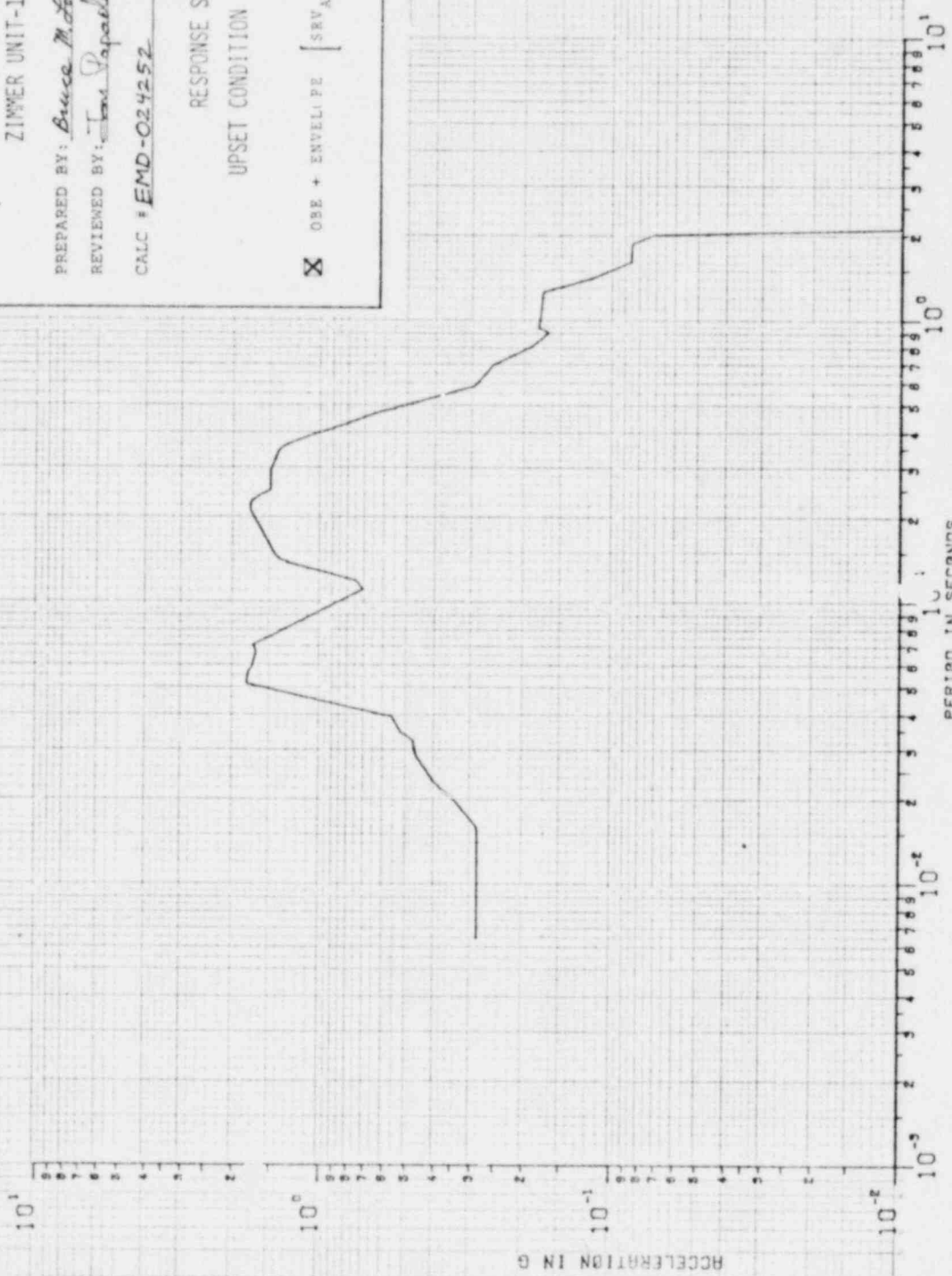
CALC # EMD-024252 PAGE 44 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

CALC # EMD-024252
REV. 01
DATE: 7/25/80
PAGE 75 OF 206



VW COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAR. BLDG. DF-1% 593'-6" REV 01
H-E KEUFFEL & ESSER CO. MADE IN U.S.A.

RUN ID: 932 BML 6/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Gray DATE: 6/16/80

REVIEWED BY: Tom Sapadapala DATE: 6-27-80

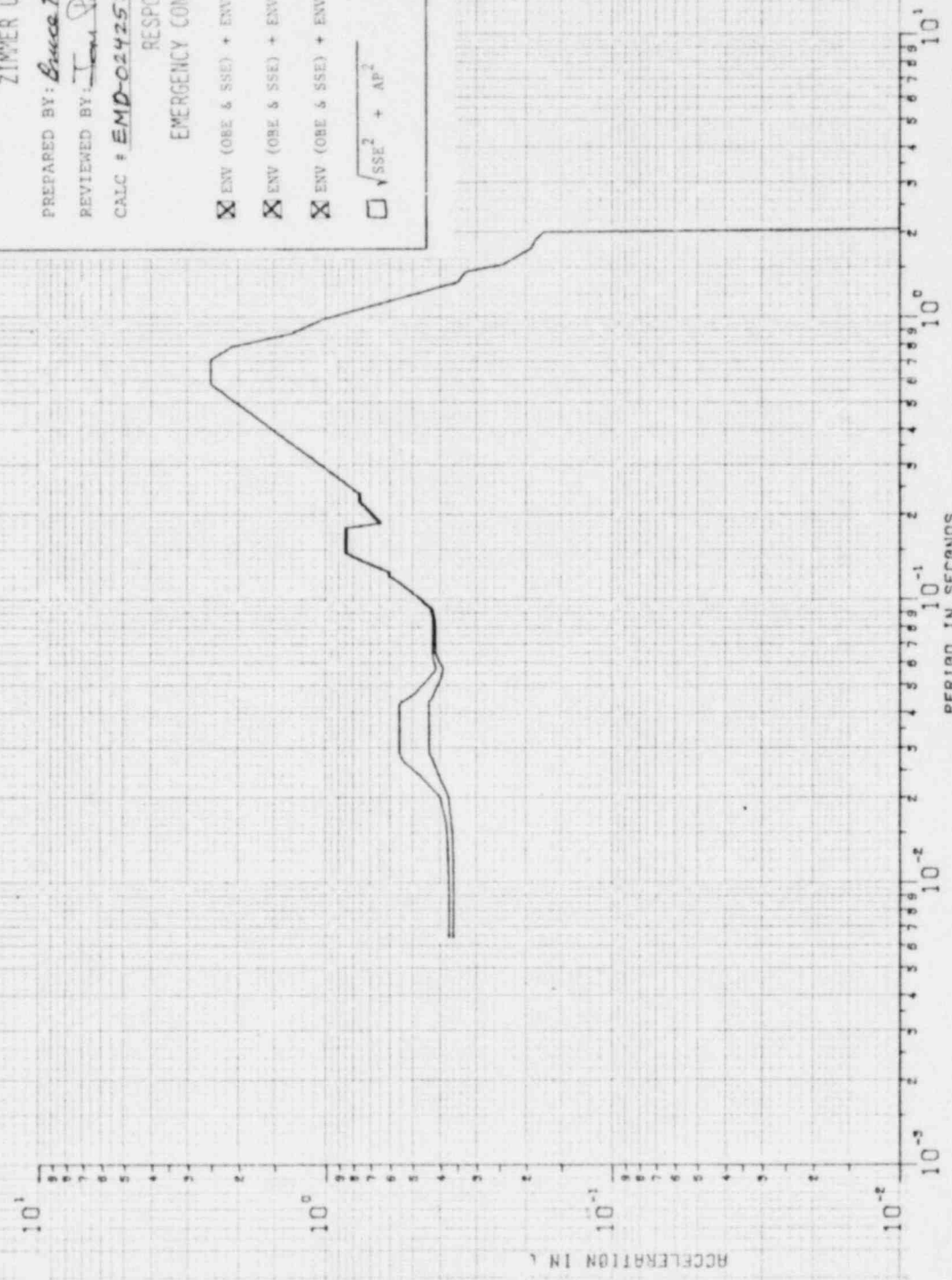
CALC # EMD-024252 PAGE 45 OF 52

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CBC
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc. No. EMD - 024252
 Rev. 01
 Proj. No. 4130-15
 Page 45 of 52



PERIOD IN SECONDS

H0-NS DF-2% ABSV(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 593'-6" REV. 01

RUN ID 899 BAL 06/16/80

ZIMMER UNIT-1 4130-15

PREPARED BY: George M. Fry DATE: 6/16/80
REVIEWED BY: Tom Repasko DATE: 6-27-80
CALC # EMD-024252 PAGE 46 OF 52

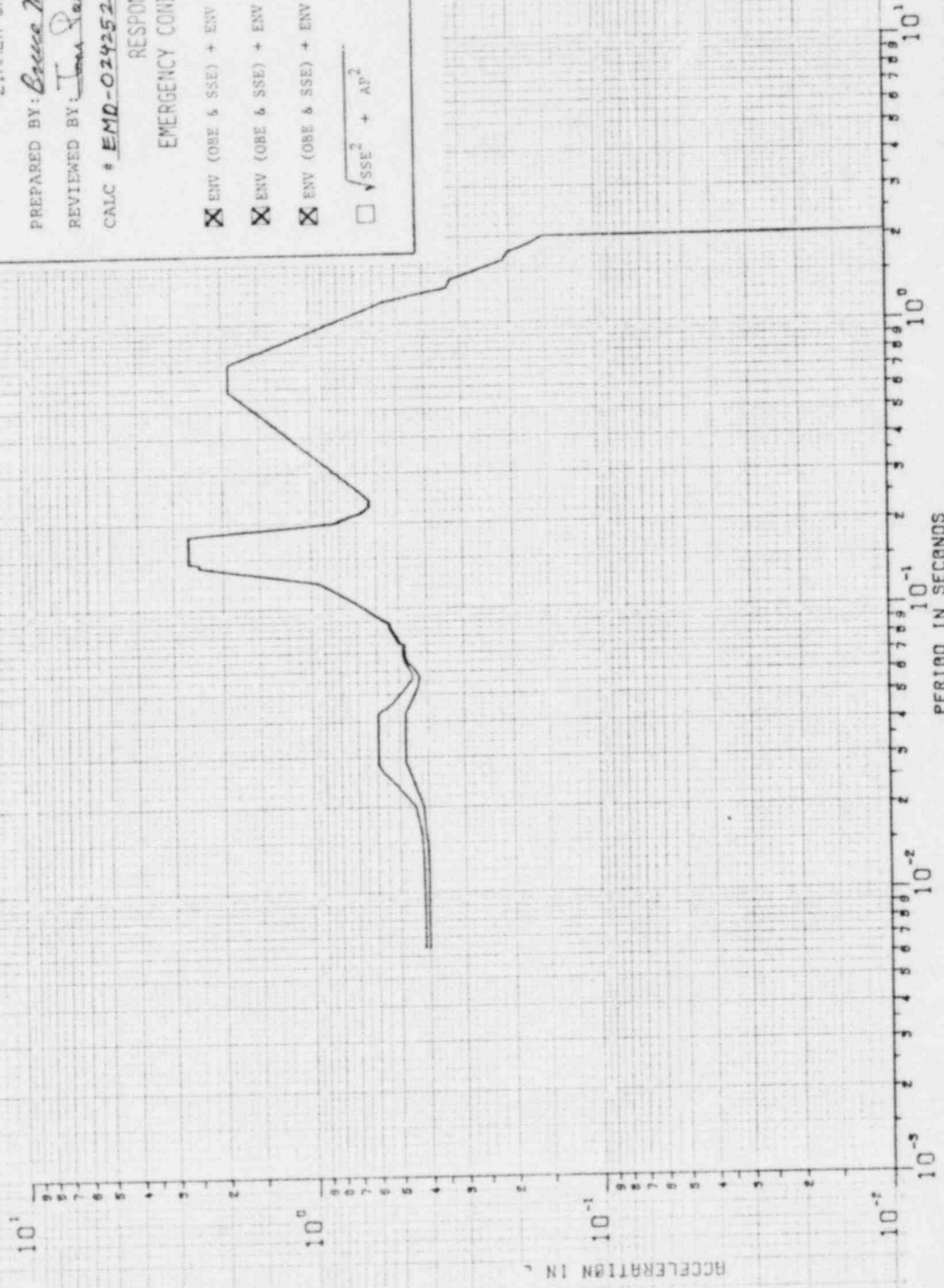
RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CHG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2

$\sqrt{SSE^2 + AI^2}$

CHK. NO. EMD - 024252
Pkt. 01 Date: 7/2/80
Plot. No. 4130-15
Page 46 of 52



PERIOD IN SECONDS

H0-EW DF-2% RBSV(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 593'-6" REV. 01

K&E SCUFFELBESSER CO. PRINTED IN U.S.A.

RUN 10 897 PML 06/16/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Long* DATE: *6/16/80*

REVIEWED BY: *Tom Papadopoulos* DATE: *6-27-80*

CALC # *EMD-024252* PAGE *47* OF *52*

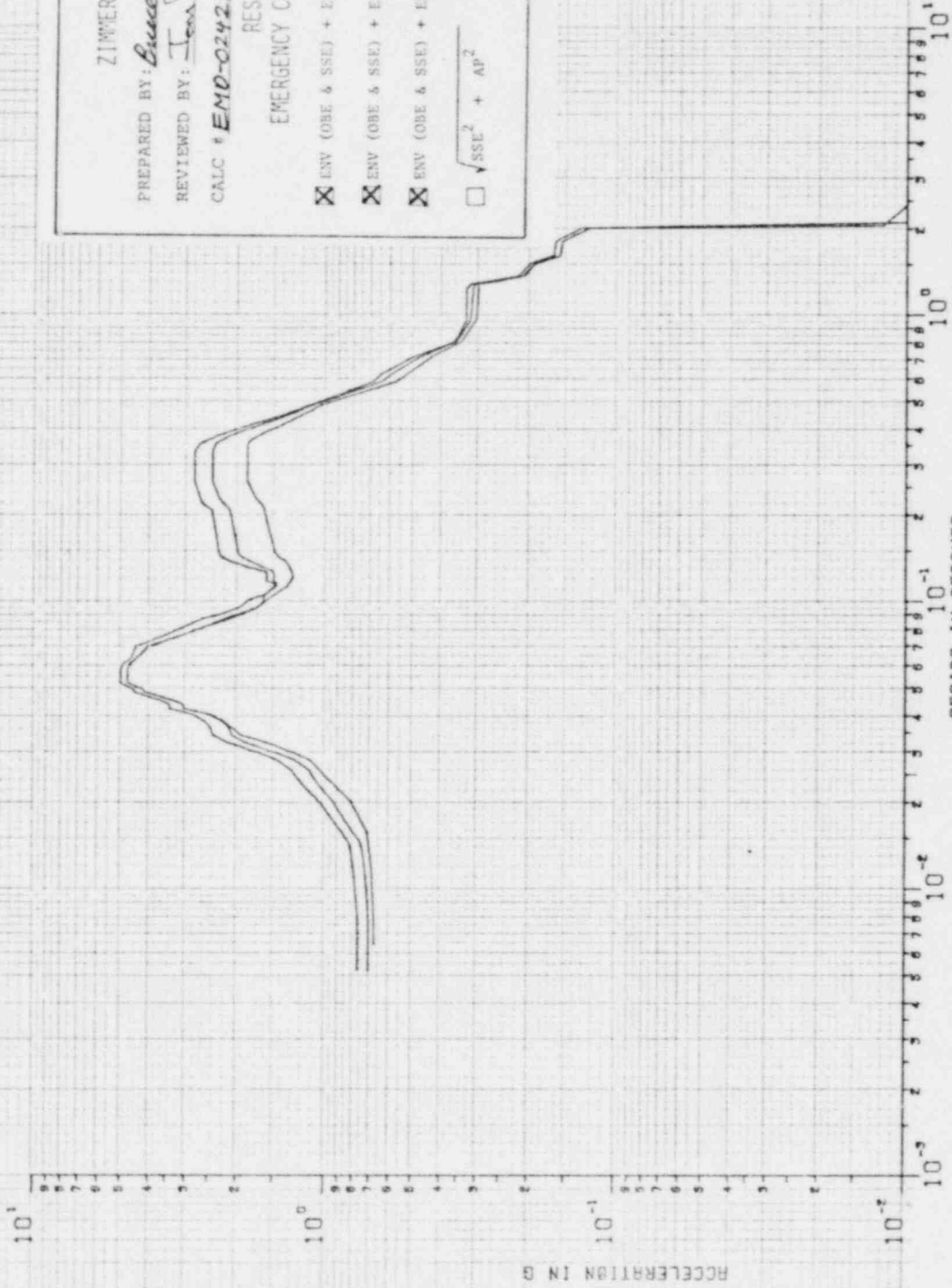
RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CHG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2

$\sqrt{SSE^2 + AP^2}$

Calc. No: *EMD-024252*
 Rev. Cl. *6/16/80*
 Proj. No. *4130-15*
 Page *47* of *52*

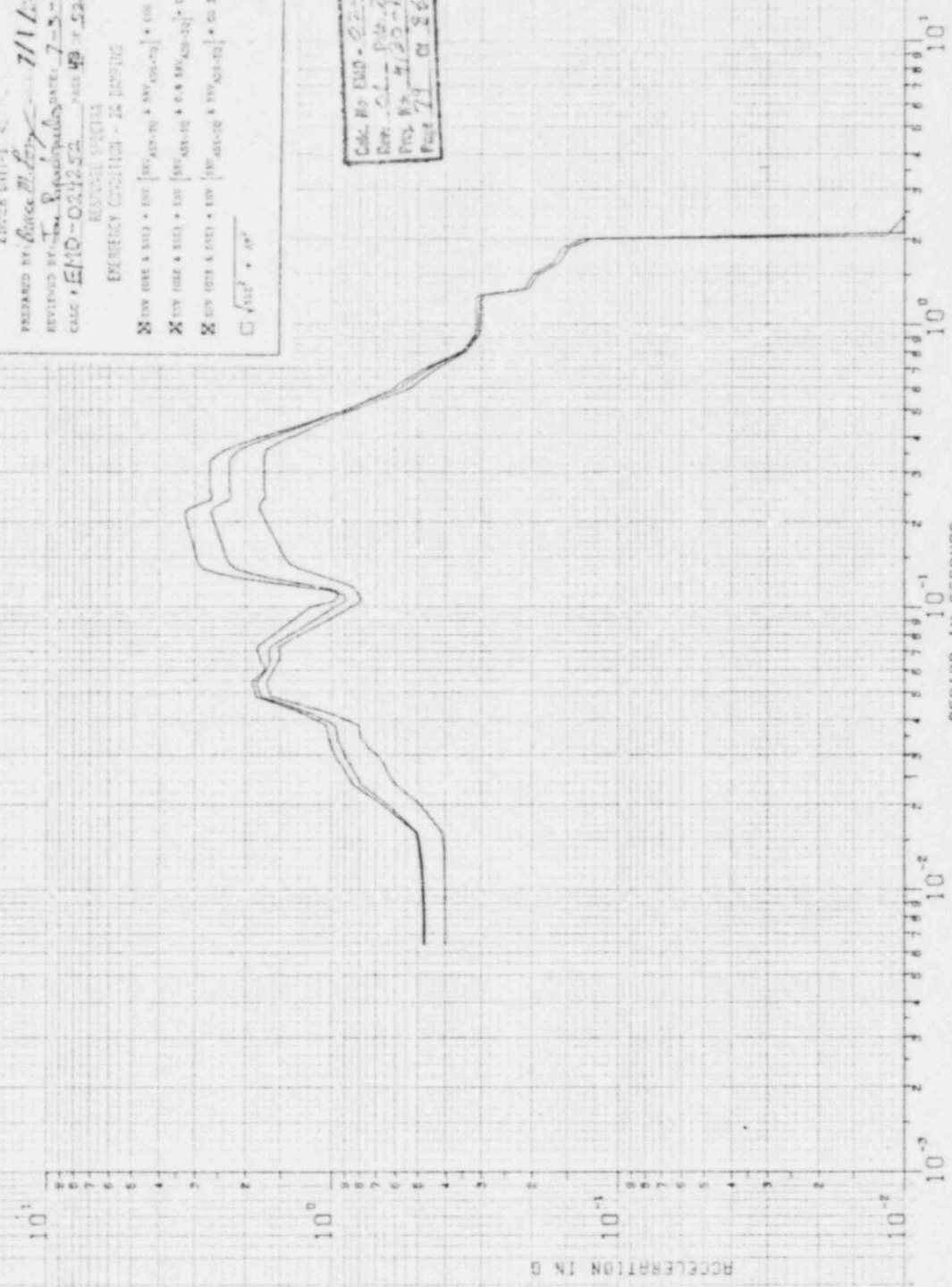


VS-VS DF-2% ABSV(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 593'-6" REV. 01

RUN ID 899 BML 06/16/80

ZIMMER UNIT-1
 PREPARED BY: *George M. Kelly* 7/1/80
 REVIEWED BY: *J. S. ...*
 CALC: **END-021252** PAGE 49 OF 52
 RESONANT FREQUENCIES
 EMERGENCY CONDITION - 24 HOURS
 X 10V (08E & 34D) • 10V (10V, 08E & 34D, 08E-24) • 0.08
 X 10V (08E & 34D) • 10V (10V, 08E & 34D, 08E-24) • 0.08
 X 10V (08E & 34D) • 10V (10V, 08E & 34D, 08E-24) • 0.08
 □ $\sqrt{1/2} \cdot 10^*$

Calc. By EMD - 021252
 Rev. 01
 Plot No. 7/1/80-15
 Page 74 of 52



PERIOD IN SECONDS
 VW-VW DF-2% ABSVC(C2 + C3 + C4) ZIMMER REACTOR BLDG. ELEV. 593'-6" REV. 01
 K-E NEUTRONICS INC. MADE IN U.S.A. FULLY COMPLIANT WITH ASME CODES

Run ID: 878 BML 07/01/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Gray DATE: 6/20/80

REVIEWED BY: Tom Papadopoulos DATE: 6-27-80

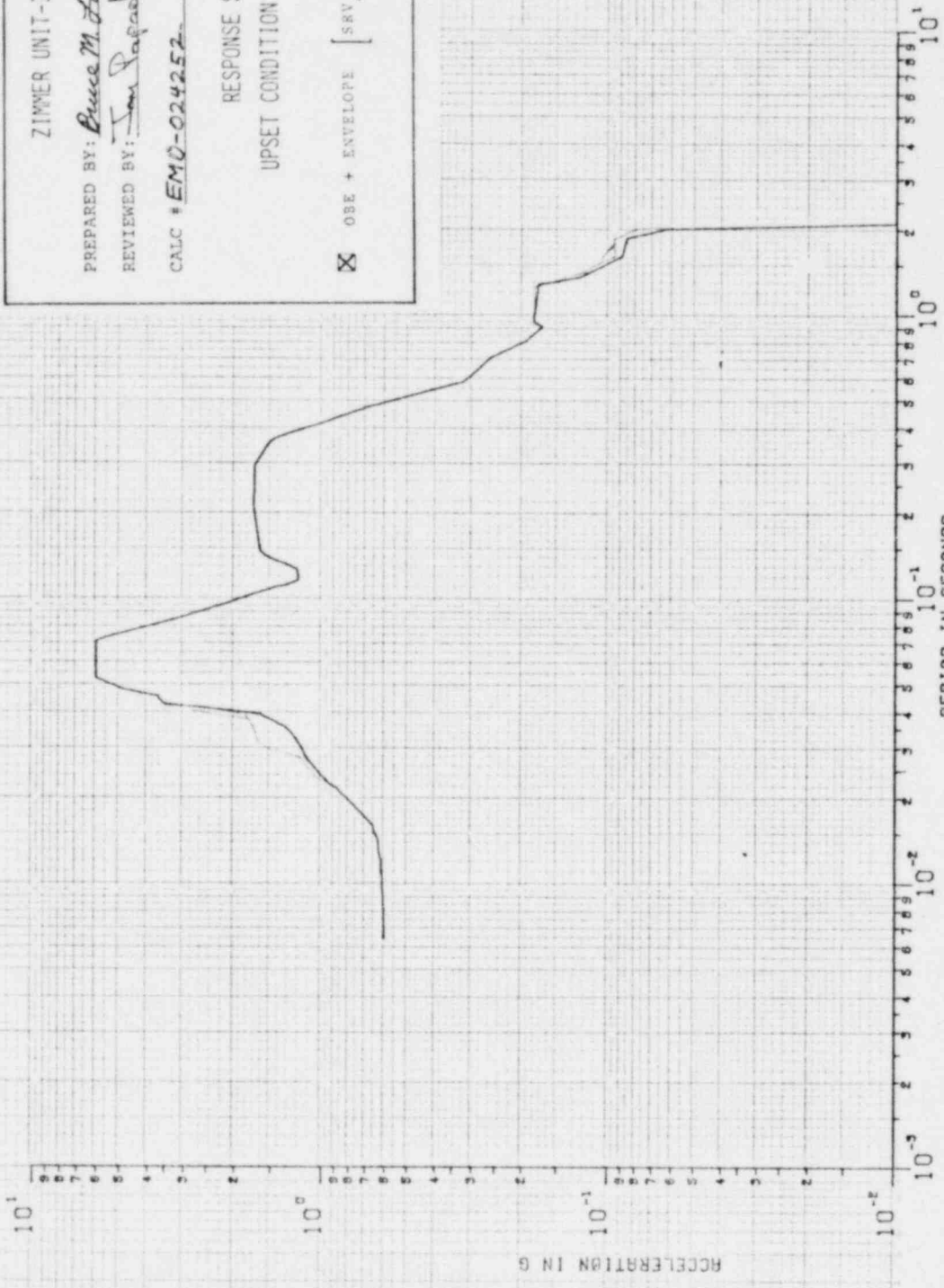
CALC # EM0-024252 PAGE 44 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No: EM0-024252
Rev: 01 Date: 7/4/80
Proj. No: 4130-15
Page: 50 of 52



VS COMB(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLOG. DF-1% 627'-9" REV 01

RUN ID: 932 BML 06/20/80

W.E. KEUFFELE & ESSER CO. FORT WORTH, TEXAS

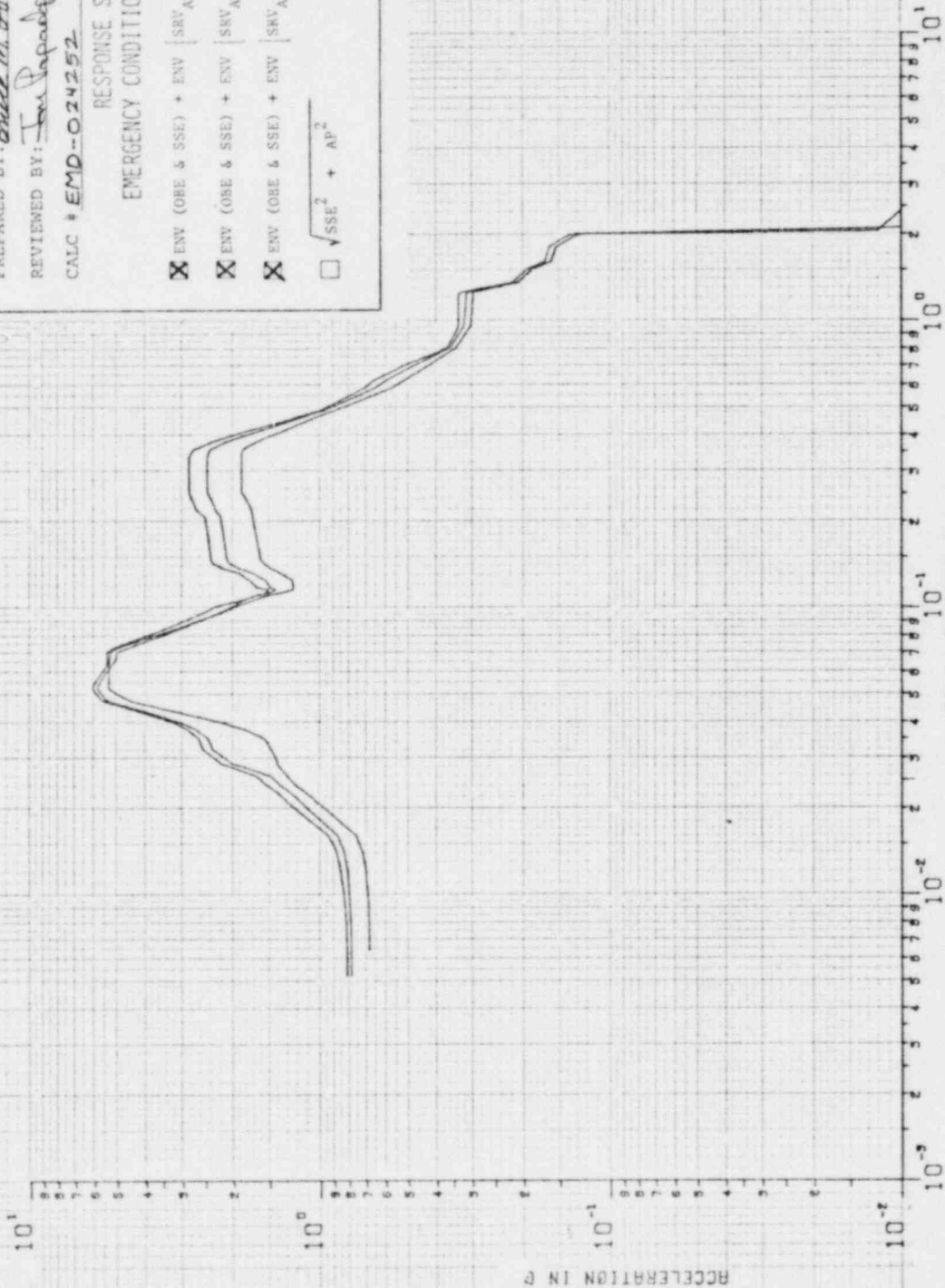
ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Stoy DATE: 6/16/80
REVIEWED BY: Joe Papadopoulos DATE: 6-27-80
CALC # EMD-024252 PAGE 50 OF 52

RESPONSE SPECTRA
EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV (SRV ASY-TQ & SRV ADS-TQ) + CHG
- ENV (OBE & SSE) + ENV (SRV ASY-TQ & 0.6 SRV ADS-TQ) + CO 1
- ENV (OBE & SSE) + ENV (SRV ASY-TQ & SRV ADS-TQ) + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc. No: EMD-024252
Rev. 01 Date: 7/27/80
Proj. No: 4130-15
Page 51 of 56



VS-VS DF-2% ABSV(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 627'-9" REV. 01
Run ID 851A BML 06/16/80

NE NEUFFEL & ESSER CO

ZIMMER UNIT-1 4130-15

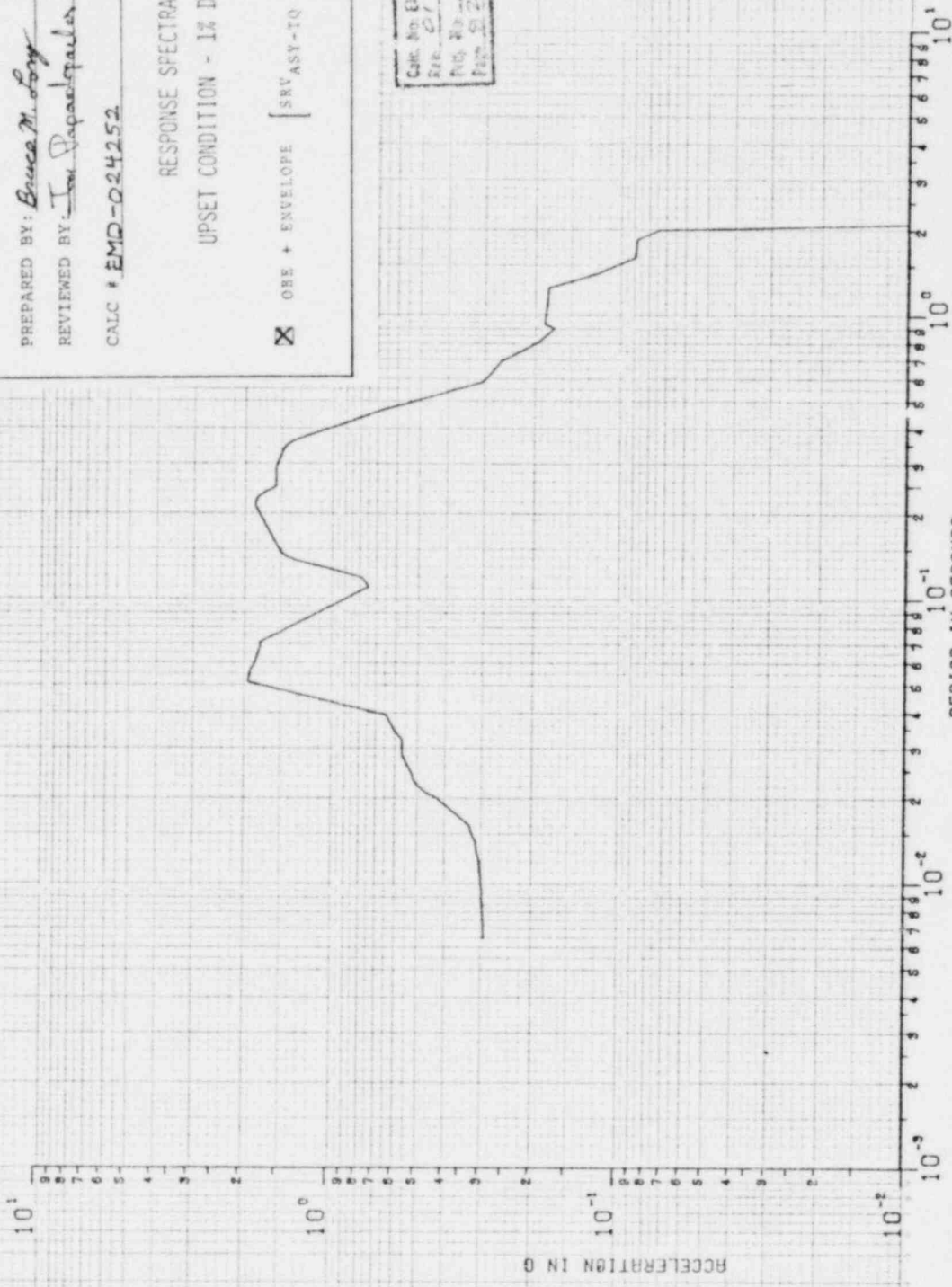
PREPARED BY: Bruce M. Long DATE: 6/27/80
REVIEWED BY: Tom Papadopoulos DATE: 6-27-80
CALC # EMD-024252 PAGE 51 OF 52

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_ASY-TQ + SRV_ALL-TQ]

Calc. No. EMD-024252
REV. 01 P. 2/23
NO. 11/30-3
PAGE 51 OF 52



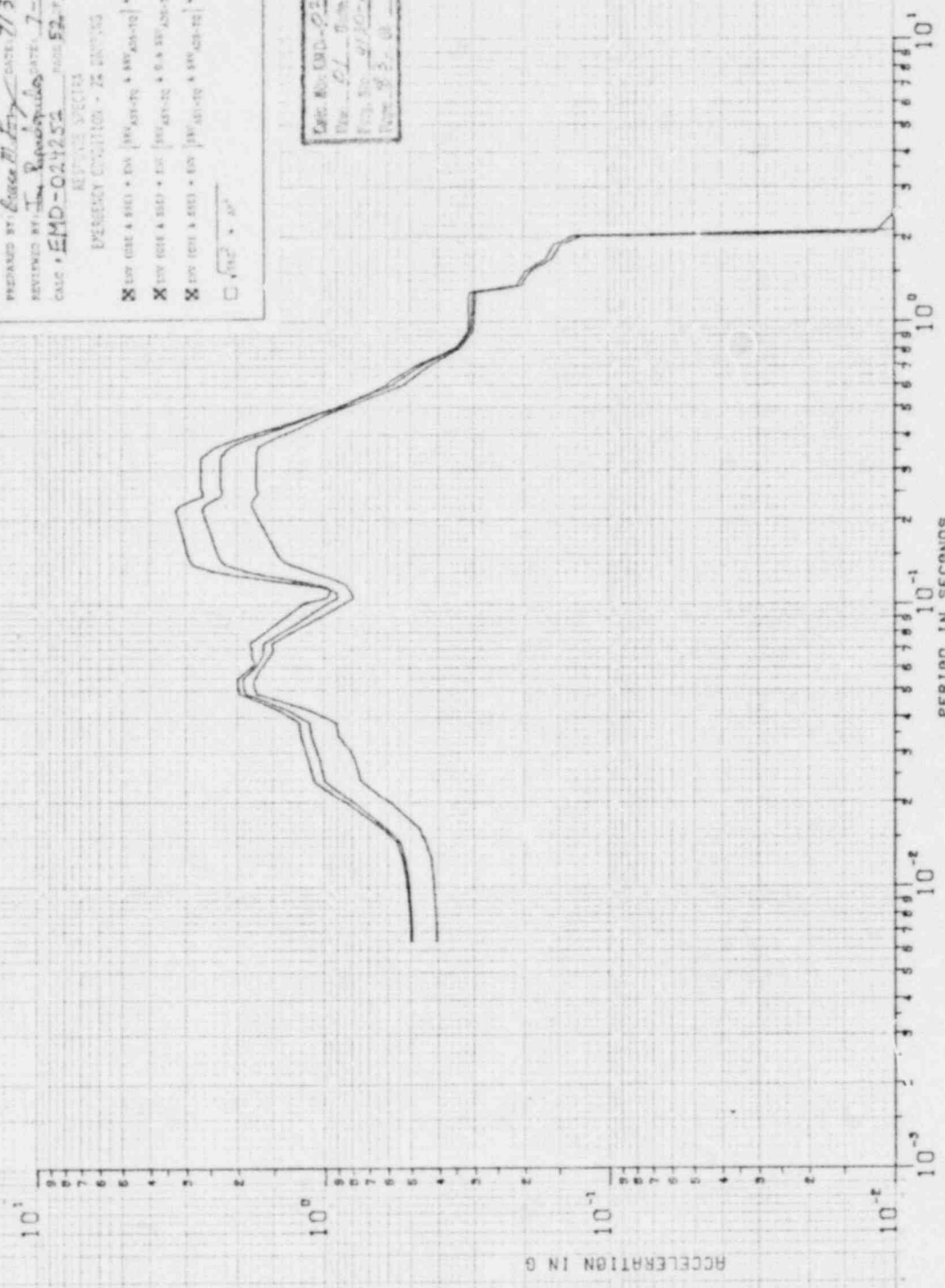
VW-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIMMER REACTOR BLDG. 627'-9''

BY: WUEFFEL & ESSER CO. MADE IN USA. FILE NO. 627-9-115

RUN ID: 470 EML 06/21/80

ZIMMER UNIT-1 4130-15
 PREPARED BY *George M. Gray* DATE *7/3/80*
 REVIEWED BY *Tom Repachinski* DATE *7-3-80*
 CALC. # **EMD-024252** PAGE **52** OF **52**
 RESONANCE SPECTRA
 EMERGENCY CONTACT NO. 25 200-3300
 100 (0.01 & 0.03) & 100 (0.01 & 0.03) & 100 (0.01 & 0.03) & 100
 100 (0.01 & 0.03) & 100 (0.01 & 0.03) & 100 (0.01 & 0.03) & 100
 100 (0.01 & 0.03) & 100 (0.01 & 0.03) & 100 (0.01 & 0.03) & 100
 100 (0.01 & 0.03) & 100 (0.01 & 0.03) & 100 (0.01 & 0.03) & 100

Calc. No. **EMD-024252**
 Date **07/03/80**
 Rev. No. **01/01/80**
 Page **52** of **52**



VW-VW DF-2% ABSV(C2 + C3 + C4) ZIMMER REACTOR BLDG. ELEV. 627'-9" REV. 01
 RWV ID: 691 BML 07/03/80
 KEUFFEL & ESSER CO. PRINTED IN U.S.A.

691 BML 07/03/80 639

Calc. No.: EMD-#024386
Date: July 18, 1980
Revision: 01
Safety-Related

CONTAINMENT BUILDING
T-QUENCHER POOL DYNAMIC SPECTRA GENERATION
FOR EQUIPMENT ASSESSMENT DUE TO SRV
ACTUATIONS IN VARIOUS LOAD COMBINATIONS

The Cincinnati Gas & Electric Company
Wm. H. Zimmer Station Unit 1
Project: 4130-15

Prepared by: Bruce M. Long Date: 7/18/80
Reviewed by: Tom Papadopoulos Date: 7-18-80
Approved by: M. Hamilton Date: 7-18-80

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INTRODUCTION:

The purpose of this report is to document the generation of the combined seismic response spectra for the Containment Building. The loading combinations are based upon the equipment qualification load combinations defined in Table V.C.2 of Design Criteria A51-70, Rev. 01.

PROCEDURE:

- Step 1: Generate digitized data for the seismic SSI (Soil Seismic Interaction) spectra. This was required as seismic SSI was the only spectra not digitized and stored on the UNIVAC 1100/81 computer system-by SDDD.
- Step 2: Enveloping of the \emptyset BE and SSE seismic SSI spectra. (In order to eliminate error in the mathematical method used by the program to envelope, it was necessary to determine the intersection points between the curves being enveloped. Refer to the original validation report, EMD#021349 for further explanation).
- Step 3: Enveloping of the SAV-ASY (3 valve), & SRV-ADS (ALL) spectra.
- Step 4: Enveloping 0.6 x SRV-ADS with SRV-ASY (3 valve) spectra.
- Step 5: Applying the appropriate multiplication factors to the A.P. (Annulus Pressurization) response spectra, EMD File #017896.
- Step 6: Combine SSE and AP using SRSS method.
- Step 7: Combine remaining combinations using ABS method.
- Step 8: Storing of combined spectra UNIVAC 1100/81 and plotting.

COMMENTS:

1. The generation of seismic spectra combination C5 was limited to the following three locations in the horizontal direction only:
 - a. 521'-11" - RPV pedestal at the drywell floor
 - b. 542'-9" - top of RPV pedestal
 - c. 590'- $\frac{1}{2}$ " - biological shield wall

This is because the model utilized for the selection of the A.P. loads only contains three node points applicable, (the pedestal/biological shield wall).

2. As specified in SDD-GE-410 Rev. 02
SDD-GE-411 Rev. 02
SDD-GE-426-V Rev. 01
SDD-GE-426-H Rev. 01

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the GE spectra was used for the SRV and LOCA loads at the biological shield wall elev. 590'- $\frac{1}{2}$ ".

3. The G.E. response spectra for the biological shield wall at 590' had provided no horizontal SRV-ADS spectra. The SRV-ASY horizontal spectra was considered equivalent to the SRV-ADS and hence was used in lieu of the SRV-ADS absence.
4. The G.E. spectra also did not provide any SRV-ASY response spectra in the vertical direction at the biological shield wall elev. 590'- $\frac{1}{2}$ ". Therefore the SRV ADS vertical spectra was assumed equivalent with the vertical SRV-ASY and was used in lieu of SRV ASY.
5. Since no horizontal CO spectra are provided at the biological shield wall this load is assumed to be zero.
6. Per phone conversation with P. K. Dalal, 2/7/80 the seismic spectra at 565'-0" was used for elev. 590'- $\frac{1}{2}$ " at the biological shield wall.
7. Per phone conversation with A. N. Gandhi, 6/26/80, for the seismic spectra (Report #SDD-EMD-030 Rev. 01) spectra numbers 13A thru 13F were used for elev. 521'-11" at the RPV pedestal at the drywell floor and spectra numbers 17A thru 17F were used for elev. 542'-9" at the top of the RPV pedestal.

OBSERVATIONS:

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1. The SSE vertical spectra enveloped the vertical spectra at the following locations.
2. The SSE horizontal North-South spectra always enveloped the horizontal North-South \emptyset BE spectra.
3. The SSE horizontal East-West enveloped the \emptyset BE horizontal East-West at only 474'-10" and 504'-4".
4. The horizontal SRV-ASY enveloped the horizontal SRV-ADS spectra except at 474'-10", 504'-4" and 526'-9".
5. The vertical SRV-ADS enveloped the SRV-ASY vertical spectra except at 474'-10", 504'-9", 523'-9" and 526'-9".
6. The vertical 0.6 x SRV-ADS was enveloped by SRV-ASY at only 521'-11", and 542'-9".
7. The affect of T-Quencher curve combination C5 ($\sqrt{(SSE)^2+(AP)^2}$) at elevations 521'-11", 542'-9" and 590'- $\frac{1}{2}$ " was primarily in the range of 20 to 65 H. In this range the acceleration values were typically as high as 1.4g at 521'-11" and 2.8g at 542'-9".

SPECTRA FILE RECORD:

The digitized data for the combined spectra has been stored on the in-house UNIVAC 1100/81 system under the following file names:

ZIM-BML-C \emptyset NT*TQ-RSP- \emptyset BER1.
ZIM-BML-C \emptyset NT*TQ-RSP-SSER1.

The following scheme is used for naming the elements:

ex. ZIM-BML-CONT*TQ-RSP-SSER1 504-4/NS2

Elevation

See pages 8 and 9 in report for elevations

Direction

NS = Horizontal, North-South
 EW = Horizontal, East-West
 VW = Vertical Wall

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File No:	EMD-#024386
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Loading Combination Key

blank = $N + \emptyset BE + \text{Envelope}(\text{SRV-ALL-TQ} + \text{SRV-ASY3-TQ})$

2 = $N + \text{Envelope}(\emptyset BE + SSE) + \text{Envelope}(\text{SRV-ADS-TQ} + \text{SRV-ASY3-TQ}) +$
 Chugging, 2% damping

3 = $N + \text{Envelope}(\emptyset BE + SSE) + \text{Envelope}(0.6 \times \text{SRV-ADS-TQ}) + \text{SRV-ASY3-TQ}$
 + $C\emptyset-1, 2\%$ damping
 (1-50Hz)

4 = $N + \text{Envelope}(\emptyset BE + SSE) + \text{Envelope}(\text{SRV-ADS-TQ} + \text{SRV-ASY3-TQ}) +$
 $C\emptyset-2, 2\%$ damping
 (1-50Hz)

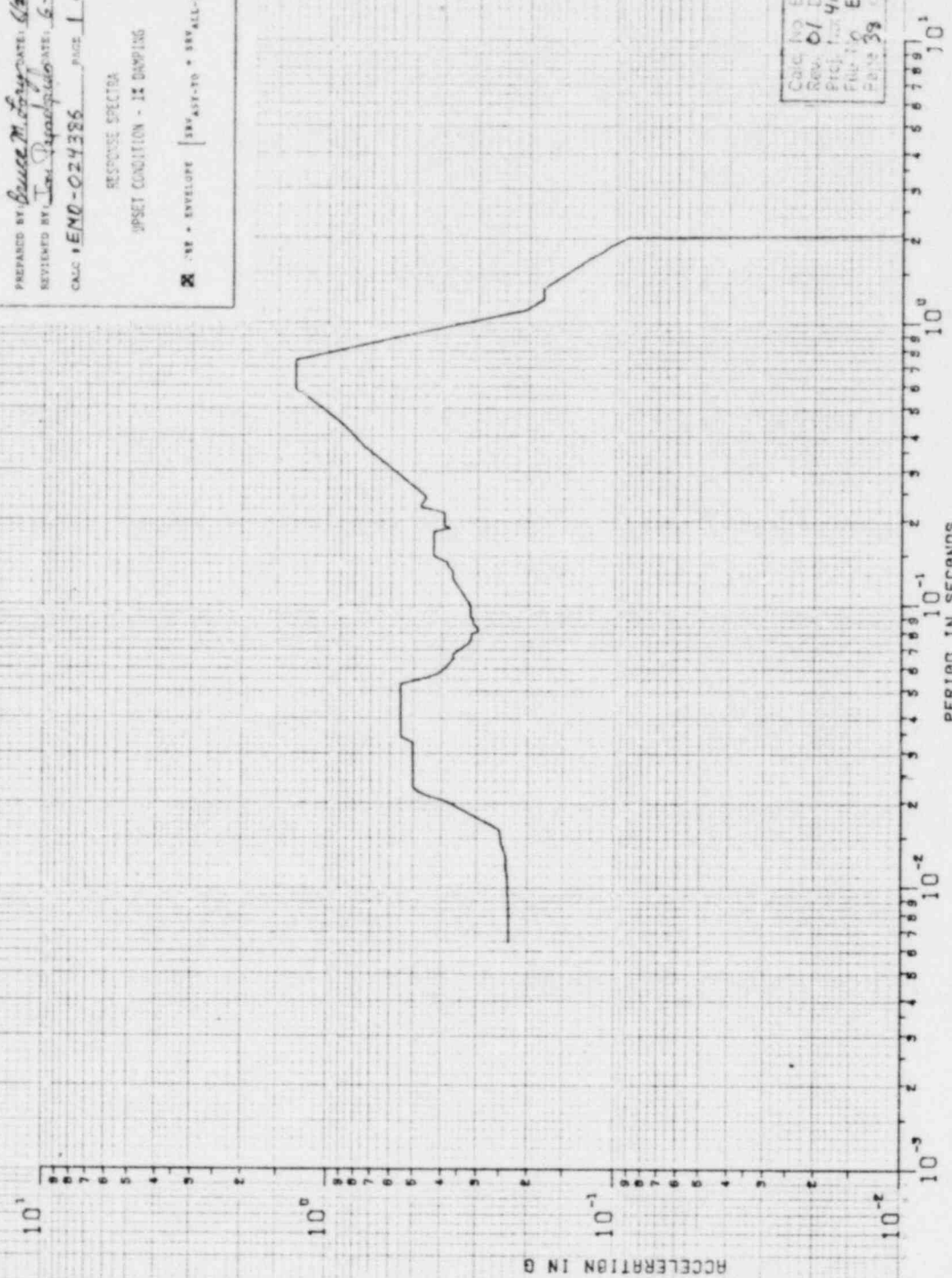
5 = $\sqrt{(SSE)^2 + (A.P.)^2}$

CONCLUSIONS:

There is a need for a more complete definition of the significance that the A.P. loads have on the Containment Building. Presently there are only three locations within the Containment Building where A.P. spectra could be considered. More node points are necessary in the A.P. model before other locations in the Containment Building can include the A.P. loads.

ZIPPER UNIT-1 4120-25
 PREPARED BY Bruce M. Fry DATE: 6/20/80
 REVIEWED BY Jack Papadopoulos DATE: 6-20-80
 CALC # EMD-024386 PAGE 1 OF 60
 RESPONSE SPECTRA
 UPSET CONDITION - 1% DAMPING
 .XV - ENVELOPE SRV-ASY-10 * SRV-ALL-10

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 Rev. 01 Date 7/18/80
 Proj. No. 4130-15
 File No. EMD-024386
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H0-NS DF-1% ABSV(0BE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 474'-10" REV 1

RUN ID: 946 BML 06/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Day DATE: 6/20/80

REVIEWED BY: Tom Papadopoulos DATE: 6-20-80

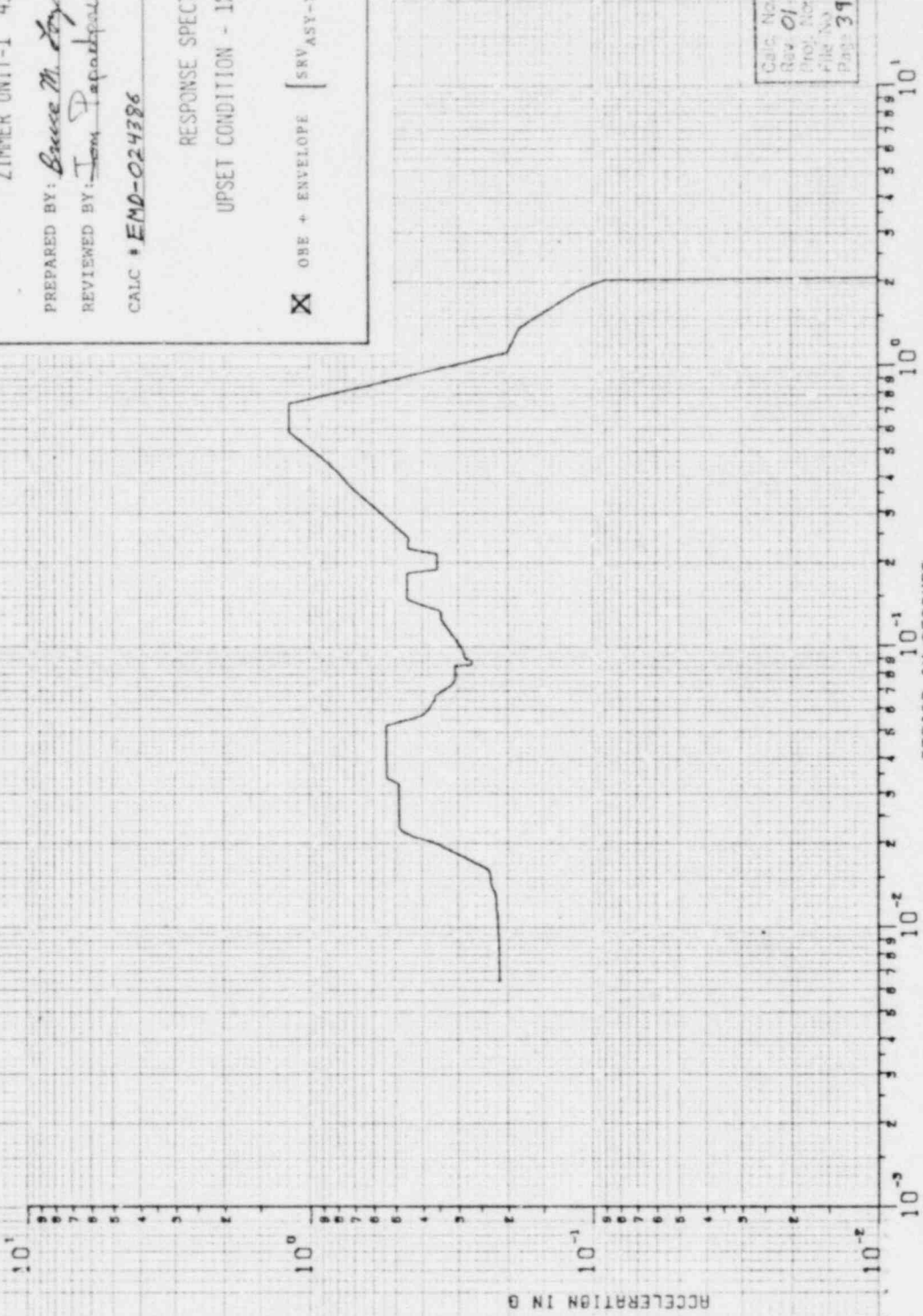
CALC # EMD-024386 PAGE 2 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No. EMD-024386
Rev. 01 Date: 7/18/80
Proj. No. 4130-15
File No. EMD-024386
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PERIOD IN SECONDS

HQ-EW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 474*-10** REV 1

RUN ID: 946 BML 06/20/80

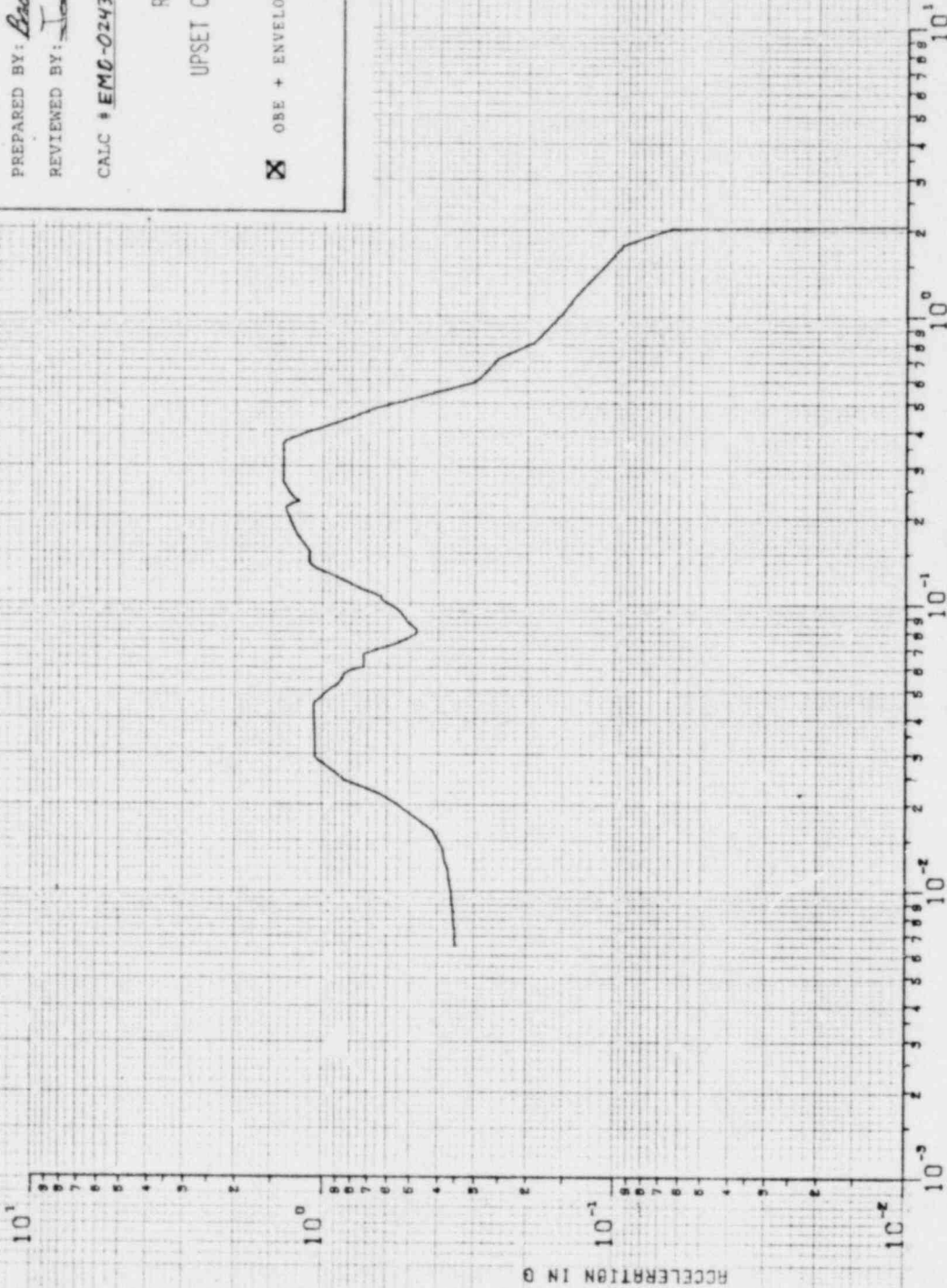
ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Day* DATE: *6/20/80*
REVIEWED BY: *Tom Papadopoulos* DATE: *6-20-80*
CALC # *EMC-024386* PAGE *3* OF *60*

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc No *EMC-024386*
Rev-01 Date *7/18/80*
File No *4130-15*
F. D. *024386*
P. *40* of *104*



VW-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 474'-10" REV 1

RUN ID: 946 BAIL 06/20/80

ZIMMER UNIT-1 4130-15

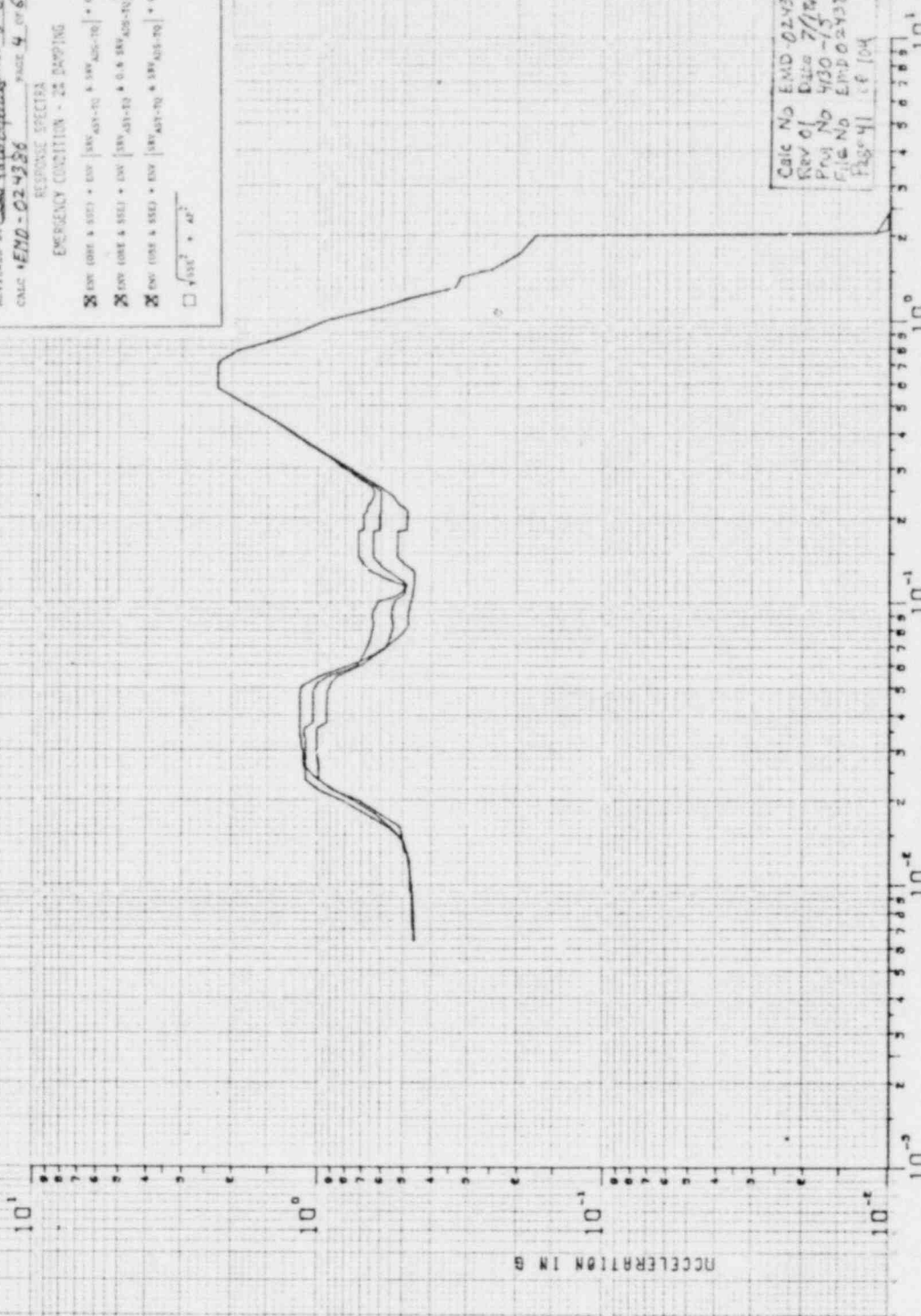
PREPARED BY *Emilio M. Lopez* DATE: *6/23/80*
REVIEWED BY *Tom Vancamp* DATE: *6-23-80*
CALC # *END-024386* PAGE *4* OF *60*

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENG (DRS & SES) • EW | SW ASY-TQ • SW ASY-TQ | • CW
- ENG (DRS & SES) • EW | SW ASY-TQ • SW ASY-TQ | • CW
- ENG (DRS & SES) • EW | SW ASY-TQ • SW ASY-TQ | • CW
- $\sqrt{350^2 + 40^2}$

Calc No END-024386
 Rev of Data 7/18/80
 Proj No 4130-15
 File No END-024386
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HQ-NS DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 474'-10" REV. 01
 K-E MEUFFELBESSER CO. PRINTED IN USA

RUN ID: 928BML 06/23/80

928BML 06/23/80 070

ZIMMER UNIT-1 4130-15

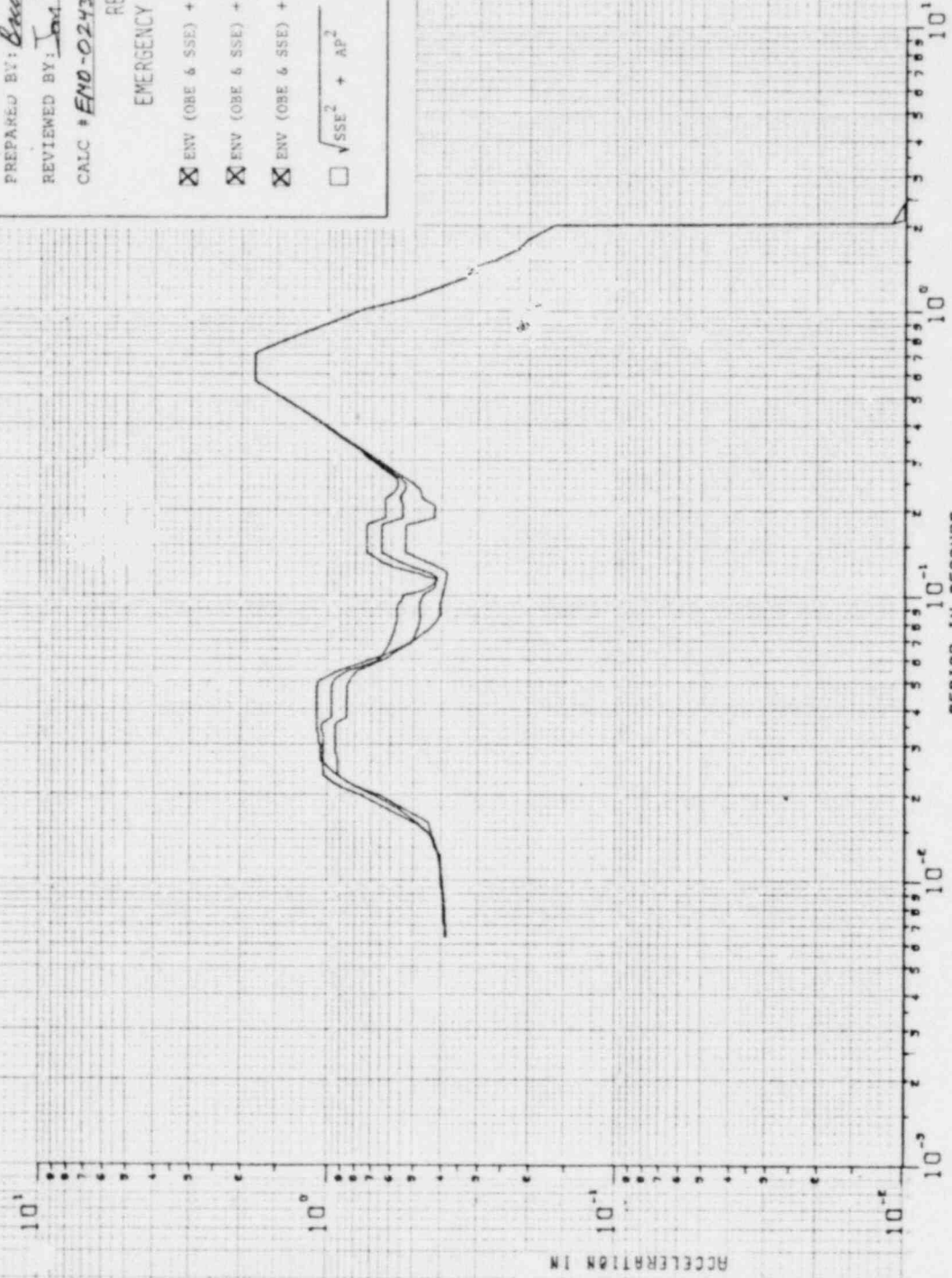
PREPARED BY: Bruce M. Long DATE: 6/23/80
REVIEWED BY: Tom Papadopoulos DATE: 6-23-80
CALC # EMO-024386 PAGE 5 OF 60

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CHG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2

$\sqrt{SSE^2 + AP^2}$



Calc. No:	EMD-024386
Rev. 01	Date 7/19/80
File No:	4130-15
File No:	EMD-024386
Page 42	of 104

HQ-EW DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WFL 474--10-- REV. 01

K-E KEUTFELBESSER CO. PRINTED IN U.S.A. FULL SCALE HIGH G INCHES

RUN ID: 928 BML 06/23/80

ZIMMER UNIT-1 4130-15

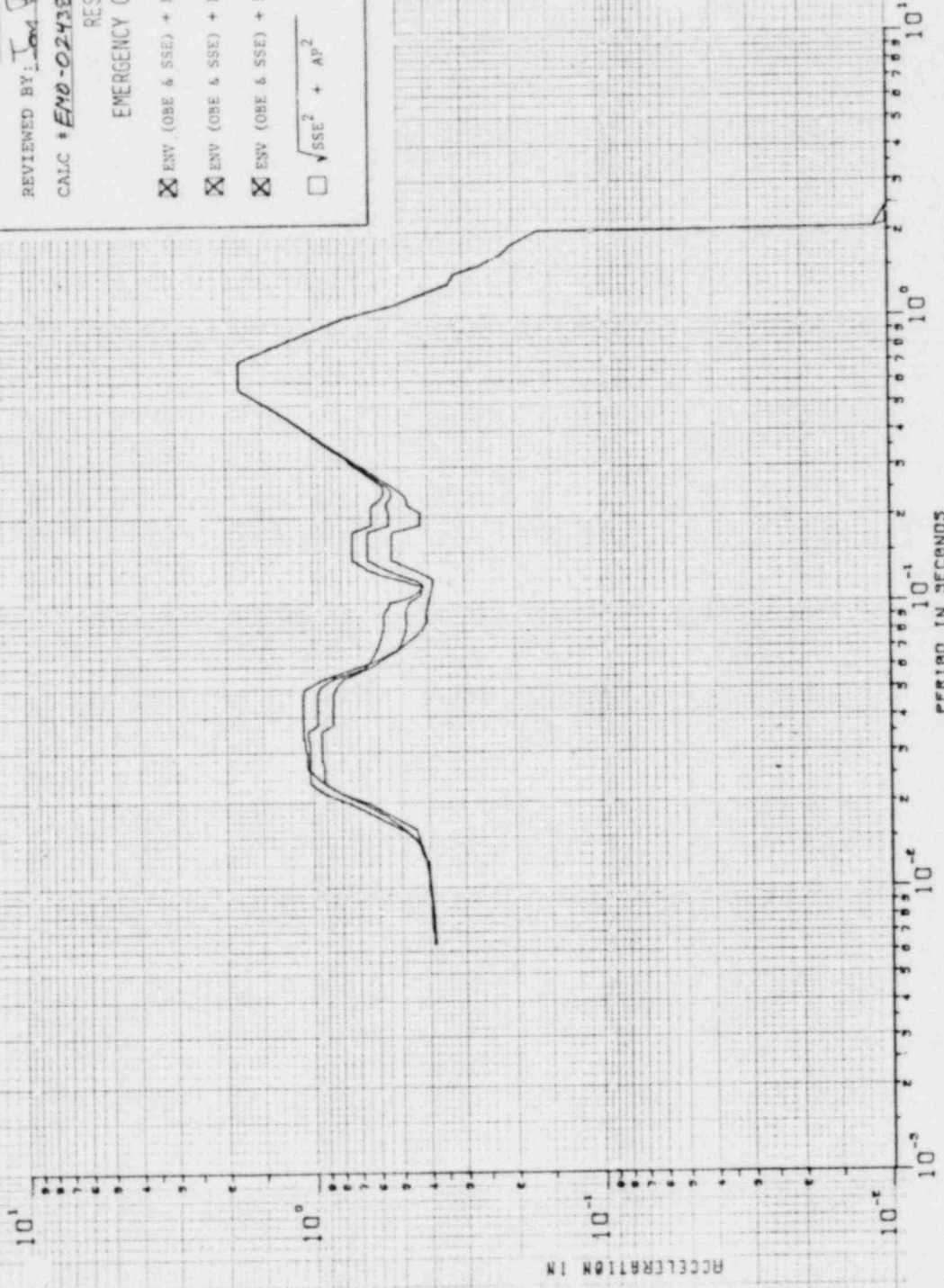
PREPARED BY: *Bruce M. Day* DATE: *6/23/80*
REVIEWED BY: *Tom Papadopoulos* DATE: *6-23-80*
CALC # *EM0-024386* PAGE *5* OF *60*

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CRG
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc No EMD-024386
 Rev 01 Date 7/18/80
 Proj No 4130-15
 File No EMD-024386
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H0-EW DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 474'-10" REV. 01

KE KEUFFEL & ESSER CO. PRINTED IN U.S.A. FULL SCALING PER 2.5 IN. = 1.0 CM/SEC

RUN ID: 928 BML 06/23/80

ZIMMER UNIT-1 4130-15

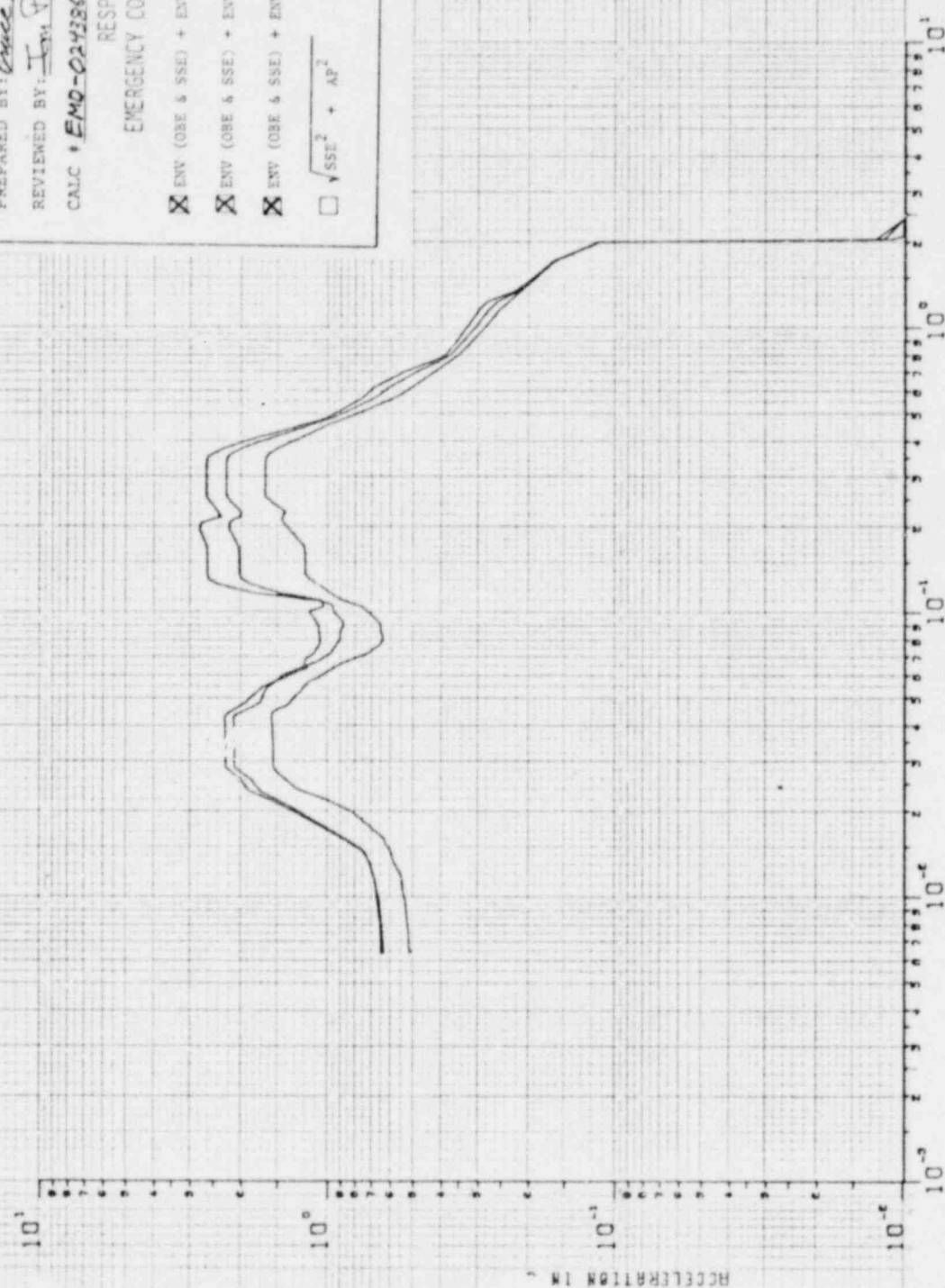
PREPARED BY: *Emce M. J. J.* DATE: *5/21/80*
REVIEWED BY: *J. M. Papadopoulos* DATE: *6-23-80*
CALC: *EMQ-024386* PAGE *6* OF *60*

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CHG
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc No: *EMQ-024386*
 Rev: *01* Date: *7/8/80*
 Plot No: *460-15*
 File No: *EMQ-024386*
 Page: *43* of *60*



VN-VW DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 474'-10" REV. 01

K-E KEUFFEL & ESSER CO PRINTED IN U.S.A. FILE NO. 460-15 (EMQ-024386)

RUN ID: 928 BML 06/23/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Lucie M. Long* DATE: *6/20/80*
REVIEWED BY: *Tom Papadopoulos* DATE: *6-20-80*
CALC # *EMD-024386* PAGE *7* OF *60*

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc No EMD-024386
Rev 01 Date 7/13/80
Proj No 4130-15
Job No EMD-024386
Sheet 104



H0-NS DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 504*-4** REV 1

RUN ID: 946 BML 6/20/80

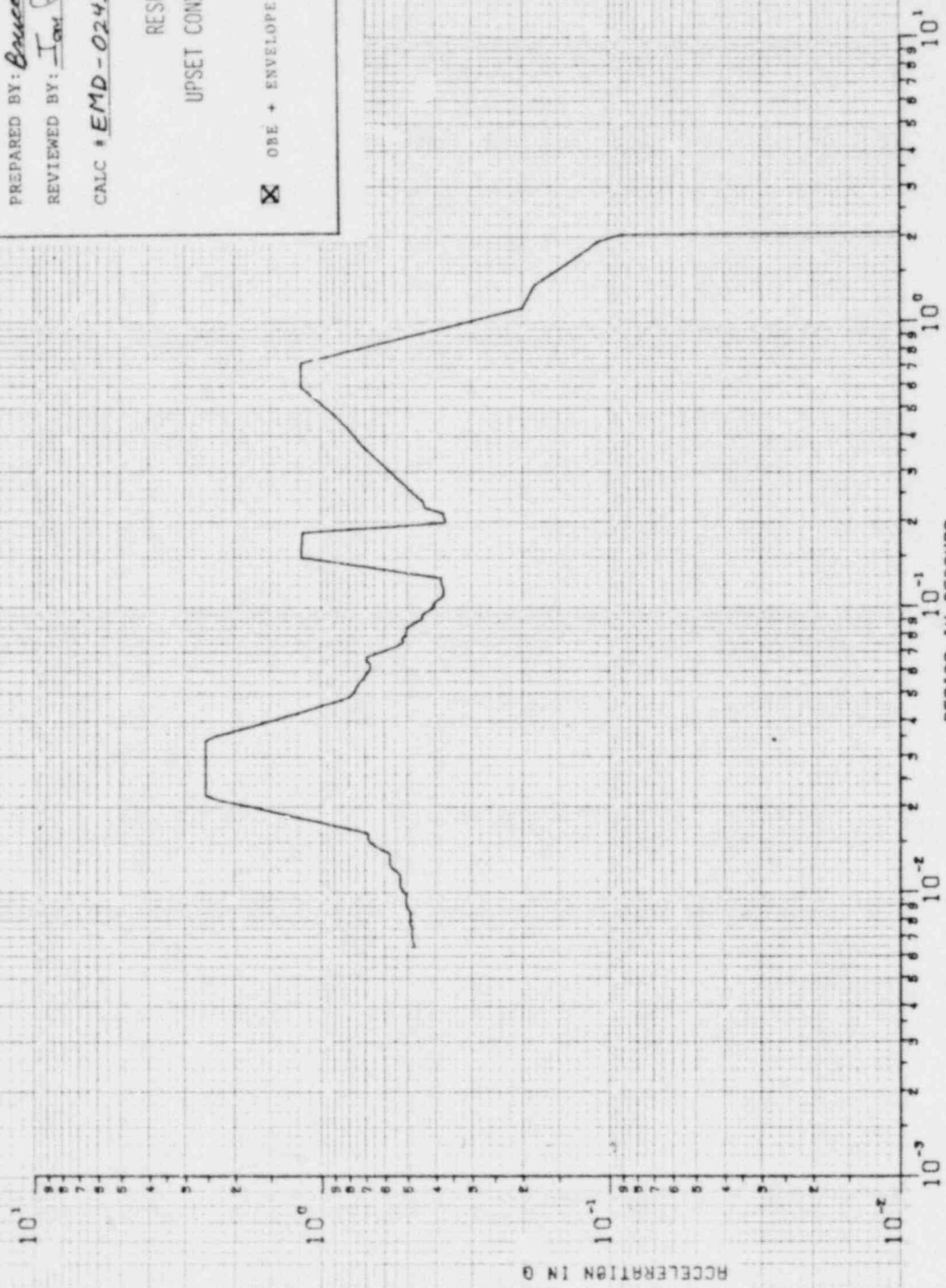
ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/20/80
REVIEWED BY: Tom Papadopoulos DATE: 6-20-80
CALC # EMD-024386 PAGE 8 OF 60

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

CALC NO. EMD-024386
REV. OF DATE 7/12/80
PLOT NO. 4130-15-024386
PAGE 45 OF 60



HQ-EW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 504'-4" REV 1

QUANTUM 1.8 INCH CYCLES

HOE KEUFFEL & ESSERCO PRINTED IN U.S.A.

RUN ID: 946 BML 06/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Dwyer DATE: 6/20/80
REVIEWED BY: Jim Papadopoulos DATE: 6-20-80
CALC # EMD-024386 PAGE 9 OF 60

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE SRV ASY-TQ + SRV ALL-TQ

Calc No EMD-024386
Rev. 01 Date 7/18/80
File No 4130-15
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VW-VW DF-17 ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 504'-4" REV 1

RUN ID: 946 BML06/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Day DATE: 6/23/80

REVIEWED BY: Tom Papadopoulos DATE: 6-25-80

CALC # EMD-024386 PAGE 10 OF 60

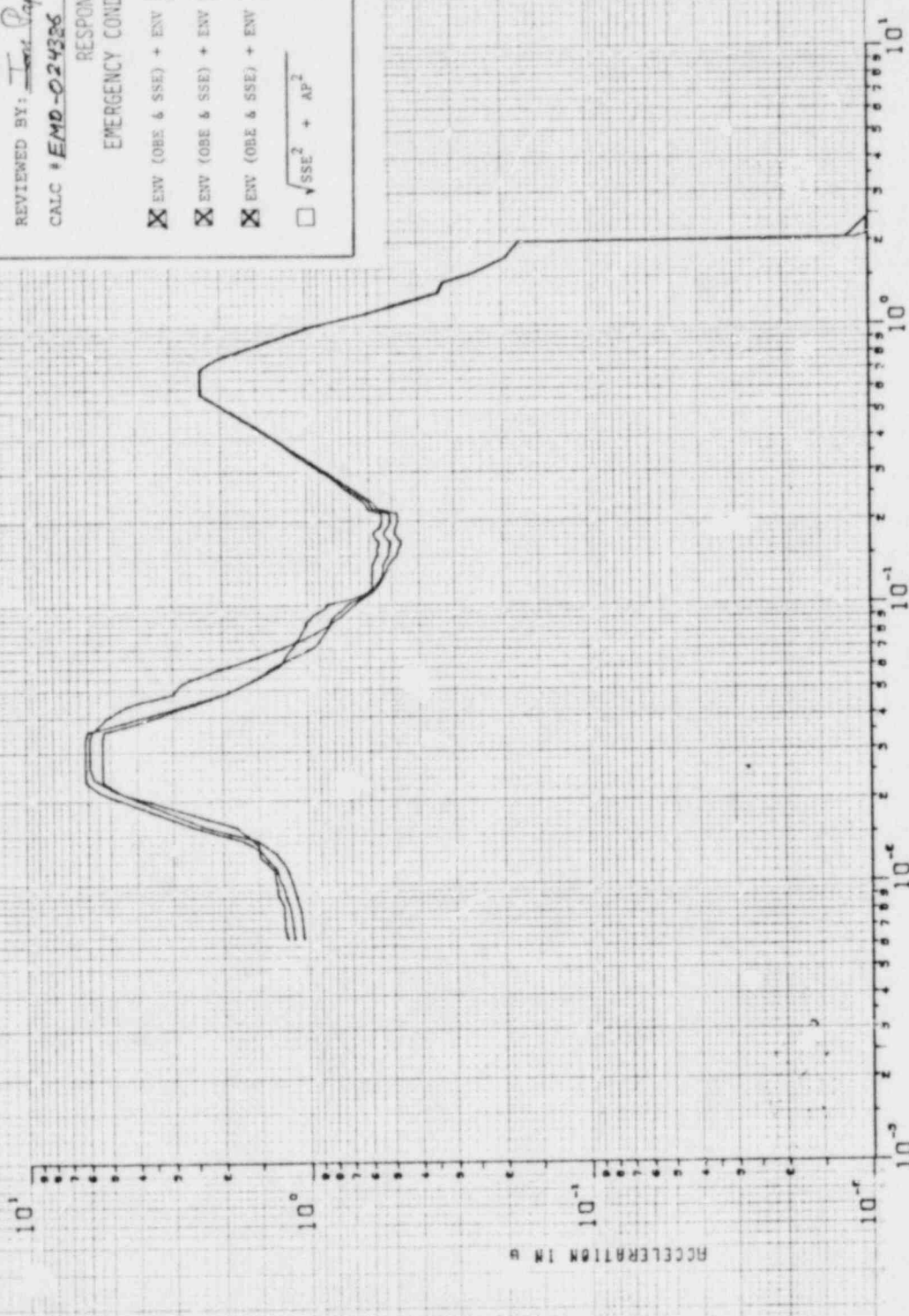
RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CBG
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2

$\sqrt{SSE^2 + AP^2}$

Calc. No. EMD-024386
 Rev. 01 Date 7/19/80
 Proj. No. 4130-15
 File No. EMD-024386
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HQ-NS DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 504'-4" REV. 01

K-E KEUFFEL & ESSER CO PRINTED IN U.S.A. FULL SCALE DRAWING

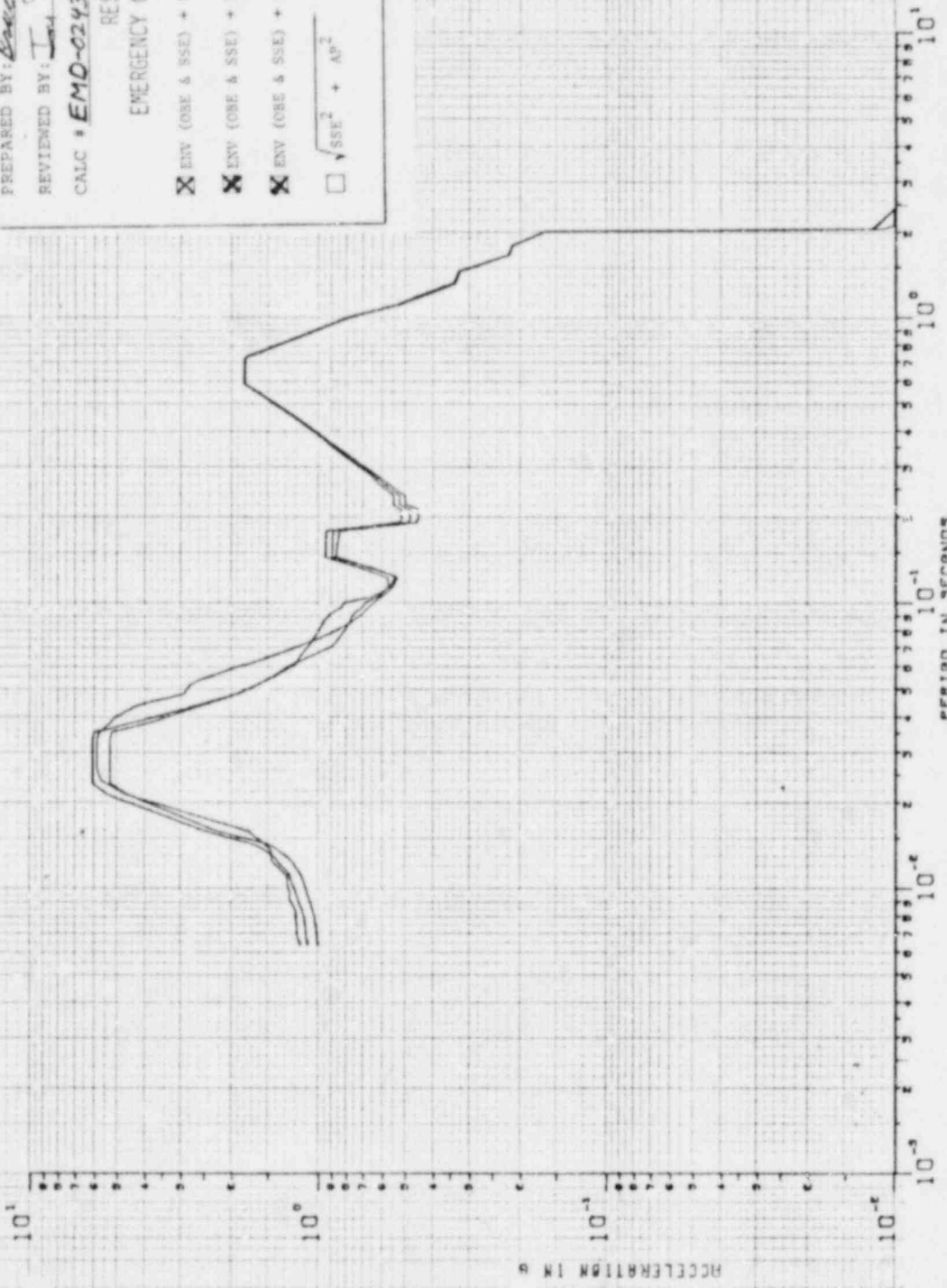
RUN ID: 928 BML 06/23/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Ernest M. Long* DATE: *6/23/80*
REVIEWED BY: *Tom Papadopoulos* DATE: *6-23-80*
CALC # *EMD-024385* PAGE *11* OF *60*

RESPONSE SPECTRA
EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CQC
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CO 2
- $\sqrt{SSE^2 + AP^2}$



Calc No *EMD-024386*
 Rev. 01 Date *7/15/80*
 Proj No *4130-15*
 File No *EMD-024386*
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HQ-EW DF-2% ABSV(C2 + C3 + C4) ZIMMER CONFINEMENT WALL 504'-4" REV. 01

K&E NEUFFELLESER CO PRINTED IN U.S.A. FULL LABORATORY QUALITY INSTRUMENTS

RUN ID: 92E BAL 06/23/80

ZIMMER UNIT-1 4130-15

PREPARED BY *James P. ...* DATE *7/11/80*

REVIEWED BY *...* DATE *7-11-80*

CALC # *EMD-024386* PAGE *12* OF *60*

RESPONSE SPECTER

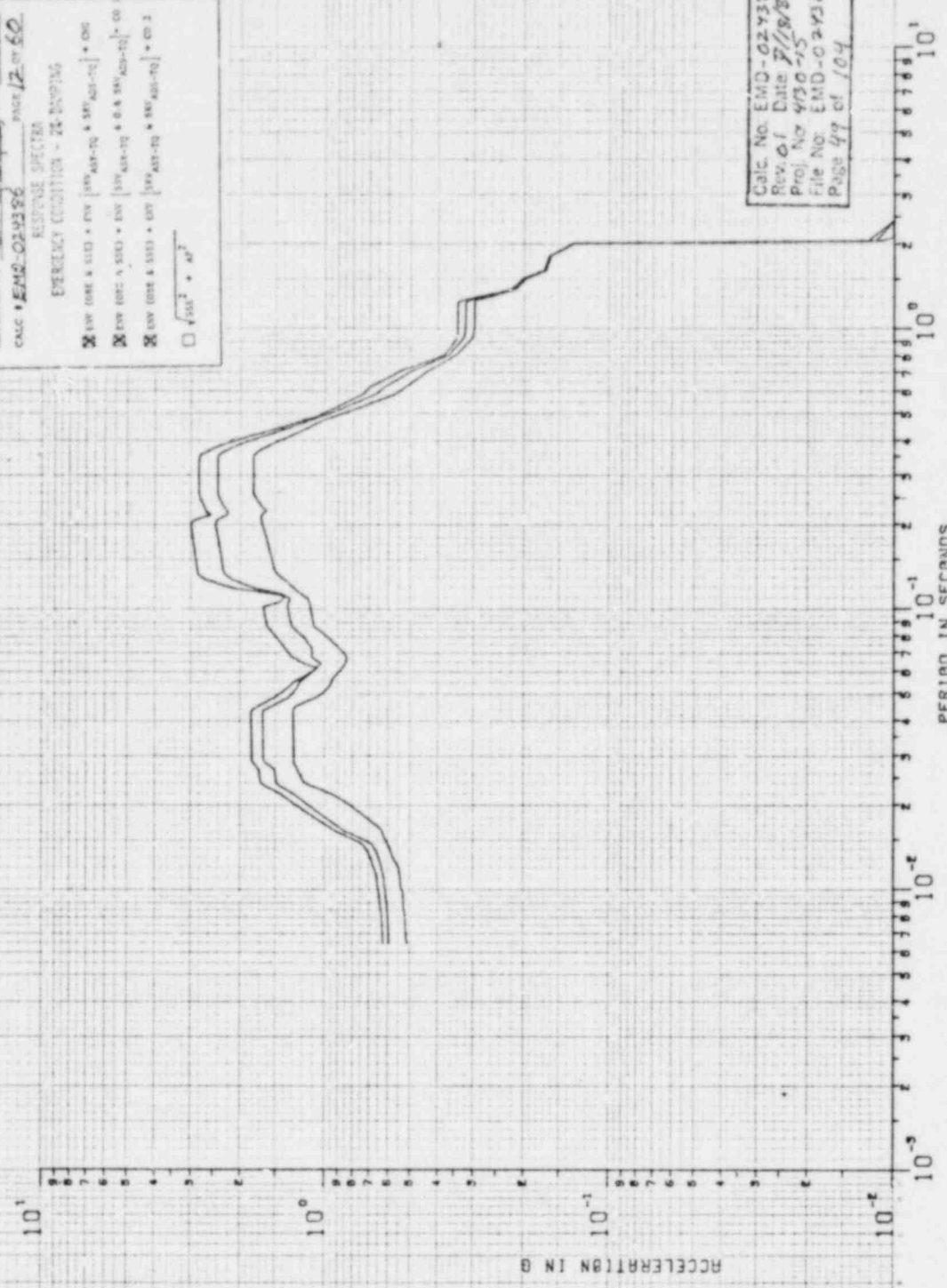
ENERGY CONDITION - *25* IN/IN/IN

ENV 006 & 010 & ENV 100 000-100 & ENV 100 100-100 & ENV 100 100-100 & ENV 100 100-100

ENV 007 & 011 & ENV 101 000-100 & ENV 101 100-100 & ENV 101 100-100 & ENV 101 100-100

ENV 008 & 012 & ENV 102 000-100 & ENV 102 100-100 & ENV 102 100-100 & ENV 102 100-100

$\sqrt{S_{11}^2 + S_{22}^2}$



Calc. No. EMD-024386
 Rev. 01 Date 7/11/80
 Proj. No. 4130-15
 File No. EMD-024386
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VH-VH DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 504'-4" REV. 01

RUN ID: 256 BML 07/11/80

K&E KEUFFEL & ESSERCO PRINTED IN U.S.A. FULL SCALE RESPONSE & ANALYSIS

ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Day* DATE: *6/20/80*

REVIEWED BY: *Tom Papadopoulos* DATE: *6-20-80*

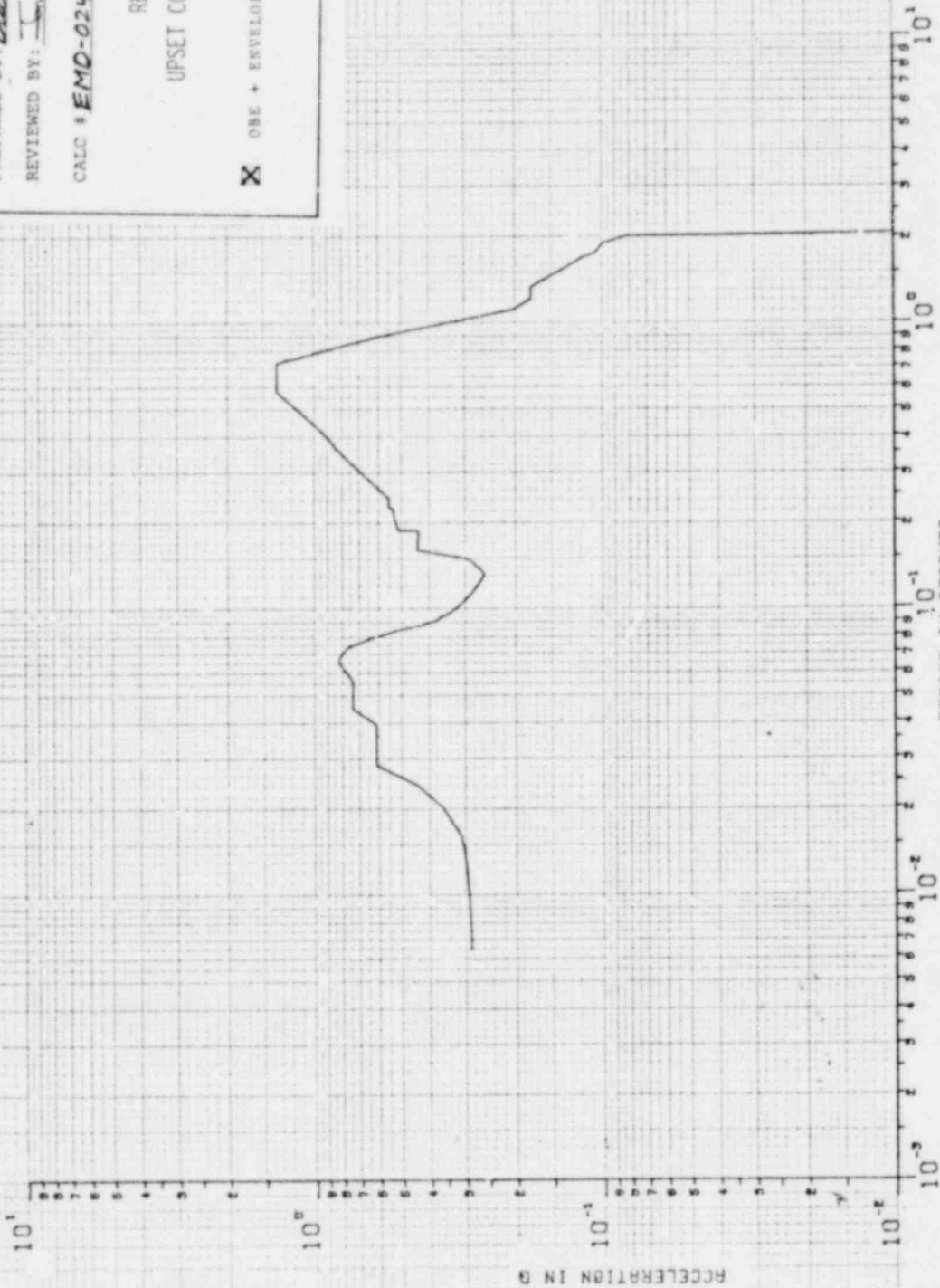
CALC # *EMD-024386* PAGE *13* OF *60*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No. EMD-024386
Rev. 01 Date 7/18/80
Proj. No. 4130-15
File No. EMD-024386
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H0-NS DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM RPV PED/DRYFLOOR 521'-11''

RUN ID: 946 PML 06/20/80

ZIMMER UNIT-1 4130-15

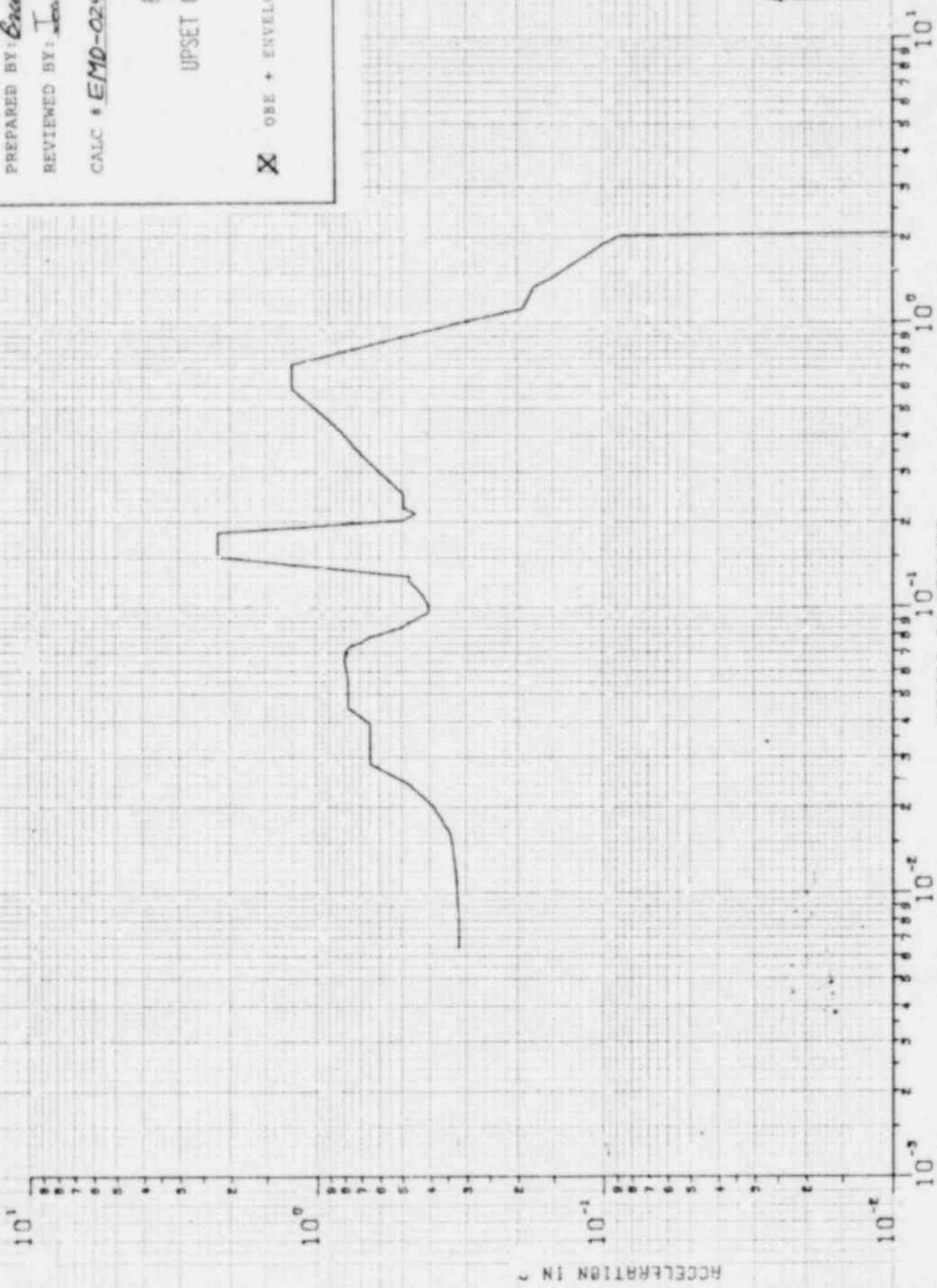
PREPARED BY: Bruce M. Gray DATE: 6/20/80
REVIEWED BY: Tom Papadopoulos DATE: 6-20-80
CALC # EMD-024386 PAGE 14 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No. EMD-024386
Rev 0j Date 7/2/80
Proj. No 4130-16
File No EMD-024386
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HQ-EW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM RPV PED/DRYFLOOR 521'-11''

RUN ID: 946 BML 6/20/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Grace M. Gray* DATE: *7/2/80*

REVIEWED BY: *Tom Papadopoulos* DATE: *7-2-80*

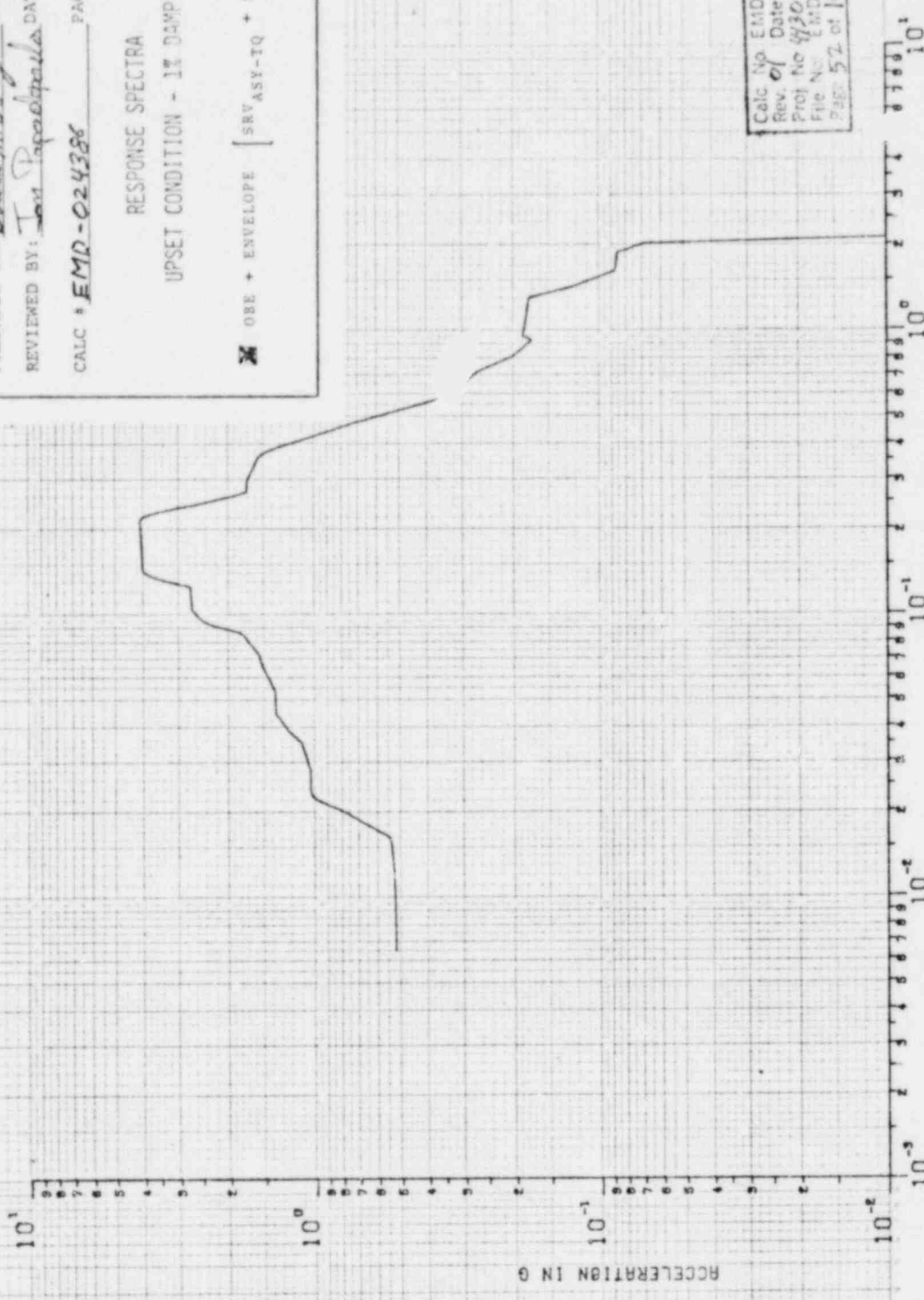
CALC # *EMD-024388* PAGE *15* OF *60*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc No	EMD-024388
Rev. of	Date 7/1/80
Proj No	4130-15
File No	EMD-024388
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VW-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM RPV PED/DRYFLOOR 521'-11"

162 KEUFFELAESSER CO. PRINTED IN U.S.A.

FILE NO. 4130-15-15

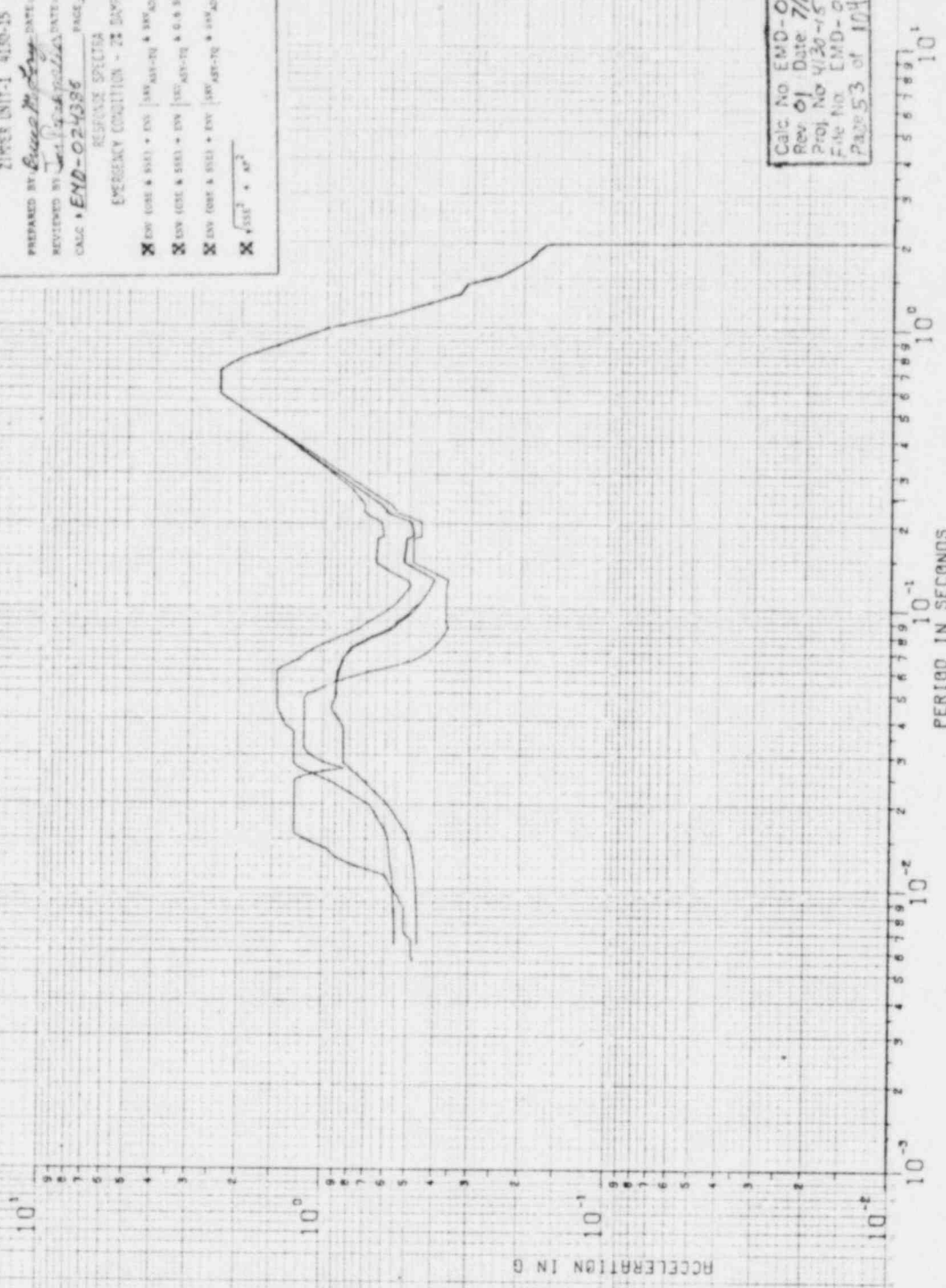
RUN ID: 154 BAIL 07/02/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Edward M. Long* DATE: *7/13/80*
REVIEWED BY: *John G. ...* DATE: *7-2-80*
CALC: *EMD-024385* PAGE *K* OF *60*

RESPONSE SPECTRA
EMERGENCY CONDITION - 2% DAMPING

- ENV (085 & 055) • ENV (085-09) • ENV (055-09) • ONE
- ENV (085 & 055) • ENV (085-09) • ENV (055-09) • 0.4 3RD (085-09) • CO
- ENV (085 & 055) • ENV (085-09) • ENV (055-09) • 0.4 3RD (055-09) • CO
- $\sqrt{ENV^2 + 0.02^2}$



Calc No EMD-024386
 Rev 01 Date 7/18/80
 Proj No 4130-15
 File No EMD-024385
 Page 53 of 104

HQ-NS DF-2% ABSV(C2 + C3 + C4 + C5) ZIM RPV PED/DRYWELL FLOOR 521'-11" REV. 01
 KEUFFEL & ESSER CO. PRINTED IN U.S.A. FIG. 10-10760-23-1-1-2-2-85

RUN ID: 150 BML 07/02/80

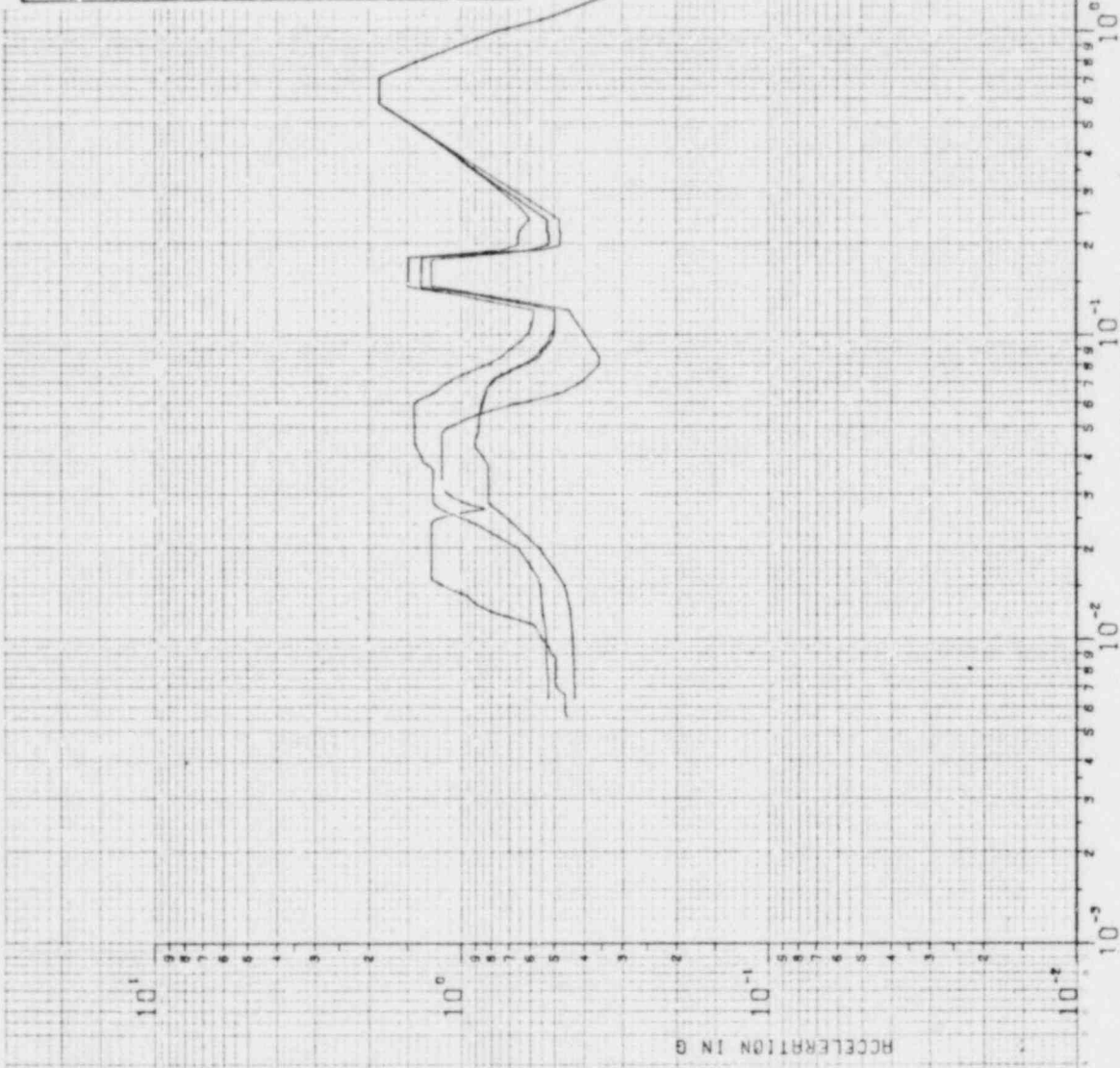
ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Long* DATE: *7/2/80*
REVIEWED BY: *Tom Papadopoulos* DATE: *7-2-80*
CALC # *EMD-024386* PAGE *17* OF *60*

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CRG
- ENV (OBE & L) + ENV [SRV_{AS(-TQ)} & 0.5 SRV_{ADS(-TQ)}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2
- $\sqrt{SSE^2 + AP^2}$



Calc. No. EMD-024386
 Rev. of Date 7/2/80
 Proj. No. 4130-15
 File No. EMD-024386
 Page 54 of 104

PERIOD IN SECONDS

H0-EW DF-2% ABSV(C2 + C3 + C4 + C5) .1M RPV PED/DRYWELL FLOOR 521'-11" REV. 01

PRINTED IN U.S.A. KEUFFEL & ESSER CO. FULL SERVICE ENGINEERING

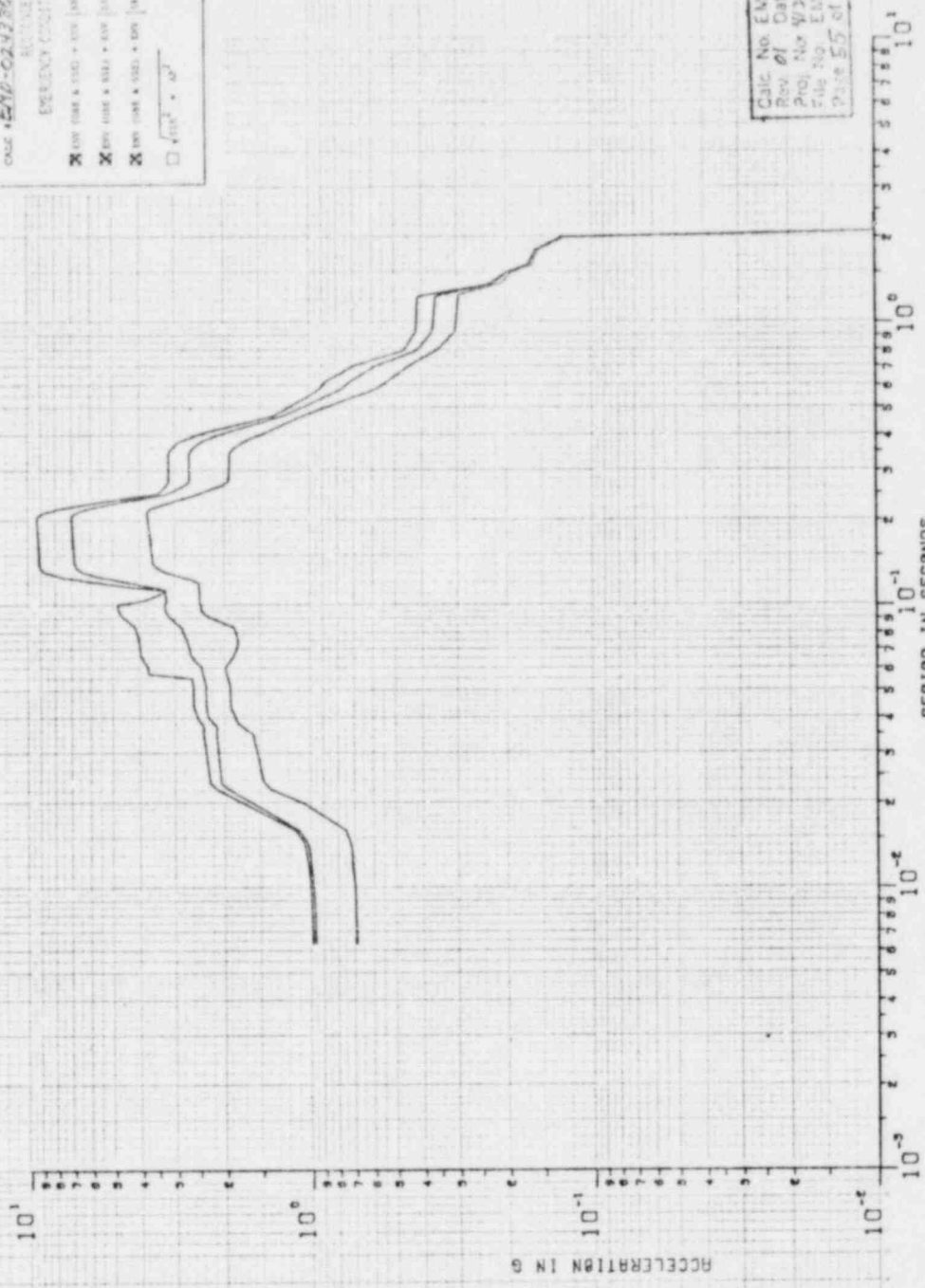
RUN ID: 150 BML 07/02/80

ZIMM DF-2Z ABSV-15
 PREPARED BY *James M. Haggerty* 7/1/80
 REVIEWED BY *Richard B. Besser* DATE 7-7-80
 OAC # *EMD-024336* ASSN *18* OF *63*

RESERVE SPECTRA
 EVIDENCE CONDITION - *24* APPROX

100 1000 & 1000 • 100 [100 1000-100 & 100 1000-100] • 100
 100 1000 & 1000 • 100 [100 1000-100 & 100 1000-100] • 100
 100 1000 & 1000 • 100 [100 1000-100 & 100 1000-100] • 100
 1000 • 1000

Calc. No. EMD-024336
 Rev. of Date 7/1/80
 Proj. No. W20-15
 File No. EMD-024336
 Page 55 of 104



VW-VW DF-2Z ABSV(C2 + C3 + C4) ZIMM RPV PEDESTAL/DRYWELL FLOOR 521'-11" REV 01

RUN ID: 387 BML 07/07/80

FALL LOADING/NO. 15 INCH G-CLAS

PRINTED IN U.S.A.

KEUFFEL & ESSER CO.

REV

387BML 07/07/80 002

ZIMMER UNIT-1 4130-15

PREPARED BY: *Steve M. Long* DATE: *6/20/80*

REVIEWED BY: *Tom Papadopoulos* DATE: *6-20-80*

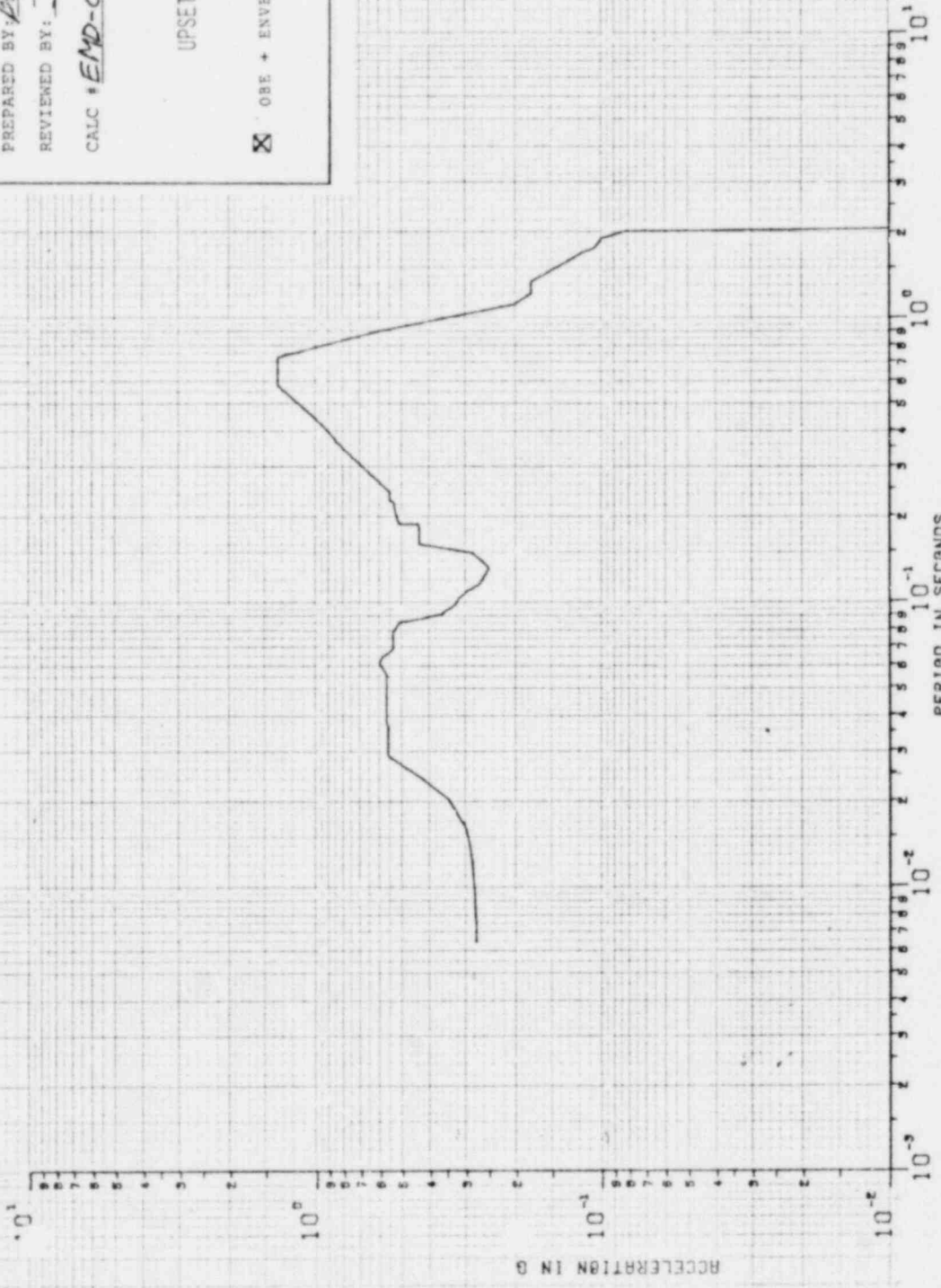
CALC # *EMD-024386* PAGE *19* OF *60*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc No. EMD-024386
Rev of Date 7/18/80
Proj No. 4130-15
File No. EMD-024386
Page 56 of 104



H0-NS DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM DRYWELL/SUP POOL COL 523 '9'

ZIMMER UNIT-1 4130-15

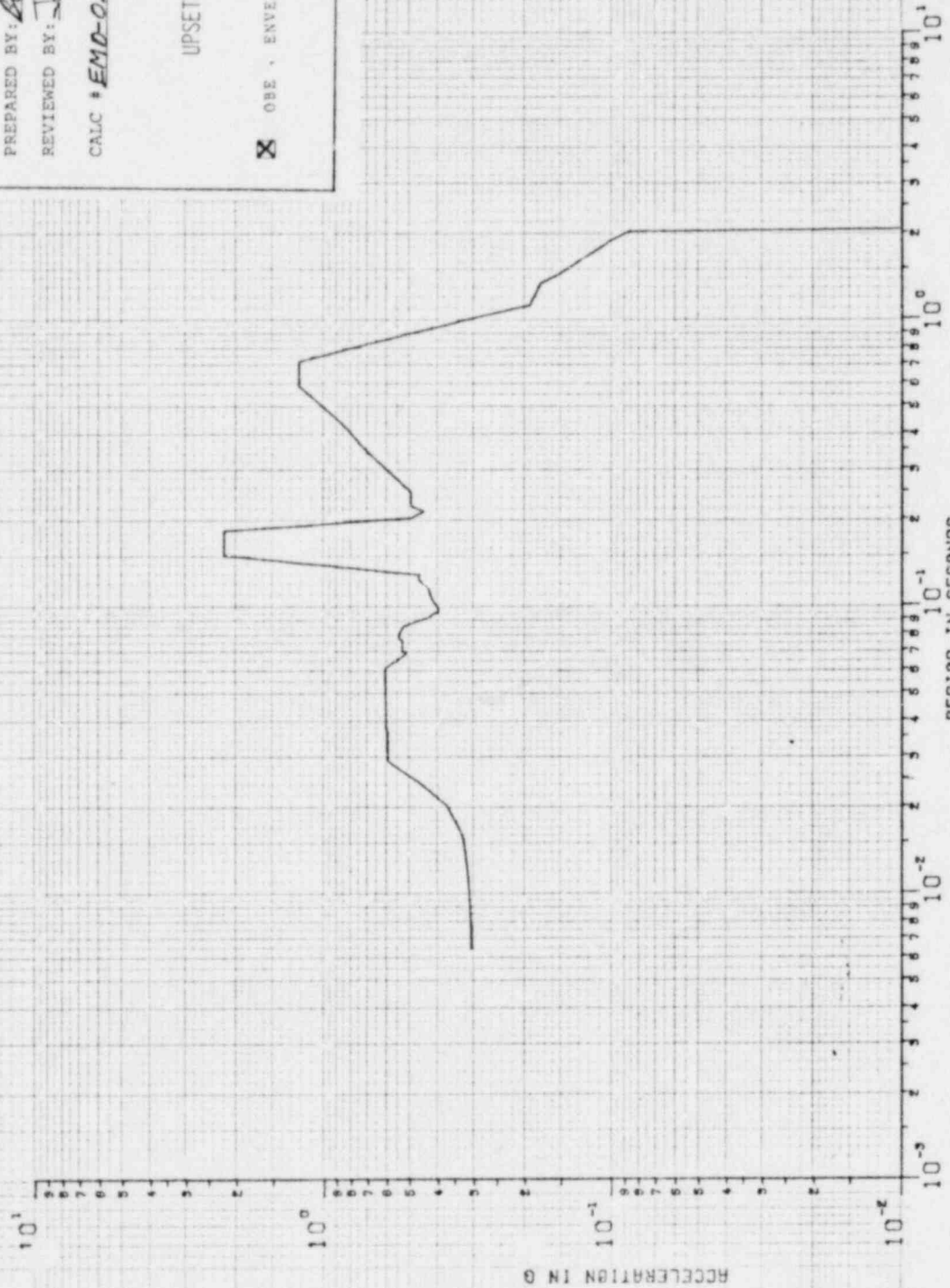
PREPARED BY: Bruce M. Day DATE: 6/20/80
REVIEWED BY: Tom Papadopoulos DATE: 6-20-80
CALC # EMD-024386 PAGE 20 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc No. EMD-024386
Rev of Date: 2/18/80
Proj. No: 4130-15
File No. EMD-024386
Page 57 of 104



H0-EW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM DRYWELL/SUP POOL COL 523.7'

RUN ID: 946 BML 6/20/80

ZIMMER UNIT-1 4130-15

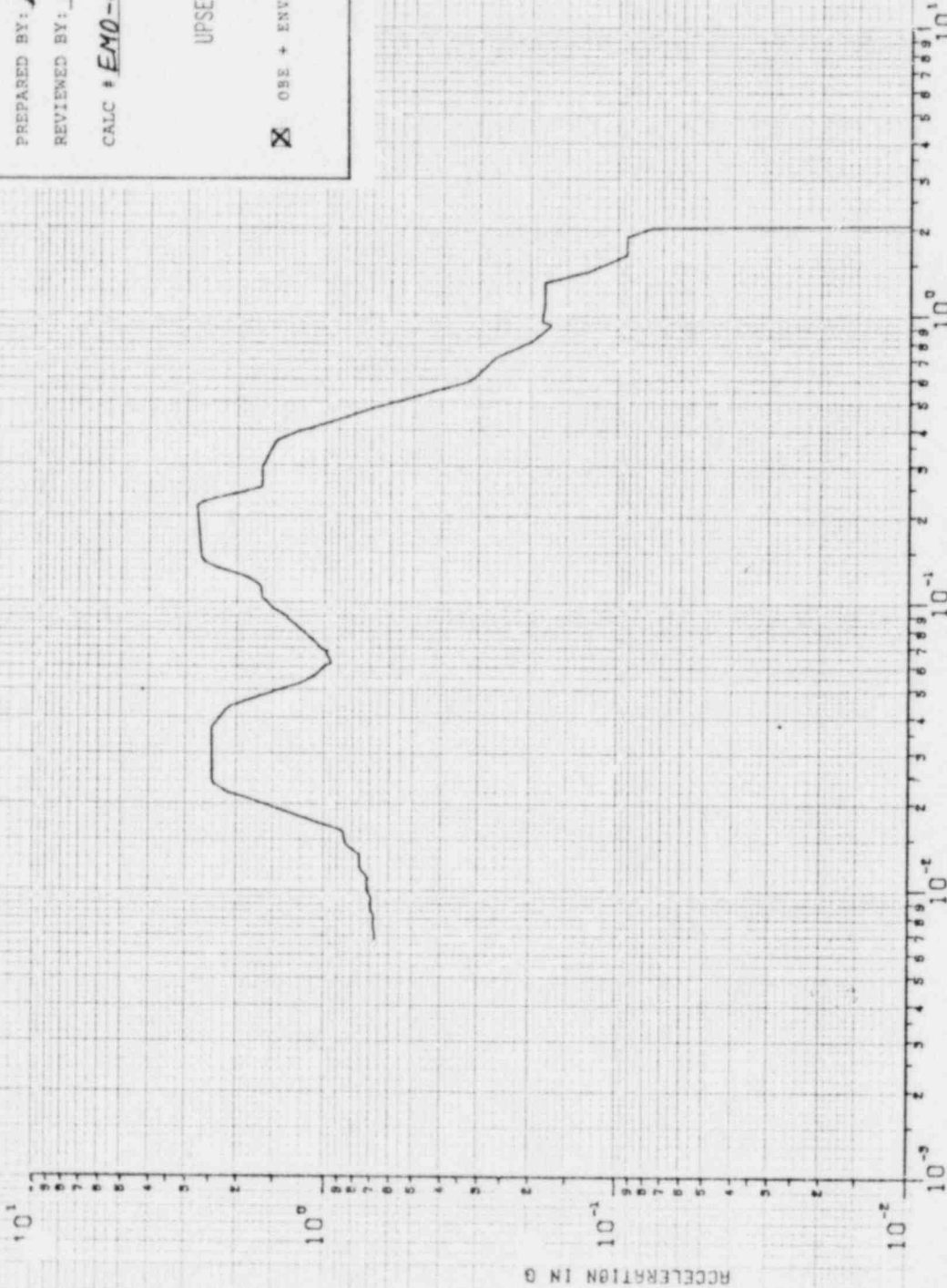
PREPARED BY: Bruce M. Long DATE: 6/20/80
REVIEWED BY: Tom Papadopoulos DATE: 6-20-80
CALC # EMD-024386 PAGE 21 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE SRV ASY-TQ + SRV ALL-TQ

Calc. No. EMD-024386
Rev. Of Date 3/18/80
Proj. No. 4730-15
File No. EMD-024386
Page 53 of 104



PERIOD IN SECONDS

VW-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM DRYWELL/SUP POOL COL 523.9"

LOGARITHMIC INCHES

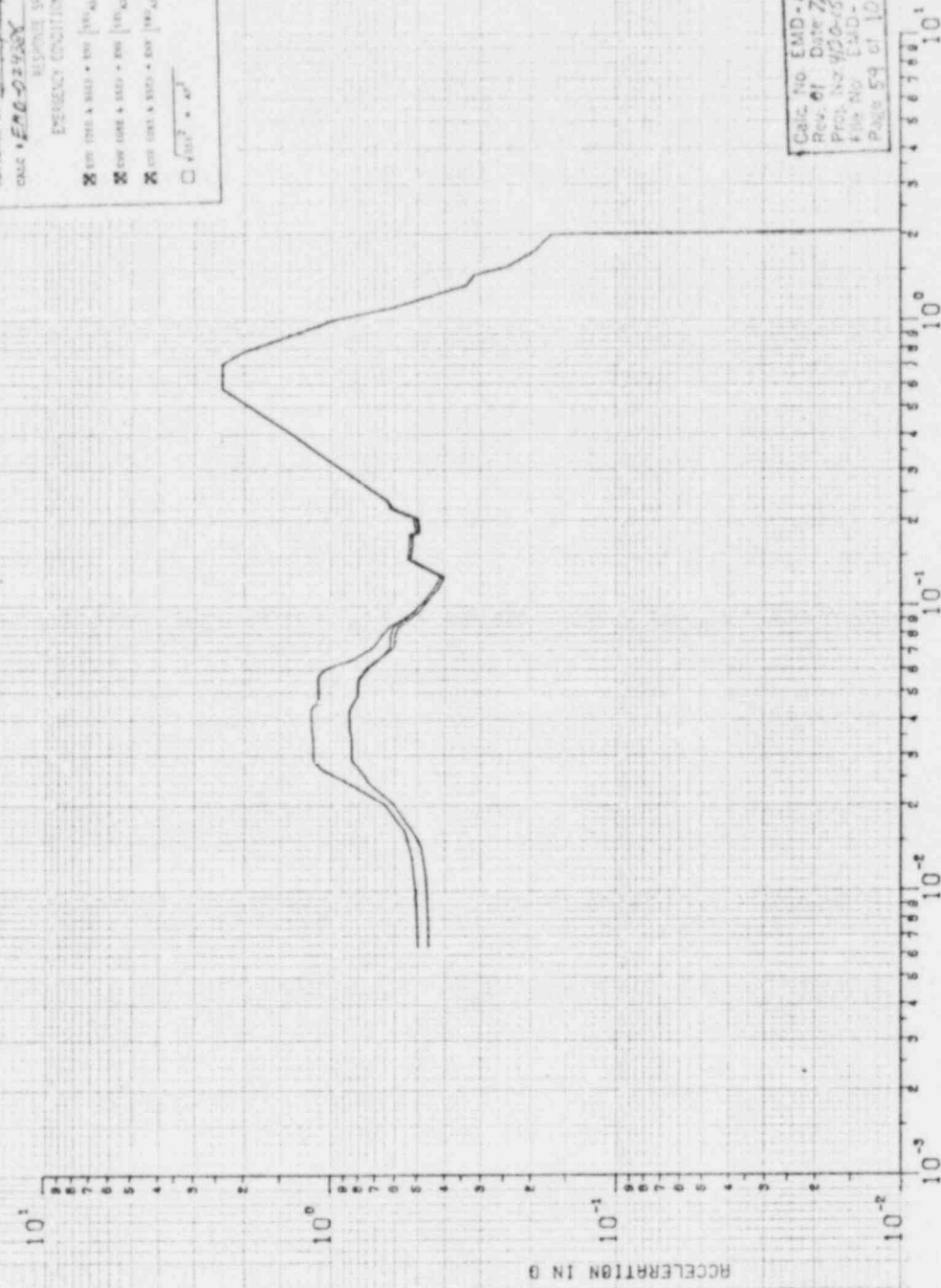
K-E KEUFFEL & ESSER CO. PRINTED IN U.S.A.

Run ID: 941012 cc/21/80

ZIMMER UNIT - 8230-15
 PREPARED BY *George P. Ziegler* DATE *6/24/80*
 REVIEWED BY *W. J. ...* DATE *6/24/80*
 CALC. *EMD-02436* PAGE *25* OF *60*

RESPONSE SPECTRA
 EMERGENCY CONDITION - 25 (MP/MS)
 100 (MS) A 1000 + 800 (MP/MS) + 0.001 (MP/MS) + 0.001 (MP/MS)
 100 (MS) A 1000 + 800 (MP/MS) + 0.001 (MP/MS) + 0.001 (MP/MS)
 100 (MS) A 1000 + 800 (MP/MS) + 0.001 (MP/MS) + 0.001 (MP/MS)
 100 (MS) A 1000 + 800 (MP/MS) + 0.001 (MP/MS) + 0.001 (MP/MS)

CALC. NO. EMD-02436
 REV. 01 DATE 7/18/80
 PROJ. NO. 4200-15
 FILE NO. EMD-02436
 PAGE 59 OF 101



HO-NS DF-2% ABSV(C2 + C3 + C4) ZIM DRYWELL FL/SUPP POOL COLUMN 523'-9" REV. 01
 KEUFFEL & ESSER CO. MADE IN U.S.A.

RUN ID: A87 BML 06/24/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Eric M. Toy DATE: 6/24/80

REVIEWED BY: Tom Papadopoulos DATE: 6-24-80

CALC # EMD-024386 PAGE 23 OF 60

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CHC
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] + CO 1
- ENV (OBE & SSE) + ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] + CO 2
- $\sqrt{SSE^2 + AP^2}$



Calc. No. EMD-024386
 Rev. 01 Date 7/18/80
 Proj. No. 4130-15
 File No. EMD-024386
 Page 60 of 104

H0-EW DF-2% ABSV(C2 + C3 + C4) ZIM DRYWELL FL/SUPP POOL COLUMN 523'-9" REV. 01
 KEUTTELBESSER CO. PRINTED IN U.S.A. FILE NUMBER: 22-NOT FILED

RUN 10: A87 BML 06/24/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Lucia M. King* DATE: 6/24/80

REVIEWED BY: *Tom Papadopoulos* DATE: 6-24-80

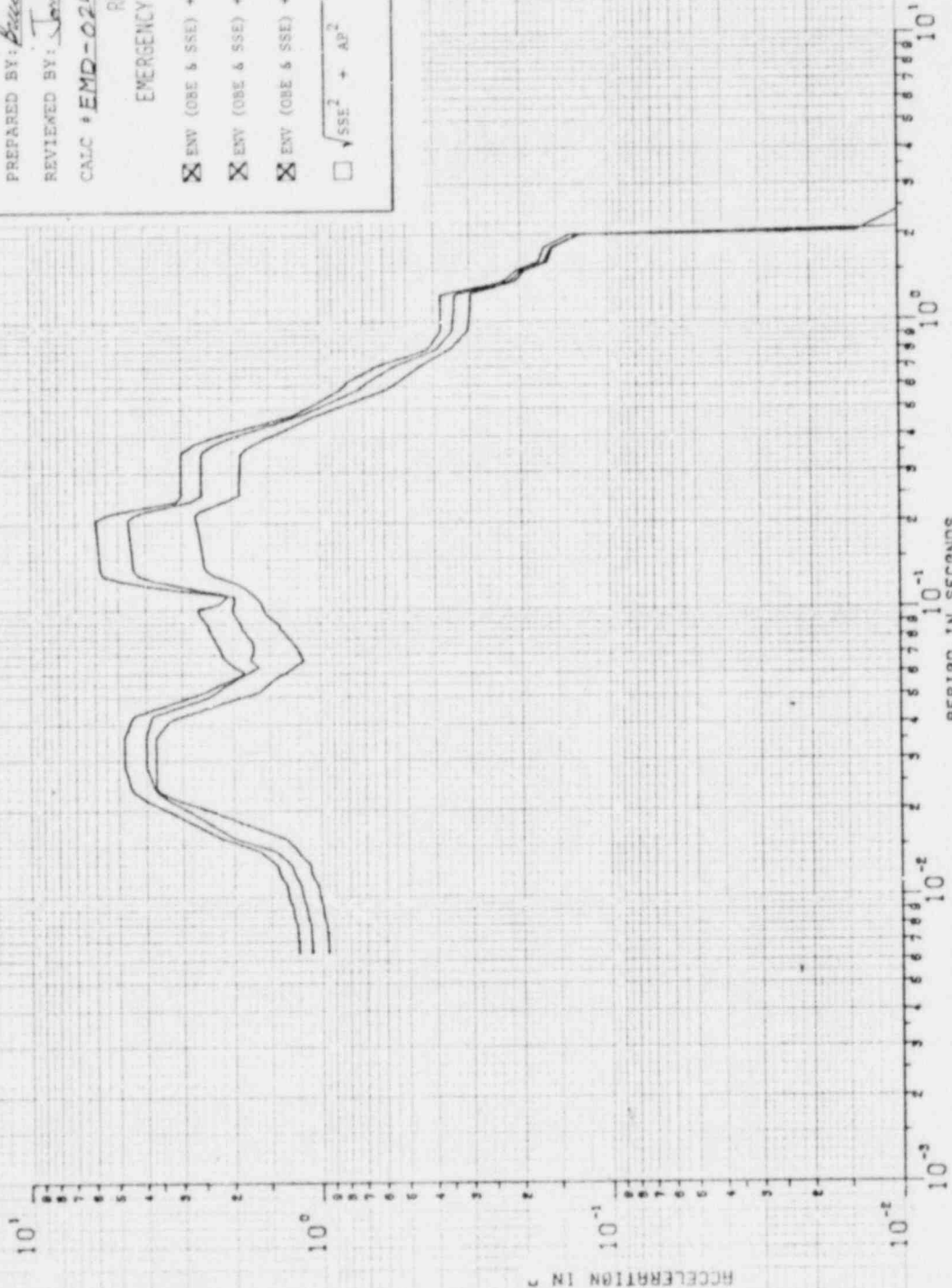
CALC # EMD-024386 PAGE 24 OF 60

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CHC
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CO 2

$\sqrt{SSE^2 + AP^2}$



Calc No. EMD-024386
 Rev. Of Date 7/27/80
 Proj No. 4130-15
 File No. EMD-024386
 Page 61 of 104

VW-VW DF-2% ABSV(C2 + C3 + C4) ZIM DRYWELL FL/SUPP POOL COLUMN 523'-9" REV. 01
 KEUFFEL & ESSER CO. PRINTED IN U.S.A. FULL-COMPUTER-CONTROLLED

RUN ID: A87 BML 06/24/80

ZIMMER UNIT-1 4130-15

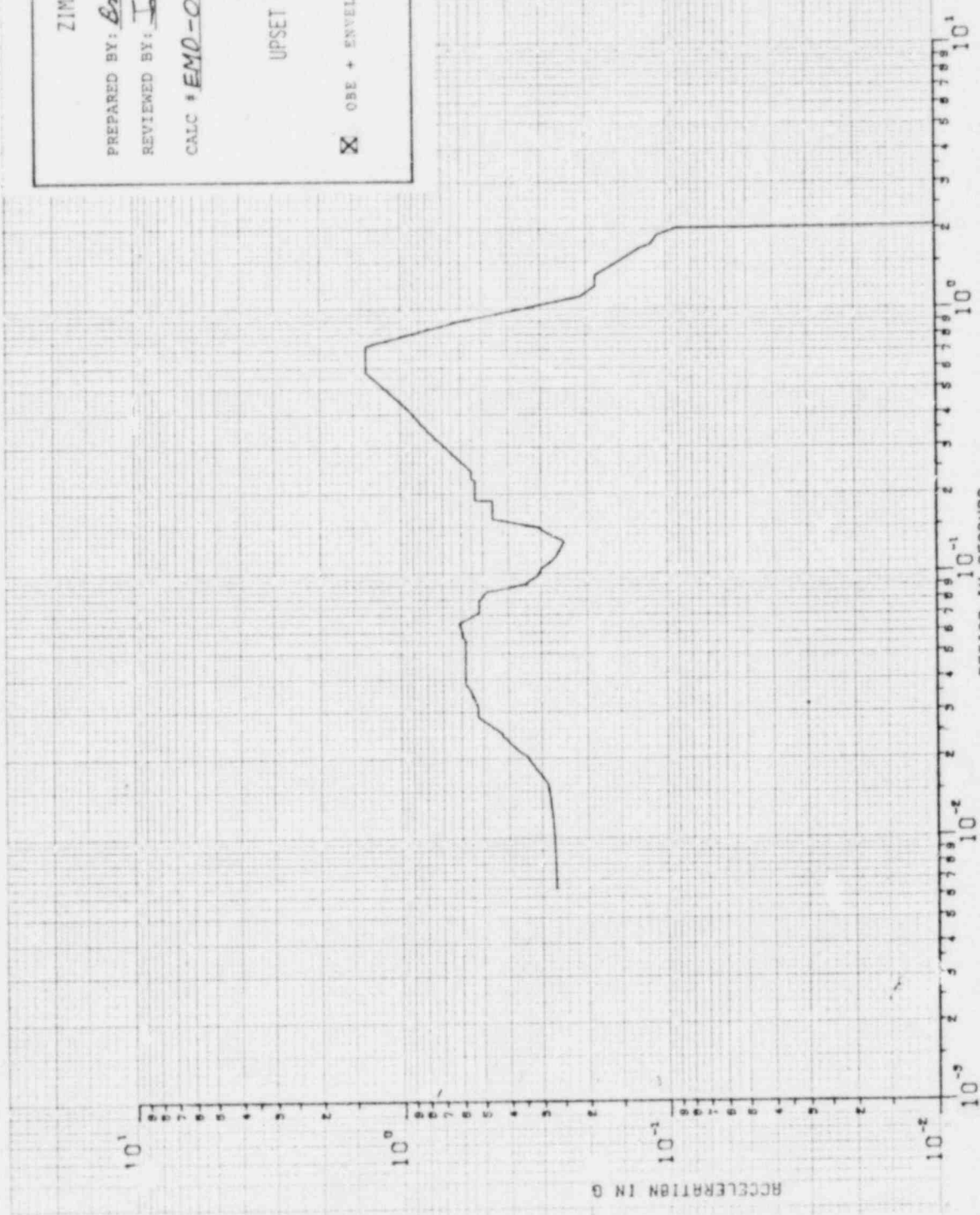
PREPARED BY: Bruce M. Long DATE: 6/20/80
REVIEWED BY: Tom Papadopoulos DATE: 6-20-80
CALC # EMD-024386 PAGE 25 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc No: EMD-024386
Rev. 01 Date: 7/13/80
Proj No: W30-5
File No: EMD-024386
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H0-NS DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 526'-9" REV. 01

RUN ID: 946 BNL 06/20/80

ZIMMER UNIT-1 4130-15

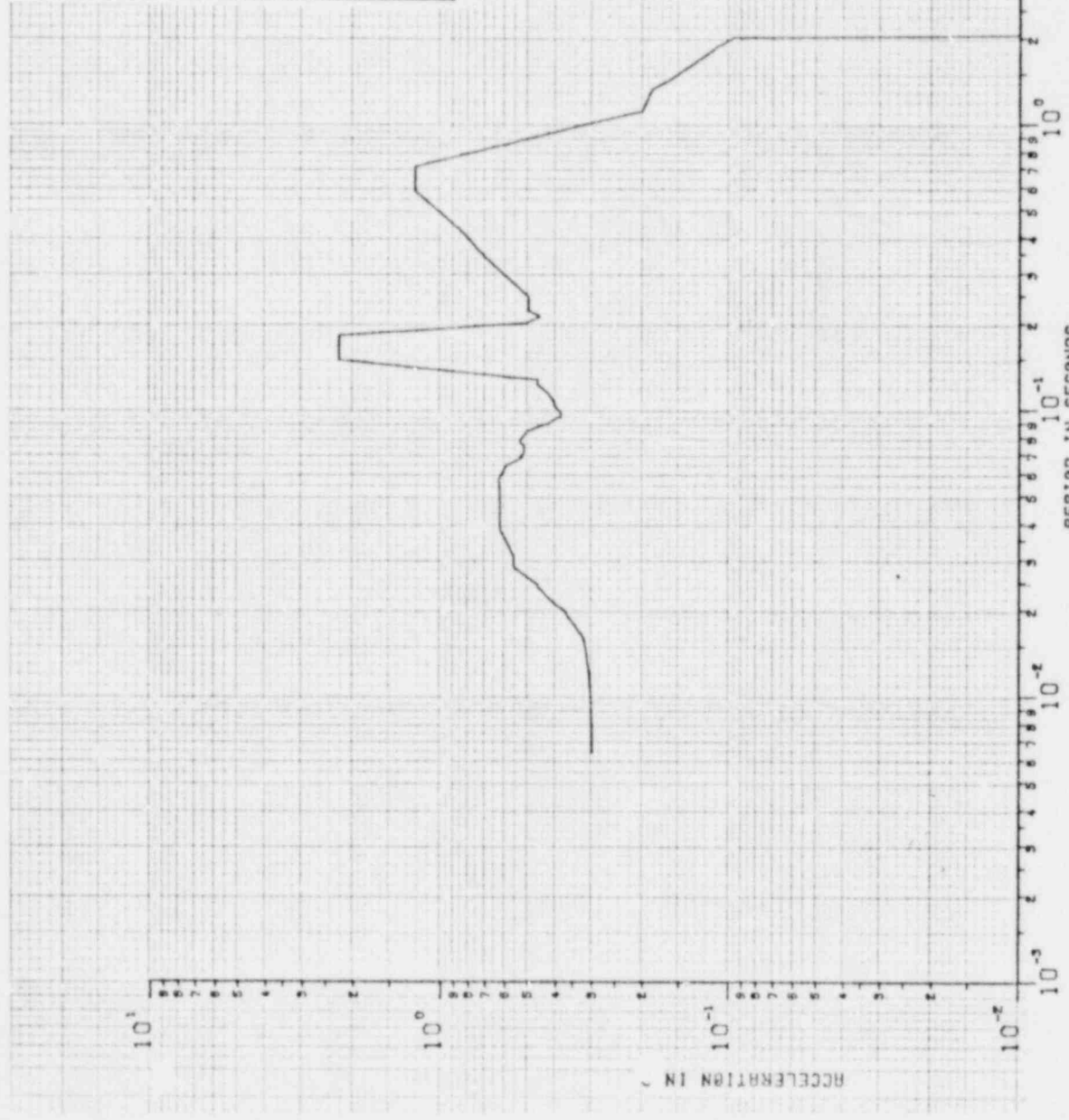
PREPARED BY: Bruce M. Fry DATE: 6/29/80
REVIEWED BY: Tom Papacharaltes DATE: 5-20-80
CALC # EMD-024386 PAGE 26 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_ASY-TQ + SRV_ALL-TQ]

Calc No EMD-024386
Rev 01 Date: 7/13/80
Proj No: 4/30-15
File No: EMD-024386
Page: 63 of 104



HQ-EW DF-1% ABSV(OBE+ENV(SRV-RI L-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 526*-9** REV. 01

SOULSBY INC. EN-400-C1005

MADE IN U.S.A. NEUFELDESSERCO

RUN ID: 946 PNL 26/20/80

ZIMMER UNIT 1 4130-15

PREPARED BY: *Base M. J. J.* DATE: *6/20/80*

REVIEWED BY: *Tom Papadopoulos* DATE: *6-20-80*

CALC # *EMD-024386* PAGE *27* OF *60*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc No. EMD-024386
Rev. Of Date *7/25/80*
Proj No *4130-15*
File No. EMD-024386
Page *27* of *60*



VW-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 526'-9" REV. 01

RUN 10: 9:46 PM 06/20/80

ZIMMER UNIT-1, 8100-15

PREPARED BY *George M. Fry* DATE: *7/8/80*
REVIEWED BY: *Dr. J. J. ...* DATE: *2-8-80*
CALC: *EMD-02438C* PAGE: *22* OF *60*

RESPONSE SPECTRA

EMERGENCY CONDITION - 21 NOV/1980

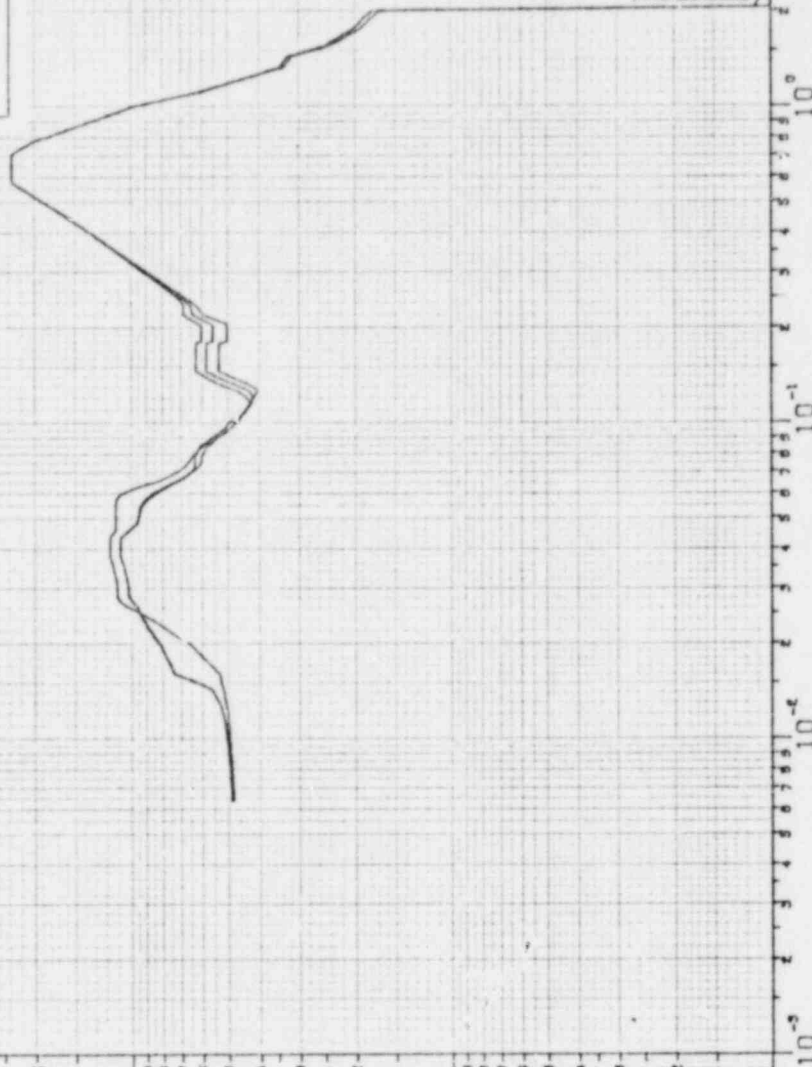
- 1000 HZ & 1000 * 100 (100-100) * 100 (100-100) * 100
- 1000 HZ & 1000 * 100 (100-100) * 100 (100-100) * 100
- 1000 HZ & 1000 * 100 (100-100) * 100 (100-100) * 100

$C = \sqrt{1000} * 10^3$

Calc. No. EMD-02438C
 Rev. 01 Date 7/18/80
 Proj. No. 4/80-15
 File No. EMD-02438C
 Page 25 of 104

ACCELERATION IN G

PERIOD IN SECONDS



H0-NS DF-2% ACSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 526'-9" REV. 01

NE NEUFEL & ESSER CO. PRINTED IN U.S.A.

RUN 10:706 BML 07/08/80

706BML J7/08/80

ZIMMER UNIT-1 4150-15

PREPARED BY *Edward M. ...* DATE: 7/2/80

REVISION BY: *Joe ...* DATE: 2-8-80

ORIG: EMD 02-4-396 PAGE 29 OF 60

RESPONSE SPECTRA

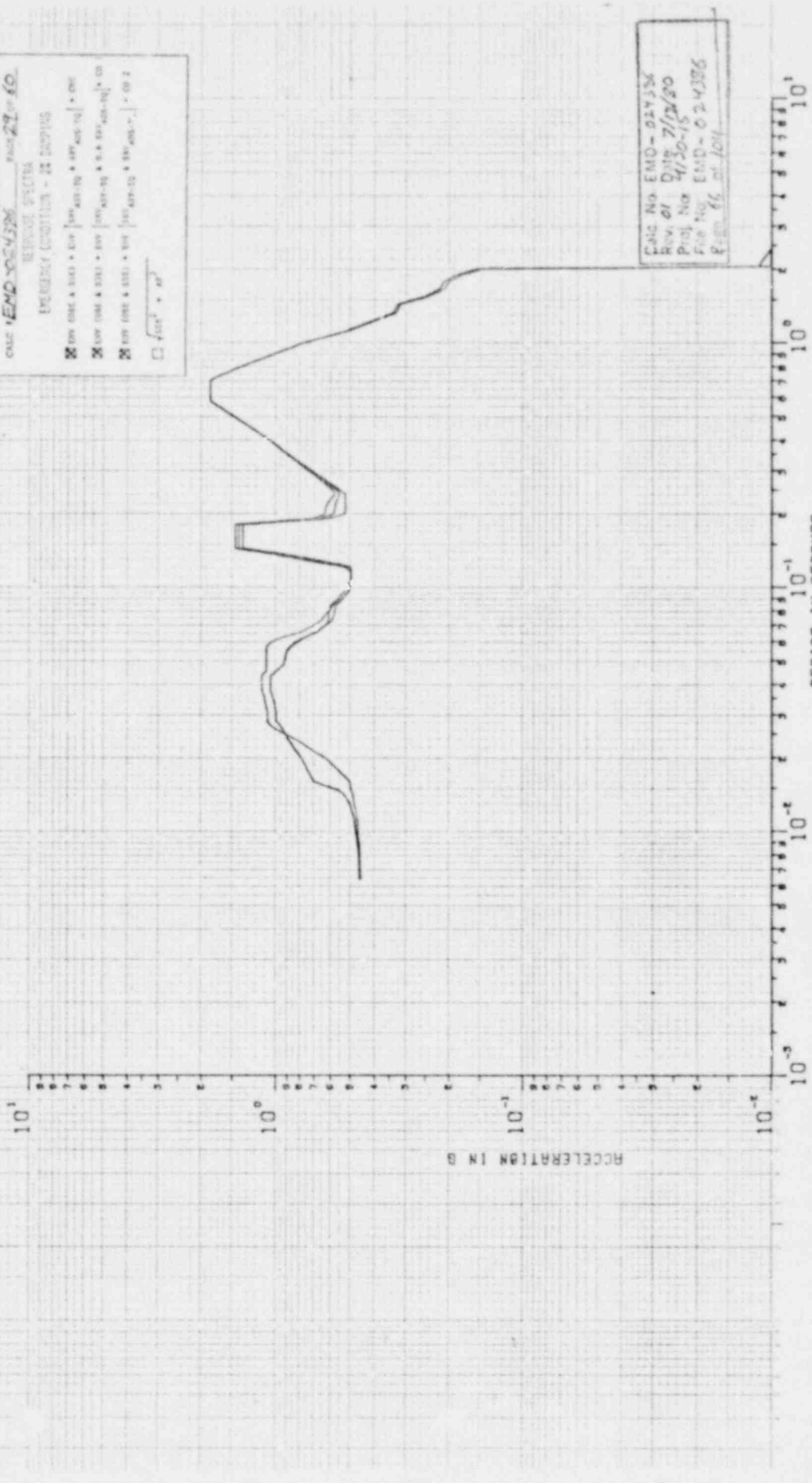
EXCITATION: 22 DROPPING

100 000 & 100 & 100 100 000 & 100 000 100 & 100

100 100 & 100 & 100 100 000 & 100 000 100 & 100

100 100 & 100 & 100 100 000 & 100 000 100 & 100

$\sqrt{a^2 + b^2}$



CAG No. EMD-024336
 Rev. 01 Date: 7/2/80
 Proj. No. 4150-15
 File No. EMD-024336
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PERIOD IN SECONDS

H0-EW DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 526'-9" REV. 01

INC. NEUFELGESSER ENGINEERS

REV 10:766 BML 07/08/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Fry DATE: 7/8/80
REVIEWED BY: Jim Papadopoulos DATE: 7-8-80
CALC # EMD-024386 PAGE 30 OF 60

RESPONSE SPECTRA
EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CHG
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CO 2
- $\sqrt{S_{acc}^2 + AP^2}$

Calc No. EMD-024386
 Rev of Date: 7/8/80
 Proj No. 4130-15
 File No. EMD-024386
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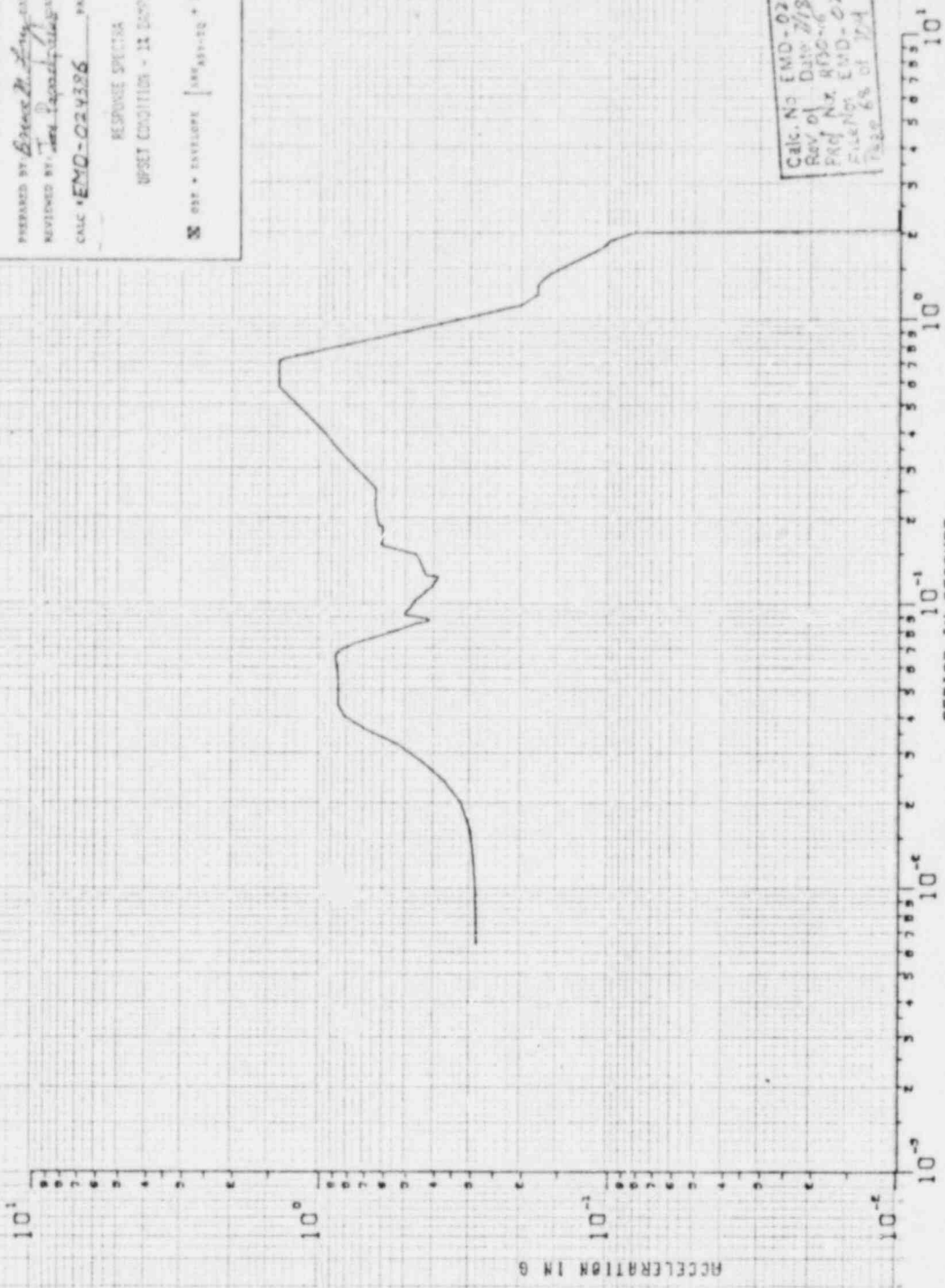
VH-VW DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 526'-9" REV. 01

NE NEUFFEL & ESSER CO PRINTED IN U.S.A. FULLY AUTOMATIC 2-D DIGITIZER

RVM 10: 706 BAL 07/08/80

ZIMMER UNIT-1 4130-15
 PREPARED BY *Ernest M. Long* DATE: *1/23/80*
 REVIEWED BY: *Tom Parach* DATE: *6-23-80*
 CALC #EMD-024386 PAGE 31 OF 60
 RESPONSE SPECTRA
 OFFSET CONDITION - 11 DAMPING
 * * * ENVELOPE [SRV-ASY-30 + SRV-ALL-10]

Calc. No. EMD-024386
 Rev. of Date: *7/9/80*
 Proj. No. *ASV-30*
 File No. EMD-024386
 Page 31 of 60



K-E KEUFFEL & ESSER CO. PRINTED IN U.S.A. FULL COMPLIANCE WITH FEDERAL STANDARDS
 H0-NS DF-17: ABSV(0BE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM TOP/RPV PEDESTAL 542*-9

RUN 10:571 BML 06/23/80

ZIMMER UNIT-1 4130-15

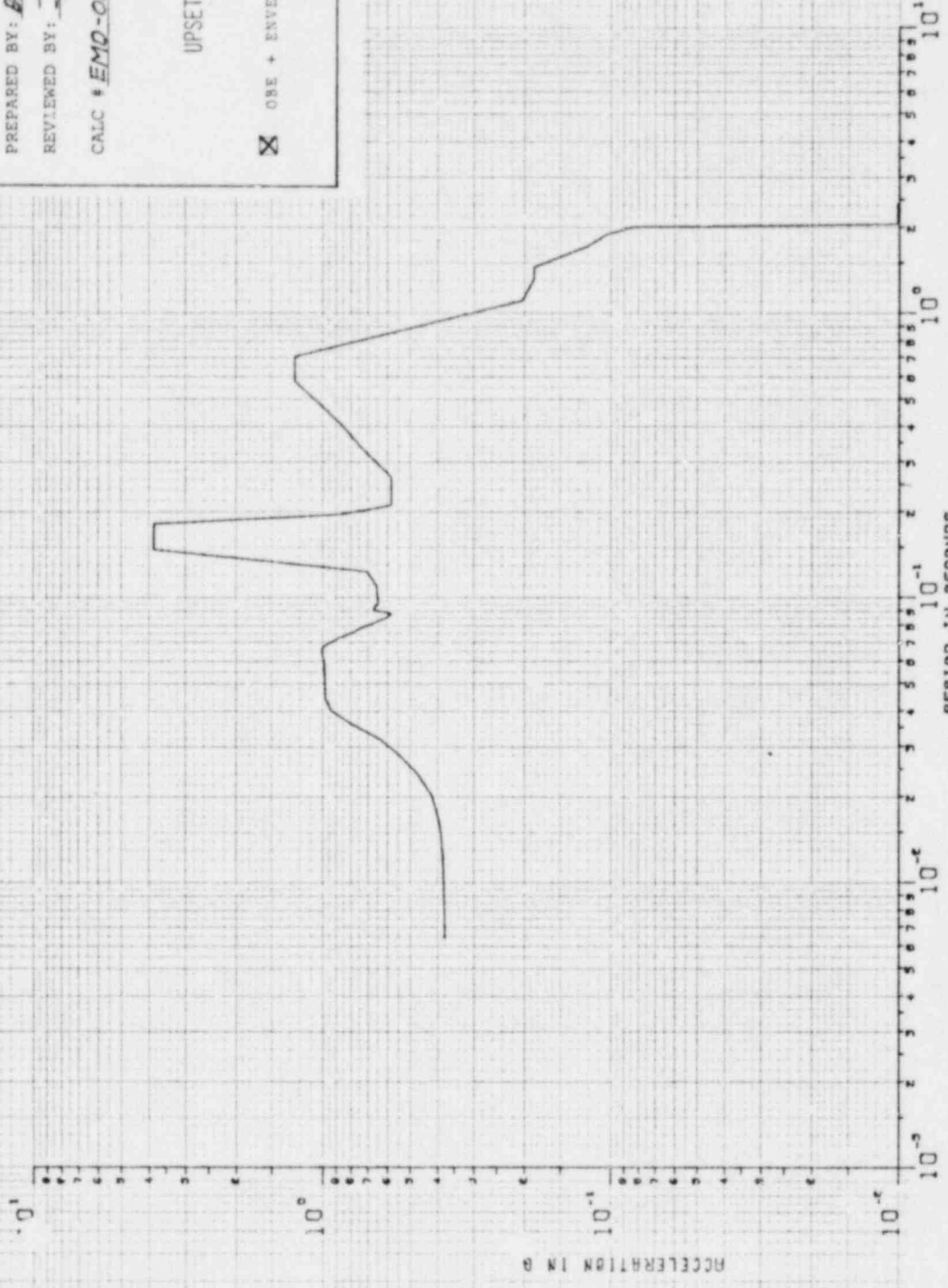
PREPARED BY: Bruce M. Fry DATE: 6/23/80
REVIEWED BY: Tom Papadimitriou DATE: 6-23-80
CALC # EMD-024386 PAGE 32 OF 40

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No. EMD-024386
Rev. 01 Date 7/5/80
Proj. No. 4130-15
File No. EMD-024386
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H0-EW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM TOP/RPV PEDESTAL 542'-9''1

EL&E-CERCO PRINTED IN U.S.A. FULL COMPLIANCE WITH ISO 9001

RUN ID: 871 BML 06/23/80

NAME KEUTFE

ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce McTay* DATE: *6/23/80*
REVIEWED BY: *Tom Papadopoulos* DATE: *6-23-80*
CALC # *EMD-024386* PAGE *37* OF *60*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No. EMD-024386
Rev. 01 Date: 7/28/80
Proj. No. 4130-15
File No. EMD-024386
Page 70 of 104



VH-VH OF-1% ABBV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM TQP/RPV PEDESTAL 542*-9**1

RUN ID: 8118ML 56/23/80

LAESSERCO PRINTED IN U.S.A. FULL COMPLIANCE WITH FCC/UL
K-E KEUFZEL

ZIMMER UNIT-1, ALSO-15
 PREPARED BY: *Enrico P. Ayala* DATE: 7/1/80
 RECEIVED BY: *Enrico P. Ayala* DATE: 7-2-80
 CALC: EMD-024286 PER 71 of 104

RESISTIVE SPECIES
 FREQUENCY LOCATION: 25.000000

ENV (DBE & SBI) * ENV [ENV (DBE & SBI) * ENV (DBE & SBI)] * ENV
 ENV (DBE & SBI) * ENV [ENV (DBE & SBI) * ENV (DBE & SBI)] * ENV
 ENV (DBE & SBI) * ENV [ENV (DBE & SBI) * ENV (DBE & SBI)] * ENV
 ENV (DBE & SBI) * ENV [ENV (DBE & SBI) * ENV (DBE & SBI)] * ENV

Calc. No. EMD-024286
 Rev. 01 Date 7/1/80
 Proj. No. 4130-76
 File No. EMD-024286
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HQ-NS DF-2% ABSV(C2 + C3 + C4 + C5) ZIM TOP/RPV PEDESTAL 542*-9** REV. 01

RUN ID: 202BML 07/09/80

407
 KEUFFEL & ESSER CO. PRINTED IN U.S.A. FILE LOCATION: 25 INCHES

202BML J7/09/80

ZIMMER UNIT-1 4130-15

PREPARED BY *George M. Kelly* DATE: *7/9/80*

REVISIONS BY: *John S. ...* DATE: *7-9-80*

CALC: *EMO-024386* PAGE: *35* OF *60*

RESPONSE SPECTRA

ENERGENCY CONDITION - *20* DAWNING

10% (0.04 & 0.08) • 10% (0.04-0.08 & 0.08-0.1) • 0.05

10% (0.04 & 0.08) • 10% (0.04-0.08 & 0.08-0.1) • 0.1

10% (0.04 & 0.08) • 10% (0.04-0.08 & 0.08-0.1) • 0.2

$\frac{1}{100} \cdot A^2$

Calc. No. EMD-024386

Rev. 01 Date: *7/9/80*

Proj. No. *W/30-15*

File No. EMD-024386

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10¹

10⁰

10⁻¹

10⁻²

ACCELERATION, % G

10⁻³

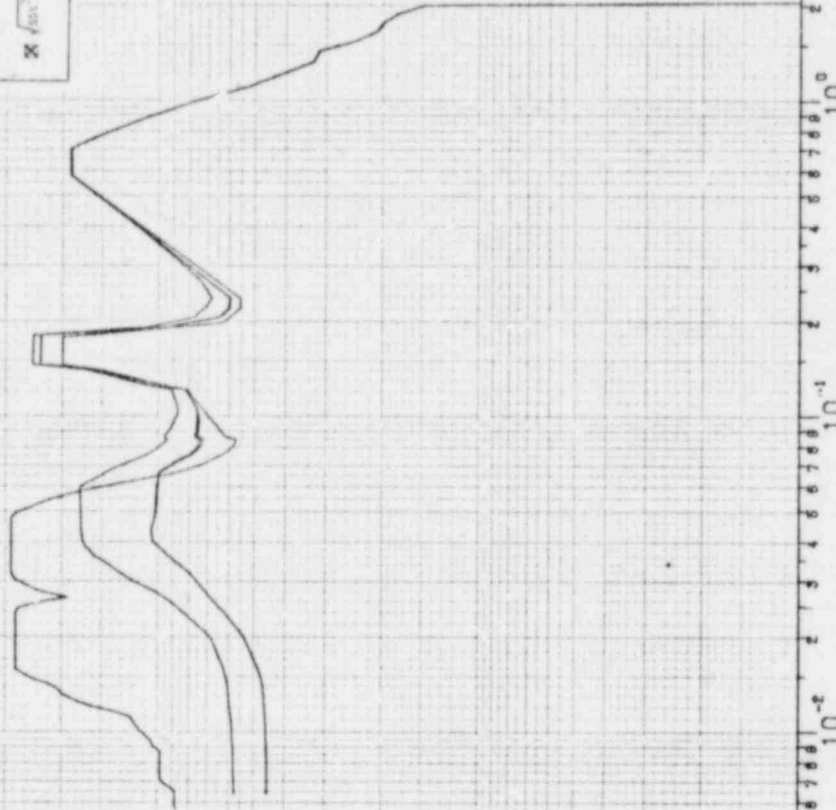
10⁻²

10⁻¹

10⁰

10¹

PERIOD IN SECONDS



H0-EW DF-2% ABSV(C2 + C3 + C4 + C5) ZIM TOP/RPV PEDESTAL 542'-9" REV. 01

ES&FR CO. PRINTED IN U.S.A. FULL SCALE RESPONSES IN G-CYCLES

REV. 01 N.E. REUFFER

RUN 10:202 BML 07/09/80

ZIMMER UNIT-1 4130-15

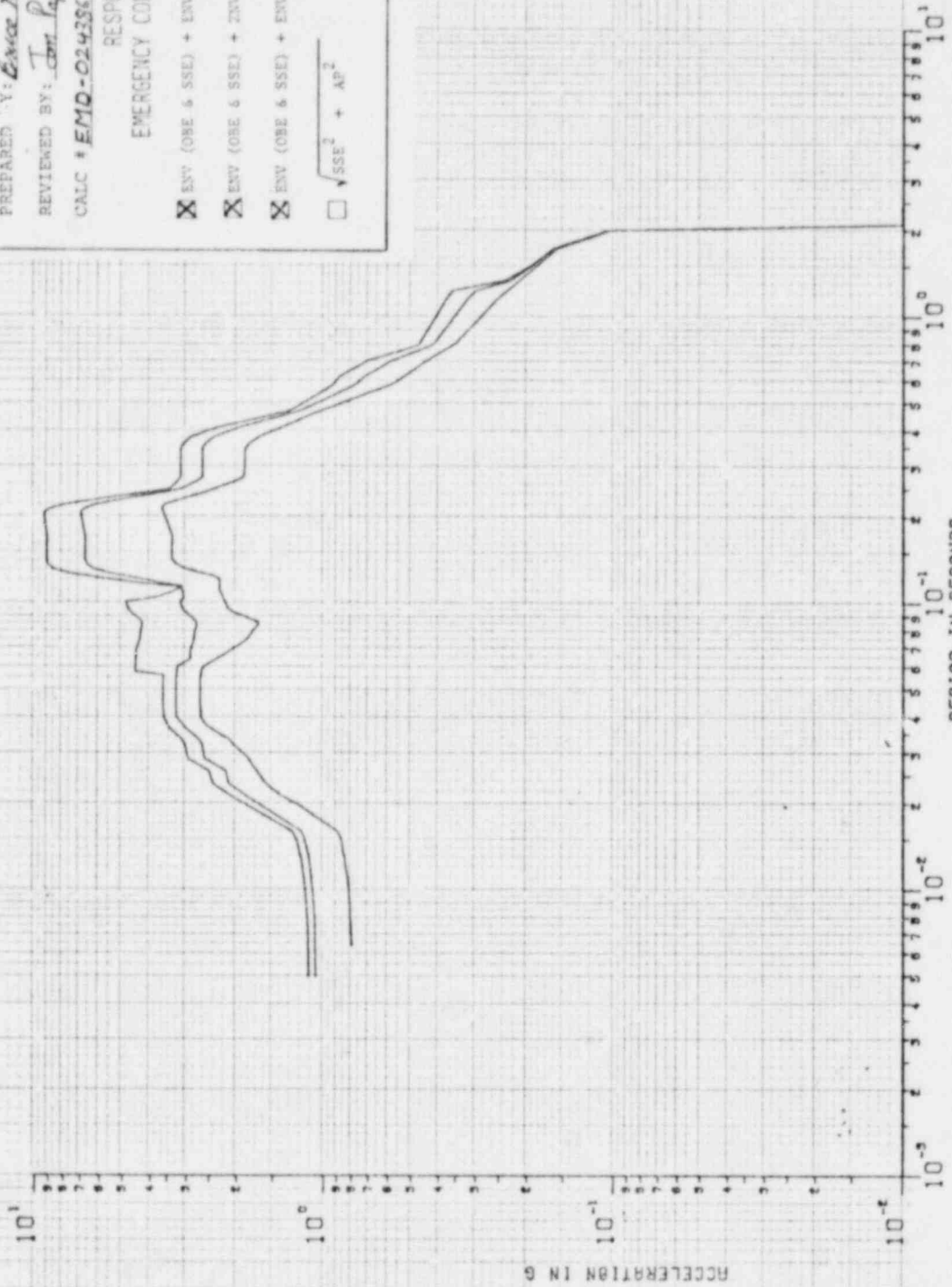
PREPARED BY: *Eric M. Gray* DATE: *7/1/50*
REVIEWED BY: *Tom Papadopoulos* DATE: *2-7-80*
CALC # *EMD-024386* PAGE *36* OF *60*

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV SRV ASY-TQ & SRV ADS-TQ + CMG
- ENV (OBE & SSE) + ENV SRV ASY-TQ & 0.6 SRV ADS-TQ + CO 1
- ENV (OBE & SSE) + ENV SRV ASY-TQ & SRV ADS-TQ + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc. No. EMD-024386
 Rev. 01 Date: 7/19/50
 Proj No 4130-15
 File No. EMD-024386
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VW-VW DF-2% ABSV(C2 + C3 + C4) ZIM TOP OF RPV PEDESTAL 542'-9" REV. 01

RUN ID:387 BML 07/07/50

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/23/80

REVIEWED BY: Tom Lapadula DATS: 5-23-80

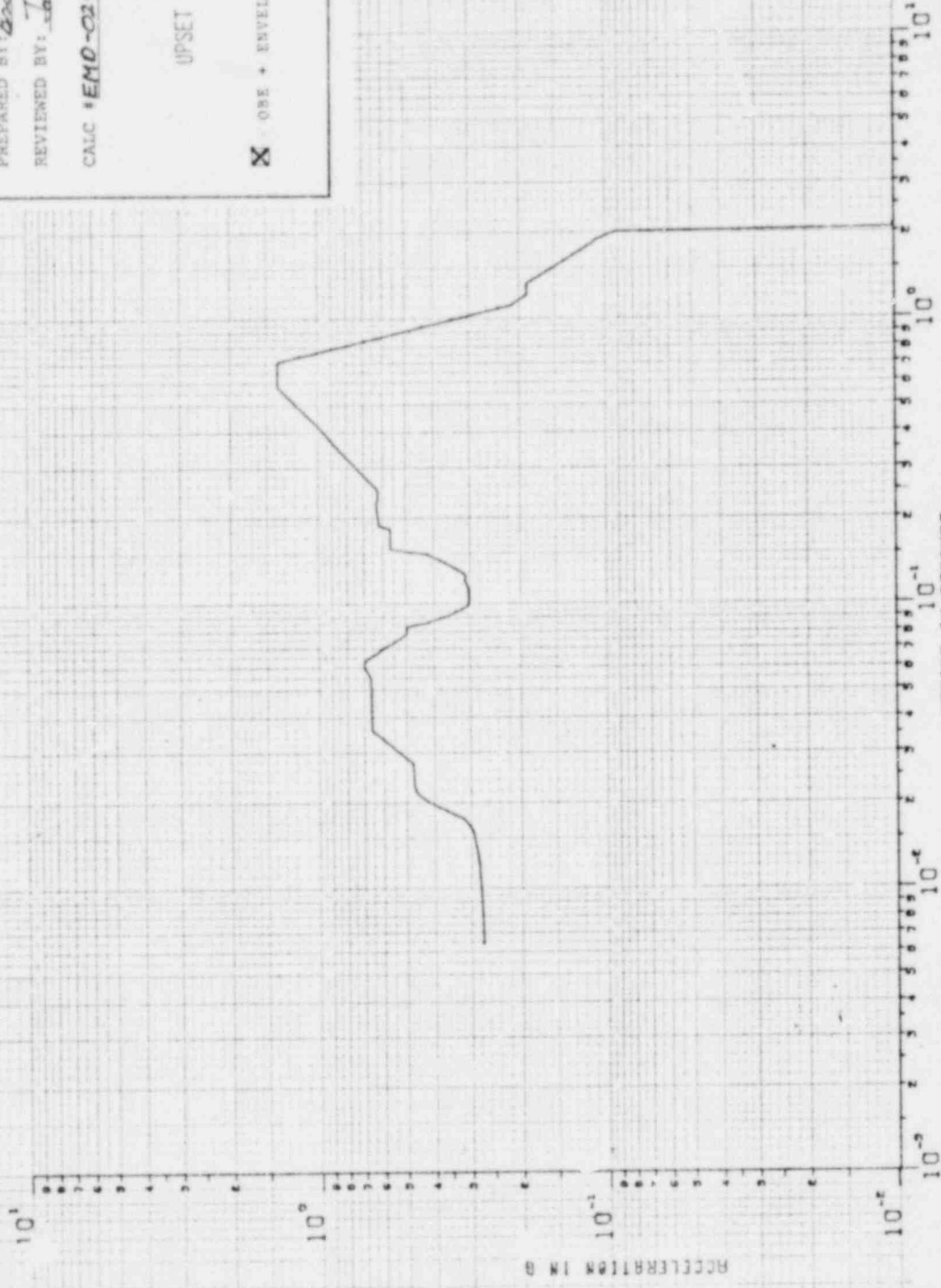
CALC # EMD-024386 PAGE 37 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc No. EMD-024386
Rev. 01 Date 7/17/80
Proj No. 4330-05
File No. EMD-024386
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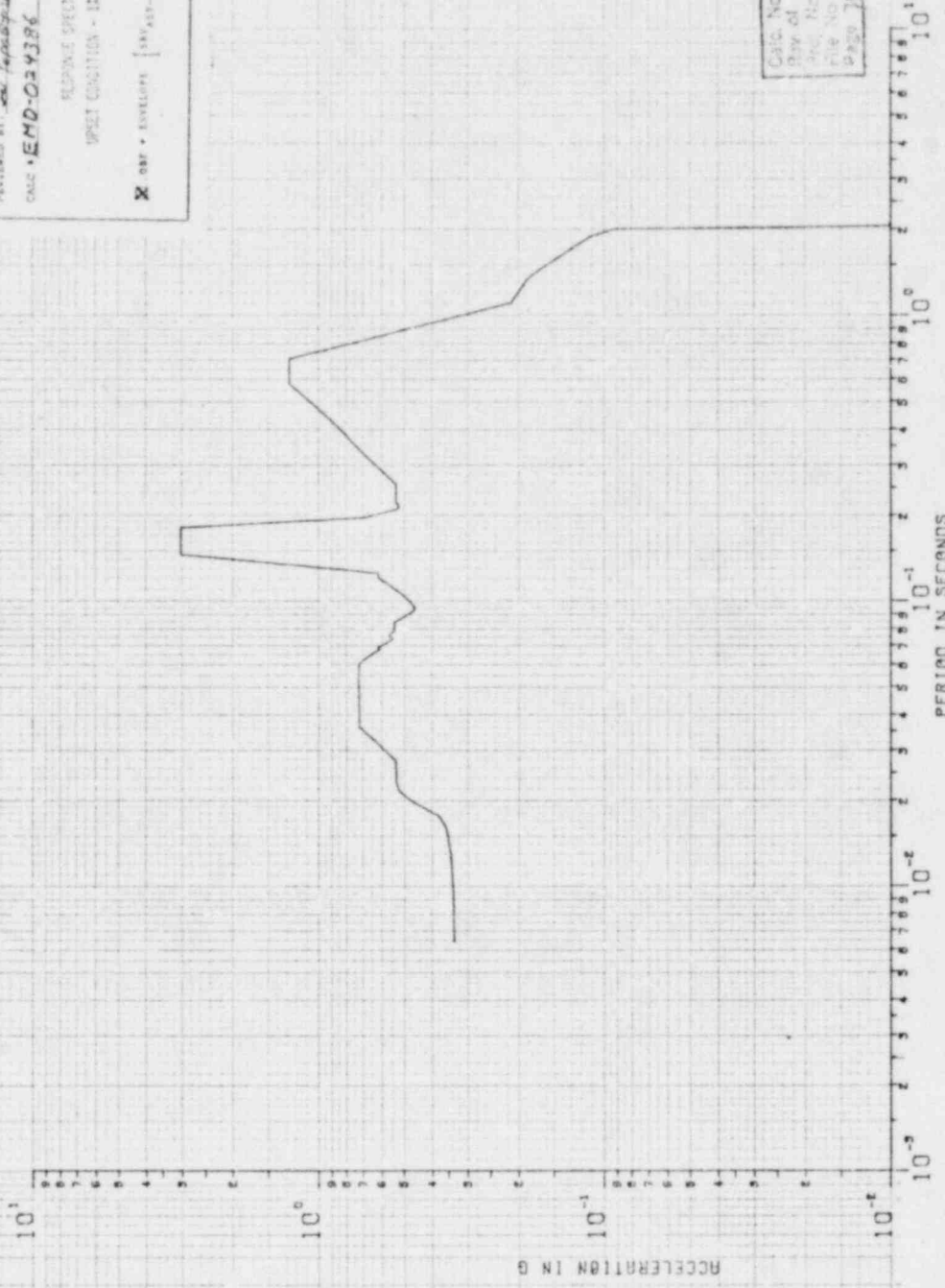
HQ-NS DF-1% RBSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CENT WALL 544'-10" REV 01

RUN ID: 871 BML 06/23/80

KE KEUFEL

ZIMMER DATA-1, 4330-35
 PREPARED BY: *George M. Fry*, DATE: *7/19/80*
 PROVIDED BY: *THE HANDBOOK DATA*, DATE: *7-2-80*
 CALC: *EMD-024386*, PAGE *38* OF *60*
 RESPONSE SPECTRA
 OFFSET CONDITION - IN SHIPPING
 X ORF • ENVELOPE [SRV, ASY-TQ, SRV, ALL-TQ]

CALC No. *EMD-024386*
 Day of Date *7/19/80*
 File No. *8130-15*
 File No. *EMD-024386*
 Page *35* of *104*



HQ-EW DF-17 ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 544*-10** REV C

NSI NEUFELD/ESSER CO. PRINTED IN USA

RUN 10:484 BML 07/09/80

484BML J7/09/80

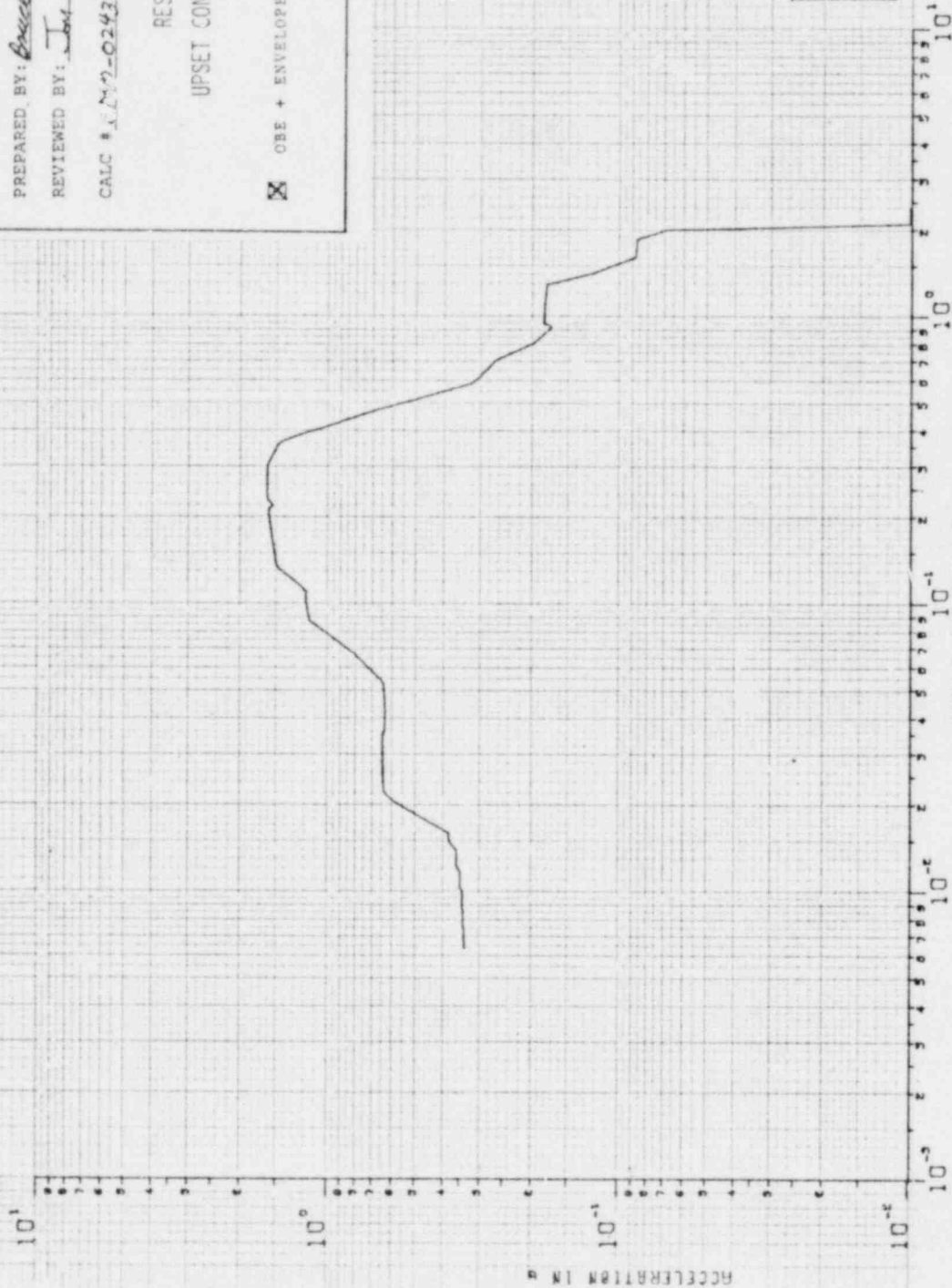
ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Long* DATE: 6/23/80
REVIEWED BY: *Tom Papadopoulos* DATE: 6-23-80
CALC # *A.M. 024388* PAGE *39* OF *60*

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE $\left[c_{VV}^{ASY-TQ} + SRV_{ALL-TQ} \right]$

Calc No. EMD-024386
Rev. 01 Date 7/18/80
Proj. No. 4130-15
File No. EMD-024386
Page 76 of 104



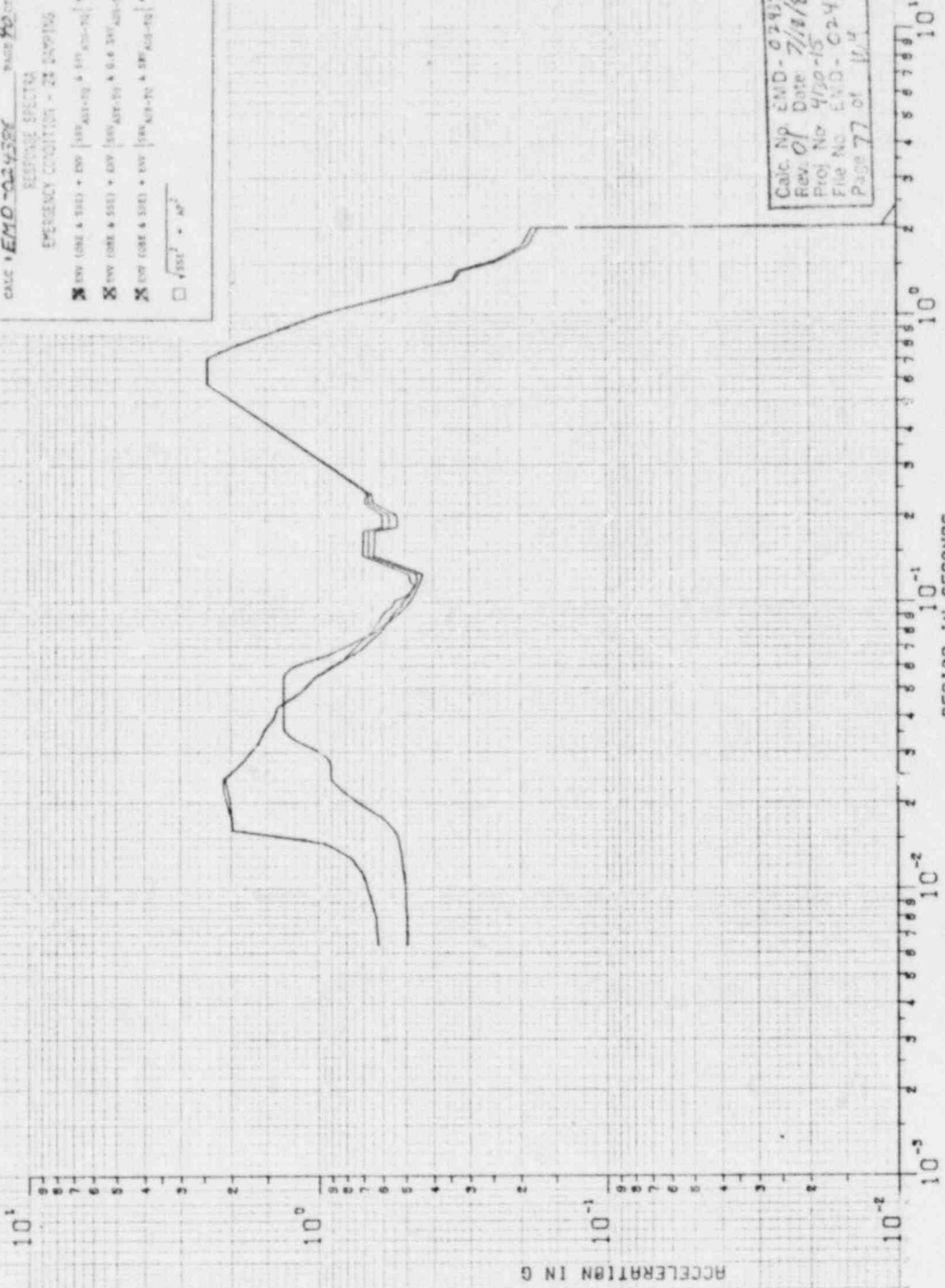
VW-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-RSY3-TQ)) ZIM CONT WALL 544'-10" REV 01

Rev ID: 871 BML 06/23/80

ZIMMER UNIT-1 4130-15
 PREPARED BY Bruce P. [Signature] DATE: 6/24/80
 REVIEWED BY: Tom [Signature] DATE: 6-29-80
 CALC: EMD-024386 PAGE 77 OF 80
 RESPONSE SPECTRA
 EMERGENCY CONDITION - 2X DOWNING

- X INV (OR) & (SEI) * INV [SAS] [ASR-10] & [SAS] [ASR-10] * INV
- X INV (OR) & (SEI) * INV [SAS] [ASR-10] & 0.6 [SAS] [ASR-10] * INV
- X INV (OR) & (SEI) * INV [SAS] [ASR-10] & [SAS] [ASR-10] * INV
- $\sqrt{SSR^2 + A^2}$

Calc. No. EMD-024386
 Rev. 01 Date: 7/18/80
 Proj. No. 4130-15
 File No. EMD-024386
 Page 77 of 80



HQ-NS OF -2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 544'-10" REV. 01

RUN ID: 321 BML 06/24/80

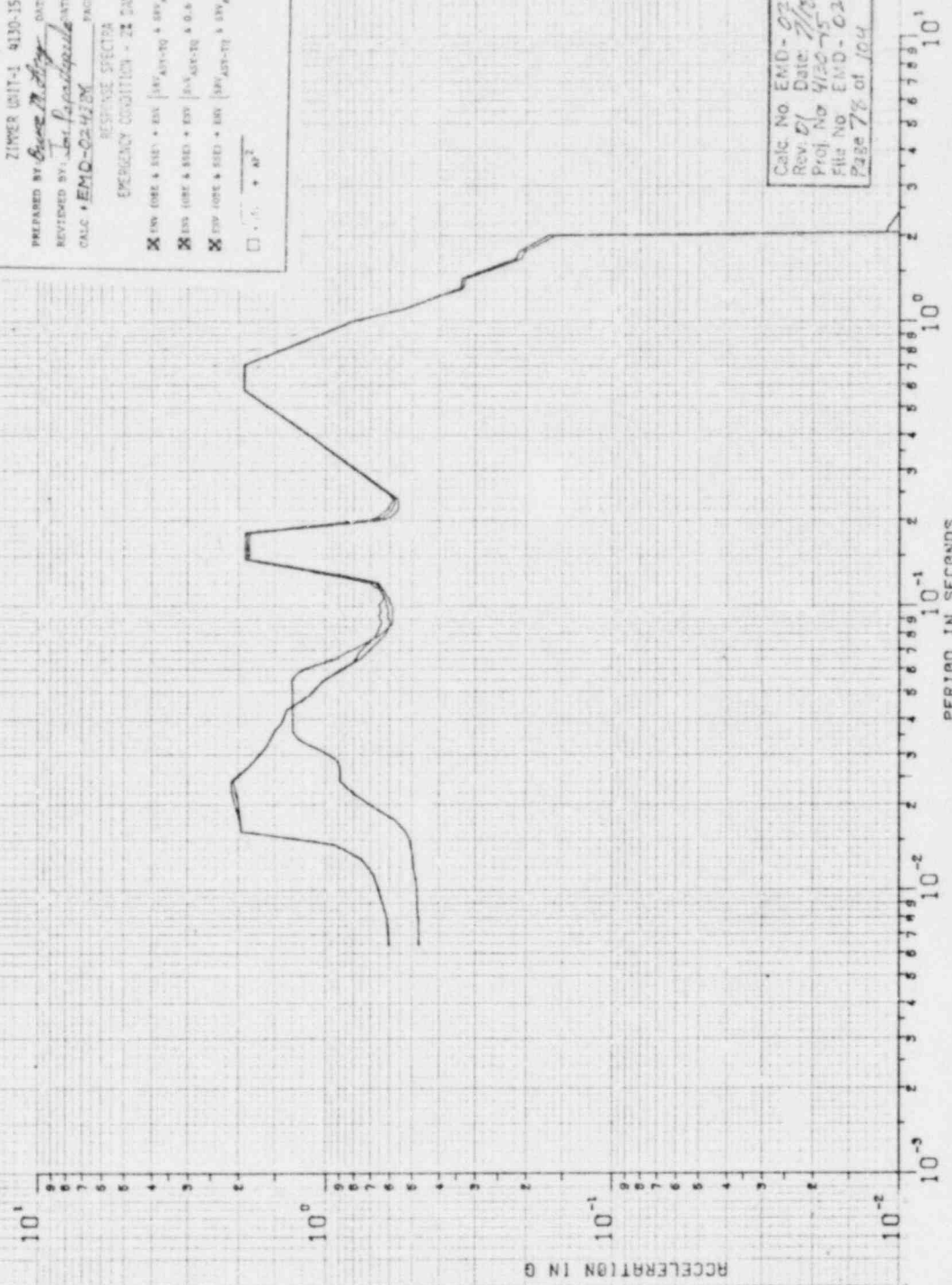
321 BML 06/24/80

ZIMMER UNIT-1 4130-15
 PREPARED BY *Gene D. King* DATE: *4/24/80*
 REVISION BY: *Tom Paschig* DATE: *1-24-80*
 CALC: *EMD-024386* PAGE *41* OF *60*

RESPONSE SPECTRA
 EMERGENCY CONDITION - SHIPPING

10% (0.5% & 5%) • REV [REV, 0.5-10] & 5% (0.5-10) • CNG
 5% (0.5% & 5%) • REV [REV, 0.5-10] & 0.5% (0.5-10) • CNG
 0.5% (0.5% & 5%) • REV [REV, 0.5-10] & 5% (0.5-10) • CNG
 1.0 • $\frac{1}{\omega^2}$

Calc No EMD-024386
 Rev. 01 Date: *7/18/80*
 Proj. No 4130-15
 File No EMD-024386
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H0-EH DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 544'-10" REV. 01

RUN ID: 321 BML 05/24/80

ZIMMER UNIT-1 4130-15

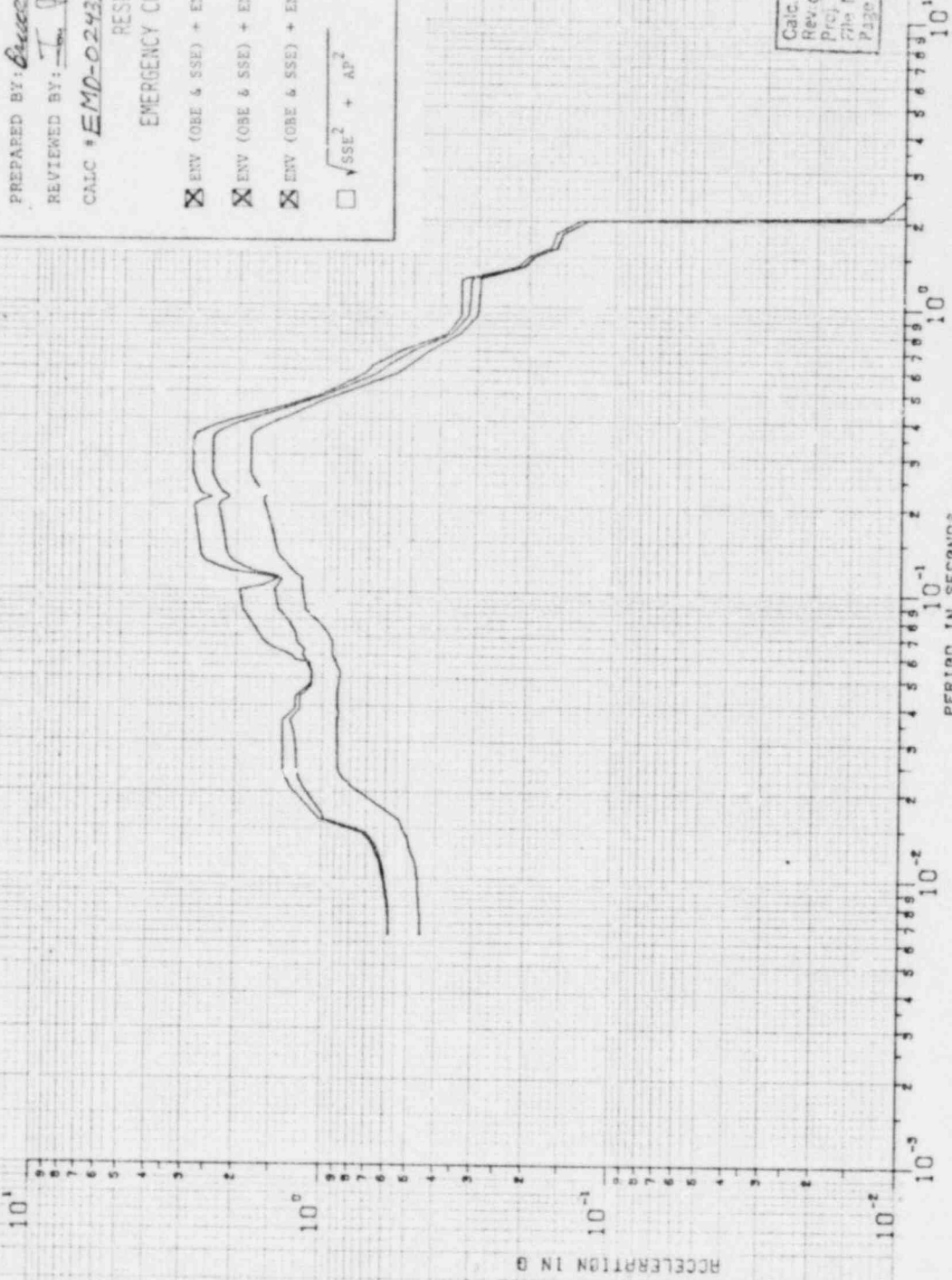
PREPARED BY: Bruce M. *By* DATE: 6/24/80
REVIEWED BY: J. Papadopoulos DATE: 6-24-80
CALC # EMD-024386 PAGE 42 OF 60

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CMC
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc. No. EMD-024386
 Rev. Date 7/8/80
 Proj. No. 7/30-75
 File No. EMD-024386
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VW-VW DF-2% ABSV(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 544'-10" REV. 01

RUN ID: 321 BML 06/24/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/22/80

REVIEWED BY: Tom Papadopoulos DATE: 6-23-80

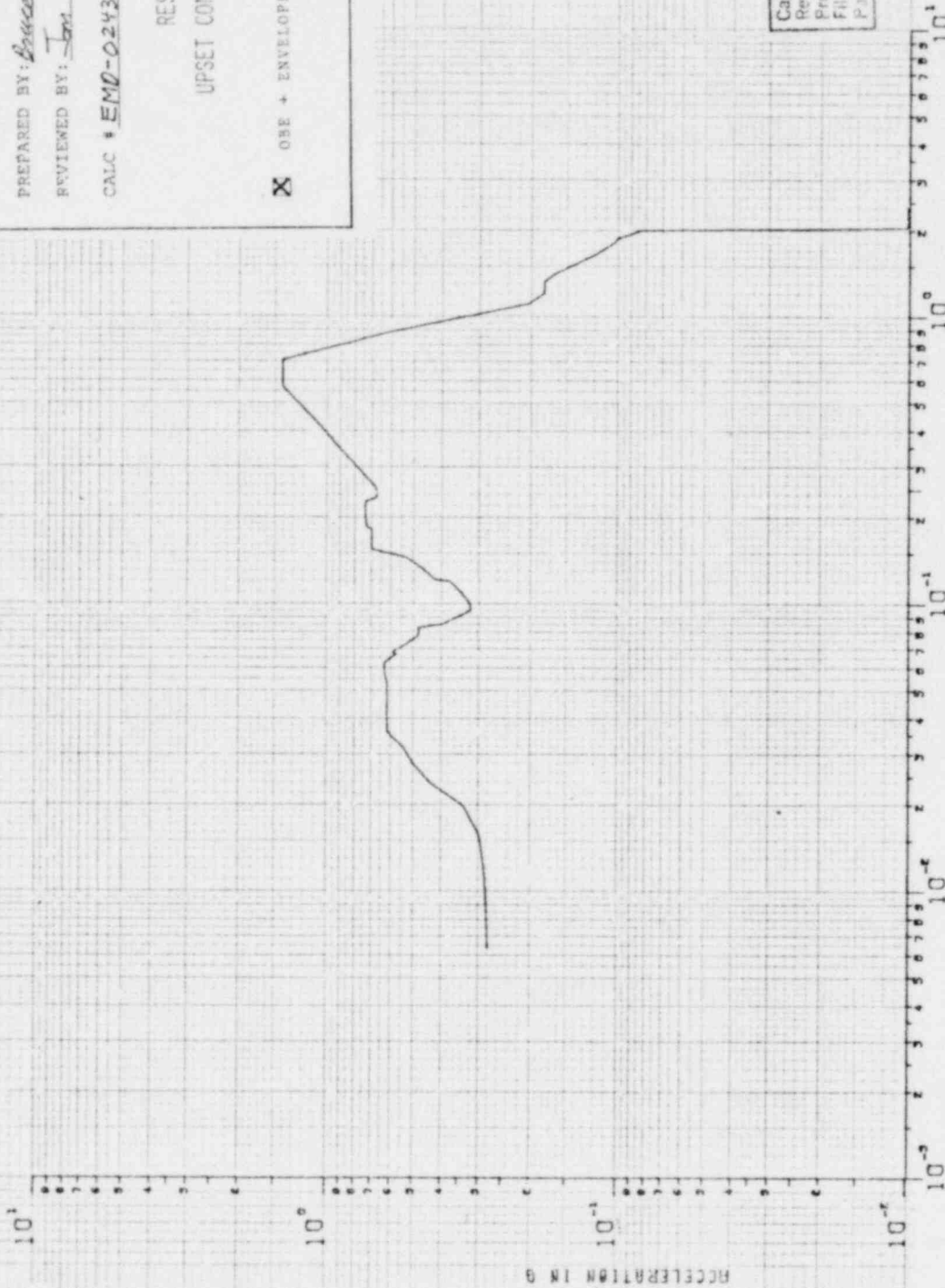
CALC # EMD-024386 PAGE 43 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASV-TQ + SRV ALL-TQ]

Calc. No. EMD-024386
Rev. 01 Date 7/19/80
Proj. No. 4130-15
File No. EMD-024386
Page 56 of 104



HQ-NS OF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 570'-6" REV 01

JFFEL & ESSER CO. PRINTED IN U.S.A. FULL SCALE RANGE: 25.00000000

RUN 10: 271 BML 06/23/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Soy DATE: 6/23/80

REVIEWED BY: Joe Papadopoulos DATE: 6-23-80

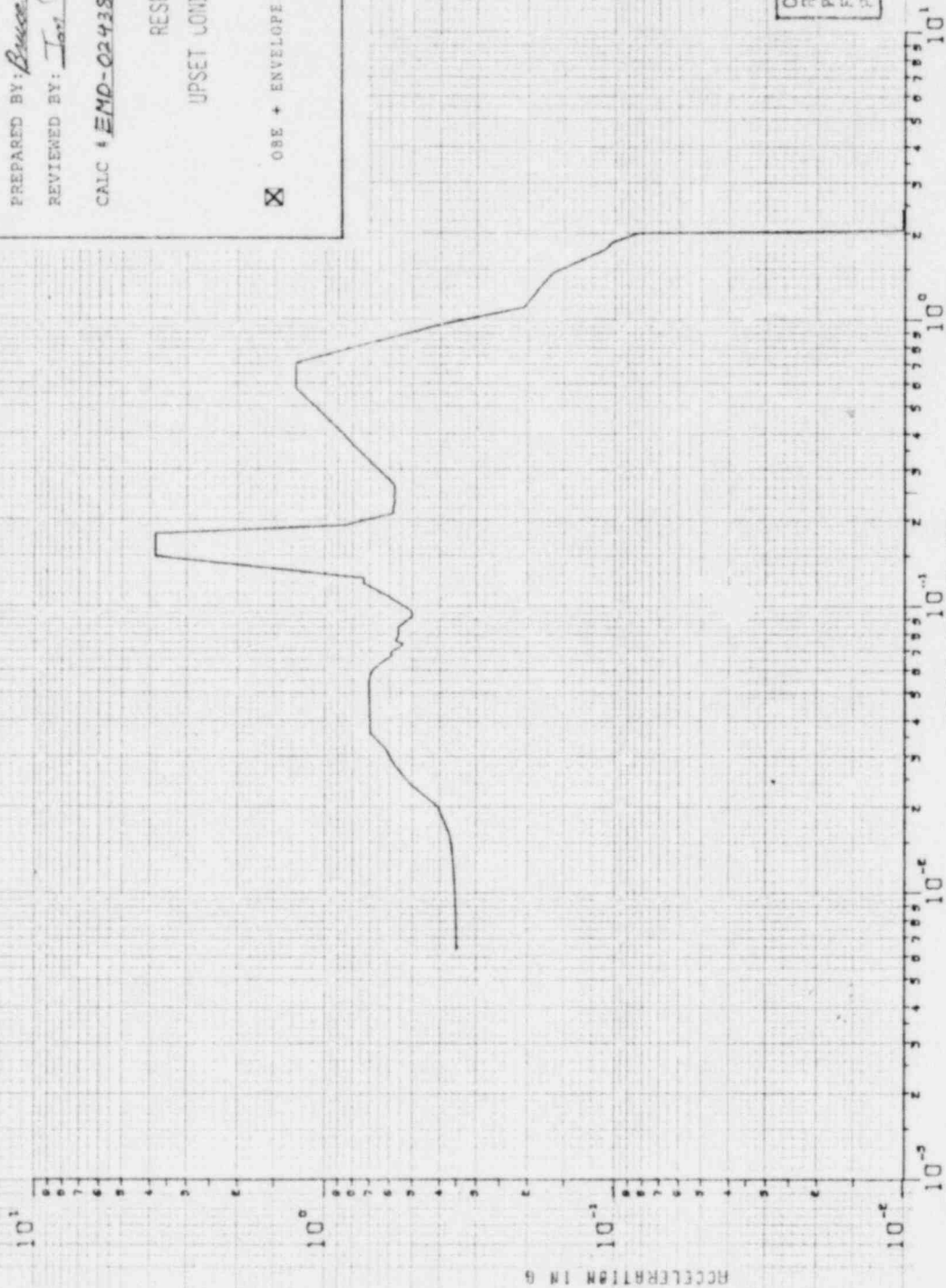
CALC # EMD-024386 PAGE 44 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc No.	EMD-024386
Rev	0
Date	7/2/80
Proj No	4130-15
File No	EMD-024386
Page	91 of 104



HQ-EW DF-1% ABSV(OBE+ENV)(SRV-ALL-TQ+SRV-ASY3-TQ) ZIM CONT WALL 570'-6" REV 01

UFFEL & BRESSER CO. PRINTED IN U.S.A. FULL SCALING: 2.5 INCHES/INCH

RUN ID: 871 BML 6/23/80

K&E KE

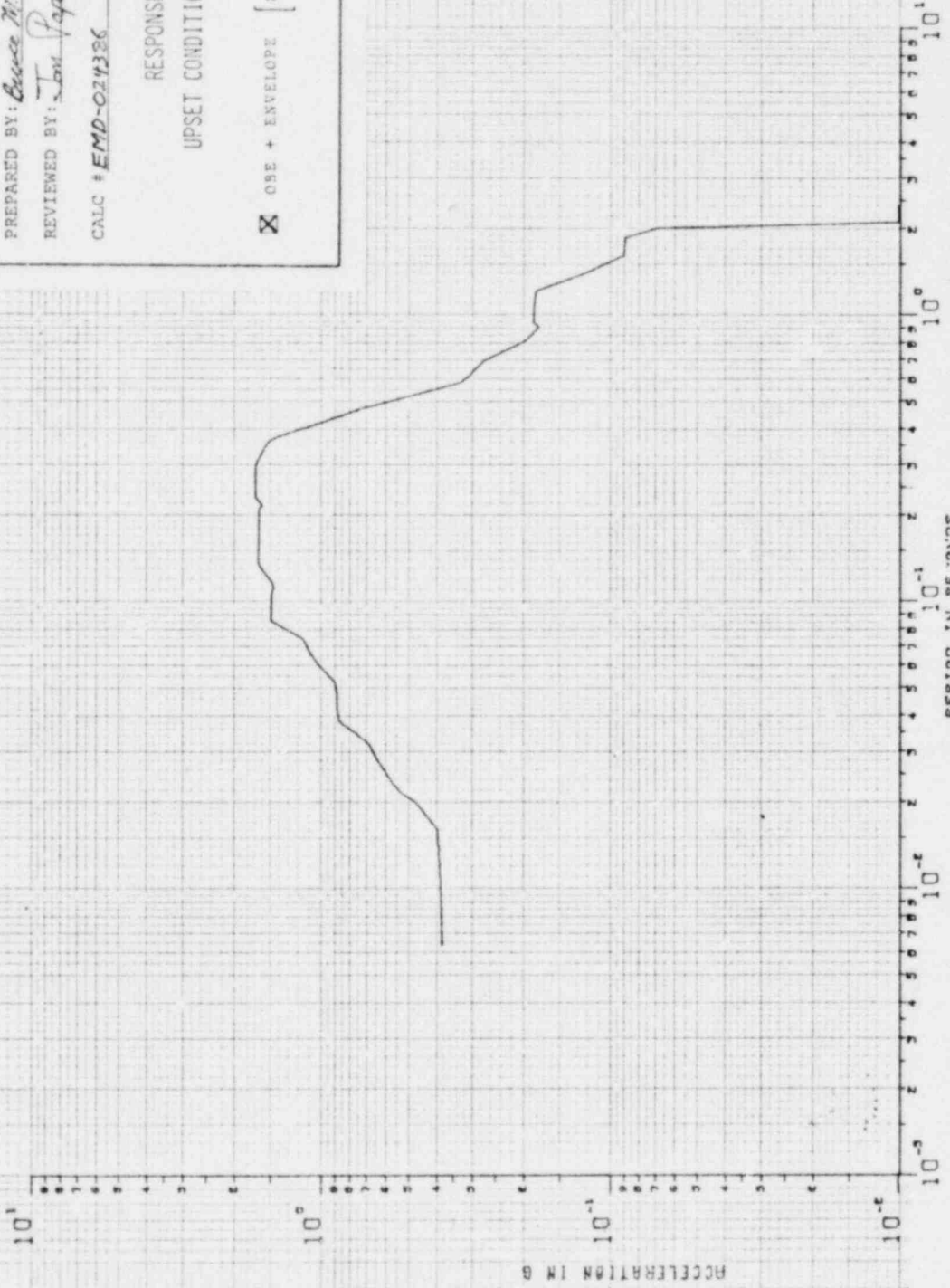
ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/23/80
REVIEWED BY: Tom Spadonella DATE: 6-23-80
CALC # EMD-024326 PAGE 45 OF 60

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc. No. EMD-024326
Rev. 01 Date 7/5/80
Proj. No. 4130-15
File No. EMD-024326
Page 45 of 104



VW-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 570'-6" REV 01

RUN ID: 871 BML 06/23/80

ZIMMER UNIT-1, 9130-15
 PREPARED BY: *Gene M. Key* DATE: *7/2/80*
 REVIEWED BY: *J. A. Robinson* DATE: *7-3-80*
 CALC: *EMD-024356* PAGE *46* OF *60*
 RESPONSE SPECTRUM
 FREQUENCY COORDINATE - 25.000000 Hz
 X 100 (008) A 200 • ENV [100] [100] A 100 [100] • ONE
 X 100 (008) A 500 • ENV [100] [100] A 0.5 000 [100] • 50
 X 100 (008) A 500 • ENV [100] [100] A 0.5 000 [100] • 50
 $\sqrt{0.01} \cdot 10^2$

Calc. No. EMD-024356
 Rev: 01 Date: 7/15/80
 Proj. No. 4130-15
 File No. EMD-024356
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HQ-NS DF-2% ABSV(C2 + C3 + C4) ZIM CONTAINMENT WALL ELEV. 570'-6" REV. 01

RUN ID: 752 BML 07/03/80

752BML J7/03/80 686

ZIMMER UNIT-1 4130-15

PREPARED BY: *Casey M. King* DATE: *7/2/80*

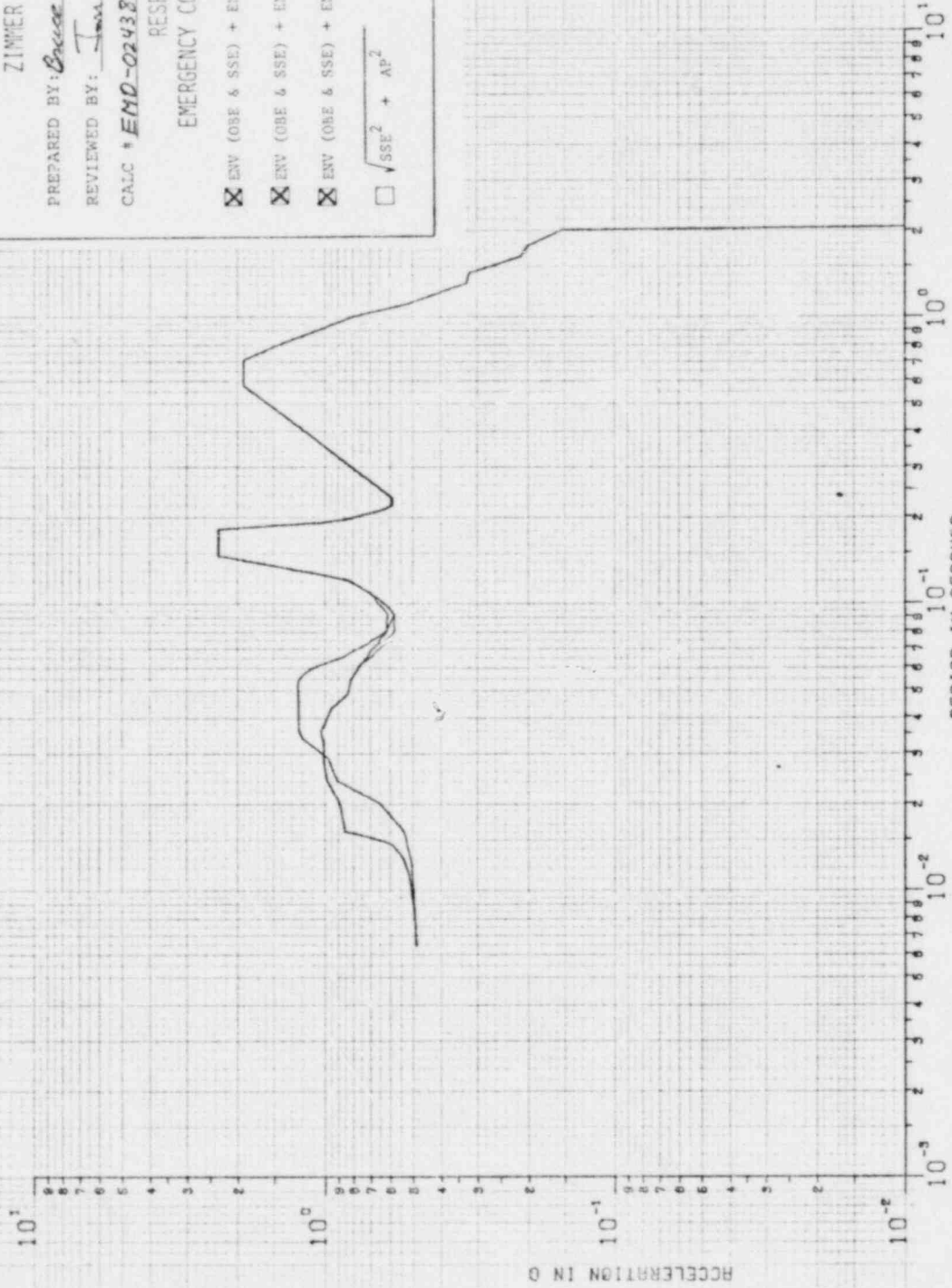
REVIEWED BY: *Tom Papadopoulos* DATE: *7-3-80*

CALC # *EMD-024386* PAGE *47* OF *60*

RESPONSE SPECTRA
EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CRG
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASY-TQ & SRV ADS-TQ] + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc No EMD-024386
 Rev. 01 Date: 7/2/80
 Proj No 4130-15
 File No EMD-024386
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HO-EW OF -2% ABSV(C2 + C3 + C4) ZIM CONTAINMENT WALL ELEV. 570'-6" REV. 01

RUN ID: 752 BML 07/03/80

KEUFFEL & ESSER CO. PRINTED IN U.S.A. FULL SCALE RECORDING SYSTEMS

752BML END OF PLOT

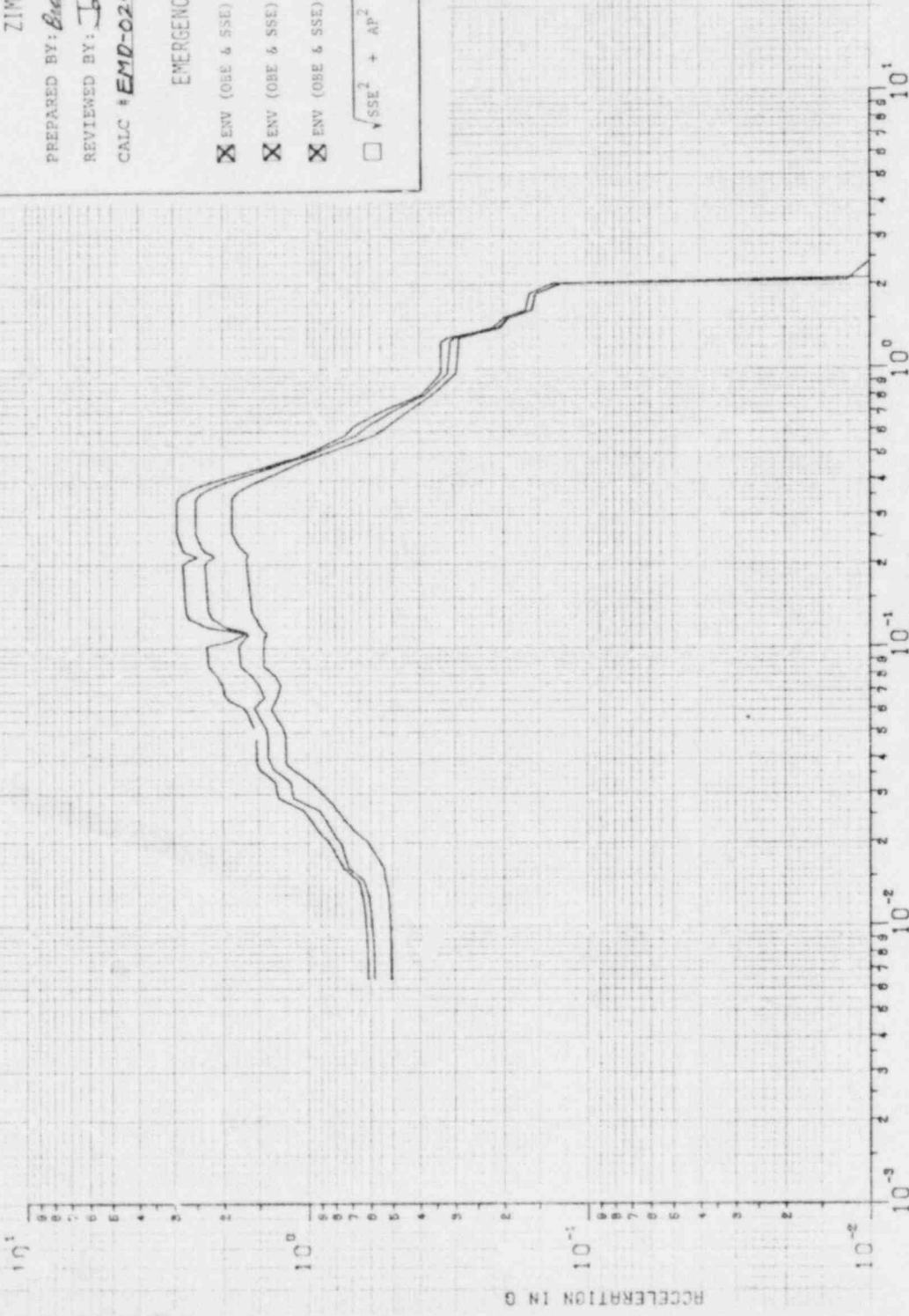
ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce N. Long* DATE: *7/3/80*
 REVIEWED BY: *Tom Papadopoulos* DATE: *7-3-80*
 CALC # *EMD-024386* PAGE *48* OF *60*

RESPONSE SPECTRA
 EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV [SRV ASV-TQ & SRV ADS-TQ] + CHG
- ENV (OBE & SSE) + ENV [SRV ASV-TQ & 0.6 SRV ADS-TQ] + CO 1
- ENV (OBE & SSE) + ENV [SRV ASV-TQ & SRV ADS-TQ] + CO 2
- $\sqrt{SSE^2 + AP^2}$

Calc No. EMD-024386
 Rev. 01 Date 7/2/80
 Proj No. 4130-15
 File No. EMD-024386
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VW-VW DF-2% ABSV(C2 + C3 + C4) ZIM CONTAINMENT WALL ELEV. 570'-6" REV. 01

KE KEUFFEL & ESSER CO. PRINTED IN U.S.A. SCALE 1/4" = 100' (SEE NOTES)

RUN 1057.2 BML 07/03/80

ZIMMER UNIT-1 4130-15

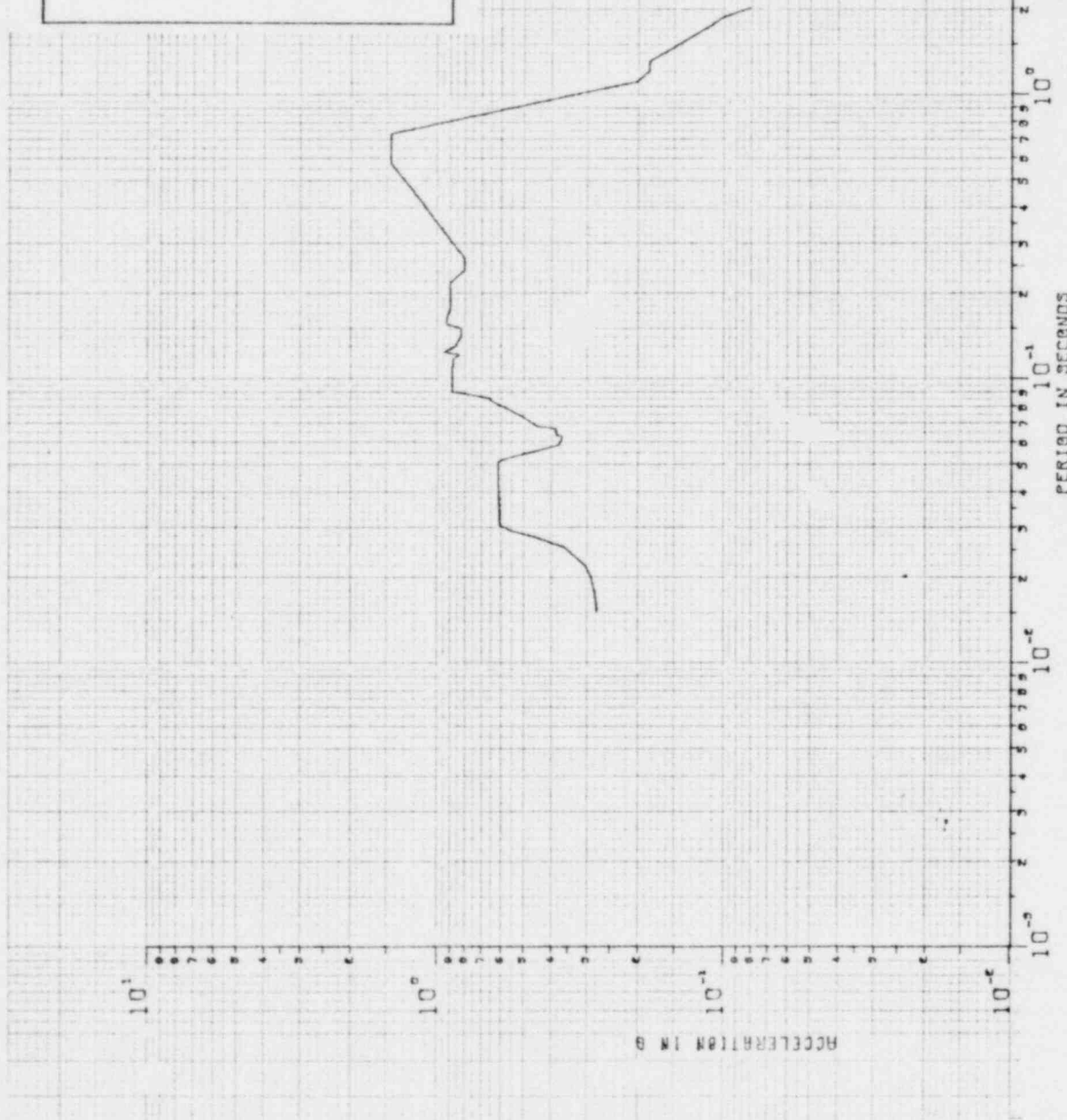
PREPARED BY: *Bruce Motley* DATE: *6/23/80*
REVIEWED BY: *Tom Papadopoulos* DATE: *6-23-80*
CALC # *EMD-024386* PAGE *49* OF *60*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc No: EMD-024386
Rev: 01 Date: 7/19/80
Proj No: 4130-15
File No: EMD-024386
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HO-NS DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM BICSHIELD WALL 590*-5**

RUN ID: 871 BML 06/23/80

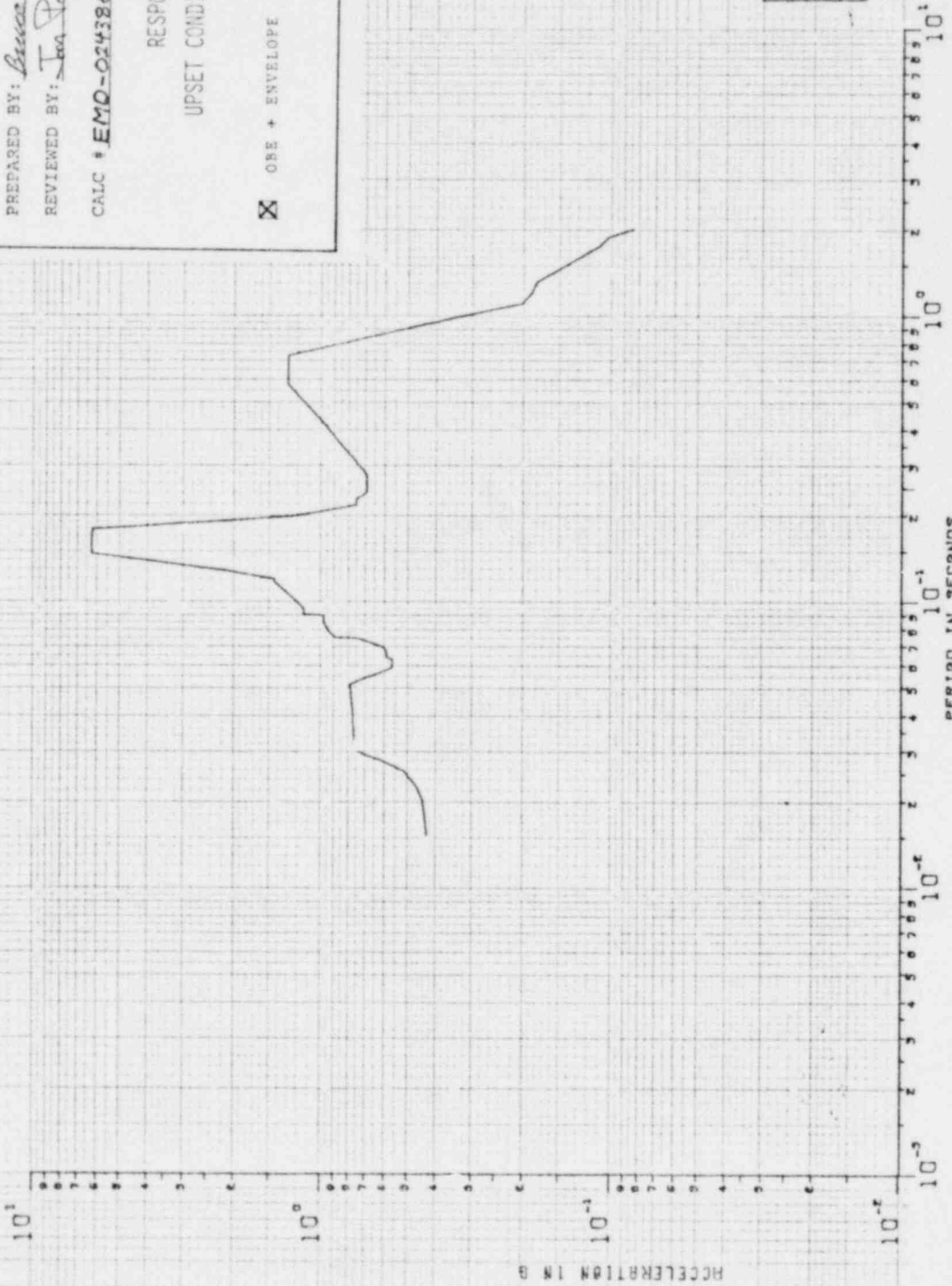
ZIMMER UNIT-1 4130-15

PREPARED BY: *Bessie M. Long* DATE: *6/23/80*
REVIEWED BY: *Jan Papadopoulos* DATE: *6-23-80*
CALC # *EMD-024386* PAGE *50* OF *60*

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc No EMD-024386
Rev. 01 Date: *7/28/80*
Proj No: *4/30-75*
File No: EMD-024386
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HQ-EW OF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SKV-ASY3-TQ)) ZIM BIOSHIELD WALL 590--.5..

UFFLESSERCO PRINTED IN U.S.A. FULL LOGSAPR1980 75 25 20 CYCLES

RUN ID: 871 BML 06/23/80

K-E K

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 6/23/80

REVIEWED BY: Tom Roodenakis DATE: 6-23-80

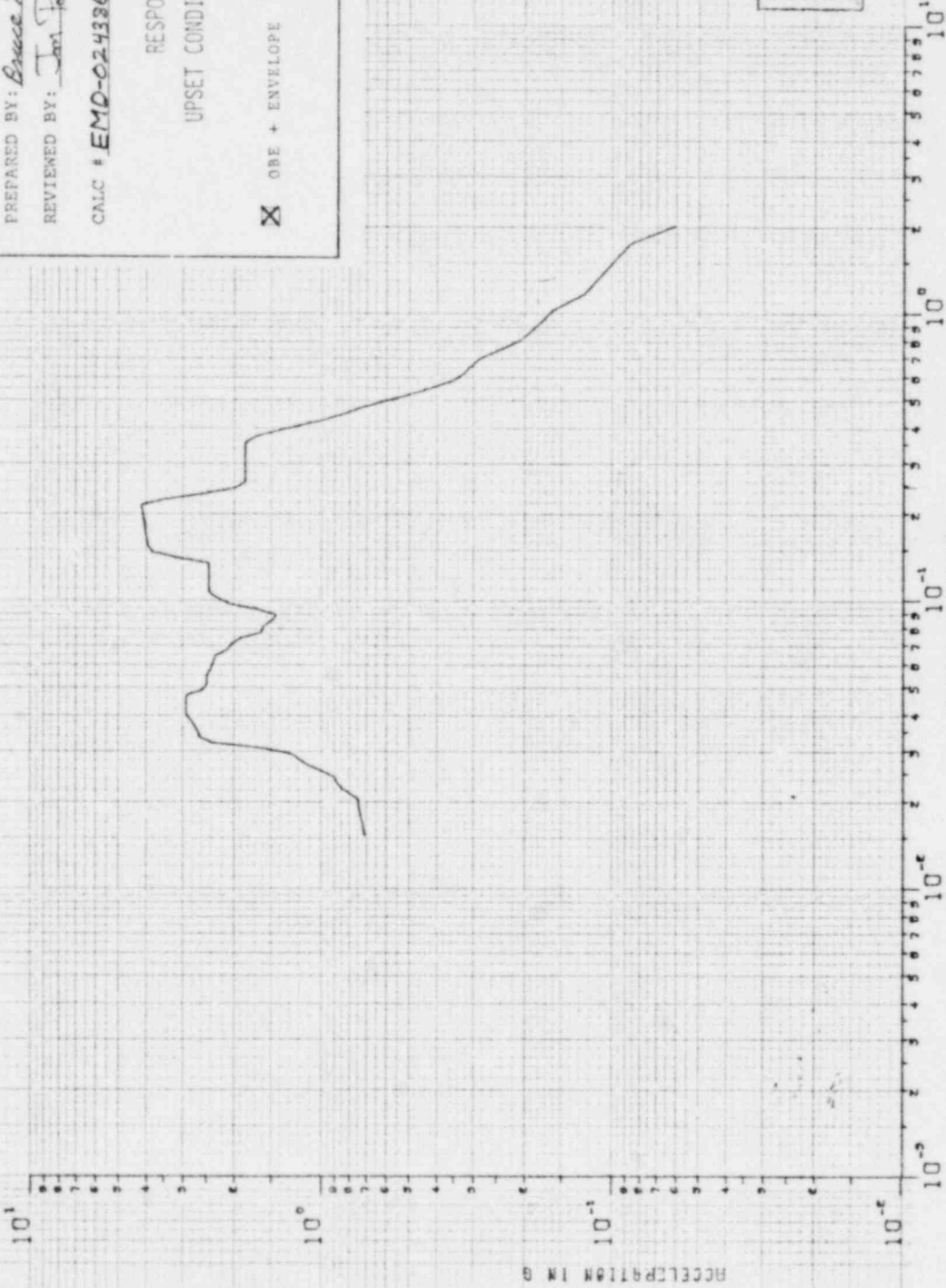
CALC # EMD-024386 PAGE 51 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc No. EMD-024386
Rev: 01 Date: 7/8/80
Proj. No: 4130-15
File No. EMD-024386
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VN-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM BISHIELD WALL 590'-.5''

RUN ID: 871 BML 06/23/80

ZIMMER UNIT-1 4130-35

PERFORMED BY *Bob H. [unclear]* DATE: 7/15/80
REVISION BY *Tom R. [unclear]* DATE: 7-15-80
CALC # EMD-024386 PAGE 52 OF 62

RESPONSE SPECTRA
EMERGENCY CONDITION - 2X DESIGN

- EBY 000K & 000L & 000M & 000N & 000O & 000P & 000Q & 000R & 000S & 000T & 000U & 000V & 000W & 000X & 000Y & 000Z
- EBY 000K & 000L & 000M & 000N & 000O & 000P & 000Q & 000R & 000S & 000T & 000U & 000V & 000W & 000X & 000Y & 000Z
- EBY 000K & 000L & 000M & 000N & 000O & 000P & 000Q & 000R & 000S & 000T & 000U & 000V & 000W & 000X & 000Y & 000Z
- $\sqrt{3X^2 + 3Y^2}$

ACCELERATION IN G



Calc. No. EMD-024386
 Rev: 01 Date: 7/15/80
 Proj. No. 430-35
 Job No. EMD-024386
 Page 59 of 62

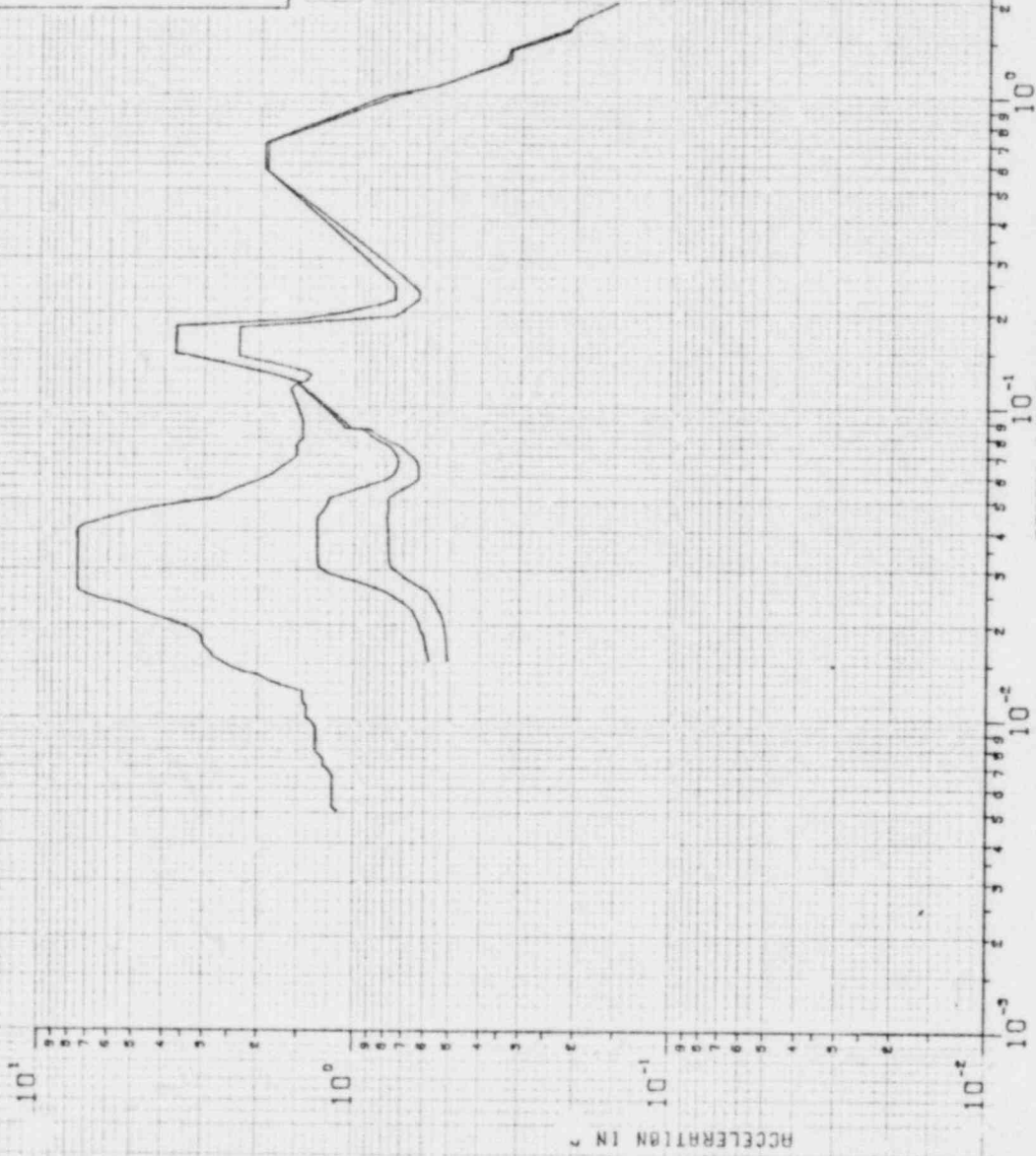
H0-NS DF-2% ABSV(C2 + C3 + C4 + C5) ZIM B10. SHIELD WALL 590'-.5'' REV. 01
 HVE NEUTFELLESENER CO. PHOENIX, AZ

REV 10: 430 BML 7/15/80

430BML 07/15/80 470

ZIMMER UNIT-1 4130-15
 PREPARED BY: *John P. Decker* DATE: 7/15/80
 REVIEWED BY: *John P. Decker* DATE: 7-15-80
 CALC # EMD-024386 PAGE 53 OF 60

RESISTIVE SPECTRUM
 EMERGENCY CONDITION - 25 IN/1000
 X 10V (08C & 5413) • 10V (10V) 100-10 & 10V 100-10 • 10G
 X 10V (08E & 5513) • 10V (10V) 100-10 & 0.6 10V 100-10 • 10G
 X 10V (08F & 5513) • 10V (10V) 100-10 & 10V 100-10 • 10G
 X $\sqrt{1000} \cdot 10^2$



CALC NO EMD-024386
 REV. 01 Date: 7/15/80
 PROJ. NO. 4130-15
 FILE NO. EMD-024386
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H0-EW OF-2% ABSV(C2 + C3 + C4 + C5) ZIM B10. SHIELD WALL 590'-.5'' REV. 01

REV 10: 430 BAIL 07/15/80

KEUFELEBESSER CO. PRINTED IN U.S.A.

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Long DATE: 7/15/80

REVIEWED BY: Tom Papadopoulos DATE: 7-15-80

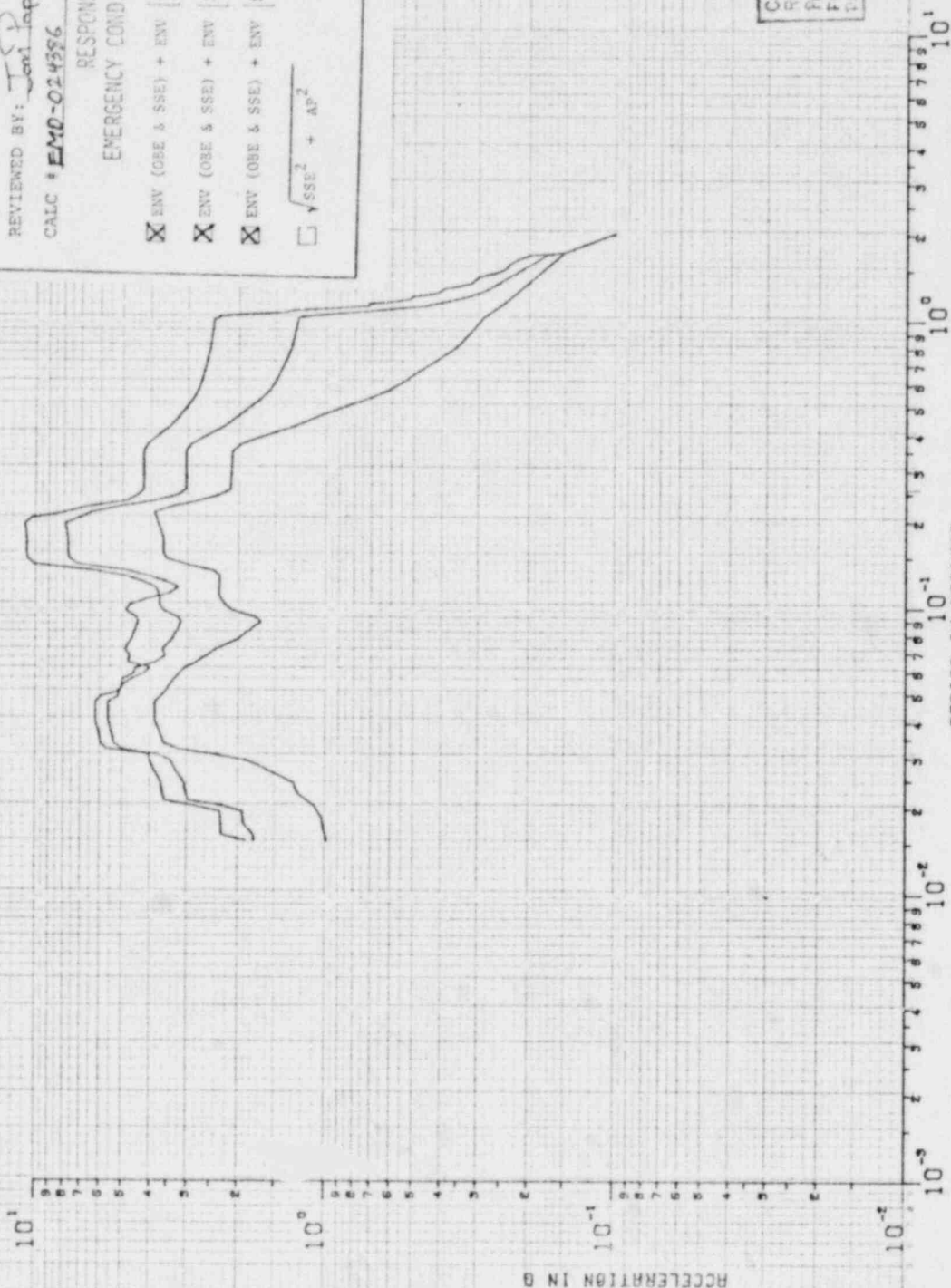
CALC # EMD-024386 PAGE 54 OF 60

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- ENV (OBE & SSE) + ENV SRV_{AST-TQ} & SRV_{ADS-TQ} + CIVIL
- ENV (OBE & SSE) + ENV SRV_{AST-TQ} & 0.6 SRV_{ADS-TQ} + CO 1
- ENV (OBE & SSE) + ENV SRV_{AST-TQ} & SRV_{ADS-TQ} + CO 2

$\sqrt{SSE^2 + AP^2}$



Calc No EMD-024386
 Rev. 01 Date 7/15/80
 Plot No 4130-15
 File No EMD-024386
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VW-VW DF-2% ABSV(C2 + C3 + C4) PERIOD IN SECONDS
 ZIM B10. SHIELD WALL 590'-.5'' REV. 01
 NEUFELDESSER CO. PHOTO A USA

REV 10:430 BHL 07/15/80

ZIMMER UNIT-1 4130-15

PREPARED BY: *Bruce M. Long* DATE: *6/23/80*
REVIEWED BY: *Tom Papadopoulos* DATE: *6-23-80*
CALC # *EMD-024386* PAGE *55* OF *60*

RESPONSE SPECTRA
UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

Calc. No. EMD-024386
Rev. of Date: 7/18/80
Proj. No. 4130-15
File No. EMD-024386
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HQ-NS DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-HSY3-TQ)) :M CONT/STAB TRUSS 590*-7**

RUN ID: 871 BAL 6/23/80

ZIMMER UNIT-1 4130-15

PREPARED BY: Bruce M. Fry DATE: 6/23/60

REVIEWED BY: Tom Papadopoulos DATE: 6-23-60

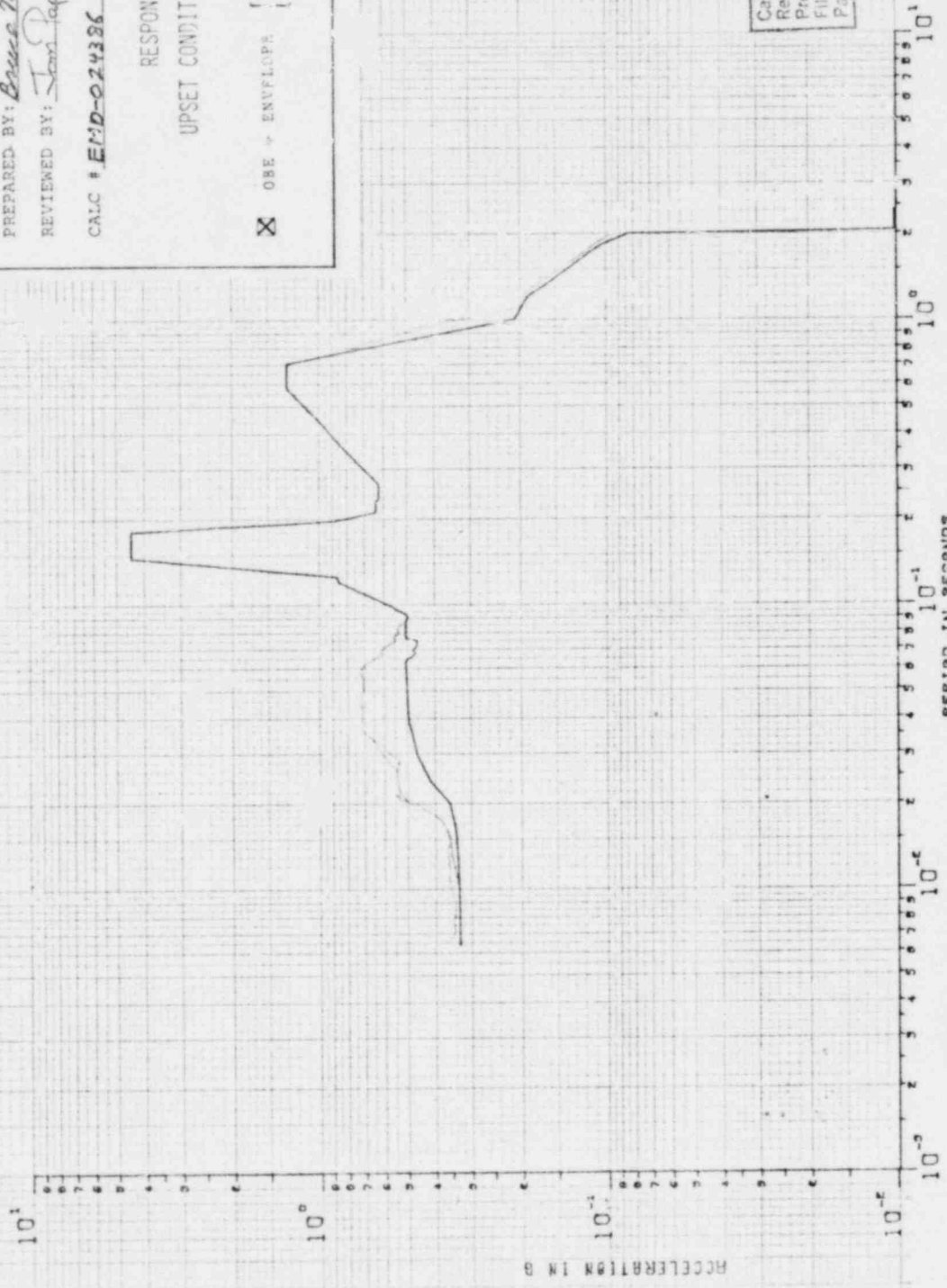
CALC # EMD-024386 PAGE 56 OF 60

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV ASY-TQ + SRV ALL-TQ]

Calc. No. EMD-024386
Rev. 01 Date: 7/18/60
Proj. No. 4130-15
File No. EMD-024386
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HQ-EW OF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT/STAB TRUSS 590*-7**

RUN ID: 871 BML 06/23/60

K-E

ZIMMER UNIT-1 4130-15

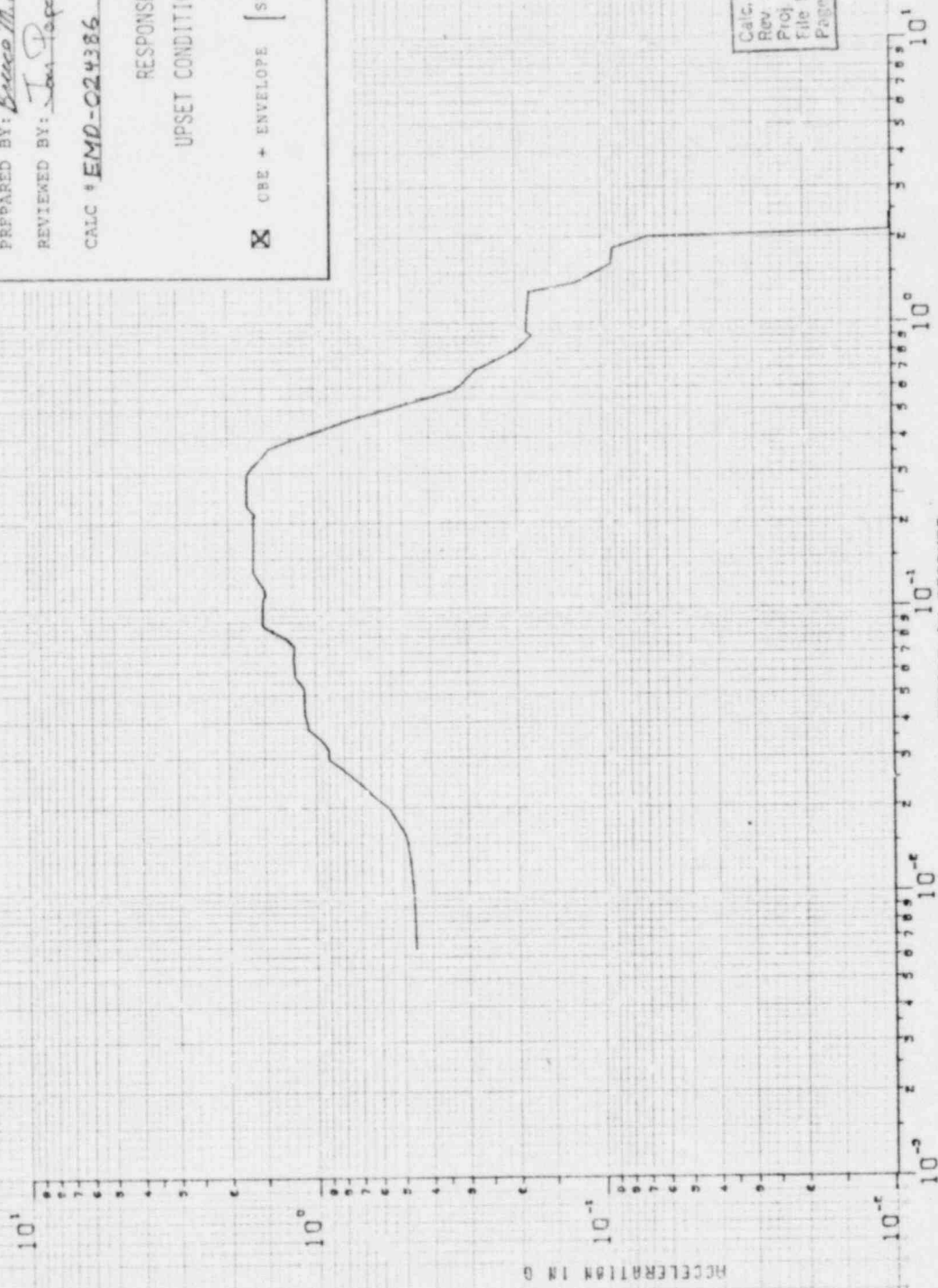
PREPARED BY: *Enrico M. Long* DATE: *6/27/60*
REVIEWED BY: *Tom Papadopoulos* DATE: *6-23-60*
CALC # *EMD-024386* PAGE *57* OF *60*

RESPONSE SPECTRA

UPSET CONDITION - 1% DAMPING

OBE + ENVELOPE [SRV-ASY-TQ + SRV-ALL-TQ]

Calc. No. EMD-024386
Rev. 01 Date: 7/19/60
Proj. No. 4130-15
File No. EMD-024386
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VW-VW DF-1% ABSV(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT/STAB TRUSS 590'-7''

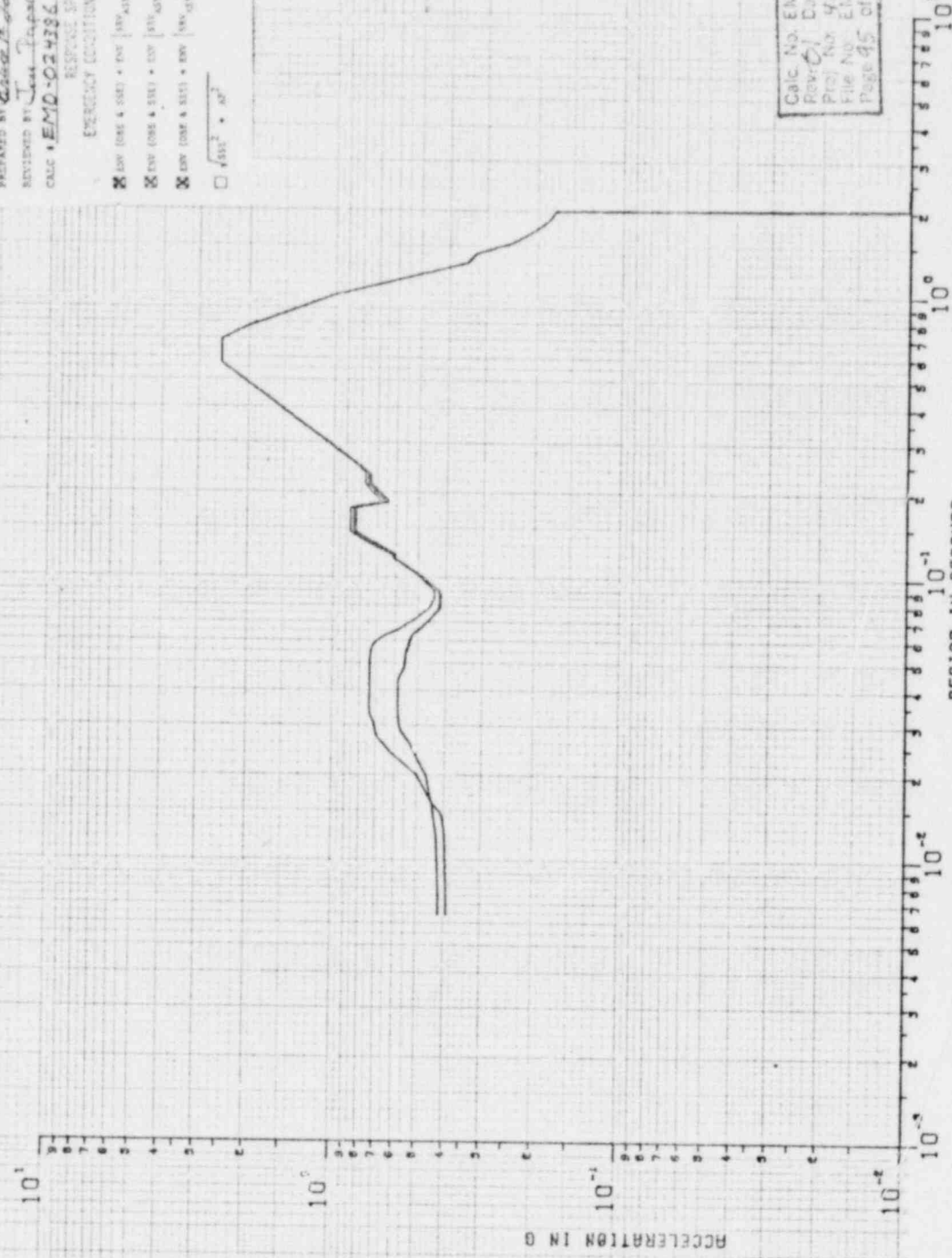
RUN ID: 871 BML 06/23/60

ZIMMER UNIT-1, 4130-15

PREPARED BY *George N. Lee* DATE: *7/13/80*
REVIEWED BY *John J. ...* DATE: *7-5-80*
CALC: *EMD-024386* PAGE *58* OF *60*

RESPONSE SPECTRA
EMERGENCY EDITION - 24 DRAWING
 XDR (DRF & SSI) • XDR (BY AXI-TQ) • XDR (ADM-TQ) • ONE
 XDR (DRF & SSI) • XDR (BY AXI-TQ) • XDR (ADM-TQ) • ONE
 XDR (DRF & SSI) • XDR (BY AXI-TQ) • XDR (ADM-TQ) • ONE
 $\sqrt{SSV^2 + AV^2}$

Calc No. EMD-024386
Rev: *01* Date: *7/13/80*
Proj No: *4130-15*
File No: EMD-024386
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H0-NS DF-2% ABSV(C2 + C3 + C4) ZIM CONT WALL/STABILIZER TRUSS 590'-7" REV. 01

REV 10:707 BML 07/08/80

ZIMMER UNIT-1 4130-15

PREPARED BY *George M. ...* DATE *7/8/50*

RETAINED BY *...* DATE *7-8-50*

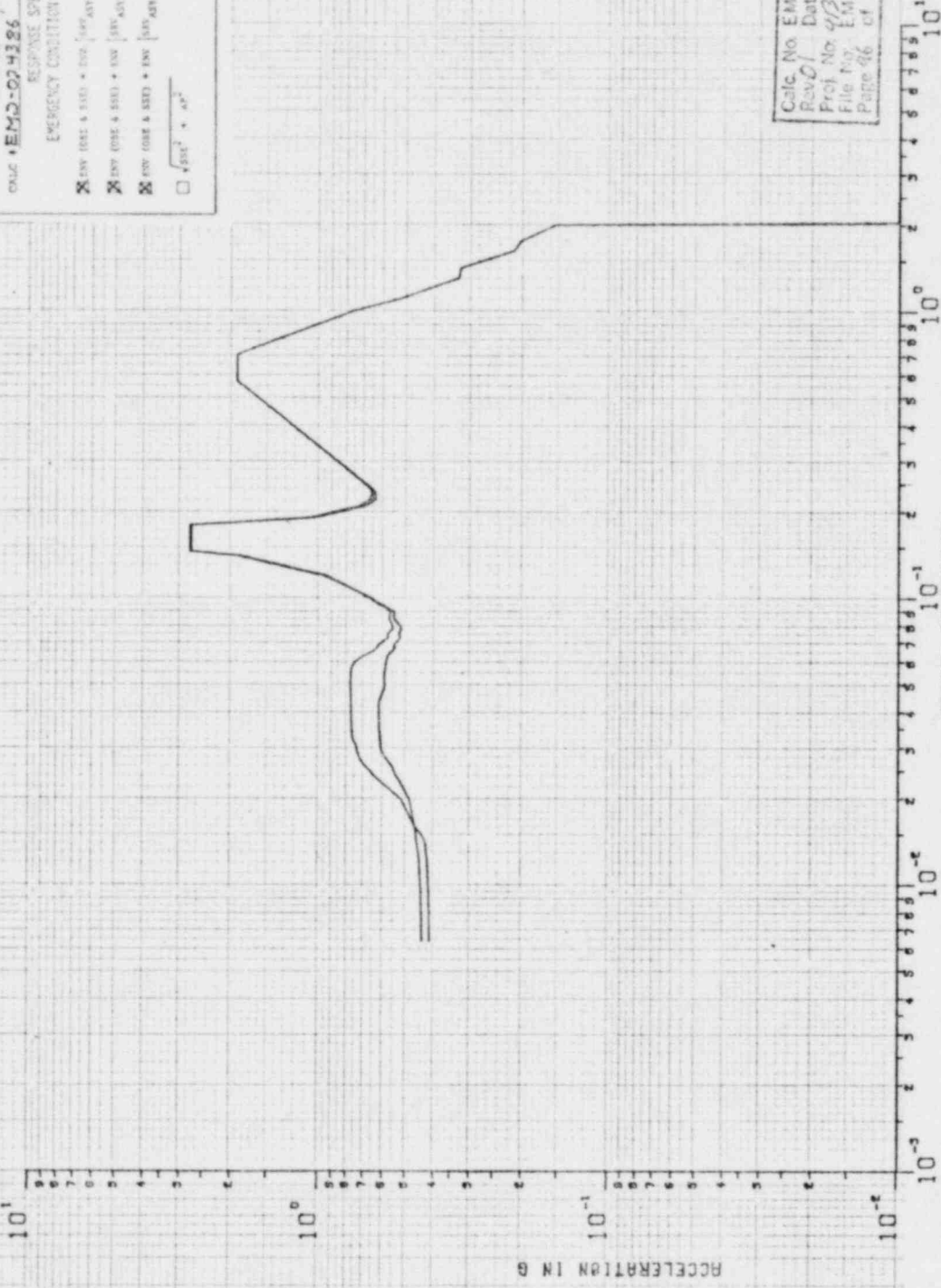
CHALC # *EMD-024386* PAGE *59* OF *60*

RESPONSE SPECTRA

EMERGENCY CONDITION - 2% DAMPING

- X SVY (08E & 08S) + SVX (090) ASY-70 & SVY (ASV-70) + SVX (ASV-70)
- X SVY (08E & 08S) + SVX (090) ASV-70 & SVY (ASV-70) + SVX (ASV-70)
- X SVY (08E & 08S) + SVX (090) ASV-70 & SVY (ASV-70) + SVX (ASV-70)
- X SVY + SVX

Calc. No. *EMD-024386*
 Rev. *01* Date *7/21/50*
 Proj. No. *4130-15*
 File No. *EMD-024386*
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H0-EW DF-2% ABSV(C2 + C3 + C4) ZIM CONT WALL/STABILIZER TRUSS 590*-7** REV. 01

RUN 10:707 BML 07/01/50

ZIMMER UNIT-1 4130-15

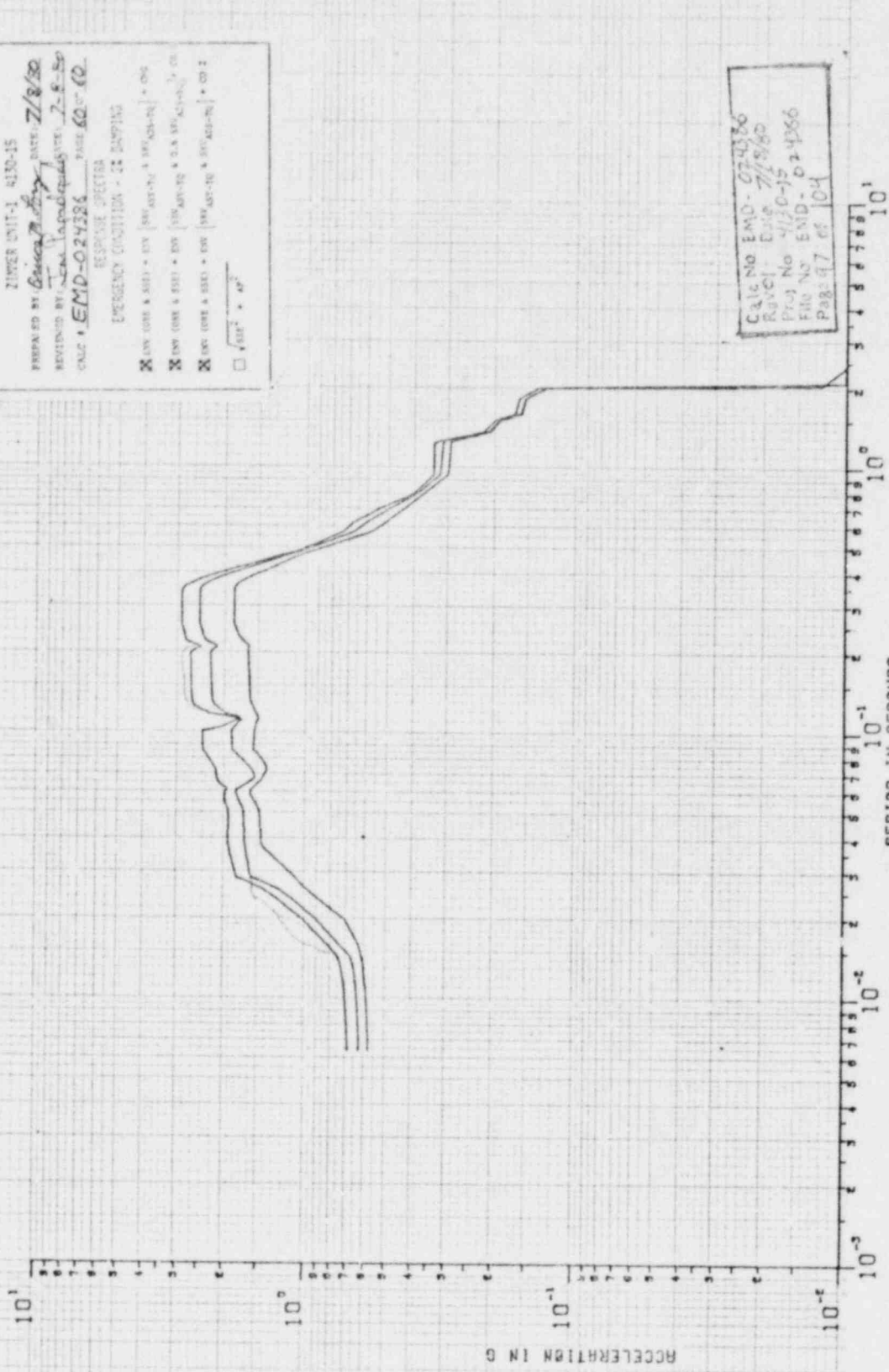
PREPARED BY: *George P. [unclear]* DATE: 7/8/80
REVISION BY: *John [unclear]* DATE: 7-8-80
CALC: EMD-024386 PAGE 60 OF 60

RESPONSE SPECTRA
EMERGENCY CONDITION - 22 DAMPING

- X 100 (0.05 & 0.01) • 0.01 (0.05, 0.01) • 0.01 (0.05, 0.01) • 0.01
- X 100 (0.05 & 0.01) • 0.01 (0.05, 0.01) • 0.01 (0.05, 0.01) • 0.01
- X 100 (0.05 & 0.01) • 0.01 (0.05, 0.01) • 0.01 (0.05, 0.01) • 0.01

$\sqrt{a^2 + b^2}$

CALC NO EMD-024386
 REVISED DATE 7/8/80
 PROJ NO 4130-15
 FILE NO EMD-024386
 PAGE 60 OF 60



VW-VW DF-2% ABSV(C2 + C3 + C4) ZIM CONT WALL/STABILIZER TRUSS 590*-7** REV. 01

RUN ID: 707 BML 07/06/80

REUFFELLESSER CO. MADE IN U.S.A.

Calc. No.: EMD-027316
Date: December 23, 1980
Revision: 00
Safety-Related

REACTOR BUILDING
T-QUENCHER POOL DYNAMIC SPECTRA GENERATION
for EQUIPMENT ASSESSMENT DUE to
SRV ACTUATIONS IN VARIOUS LOAD COMBINATIONS
(SRSS Method of Combining)

The Cincinnati Gas & Electric Company

Wm. H. Zimmer Station Unit 1

Project: 4130-15

Prepared by: Bruce M. Long Date 12/23/80
Reviewed by: Tom Papadopoulos Date 12/23/80
Approved by: J. Harshbarger Date 12/23/80

INTRODUCTION:

The purpose of this report is to document the generation of the T-Quencher Pool Dynamic Load Response Spectra Combinations for the Reactor Building. The loading combinations are based upon the equipment qualification load combinations defined in Table V.C.Z. of Design Criteria A51-70; rev. 01, dated 6/5/80.

PROCEDURE:

- Step 1: Generate digitized data for the SSI (Soil-Structure Interaction) seismic response spectra. This had previously been done for the prior combinations which involved the combination method by absolute
- Step 2: Enveloping of the ØBE (1% damp.) and SSE (2% damp.) SSI response spectra. To eliminate possible slight mathematical errors in this program, it was necessary to determine intersection points and insert these data points into the enveloped spectra.
- Step 3: Enveloping of SRV-ASY-TQ (3 valve) & SRV-ADS(ALL)-TQ spectra at 1% and 2% damping.
- Step 4: Enveloping 0.6 x SRV-ADS(ALL)-TQ & SRV-ASY-TQ(3 valve)
- Step 5: Combining of the enveloped spectra with the appropriate SLLD spectra using the combining method of SRSS (square root of the sum of the squares). The combinations have been performed using the Design Criteria A51-70 and the resultant spectra output stored onto the in-house UNIVAC 1100/81 computer.

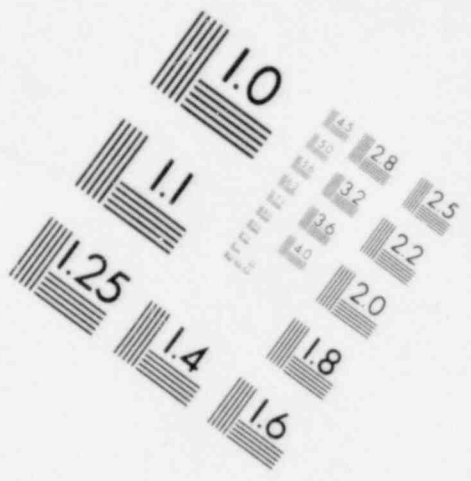
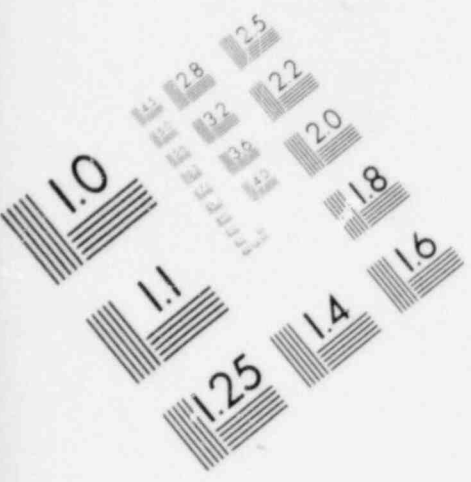
COMMENTS:

1. The latest revision to the A.P. (Annulus Pressurization) response spectra has spectra at only the RPV locations within the Containment building. Consequently the T-Quencher response spectra combination labeled C5 for the reactor building locations cannot be considered (combination C5 = $\sqrt{(A.P.)^2 + (SSE)^2}$ at 2% damp.).

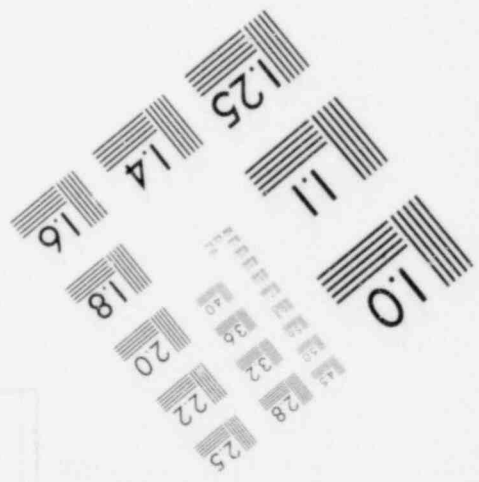
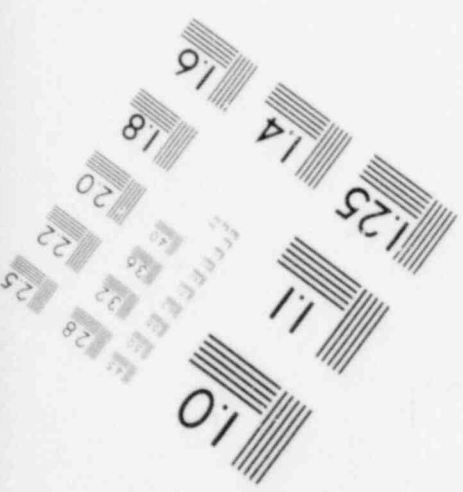
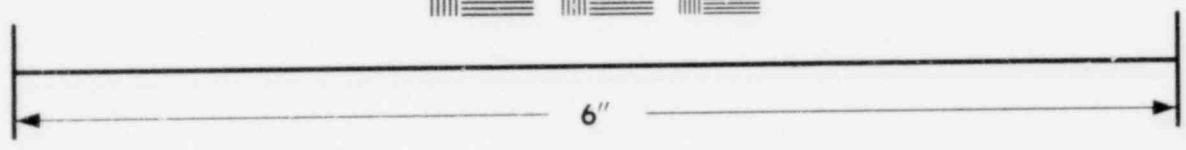
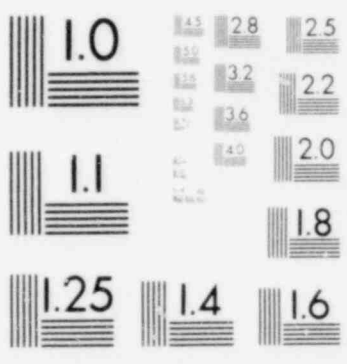
2. No SSI response spectra has been provided by SDDD the vertical wall location, 475'-6". Consequently the vertical slab SSI spectra was used twice for the vertical mode combinations at elevation 475'-6".

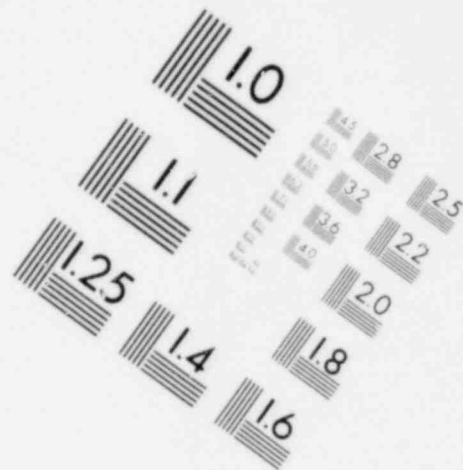
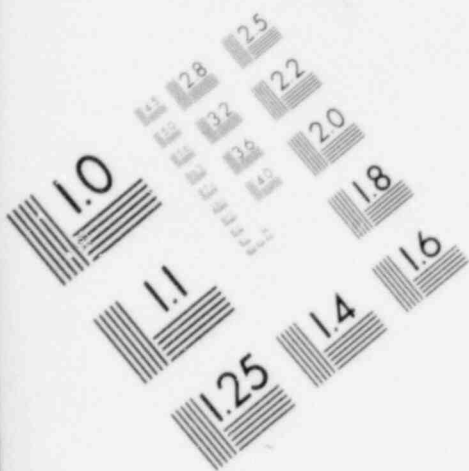
OBSERVATIONS:

1. Enveloping of the SSI spectra yielded the fact that the SSE response spectra totally enveloped the corresponding OBE response spectra for the horizontal North-South direction from elevation 525'-7" up to 627'-9". Otherwise the two types of plant operating seismic conditions overlapped each other.
2. Enveloping at 2% damping of SRV-ADS-TQ with SRV-ASY3-TQ yielded only four sets of enveloped spectra which happened to be corresponding to only the two lowest reactor building elevations.
3. The horizontal SRV-ADS-TQ response spectra generated by SDDD was insignificant in its acceleration values for the upper five elevations.

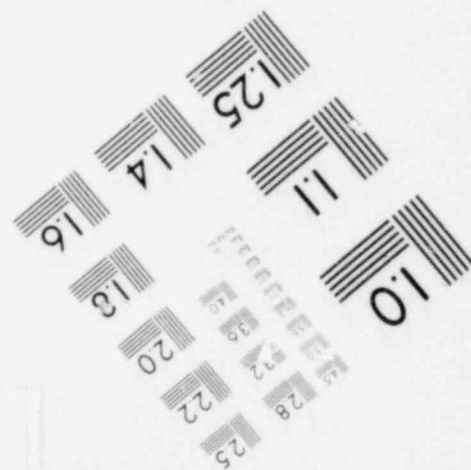
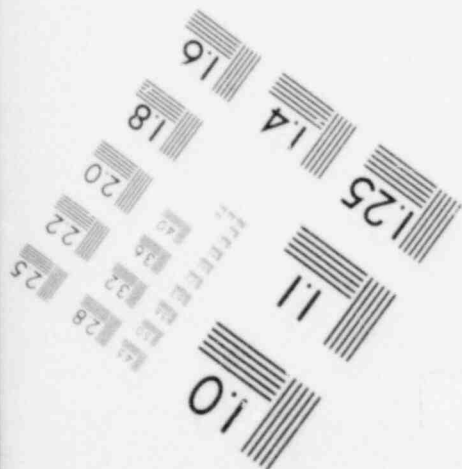
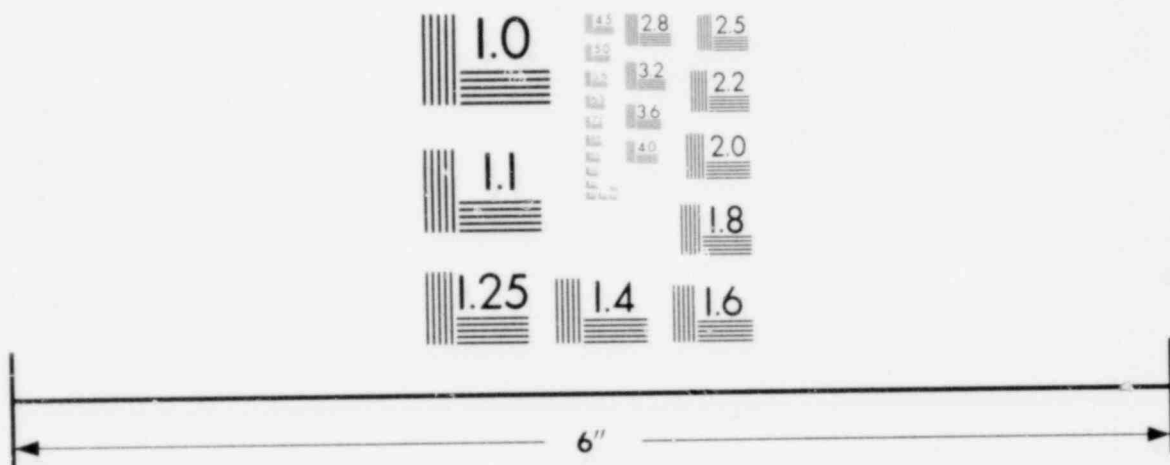


**IMAGE EVALUATION
TEST TARGET (MT-3)**





**IMAGE EVALUATION
TEST TARGET (MT-3)**



722BML 12/05/80 240

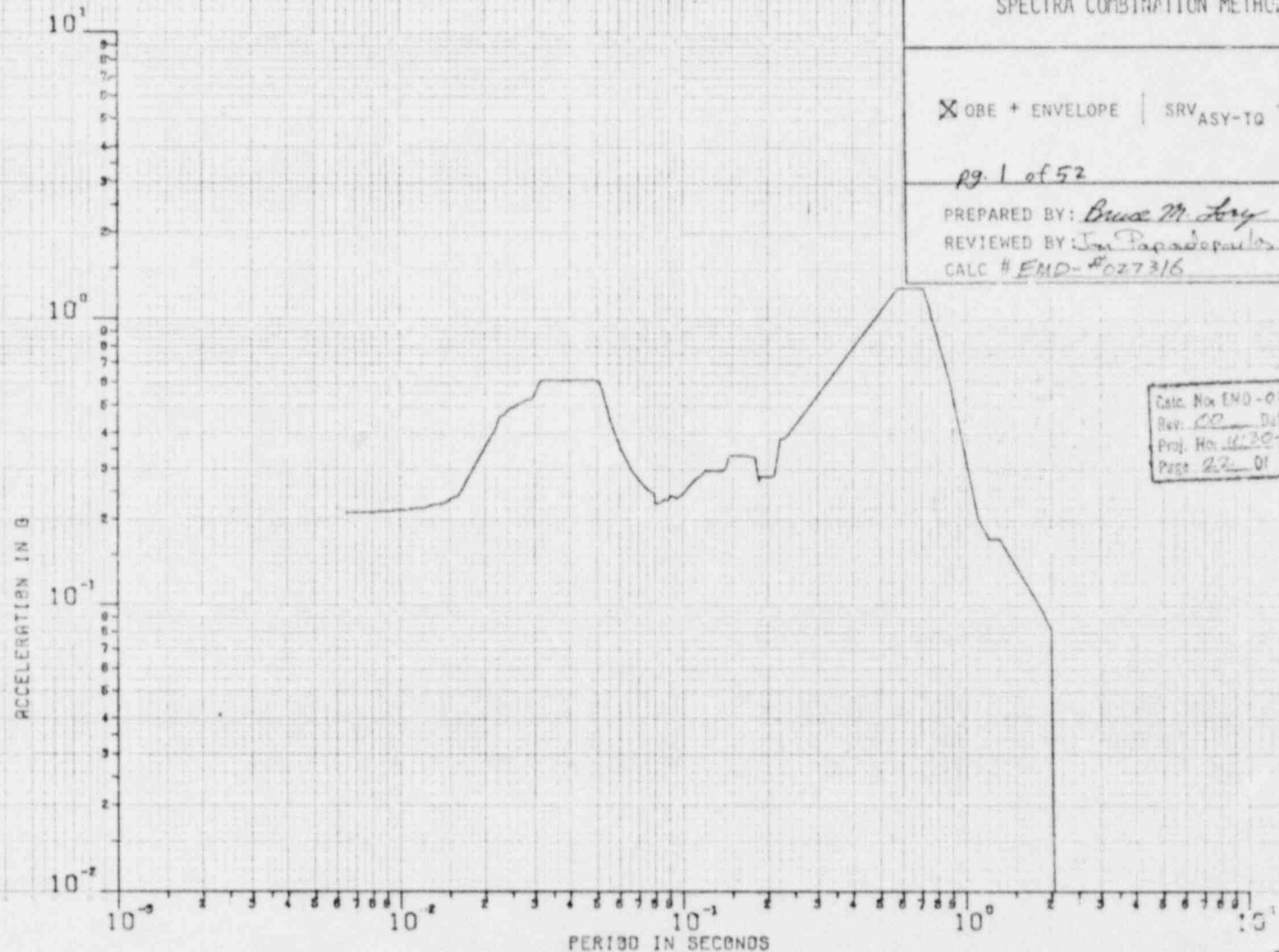
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

X OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

Pg. 1 of 52

PREPARED BY: Bruce M. Fry DATE: 12/15/80
REVIEWED BY: Jim Papadopoulos DATE: 12/5/80
CALC # EMD-#027316 DATE: 12/03/80

Calc. No. EMD-027316
Rev. 00 Date 12/23/80
Proj. No. 4130-15
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NS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1Z 475'-6" REV 00

RUN ID: 772 BAIL 12/03/80

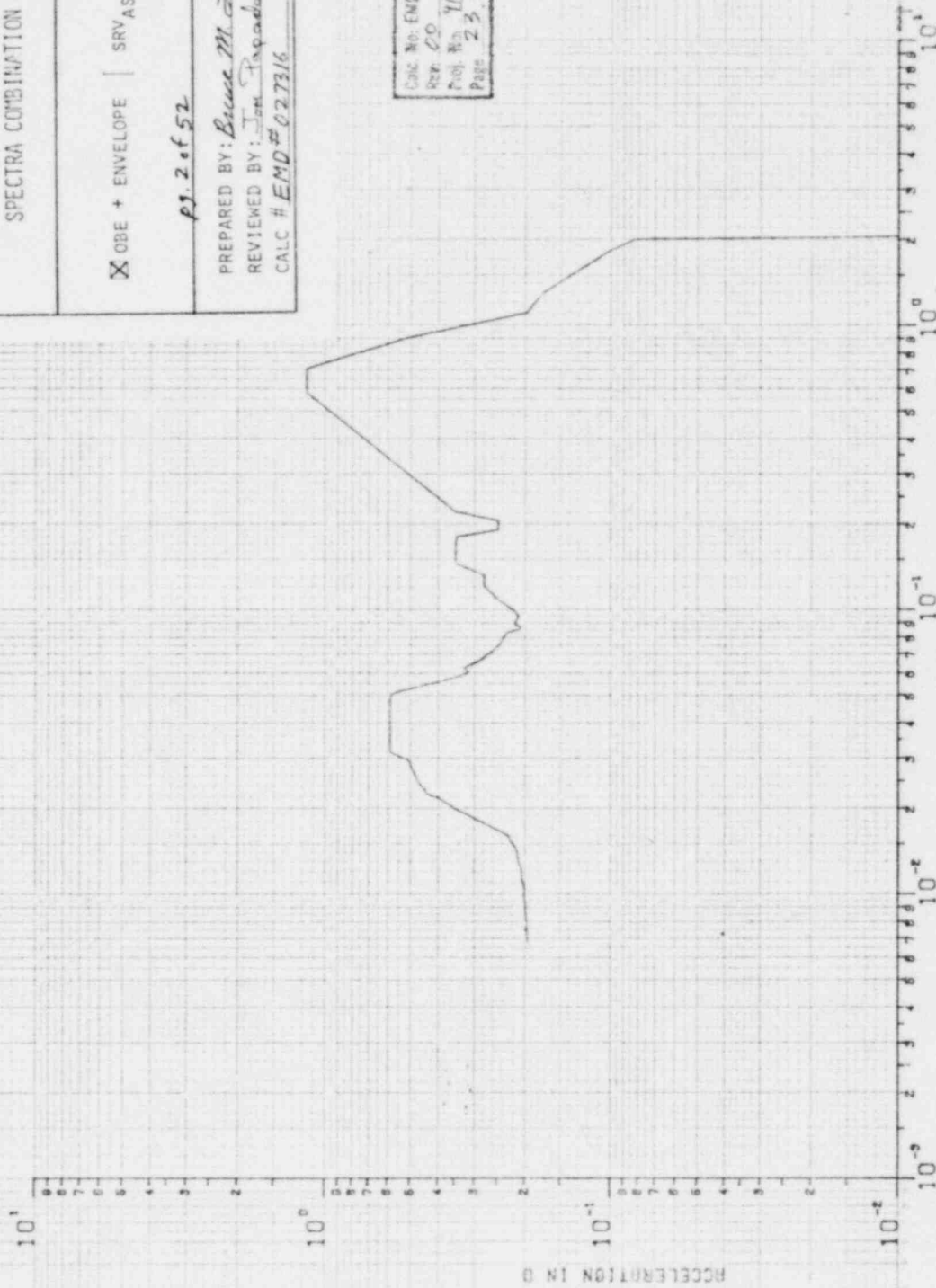
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV AS - TQ + SRV ALL - TQ

PJ. 2 of 52

PREPARED BY: Bruce M. Long DATE: 11/5/70
REVIEWED BY: Jim Papadopoulos DATE: 12-5-82
CALC # EMD # 027316 DATE: 12/23/82

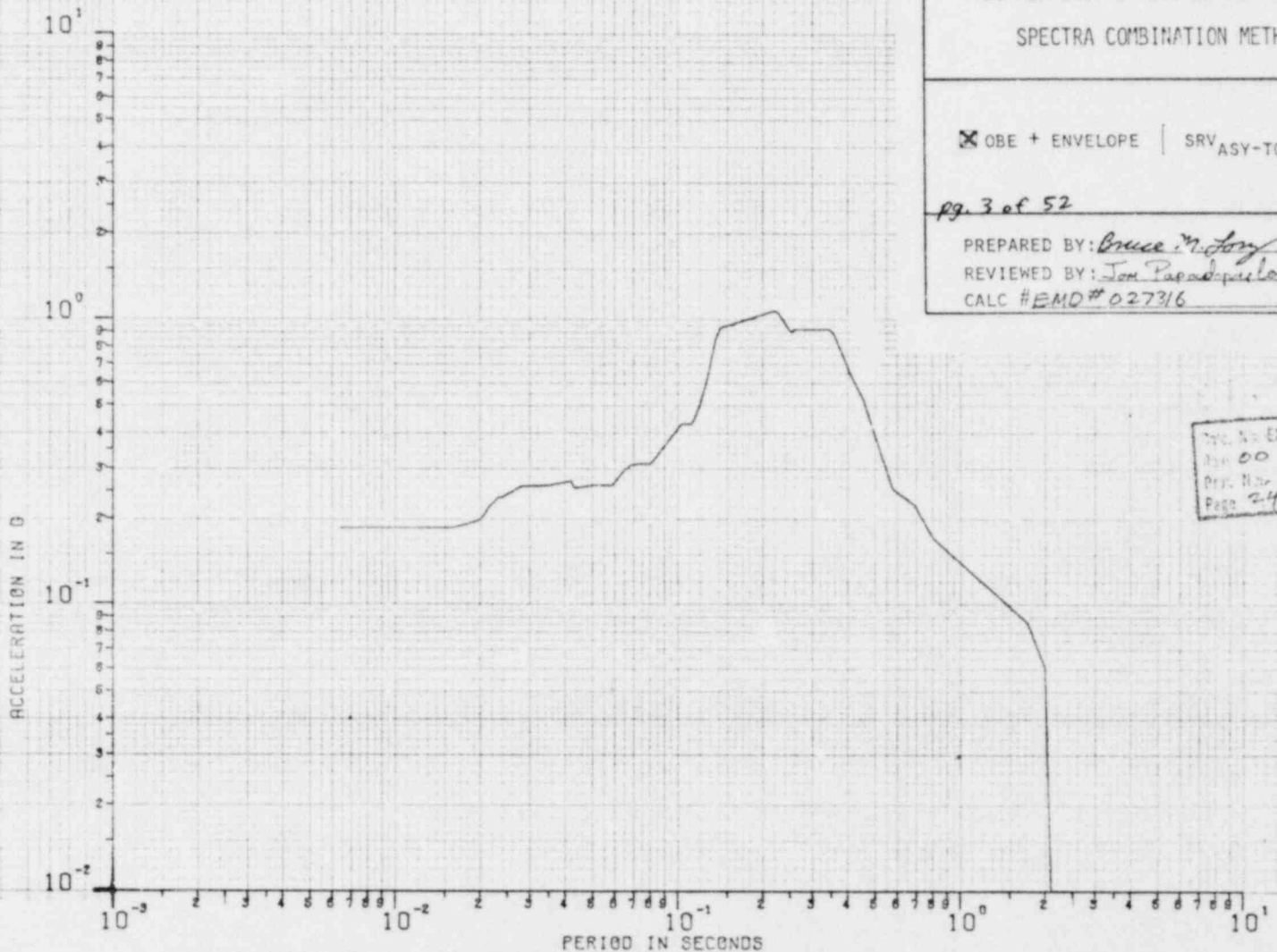
Case No: EMD - 027316
Rev: 00 Date: 12/22/82
Proj: 1130-15
Page: 23 of 75



PERIOD IN SECONDS

EW SRSS(OBE+ENV.(SRV-RSY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1Z 475'-6" REV 00

Run 10:772 BML 12/05/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 3 of 52

PREPARED BY: Bruce M. Long DATE: 12/5/80
 REVIEWED BY: Jon Papadopoulos DATE: 12-5-80
 CALC # EMD# 027316 DATE: 12/23/80

Calc. No: EMD-027316
 Rev: 00 Date: 12/23/80
 Proj. No: 4130-00
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VW SRSS(OBE+ENV.(SRV-ASY-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 475'-6'' REV 00

RW 10: 772 BAL 12/05/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

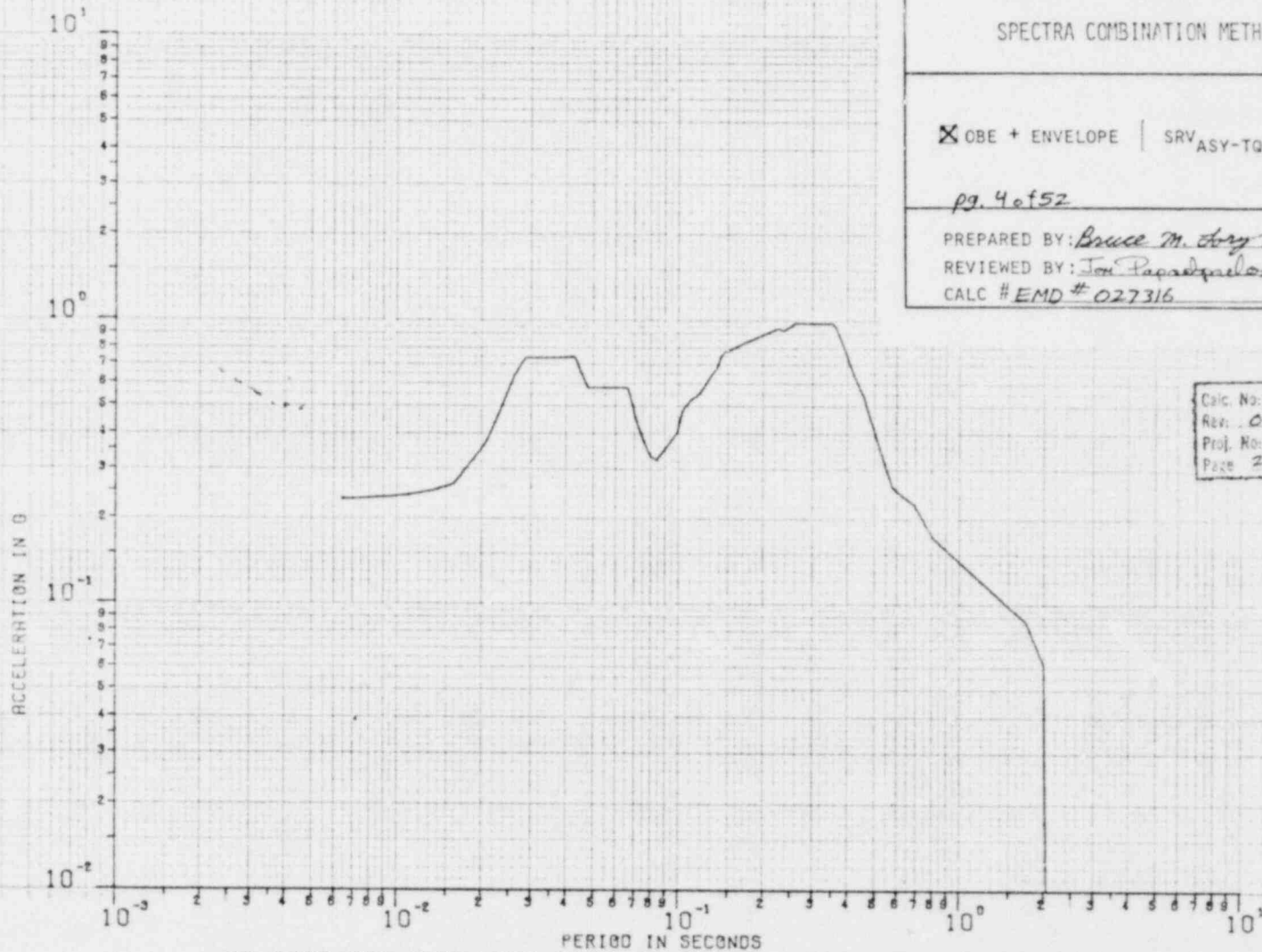
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 4 of 52

PREPARED BY: Bruce M. Jory DATE: 12/5/80
 REVIEWED BY: Tom Papadopoulos DATE: 12-5-80
 CALC # EMD # 027316 DATE: 12/21/80

Calc. No: EMD-027316
 Rev: 00 Date: 12/21/80
 Proj. No: 4130-00
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VS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 475'-6'' REV 00

RUN ID: 772 BML 12/03/80

904BML 12/06/80 ³¹⁰

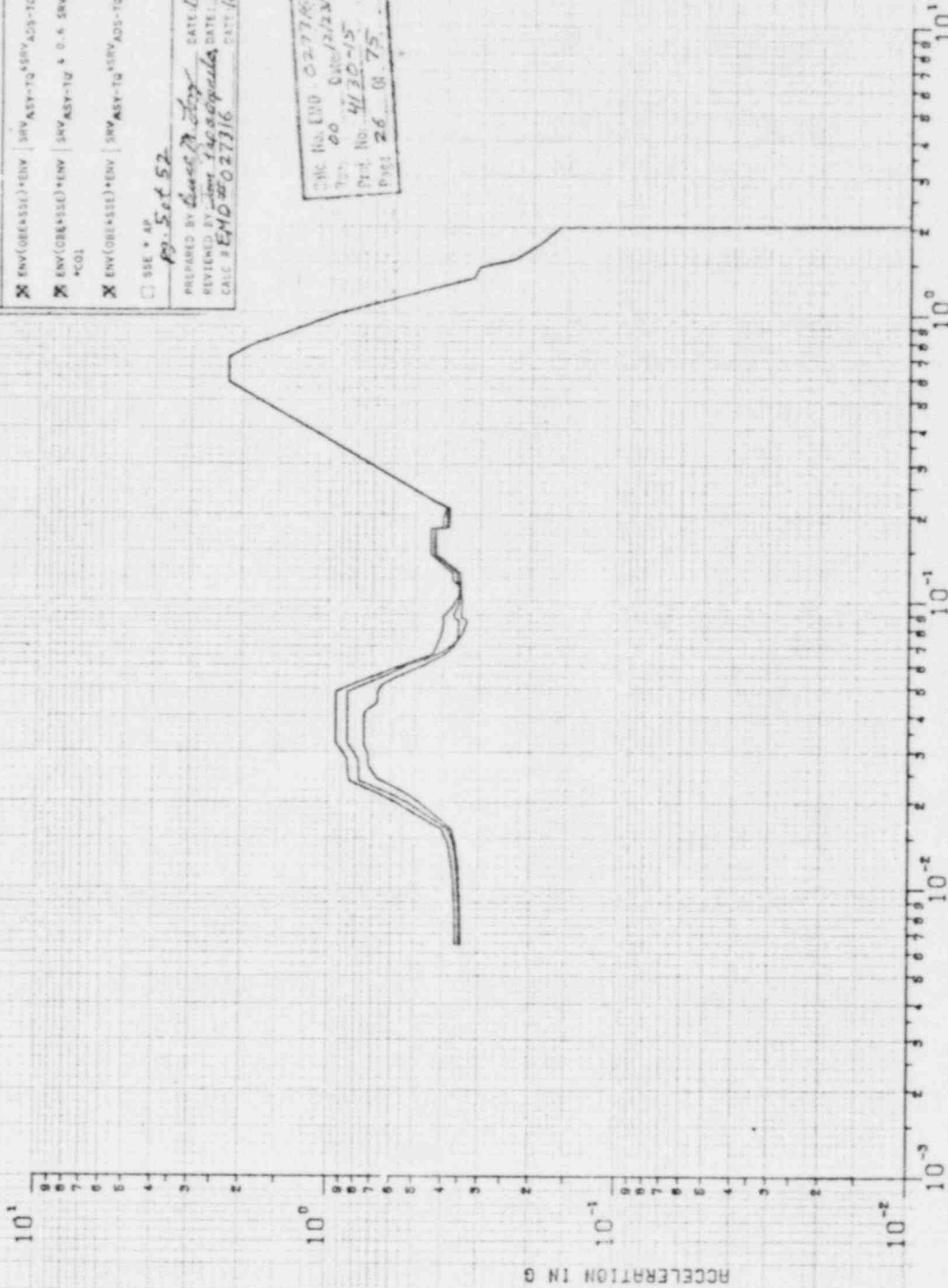
ZIMMER UNIT-1 4120-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

ENV(OBSERVED)+ENV | SWV ASY-TQ ASRV AOS-TQ | *C01
 ENV(OBSERVED)+ENV | SWV ASY-TQ A 0.6 SWV AOS-TQ
*C01
 ENV(OBSERVED)+ENV | SWV ASY-TQ ASRV AOS-TQ | *C02
 SSE * AF

P3. Set 52

PREPARED BY *David R. Day* DATE *12/16/80*
REVIEWED BY *Tom H. G. G. G. G.* DATE: *12-18-80*
CALC # *END 027716* DATE: *12/17/80*

CALC # *END 027716*
DATE: *12/17/80*
REV. NO. *4130-15*
PAGE *26* OF *75*



HO-NS SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-27.475*-6** REV. 00

INC. BUFFELBERGER CO. WASHINGTON, D.C.

RUN ID: 904 BML 12/06/80

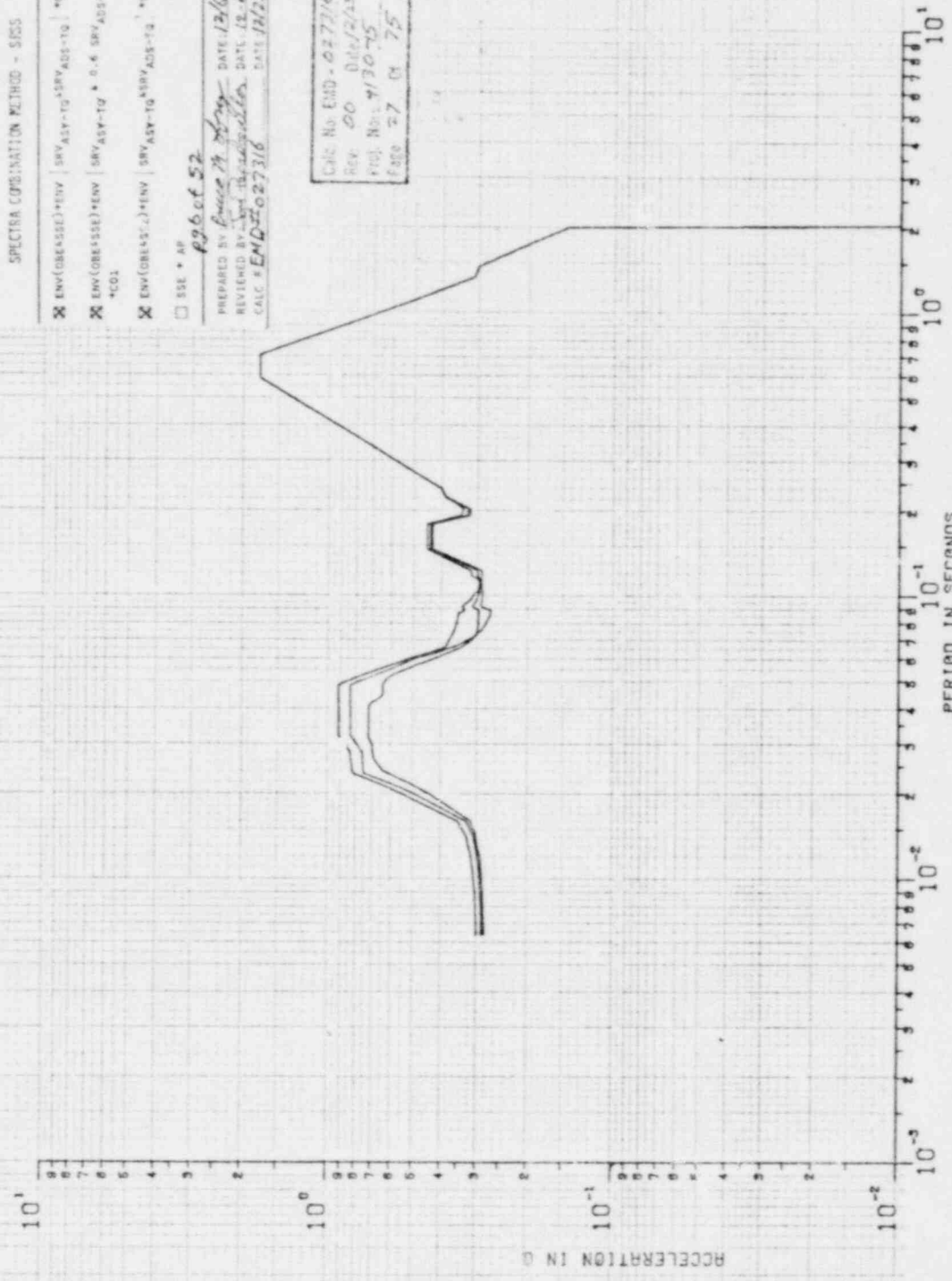
ZIMMER UNIT-1 4150-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(CROSS)Y+Y | SRV ASY-TQ-SRV AD5-TQ | *MOM
- ENV(CROSS)Z+Z | SRV ASY-TQ * 0.6 SRV AD5-TQ | *COZ
- ENV(CROSS)X+X | SRV ASY-TQ-SRV AD5-TQ | *COX
- SSE * AP

896 of 52

PREPARED BY Bruce H. [unclear] DATE 12/8/80
REVIEWED BY [unclear] DATE 12.6.80
CALC # EMD-027316 DATE 12/23/80

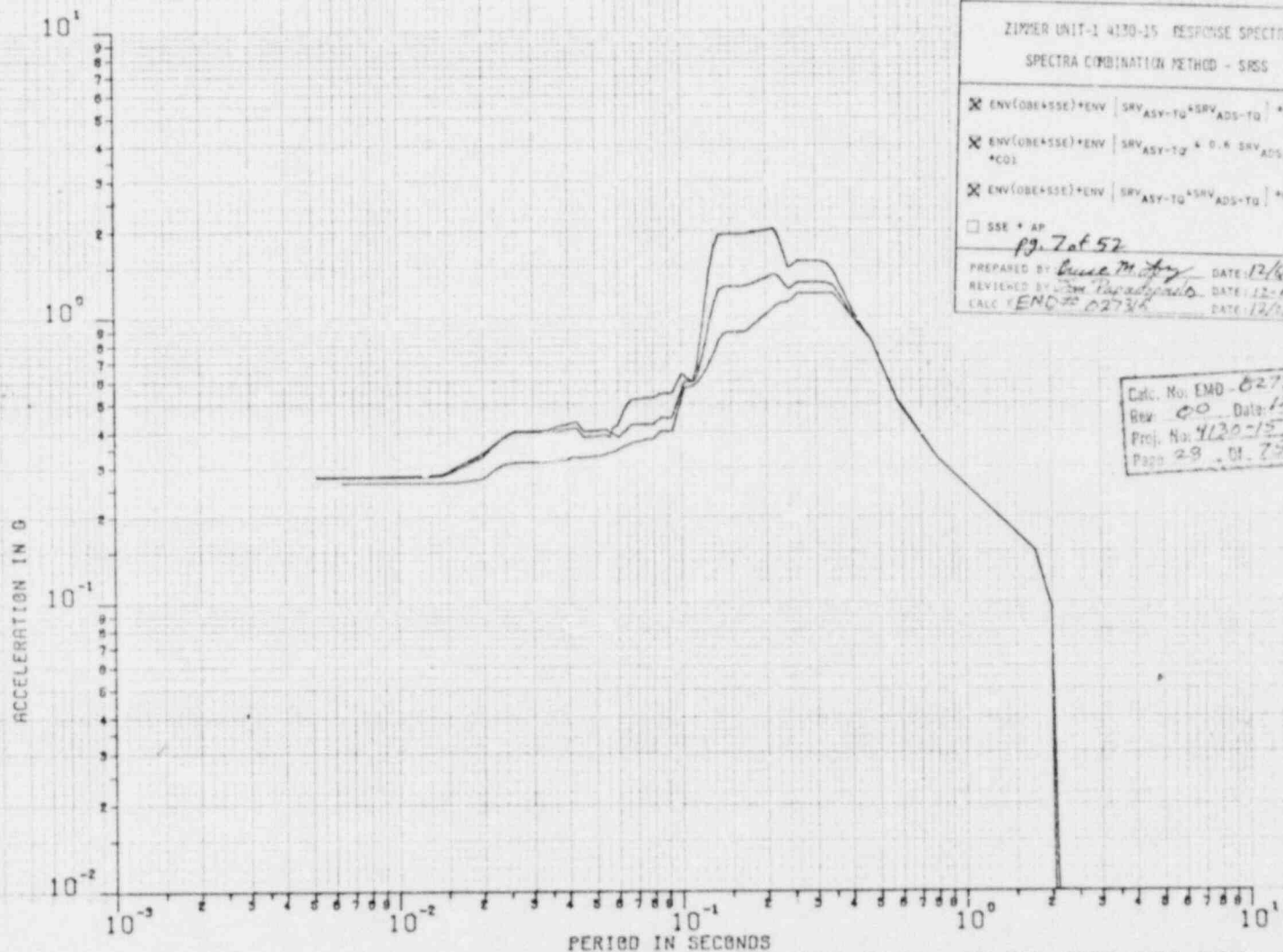
Calc No. EMD-027316
Rev. 00 Date 12/23/80
Plot No. 4130.75
Page 27 of 75



H0-EW SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 475'-6" REV. 00

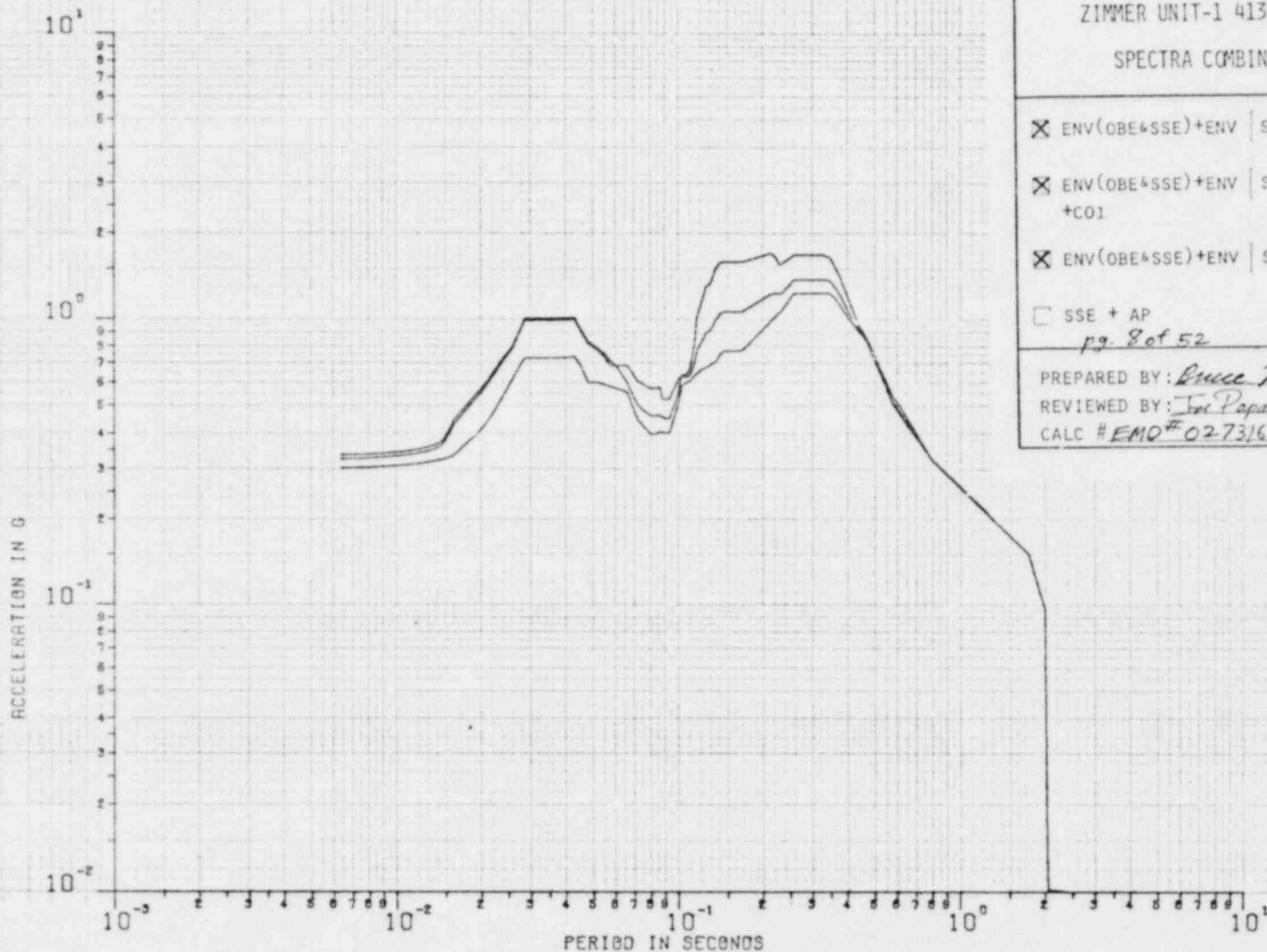
Rev 10. 704 Rev 12/16/80

100% REINFORCED CONCRETE



VW-VW SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 475'-6'' REV. 00

RUN 10' 904 BML 12/01/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}^{0.6}SRV_{ADS-TQ}] +CHG
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}^{0.6}SRV_{ADS-TQ}] +C01
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}^{0.6}SRV_{ADS-TQ}] +C02
- SSE + AP

pg. 8 of 52

PREPARED BY: Bruce M. Long DATE: 12/6/80
 REVIEWED BY: Tom Papadopoulos DATE: 12-6-80
 CALC # EMO# 027316 DATE: 12/23/80

Calc. No. EMO-027316
 Rev: 02 Date: 12/23/80
 Proj. No. 4130-15
 Page 29 of 75

VS-VS SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 475'-6'' REV. 00

RUN 10:904 BML 12/06/80

ZIMMER UNIT-I 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV-ASY-TQ + SRV-ALL-TQ

pg. 9 of 52

PREPARED BY: Bruce M. Long DATE: 12/14/80
REVIEWED BY: Jim Papadopoulos DATE: 12 1 80
CALC # EMD# 037311 DATE: 03/27/82

Calc. No. EMD - 027516
Rev. 00 Date: 12/13/80
Proj. No. 4130-15
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PERIOD IN SECONDS

NS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-17 503*-6** REV 00

Run 10: 906 P.M. 12/06/80

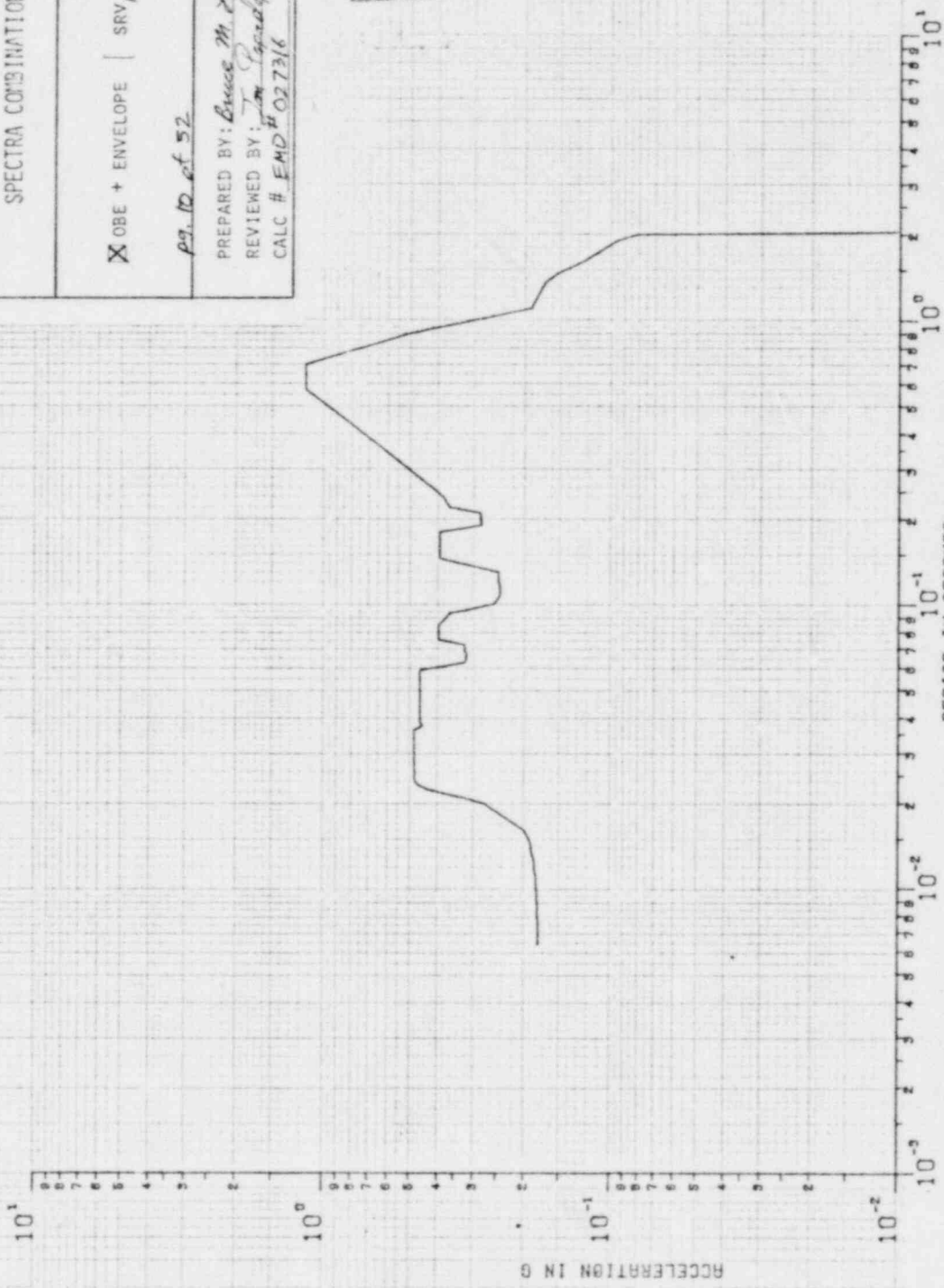
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 10 of 52

PREPARED BY: Bruce M. Long DATE: 12/16/80
REVIEWED BY: Tom Papadimitriou DATE: 12-6-80
CALC # EMD # 027316 DATE: 12/13/80

Calc. No. EMD-01228
Rev: 02 Date: 12/13/80
Proj. No. 4130-15
Page 31 of 75



PERIOD IN SECONDS

EW SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-17 503*-6** REV 00

RUN 10: 906 AM 12/06/80

KEUFFEL & ESSER CO. ENGINEERS

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

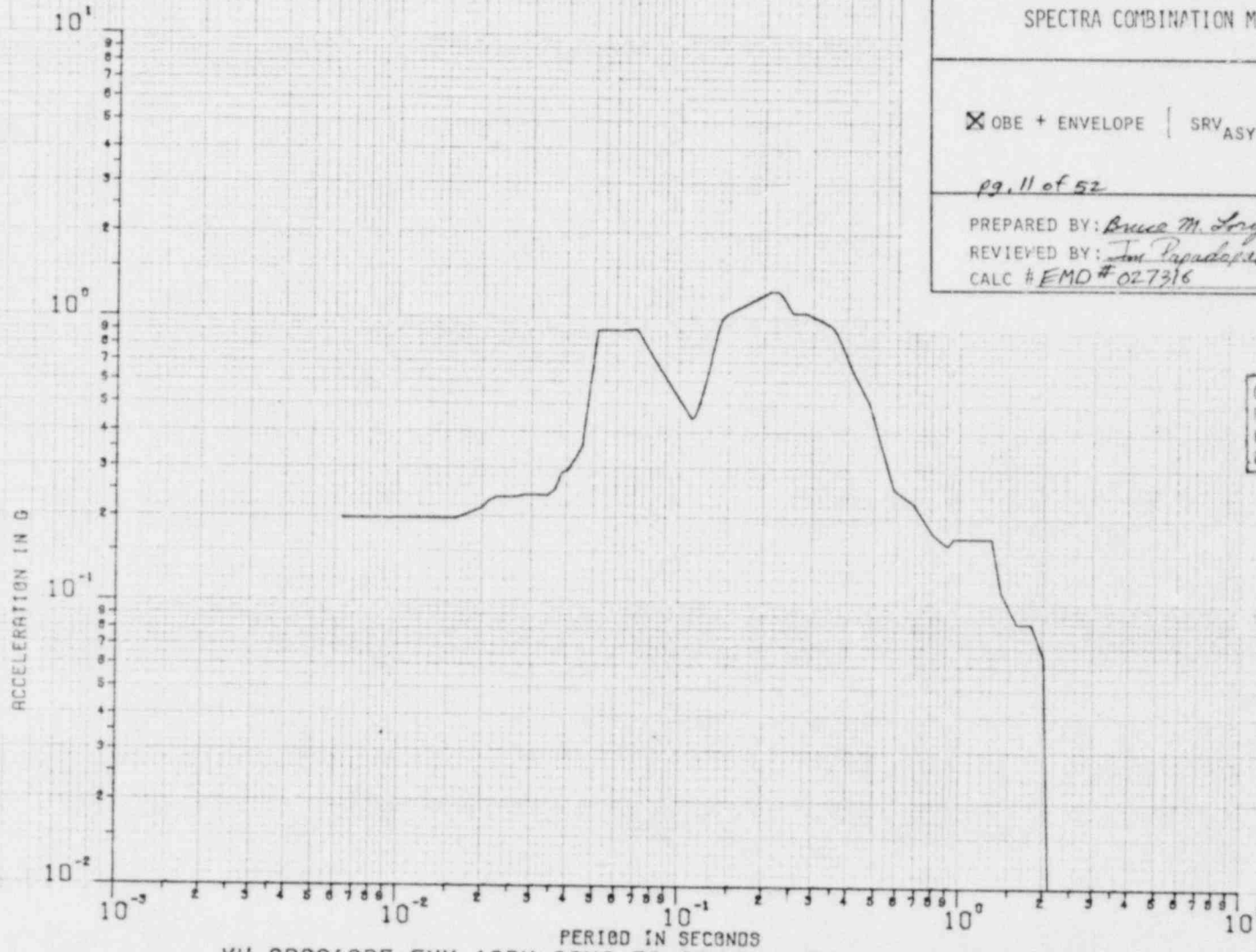
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

pg. 11 of 52

PREPARED BY: Bruce M. Levy DATE: 12/6/80
 REVIEWED BY: Jim Papadopoulos DATE: 12-6-80
 CALC # EMD # 027316 DATE: 12/23/80

Calc. No. EMD - 027316
 Rev: 00 Date: 12/23/80
 Proj. No. 4130-15
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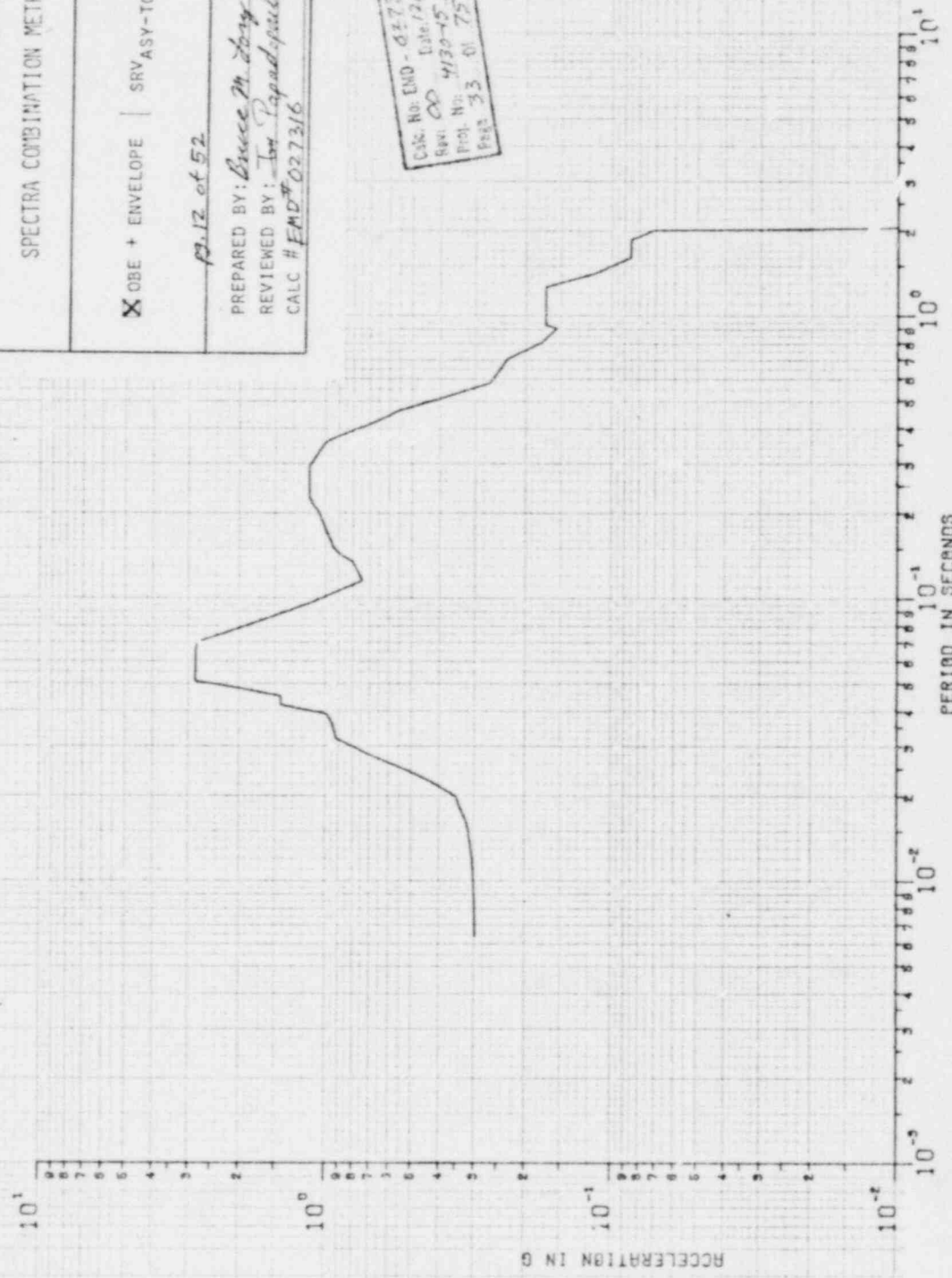


VW SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 503'-6" REV 00

RUN 10:406 BML 12/06/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA SPECTRA COMBINATION METHOD - SPSS	
<input checked="" type="checkbox"/> OBE + ENVELOPE	<input type="checkbox"/> SRV_ASY-TQ + SRV_ALL-TQ <i>12.12.01.52</i>
PREPARED BY: <i>Bruce M Long</i>	DATE: <i>12/11/80</i>
REVIEWED BY: <i>Tom Papadopoulos</i>	DATE: <i>12.6.80</i>
CALC # <i>EMD#027316</i>	DATE: <i>12/31/80</i>

Calc. No: EMD-027316
 Date: 12/2/80
 Rep: 00 4130-15
 Proj: 33 01 75
 Page: 33 01 75



VS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF--1% 503*-6** REV 00

INC. NEUFELDESSERCO PHOENIX, U.S.A.
 RUN ID: 906 P.M. 12/06/80

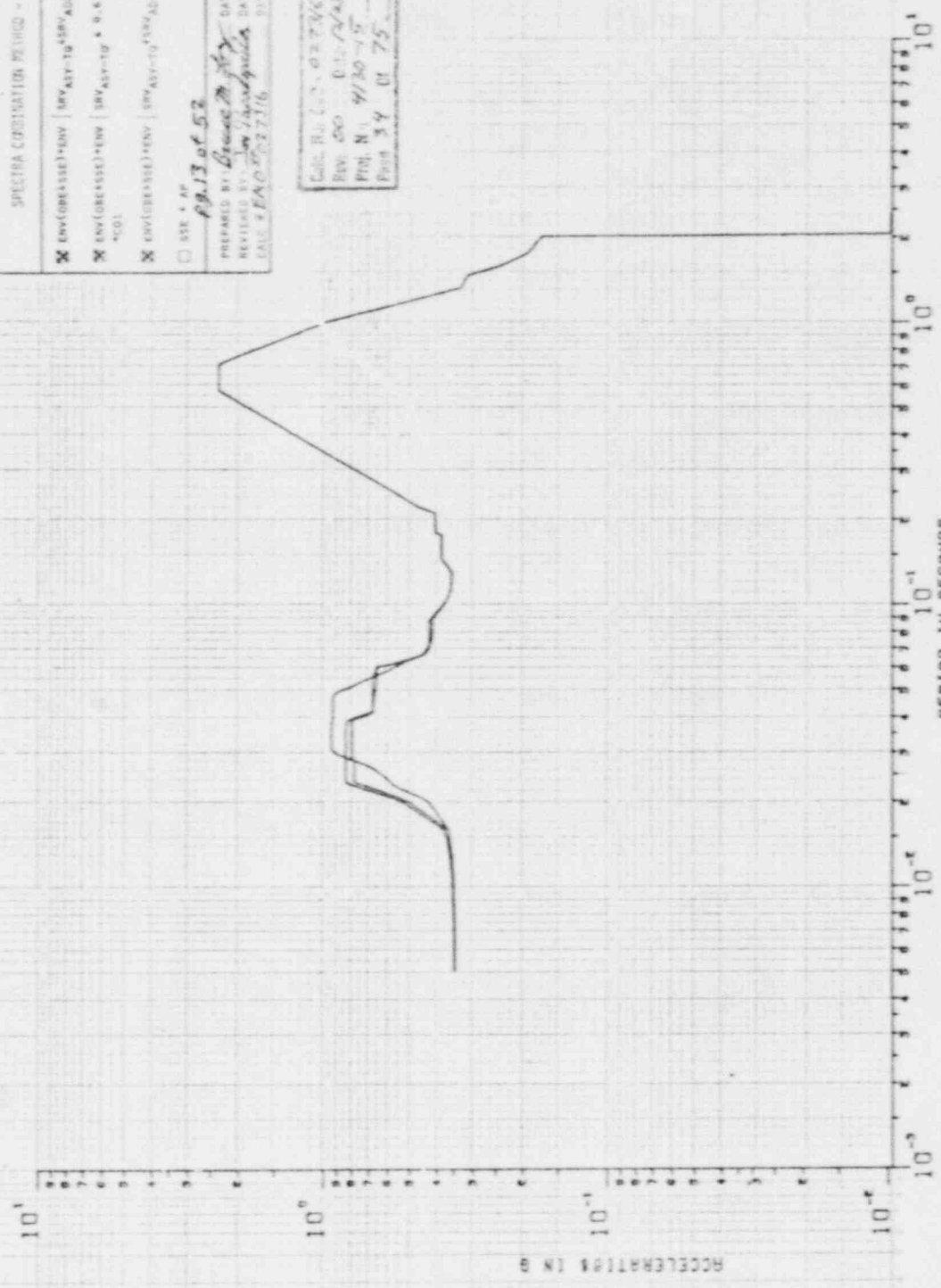
ZIMMER UNIT-1 4250-15 RESONANCE SPECTRA
 SPECTRA CONDITION METHOD - SRSS

ENVIRONMENTAL VIB | SRV ASY TO SRV ADS TO | *CMB
 ENVIRONMENTAL VIB | SRV ASY TO * 0.4 SRV ADS TO | *C01
 ENVIRONMENTAL VIB | SRV ASY TO SRV ADS TO | *C02
 SEE * AF

89.13 of 52

PREPARED BY: *James M. [unclear]* DATE: 12/16/80
 REVIEWED BY: *Tom [unclear]* DATE: 12/16/80
 CALC: ENC 89.1316 DATE: 12/16/80

Calc. R. Co., 02746
 Rev. 250 012/2/82
 Proj. N. 4130-15
 Print 34 of 75



HO-NS SRSS(C2 + C3 + C4) ZIMMER REACTOR BLOC. OF -2% 503'-6'' REV. 00

RUN 10: 736 BML 12/16/80

ZIPPER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

ENV(OBS+SEI)+ENV | SRV ASV-TQ+SRV AOS-TQ *CNG
 ENV(OBS+SEI)+ENV | SRV ASV-TQ * 0.5 SRV AOS-TQ *COL
 ENV(OBS+SEI)+ENV | SRV ASV-TQ+SRV AOS-TQ *COL
 SSE * AP

pg. 14 of 52
 PREPARED BY: *George M. Long* DATE: 12/16/80
 REVIEWED BY: *Jim Long* DATE: 12-16-80
 CALC # END: 5-027316 SLT: 173370

CALC. NO. END - 027316
 Rev. # 00 DATE 12/17/80
 Proj. No. 4130-15
 Part 35 of 75



HO-EW SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 503*-6** REV. 00
 PERIOD IN SECONDS

RUN ID: 746 RML 12/16/80

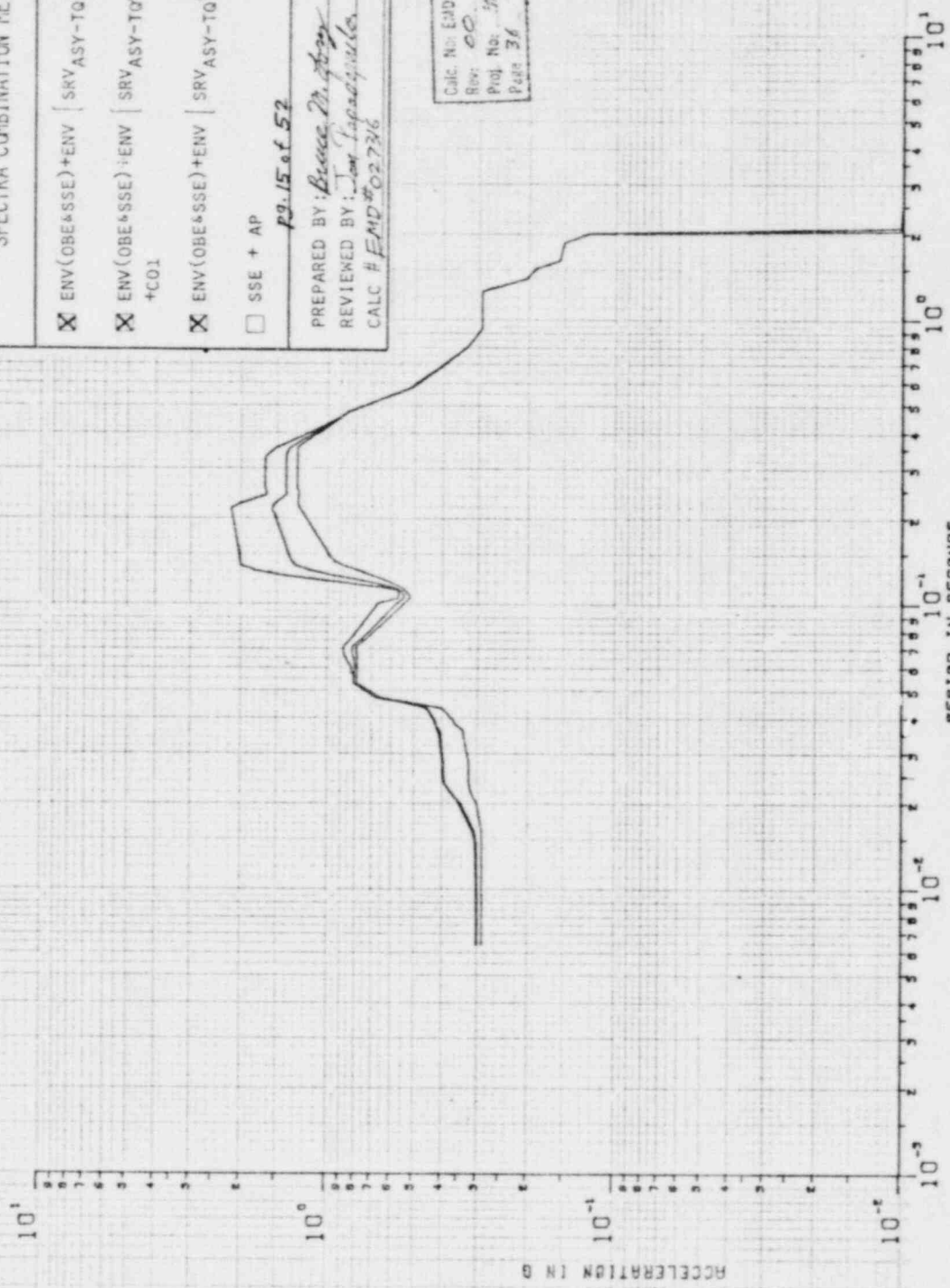
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV | SRV ASY-TQ⁶SRV ADS-TQ | +CHG
- ENV(OBE+SSE)+ENV | SRV ASY-TQ⁶ & 0.6 SRV ADS-TQ | +CO1
- ENV(OBE+SSE)+ENV | SRV ASY-TQ⁶SRV ADS-TQ | +CO2
- SSE + AP

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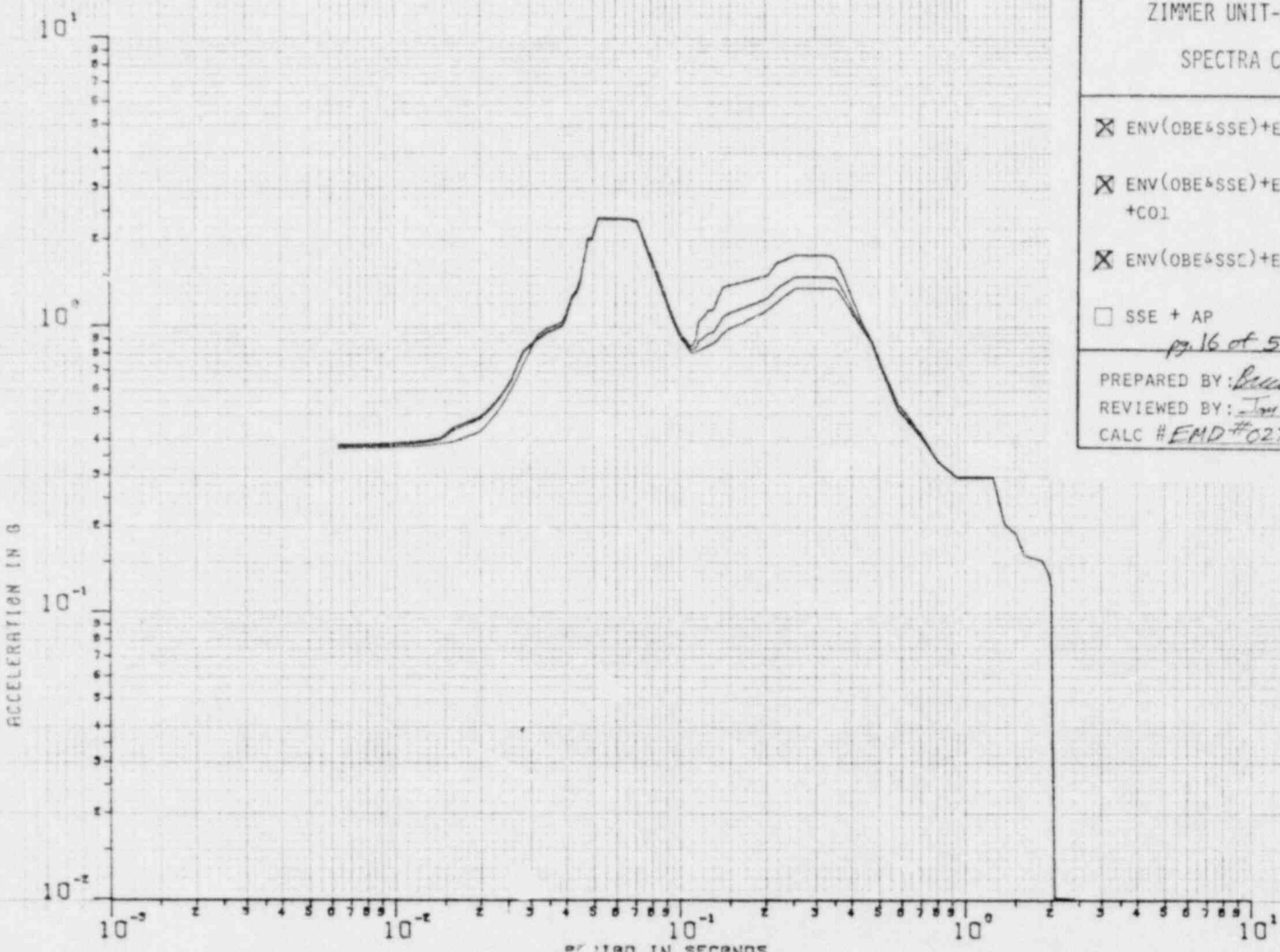
PREPARED BY: Bruce N. Gray DATE: 12/16/80
REVIEWED BY: Tom Lapadula DATE: 12-11-80
CALC # EMD 02736 DATE: 12/23/80

Calc. No: EMD-02736
Rev: 00 Date: 12/23/80
Proj. No: 4130-15
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VH-VW SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 503*-6** REV. 00

RUN 10:736 PML 12/16/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE&SSE)+ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] +CHG
- ENV(OBE&SSE)+ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] +C01
- ENV(OBE&SSC)+ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] +C02
- SSE + AP

pg. 16 of 52

PREPARED BY: Gene M. Long DATE: 12/16/80
 REVIEWED BY: Jim Papadopoulos DATE: 12-16-80
 CALC # EMD # 0273/6 DATE: 12/17/80

Calc. No. EMD - 0273/6
 Rev. 00 Date: 12/17/80
 Proj. No. 4130-15
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VS-VS SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 503'-6'' REV. 00

RUN ID: 736 BML 12/16/80

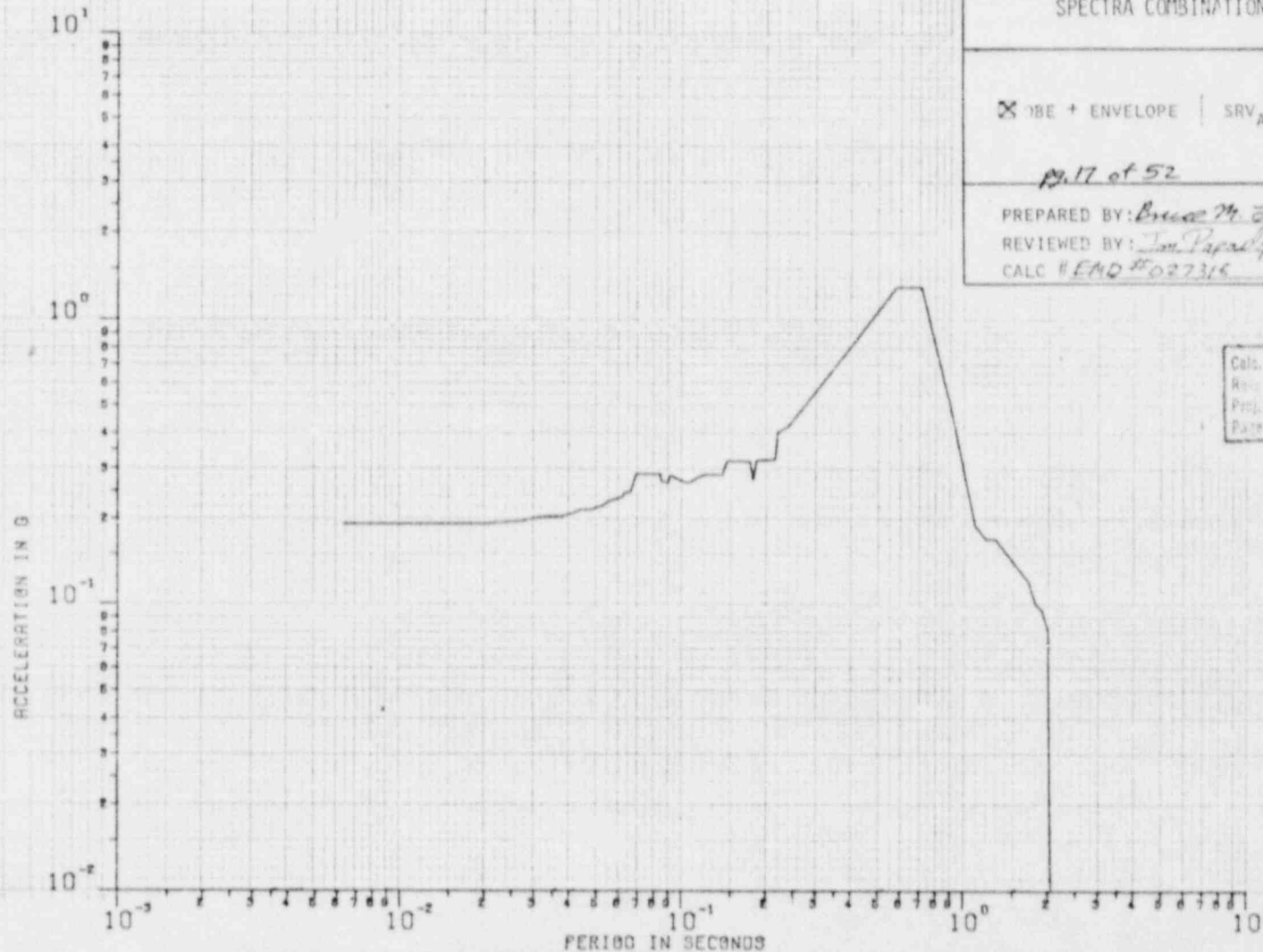
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 17 of 52

PREPARED BY: Bruce M. Fry DATE: 12/1/80
REVIEWED BY: Tom Papadimitriou DATE: 12-6-80
CALC # EMD #027316 DATE: 11/2/79

Calc. No: EMD - 027316
Rev: CO Date: 11/2/80
Proj. No: 4130-15
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NS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 525'-7'' REV 00

NEUTRAL BUILDING CO

RUN 10:406 KML 12/06/80

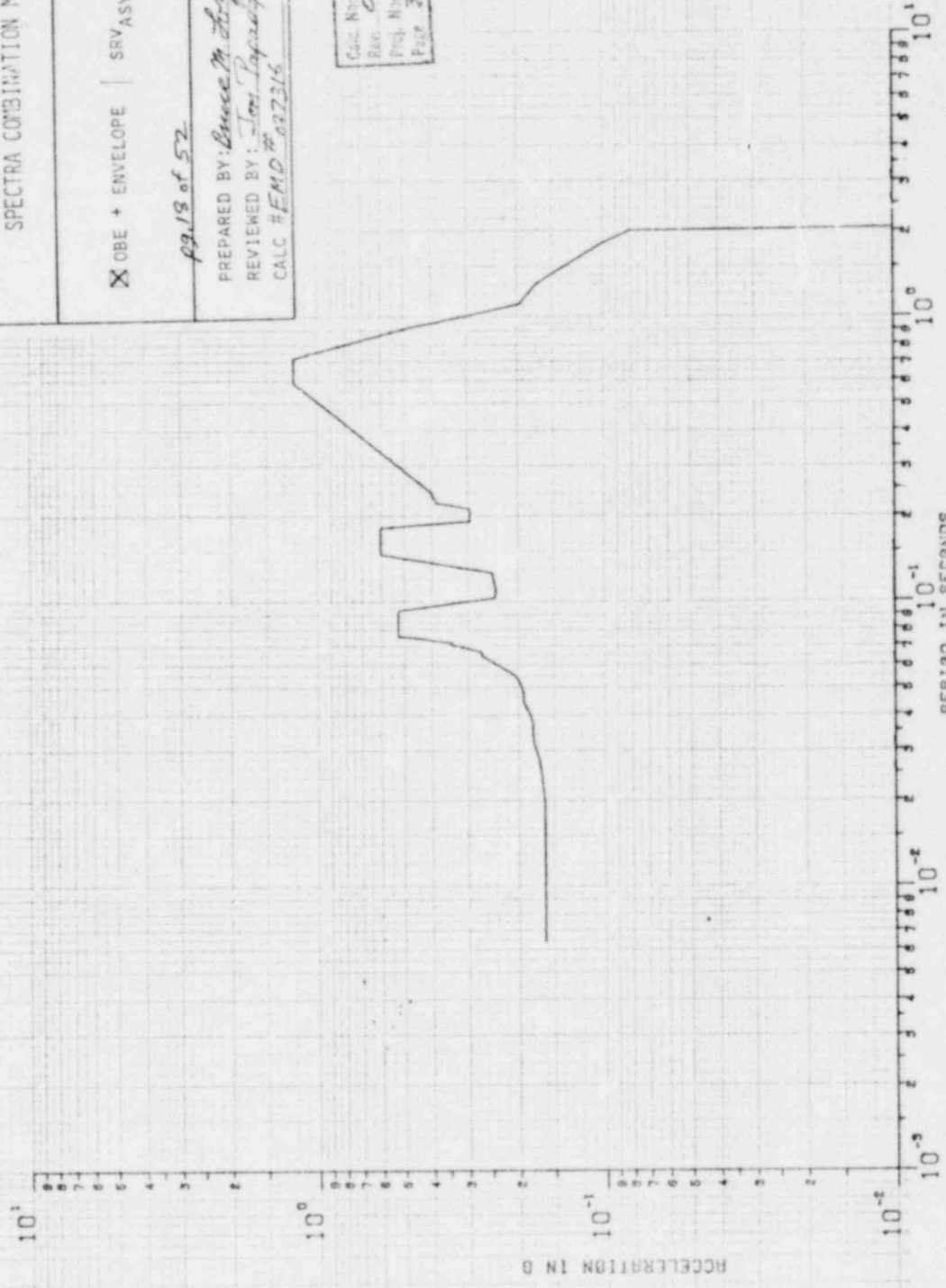
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SFSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 18 of 52

PREPARED BY: *Bruce M. Stoy* DATE: 12/1/80
REVIEWED BY: *Tom Papadopoulos* DATE: 12-6-80
CALC # EMD # 827316 DATE: 12/1/80

Calc No. EMD - 027316
Rev. 00 Date: 12/1/80
Proj. No. 7130-15
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EW SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 525'-7" REV 00
NEUTEL/ENNER/CA

Rev 70: 906 P.M.L. 12/6/80

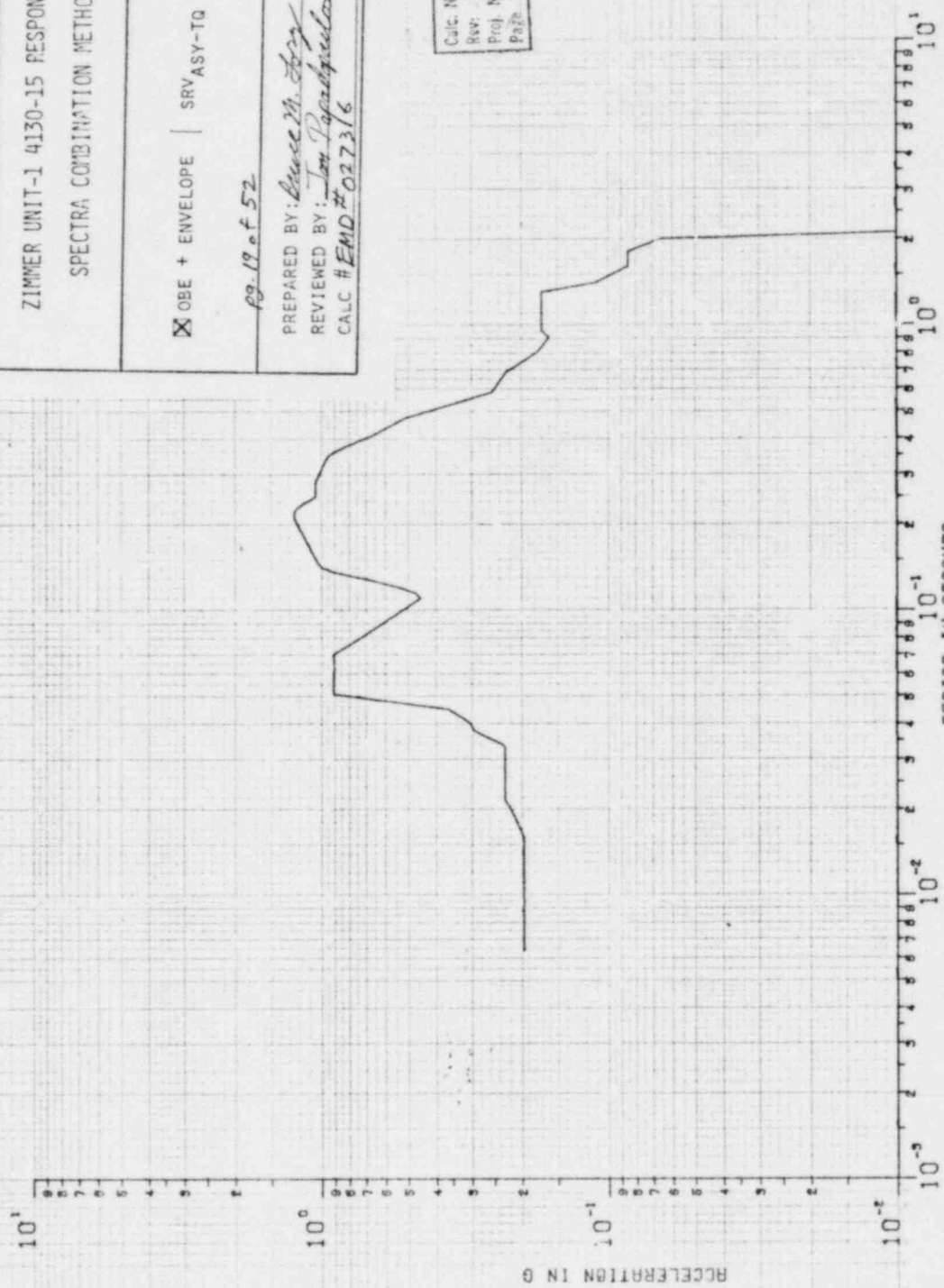
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV-ASY-TQ + SRV-ALL-TQ

pg. 18 of 52

PREPARED BY: Bruce M. Fry DATE: 12/16/80
REVIEWED BY: Tom Papadopoulos DATE: 12-1-80
CALC # EMD # 027316 DATE: 12/23/80

Calc No: EMD-027316
Rev: 00 Date: 12/23/80
Proj No: 4130-15
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VH SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 525'-7" REV 00

RUN ID: 906 BML 12/01/80

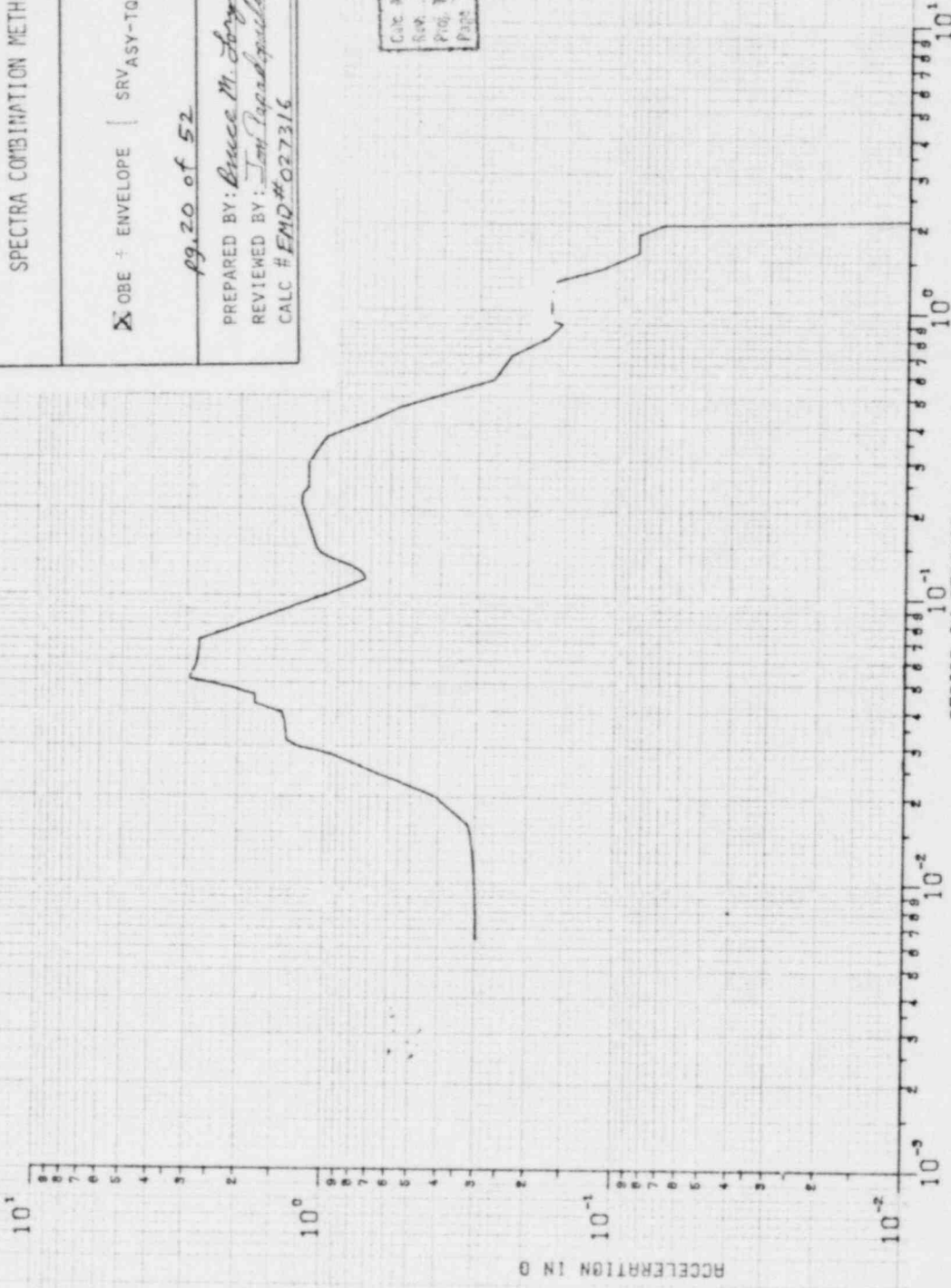
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV-ASY-TQ + SRV-ALL-TQ

pg. 20 of 52

PREPARED BY: *Bruce M. Long* DATE: 12/16/80
 REVIEWED BY: *Tom Papadopoulos* DATE: 12-6-80
 CALC # EMD# 027316 DATE 12/13/80

Calc No EMB - 027316
 Rev. 00 2/28/2/2/80
 Proj. No. 4130-15
 Page 41 of 75



VS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 525*-7** REV 00

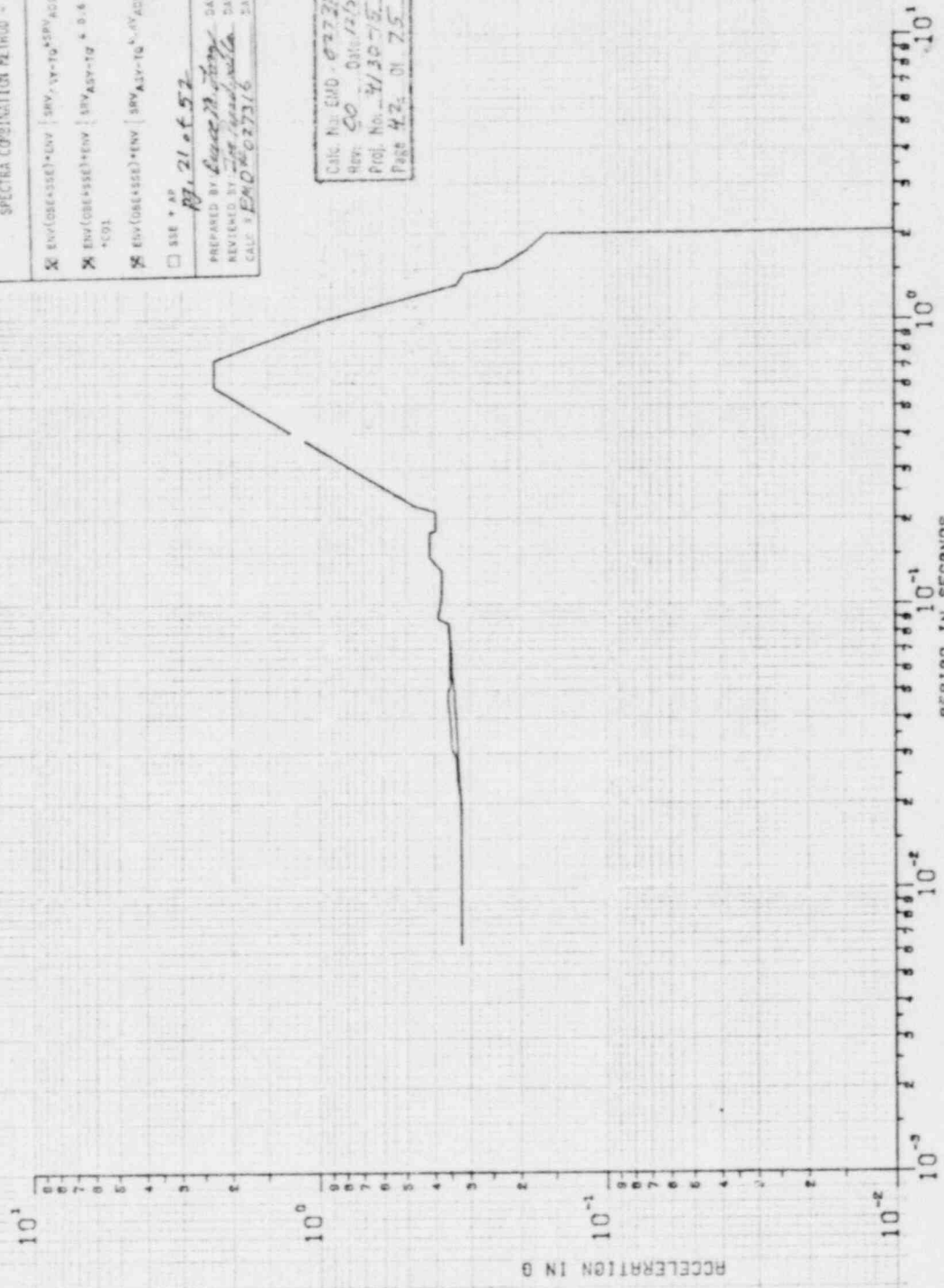
RUN 10:06 PM 12/06/80

ZIMMER UNIT-1 4120-15 RESPONSE SPECTRA
SPECTRA CORRELATION METHOD - SRSS

ENV(OBSERVED)+ENV | SRV(AV-TQ)+SRV(AS-TQ) | NONS
 ENV(OBSERVED)+ENV | SRV(AV-TQ) + 0.6 SRV(AS-TQ) | COI
 ENV(OBSERVED)+ENV | SRV(AV-TQ)+SRV(AS-TQ) | NCDZ
 SEE * AP

PREPARED BY: *Eng. B. J. ...* DATE: *12/8/80*
 REVIEWED BY: *J. ...* DATE: *12/8/80*
 CALC # *END-027316* DATE: *12/13/80*

CALC NO: *END-027316*
 REV: *60* DATE: *12/13/80*
 PROJ. NO: *4130-15*
 PAGE: *42* OF *75*



H0-NS SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-27.525'-7" REV. 0F

ENVIRONMENTAL SYSTEMS CO.

RUN ID: 002 BML 12/08/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

ENV(OBSERVED) * ENV | ENV_ASY-10 * ENV_ASY-10 | * COI

ENV(OBSERVED) * ENV | ENV_ASY-10 * 0.6 SRV_ASY-10 | * COI

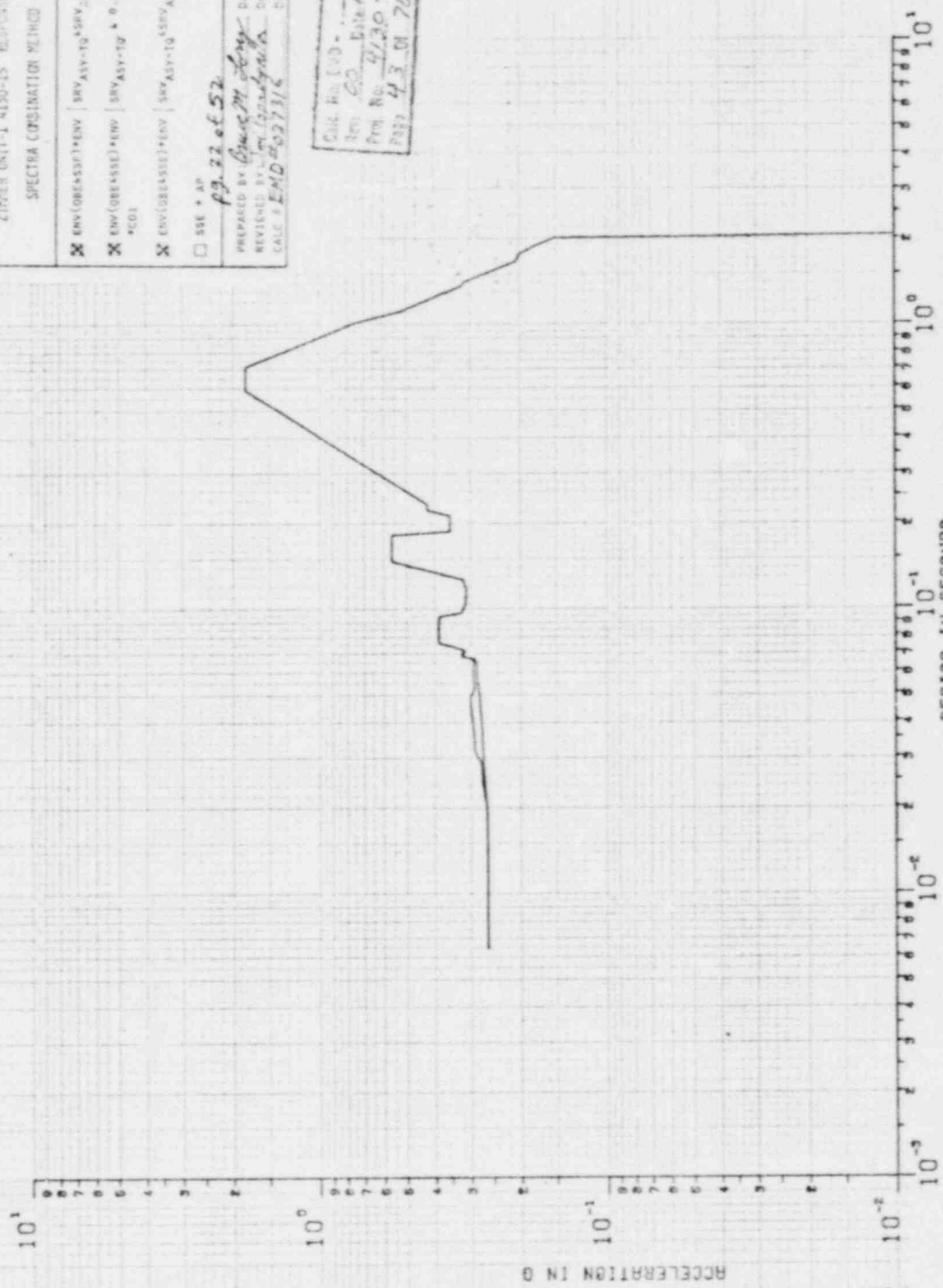
ENV(OBSERVED) * ENV | ENV_ASY-10 * SRV_ASY-10 | * COI

SSE * AP

19.22.052

PREPARED BY: *David M. Long* DATE: 12/8/80
REVIEWED BY: *Tom J. [unclear]* DATE: 12/8/80
CALC # END#02716 DATE 12/23/80

CALC NO. 100
REV. 00 DATE 12/23/80
PROJ. NO. 4130-15
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H0-EW SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 525'-7" REV. 00

RUN ID: 002 PML 17/05/80

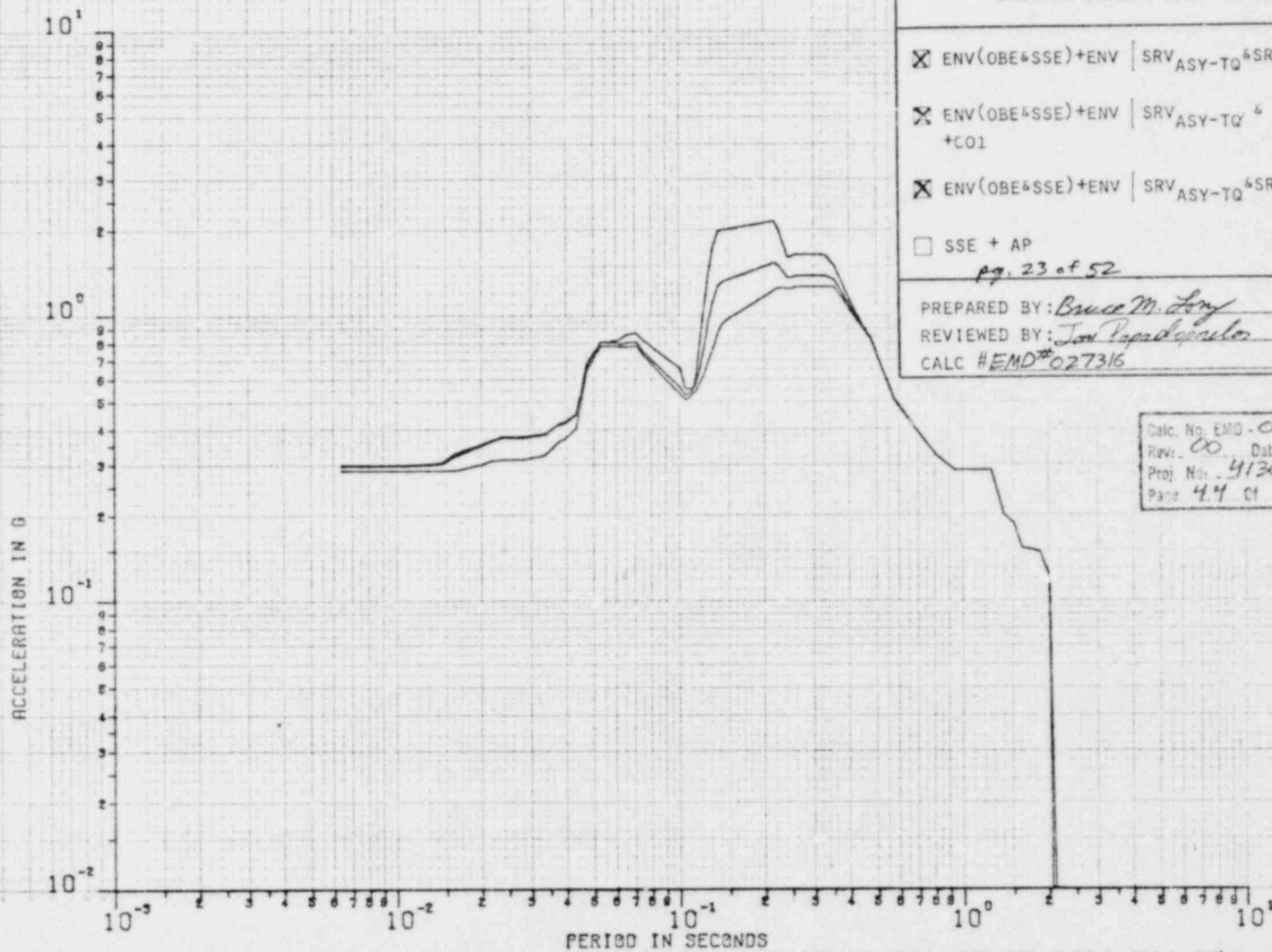
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

- ENV(OBE&SSE)+ENV | SRV_{ASY-TQ} & SRV_{ADS-TQ} | +CHG
- ENV(OBE&SSE)+ENV | SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ} | +C01
- ENV(OBE&SSE)+ENV | SRV_{ASY-TQ} & SRV_{ADS-TQ} | +C02
- SSE + AP

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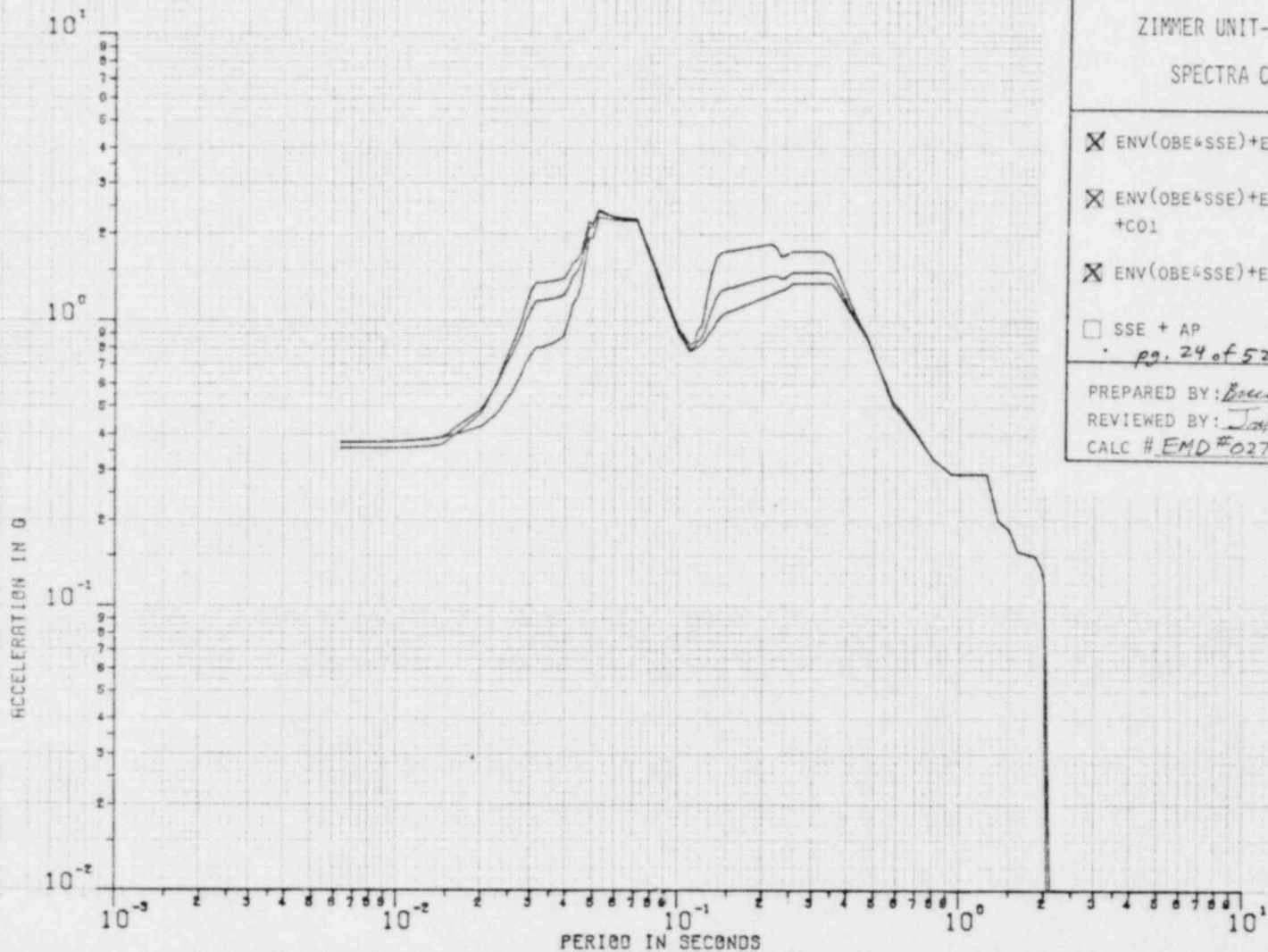
PREPARED BY: Bruce M. Long DATE: 12/3/80
REVIEWED BY: Tom Papadopoulos DATE: 12-8-80
CALC # EMD# 027316 DATE: 12/23/80

Calc. No. EMD-027316
Rev. 00 Date: 12/23/80
Proj. No. 4130-15
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VW-VW SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 525'-7'' REV. 00

RUN ID: 002 BAL 12/08/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] +CHG
 - ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] +CO1
 - ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] +CO2
 - SSE + AP
- pg. 24 of 52

PREPARED BY: Bruce M. Larry DATE: 12/8/80
 REVIEWED BY: Jim Papadopoulos DATE: 12-8-80
 CALC # EMD#027316 DATE: 12/23/80

Calc. No: EMD - 027316
 Rev: 00 Date: 12/23/80
 Proj. No: 4130-15
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VS-VS SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 525'-7'' REV. 00

ICE KIEFFELBESSER CO. PORTLAND, OREGON

RUN 30: CO2 BML 12/09/80

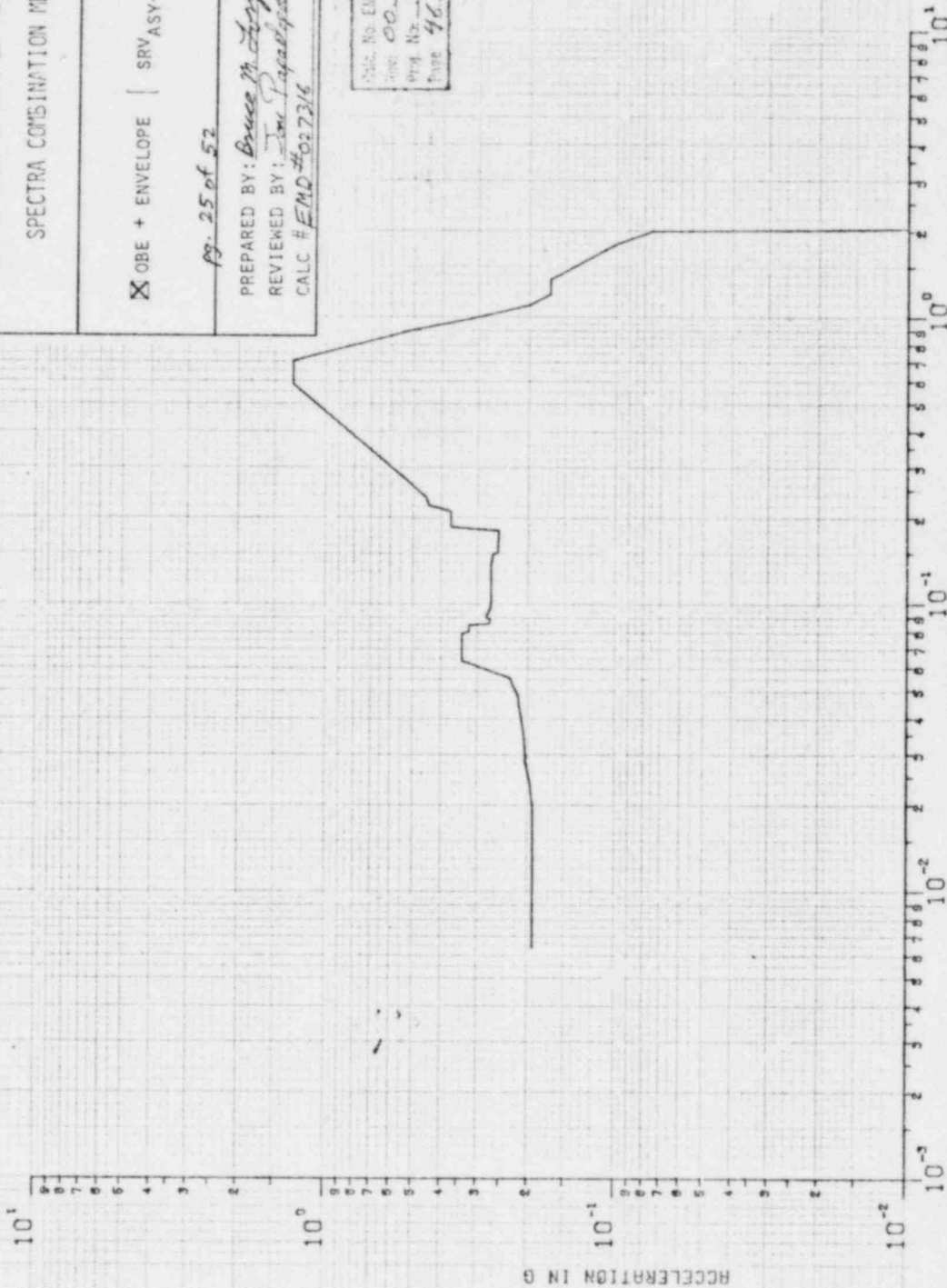
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 25 of 52

PREPARED BY: Bruce M. Long DATE: 12/1/80
 REVIEWED BY: Tom Papadopoulos DATE: 12-6-80
 CALC # EMD-037316 DATE 12/23/80

Calc. No. EMD-037316
 Date 00-00-12/1/80
 Plot No. 4130-15
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NS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-17 546*-0** REV 00

Run 10: 965 P.M. 12/06/80

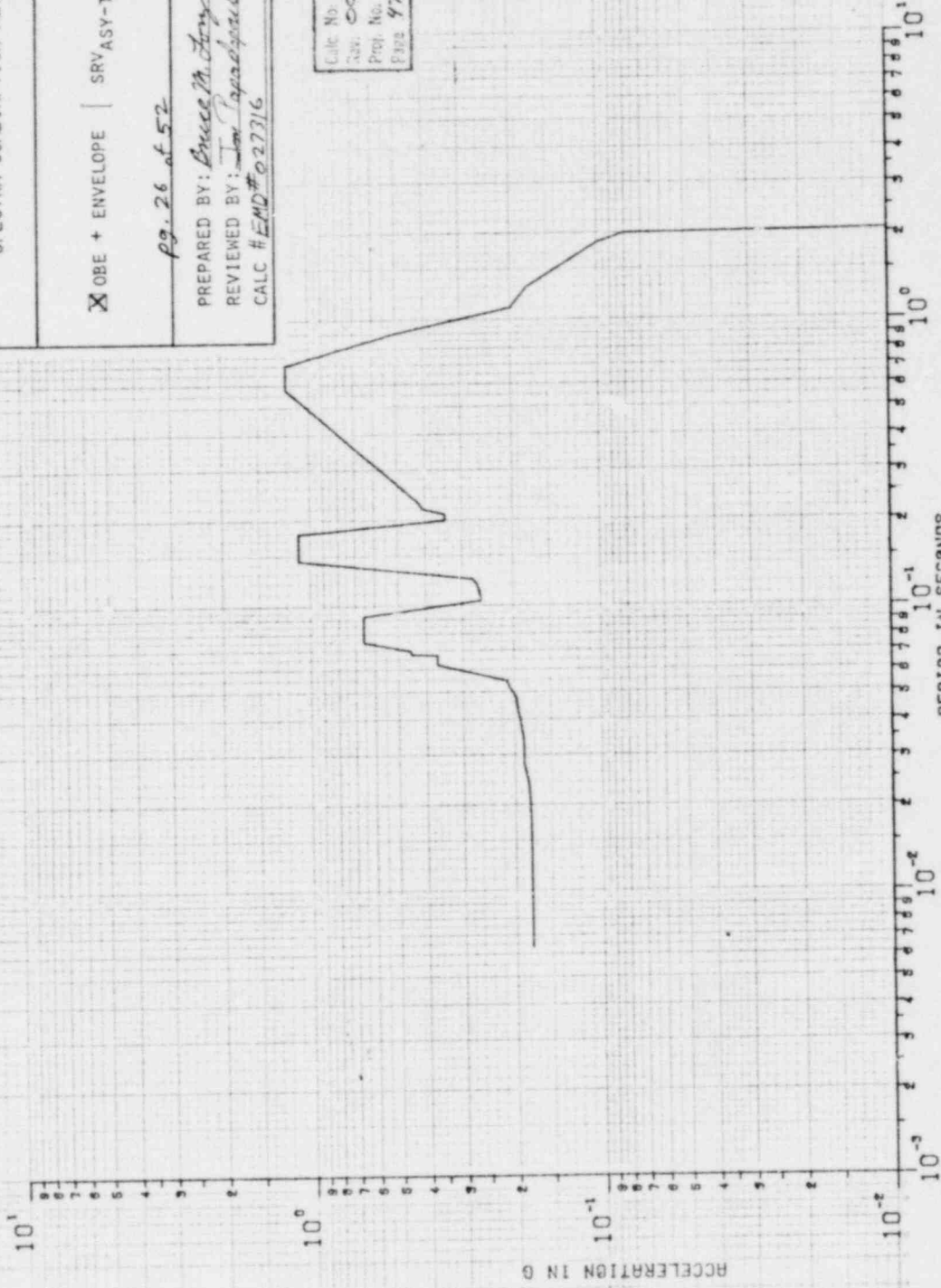
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 26 of 52

PREPARED BY: Bruce M. Gray DATE: 12/16/80
REVIEWED BY: Tom Papadopoulos DATE: 12-8-80
CALC # EMD#027316 DATE: 12/27/80

Calc. No. EMD - 027316
Rev. 00 Date: 12/23/80
Proj. No. 430-15
Page 47 of 75



EW SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 546'-0" REV 00

RUN ID: 906 BAIL 12/06/80

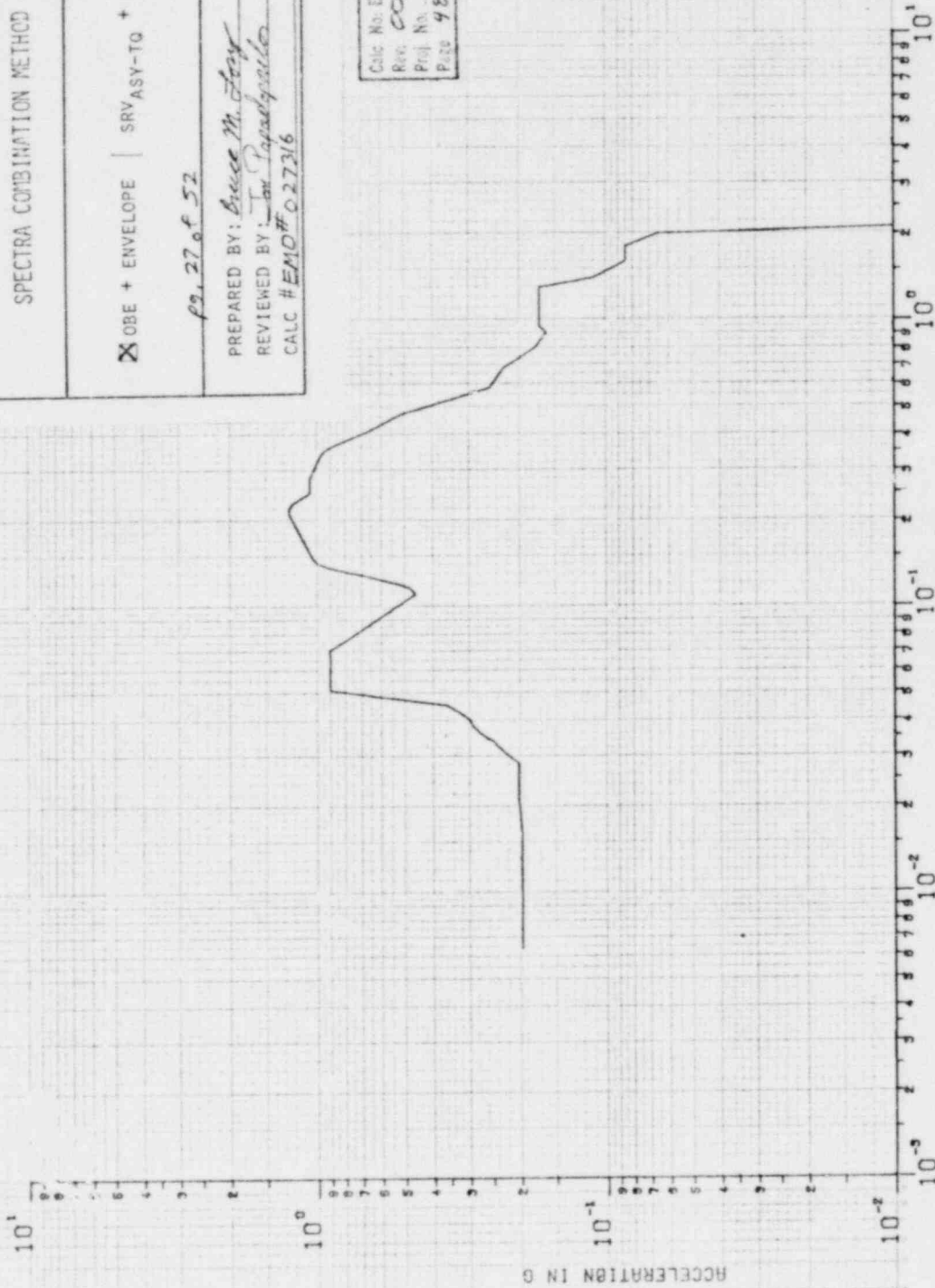
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV ASY-TQ + SRV ALL-TQ

12.27 of 52

PREPARED BY: Bruce M. Stoy DATE: 12/6/80
REVIEWED BY: Tom Papadopoulos DATE: 12-6-80
CALC # EMD# 027316 DATE: 12/23/80

Calc No: EMD - 027316
Rev: 00 - Date: 12/23/80
Proj No: 9730-15
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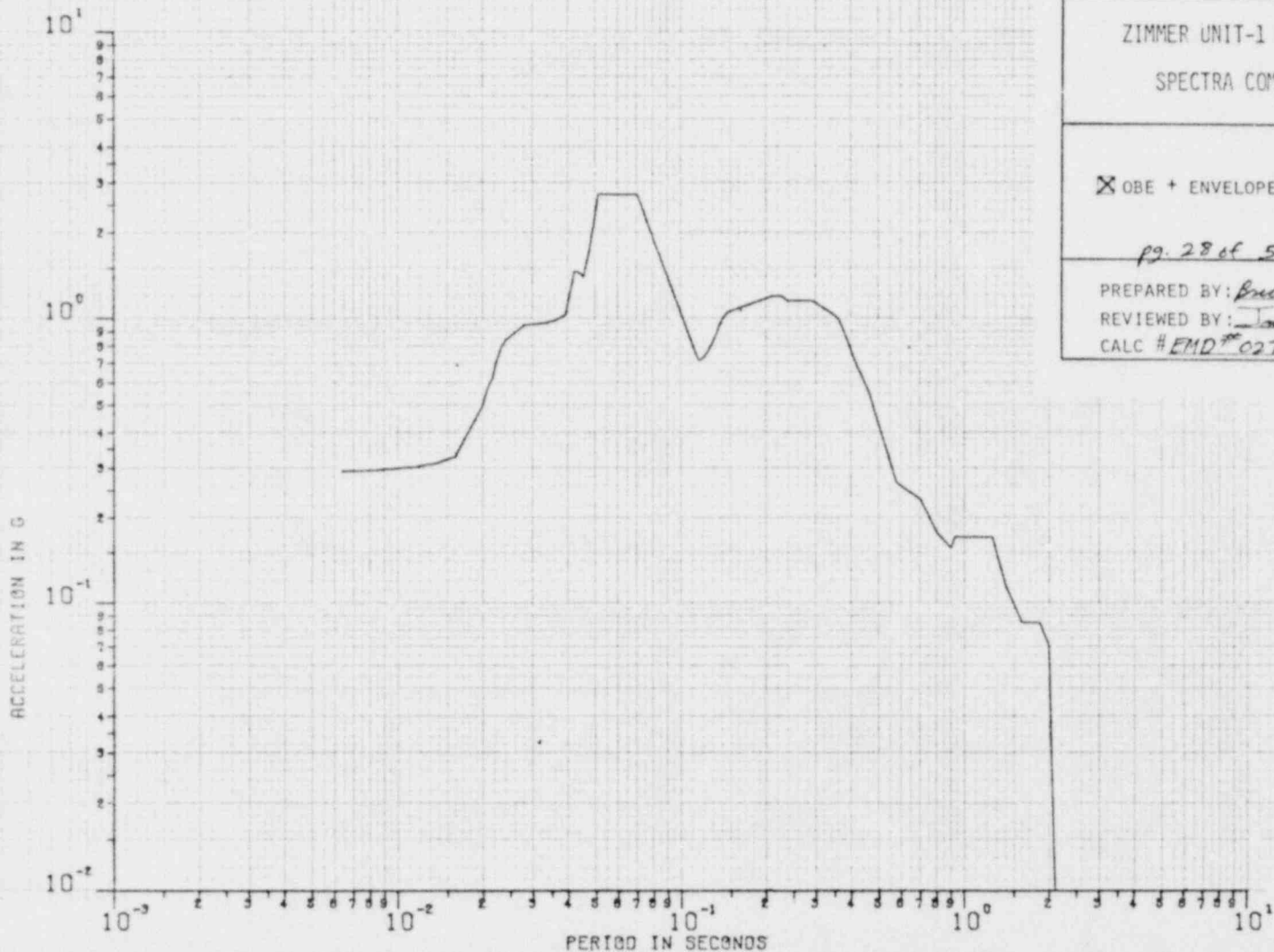


PERIOD IN SECONDS

VW SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG DF-1% 546*-0** REV 00

SCALED RESPONSE

Run ID: 906 BAIL 12/06/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 28 of 52

PREPARED BY: Bruce M. Long DATE: 12/6/80
 REVIEWED BY: Tom Papadopoulos DATE: 12-6-80
 CALC # EMD# 027316 DATE: 12/23/80

Calc. No: EMD - 027316
 Rev: 10 Date: 12/23/80
 A. No: 4130-15
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VS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 546'-0'' REV 00

VE NEUFELDESSER CO. PRINTED IN U.S.A. FEDERAL BUREAU OF INVESTIGATION

Run 10: 906 BML 12/06/80

906BML END OF PLOT

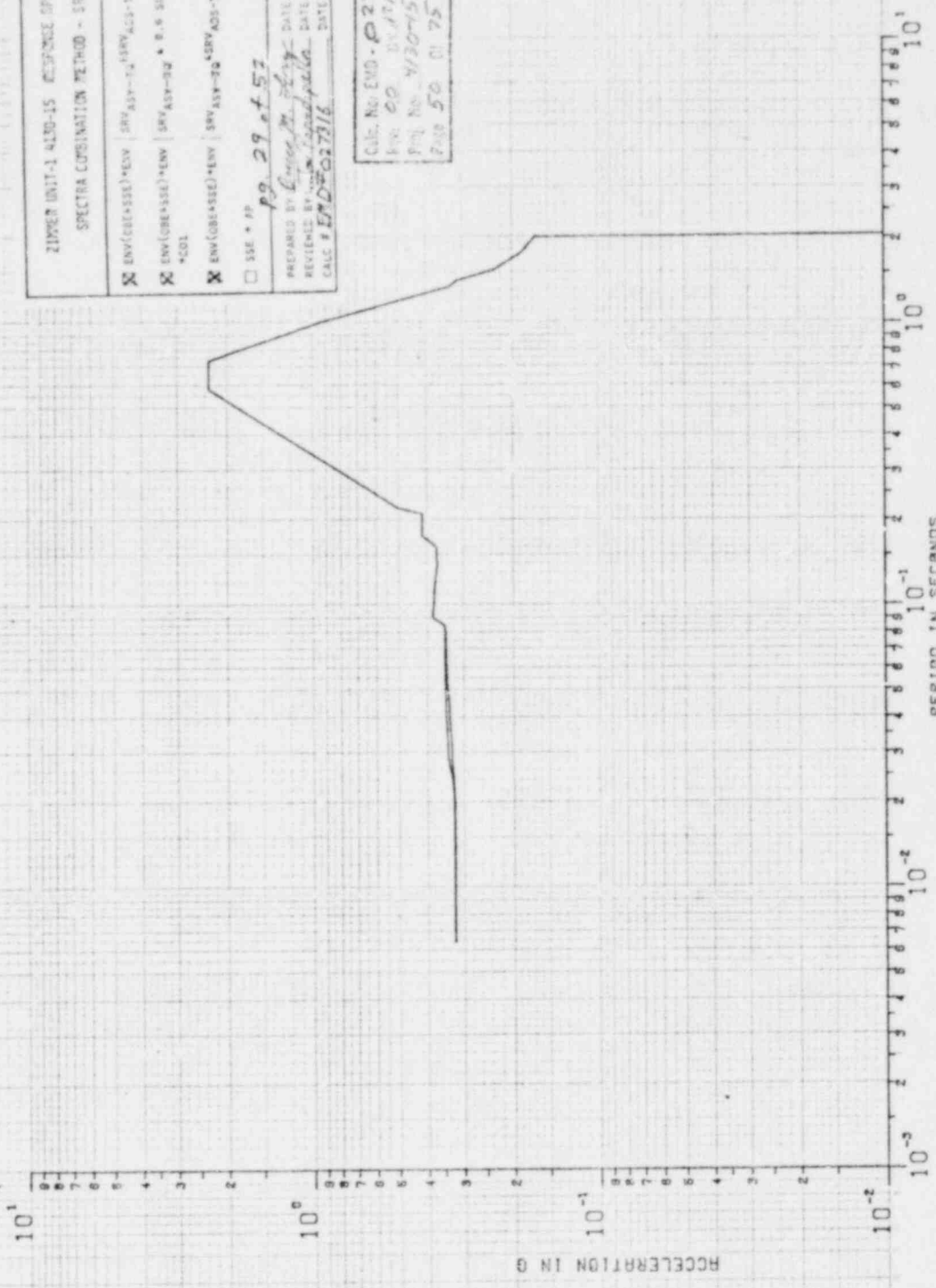
ZIMMER UNIT-1 ALSO-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SGS

ENV(OBSASSE)+ENV | SRV ASS-T₀ ASRV ASS-T₀ *C04
 ENV(OBSASSE)+ENV | SRV ASS-T₀ * B.6 SRV ASS-T₀ *C01
 ENV(OBSASSE)+ENV | SRV ASS-T₀ ASRV ASS-T₀ *C02
 SSE * PP

19 29 of 53

PREPARED BY: *George M. Kelly* DATE: 11/5/80
 REVIEWED BY: *W. J. ...* DATE: 11-2-80
 CALC # *EMD-027216* DATE: 11/23/80

Calc. No. EMD-027216
 Rev. 00 BY 11/2/80
 Proj. No. 4130-15
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HQ-NS SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 546*-0** REV. 00

RVM ID: 771 BML 12/05/80

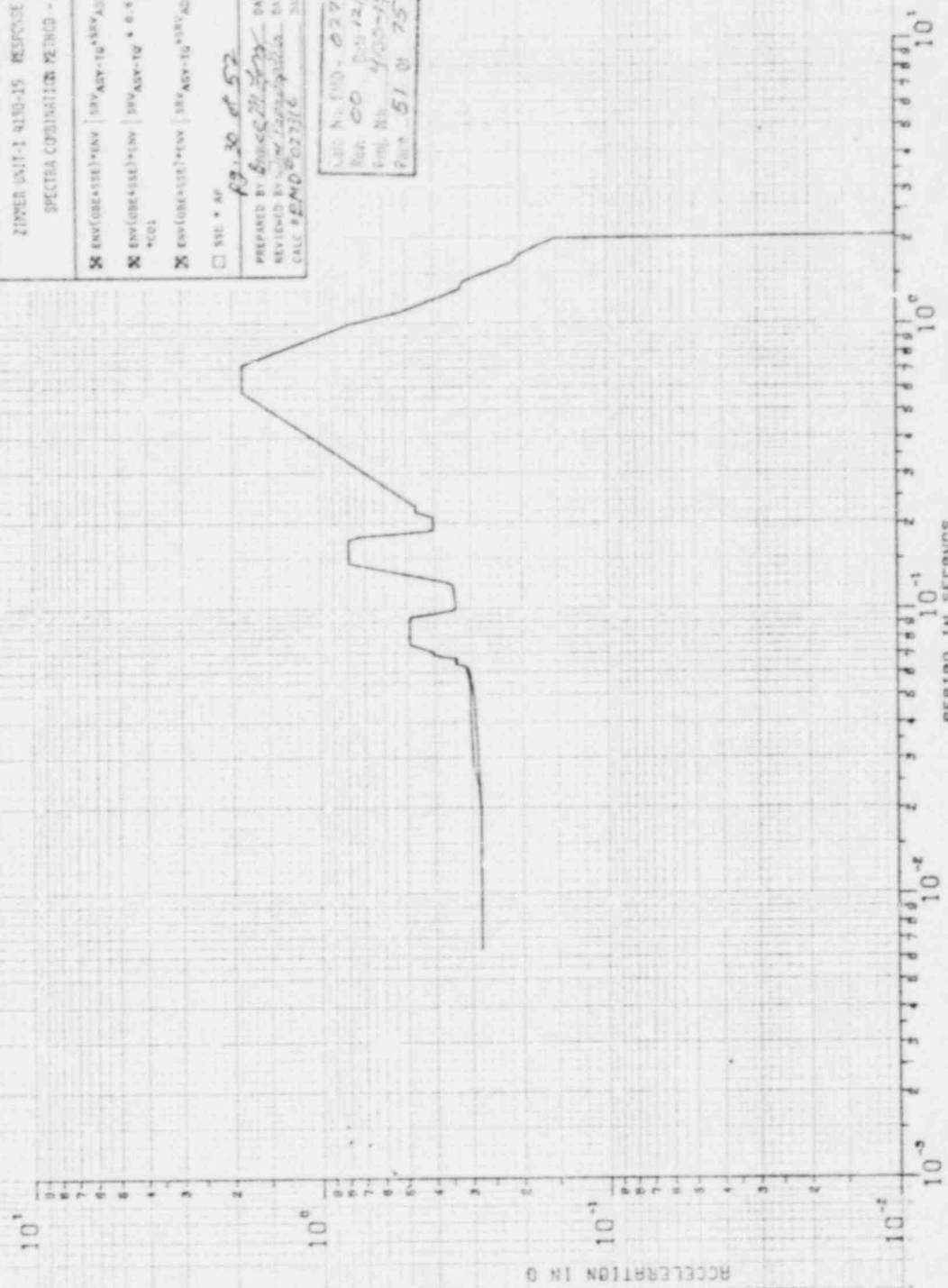
ZIMMER UNIT-1 4150-15 RESPONSE SPECTRA
 SPECTRA COMPUTATION METHOD - SRSS

ENV(OBSERVED)+ENV | ENV ADV-TQ *ENV ADV-TQ *OMB
 ENV(OBSERVED)+ENV | ENV ADV-TQ * 6.5 ENV ADV-TQ *COI
 ENV(OBSERVED)+ENV | ENV ADV-TQ *ENV ADV-TQ *COI
 SVT * AP

17.30 0.52

PREPARED BY: *James R. [unclear]* DATE: 12/5/80
 REVIEWED BY: *[unclear]* DATE: 12/5/80
 CALC: *REND 027316* DATE: 12/5/80

LAB No. 100 - 027316
 Ser. 00 Date: 12/5/80
 File No. 4150-15
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HO-EW SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 546*-0** REV. 00

RUN ID: 771042 12/05/80

NOT RECALCULATED

ZIMMER UNIT-1 AL20-15 RESPONSE SPECTRA
 SPECTRA CONSISTATION PETH⁰⁰ - SRSS

ENV(CRE+SEI)+ENV | SRV ASY-TG ASS⁰¹ | JS-TG | *C09
 ENV(CRE+SEI)+ENV | SRV ASY-TG * 0.6 SRV ASY-TG
 *C01
 ENV(CRE+SEI)+ENV | SRV ASY-TG ASS⁰¹ | *C02
 SSE + AP

pg. 31 of 52

PREPARED BY *David H. [unclear]* DATE 12/5/80
 REVIEWED BY *[unclear]* DATE 12-5-80
 CALC # ENCLOSURE 02716 DATE 12/2/80

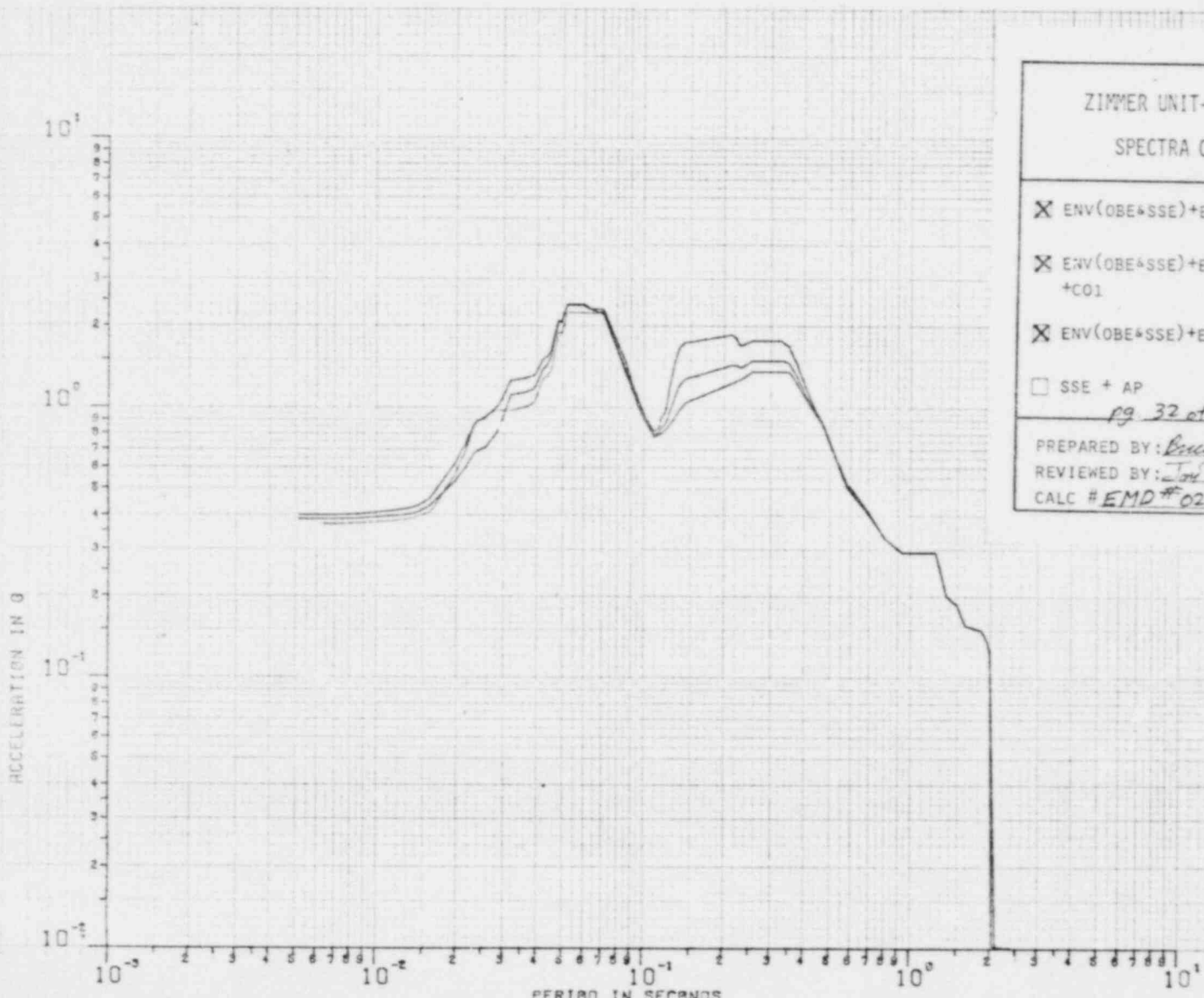
Calc No. EMD-027316
 Proj. No. 4130-15
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VW-VW SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2Z 546'-0" REV. 00

RUN 10:771 AM 12/05/80

INC. NEUTRELLERSSCO



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] +CHG
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TC}] +C01
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} & SRV_{ADS-TQ}] +C02
- SSE + AP

pg. 32 of 52

PREPARED BY: Bruce M. Jory DATE: 12/5/80
 REVIEWED BY: Tom Papadopoulos DATE: 12-5-80
 CALC # EMD # 027316 DATE: 12/23/80

Calc. No: EMD - 027316
 Rev: 00 Date: 12/23/80
 Prob. No: 4130-15
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VS-VS SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. DF-2% 546'-0'' REV. 00

RUN 10: 771 BML 12/05/80

771BML END OF PLOT

TIME: 0.13

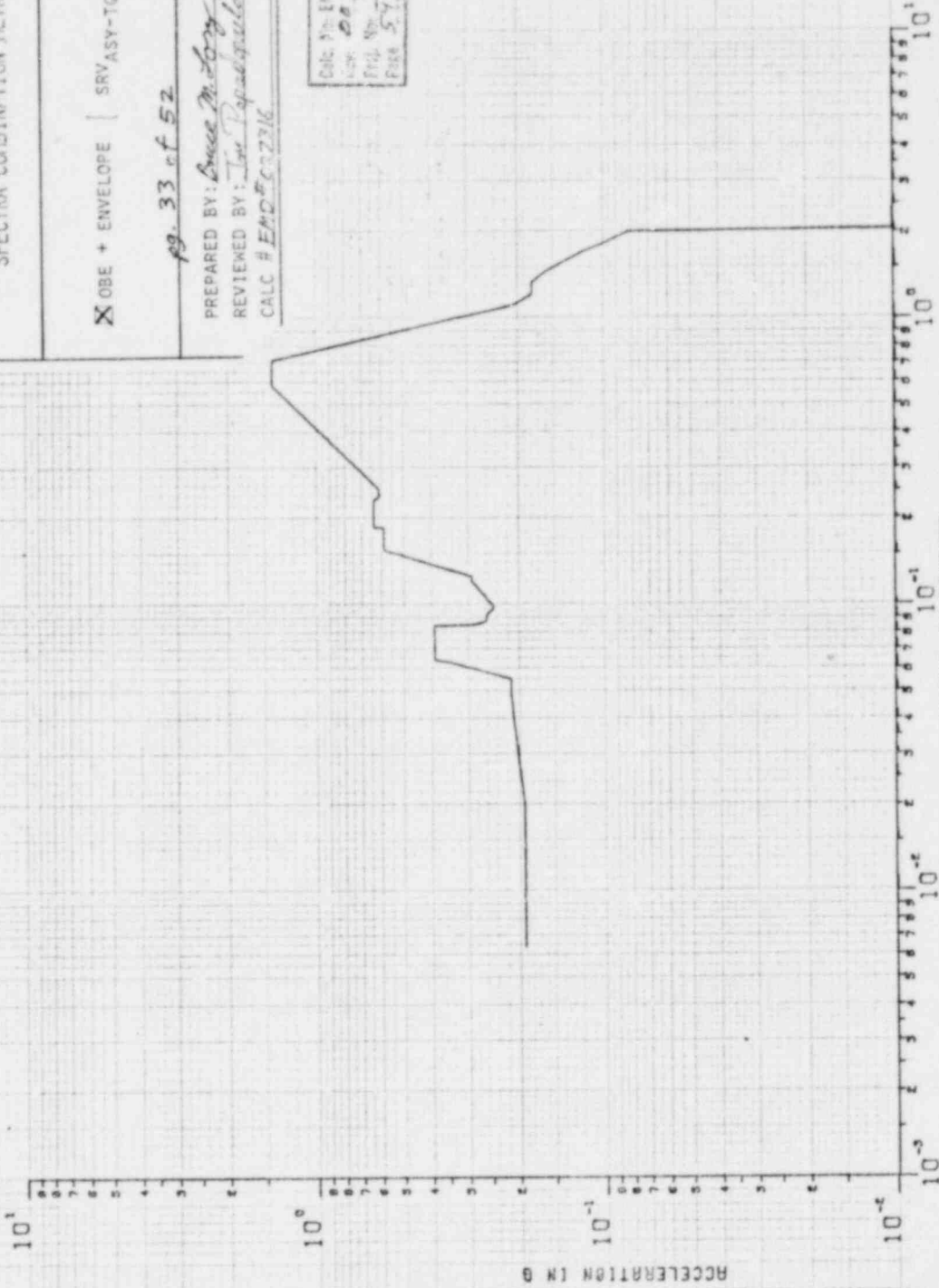
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 33 of 52

PREPARED BY: Bruce M. Long DATE: 12/16/80
REVIEWED BY: Joe Papadopoulos DATE: 12-16-80
CALC # EMD-027316 DATE: 12/16/80

Calc. No. EMD-027316
Rev. No. 00 Date: 12/16/80
Proj. No. 2130-15
Pile No. 57 of 75



NS SRSS(OBE+ENV.(SRV_{ASY3-TQ}+SRV_{ALL-TQ})) ZIM REAR. BLDG. DF-1% 570'-6" REV 00

NS NEUTFEEL+ESSER CO. 80M2746 EML 12/16/80

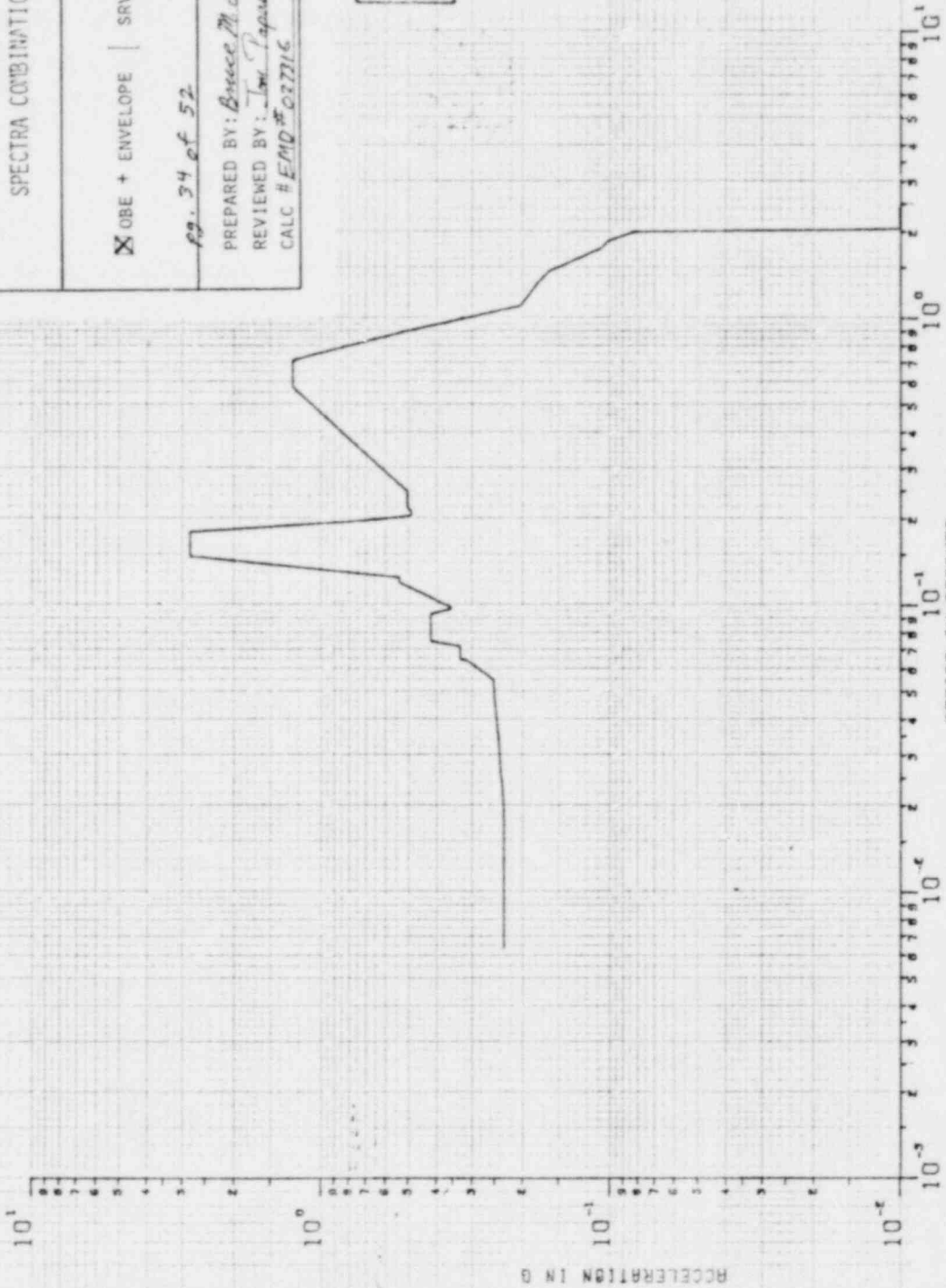
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV-ASY-TQ + SRV-ALL-TQ

pg. 34 of 52

PREPARED BY: Bruce M. Long DATE: 12/16/80
REVIEWED BY: Tom Papadimitriou DATE: 12-16-80
CALC # EMD # 027716 DATE: 12/17/80

Calc. No: EMD-027316
Rev. No: 011/12/1980
Rev. No: 4/15/85
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PERIOD IN SECONDS

EW SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAR. BLDG. DF-17 570*-6** REV 00

K&E NEUTRELL & ESSER CO.

RUN ID: 746 PML 12/16/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV ASY-TQ + SRV ALL-TQ

pg. 35 of 52

PREPARED BY: Bruce M. Fry DATE: 12/14/80
 REVIEWED BY: Tom J. [unclear] DATE: 12-16-80
 CALC # FMD # 027316 DATE: 12/23/80

Calc. No. EMO-027316
 Rev. No. CIV 12/23/80
 Proj. No. 4130-15
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VH SRSS(OBE+ENV).(SRV-ASY3-TQ+SRV-ALL-TQ) ZIM REAC. BLOG. OF-17 570*-6** REV 00

KE KEUTZEL & SONS

RUN 10: 700 BML 12/16/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

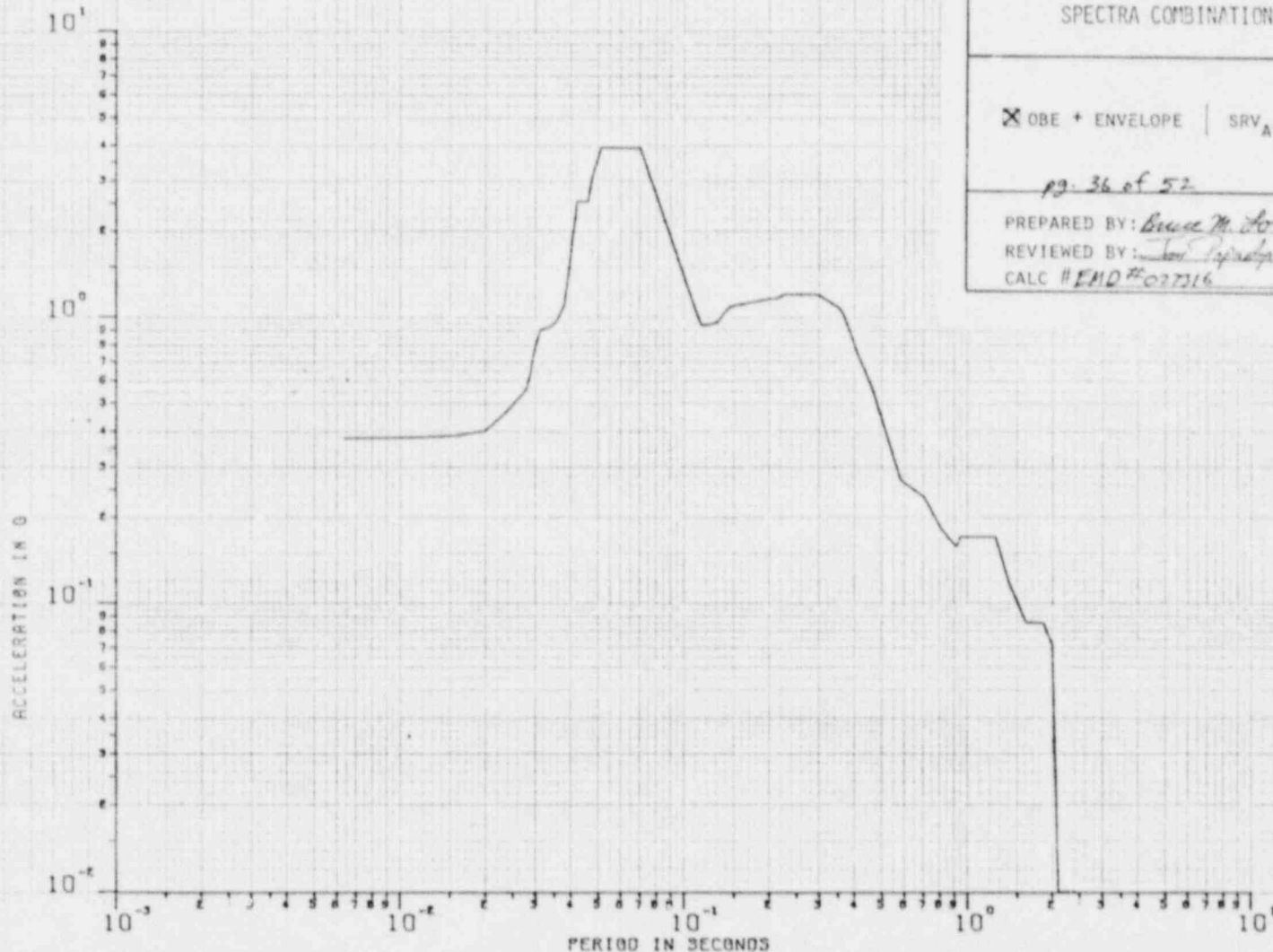
pg. 36 of 52

PREPARED BY: Bruce M. Jory DATE: 12/16/80

REVIEWED BY: Joe Papadopoulos DATE: 12-16-80

CALC # EMD#077316 DATE: 12/23/80

Calc. No. EMD - 077316
 Rev. 00 Date 12/23/80
 Proj. No. 4130-15
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VS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLOG. DF-1% 570'-6'' REV 00

KS KREITELDESSER CO. 11110 N. 45th St. Scottsdale, AZ 85254

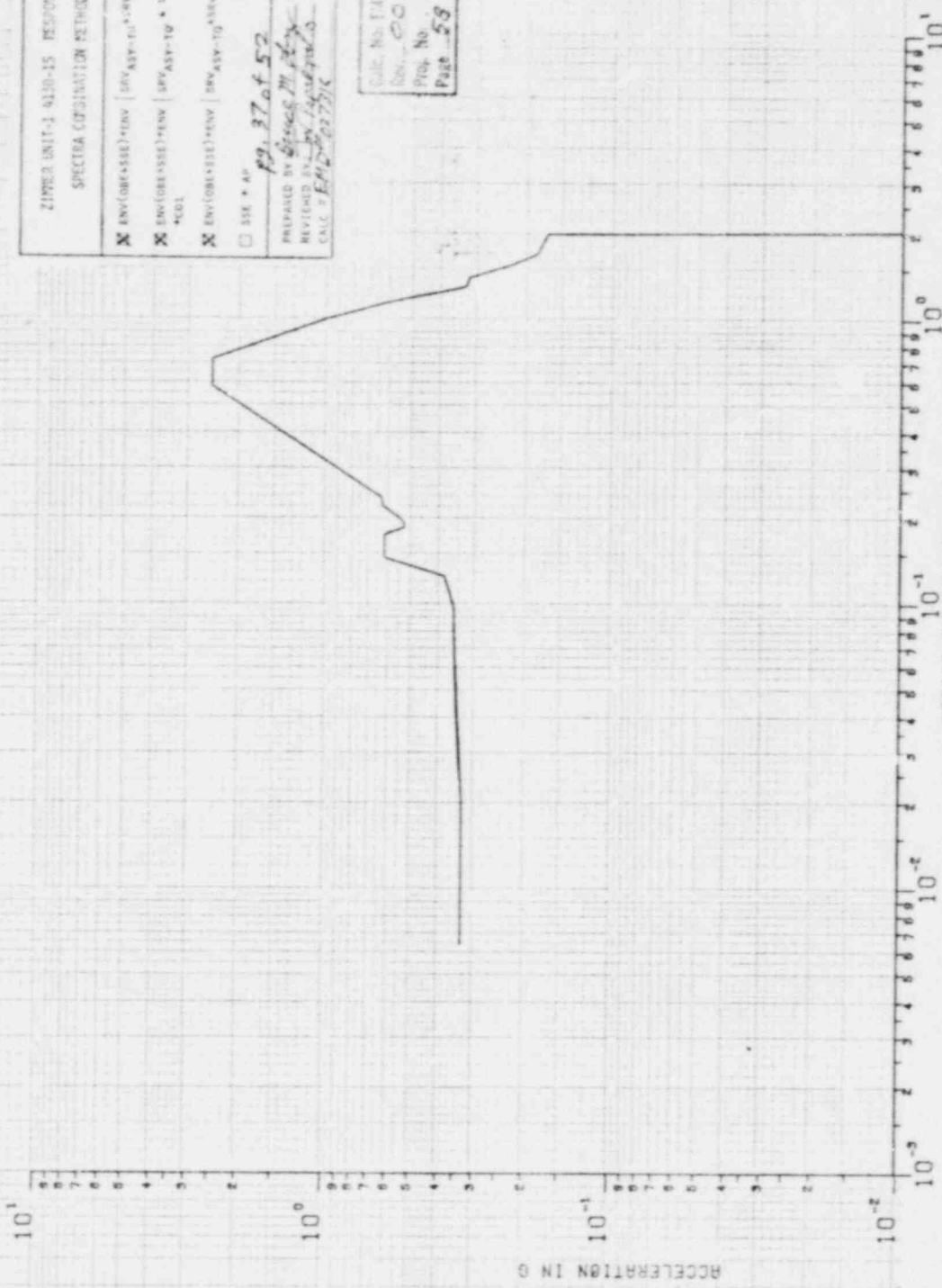
RUN ID: 746 BML 12/16/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA OPTIMIZATION METHOD - SRSS

ENV(OBSASSE)+ENV | DEV ASY-TQ | *ASY-1Q | *ASY-1Q | *ASY-1Q | *ASY-1Q
 ENV(OBSASSE)+ENV | DEV ASY-TQ | *ASY-1Q | *ASY-1Q | *ASY-1Q | *ASY-1Q
 ENV(OBSASSE)+ENV | DEV ASY-TQ | *ASY-1Q | *ASY-1Q | *ASY-1Q | *ASY-1Q
 SIK * AF

PREPARED BY *James M. Kelly* DATE: 12/15/56
 REVIEWED BY *W. J. ...* DATE: 12/15/56
 CALC. BY *W. J. ...*

Calc. No. 1110 - 0-47116
 Rev. 00 5/11/57
 Proj. No. 4130-15
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H0-NS DF-2% SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. ELEV. 570'-6" REV. 00

REV 10:543 P.M.C 12/15/56

NEUFELDERCO

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

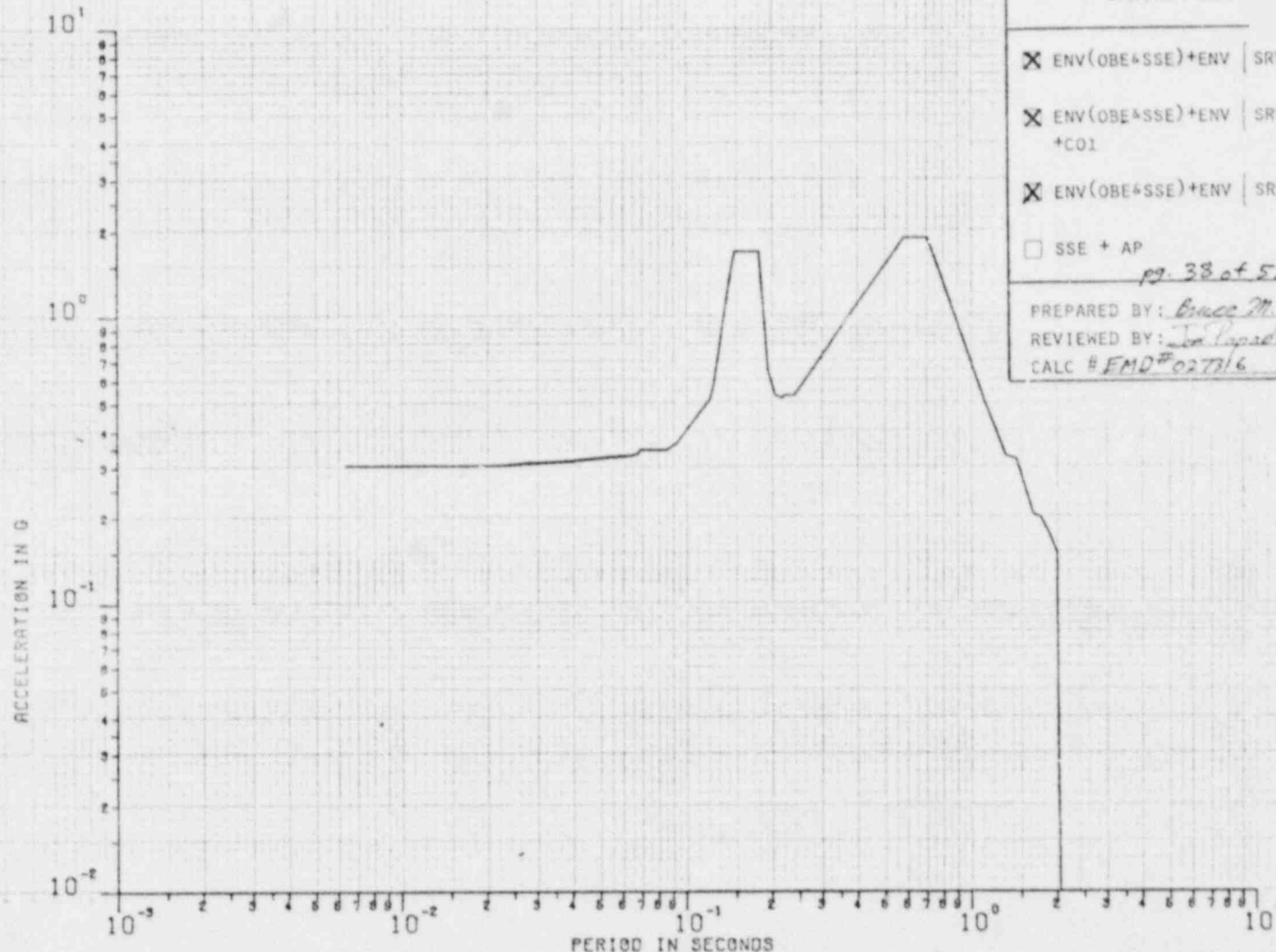
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} + SRV_{ADS-TQ}] +CHG
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} + SRV_{ADS-TQ}] +CO1
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} + SRV_{ADS-TQ}] +CO2
- SSE + AP

pg. 38 of 52

PREPARED BY: *Bruce M. Long* DATE: 12/9/80
 REVIEWED BY: *John Papadopoulos* DATE: 12-9-80
 CALC # EMD# 02716 DATE: 12/22/80

Calc. No. EMD-027318
 Rev. 00 Date 12/23/80
 Proj. No. 4130-15
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H0-EW DF-2% SRSS(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 570'-6" REV. 00

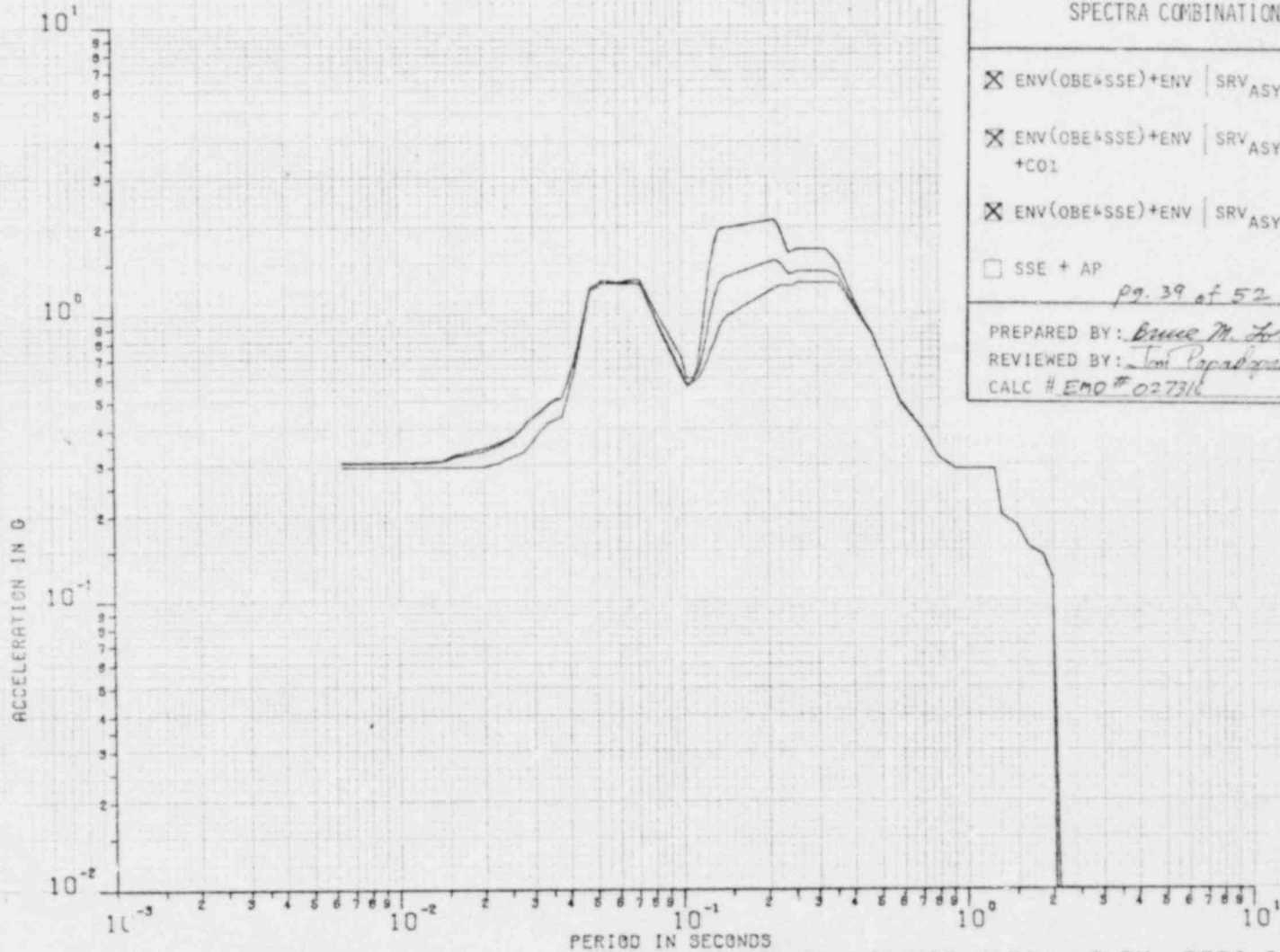
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}*SRV_{ADS-TQ} | +CHG
- ENV(OBE+SSE)+ENV | SRV_{ASY-TQ} * 0.6 SRV_{ADS-TQ} | +C01
- ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}*SRV_{ADS-TQ} | +C02
- SSE + AP

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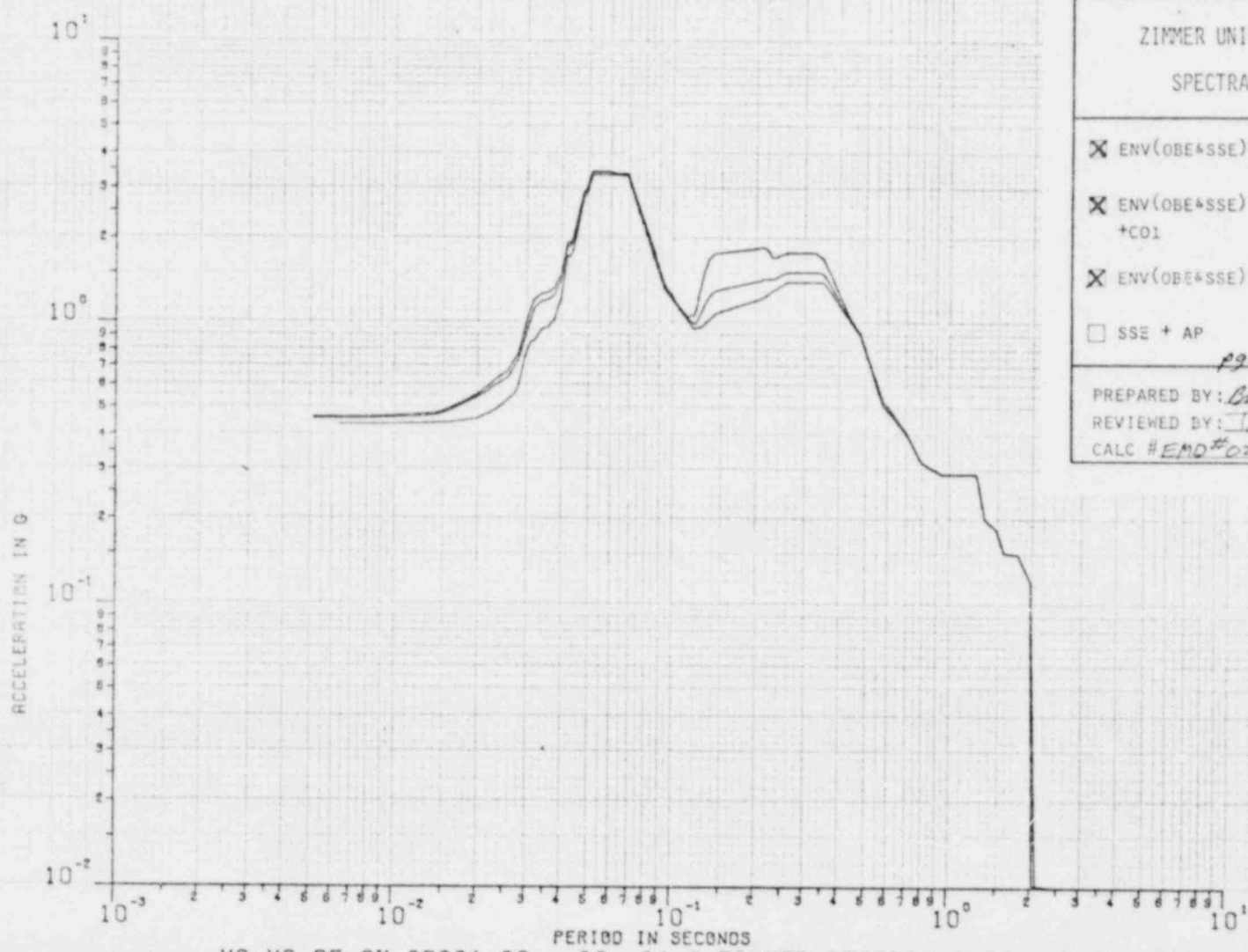
PREPARED BY: Bruce M. Long DATE: 12/5/80
 REVIEWED BY: Tom Papadopoulos DATE: 12-5-80
 CALC # EMD # 027316 DATE: 12/23/80

Calc. No: EMD-027316
 Rev: 00 Date: 12/23/80
 Proj. No: 4130-15
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VW-VW DF-2% SRSS(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 570'-6" REV. 00

543BML END OF PLOT



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}+SRV_{ADS-TQ}] +CHG
 ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ}] +CO1
 ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}+SRV_{ADS-TQ}] +CO2
 SSE + AP

pg. 40 of 52

PREPARED BY: Bruce M. Long DATE: 12/5/80
 REVIEWED BY: Tom Papadopoulos DATE: 12-5-80
 CALC # EMD#027316 DATE: 12/5/80

Calc. No: EMD - 027316
 Rev: 00 Date: 12/5/80
 Proj. No: 4130-15
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VS-VS DF-2% SRSS(C2 + C3 +C4) ZIMMER REACTOR BLDG. ELEV. 570'-6" REV. 00

NEUFFEL & ESSER CO.

PRINTED IN U.S.A.

NEUFFEL & ESSER CO.

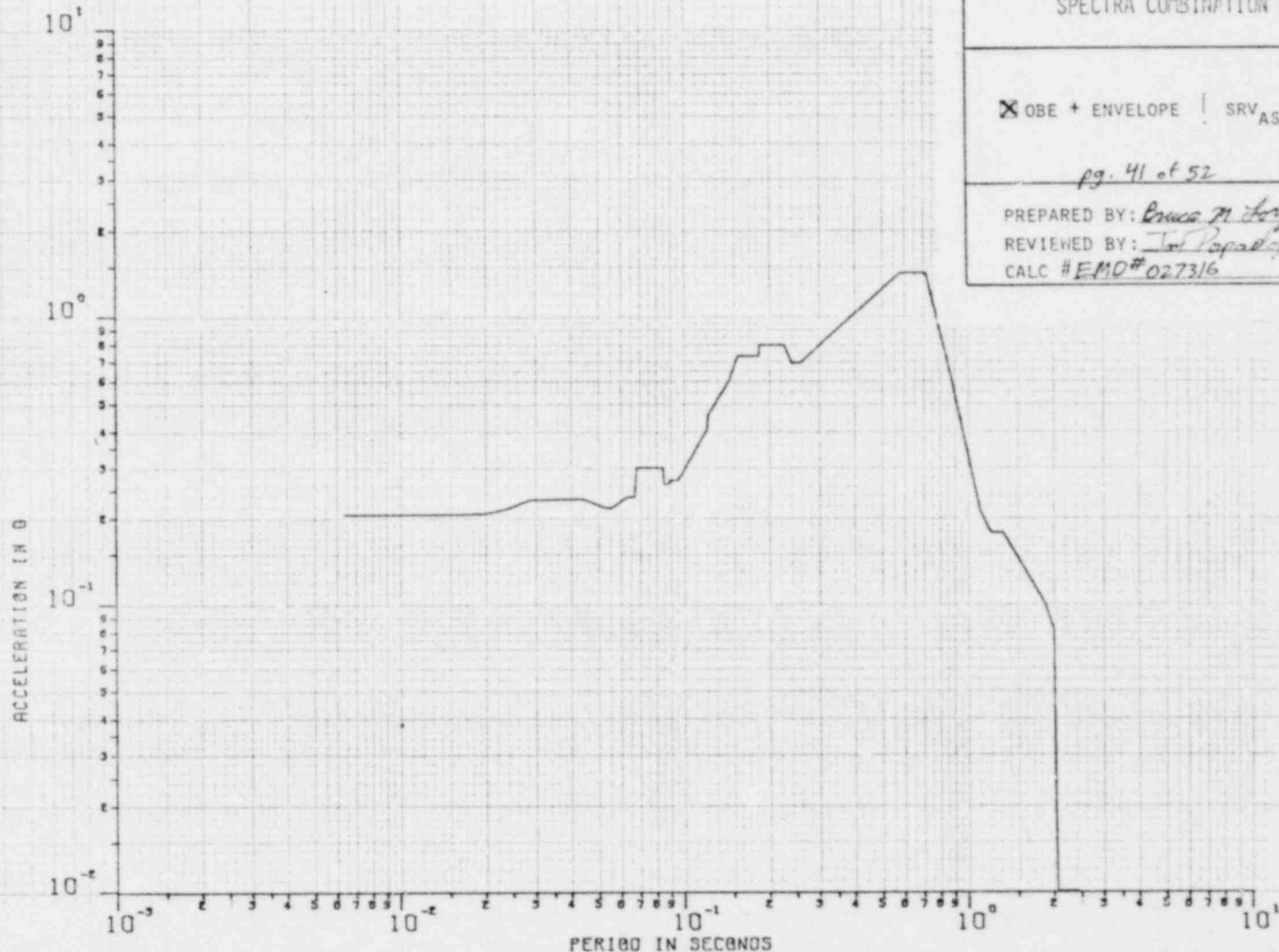
RUN ID: 543 BML12/05/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

pg. 41 of 52

PREPARED BY: Bruce M. Long DATE: 12/16/80
REVIEWED BY: Tom Papadopoulos DATE: 12-16-80
CALC # EMO#027316 DATE: 12/23/80



Calc. No: EMO-027316
Rev: 00 Date: 12/23/80
Proj. No: 4130-15
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NS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 593'-6" REV 00

K-E KEUFFEL & ESSER CO. PRINTED IN U.S.A.

RUN ID: 746 BML 12/16/80

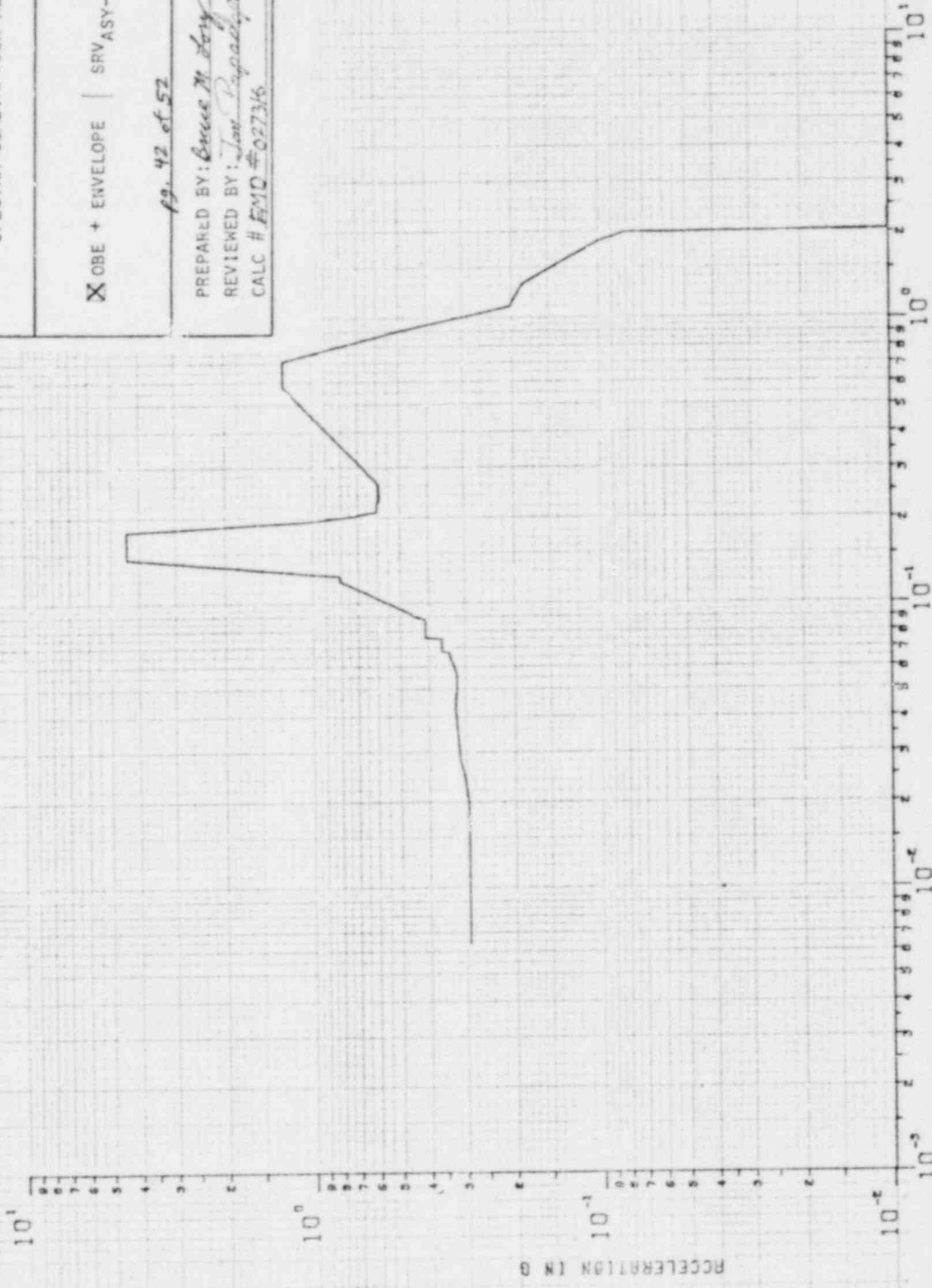
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA CONSTRUCTION METHOD - SRSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 42 of 52

PREPARED BY: Bruce M. Fry DATE: 12/16/50
REVIEWED BY: Joe Papadimitriou DATE: 12-16-50
CALC # FMD # 027316 DATE: 12/23/50

Calc. No. 100 - 027316
Rev. 00 Date 12/31/50
Proj. No. 4130-15
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EW SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-17 593*-6** REV 00

W.E. MEITZEL & SONS CO. (INCORPORATED IN U.S.A.)

RUN ID: 746 RMC 12/16/50

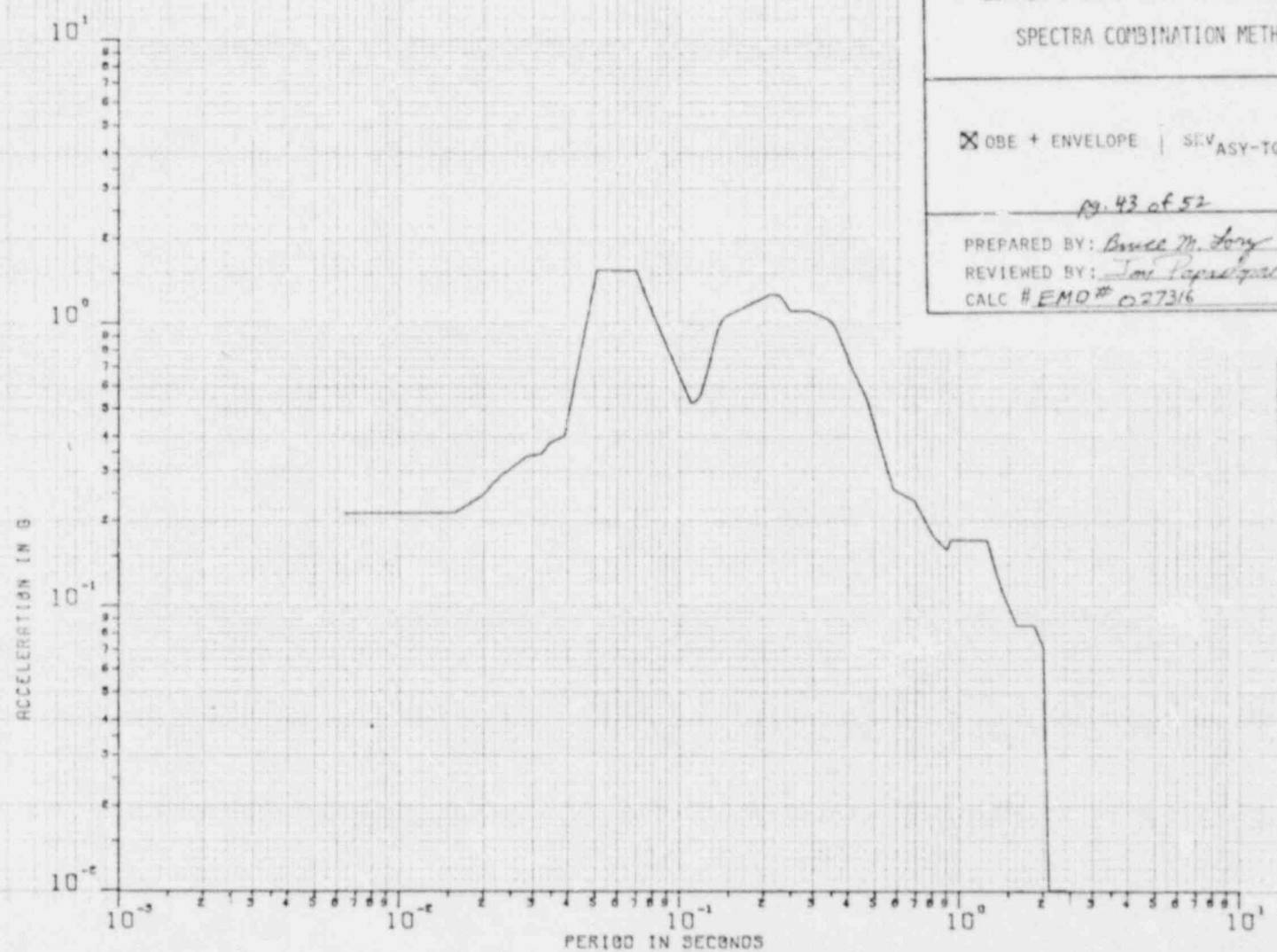
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 43 of 52

PREPARED BY: Bruce M. Lory DATE: 12/16/80
REVIEWED BY: Tom Papadopoulos DATE: 12/16/80
CALC # EMD# 027316 DATE: 12/23/80

Calc. No: EMD-027316
Rev: 00 Date: 12/23/80
Proj. No: 4130-15
Page 64 of 75



VW SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 593'-6" REV 00

H-E KEUFFEL & ESSER CO. PRINTED IN U.S.A.

Run ID: 746 BML 12/16/80

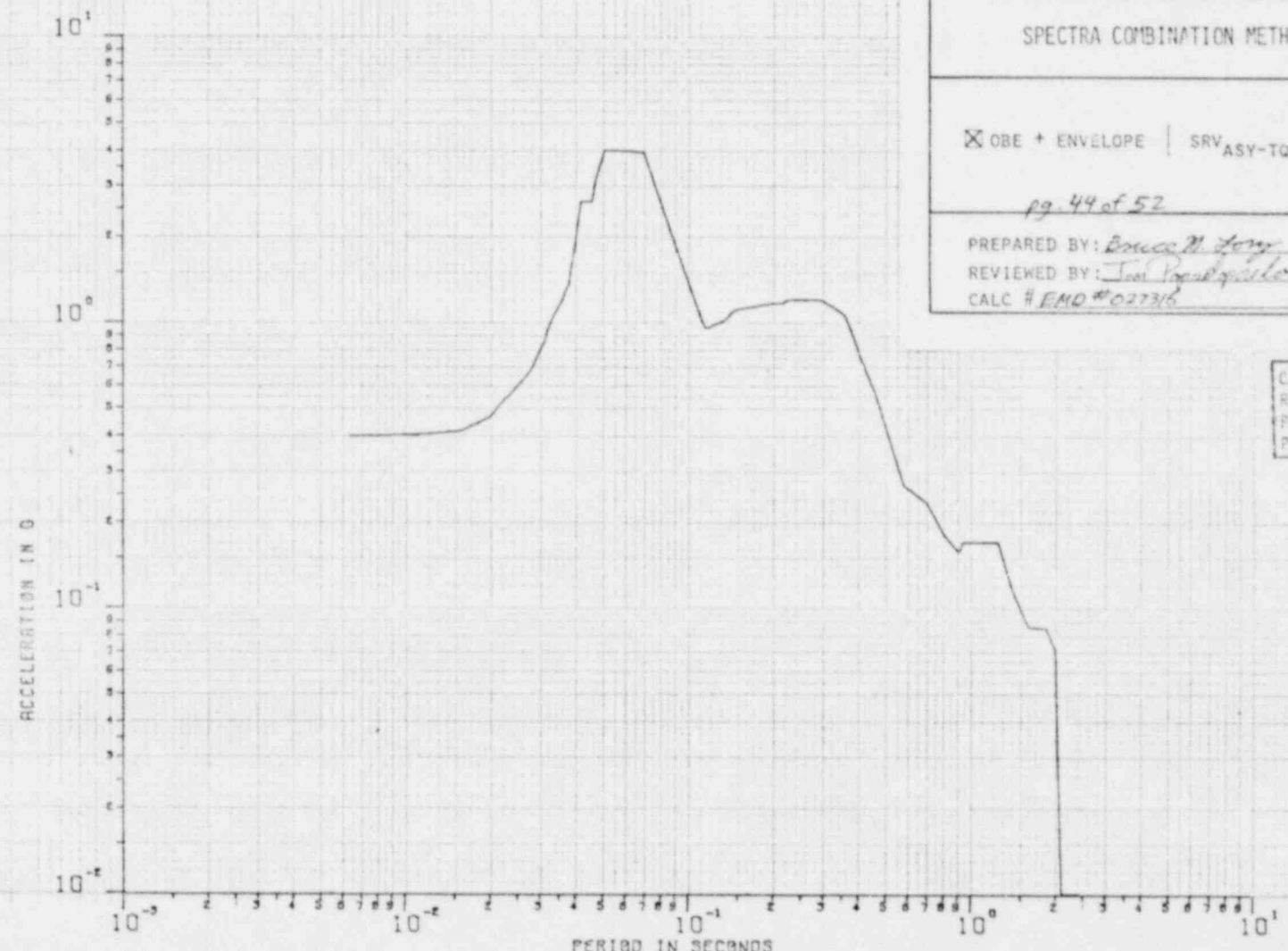
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 44 of 52

PREPARED BY: Emilio M. Jory DATE: 12/16/80
REVIEWED BY: Joel P. ... DATE: 12-16-80
CALC # EMD #027316 DATE: 11/13/80

Calc. No. EMD-027316
Rev: 00 Date: 11/13/80
Proj. No. 4130-15
Page 65 of 75



VS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 593'-6" REV 00

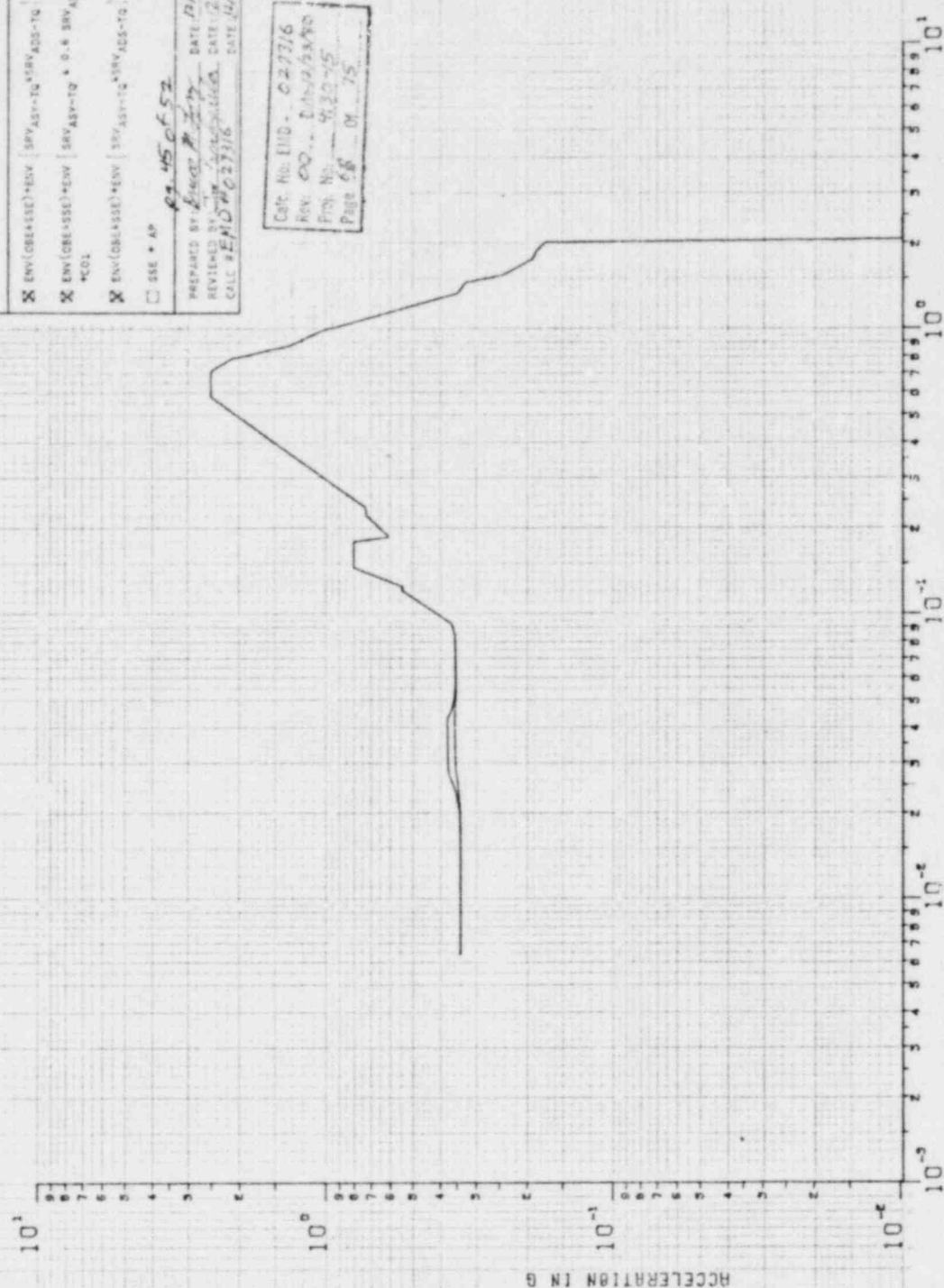
REV ID: 746 BAL 12/16/80

ZIMMER UNIT-1 4330-15 RESPONSE SPECTRA
 SPECTRA COMINATION METHOD - SRSS

ENV(OBS+ISE)+NEW | SRV(ASY-TQ)+SRV(ASQ-TQ) *MCHG
 ENV(OBS+SSS)+NEW | SRV(ASY-TQ) * 0.4 SRV(ASQ-TQ) *COI
 ENV(OBS+ISE)+NEW | SRV(ASY-TQ)+SRV(ASQ-TQ) *CCO2
 SRS * AP

PREPARED BY George P. Fry DATE 12/15/80
 REVIEWED BY W. J. [unclear] DATE 12/15/80
 CALC # EH07027316 DATE 11/21/80

Calc. No. EHD - 027776
 Rev. No. 00 - 07/22/80
 Proj. No. 4820-15
 Page 68 OF 75



H0-NS DF-2% SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. EL. 593'-6" REV. 00

NOE KEUFFEL & ESSERCO

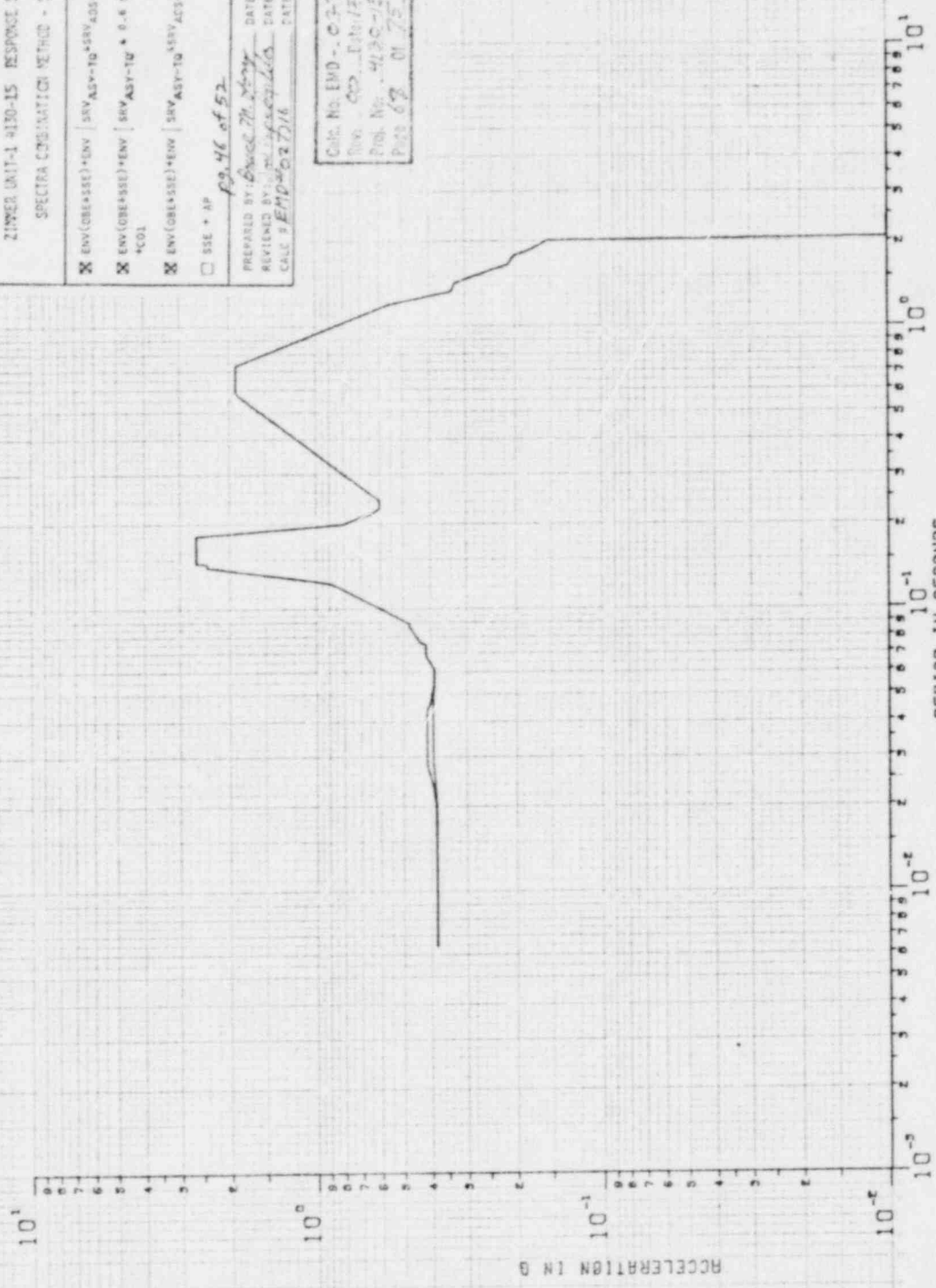
RUN 10:283 BML 12/15/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMINATION METHOD - SRS

ENV(OBSERVE)+ENV | SVV ASY-TQ+SVV ASS-TQ | *CHG
 ENV(OBSERVE)+ENV | SVV ASY-TQ | 0.6 SRV ASS-TQ
 *COL
 ENV(OBSERVE)+ENV | SVV ASY-TQ+SVV ASS-TQ | *C02
 SSE + AP

PREPARED BY: *James R. Perry* DATE: 12/15/80
 REVIEWED BY: *W. J. ...* DATE: 12/23/80
 CALL # EMD-627316 DATE: 12/23/80

Chg. No. EMD - 03-7334
 Rev. 000...
 Proj. No. 4130-15
 Pgs 63 of 75



H0-EW DF-2% SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. EL. 593'-6" REV. 00

RUN 10:283 BNL 12/15/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}+SRV_{ADS-TQ} | +CHG
 ENV(OBE+SSE)+ENV | SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ} | +CO1
 ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}+SRV_{ADS-TQ} | +CO2
 SSE + AP

PREPARED BY: *George R. Steyer* DATE: 12/8/80
 REVIEWED BY: *Tom Lapinskas* DATE: 12-8-80
 CALC #EPID#07316 DATE: 12/8/80

Calc. No. ENV - 07316
 Rev. CC - 1
 Proj. No. - 3120-15
 Page 06 of 75



VW-VW DF-2% SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. ELEV. 593'-6" REV. 00

RUN ID: 010 BML 12/08/80

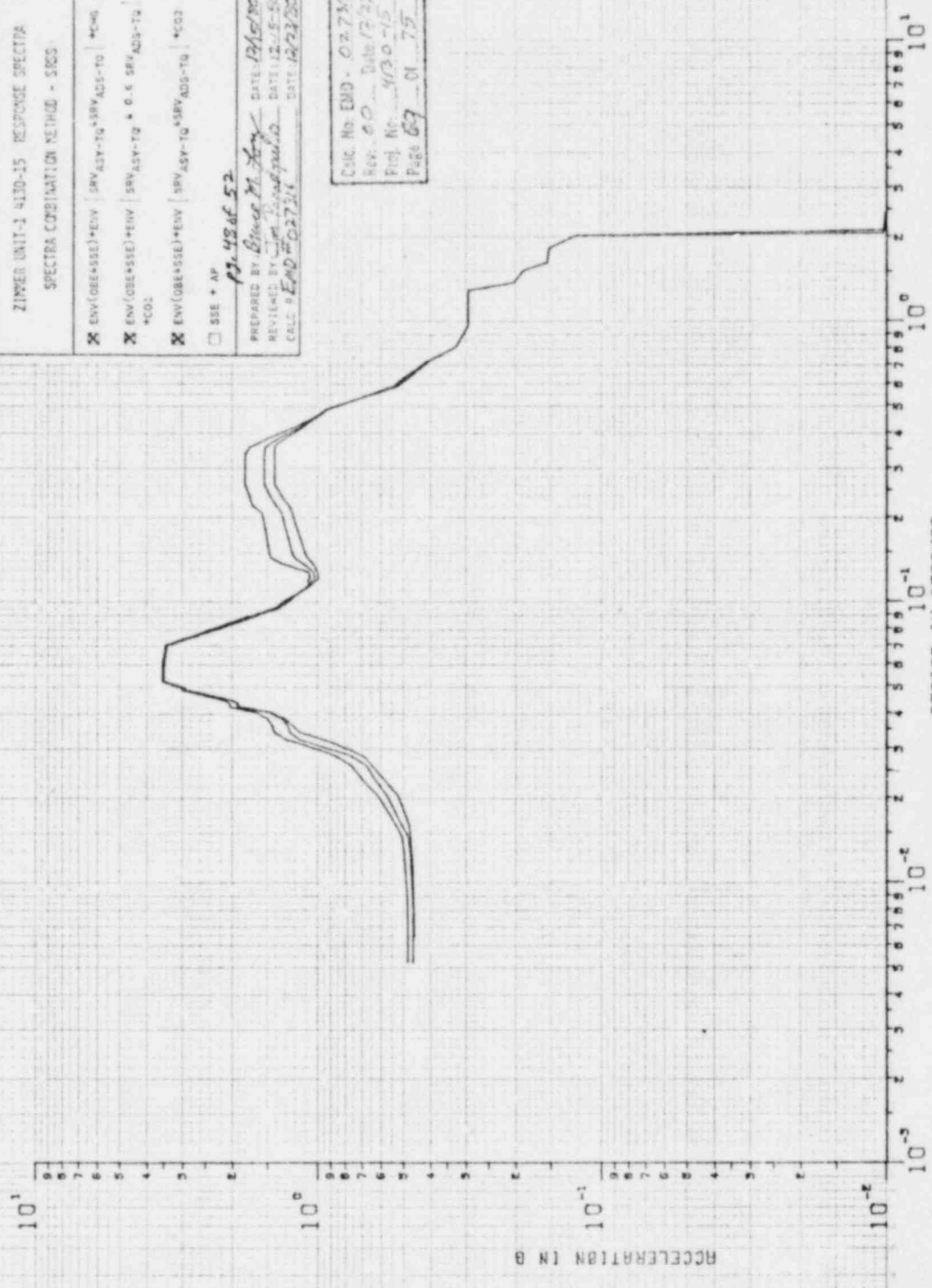
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

ENV(OBE+SSE)+ENV | SRV | ASY-TQ | ASRV | ADS-TQ | *COG
 ENV(OBE+SSE)+ENV | SRV | ASY-TQ | ASRV | ADS-TQ | *COG
 ENV(OBE+SSE)+ENV | SRV | ASY-TQ | ASRV | ADS-TQ | *COG
 SSE + AP

12.48 of 52

PREPARED BY *Steve M. Kelly* DATE 12/15/80
 REVIEWED BY *Jim Lindquist* DATE 12/15/80
 CALC # END 027311 DATE 12/23/80

CALC No. END - 027311
 Rev: 00 Date 12/23/80
 Proj. No. 4130-15
 Page 69 of 75



VS-VS DF-2% SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. EL. 593'-6" REV. 00

KE NEUFELPRESSER CO.
 RUN ID: 283 BML 12/15/80

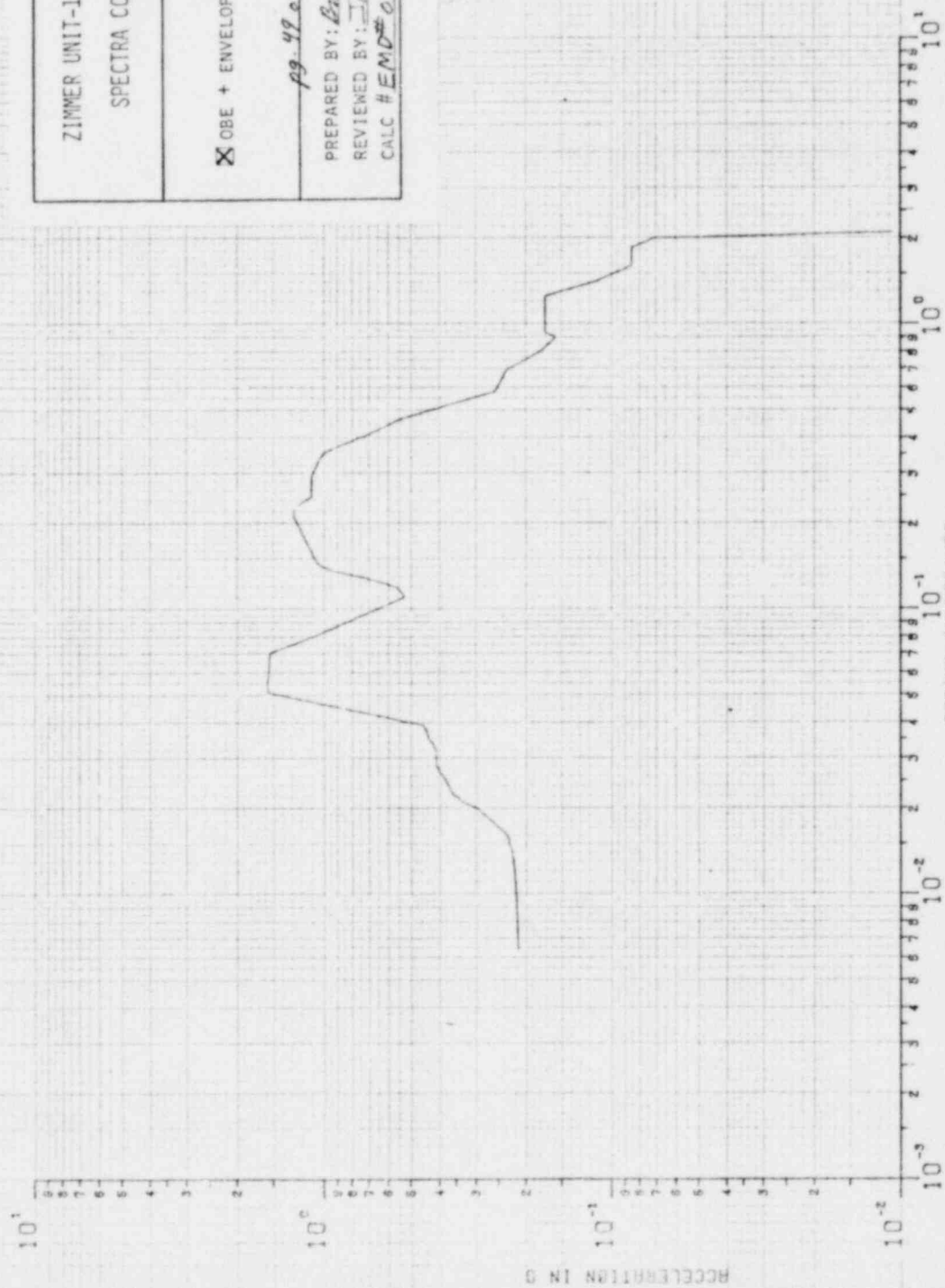
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV ASY-TQ + SRV ALL-TQ

pg. 49 of 52

PREPARED BY: *Brace Mistry* DATE: *12/5/80*
REVIEWED BY: *Jim Papadopoulos* DATE: *12-5-80*
CALC # *EMD# 0273K* DATE: *12/4/80*

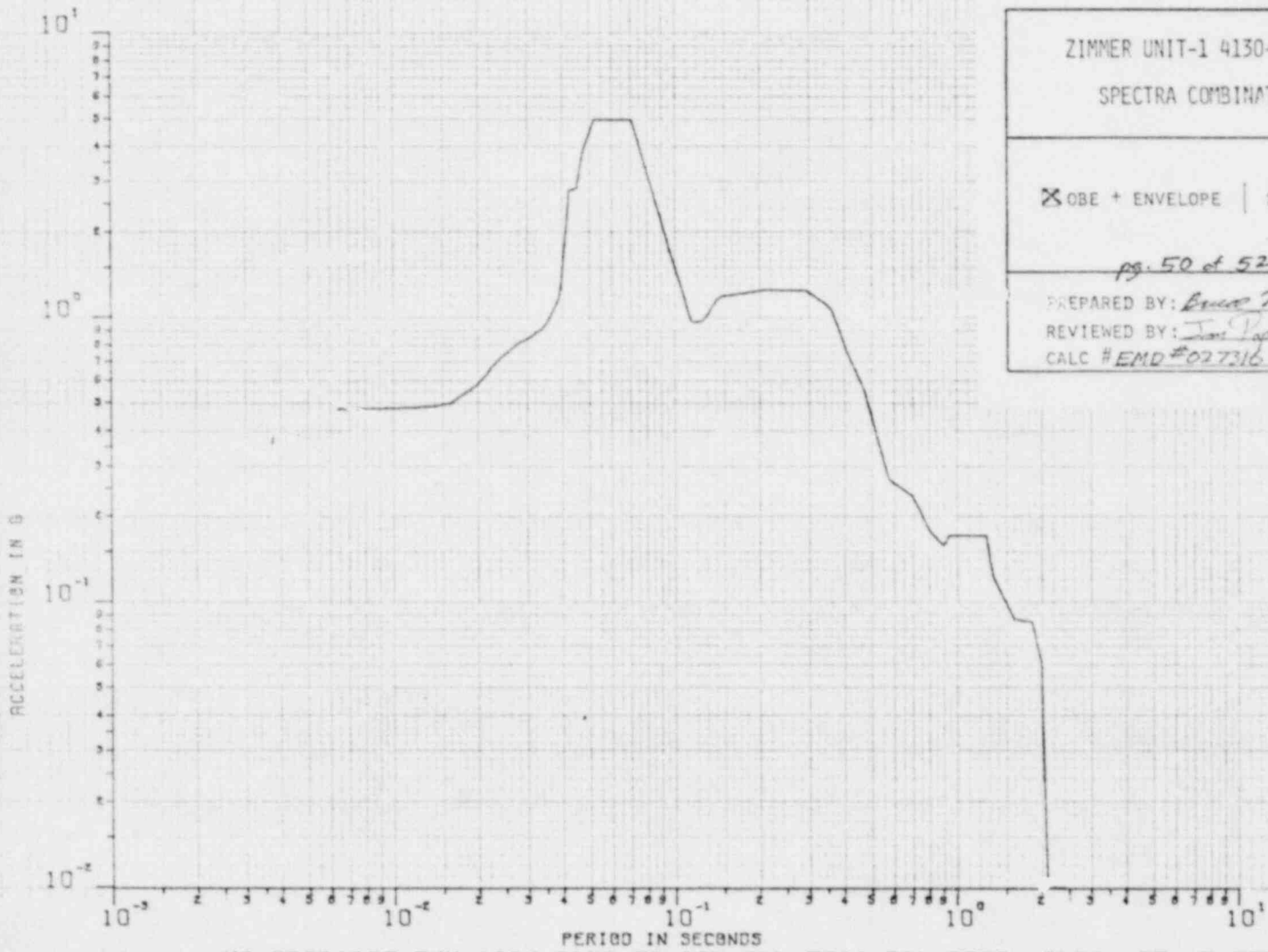
CHK No. EMD - 0273K
Rev. 020 - 01/30/75
Proj. No. 4130-15
Page 70 of 75



VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIMMER REACTOR BLDG. 627'-9"

NSI NEUFELDESSEN CO. PRINTED IN U.S.A. REG. U.S. PAT. & TM. OFF.

REV 10 : 772 BML 12/07/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 50 of 52

PREPARED BY: *Ernie M. Long* DATE: 12/16/50
 REVIEWED BY: *John Vogelgesang* DATE: 12-16-50
 CALC # EMD # 027316 DATE: 12/16/50

Calc. No: EMD - 027316
 Rev: 00 Date: 12/16/50
 Proj. No: 4080-15
 Page 78 of 75

VS SRSS(OBE+ENV.(SRV-ASY3-TQ+SRV-ALL-TQ)) ZIM REAC. BLDG. DF-1% 627'-9'' REV 00

NOT REVERTED TO ORIGINAL SCALE

RUN 10:746 BML 12/16/50

746BML END OF PLOT

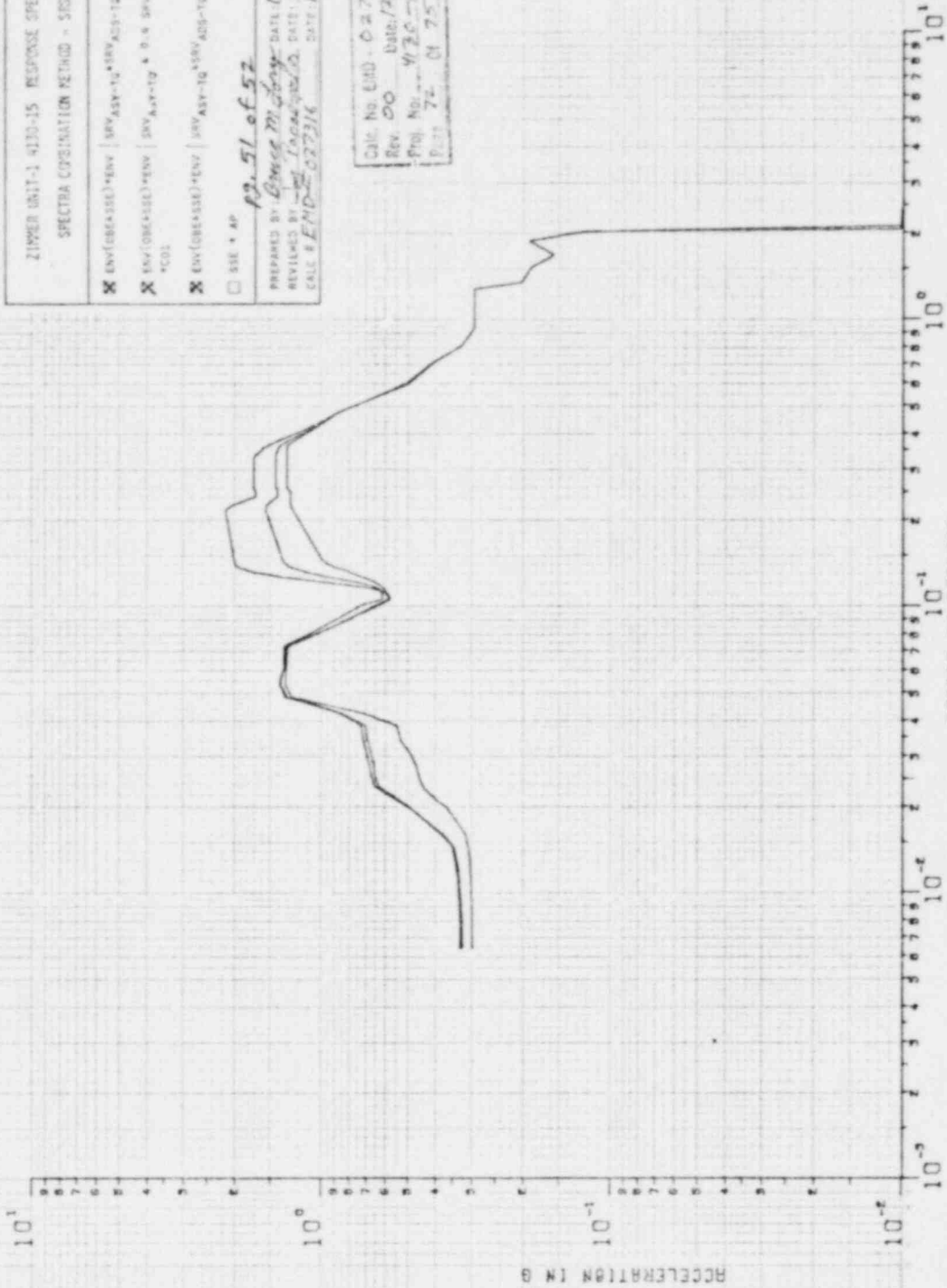
TIME: 0.22

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMPUTATION METHOD - SRSS

UNF(OBS)SE*ENV | SPS_{ASY-10} NSRV ASD-7g | *COO
 ENV(OBS)SE*ENV | SPS_{ASY-10} * 0.4 SPS_{ASD-7g} | *COO
 ENV(OBS)SE*ENV | SPS_{ASY-10} NSRV ASD-7g | *COO
 SSE * AP

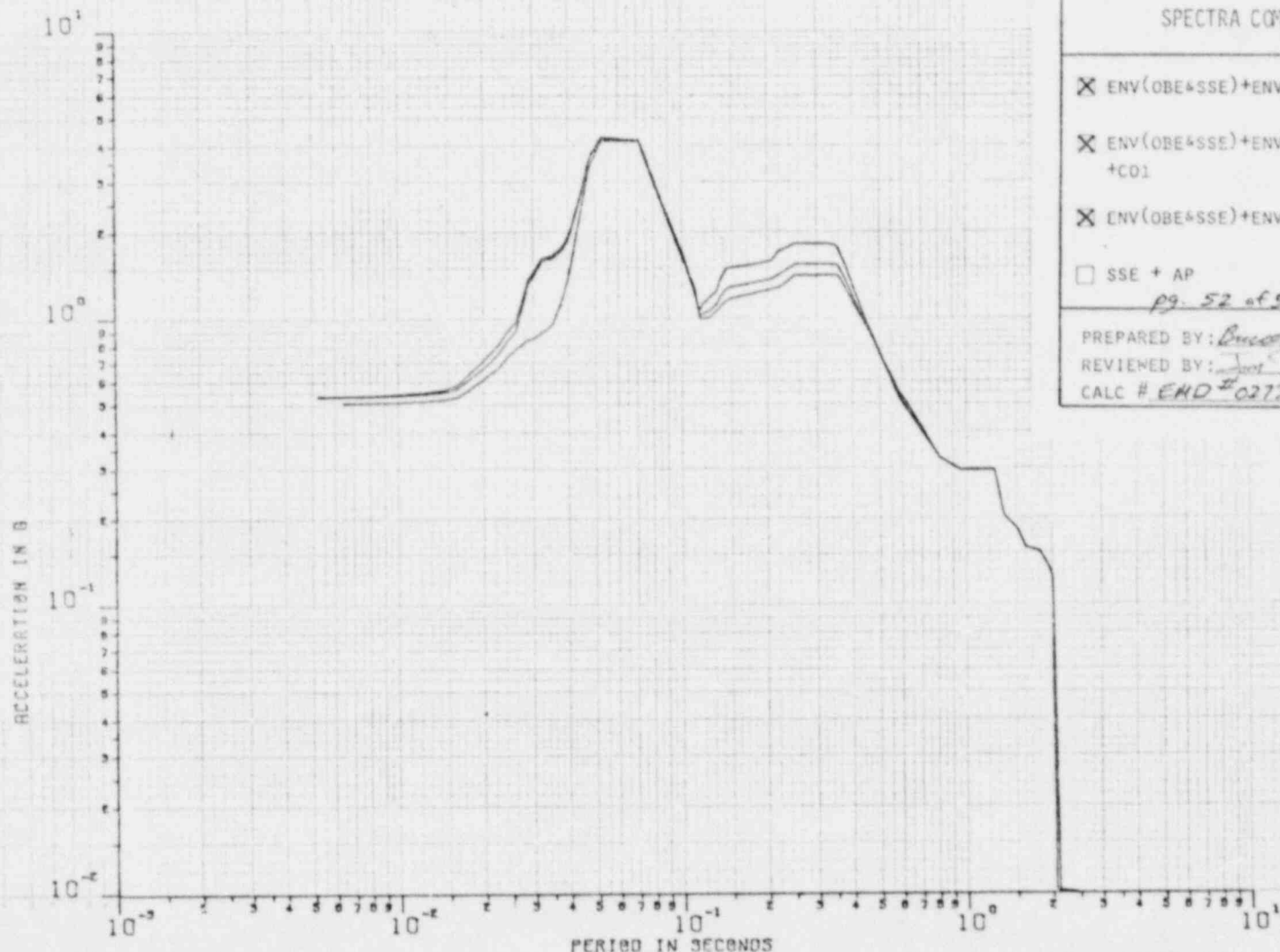
12.51 of 52
 PREPARED BY: Bruce M. Long DATE: 12/15/80
 REVIEWED BY: [Signature] DATE: 12-15-80
 CALL # END-027316 DATE: 12/23/80

Calc No. END-027316
 Rev. 00 Date: 12/23/80
 Proj. No. 4130-15
 P. 27 of 75



VW-VW OF-2% SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. 627*-9** REV. 00

1000 KEUTER RESOURCES
 RUN 10:263 PML 12/15/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} +SRV_{ADS-TQ}] +CHG
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} +.5 SRV_{ADS-TQ}] +C01
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} +SRV_{ADS-TQ}] +C02
- SSE + AP

Pg. 52 of 52

PREPARED BY: *Bruce M. Jory* DATE: *12/15/80*
 REVIEWED BY: *Jim Papadopoulos* DATE: *12-19-80*
 CALC # *END # 02736* DATE: *12/13/80*

Calc. No: *END - 02736*
 Rev: *00* Date: *12/13/80*
 Proj. No: *4130-15*
 Page: *73* of *75*

VS-VS DF-2% SRSS(C2 + C3 + C4) ZIMMER REACTOR BLDG. EL. 627'-9" REV. 00

RUN ID: 283 BML 12/15/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE (SRV ASY-TQ + SRV L-FE)

pg. 1 of 60

PREPARED BY: Bruce M. Day DATE: 12/11/80
 REVIEWED BY: Jim Vassilyuk DATE: 12/11/80
 CALC # EMC # 027834 DATE: 1/28/81



HQ-NS DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 474'-0.00 REV 00

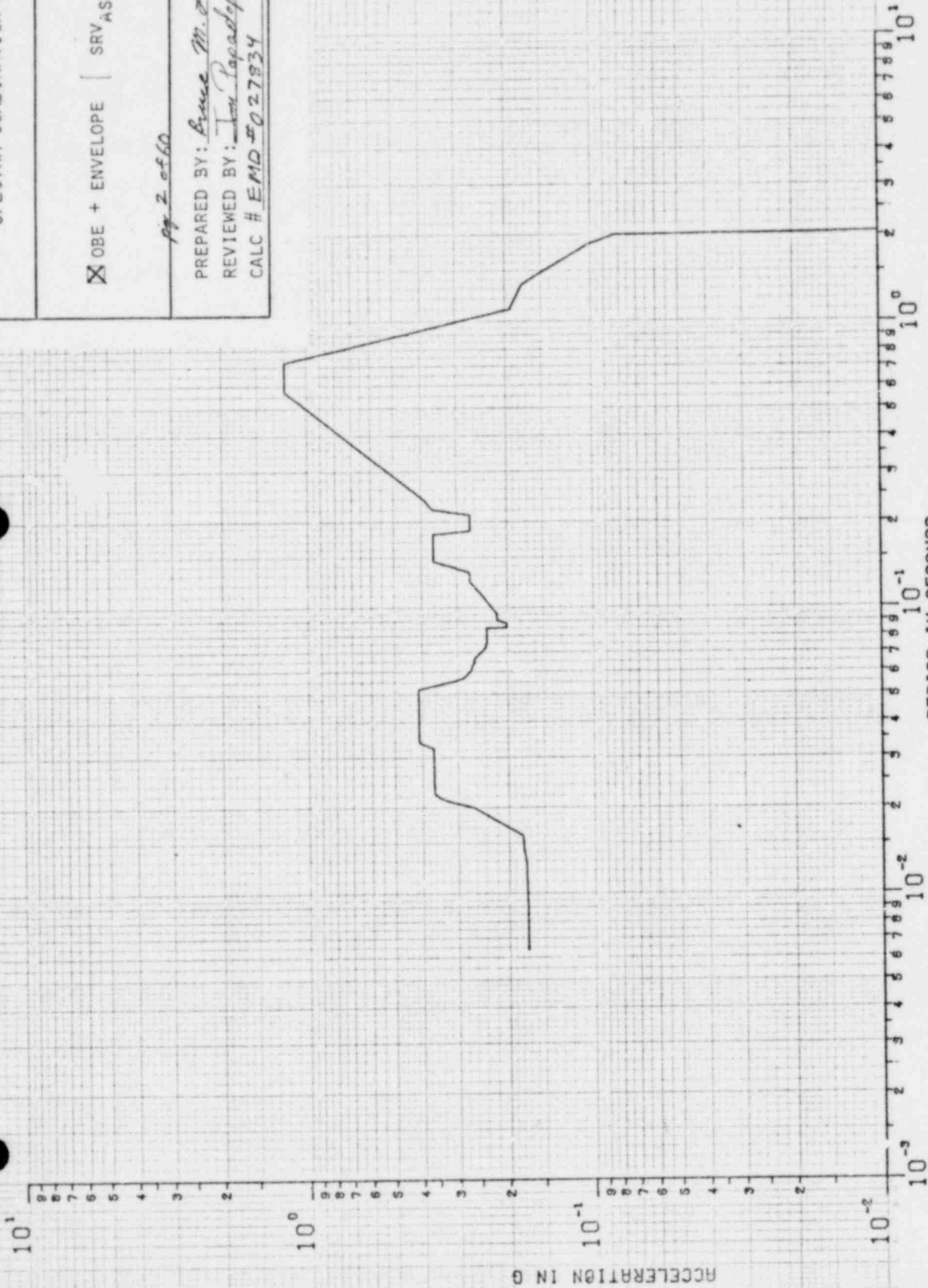
REV 10:793 346 12/11/80

SPECTRA COMBINATION METHOD - SS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg 2 of 60

PREPARED BY: Bruce M. Stoy DATE: 12/11/80
REVIEWED BY: Tom Papadopoulos DATE: 12/14/80
CALC # EMD # 027934 DATE: 11/28/81



PERIOD IN SECONDS

HQ-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 474'-10" REV 00

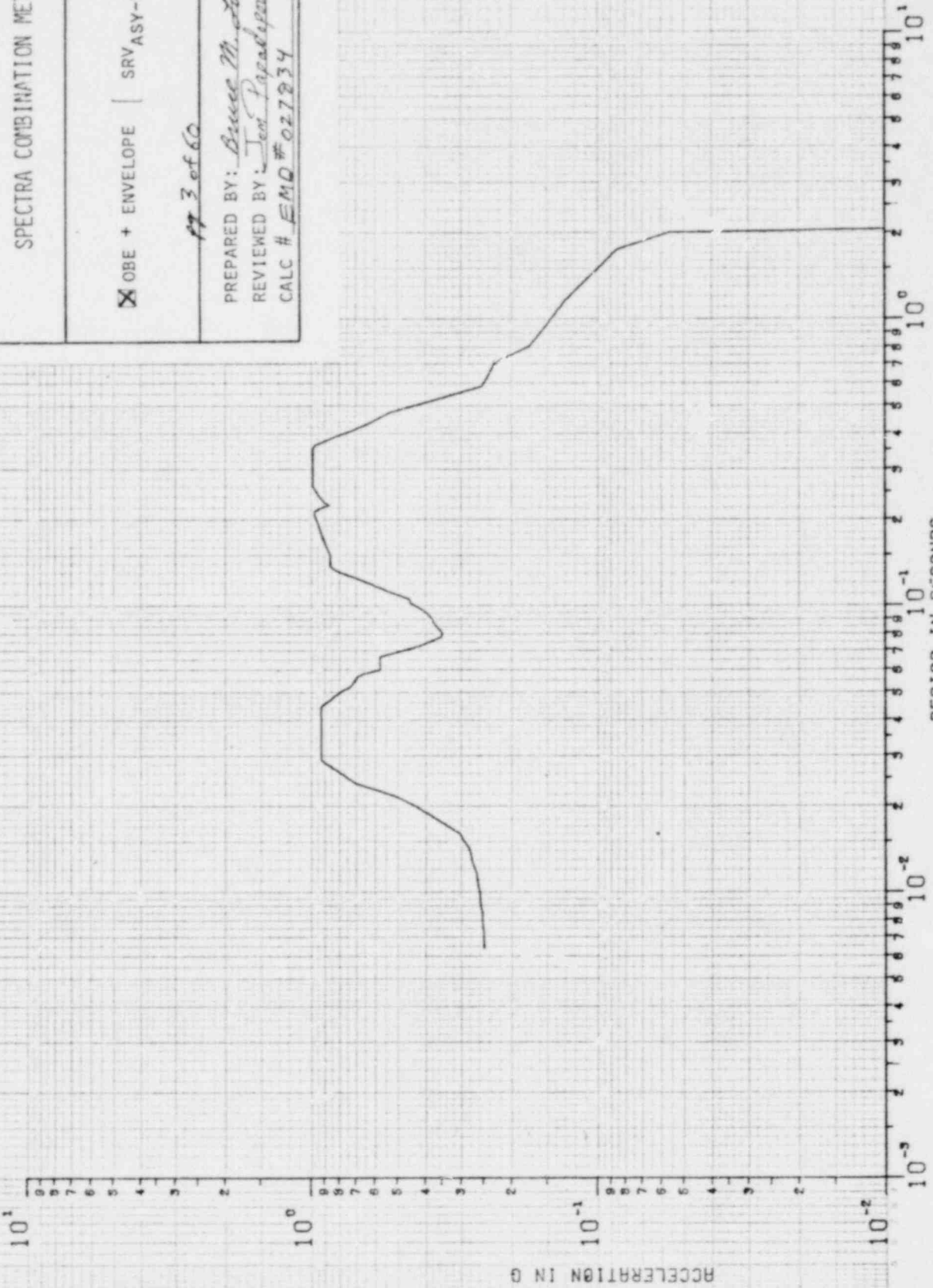
Run ID: 793Bml 12/11/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV ASY-TQ + SRV ALL-TQ

3 of 60

PREPARED BY: Bruce M. Long DATE: 12/11/80
REVIEWED BY: Tom Papadopoulos DATE: 12/11/80
CALC # EMD # 027834 DATE: 1/25/81



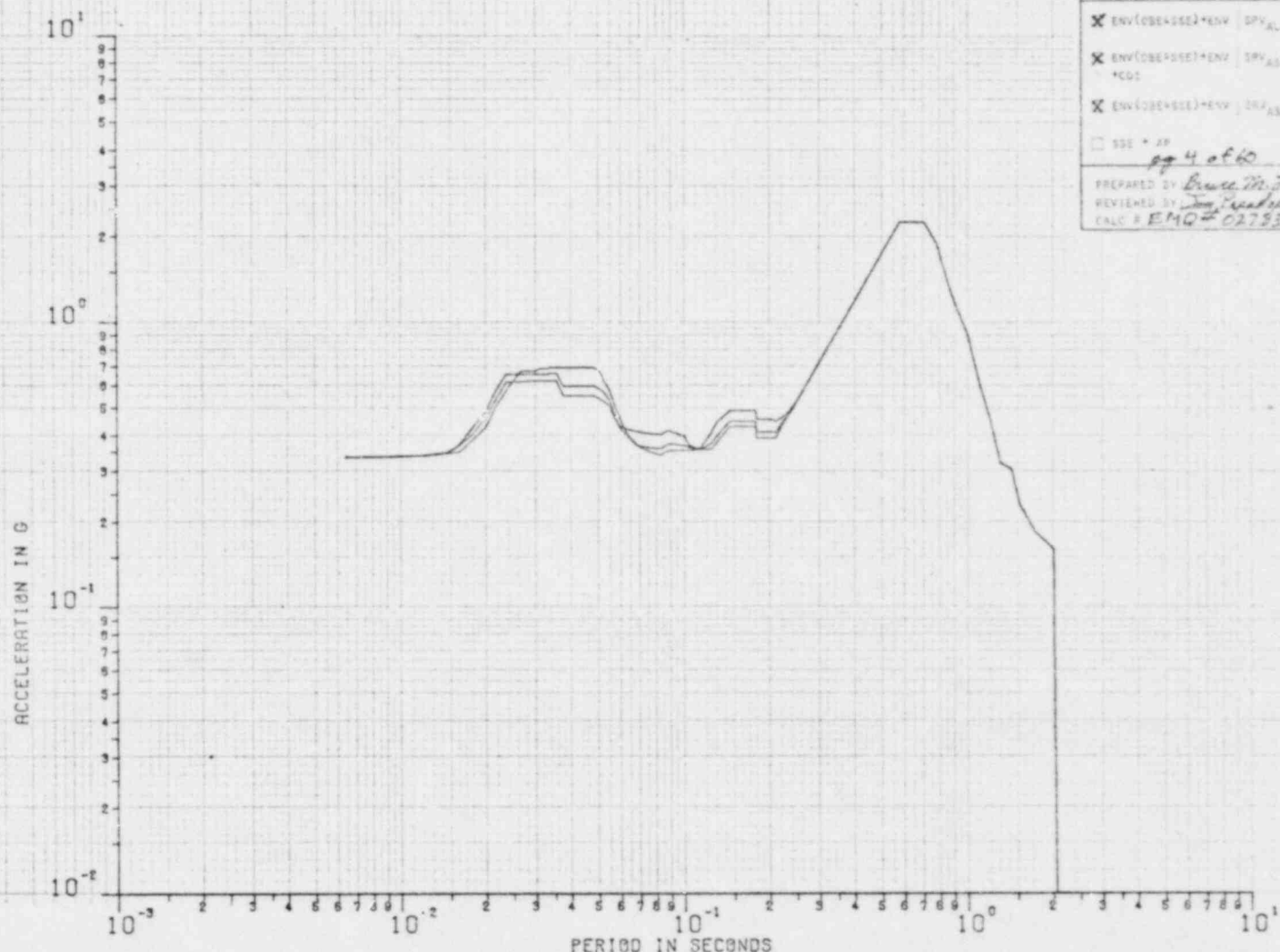
PERIOD IN SECONDS

VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 474'-10" REV 00

RUN 10.793 BML 12/11/80

SEE SHEET 15 OF 16

302BML 12/11/80 782



ZIMMER UNIT 3 4230-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

ENV(08E+05E)+ENV | SPV_AL-10+SRV_ADD-T0 *CMG
 ENV(08E+05E)+ENV | SPV_ASY-T0 * 0.4 SPV_ADD-T0 *CDI
 ENV(08E+05E)+ENV | SPV_ASY-T0+SRV_ADD-T0 *CDI
 SEE * 2P

PREPARED BY *Bruce M. Fry* DATE: *11/1/80*
 REVIEWED BY *Jim Anderson* DATE: *12/1/80*
 CALC R EMQ # *027834* DATE: *1/28/81*

H0-NS DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 474'-1C

RUN 10:302 BML 11/1/80

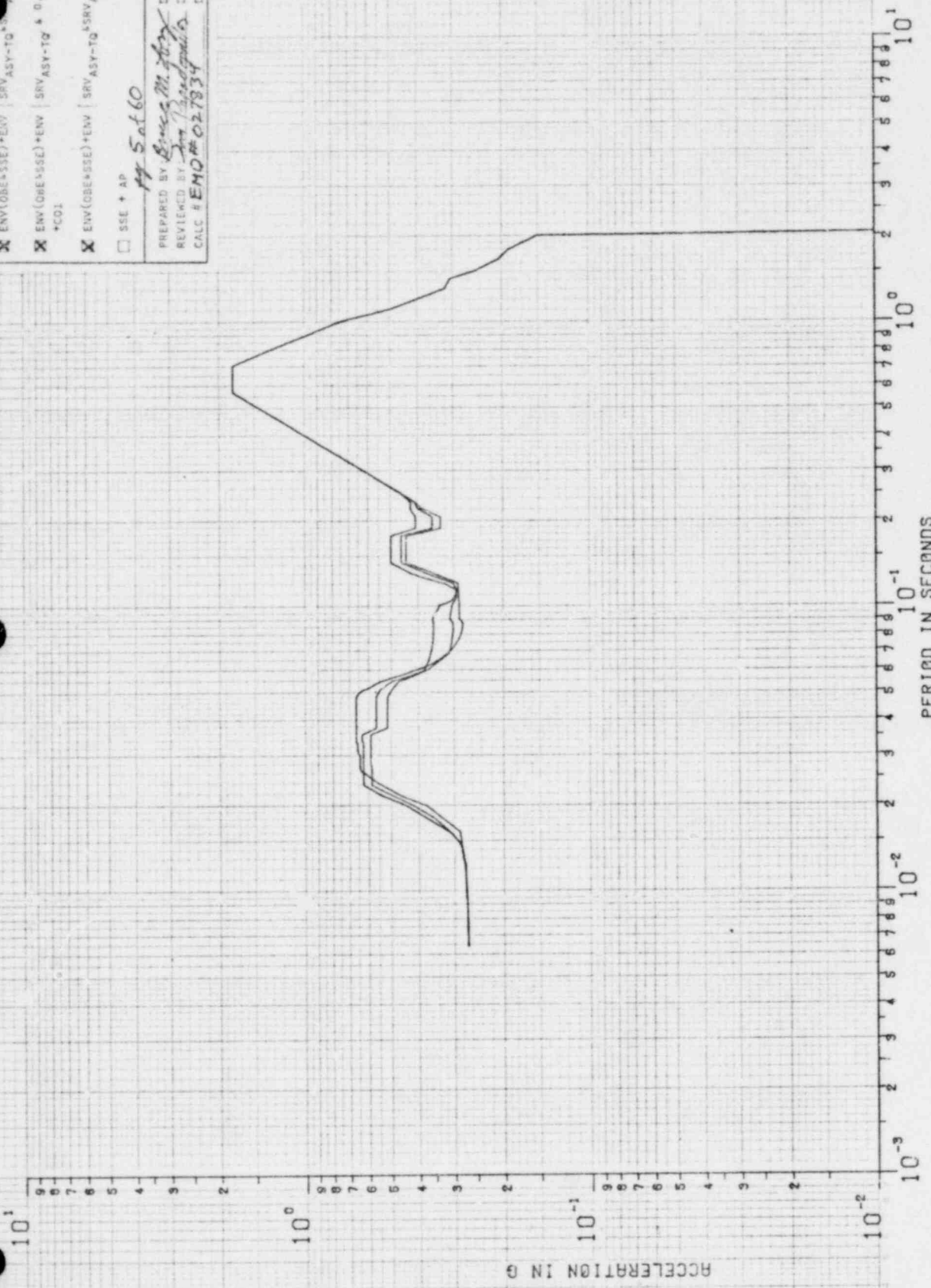
NE #2UFFFLAESSER

SPECTRA COMBINATION METHOD - SRSS

- ENY(OBE+SSE)*EMV | SRV ASY-TQ *CHG
- ENY(OBE+SSE)*EMV | SRV ASY-TQ * 0.6 SRV ADS-TQ +COI
- ENY(OBE+SSE)*EMV | SRV ASY-TQ *SRV ADS-TQ *COI
- SSE + AP

pg 5 of 60

PREPARED BY *George M. J. J.* DATE: *12/11/80*
 REVIEWED BY *Jim P. ...* DATE: *11/28/81*
 CALC # *EMO#027834*



HQ-EW DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 474'-10" REV. 00

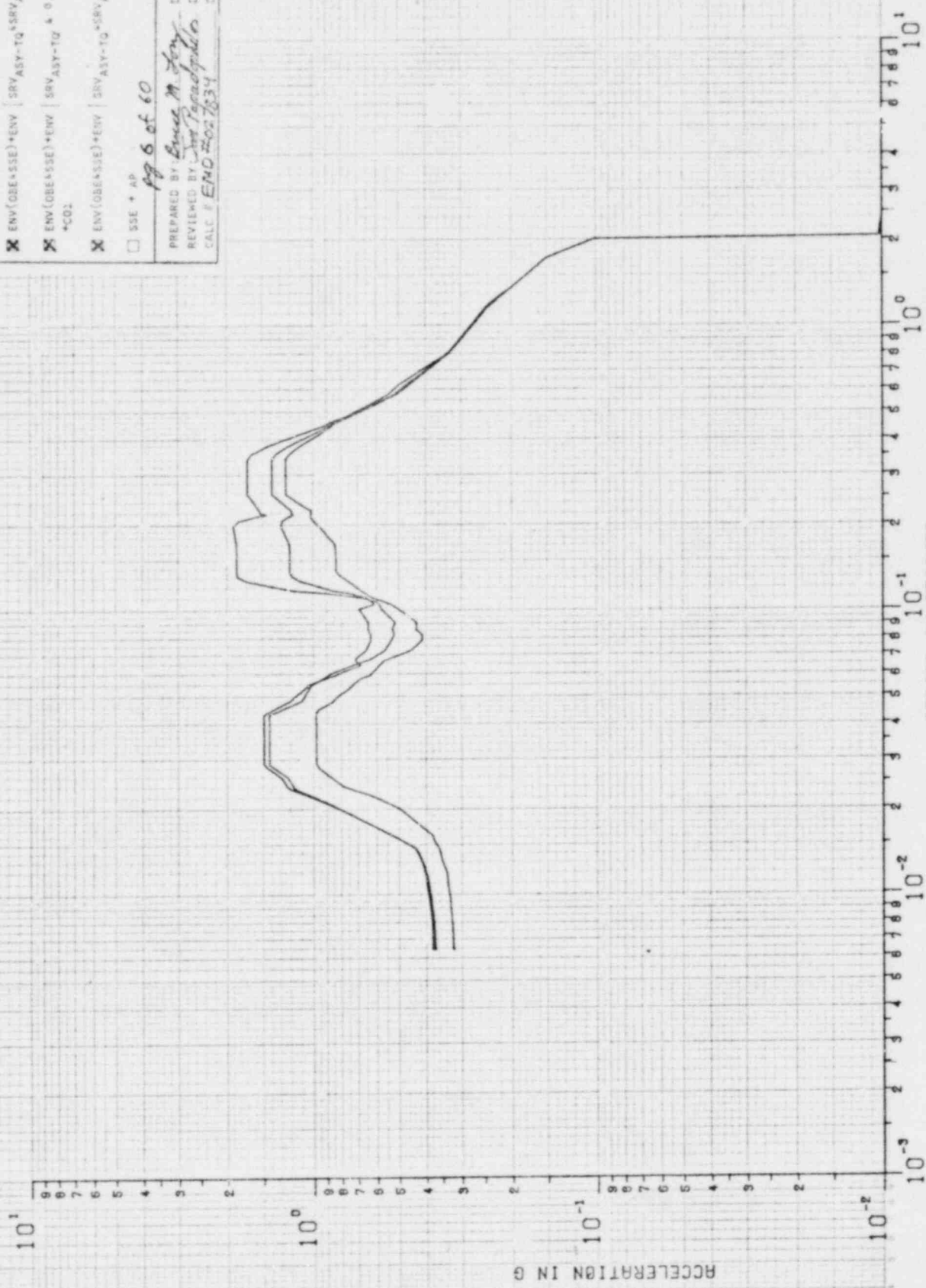
MSR STUFFEL & ESSER CO. PRINTED IN U.S.A.
 RUN ID: 302 BML 12/11/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV | SRV ASY-TQ | SRV ADS-TQ | *CHG
- ENV(OBE+SSE)+ENV | SRV ASY-TQ | * 0.6 SRV ADS-TQ | *CO2
- ENV(OBE+SSE)+ENV | SRV ASY-TQ | SRV ADS-TQ | *CO2
- SSE + AP

pg 6 of 60

PREPARED BY: Bruce M. Jory DATE: 12/1/80
REVIEWED BY: Joe Paolopolo DATE: 12/1/80
CALL # ENO 2057834 DATE: 1/5/81



PERIOD IN SECONDS

VW-VW DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 474'-10" REV. 00

RUN ID: 302 BML 12/11/80

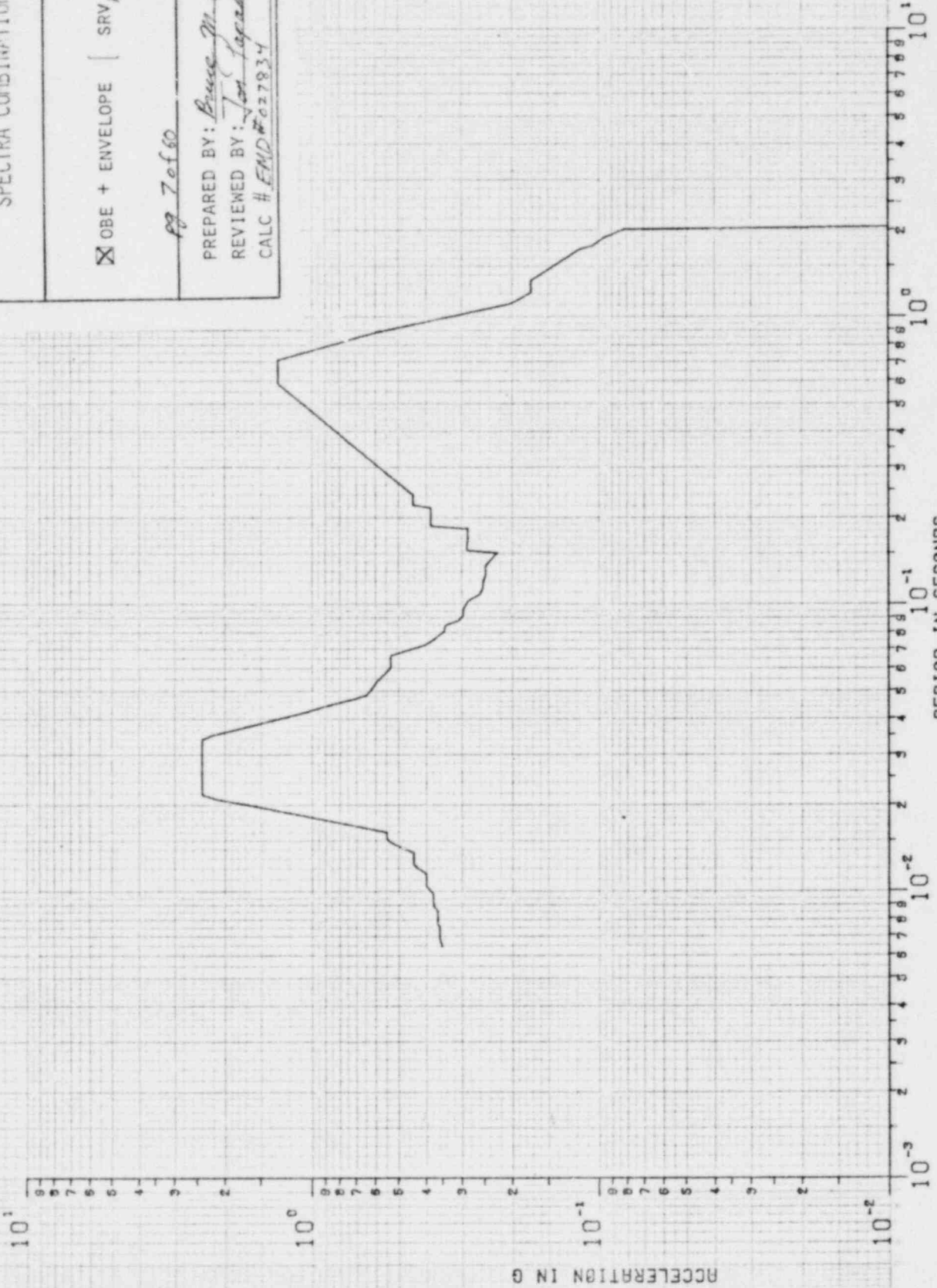
REDYNE SYSTEMS CO

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg 7 of 60

PREPARED BY: *Bruce M. Gray* DATE: *12/11/80*
REVIEWED BY: *Tom Lapadula* DATE: *12/11/80*
CALC # *END#027834* DATE: *1/28/81*



H0-NS DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 504'-4" REV 00

Run ID: 793 Base 12/11/80

FOR NEUFFER/ESSERCO

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SRSS

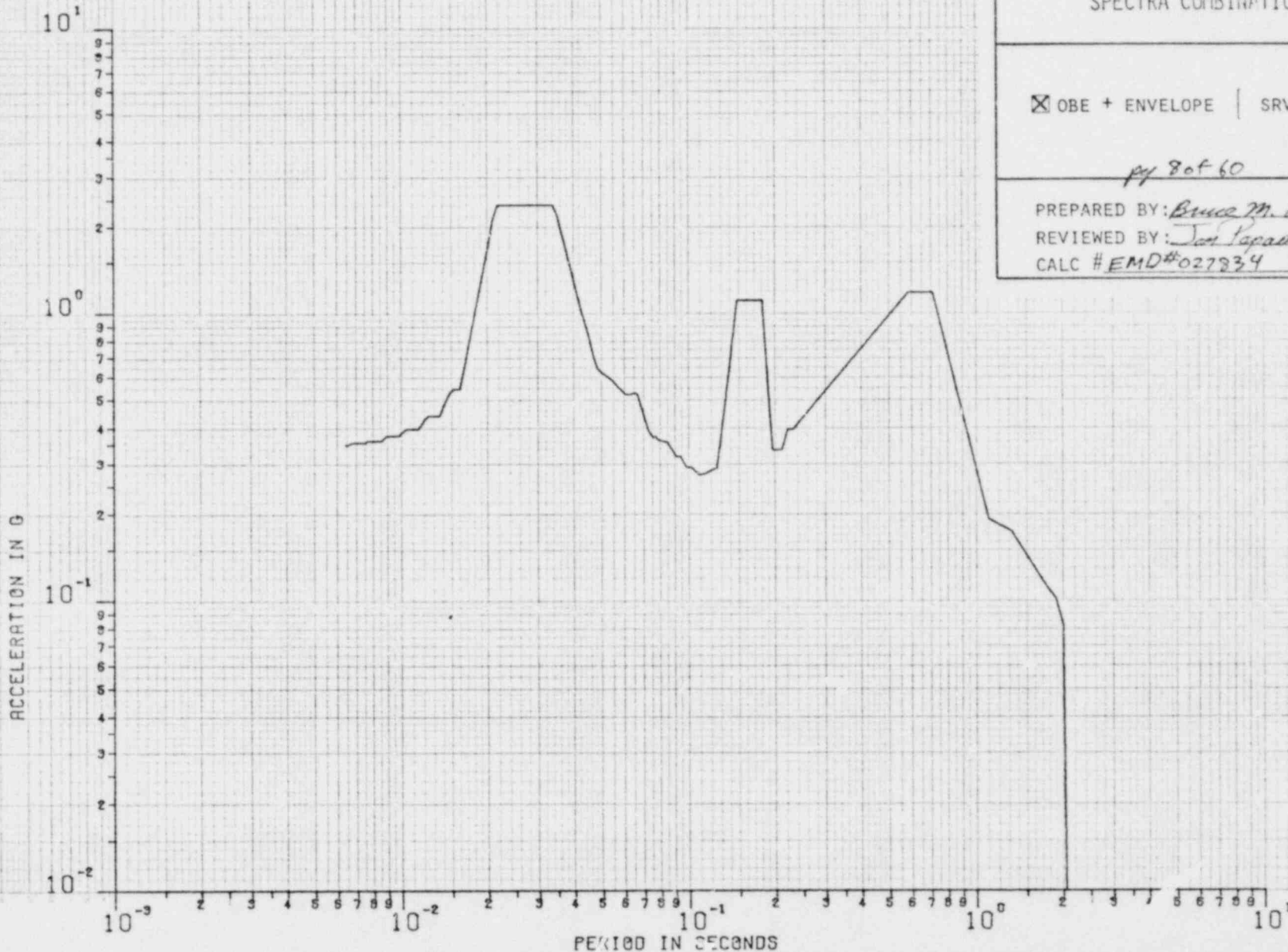
OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

pg 8 of 60

PREPARED BY: Bruce M. Long DATE: 12/11/80

REVIEWED BY: Joe Papadopoulos DATE: 12/11/80

CALC # EMD#027834 DATE: 1/23/81



H0-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 504'-4" REV 00

Run ID: 793 AMU 12/11/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRVASY-TQ + SRVALL-TQ

pg. 9 of 62

PREPARED BY: Bruce M. Gray DATE: 12/11/80
REVIEWED BY: Jon Papadopoulos DATE: 12/11/80
CALC # EMD # 027834 DATE: 1/28/81



VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 504'-4" REV 00

Run 10: 293 Bill 12/01/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBS+SS)*ENV | SRV_ASY-TQ*SRV_AOS-TQ | *CNS
- ENV(OBS+SS)*ENV | SRV_ASY-TQ*SRV_AOS-TQ | *CNS
- ENV(OBS+SS)*ENV | SRV_ASY-TQ*SRV_AOS-TQ | *CNS
- ASE * AP

pg 10 of 60

PREPARED BY *George M. ...* DATE: 12/1/80
 REVIEWED BY *John ...* DATE: 12/1/80
 CALC # FMD 017834 DATE: 12/2/81



PERIOD IN SECONDS

H0-NS DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 504'-4" REV. 00

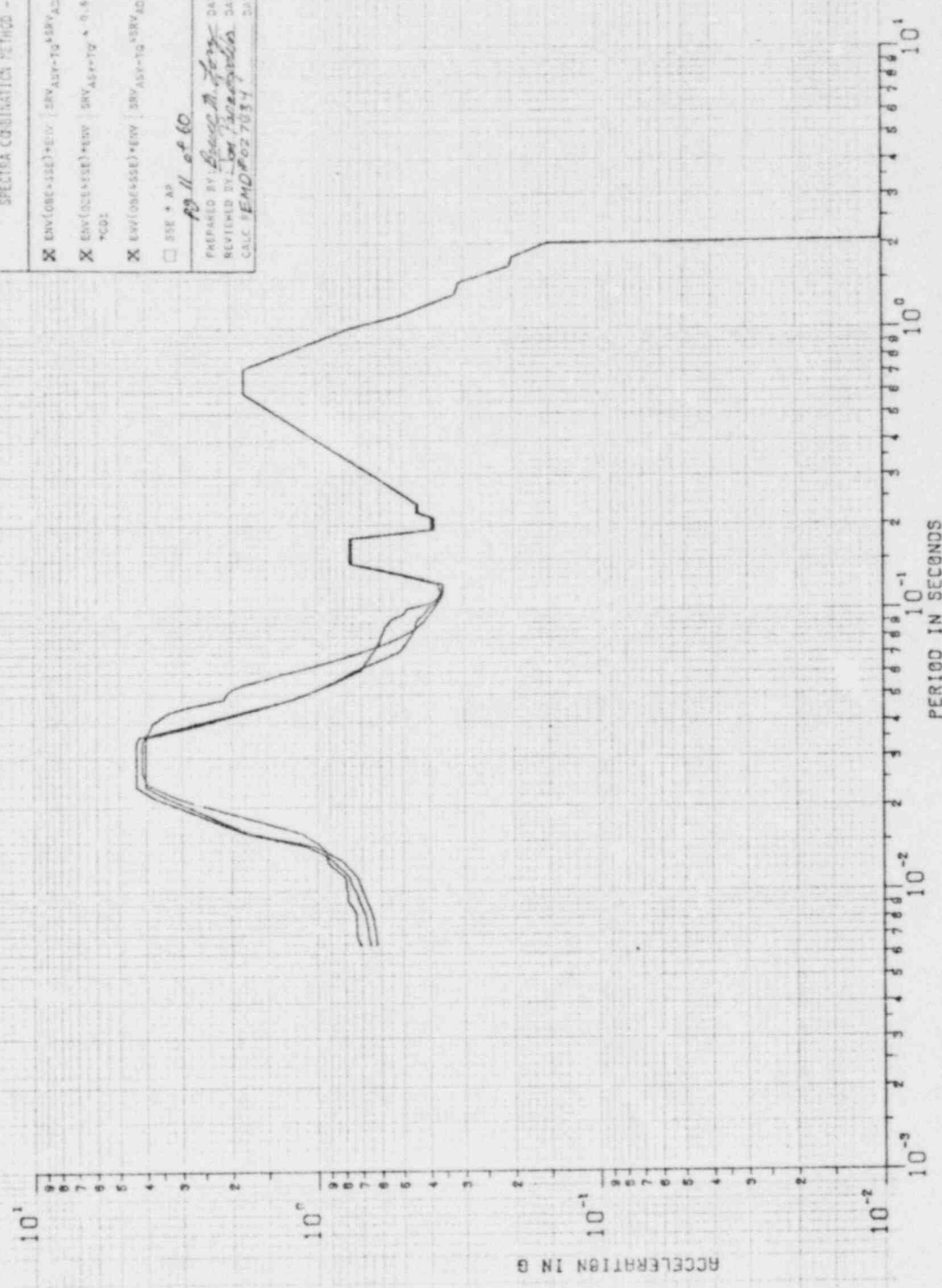
Run 10:30 PM 12/1/80

ZIMMER UNIT-1 ALSO-35 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

ENV(OBS+ISE)+EW | SRV ASY-TG | ASRV ASY-TG | *CNG
 ENV(OBS+ISE)+NEW | SRV ASY-TG | * 0.5 SRV ASY-TG
 *C01
 ENV(OBS+ISE)+EW | SRV ASY-TG | ASRV ASY-TG | *C02
 STE * AP

89 11 of 60

PREPARED BY: *David M. Perry* DATE: 12/11/80
 REVIEWED BY: *Tom Macgregor* DATE: 12/11/80
 CALC: EMD 027034 DATE: 1/28/81



H0-EW DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 504'-4'' REV. 00

RVM NO: 304 EML 12/11/80

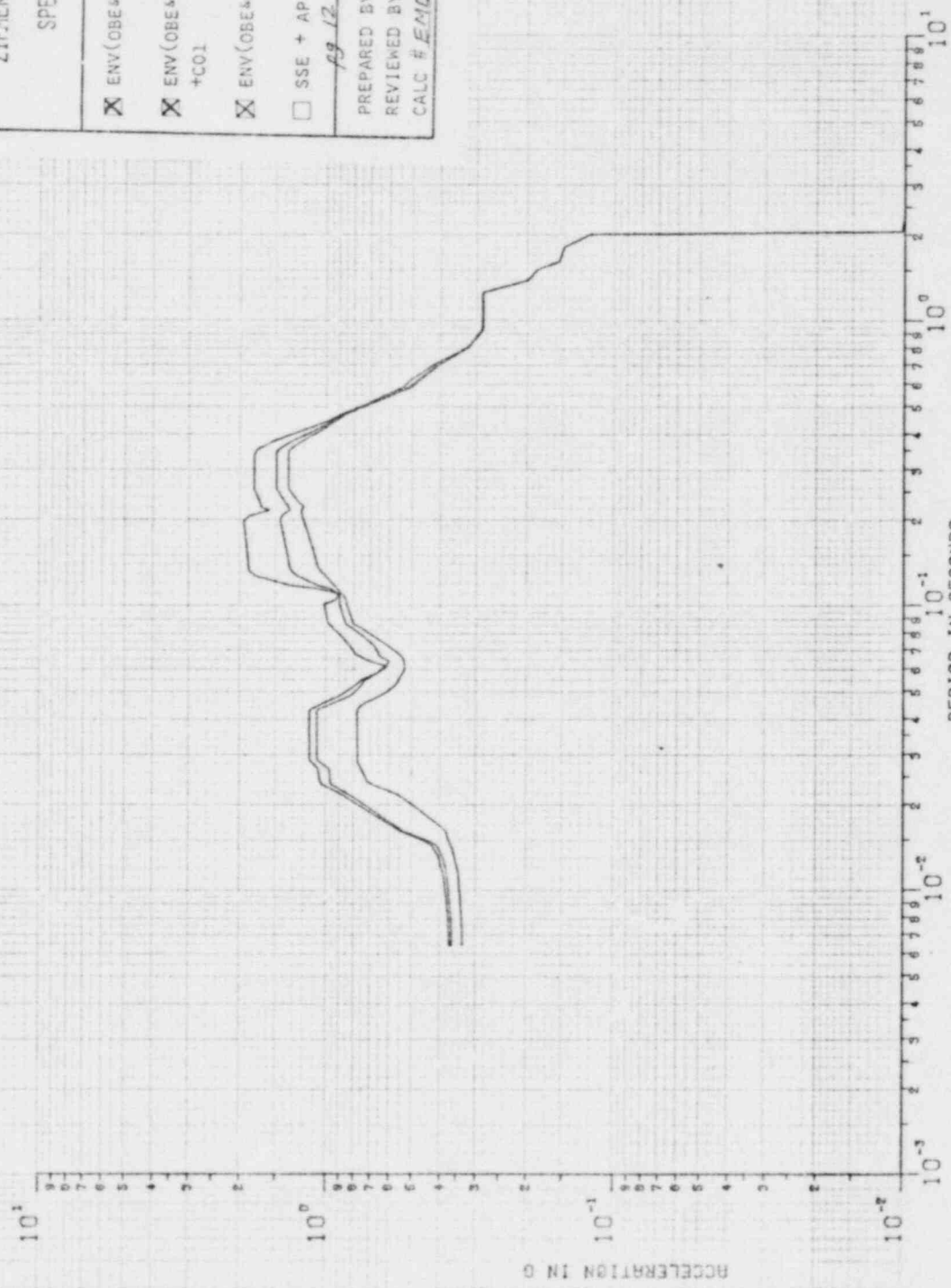
NOT REPRODUCIBLE

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}⁶SRV_{ADS-TQ} | +CHS
- ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}⁶ & 0.6 SRV_{ADS-TQ} | +CO1
- ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}⁶SRV_{ADS-TQ} | +CO2
- SSE + AP

pg 12 of 10

PREPARED BY: *James M. Fry* DATE: 12/11/80
 REVIEWED BY: *Tom Papadopoulos* DATE: 12/11/80
 CALC # EMD # 027834 DATE: 1/28/81



VW-VW DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 504'-4" REV. 00

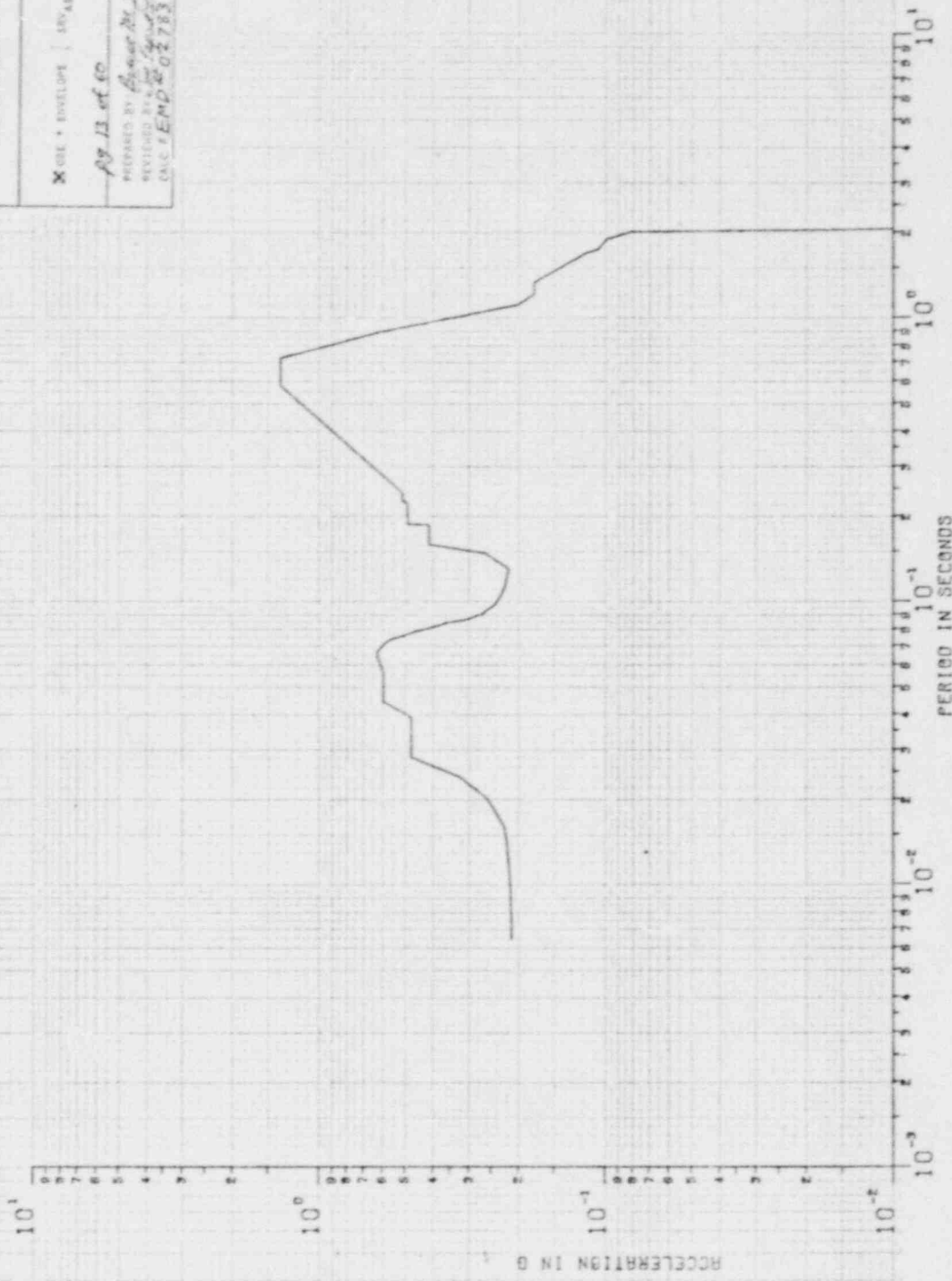
RVM 10: 502 BML 12/11/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMPOSITION METHOD - 8905

X OBE + ENVELOPE | SRV ASY-TQ + 30% ALL-TQ

pg. 13 of 60

PREPARED BY: *James Mc...* DATE: *12/11/86*
 REVIEWED BY: *...* DATE: *12/11/86*
 CALC: *END 2 02783 V* DATE: *12/11/86*



HO-NS OF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM RPV PED/DRYFLOOR 521'-11''

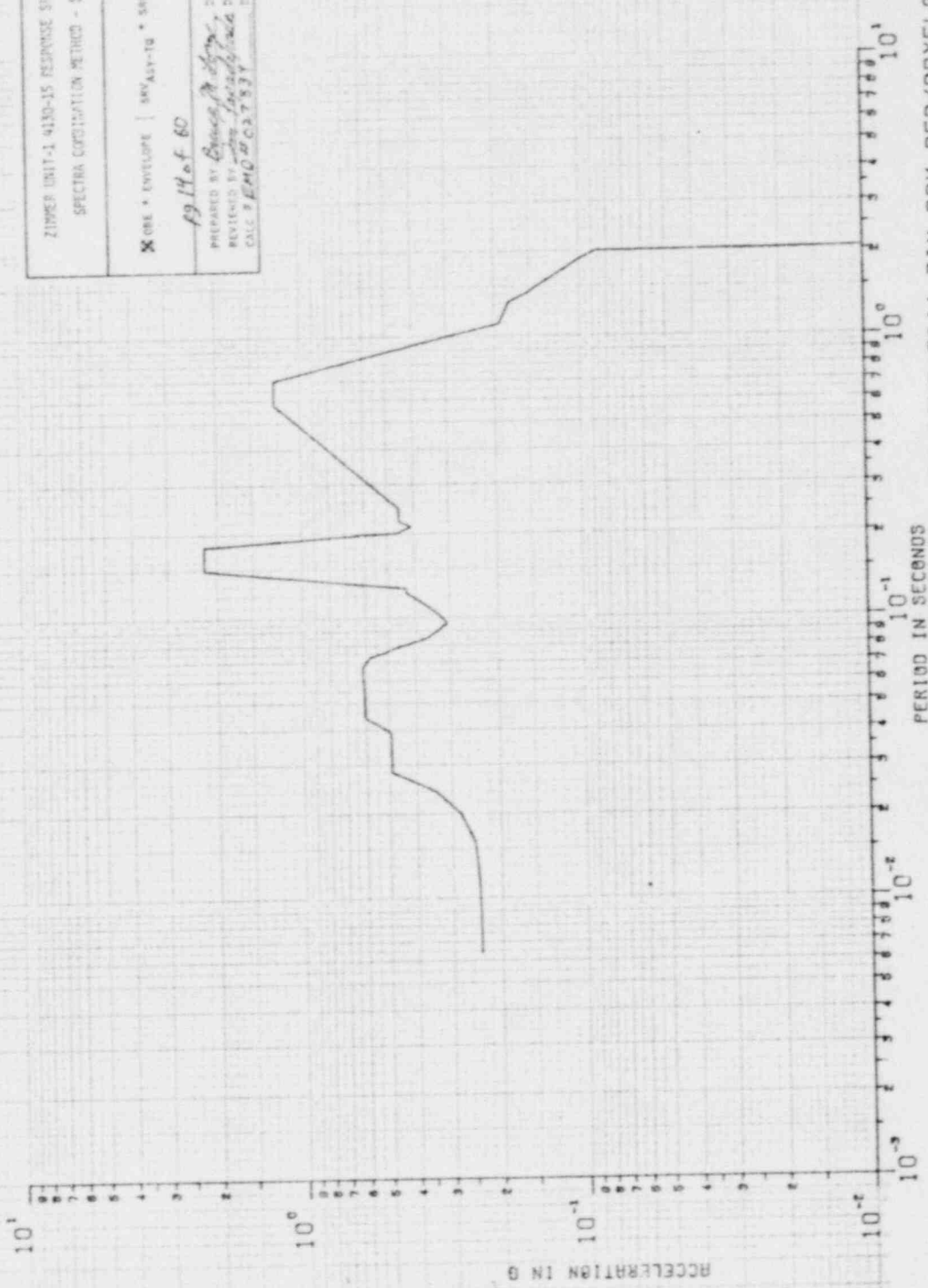
Rev 10: 293 Rev 12/11/86

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMPUTATION METHOD - SRSS

OBE + ENVELOPE | SRV-ASY-TQ * SRV-ALL-TQ

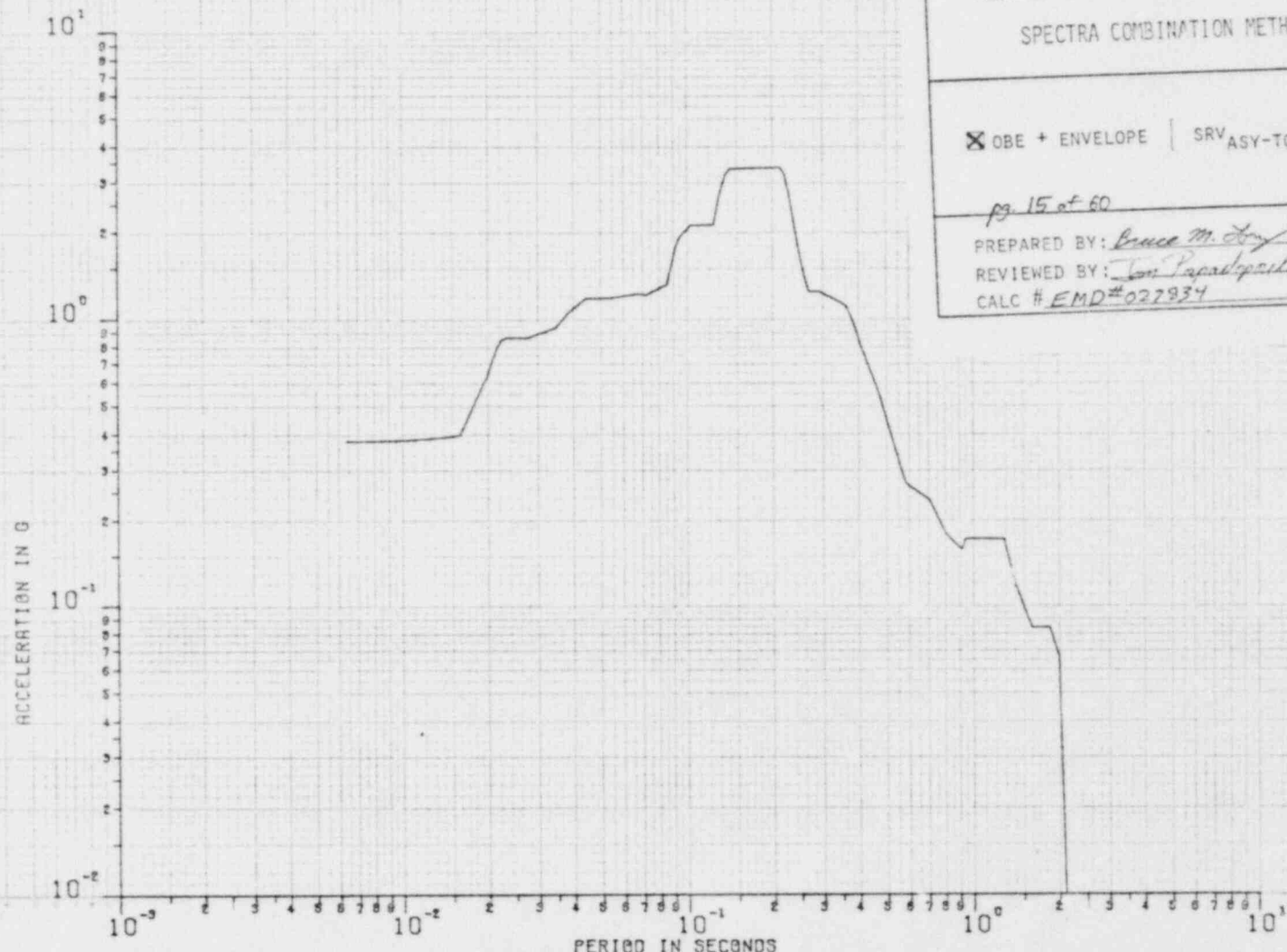
19 Oct 60

PREPARED BY Bruce A. Gray, SAIC, Dallas
 REVISION BY [unclear] DATE 12/11/80
 CALC BY PMO at 03753Y DATE 11/25/80



H0-EW DF-17 SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM RPV PED/DRYFLOOR 521'-11''

REV 10:793 BML 12/11/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 15 of 60

PREPARED BY: Bruce M. Long DATE: 12/11/80
 REVIEWED BY: Jon Papadopoulos DATE: 12/11/80
 CALC # EMD#027934 DATE: 1/22/81

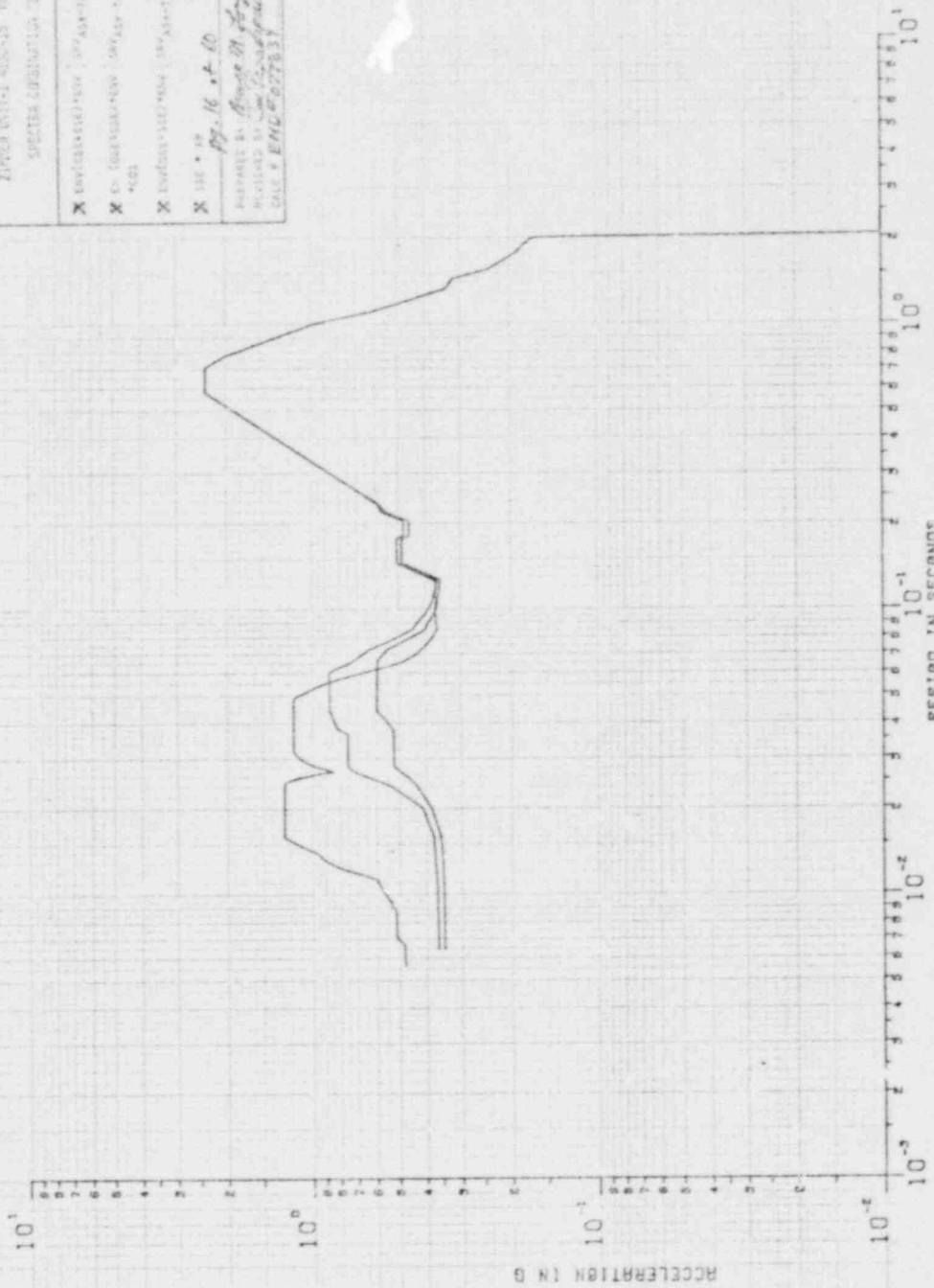
VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM RPV PED/DRYFLOOR 521'-11''

RUN 102-793 BML 12/11/80

ZIMMER UNITED STATES REGIONAL OFFICE
 SPECTRA CONSULTING ENGINEERS - SCS

ENGINEERING DESIGN (SPECIALTY) 1974-1980
 CIVIL ENGINEERING (SPECIALTY) 1974-1980
 STRUCTURAL ENGINEERING (SPECIALTY) 1974-1980
 SEISMIC DESIGN (SPECIALTY) 1974-1980

PREPARED BY: *George M. ...*
 REVISIONS BY: *...*
 DATE: *ENG 077831*



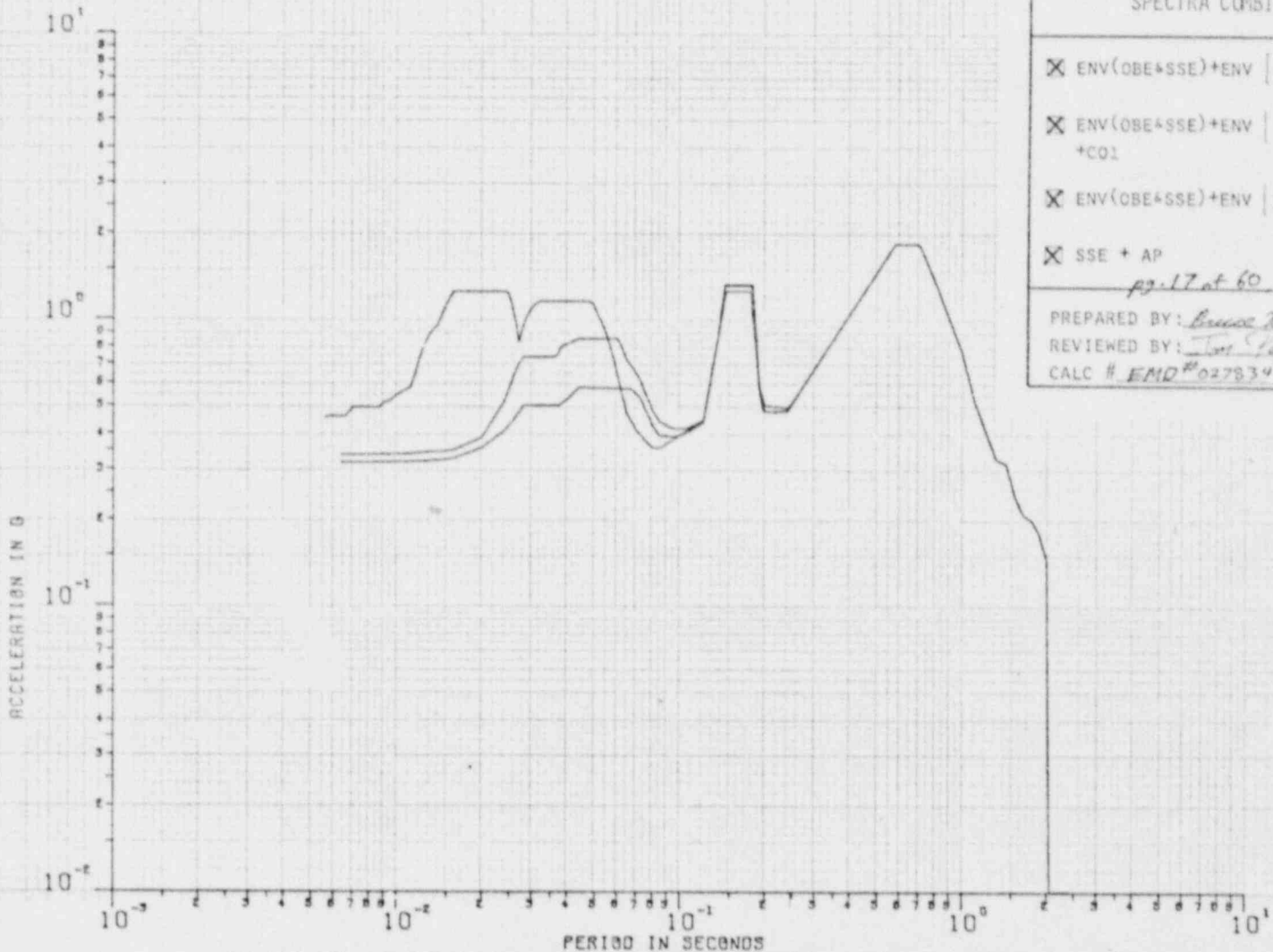
HO-NS OF -2% SRSS(C2+C3+C4+C5) ZIM PV PEDESTAL/DRYWELL FLOOR EL. 521'-11" R 00

RVM 10:54B BML 12/23/80

K-S NEUFELDESSER CO. ENGINEERS

649BML 12/23/80

080



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁴SRV_{ADS-TQ}] +CHG
 - ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁴ 0.6 SRV_{ADS-TQ}] +CO1
 - ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁴SRV_{ADS-TQ}] +CO2
 - SSE + AP
- pg. 17 of 60*
- PREPARED BY: *Bruce M. Terry* DATE: *12/22/80*
 REVIEWED BY: *Tom Papadopoulos* DATE: *12/22/80*
 CALC # *EMD#027834* DATE: *11/25/81*

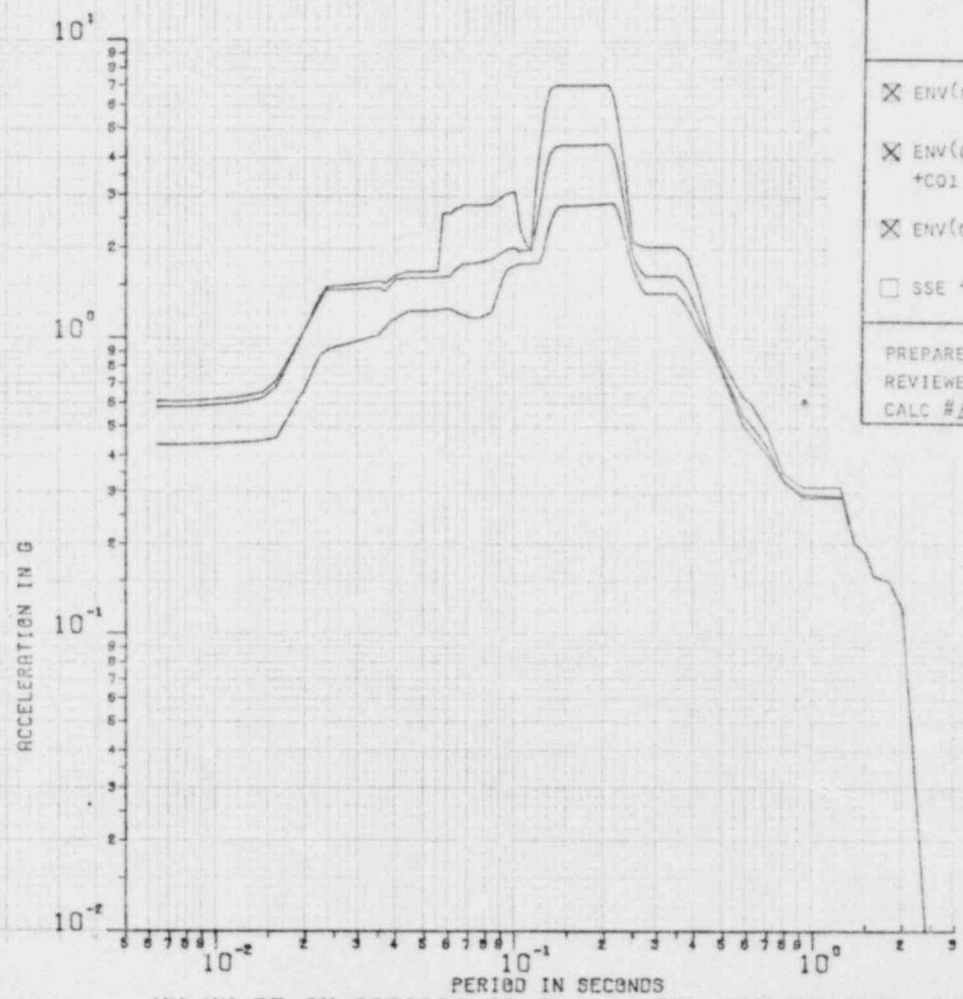
649RMI END OF PLOT TIME: 0.12

H0-EW DF-2% SRSS(C2+C3+C4+C5) ZIM RPV PEDESTAL/DRYWELL FLOOR EL. 521'-11" R 00

RUN 10:649 BML 12/22/80

526BML 02/03/81

S10



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV (SRV_{ASY-TQ}*SRV_{ADS-TQ})+CO1
 - ENV(OBE+SSE)+ENV (SRV_{ASY-TQ}*0.6 SRV_{ADS-TQ})+CO1
 - ENV(OBE+SSE)+ENV (SRV_{ASY-TQ}*SRV_{ADS-TQ})+CO2
 - SSE + AP
- pg 13, 16D*
- PREPARED BY: *Russell M. Joy* DATE: 2/3/81
 REVIEWED BY: *Tom Dugan* DATE: 2-5-81
 CALC # END # 027834 DATE: 1/28/81

VW-VW DF-2% SRSS(C2+C3+C4) ZIM RPV PEDESTAL/DRYWELL FLOOR EL. 521'-11" R 00

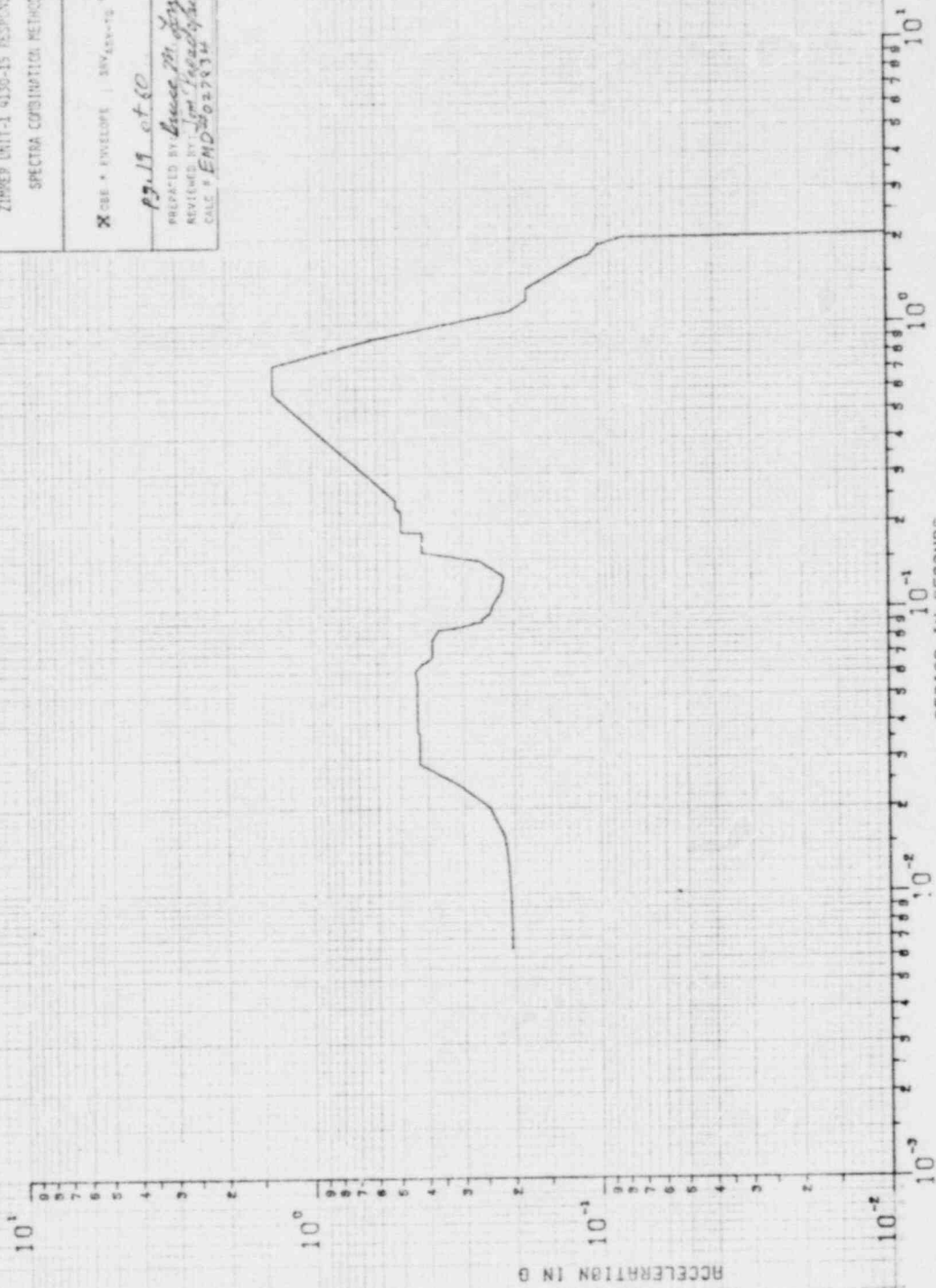
RUN 10: 526BML 02/03/81

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

OBE * ENVELOPE | SRV,ASY-TQ * BRV,ALL-TQ

83.19 et. al

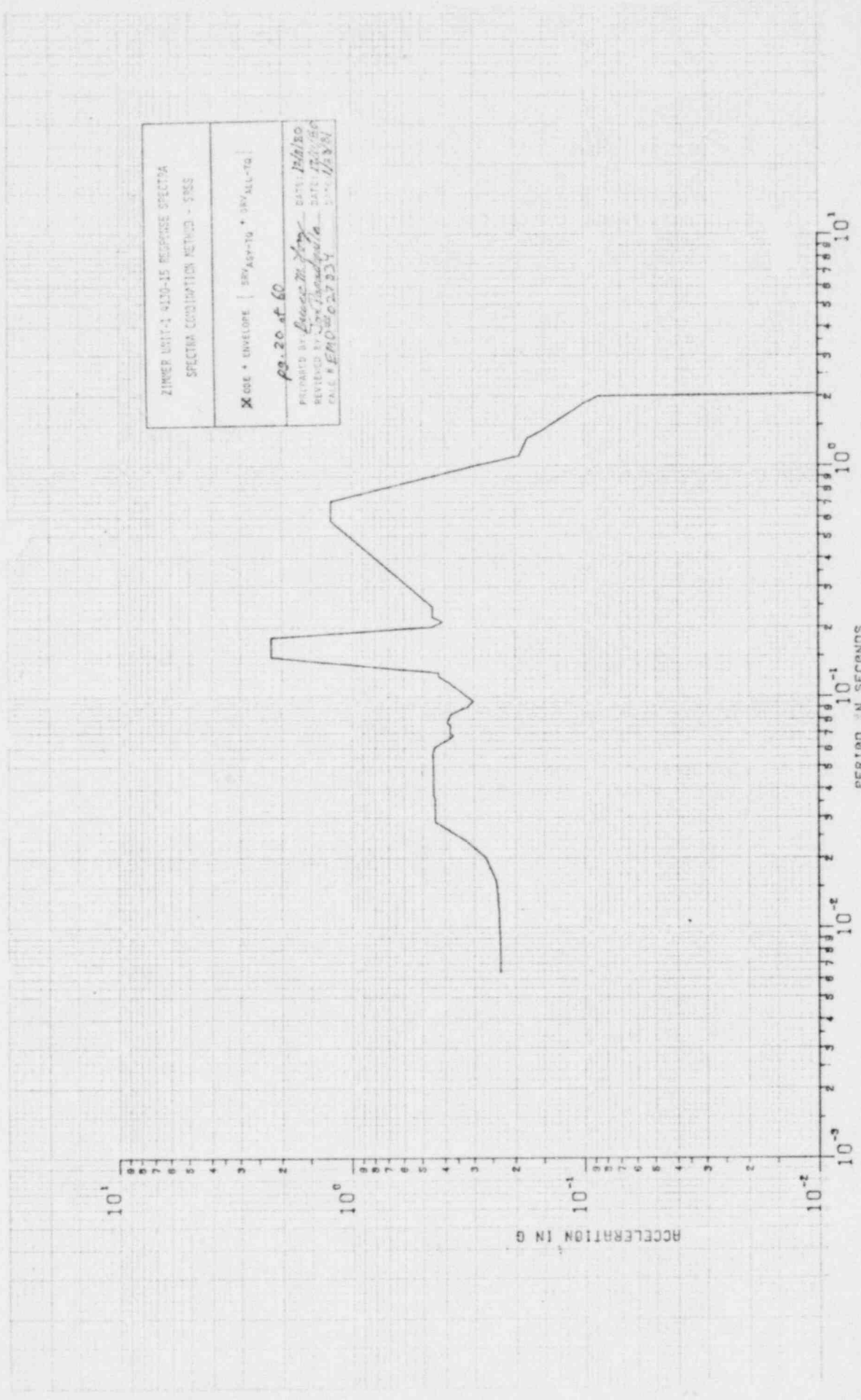
PREPARED BY Bruce M. Gray DATE: 12/10/80
 REVIEWED BY Jim Head DATE: 12/10/80
 CALC # EMD 2027934 DATE: 1/28/81



H3-NS DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM DRYWELL/SUP POOL COL 523.4"

RUN 10: 793 BML 12/11/80

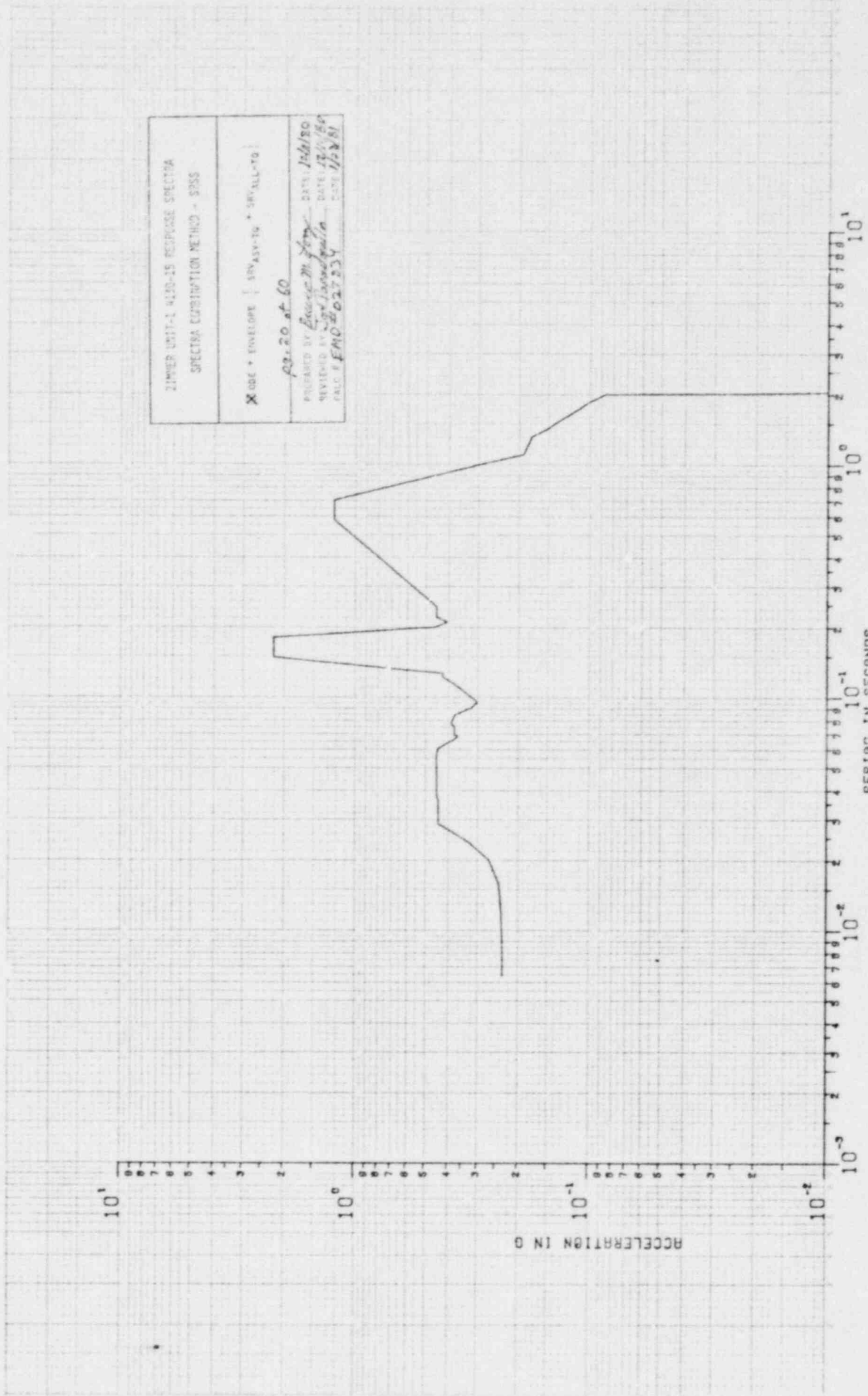
100% NEW RELEASED



H3-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM DRYWELL/SUP POOL COL 523'-9"

Rev 10:793 Rev 07/11/80

MOORE ENGINEERING CO. PASADENA, CALIF.



ZIMMER UNIT-1 ALSO-15 RESPONSE SPECTRA
 SPECTRA ESTIMATION METHOD - SRSS

OBE + ENVELOPE | SRV-ASY-TQ + SRV-ALL-TQ

PG. 20 of 60

PREPARED BY *Enrico M. Jorgensen* DATE: *12/11/80*
 REVIEWED BY *Tom Jorgensen* DATE: *12/11/80*
 FILE # *EMD-02723Y* CASE: *10281*

HQ-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM DRYWELL/SUP P00L C0L 523'-4"

REV 10:793 JUL 17/11/80

INZ NEU-TEST-EST-1001

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 21 of 60

PREPARED BY: Bruce M. Day DATE: 12/10/80
REVIEWED BY: Tom Papadopoulos DATE: 12/10/80
CALC # EMO # 027834 DATE: 1/23/81



PERIOD IN SECONDS

VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM DRYWELL/SUP POOL COL 523-9

REVISED

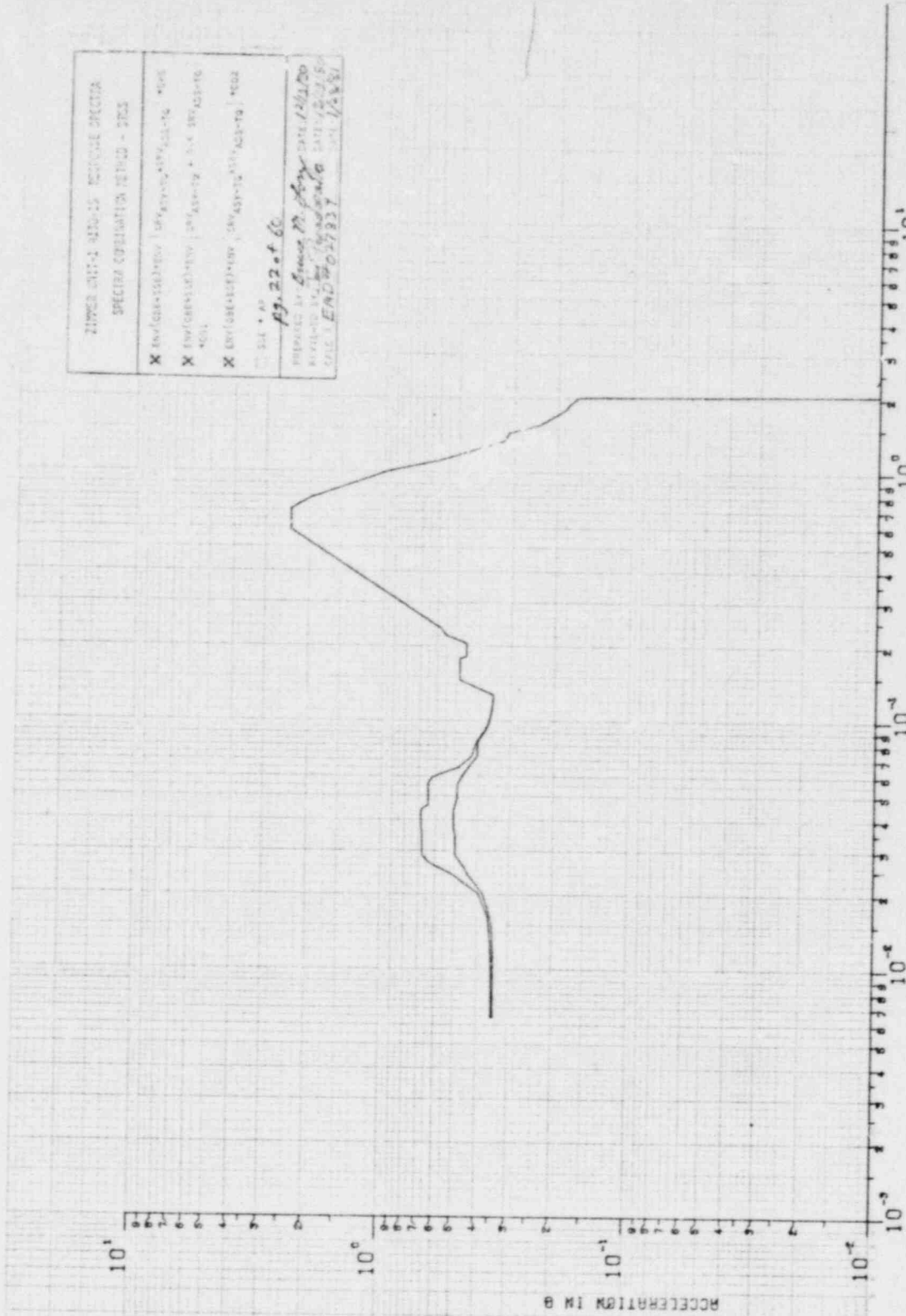
Rev 10: 793 Rev 12/11/80

ZIMMER QUANT-1 ANALYSIS SERVICE DIRECTOR
 SPECTRA CORRELATION METHOD - STS

X ENVIRONMENTAL VIBRATION ANALYSIS - 1000-10000 Hz
 X ENVIRONMENTAL VIBRATION ANALYSIS - 100-1000 Hz
 X ENVIRONMENTAL VIBRATION ANALYSIS - 10-100 Hz

SITE # 10
 19.22 of 60

PREPARED BY: James M. Perry DATE: 12/13/80
 REVIEWED BY: [Signature] DATE: 12/13/80
 FILE # END 70-17837



HO-NS OF ~2% SRSS(C2 + C3 + C4) ZIM DRYWELL FL/SUPP P00L COLUMN 523-9 REV. 00

REV ID: 034 BML 12/13/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRSS

ENV(OBE+SSE)*ENV | SRV ASY-TQ | SRV ADS-TQ | *CNG
 ENV(OBE+SSE)*ENV | SRV ASY-TQ | SRV ADS-TQ | *CNG
 ENV(OBE+SSE)*ENV | SRV ASY-TQ | SRV ADS-TQ | *CNG

SSE * AP

PREPARED BY *James M. King* DATE *12/13/80*
 REVIEWED BY *John R. Johnson* DATE *12/13/80*
 CALC # *END #027834* DATE *11/25/81*



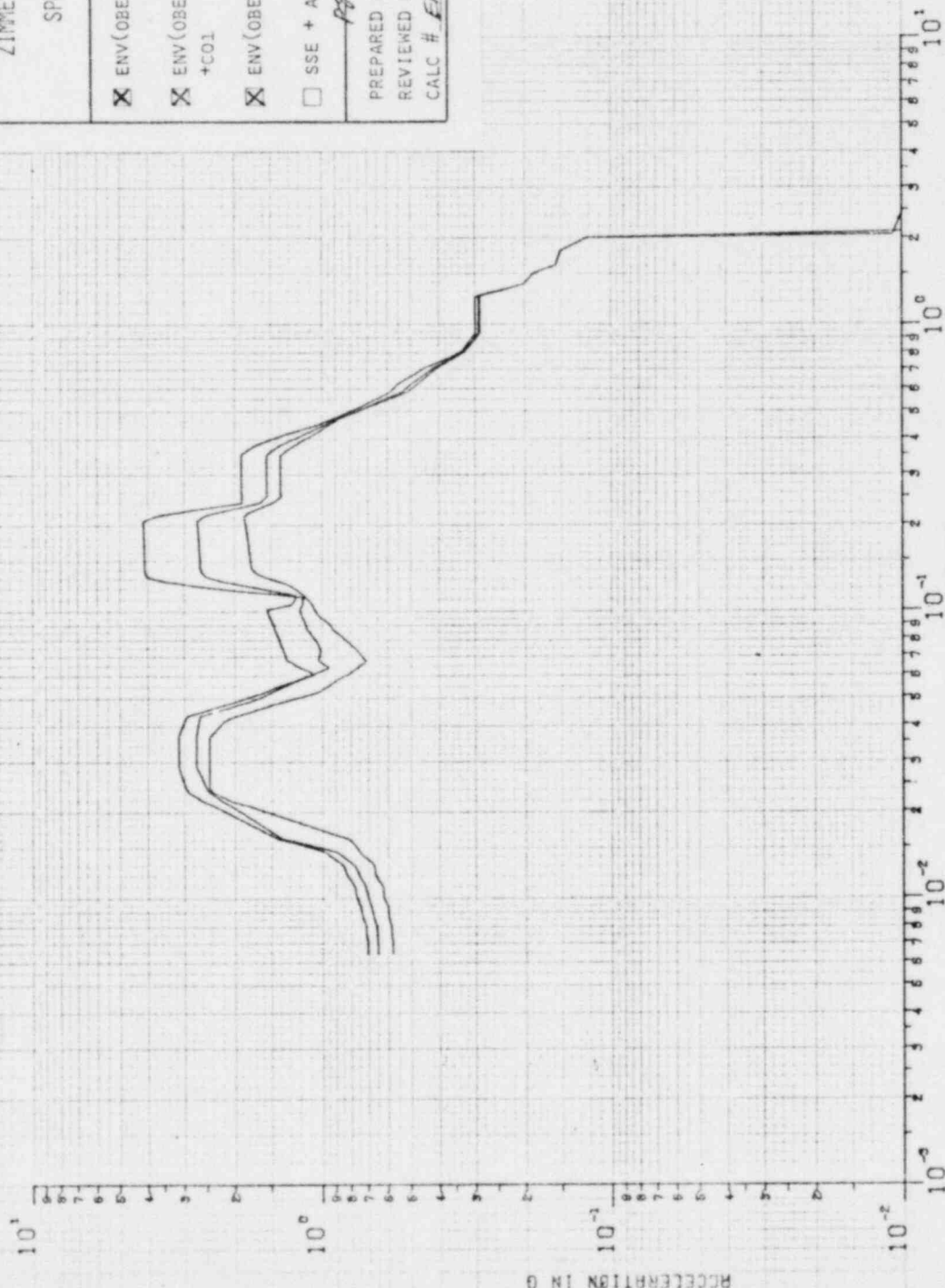
H0-EW DF-27: SRSS(C2 + C3 + C4) ZIM DRYWELL FL/SUPP POOL COLUMN 523'-9" REV. 00

BRUFFEL ENGINEERING CO. WASHINGTON, D.C. 20004
 RUN 10:054 BML 12/13/80

TIME: 0.12

054BML END OF PLOT

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA	
SPECTRA COMBINATION METHOD - SRSS	
<input checked="" type="checkbox"/>	ENV(OBE&SSE)+ENV SRV _{ASY-TQ} ⁶ SRV _{ADS-TQ} +CHG
<input checked="" type="checkbox"/>	ENV(OBE&SSE)+ENV SRV _{ASY-TQ} ⁶ & 0.6 SRV _{ADS-TQ} +CO1
<input checked="" type="checkbox"/>	ENV(OBE&SSE)+ENV SRV _{ASY-TQ} ⁶ SRV _{ADS-TQ} +CO2
<input type="checkbox"/>	SSE + AP
Pg. 24 of 60	
PREPARED BY: <i>Bruce M. Day</i>	DATE: 12/13/80
REVIEWED BY: <i>Tom Papadogiannis</i>	DATE: 12/13/80
CALC # <i>EMD # 27834</i>	DATE: 1/28/81



VW-VW DF-2% SRSS(C2 + C3 + C4) ZIM DRYWELL FL/SUPP POOL COLUMN 523*-9** REV. 00

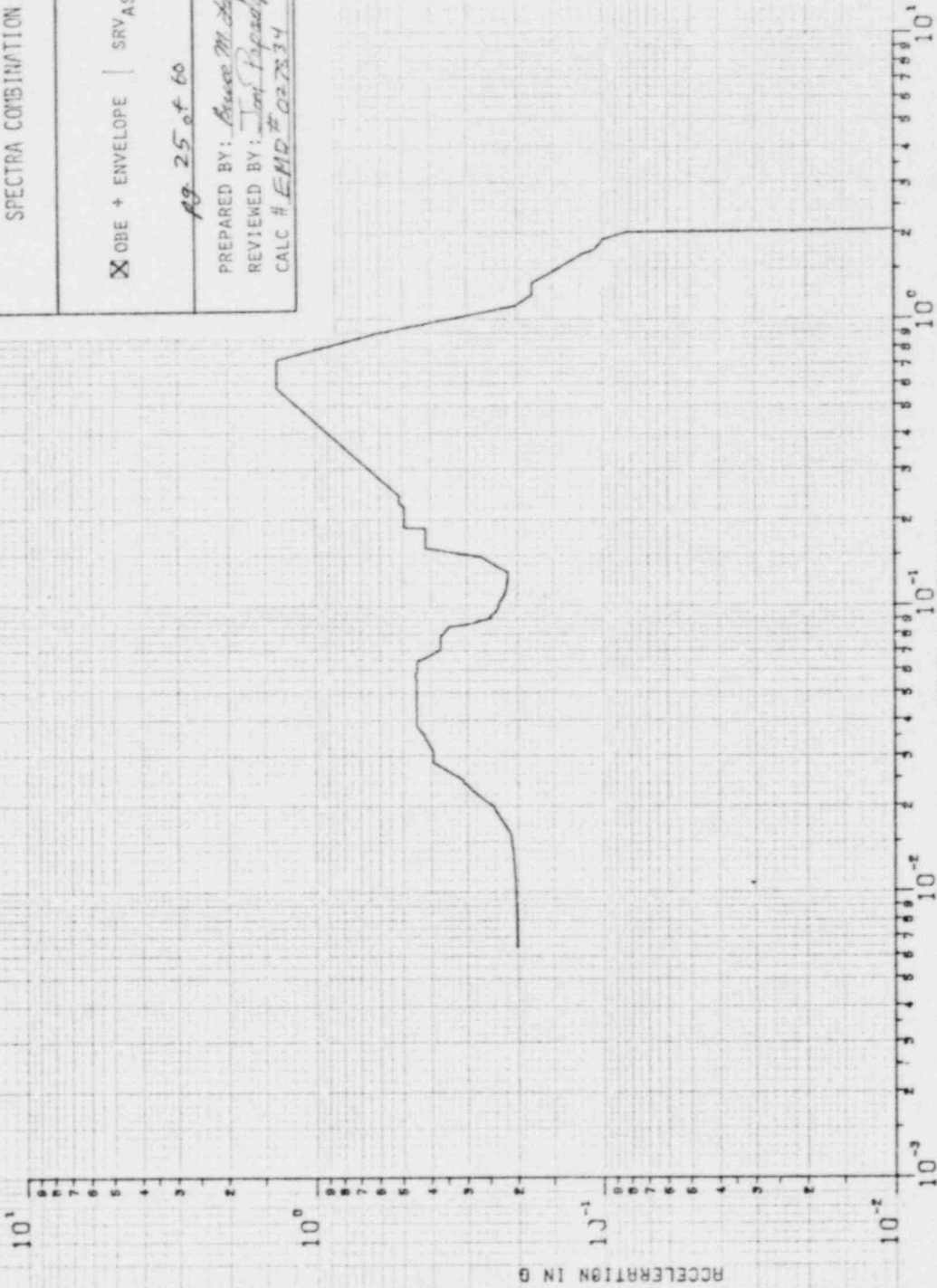
KS NEUFELDESSENCO
 RUN 10: 034 BML 12/13/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 25 of 60

PREPARED BY: Bruce M. Dwyer DATE: 12/14/80
REVIEWED BY: James P. Papadopoulos DATE: 12/14/80
CALC # EMD # 027534 DATE: 1/28/81



HQ-NS OF -1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 526'-9" REV. 00

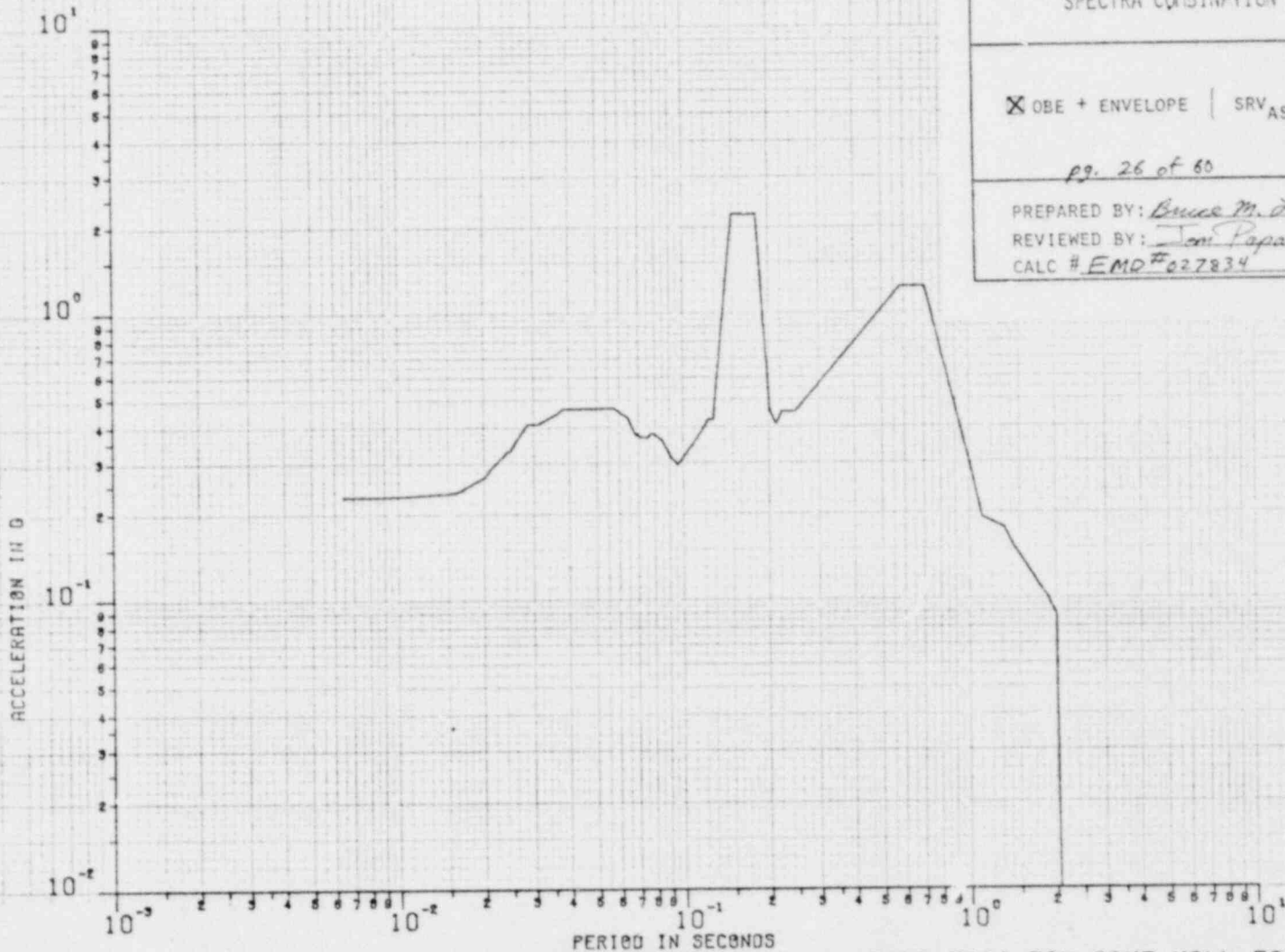
RUN ID : 793 BNL 12/11/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE [SRV_{ASY-TQ} + SRV_{ALL-TQ}]

pg. 26 of 60

PREPARED BY: Bruce M. Jony DATE: 12/11/80
REVIEWED BY: Tom Papadopoulos DATE: 12/11/80
CALC # EMD#027834 DATE: 1/28/81



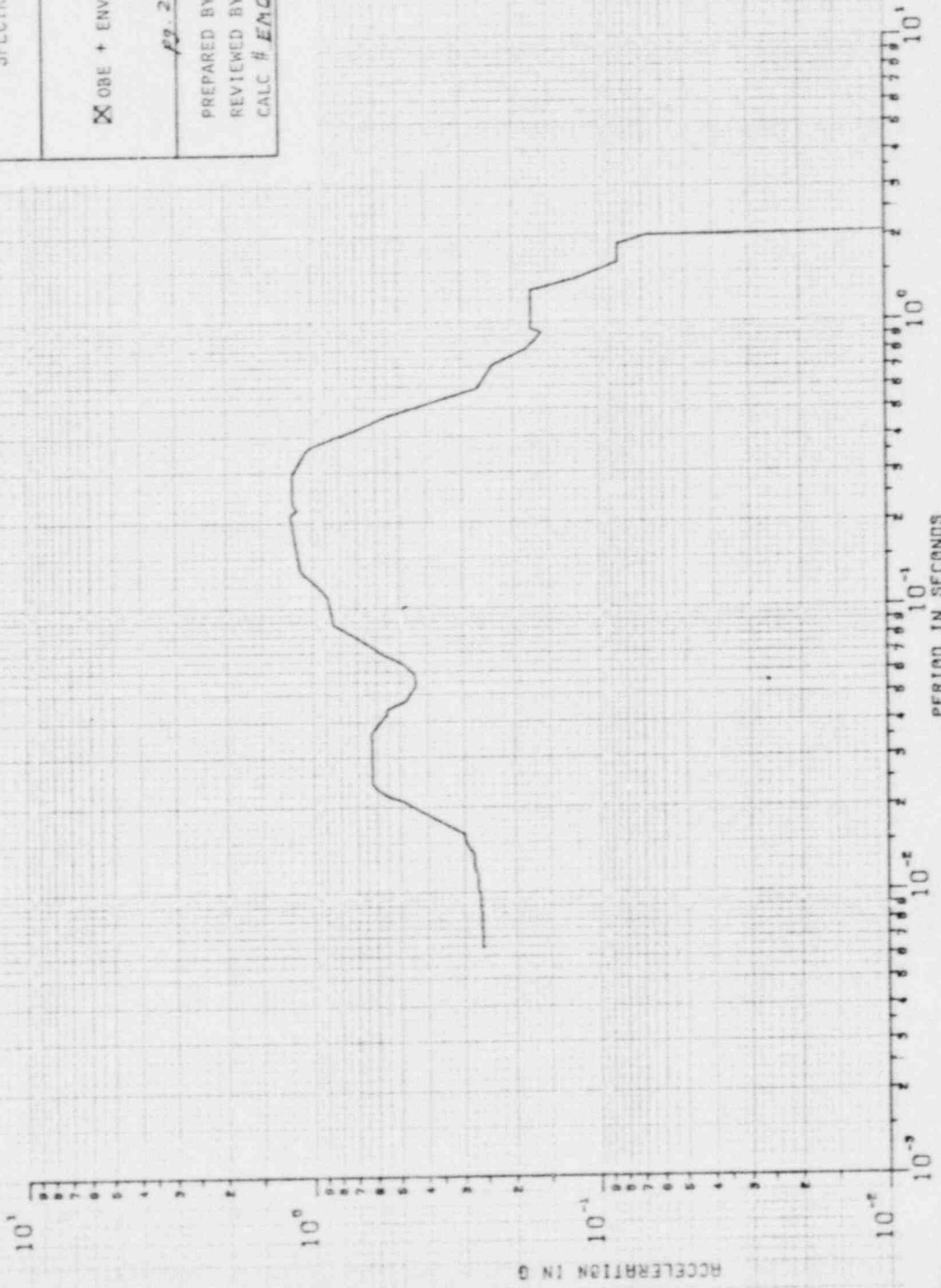
H0-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 526'-9'' REV. 00

Mc NEUFFELSESSEL CO. MADE IN U.S.A. VIBRATION ENGINEERING

RUN 10:773 BML 12/11/80

793BML END OF PLOT

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA	
SPECTRA COMBINATION METHOD - SPSS	
<input checked="" type="checkbox"/> OBE + ENVELOPE	<input type="checkbox"/> SRV-ASY-TQ + <input type="checkbox"/> SRV-ALL-TQ
pg. 27 of 60	
PREPARED BY: <i>Rouse M. Long</i>	DATE: 12/11/80
REVIEWED BY: <i>Tom Papadopoulos</i>	DATE: 12/11/80
CALC # <i>END # 087934</i>	DATE: 12/21/81

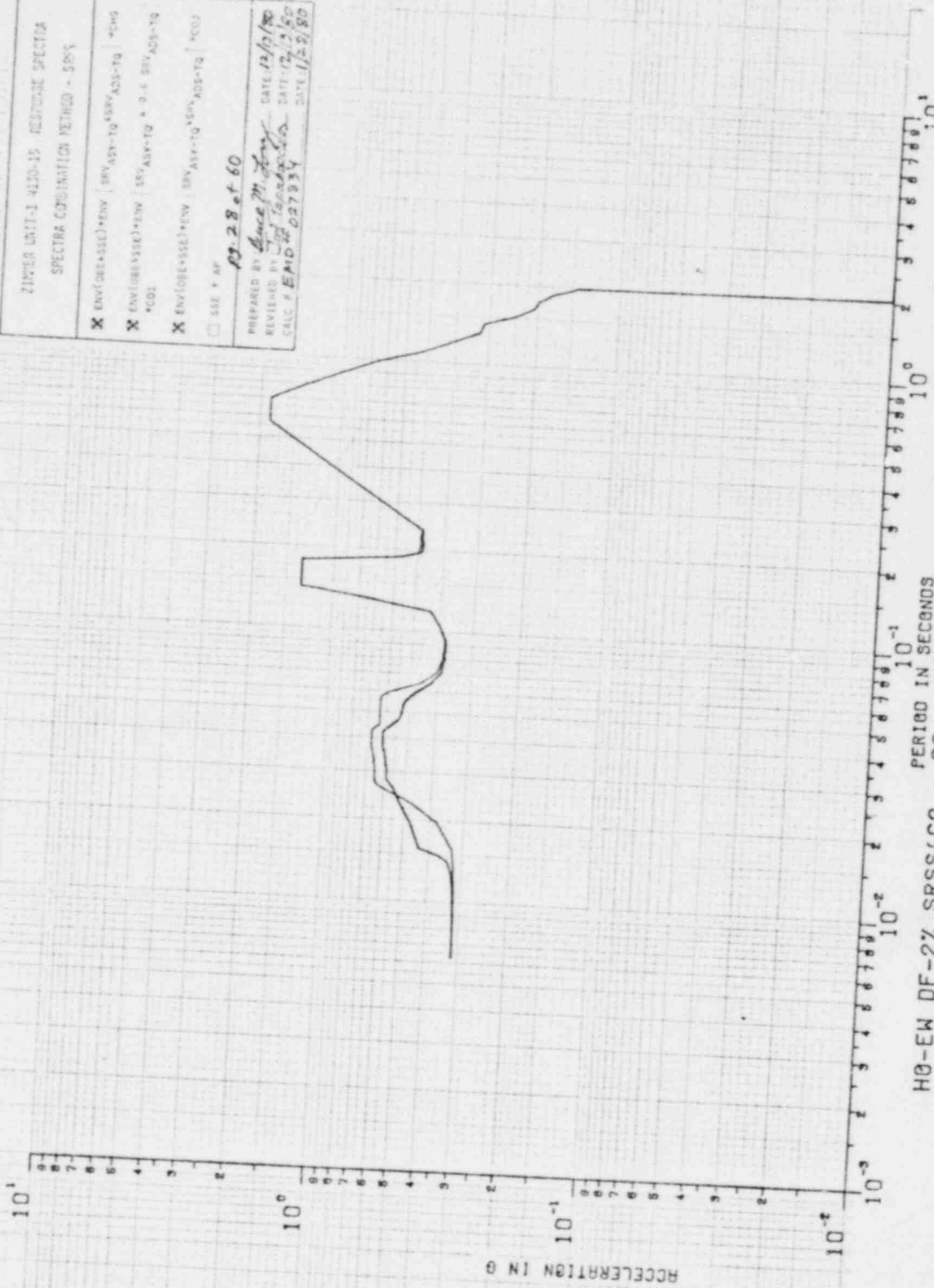


VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 526*-9** REV. 00

10% KEUFELEISSER CO. PRINTED IN U.S.A.

Run 10: 793 BML 12/11/80

ZIMMER UNIT-1 4120-15 RESPONSE SPECTRA
 SPECTRA COMPUTATION METHOD - 50%
 ENV(OBS+SSR)*ENV | 3RV,ASX-10,ASRY,ASZ-7g | *CMS
 ENV(OBS+SSR)*ENV | 3RV,ASX-10,ASRY,ASZ-7g | *CMS
 ENV(OBS+SSR)*ENV | 3RV,ASX-10,ASRY,ASZ-7g | *CMS
 SSE * AF
 09-28-80
 PREPARED BY *George M. [unclear]* DATE: 12/13/80
 REVIEWED BY *[unclear]* DATE: 12/13/80
 CALC / ENID-027834 DATE: 1/22/80



H0-EW DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 526'-9" REV. 00
 PERIOD IN SECONDS
 10^-3 10^-2 10^-1 10^0 10^1
 10^-2 10^-1 10^0 10^1
 10^0 10^1

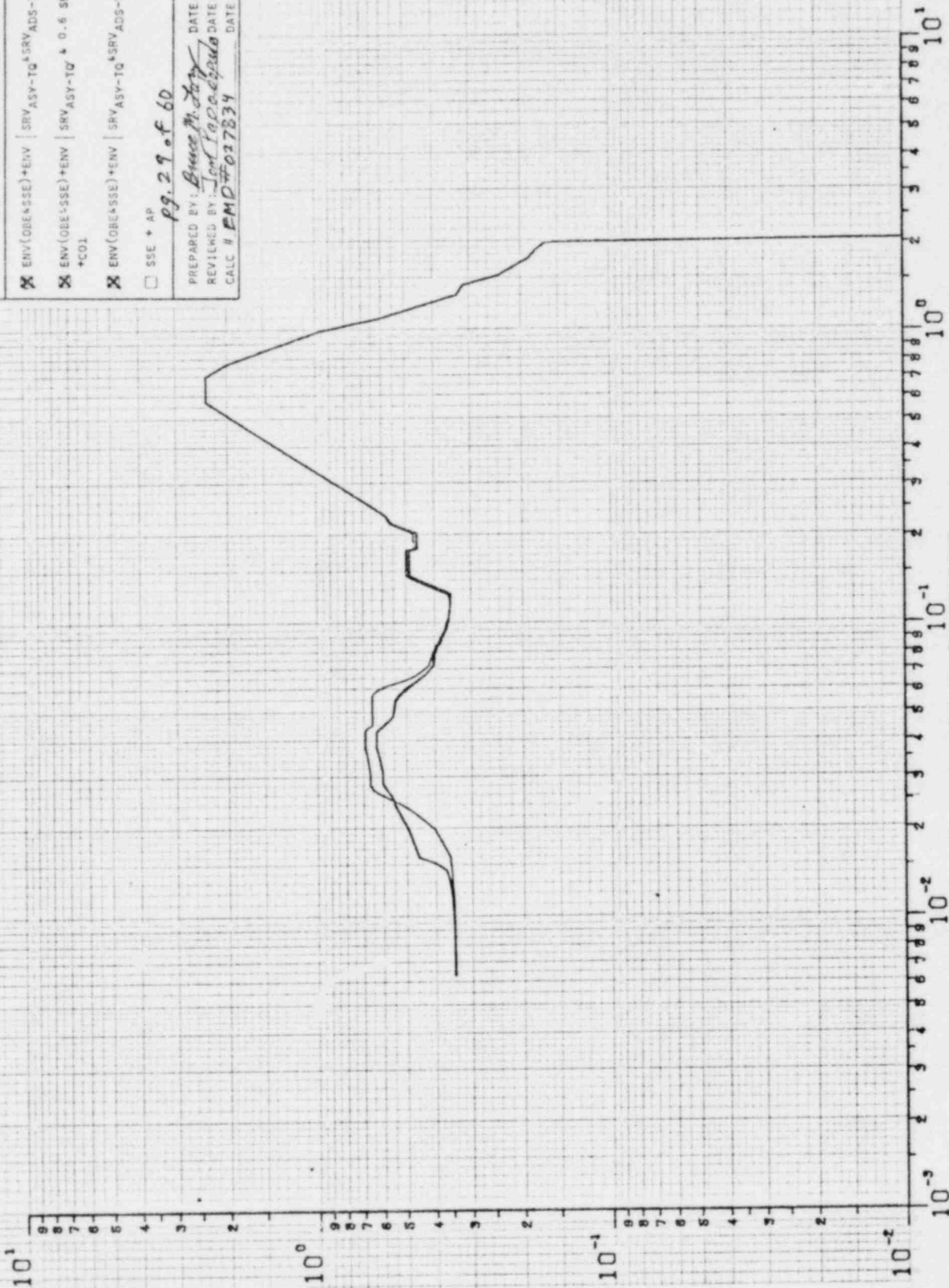
Run ID: 053 BML 12/13/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV | SRV ASY-TQ⁶SRV ADS-TQ | *CHG
- ENV(OBE+SSE)+ENV | SRV ASY-TQ⁴ | 0.6 SRV ADS-TQ
+COI
- ENV(OBE+SSE)+ENV | SRV ASY-TQ⁶SRV ADS-TQ | *COZ
- SSE + AP

pg. 29 of 60

PREPARED BY: Bruce M. Stary DATE: 11/10/80
REVIEWED BY: Jon L. C. C. C. DATE: 12/13/80
CALC # FMD#017834 DATE: 11/27/81



PERIOD IN SECONDS

H0-NS DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT ALL 526'-9" REV. 00

U.S. NUCLEAR REGULATORY COMMISSION

RUN ID: 053 BML 12/13/80

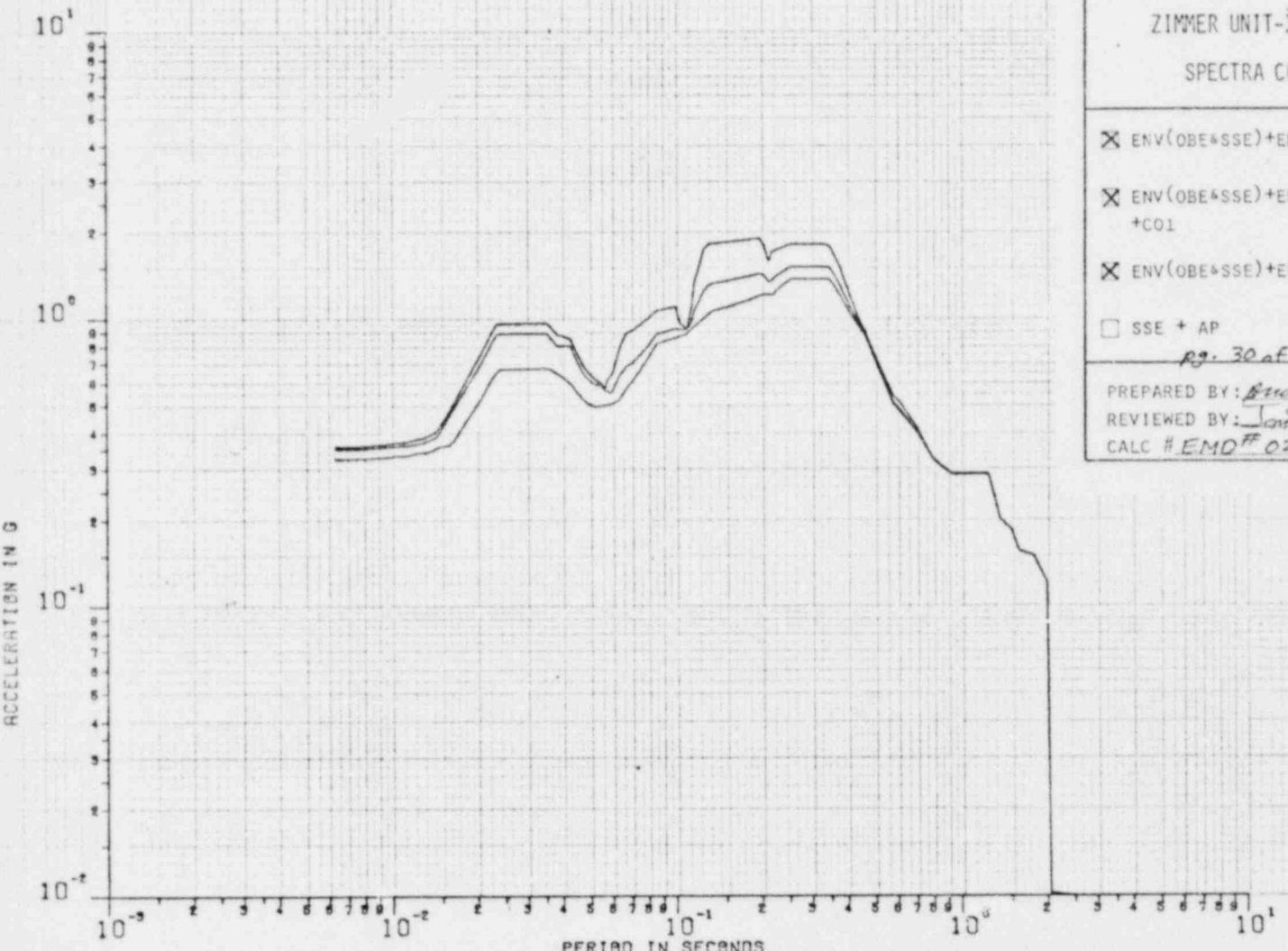
053BML END OF PLOT. TIME: 0.12

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}⁵SRV_{ADS-TQ} | +CHG
 ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}⁵ 0.6 SRV_{ADS-TQ} | +C01
 ENV(OBE+SSE)+ENV | SRV_{ASY-TQ}⁵SRV_{ADS-TQ} | +C02
 SSE + AP

pg. 30 of 60

PREPARED BY: *Eric M. Long* DATE: *12/13/80*
 REVIEWED BY: *Jon Papadopoulos* DATE: *12/13/80*
 CALC # *EMD# 027834* DATE: *1/23/81*



VW-VW DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 526'-9" REV. 00

K&E NEUFELDESSER CO. PRINTED IN U.S.A. TEL: (714) 961-1100

RUN ID: 033 BML 12/13/80

A48BML 12/17/80

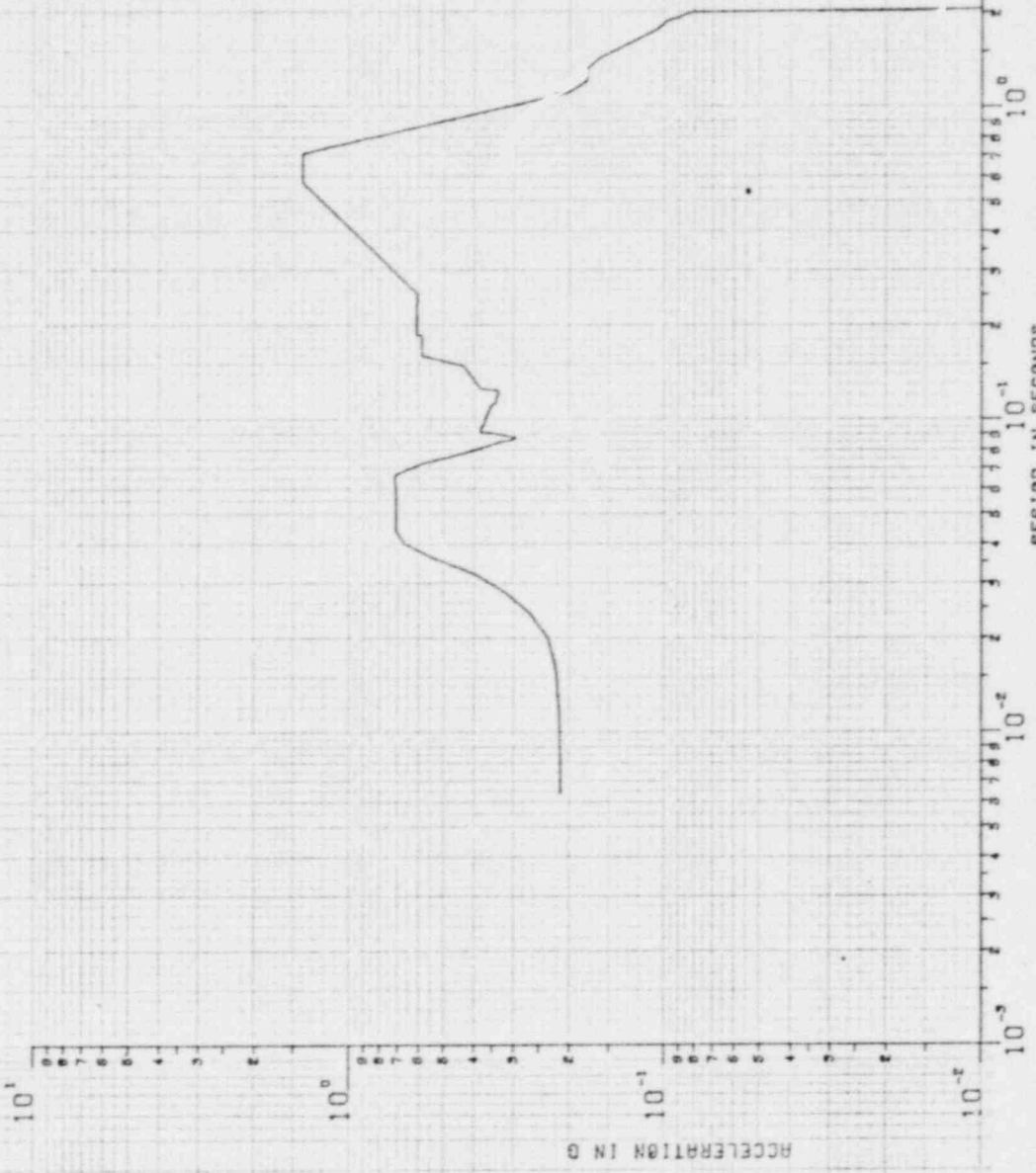
388

ZIMMER UNIT 1 4030-25 RESPONSE SPECTRA
 SPECTRA COMPUTATION METHOD - STSS

X OBE + ENVELOPE | SRV ASSY TO * SRV ALL TO

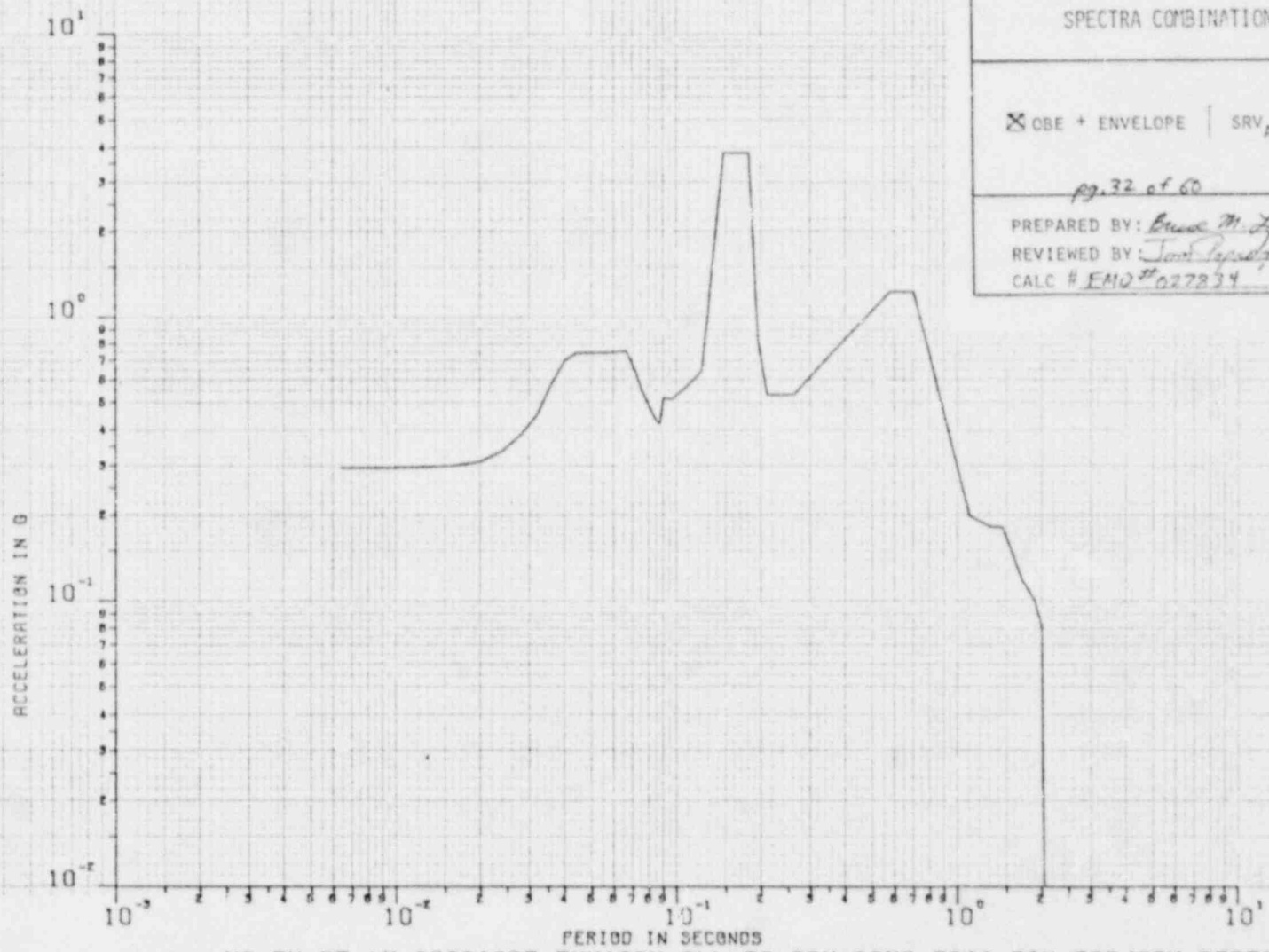
83-31 of 60

PREPARED BY: Bruce M. Long DATE: 12/17/80
 REVIEWED BY: Tom G. ... DATE: 12/17/80
 CALC: EMD 021834 DATE: 12/8/80



HO-NS DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM TOP/RPV PEDESTAL 542*-9

RUN ID: A48 BML 12/17/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 32 of 60

PREPARED BY: Bruce M. Levy DATE: 12/17/80
 REVIEWED BY: John Papadopoulos DATE: 12/17/80
 CALC # EMQ#027234 DATE: 1/28/81

H0-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM TOP/RPV PEDESTAL 542'-9"

RUN ID: A48 BML 12/17/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA SPECTRA COMBINATION METHOD - SRSS	
<input checked="" type="checkbox"/> OBE + ENVELOPE	<input type="checkbox"/> SRV ASY-TQ + SRV ALL-TQ
Pg. 33 of 60	
PREPARED BY: Bruce M. Gray	DATE: 12/2/80
REVIEWED BY: Tom Papadopoulos	DATE: 12/7/80
CALC # EMD # 027834	DATE: 11/23/81



VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM TQP/RPV FEDESTAL 542*-9**

USE NEUTRALIZER CO. FOR ALL NEUTRALIZER SYSTEMS

RUN ID: 445 BML 12/17/80

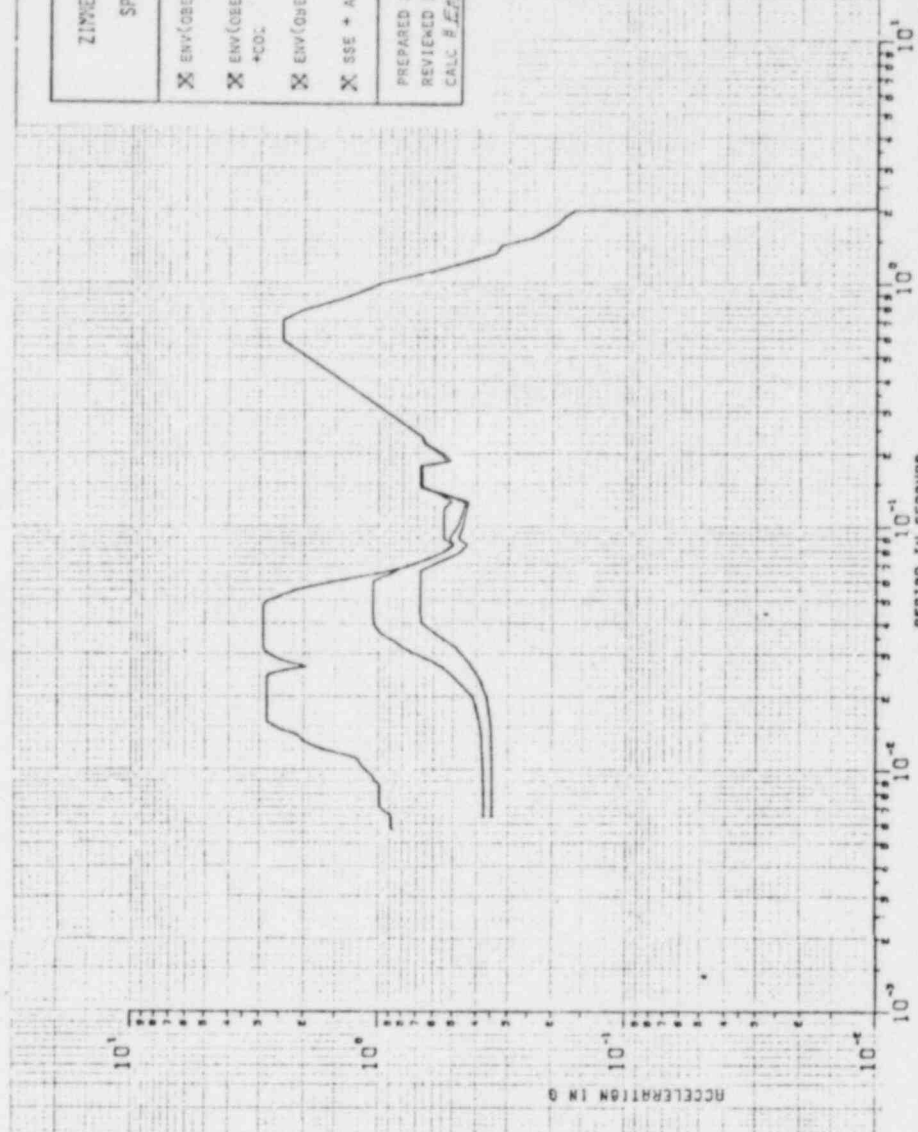
263E

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBS+SSE)*ENV | SRV ASY-TQ | SRV ADS-TQ | *CMS
- ENV(OBS+SSE)*ENV | SRV ASY-TQ + 0.6 SRV ADS-TQ | *CO2
- ENV(OBS+SSE)*ENV | SRV ASY-TQ | SRV ADS-TQ | *CO2
- SSE + AP

12.34 at 60

PREPARED BY: *Steve M. Day* DATE: 12/29/80
 REVIEWED BY: *Tom R. ...* DATE: 12.29.80
 CALC: *B. ENG...* DATE: 12/29/80



HC-NS OF-2% SRSS(C2 + C3 + C4 + C5) ZIM TOP/RPV PEDESTAL 542'-9" REV. 00
 RUN ID: 263 BML 12/29/80

263BML 12/29/80

392

440BML END OF PLOT

TIME: 0.12

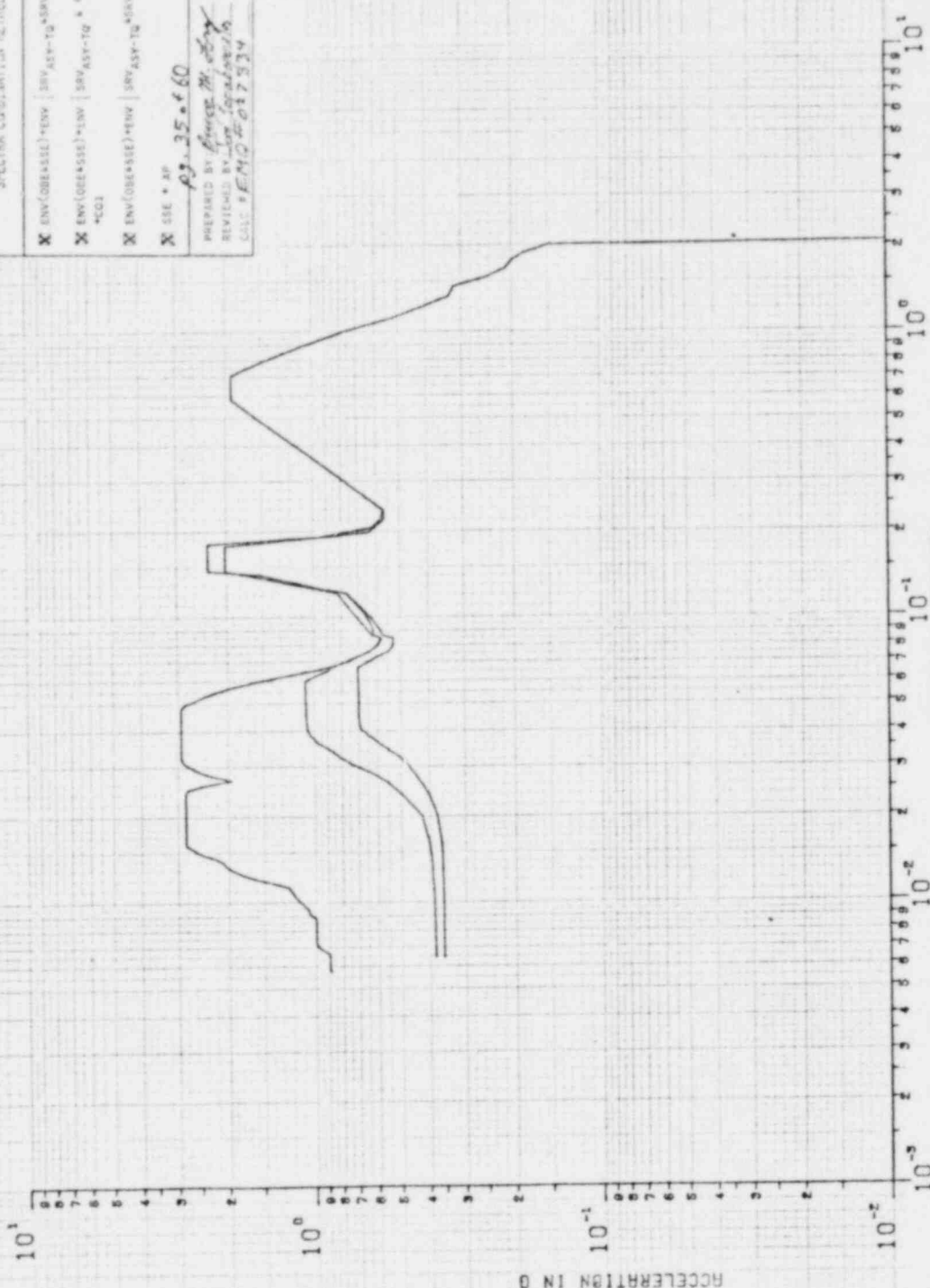
ME

ZIMMED UNIT-1 4130-05 RESPONSE SPECTRA
SPECTRA CORRELATION METHOD - SRSS

ENV(OBS+55E)+ENV | SRV_ASY-TQ | SRV_AOS-TQ | *CNG
 ENV(OBS+55E)+LOW | SRV_ASY-TQ | * 0.5 SRV_AOS-TQ
 *COI
 ENV(OBS+55E)+ENV | SRV_ASY-TQ | SRV_AOS-TQ | *COI
 SSE * AP

AP. 35.460

PREPARED BY: *George M. ...* DATE: 12/11/80
 REVIEWED BY: *...* DATE: 12/11/80
 CALC: FENG # 017334 DATE: 12/8/80



H0-EW DF-2% SRSS(C2 + C3 + C4 + C5) ZIM TOP/RPV PEDESTAL 542*-9** REV. 00

ME KEUFFELLESSERCO PRINTED IN U.S.A. RUN 10:440 BML 12/11/80

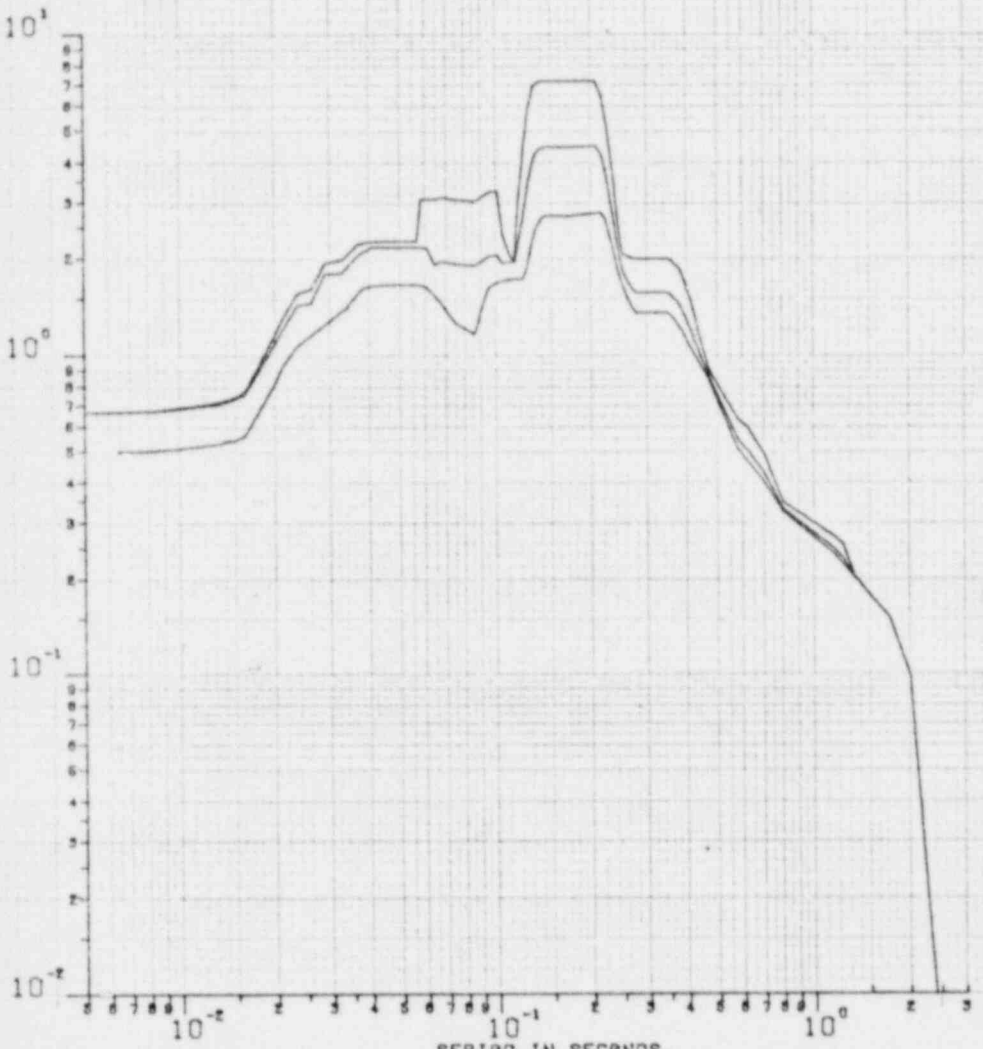
440BML 12/11/80 809

526BML END OF PLOT

TIME: 0.09

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

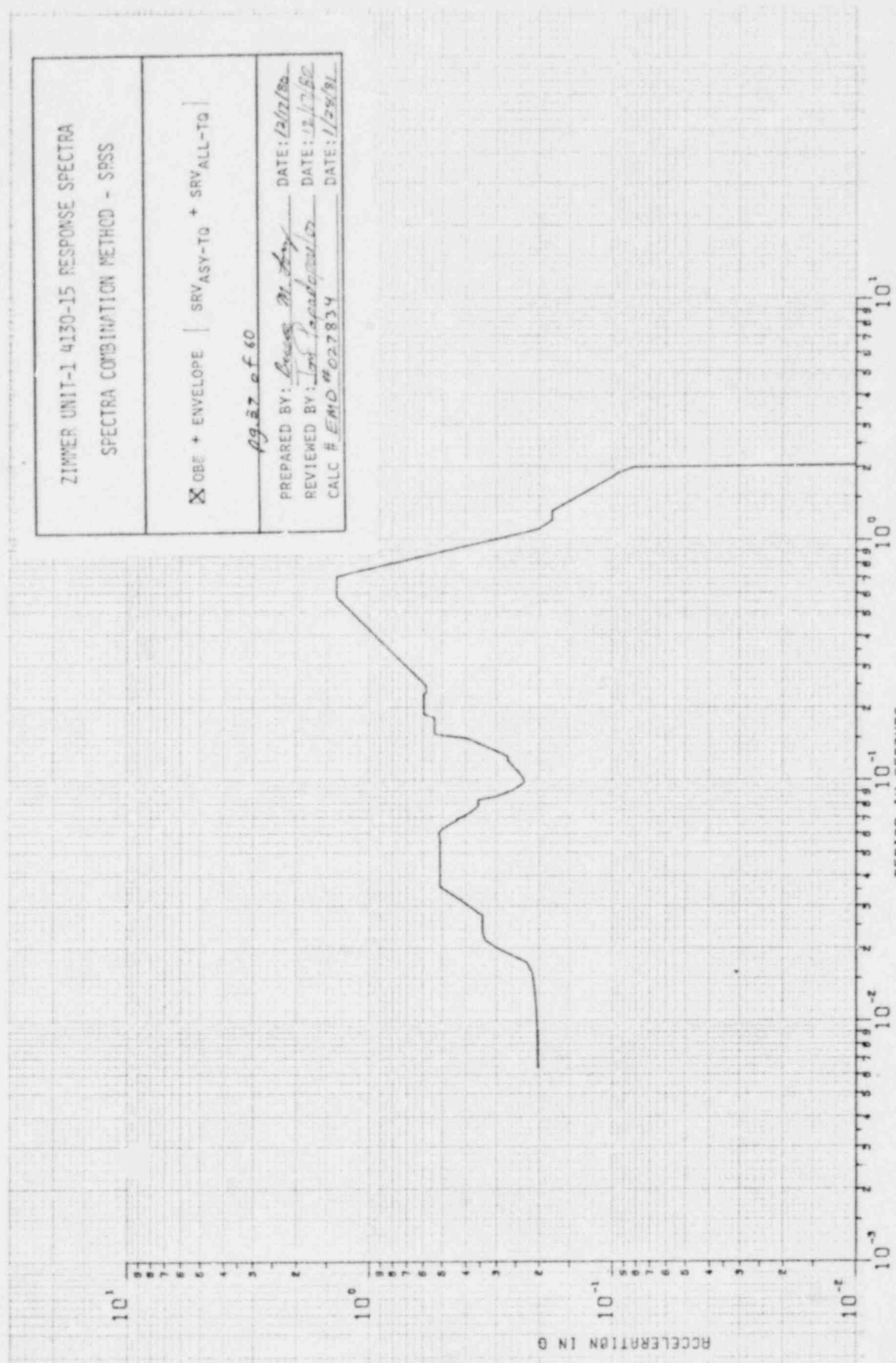
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁴SRV_{ADS-TQ}] +CHG
 - ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁴ + 0.6 SRV_{ADS-TQ}] +CO1
 - ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁴SRV_{ADS-TQ}] +CO2
 - SSE + AP
- pg. 36 of 60*
- PREPARED BY: *Eric M. Low* DATE: *2/3/81*
 REVIEWED BY: *Tom Papadopoulos* DATE: *2-3-81*
 CALC # *EMD 027834* DATE: *1/21/81*



VW-VW DF-2% SRSS(C2 + C3 + C4 + C5) ZIM TOP/RPV PEDESTAL 542'-9" REV. 00

RUN ID: 526BML 02/03/81

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA	
SPECTRA COMBINATION METHOD - SPSS	
<input checked="" type="checkbox"/> OBE + ENVELOPE	<input type="checkbox"/> SRV ASY-TQ + SRV ALL-TQ
Pg. 27 of 60	
PREPARED BY: <u>James M. Ay</u>	DATE: <u>12/2/80</u>
REVIEWED BY: <u>Tom Papadopoulos</u>	DATE: <u>12/17/80</u>
CALC # <u>EMD #027834</u>	DATE: <u>1/29/81</u>

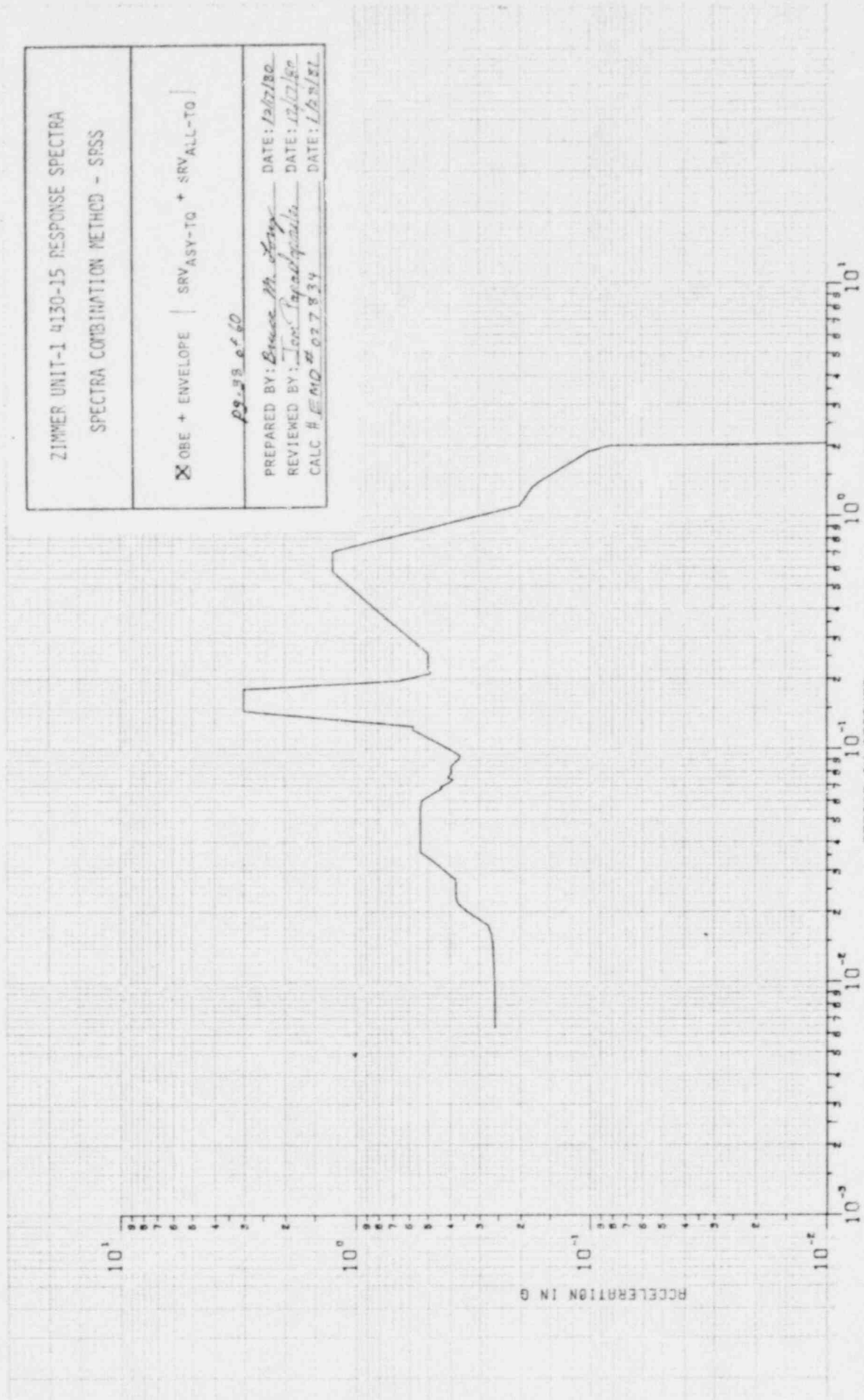


HQ-NS OF -1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 544*-10** REV 0

RUN ID: 448 BAIL 12/17/80

ENGINE NEUFELDESSELD CO

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA	
SPECTRA COMBINATION METHOD - SPSS	
<input checked="" type="checkbox"/> OBE + ENVELOPE	<input type="checkbox"/> SRV _{ASY-TQ} + <input type="checkbox"/> SRV _{ALL-TQ}
<i>pg. 58 of 60</i>	
PREPARED BY: <i>Bruce M. Long</i>	DATE: <i>12/17/80</i>
REVIEWED BY: <i>Tom Papadimitriou</i>	DATE: <i>12/17/80</i>
CALC # <i>EMD # 077834</i>	DATE: <i>1/23/81</i>



HQ-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-RSY3-TQ)) ZIM CONT WALL 544'-10" REV 0

RUN 10: A48 BML 12/17/80

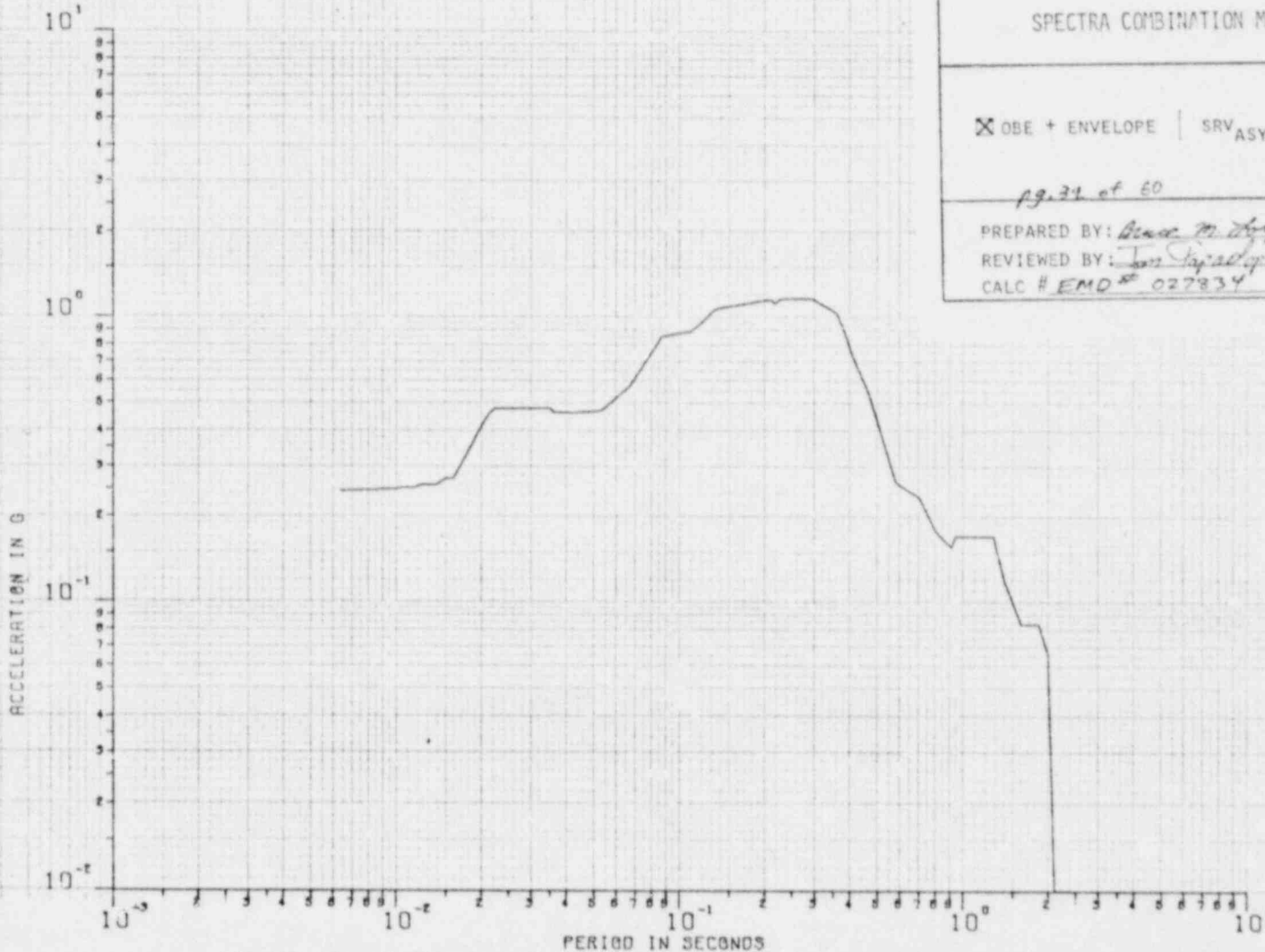
VEE RESEARCH CO. 4000 15th St. Berkeley, CA 94710

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

⊗ OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

19.31 of 60

PREPARED BY: Gene M. Day DATE: 12/17/80
REVIEWED BY: Tom Szabadkai DATE: 12/17/80
CALC # EMD # 027834 DATE: 1/22/81



VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CNT WALL 544'-10'' REV 0

RUN 10: A48 BML 12/17/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMPUTATION METHOD - 2005

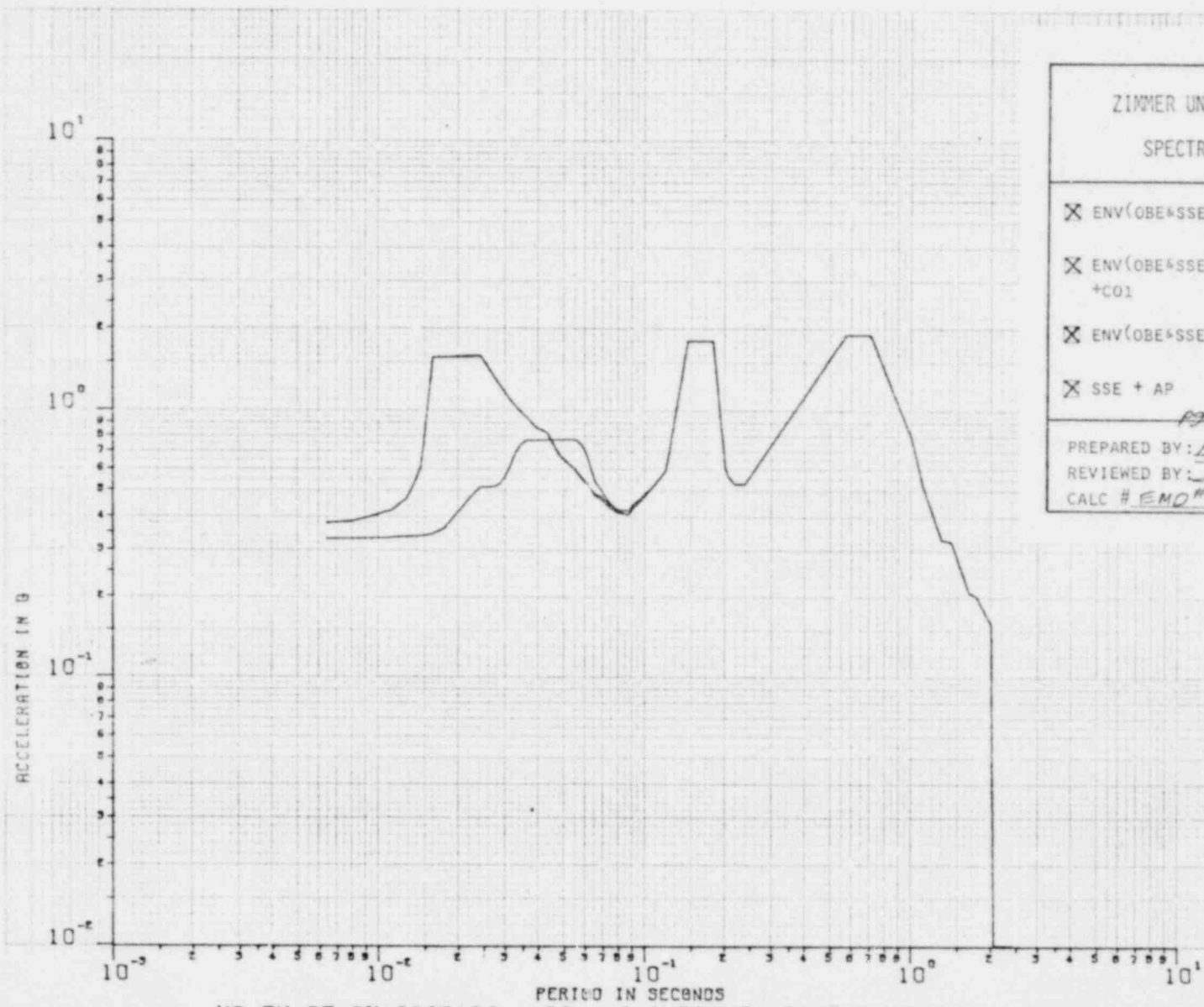
ENVIRONMENTAL VIBRATION
 ENVIRONMENTAL VIBRATION
 ENVIRONMENTAL VIBRATION
 SEA + AIR

PREPARED BY: *EMC* DATE: 12/15/80
 REVIEWED BY: *J. J. ...* DATE: 12/15/80
 CALC. BY: *EMC* DATE: 12/15/80



HQ-NS OF -2% SRSS(C2 + C3 + C4) ZIMMER CONFINEMENT WALL 544'-10" REV. 00

RUN 10:264 BML 12/15/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

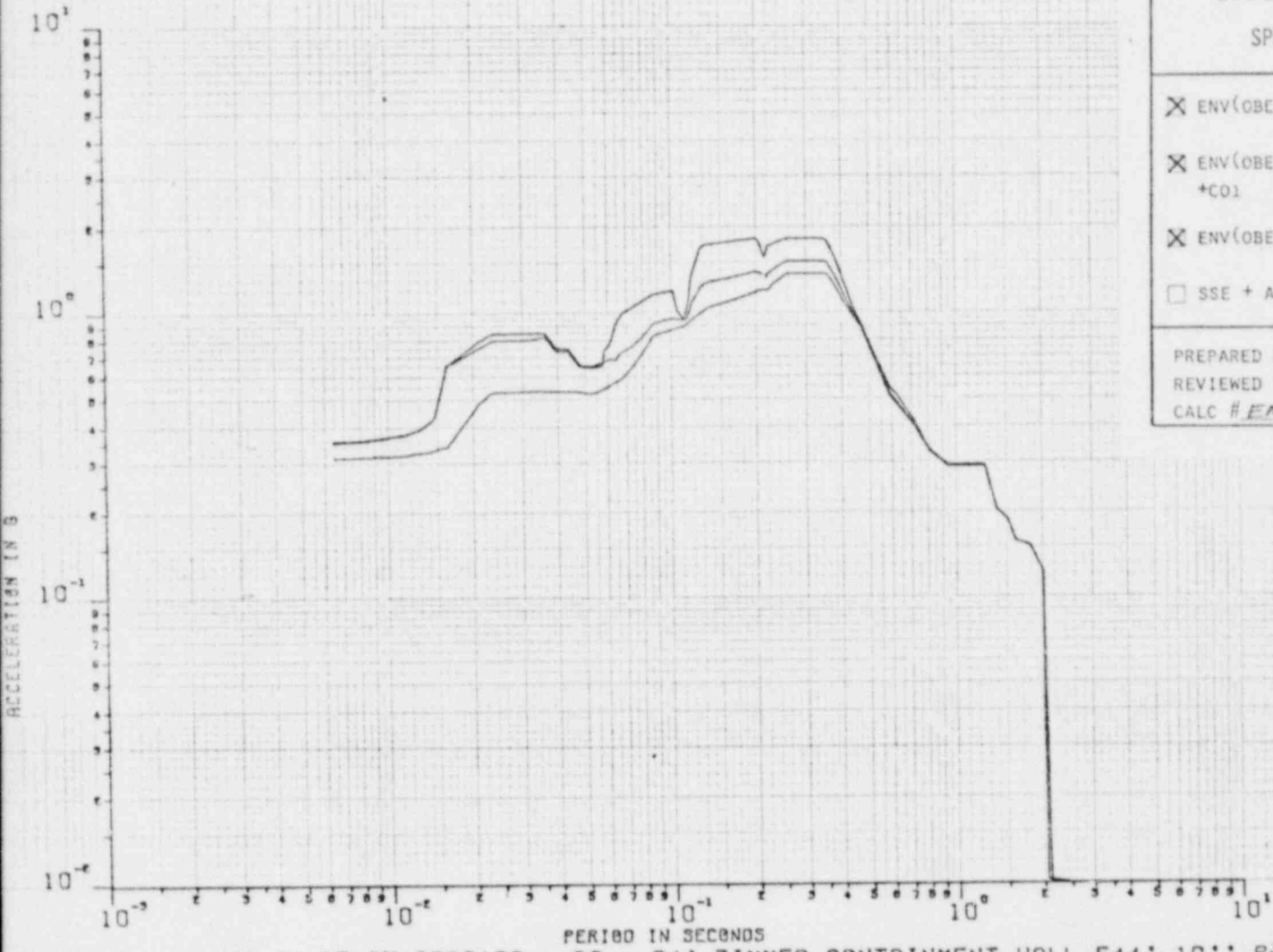
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} + SRV_{ADS-TQ}] +CHG
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} * 0.6 SRV_{ADS-TQ}] +C01
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ} + SRV_{ADS-TQ}] +C02
- SSE + AP

pg. 41 of 60

PREPARED BY: Bruce R. Ferry DATE: 12/15/80
 REVIEWED BY: Tom Spadigalis DATE: 12/15/80
 CALC # EMD#027534 DATE: 1/29/81

H0-EW DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 544'-10'' REV. 00

RUN ID: 284 RML 12/15/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}^kSRV_{ADS-TQ}] +CHG
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}^k * 0.6 SRV_{ADS-TQ}] +CO1
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}^kSRV_{ADS-TQ}] +CO2
- SSE + AP

pg 42 of 60

PREPARED BY: Bruce H. Fry DATE: 12/15/80
 REVIEWED BY: J. Papadopoulos DATE: 12/15/80
 CALC # EMD# 027839 DATE: 1/22/81

VW-VW DF-2% SRSS(C2 + C3 + C4) ZIMMER CONTAINMENT WALL 544'-10'' REV. 00

10-E NEUFREL DESIGN CO. PROVIDENCE, R.I. FULLY AUTOMATIC SUBMITTER

RUN ID: 284 BML 12/15/80

284BML END OF PLOT

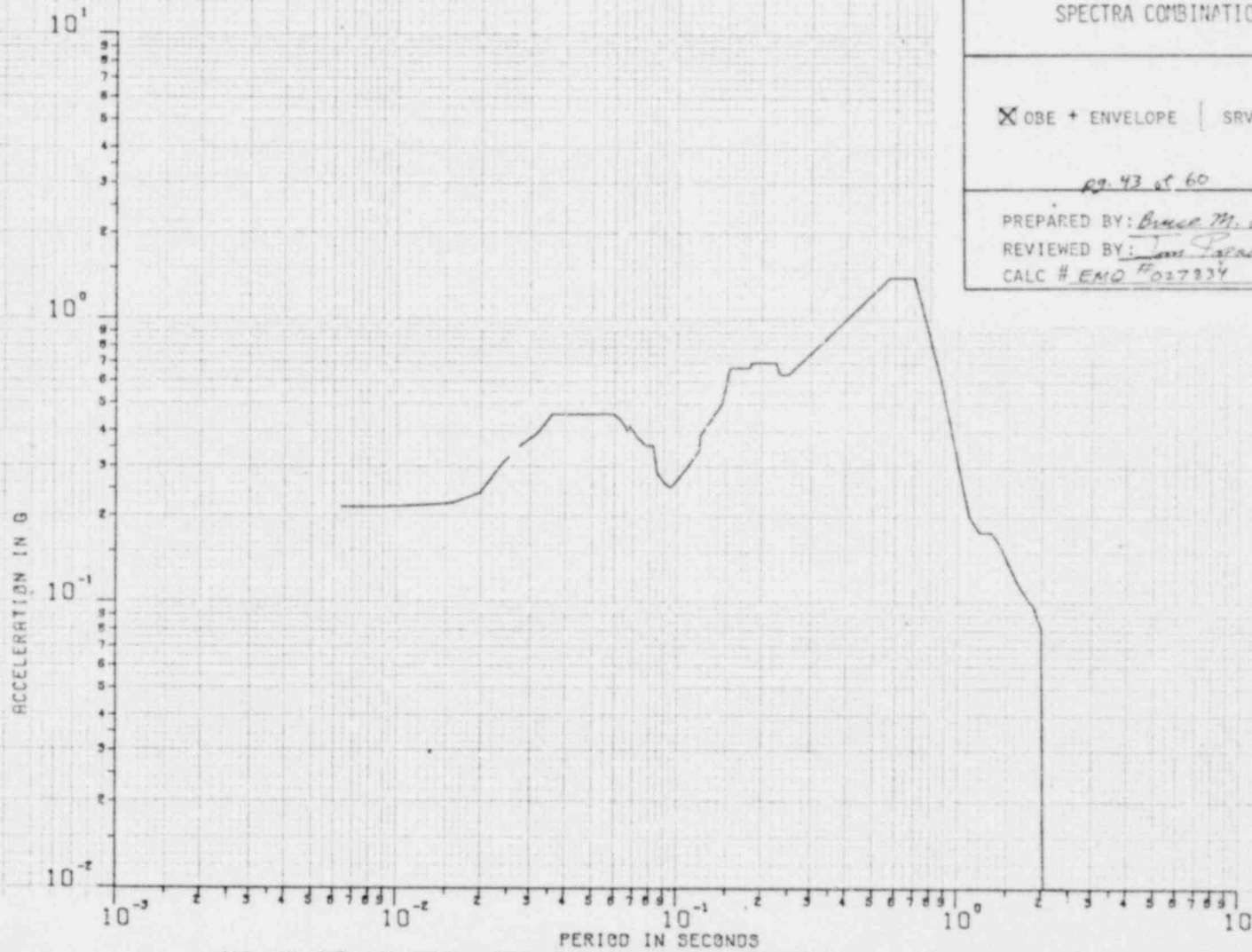
TIME: 0.11

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

RS. 43 & 60

PREPARED BY: Bruce M. Long DATE: 12/17/80
REVIEWED BY: Tom Landwehr DATE: 12/17/80
CALC # EMQ #027224 DATE: 1/28/81



H0-NS DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 570'-6'' REV 00

RUN ID: A48 BML 12/17/80

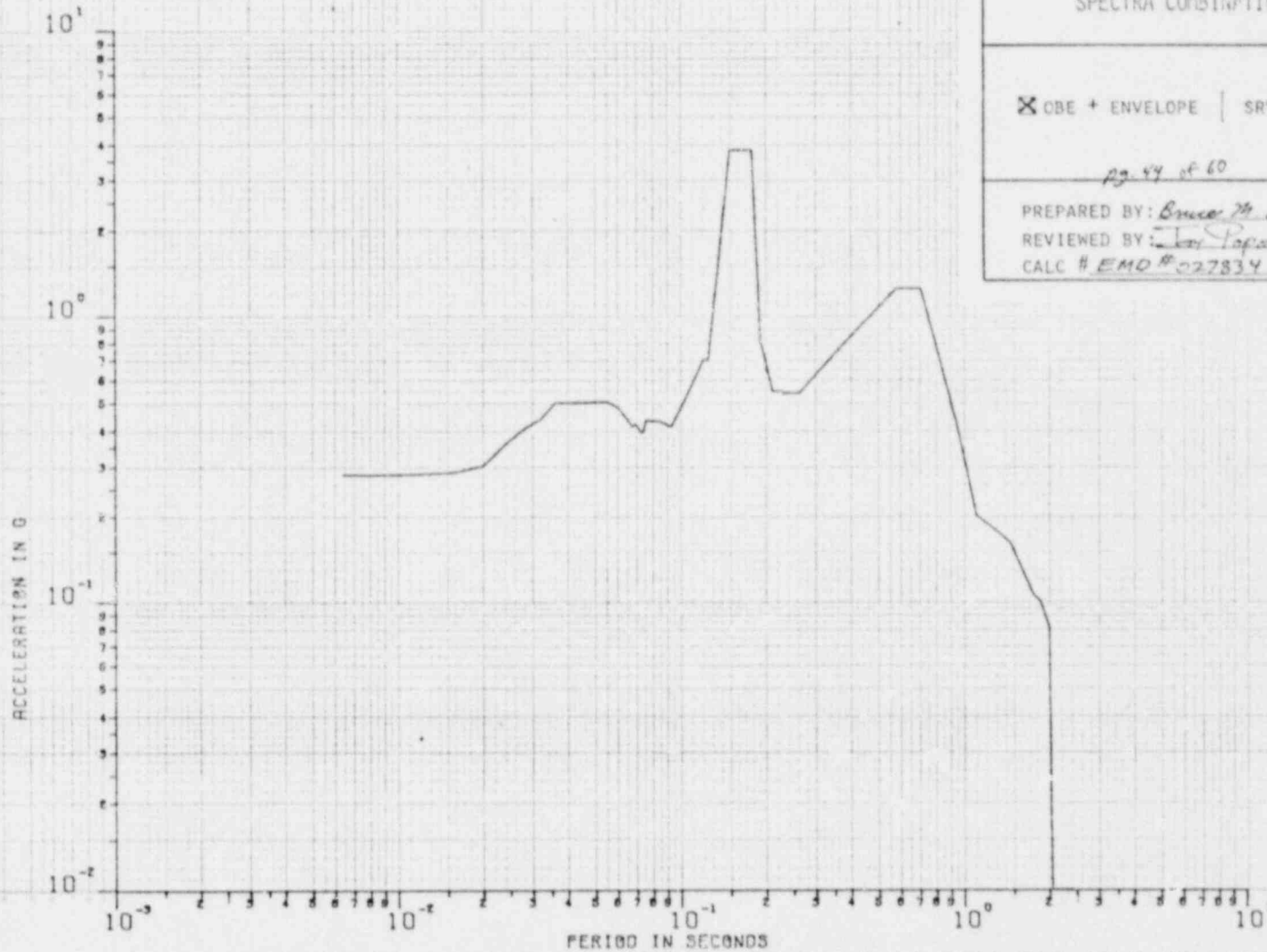
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SPSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 44 of 60

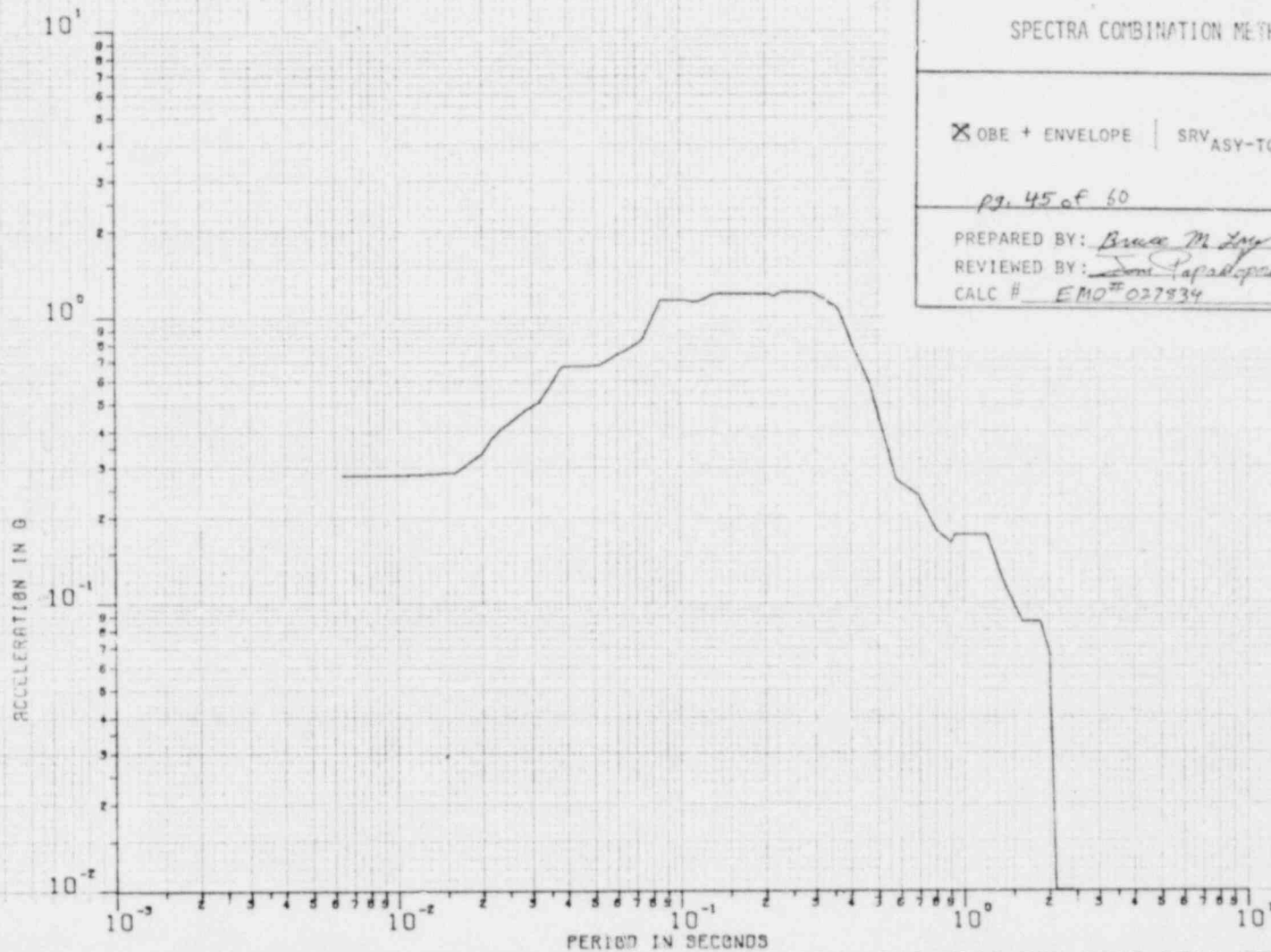
PREPARED BY: Bruce M. Long DATE: 12/17/80
 REVIEWED BY: Tom Papadopoulos DATE: 12/17/80
 CALC # EMO # 027834 DATE: 1/22/81



H0-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CO'VT WALL 570'-6'' REV 00

RUN 10: A48 PML 12/17/80

W.C. KELLY ENGINEERING CO. 1000 W. 14th St. Phoenix, AZ 85007



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 45 of 60

PREPARED BY: Bruce M. Long DATE: 12/17/80

REVIEWED BY: James Papadopoulos DATE: 12/17/80

CALC # EMO#037834 DATE: 1/28/81

VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT WALL 570'-6'' REV 00

RUN ID: 448 BML 12/17/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA CORRELATION METHOD - SRS

ENV(OBSERVED) - DIV 1000 ASY-10⁰ ASY-AOS-10⁰ - 1000
 ENV(OBSERVED) - NEW 1000 ASY-10⁰ * 2.5 1000 ASY-10⁰ - 1000
 ENV(OBSERVED) - NEW 1000 ASY-10⁰ ASY-AOS-10⁰ - 1000
 SEE * JP

Fig. 16 of 60

PREPARED BY *James M. King* DATE *12/15/80*
 REVISION BY *Jim Thompson* DATE *12/17/80*
 CALL # *ENC 60 1514* DATE *12/23/80*



H0-NS DF-2% SRSS(C2 + C3 + C4) ZIM CONTAINMENT WALL ELEV. 570'-6" REV. 00

RUM 10:222 BML 12/15/80

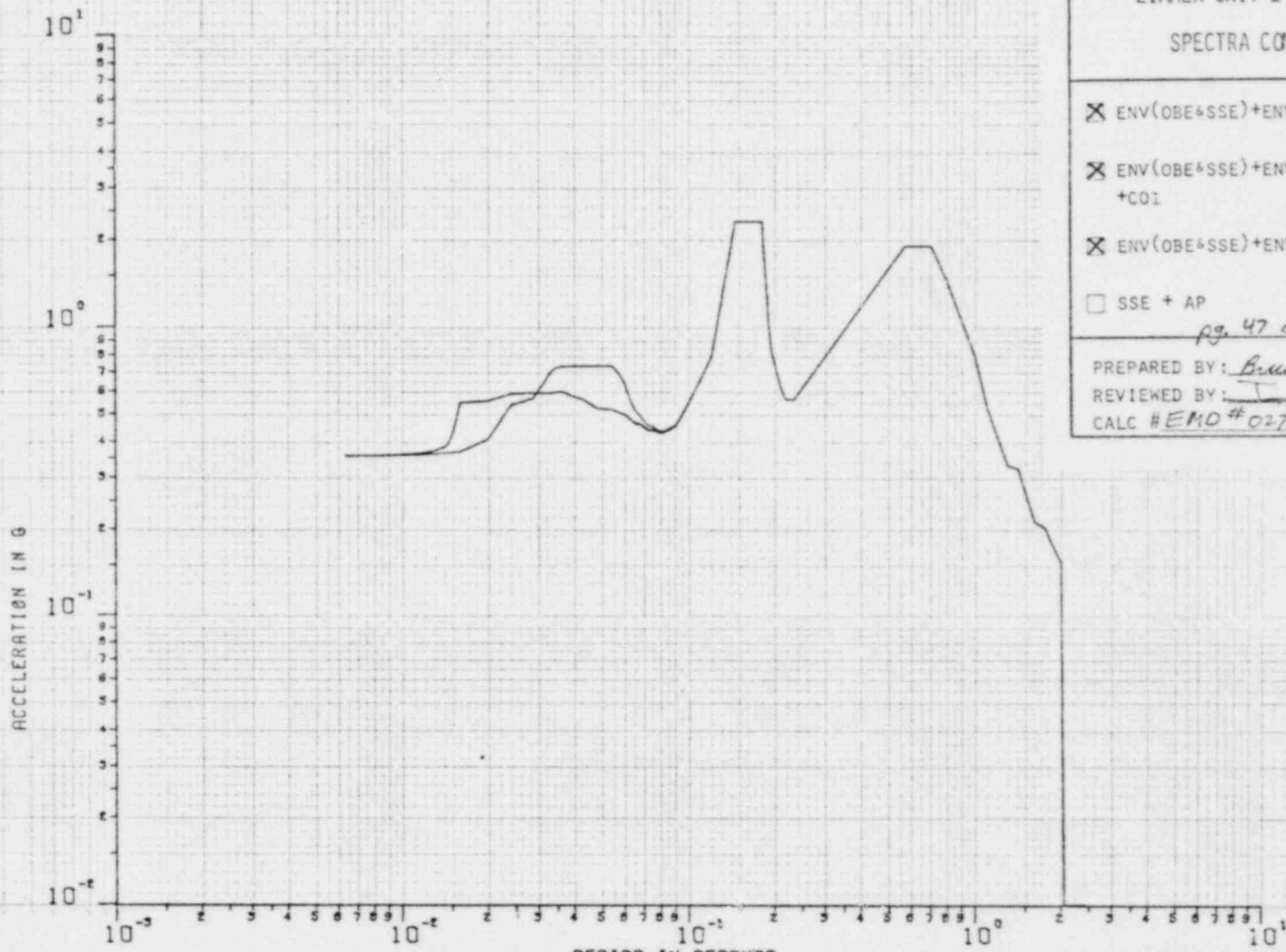
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁶SRV_{ADS-TQ}] +CHG
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁶ 0.6 SRV_{ADS-TQ}] +CO1
- ENV(OBE+SSE)+ENV [SRV_{ASY-TQ}⁶SRV_{ADS-TQ}] +CO2
- SSE + AP

pg. 47 of 60

PREPARED BY: Bruce M. Torg DATE: 12/15/80
 REVIEWED BY: James Papadopoulos DATE: 12/15/80
 CALC # EMD # 027834 DATE: 1/24/81



H0-EW DF-2% SRSS(C2 + C3 + C4) ZIM CONTAINMENT WALL ELEV. 570'-6" REV. 00

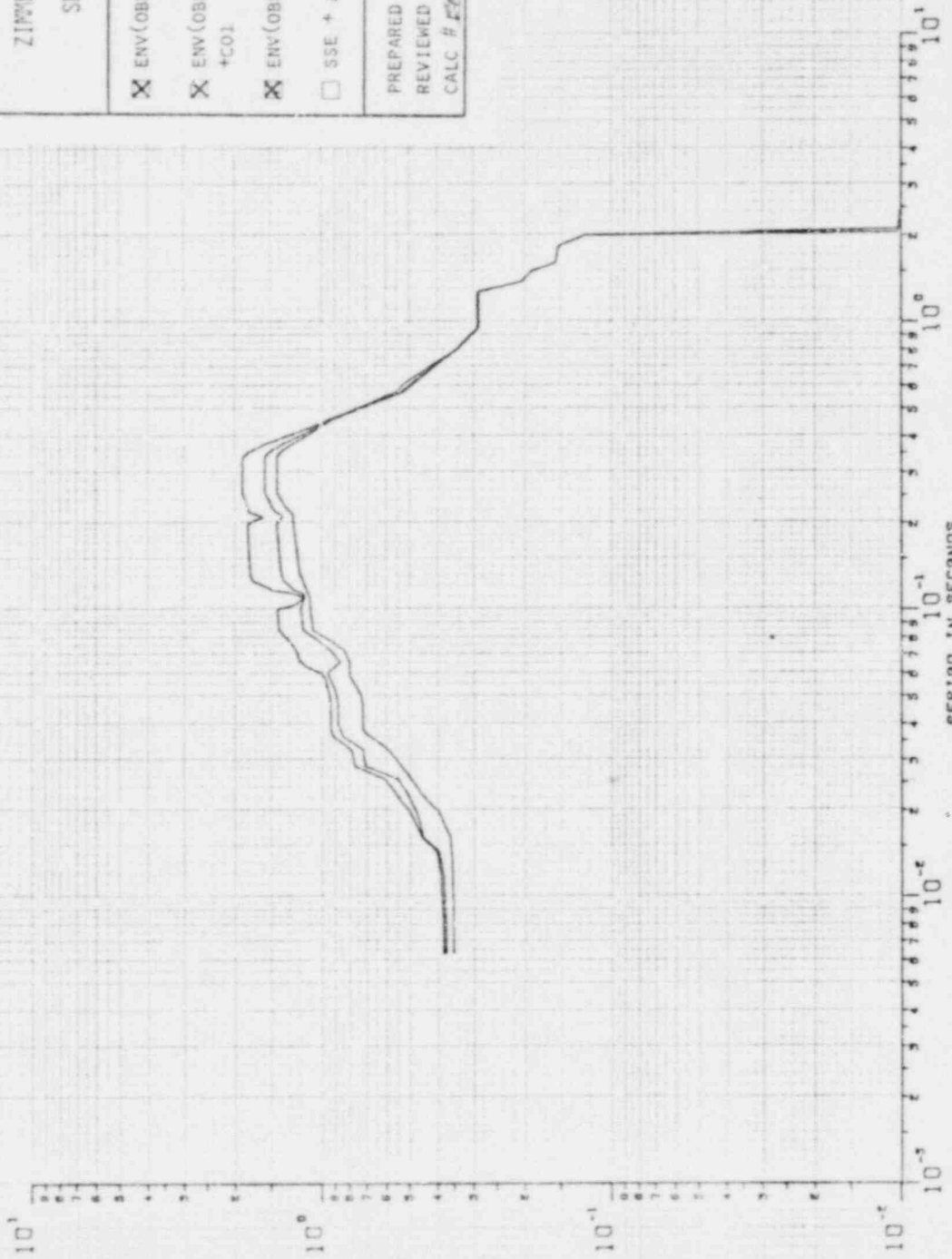
NE NEUFFEL & ESSER CO. ENGINEERS ARCHITECTS

RUN 10:222 BML 12/15/80

222BML END OF PLOT

TIME: 0.11

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA	
SPECTRA COMBINATION METHOD - SRSS	
<input checked="" type="checkbox"/> ENV(OBE+SSE)+ENV SRV ASY-TQ +SRV ADS-TQ +CMG <input checked="" type="checkbox"/> ENV(OBE+SSE)+ENV SRV ASY-TQ * 0.6 SRV ADS-TQ +CO1 <input checked="" type="checkbox"/> ENV(OBE+SSE)+ENV SRV ASY-TQ +SRV ADS-TQ +CO2 <input type="checkbox"/> SSE + AP	<p style="text-align: center;"><i>Pg. 48 of 60</i></p> <p>PREPARED BY: <i>Bruce M. Long</i> DATE: 12/15/80 REVIEWED BY: <i>James J. Padgett</i> DATE: 12/15/80 CALC # <i>END 027334</i> DATE: 1/8/81</p>



VW-VW DF-2% SRSS(C2 + C3 + C4) ZIM CONTAINMENT WALL ELEV. 570'-6" REV. 00

RW 10:272 BML 12/15/80
 K&E KUTTFELBESSED

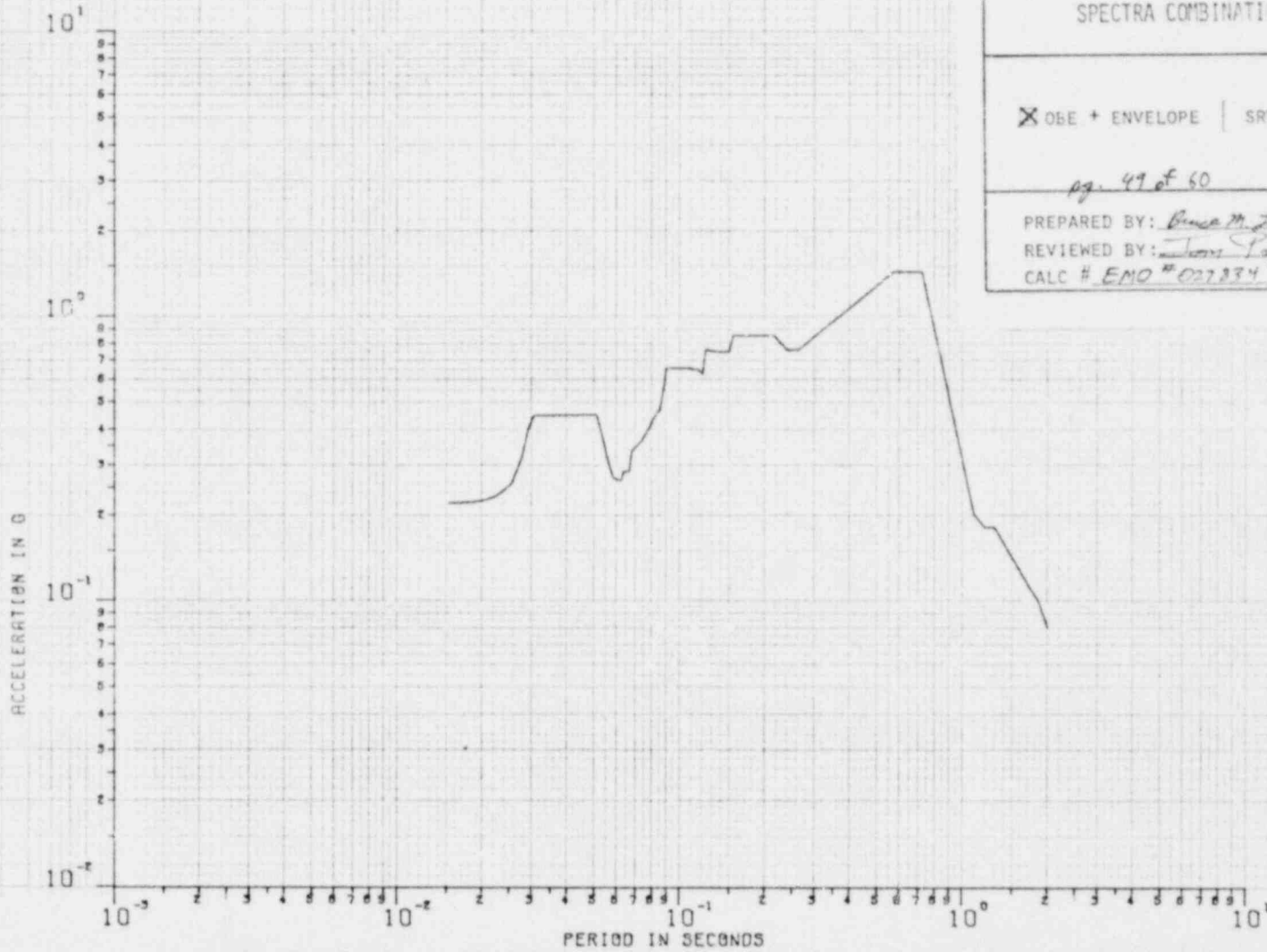
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 49 of 60

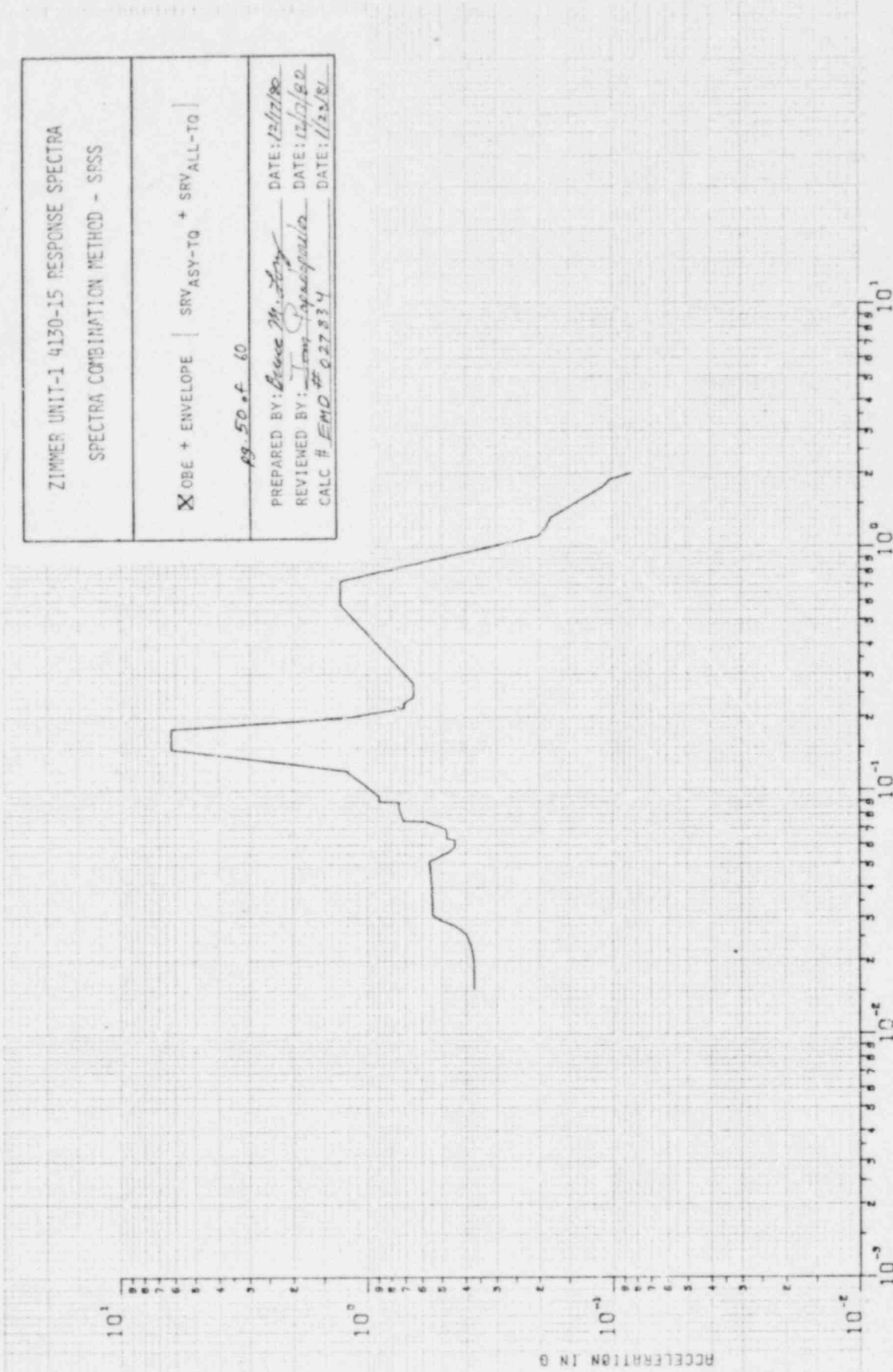
PREPARED BY: Bruce M. Long DATE: 12/17/80
REVIEWED BY: Tom Papadopoulos DATE: 12/17/80
CALC # EMO # 027334 DATE: 1/23/81



HQ-NS OF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM BISHIELD WALL 590'-.5''

RUN ID: A48 BML 12/17/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA	
SPECTRA COMBINATION METHOD - SRSS	
<input checked="" type="checkbox"/> OBE + ENVELOPE	<input type="checkbox"/> SRV _{ASY-TQ} + SRV _{ALL-TQ}
Pg. 50 of 60	
PREPARED BY: <i>Steve M. Long</i>	DATE: 12/17/80
REVIEWED BY: <i>Tom S. [unclear]</i>	DATE: 12/17/80
CALC # <i>EMO # 027.834</i>	DATE: 11/23/81



HQ-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM BISHIELD WALL 590'-.5''

RUN ID: A48 BAIL 12/17/80

SEE RESULTS SHEET

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA SPECTRA COMBINATION METHOD - SPSS	
<input checked="" type="checkbox"/> OBE + ENVELOPE	<input type="checkbox"/> SRV_ASY-TQ + SRV_ALL-TQ
19.51 of 60	
PREPARED BY: Bruce M. Long	DATE: 12/18/80
REVIEWED BY: Joan Papadopoulos	DATE: 12/17/80
CALC # EMO# 027336	DATE: 1/22/81



VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM BIOSHIELD WALL 590--.S..

NOV 10:46 AM 12/17/80

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRUM
 SPECTRA CORINATION METHOD - SRSS

ENV(OBSERVED) ENV | SRV ASY-TG | SRV ASY-TG | *MONO
 ENV(OBSERVED) ENV | SRV ASY-TG | * 0.5 SRV ASY-TG
 *COLL
 ENV(OBSERVED) ENV | SRV ASY-TG | SRV ASY-TG | *COLL
 SSI * AP

Ag. 52 of 60

PREPARED BY *James M. Ky* DATE *12/18/80*
 REVIEWED BY *James M. Ky* DATE *12/18/80*
 SCALE # *EMD 027554* DATE *1/15/81*



H0-NS OF-2% SRSS(C2 + C3 + C4 + C5) ZIM B10. SHIELD WALL 590'-.5" REV. 00

303 REUTHERS CO. HONOLULU, HAWAII

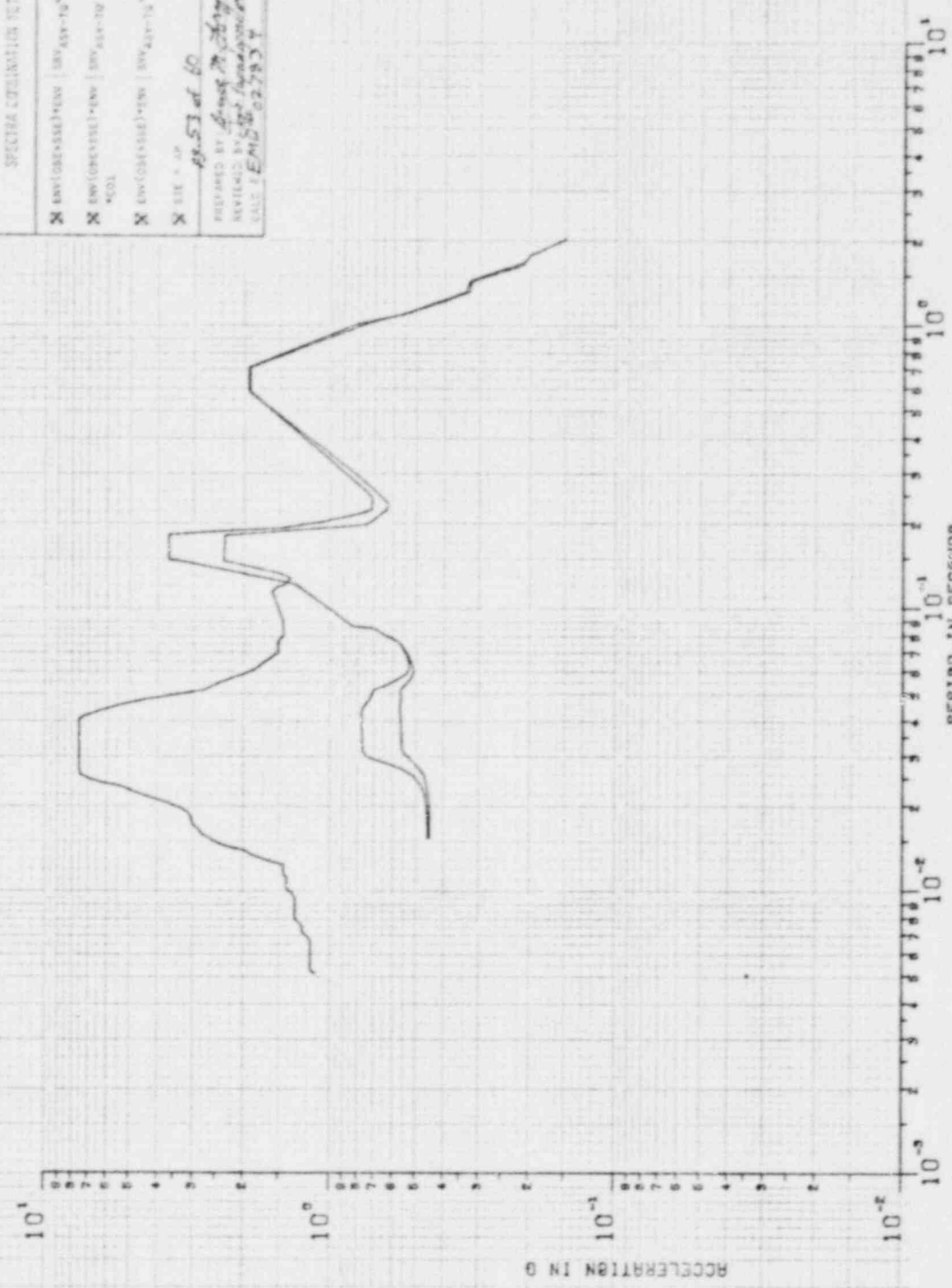
RUN ID: 664 BML 12/18/80

20721 0017-1 4230-15 RESPONSE SPECTRA
 SPECTRA COMPUTATION METHOD - RMS

ENV(COBSERVED) NEW | ENV ASS-TG 4343 4343-TG | 4300
 ENV(COBSERVED) NEW | ENV ASS-TG 4343 4343-TG | 4300
 4300
 ENV(COBSERVED) NEW | ENV ASS-TG 4343 4343-TG | 4300
 SEE A DP

AP-53 of 60

PREPARED BY *James R. King* DATE 12/8/80
 REVIEWED BY *W. B. Anderson* DATE 12/8/80
 DALL IEMG-62783 Y PLOT 1/26/81



H0-EW OF -2% SRSS(C2 + C3 + C4 + C5) ZIM B10. SHIELD WALL 590'-.5'' REV. 00

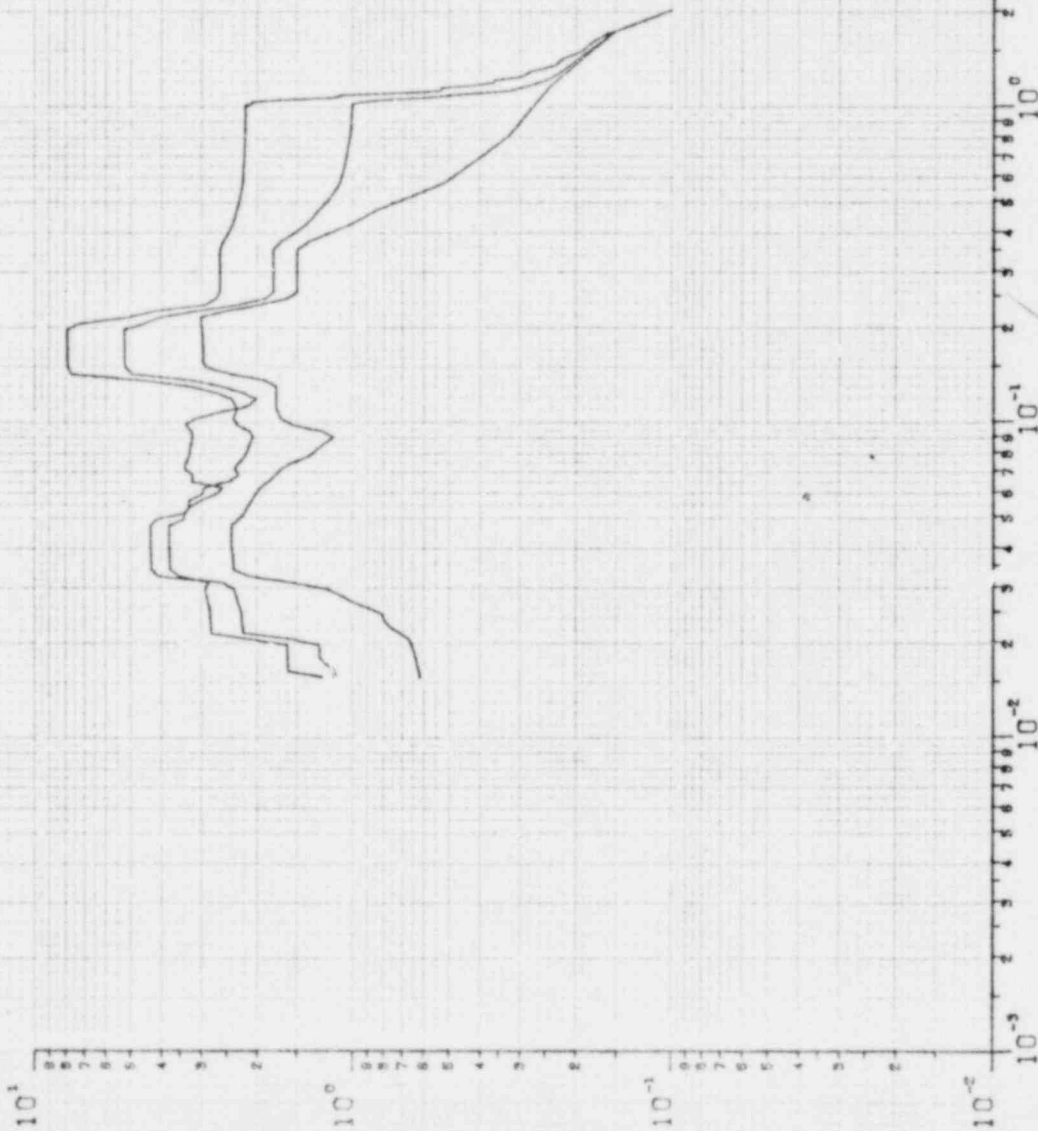
PERIOD IN SECONDS

ACCELERATION IN G

RUN 10:664 PLOT 17/18/80

664BML END OF PLOT

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA	
SPECTRA COMBINATION METHOD - SRSS	
<input checked="" type="checkbox"/> ENV(OBE+SSE)+ENV	SRV ASY-TQ +SRV ADS-TQ +CHG
<input checked="" type="checkbox"/> ENV(OBE+SSE)+ENV	+CO1 SRV ASY-TQ + 0.6 SRV ADS-TQ
<input checked="" type="checkbox"/> ENV(OBE+SSE)+ENV	+CO2 SRV ASY-TQ +SRV ADS-TQ
<input type="checkbox"/> SSE + AP	
Pg. 54 of 60	
PREPARED BY: Bruce D. Long	DATE: 12/18/80
REVIEWED BY: Tom Sigurdson	DATE: 12/18/80
CALC # END # 027334	DATE: 1/23/81



VW-VW OF-2% SRSS(C2 + C3 + C4 + C5) ZIM 210. SHIELD WALL 590*-5** REV. 00

RUN ID: 664 BML 12/18/80

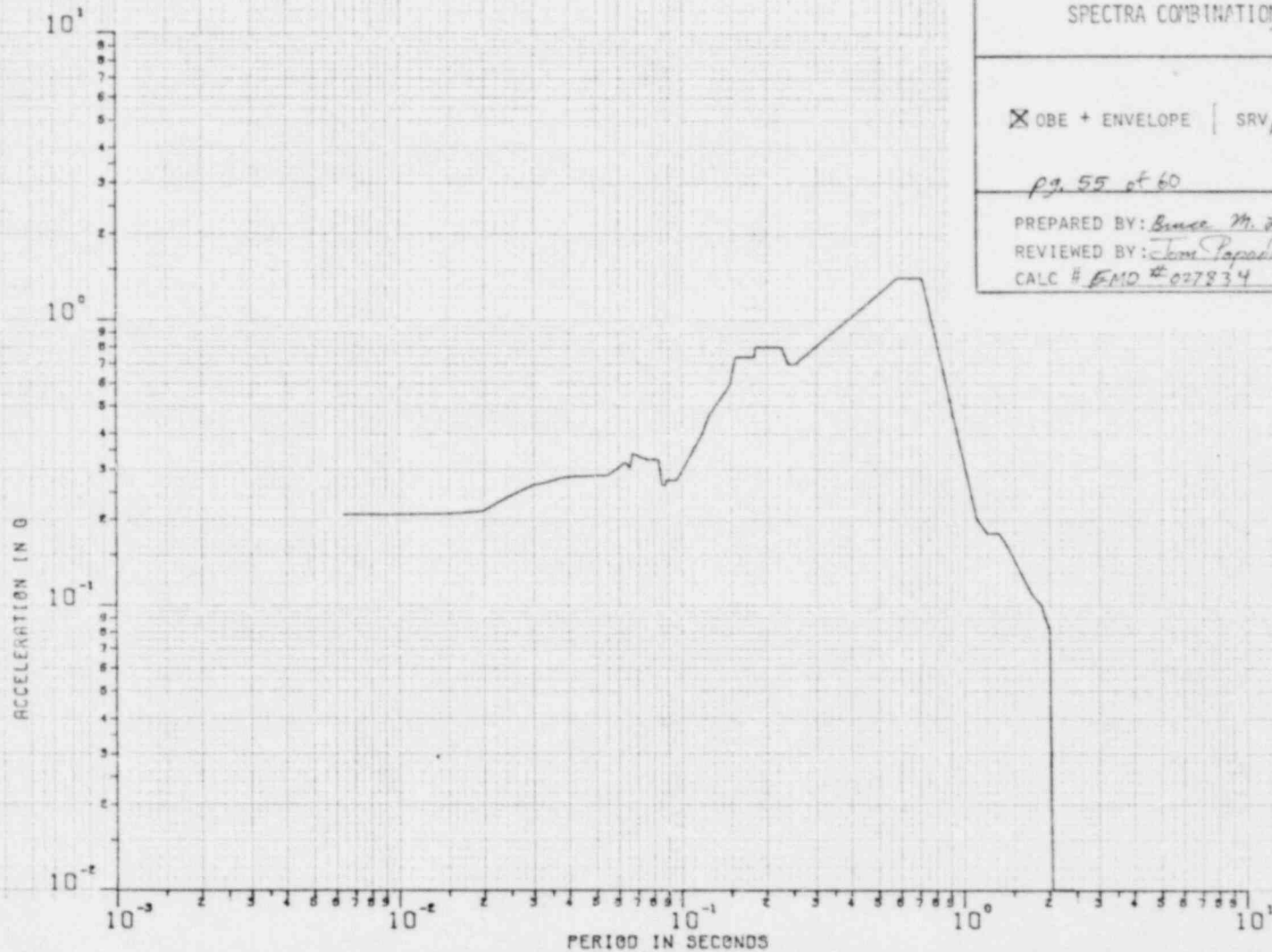
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | $SRV_{ASY-TQ} + SRV_{ALL-TQ}$

pg. 55 of 60

PREPARED BY: Bruce M. Jony DATE: 12/17/80
REVIEWED BY: Tom Papadopoulos DATE: 12/17/80
CALC # FMD # 027834 DATE: 1/28/81



H0-NS DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT/STAB TRUSS 590*-7**

RUN 105 845 BML 12/17/80

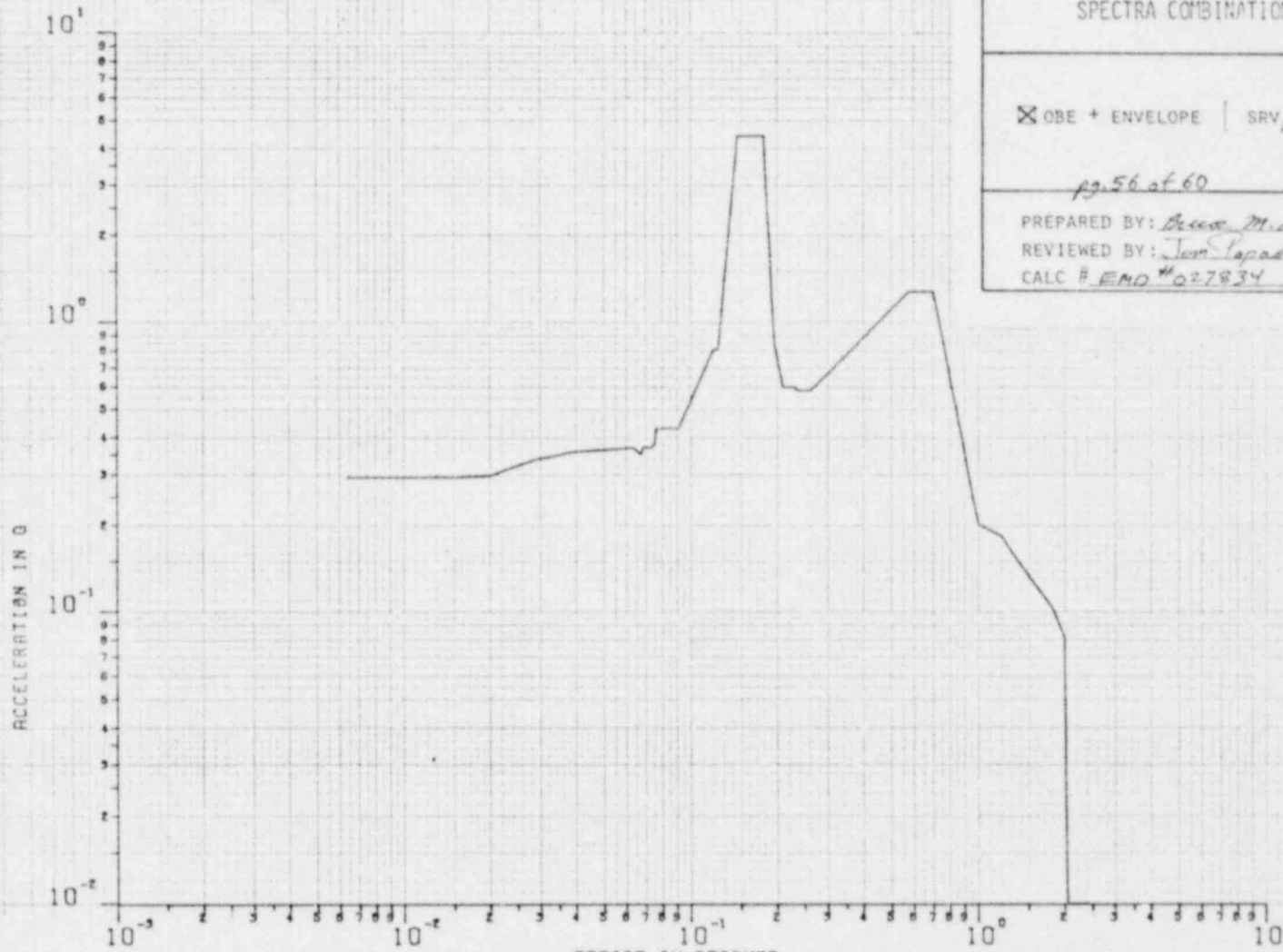
ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA

SPECTRA COMBINATION METHOD - SRSS

OBE + ENVELOPE | SRV_{ASY-TQ} + SRV_{ALL-TQ}

pg. 56 of 60

PREPARED BY: *Anna M. Long* DATE: *12/17/80*
REVIEWED BY: *John Papadopoulos* DATE: *12/17/80*
CALC # *EMO #027834* DATE: *1/23/81*



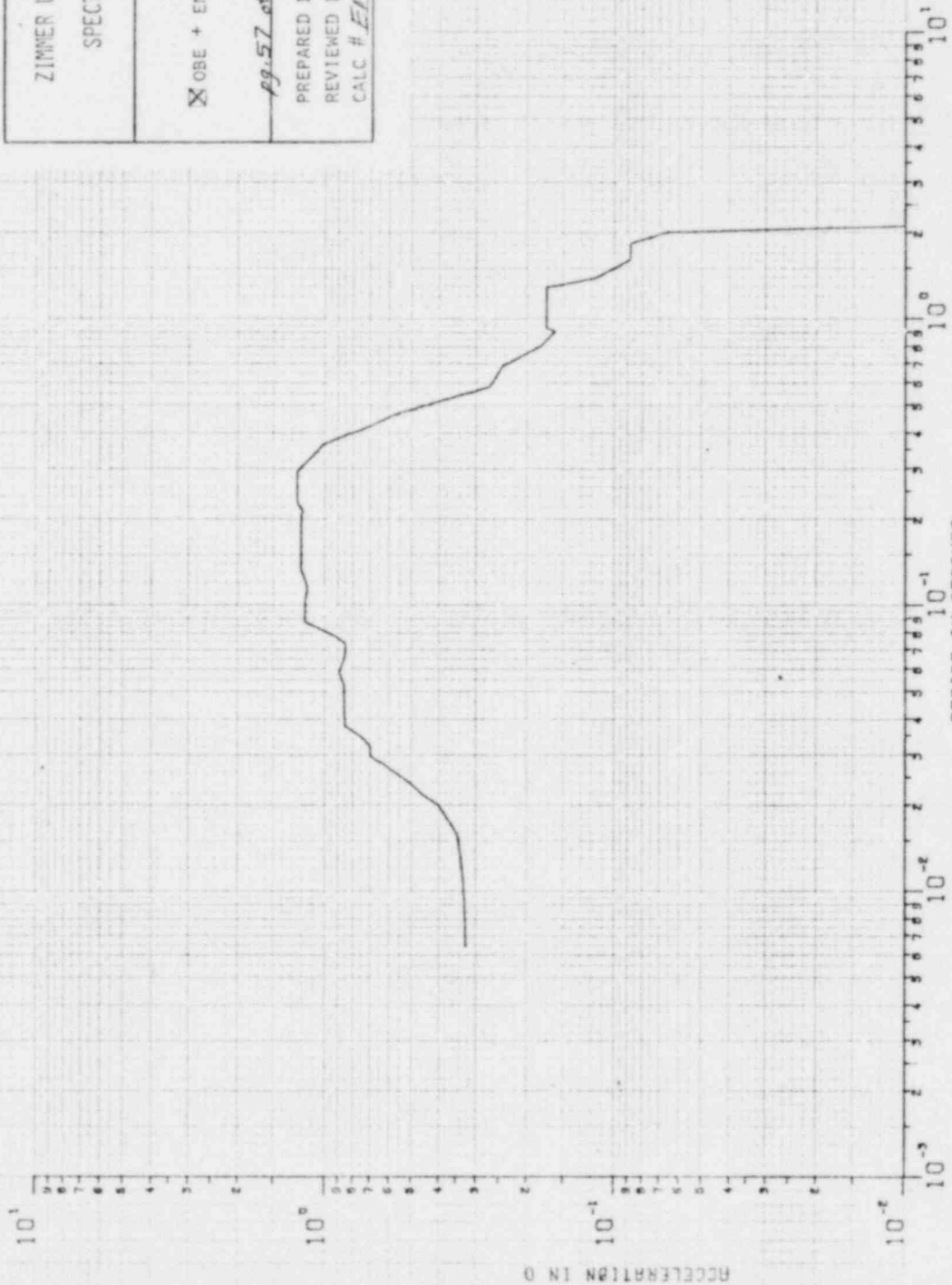
HQ-EW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT/STAB TRUSS 590*-7**

NS KENTZELAKSUN CO. PRINTED IN U.S.A. 100-100000-100000

RUN ID: 448 BUL 12/17/80

A48BML END OF PLOT

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA	
SPECTRA COMBINATION METHOD - SRSS	
<input checked="" type="checkbox"/> OBE + ENVELOPE	<input type="checkbox"/> SRV ASY-TQ + <input type="checkbox"/> SRV ALL-TQ
Pg. 57 of 60	
PREPARED BY: <i>Louise M. Arzy</i>	DATE: <i>12/17/80</i>
REVIEWED BY: <i>Tom Spadopoulos</i>	DATE: <i>12/17/80</i>
CALC # <i>EPD # 027834</i>	DATE: <i>12/21/81</i>



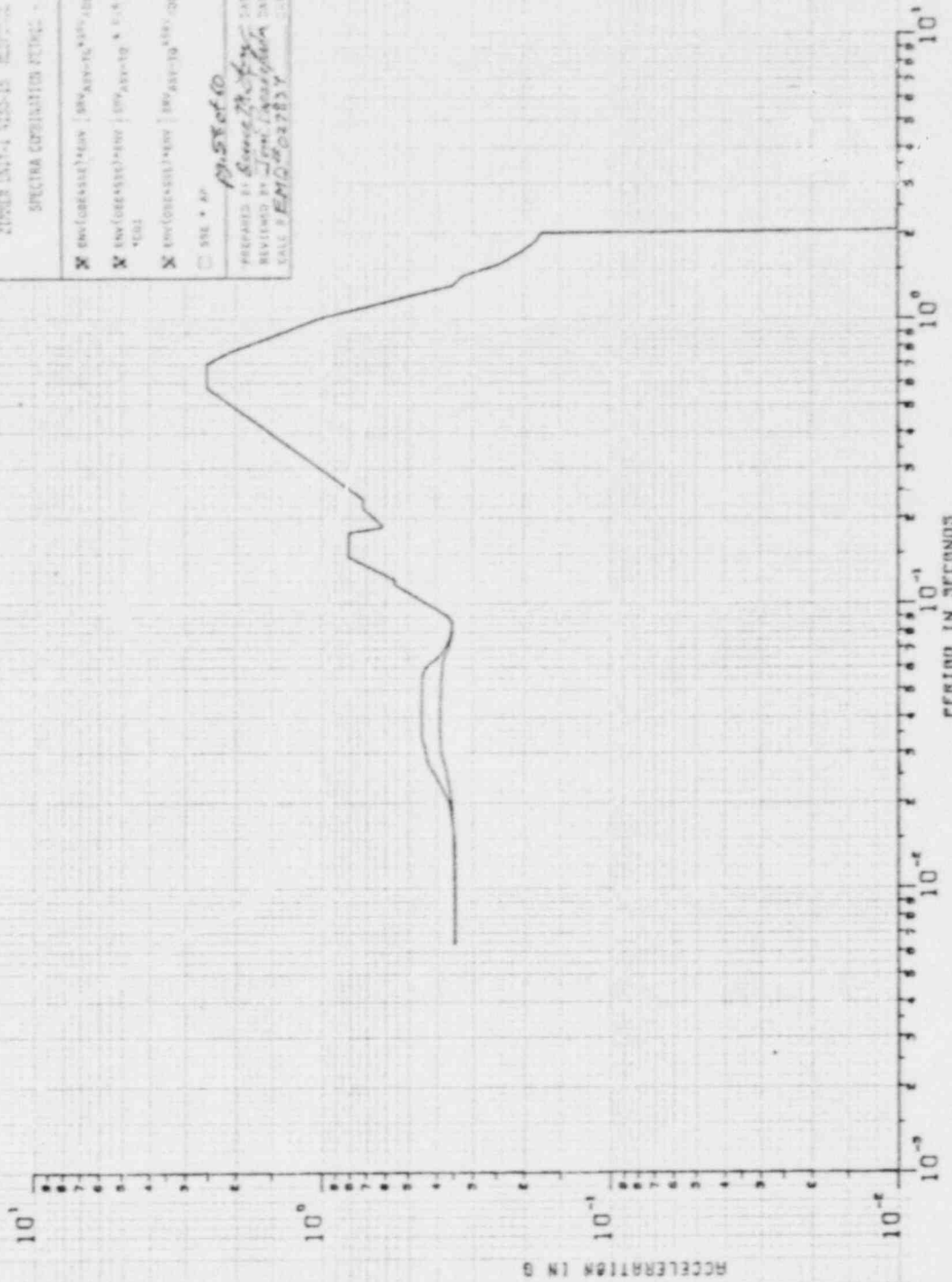
VW-VW DF-1% SRSS(OBE+ENV(SRV-ALL-TQ+SRV-ASY3-TQ)) ZIM CONT/STAB TRUSS 590*-7**

RUN 10: A48BML 12/17/80

ZIMMER UNIT-1 4320-15 REPT. NO. 100000
 SPECTRA COMPARISON METHOD - SRSS

ENVIRONMENTAL NEW (SRSS) 100% 100% 100% 100%
 ENVIRONMENTAL NEW (SRSS) 100% 100% 100% 100%
 ENVIRONMENTAL NEW (SRSS) 100% 100% 100% 100%

PREPARED BY *George P. Kelly* DATE: 12/13/60
 REVISION BY *Tommy J. G. ...* DATE: 12/13/60
 SALES ENGINEERING



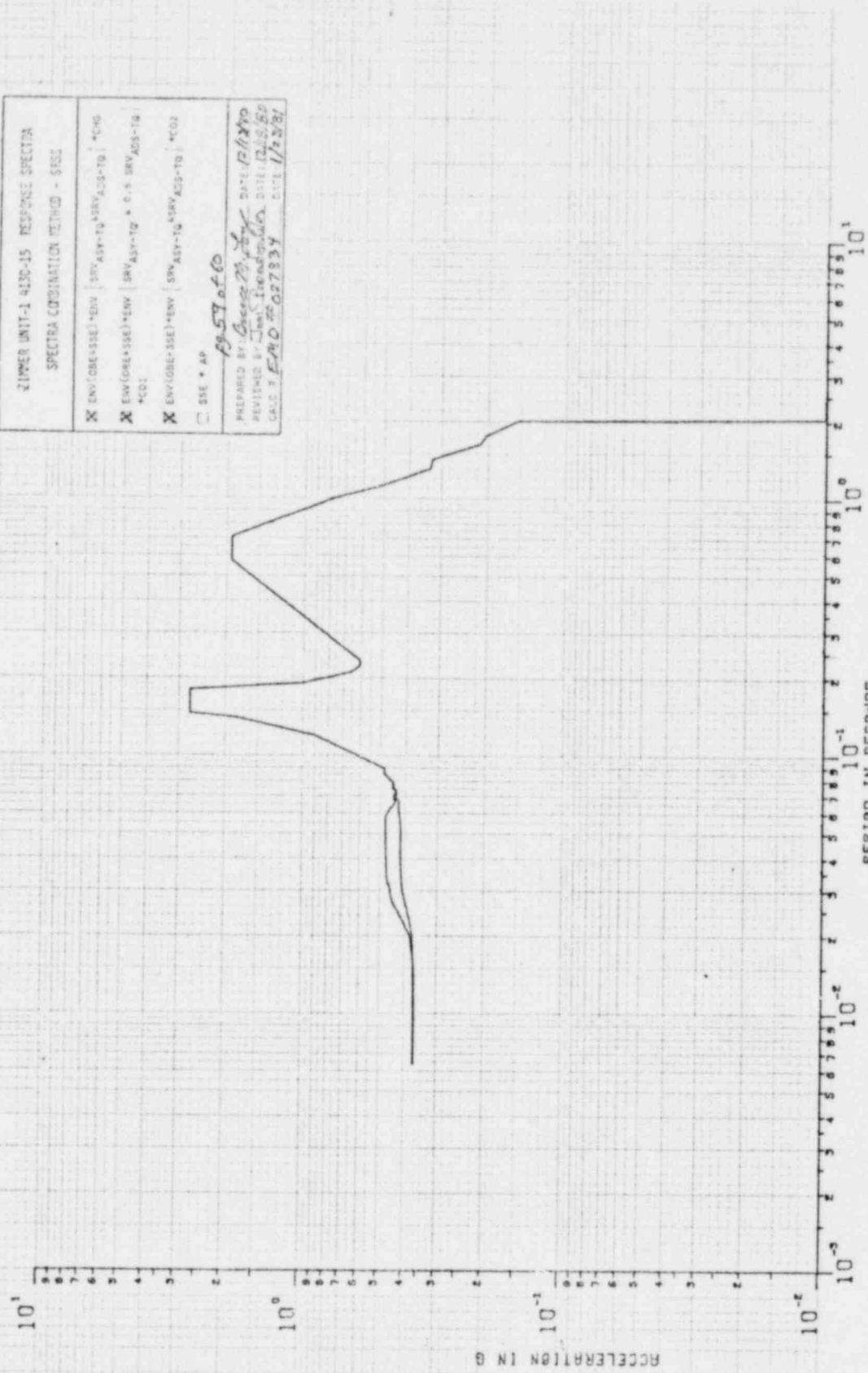
H0-NS DF-2% SRSS(C2 + C3 + C4) ZIM CONT WALL/STABILIZER TRUSS 590*-7** REV. 00
 PERIOD IN SECONDS
 NOV 10:28A BAL 12/18/60

ICE NEUFFELLESER CO. TORONTO, CANADA

ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
 SPECTRA COMBINATION METHOD - SRS

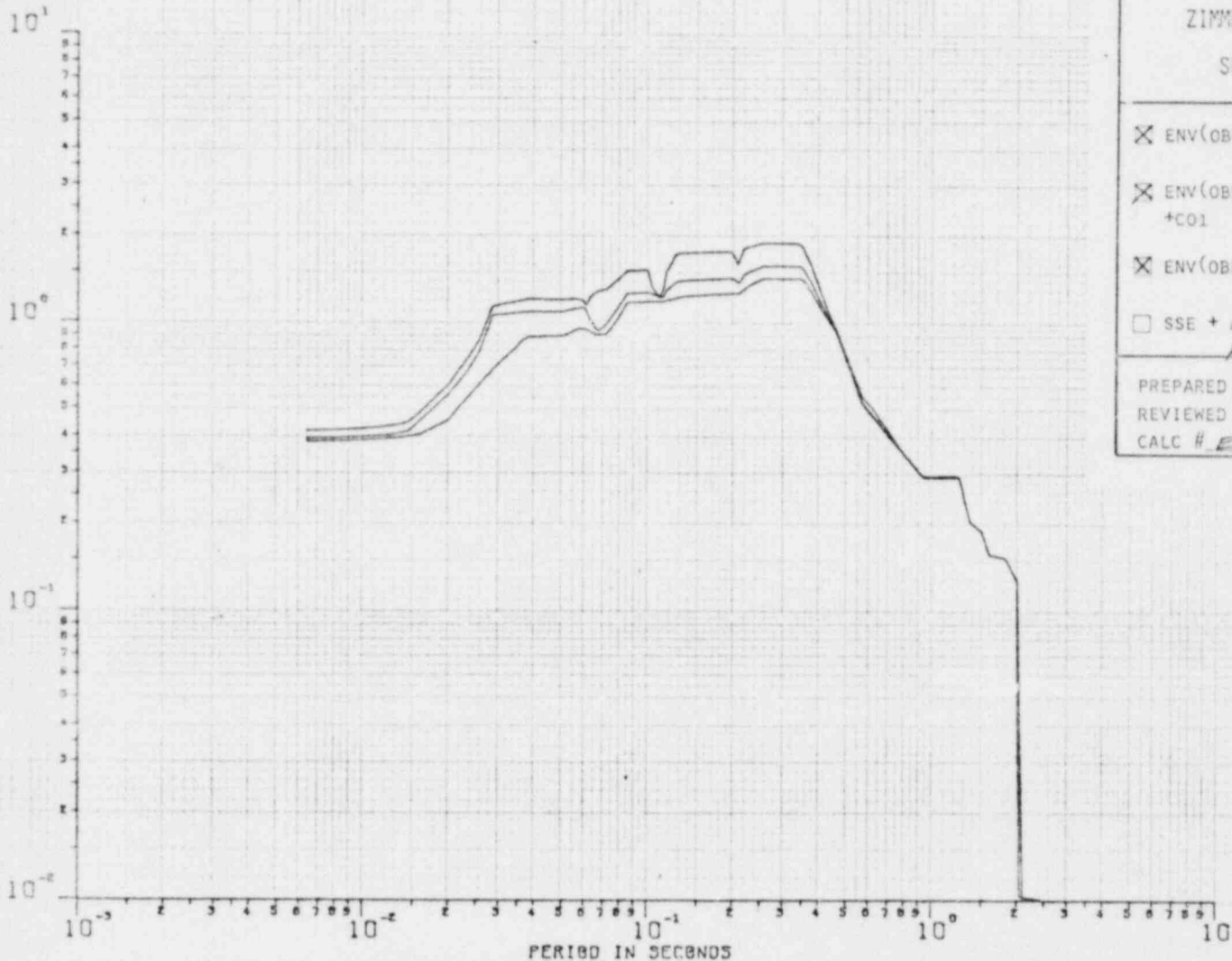
ENV(OBS+SSE)+ENV | SPV ASY-TQ ASRV ACIS-TQ | *CHG
 ENV(OBS+SSE)+ENV | SPV ASY-TQ * C-15 SRV ACIS-TQ
 *COI
 ENV(OBS+SSE)+ENV | SPV ASY-TQ ASRV ACIS-TQ | *COI
 SSE * AP

89-57 of 60
 PREPARED BY: George M. [Signature] DATE: 12/18/80
 REVIEWED BY: [Signature] DATE: 12/18/80
 CALC BY: EMD 02783Y DATE: 1/2/81



H0-EW DF-2% SRSS(C2 + C3 + C4) ZIM CONT WALL/STABILIZER TRUSS 590*-7** REV. C0

RUN ID: ZEI BML 12/18/80



ZIMMER UNIT-1 4130-15 RESPONSE SPECTRA
SPECTRA COMBINATION METHOD - SRSS

- ENV(OBE+SSE)+ENV | SRV_{ASY-TQ} & SRV_{ADS-TQ} | +CHG
 - ENV(OBE+SSE)+ENV | SRV_{ASY-TQ} & 0.6 SRV_{ADS-TQ} | +C01
 - ENV(OBE+SSE)+ENV | SRV_{ASY-TQ} & SRV_{ADS-TQ} | +C02
 - SSE + AP
- pg. 60 of 60*

PREPARED BY: *Gene M. Long* DATE: *12/18/80*
 REVIEWED BY: *Tom P. ...* DATE: *12/19/80*
 CALC # *END #027834* DATE: *11/20/81*

281BML END OF PLOT

TIME: 0.12

VW-VW DF-2% SRSS(C2 + C3 + ...) ZIM CONT WALL/STABIL ZER TRUSS 590'-7'' REV. 00

RUN 10: 281 BML 12/18/80