Consumers Power Company

Stephen H. Howell
Senior Vice President

General Offices: 1945 West Parnall Road, Jackson, Michigan 49201 • (517) 788-0453

July 20, 1979
Howe 208-79

Director of Nuclear Reactor Regulation
Attn: Mr Domenic Vassallo, Acting Director
Division of Project Management
US Nuclear Regulatory Commission
Washington, DC 20555

MIDLAND PROJECT
DOCKET NO 50-329, 50-330
SEISMIC QUALIFICATION REVIEW TEAM
(SQRT) INFORMATION
FILE: 0485.11 SERIAL: 7313

Enclosed are three (3) copies of the following SQRT data forms whic were committed to be provided by my letter to Mr Roger Boyd dated November 13, 1978.

1. Transmitter (major instrument package) (BAPC)
2. Pressure transmitters inside containment (B&W)
3. Delta-pressure transmitters inside containment (B&W)
4. RPS/ECCAS modules employing new designs (B&W)
5. Decay heat pump motor (B&W) (inadvertently left out of the November 13, 1978 letter)

With these completed SQRT forms, all action required of Consumers Power Company by NRC Requests for Additional Information 110.26 and 110.40 is considered complete.

Please advise us of the Seismic Qualification Review Team's (SQRT) schedule for its review at the Midland Site.

Stephen H Howell

SHH/jm

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S
1/3

494 237

7907260475

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR x

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: Transmitters (differential, gage, and absolute pressure)

1. Model Number: 1152 Quantity: 149

2. Vendor: Rosemount Inc.

3. Physical Description Pressure is transmitted through a process-fluid isolating diaphragm to silicone fill oil inside the sensing module. The oil exerts pressure on one side of the sensing diaphragms. The positior of the sensing diaphragm is detected by capacitance plates on both sides of the diaphragm. Differential capacitance is converted to an electrical signal.

4. Location: Building: Auxiliary building, service water structure, diesel generator building

(In Plant) Elevation: No restriction on elevation

5. Natural Frequencies in Each Direction: No natural frequencies were in in the frequency range of 1 to 33 Hz.

6. Functional Description: Converts the measured process variable in the form of pressure to an electrical signal.

7. Pertinent Reference Design Specifications: Technical Specifications 7220-J-245, 7220-J-830, 7220-J-1504

III. Is Equipment Available for Inspection in the Plant: ( ) Yes (x) No

Comments: The transmitters have not been shipped to the site.

IV. Seismic Qualification Method: Test: x

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: Refer to RRS plot attached

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (x) Multi-Frequency

2. ( ) Single Axis (x) Multi-Axis

3. Frequency Range: 1 to 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (x) Yes (attach TRS graphs)

5. g-level Test at h_1 = _____ h_2 = _____ V = _____

6. g-level Required h_1 = 5.0 g h_2 = 5.0 g V = 1.0 g

7. Mounting:

1. Seismic Report: Mounted on right angle brackets which were attached to top of test table. Each transmitter was bolted to the table with four 3/8" - 16 hex-head bolts.

2. Field Check: _____

8. Functional Verification Performed (x) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

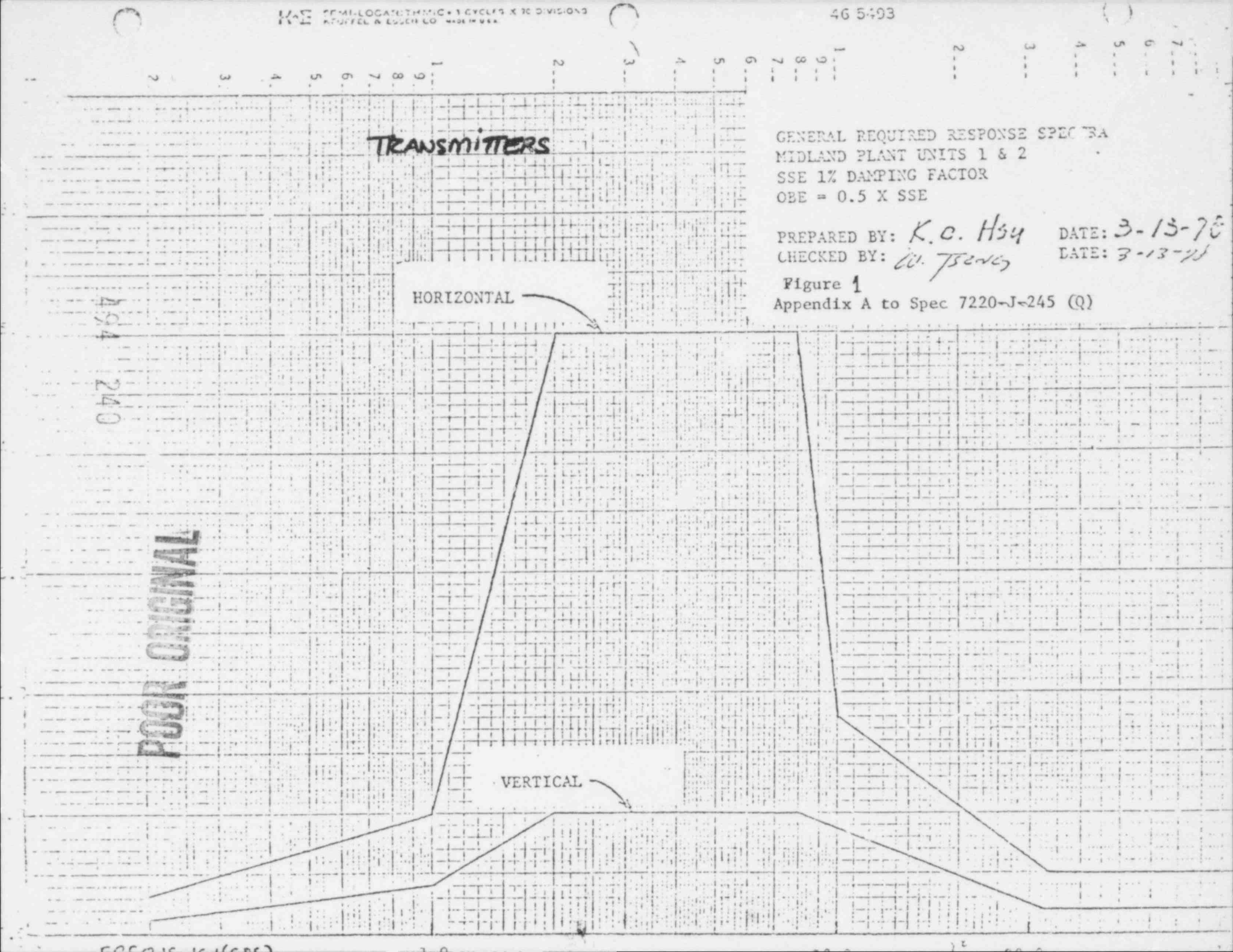
1. Description of Test including Results: _____

TRANSMITTERS

GENERAL REQUIRED RESPONSE SPECTRA
MIDLAND PLANT UNITS 1 & 2
SSE 1% DAMPING FACTOR
OBE = 0.5 X SSE

PREPARED BY: K. C. Hsu DATE: 3-13-78
CHECKED BY: W. Jones DATE: 3-13-78

Figure 1
Appendix A to Spec 7220-J-245 (Q)



SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR x

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: Transmitters (differential, gage, and absolute pressure)

1. Model Number: 1153, Series A Quantity: 76

2. Vendor: Rosemount Inc.

3. Physical Description Pressure is transmitted through a process-fluid isolating diagram to silicone fill oil inside the sensing module. The oil exerts pressure on one side of the sensing diaphragms. The position of the sensing diaphragm is detected by capacitance plates on both sides of the diaphragm. Differential capacitance is converted to an electrical signal.

4. Location: Building: Containment

(In Plant) Elevation: No restriction on elevation

5. Natural Frequencies in Each Direction: No natural frequencies were in the frequency range of 1 to 33 Hz

6. Functional Description: Converts the measured process variable in the form of pressure

7. Pertinent Reference Design Specifications: Technical Specifications 7220-J-245, 7220-J-830, 7220-J-1564

III. Is Equipment Available for Inspection in the Plant: ( ) Yes (x) No

Comments: The transmitters have not yet been shipped to the site.

IV. Seismic Qualification Method: Test: x

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: Refer to RRS plot attached

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (x) Multi-Frequency

2. ( ) Single Axis (x) Multi-Axis

3. Frequency Range: 1 to 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (x) Yes (attach TRS graphs)

5. g-level Test at h_1 = _____ h_2 = _____ V = _____

6. g-level Required h_1 = 5.0 g h_2 = 5.0 g V = 1.0 g

7. Mounting:

1. Seismic Report: Mounted on right angle brackets which were attached to top of test table. Each transmitter was bolted to the table with four 3/8" - 16 hex-head bolts.

2. Field Check: _____

8. Functional Verification Performed (x) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

GENERAL REQUIRED RESPONSE SPECTRA
MIDLAND PLANT UNITS 1 & 2
SSE 1% DAMPING FACTOR
OBE = 0.5 X SSE

PREPARED BY: K. C. Hsu DATE: 3-13-75
CHECKED BY: W. Jones DATE: 3-13-75

Figure 1
Appendix A to Spec 7220-J-245 (Q)

TRANSMITTERS

HORIZONTAL

VERTICAL

FREQUENCY(CPS)

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: Transmitters (Gage and Absolute Pressure)

1. Model Number: N1KS Quantity: 16

2. Vendor: Bailey Controls

3. Physical Description Pressure is transmitted through a process fluid isolating diaphragm to silicone fill oil inside the sensing module. The oil exerts pressure on one side of the sensing diaphragms. The position of the sensing diaphragm is detected by capacitor plates on both sides of the diaphragm. Differential capacitance is converted to an electrical signal.

4. Location: Building: Containment

(In Plant) Elevation: 593'-6", 602', 640'

5. Natural Frequencies in Each Direction: No natural frequencies were in the frequency range of 1 to 33 Hz.

6. Functional Description: Converts the measured process variable in the form of pressure to an electrical signal.

7. Pertinent Reference Design Specifications: Bailey Controls Product Instructions E41-20 and E41-19

III. Is Equipment Available for Inspection in the Plant: ( ) Yes (X) No

Comments: The transmitters have not been shipped to the site.

IV. Seismic Qualification Method: Test: ✓

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: ZPA: north-to-south = 0.122g, east-to-west = 0.128g, vertical = 0.120g

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 to 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = 3.0g h_2 = 3.0g V = 3.0g

6. g-level Required h_1 = 0.122g h_2 = 0.128g V = 0.120g

7. Mounting:

1. Seismic Report: Mounted on right angle brackets which were attached to top of test table. Each transmitter was bolted to the table with four 3/8" - 16 hex-head bolts.

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

2. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis ( ) Dynamic Analysis

( ) Response Spectrum ( ) Time-History

3. Model Type (each direction); _____

_____

4. Computer Codes: _____

5. Damping: _____

6. Support Considerations: _____

7. Critical Structural Elements:

A.

Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Stress Allowable

B.

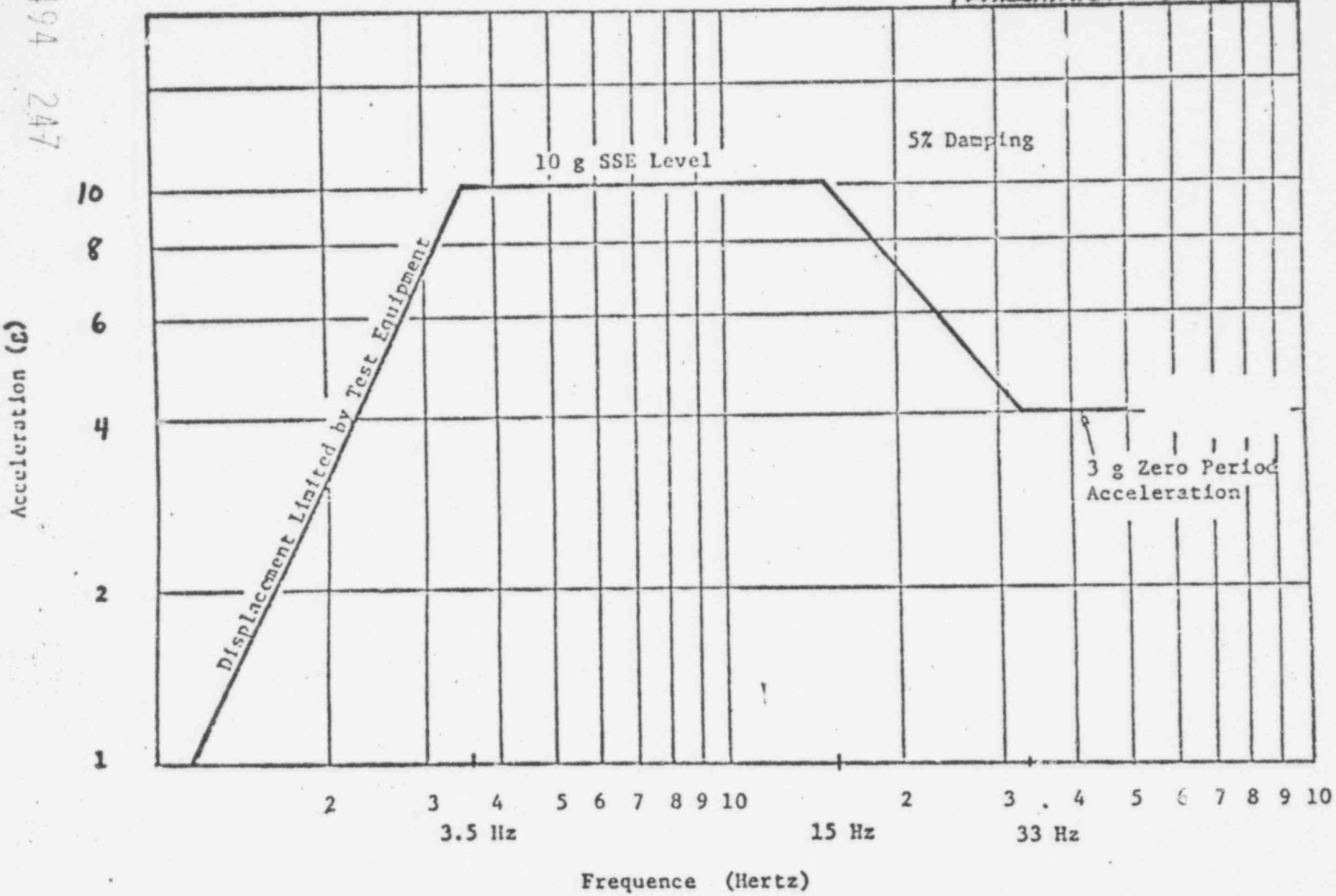
Max. Deflection	Location	Effect Upon Functional Operability

B&W HORIZONTAL/VERTICAL REQUIRED RESPONSE SPECTRUM
FOR PERIPHERAL EQUIPMENT

I.E., Transmitters & RTD's.

TRANSMITTERS (GAGE / ABS.)

494 247



The vendor's TRS enveloped our RRS.

ORIGINATOR: ______ DATE: ______

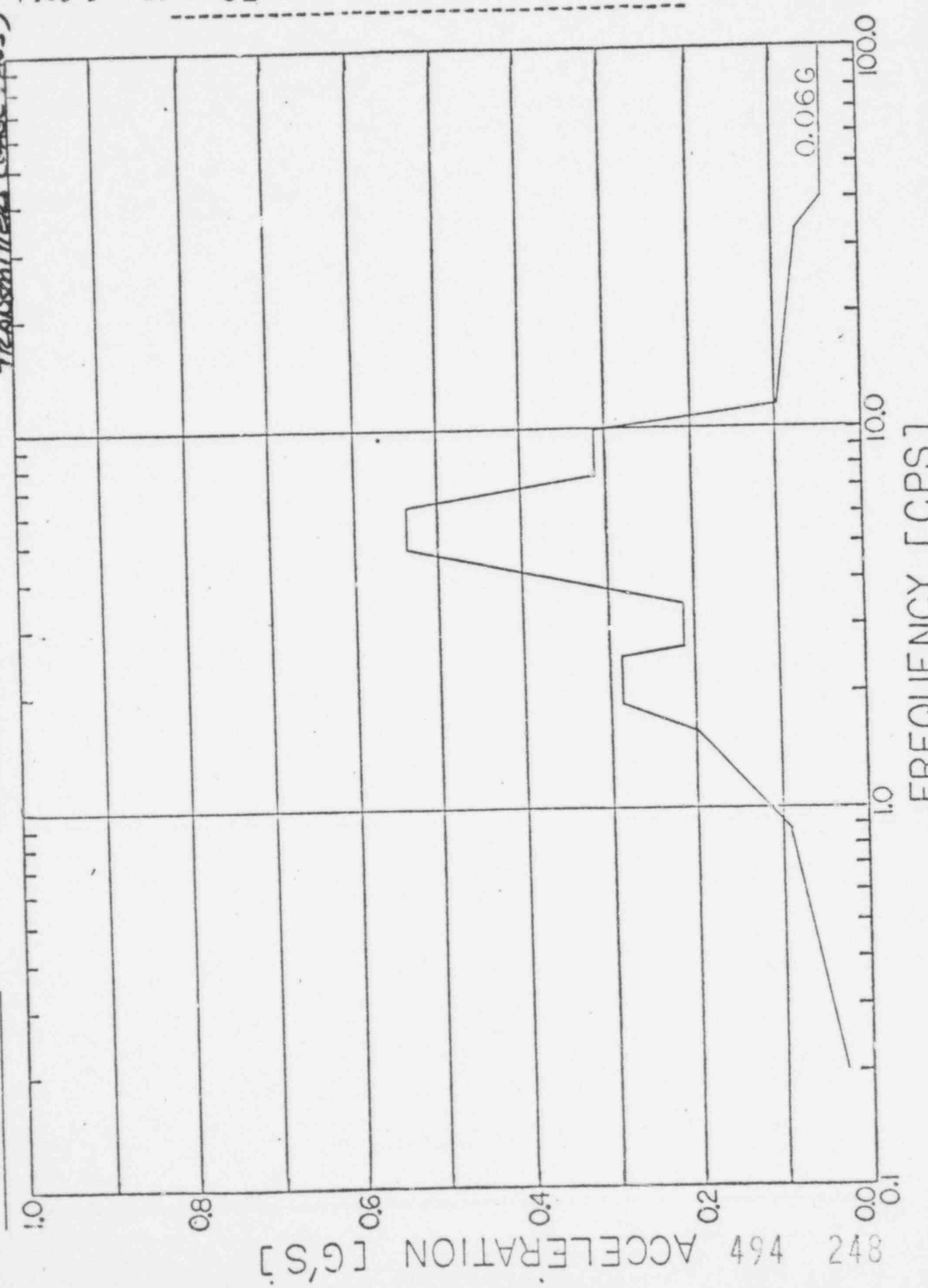
CHECKED BY: W. T[illegible] DATE: 4-15-79 SH. NO. 5

FIGURE NO: 62

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 19 AT ELEV. 587'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%
TRANSMITTERS (GAGE & ABS)



494 248

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 19 AT ELEV. 587'-0"
EAST-WEST DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSMITTERS (GAGE & ABS)

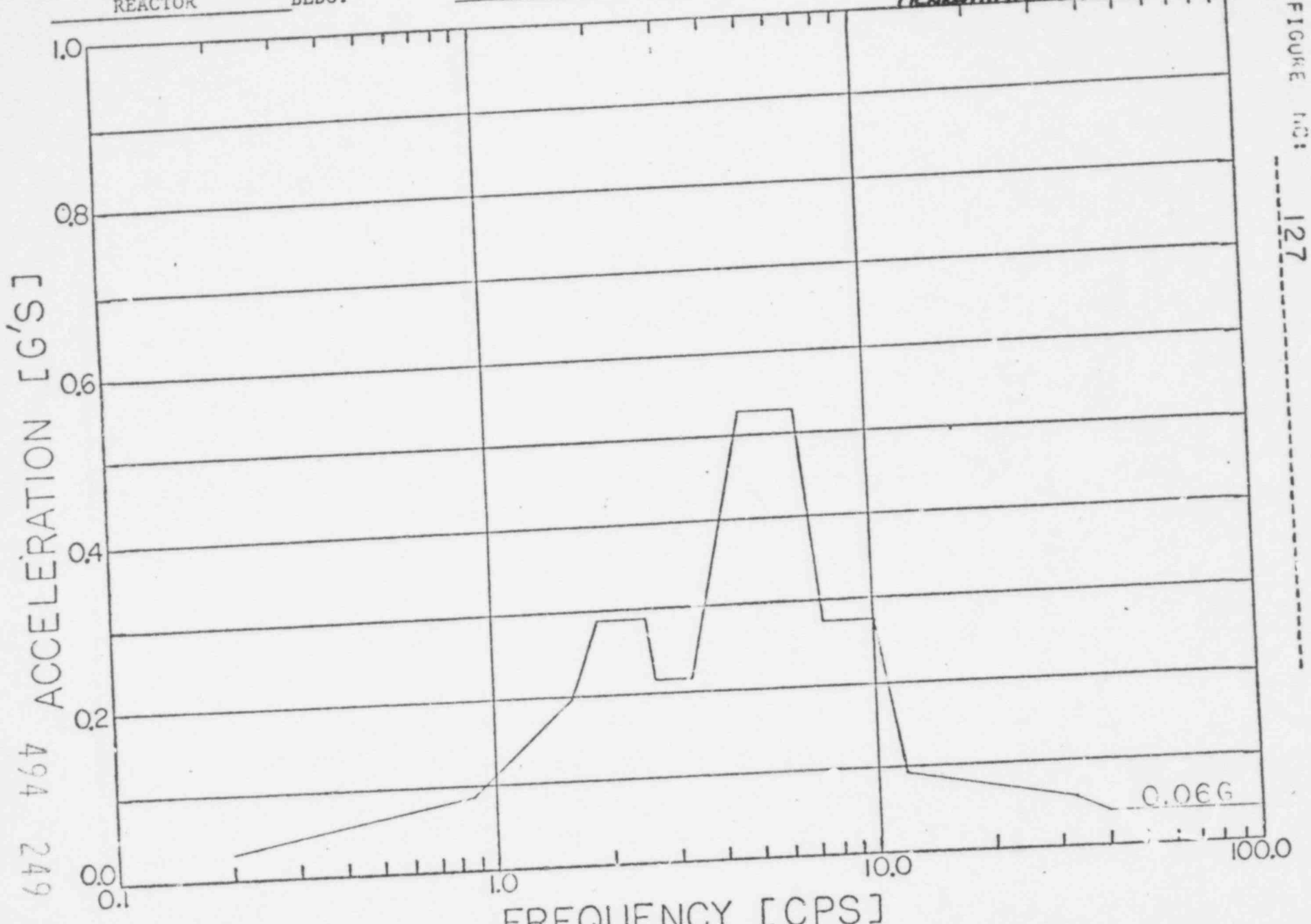


FIGURE NO. 127

494 249

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 19 AT ELEV. 587'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%

TRANSMITTERS (GAGE 1 ABS)

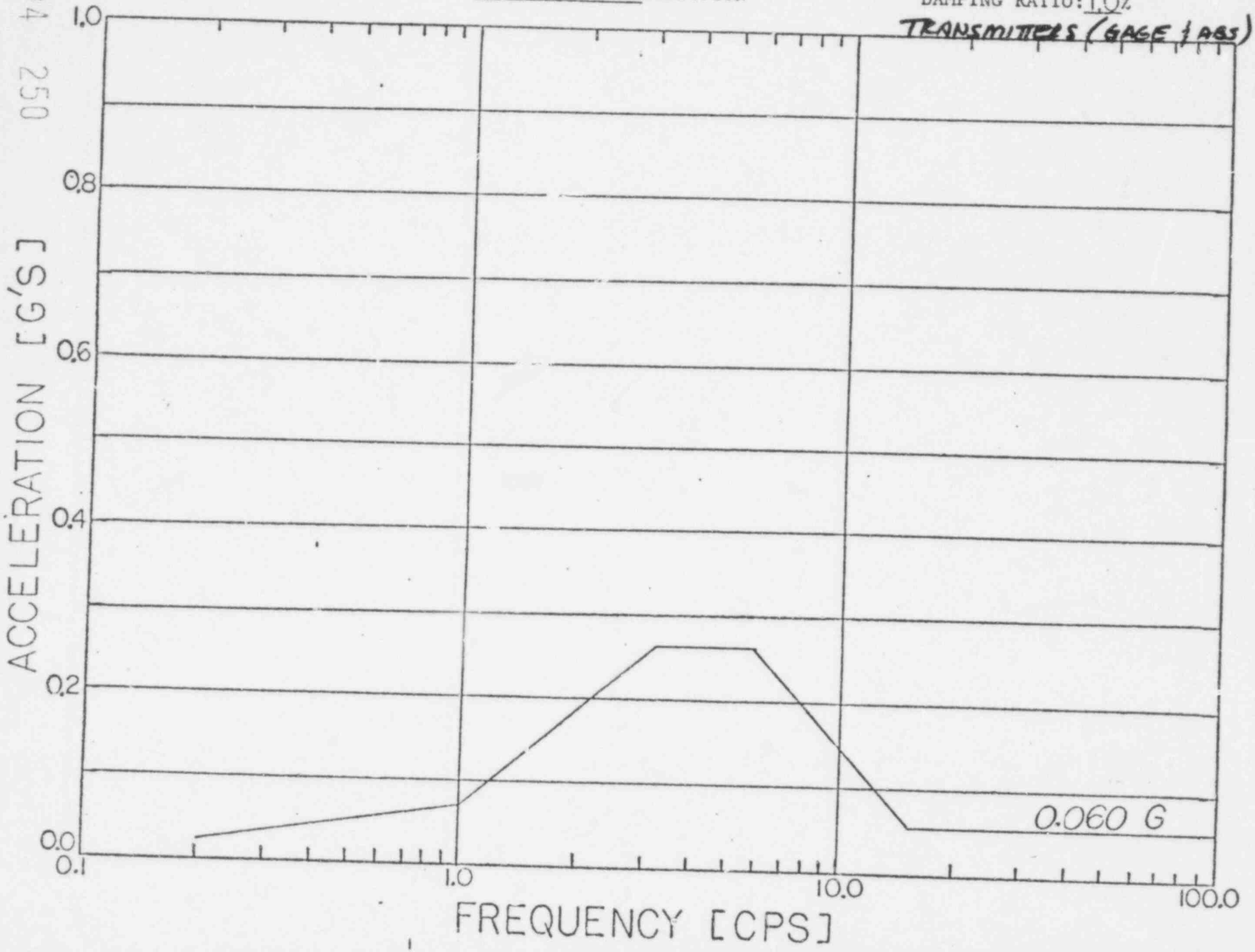


FIGURE NO. 192

494 250

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 12 AT ELEV. 603'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSMITTERS (GAGE & ABS)

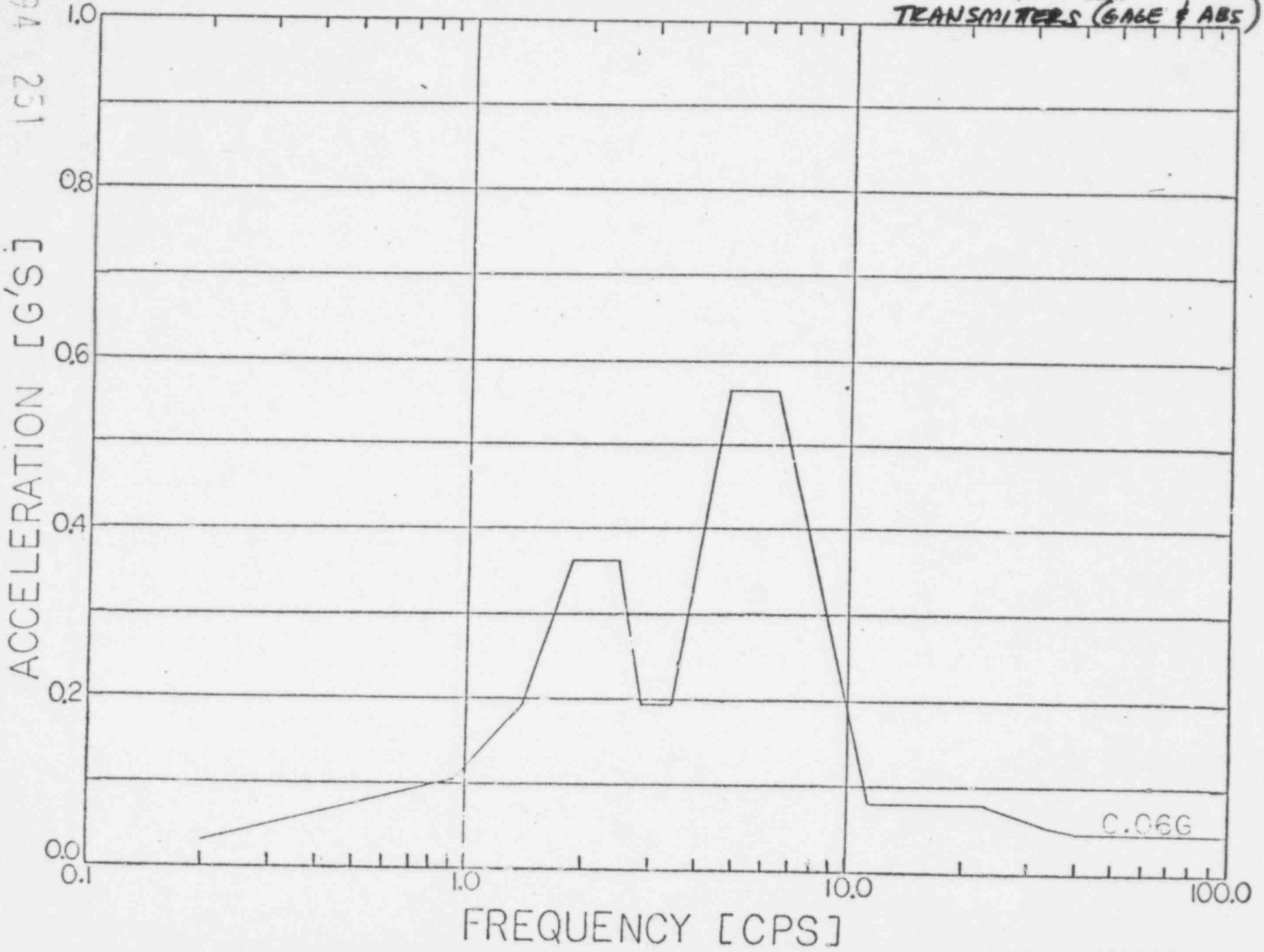


FIGURE NO. 5.7

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 12 AT ELEV. 603'-0"
EAST-WEST DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%

TRANSMITTERS (CASE & ABS)

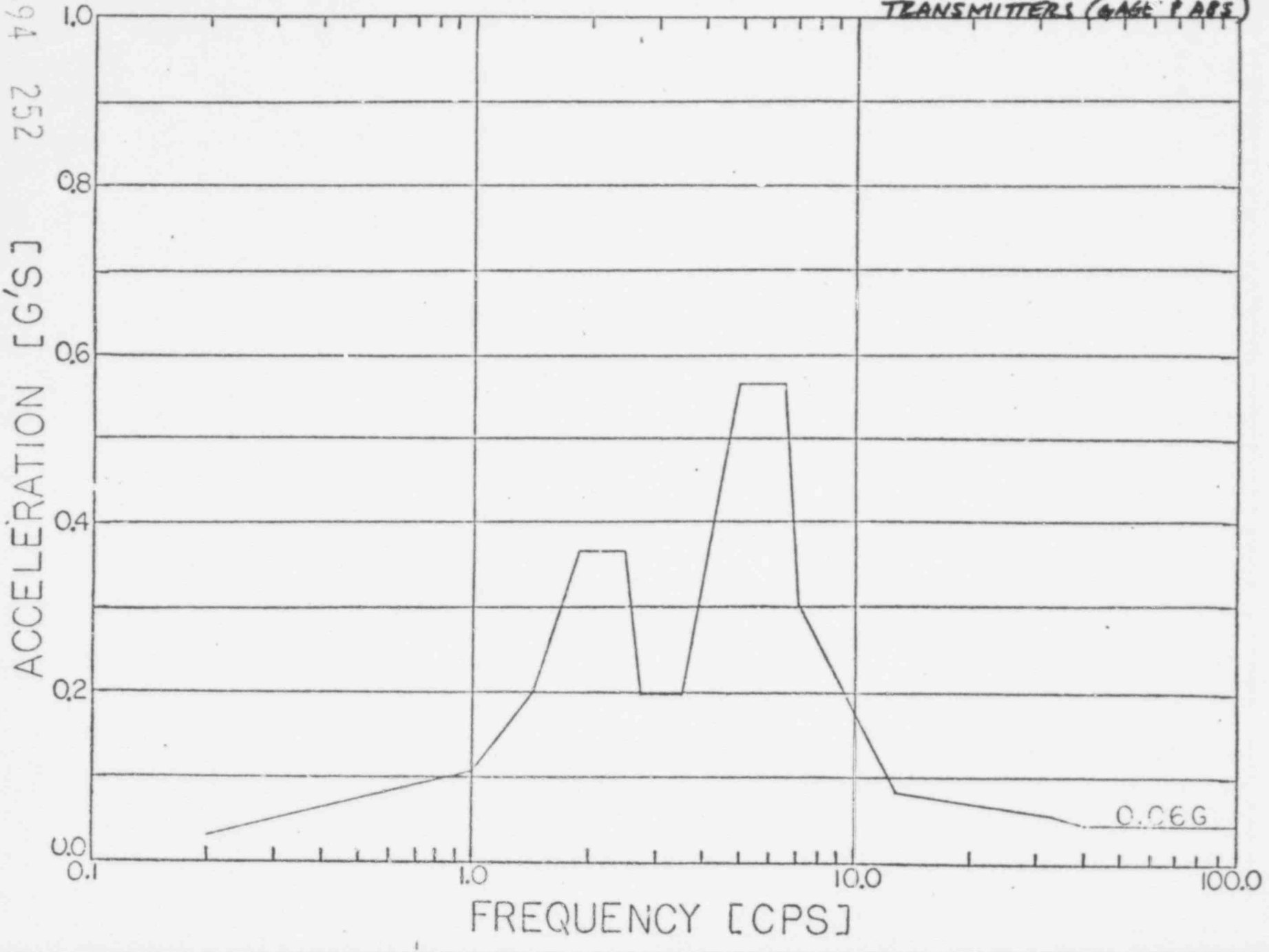


FIGURE NO. 122

494 252

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 12 AT ELEV. 603'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSMITTERS (GAGE & AES)

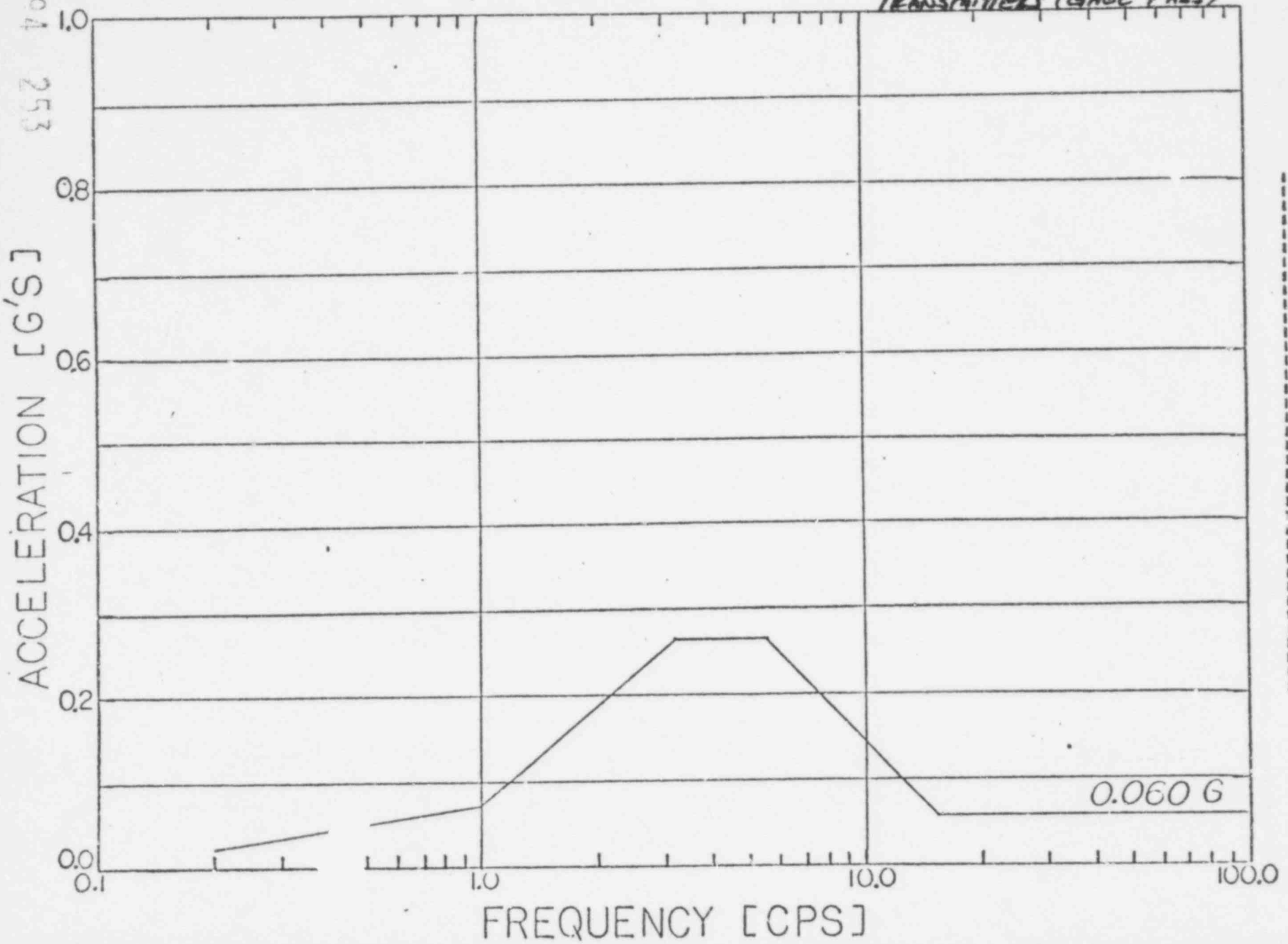


FIGURE NO. 187

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7720
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 10 AT ELEV. 640'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%

TRANSMITTERS (GAGG & ABB)

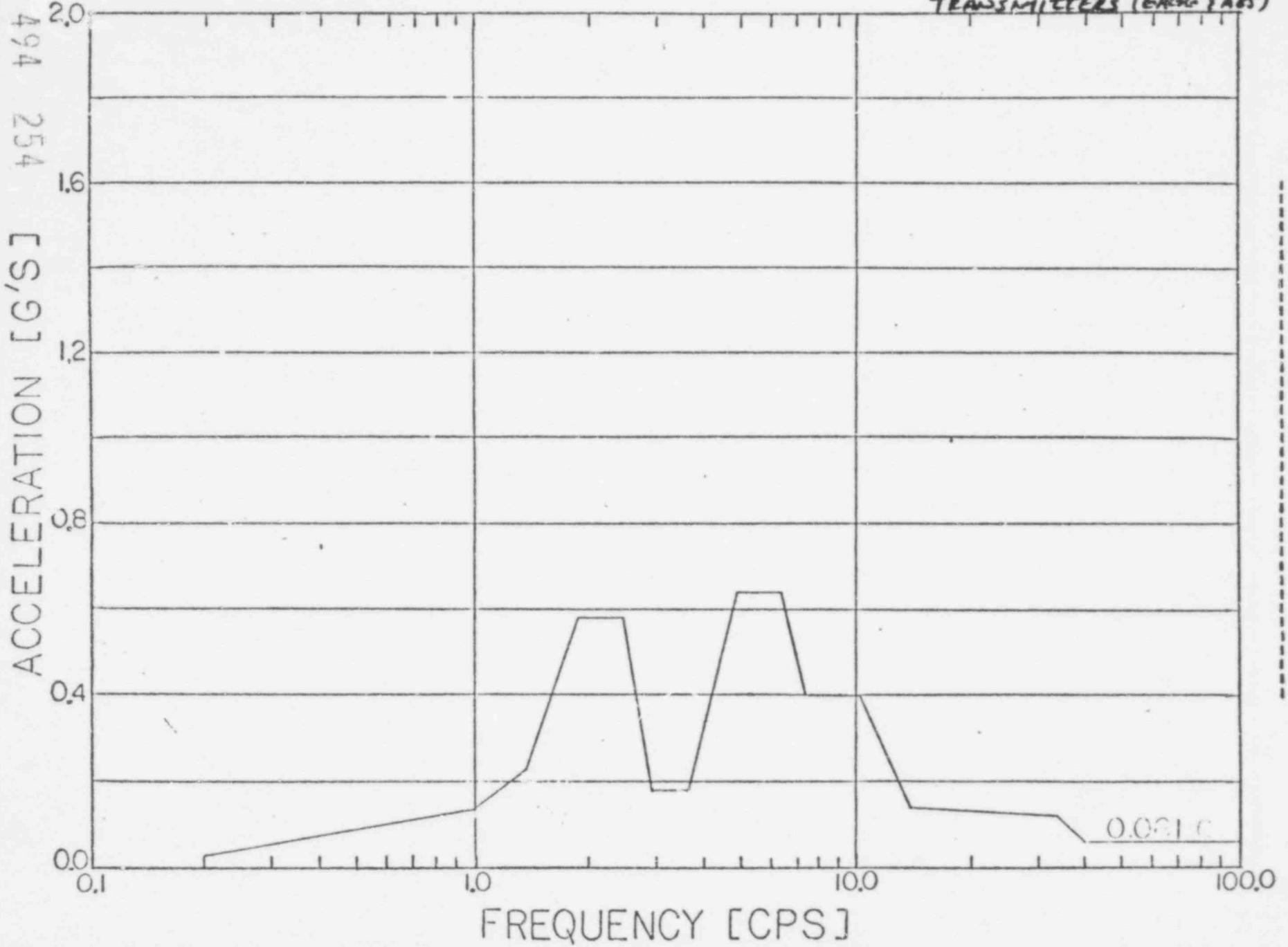


FIGURE NO: 47

494 254

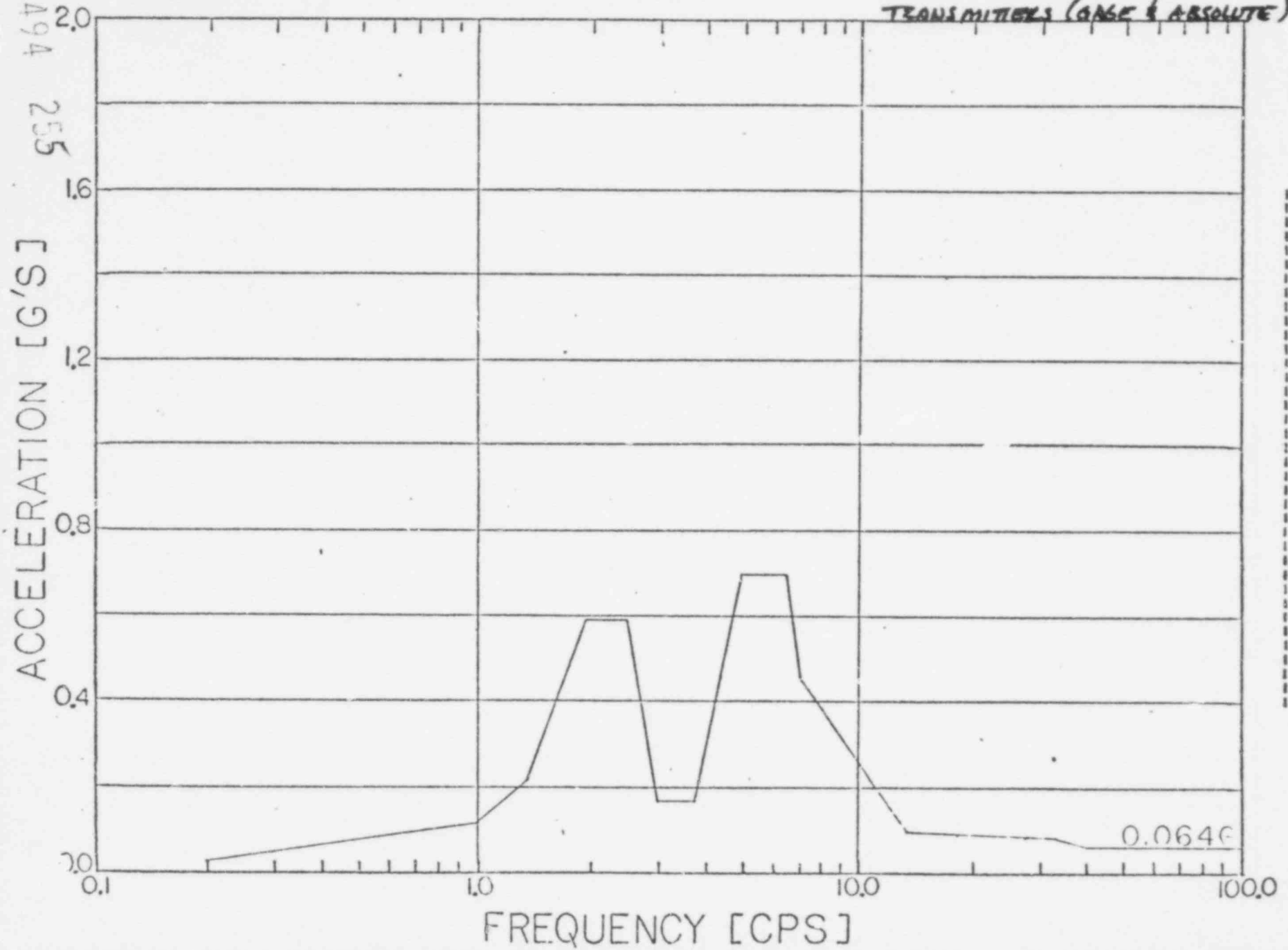
MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 10 AT ELEV. 640'-0"
EAST-WEST DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSMITTERS (CASE & ABSOLUTE)

FIGURE NO. 112

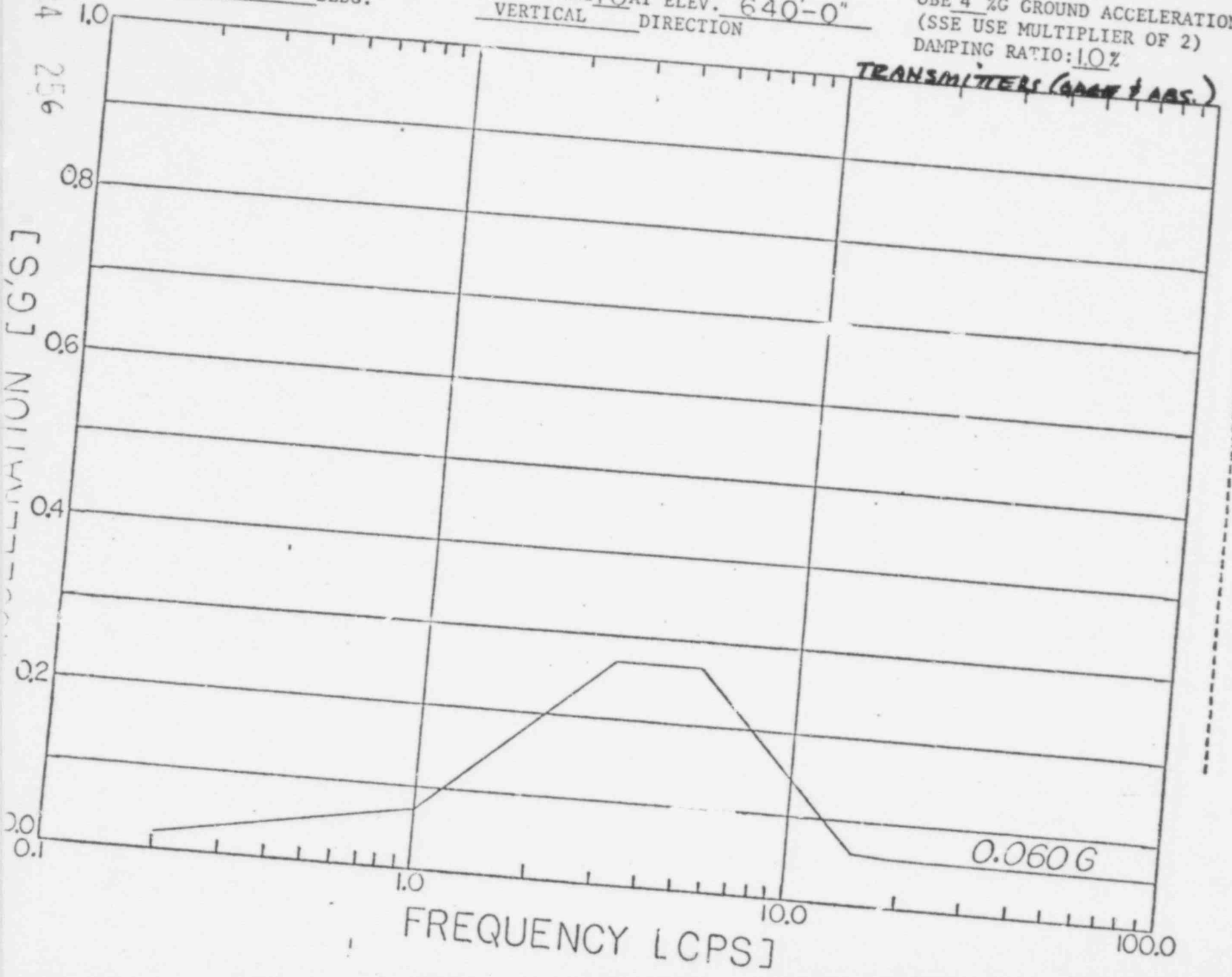


MIDLAND - LANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 10 AT ELEV. 640'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0 %

TRANSMITTERS (QUAD 4 ABS.)



494 256

FIGURE 177

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: Transmitters (ΔP's)

1. Model Number: N1BQ, N2BQ, 1152 Quantity: 35

2. Vendor: Bailey Controls (N1BQ and N2BQ) Rosemount (1152)

3. Physical Description Pressures from the process connections are transmitted through diaphragms and sealed fill fluid to a sensing diaphragm in the center of the sensing element. This sensing diaphragm acts like a spring and deflects in response to the differential pressure across it.

4. Location: Building: Containment.

(In Plant) Elevation: 593'-6", 602', 640'

5. Natural Frequencies in Each Direction: No resonances below 34 Hz.

6. Functional Description: Converts the measured process variable in the form of differential pressure to an electrical signal (4-26 mA dc)

7. Pertinent Reference Design Specifications: Bailey Controls Product Instructions E21-20, E21-21

III. Is Equipment Available for Inspection in the Plant: ( ) Yes (X) No

Comments: The transmitters have not been shipped to the site.

IV. Seismic Qualification Method: Test: ✓

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: ZPA: north-to-south = 0.122g, east-to-west = 0.128g, vertical = 0.120g

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = 3.0g h_2 = 3.0g V = 3.0g

6. g-level Required h_1 = 0.122g h_2 = 0.128g V = 0.120g

7. Mounting:

1. Seismic Report: Mounted on right angle bracket which was attached to top of test table with four 3/8"-16 hex-head bolts.

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

2. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis ( ) Dynamic Analysis

( ) Response Spectrum ( ) Time-History

3. Model Type (each direction); _____

_____

4. Computer Codes: _____

5. Damping: _____

6. Support Considerations: _____

7. Critical Structural Elements:

A.

Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Stress Allowable

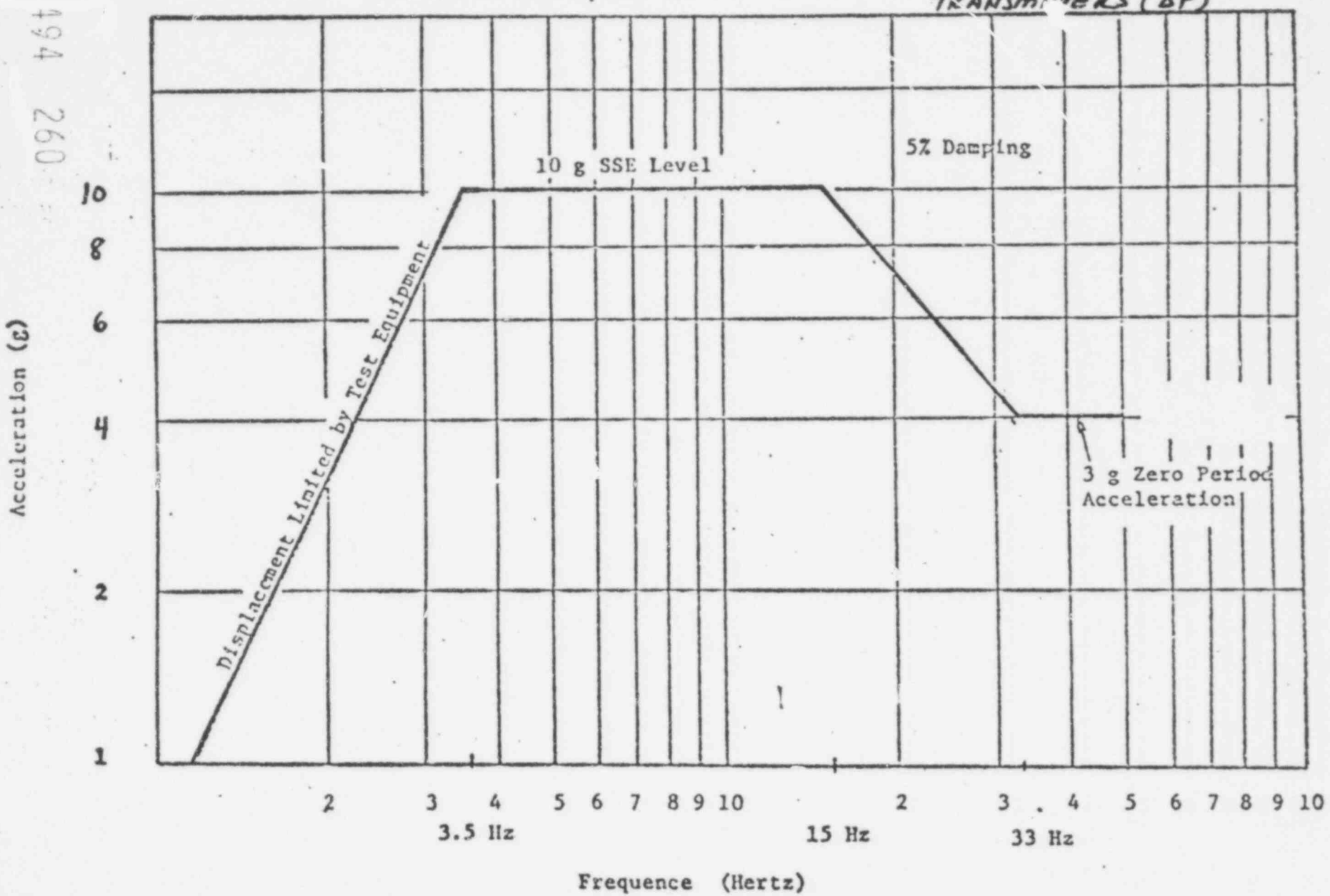
B.

Max. Deflection	Location	Effect Upon Functional Operability

B&W HORIZONTAL/VERTICAL REQUIRED RESPONSE SPECTRUM
FOR PERIPHERAL EQUIPMENT

I.E., Transmitters & RTD's.

TRANSMITTERS (ΔP)



The vendor's TRS enveloped this RRS.

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 19 AT ELEV. 587'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSMITTERS (ΔP)

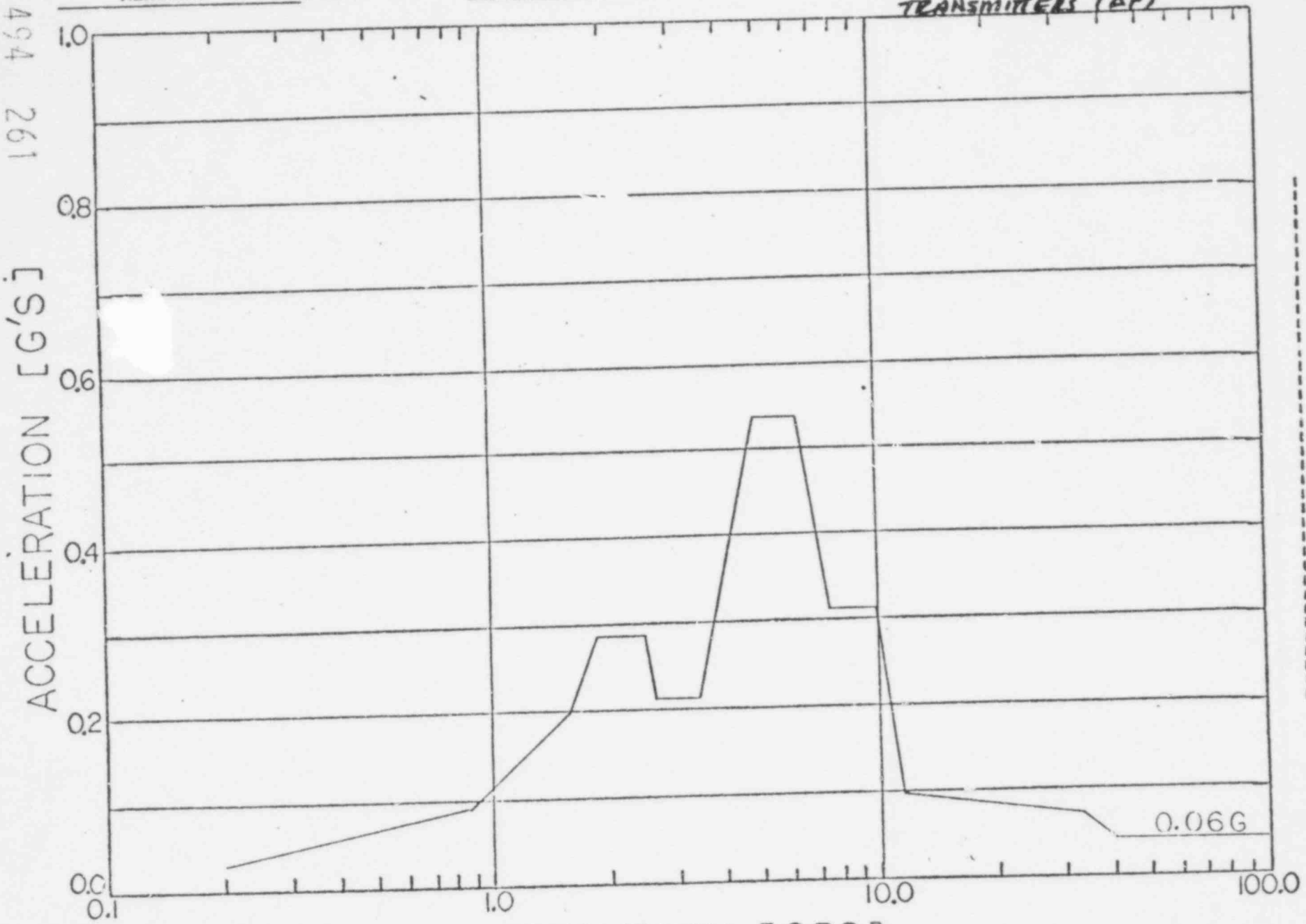
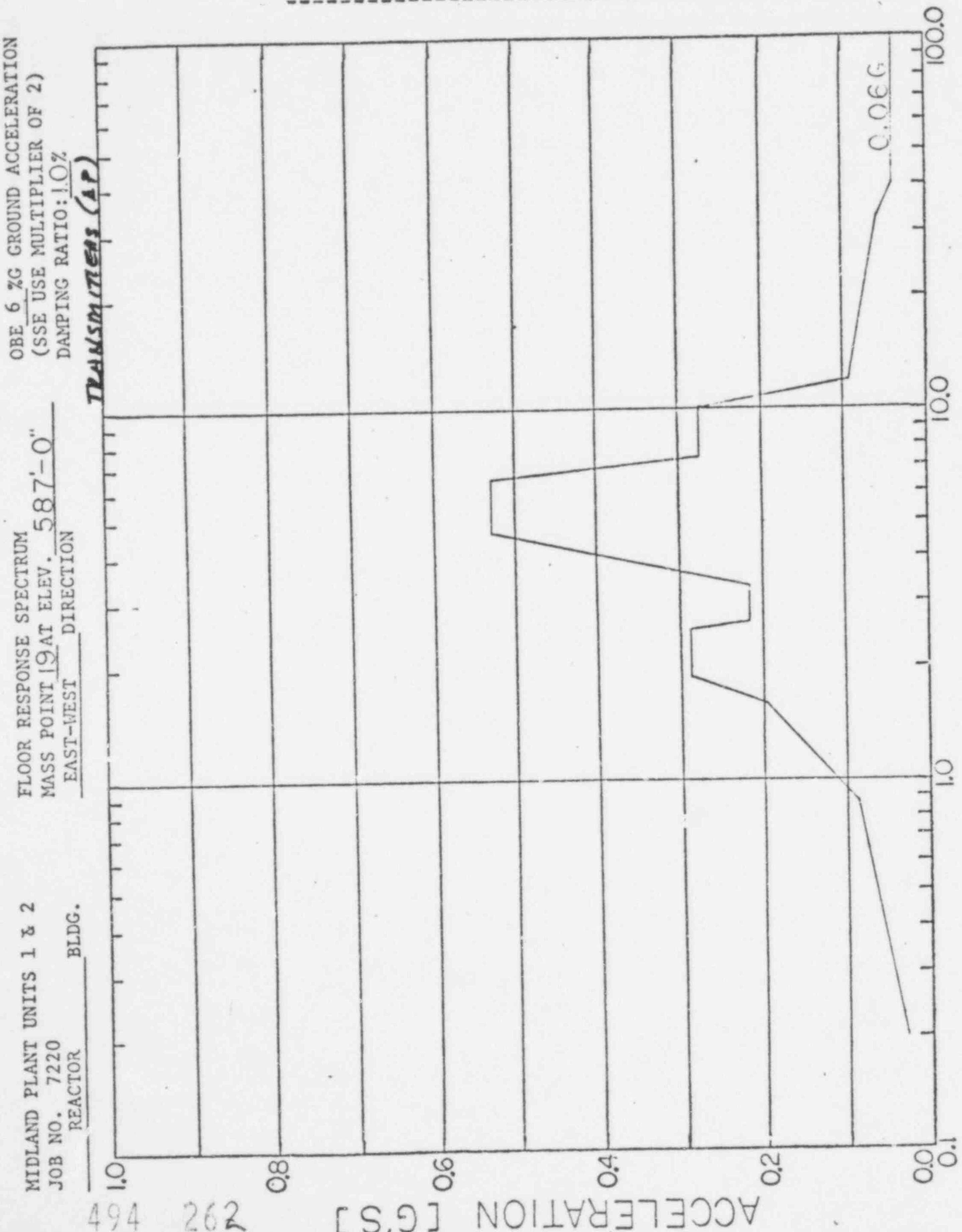


FIGURE NO. 62

494 192 261

CHECKED BY: [illegible] DATE: [illegible]

FIGURE NO: 127



494 262

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 19 AT ELEV. 587'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%

TRANSMITTERS (ΔP)

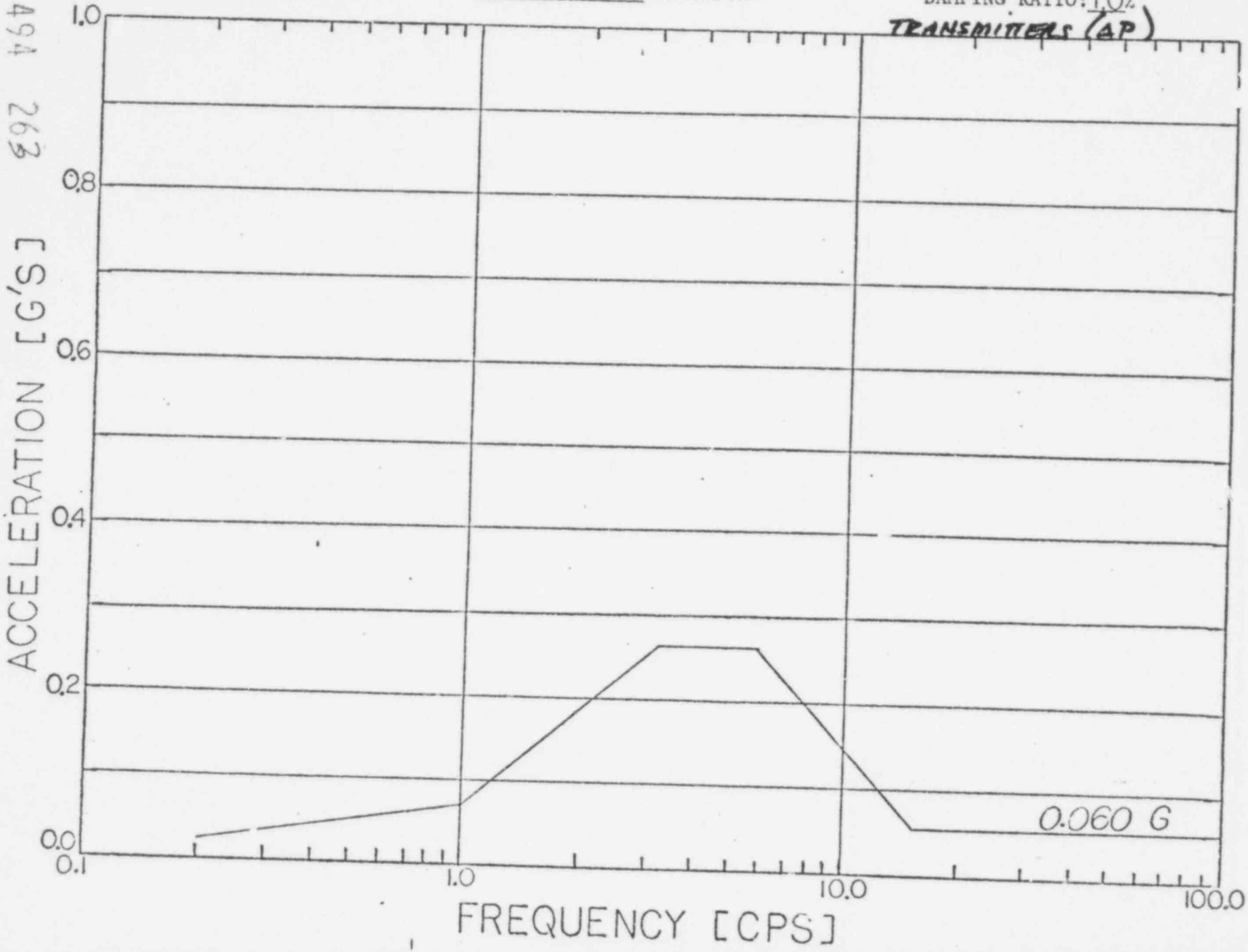


FIGURE NO: 192

494 263

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 10 AT ELEV. 640'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSLATIONS (ΔP)

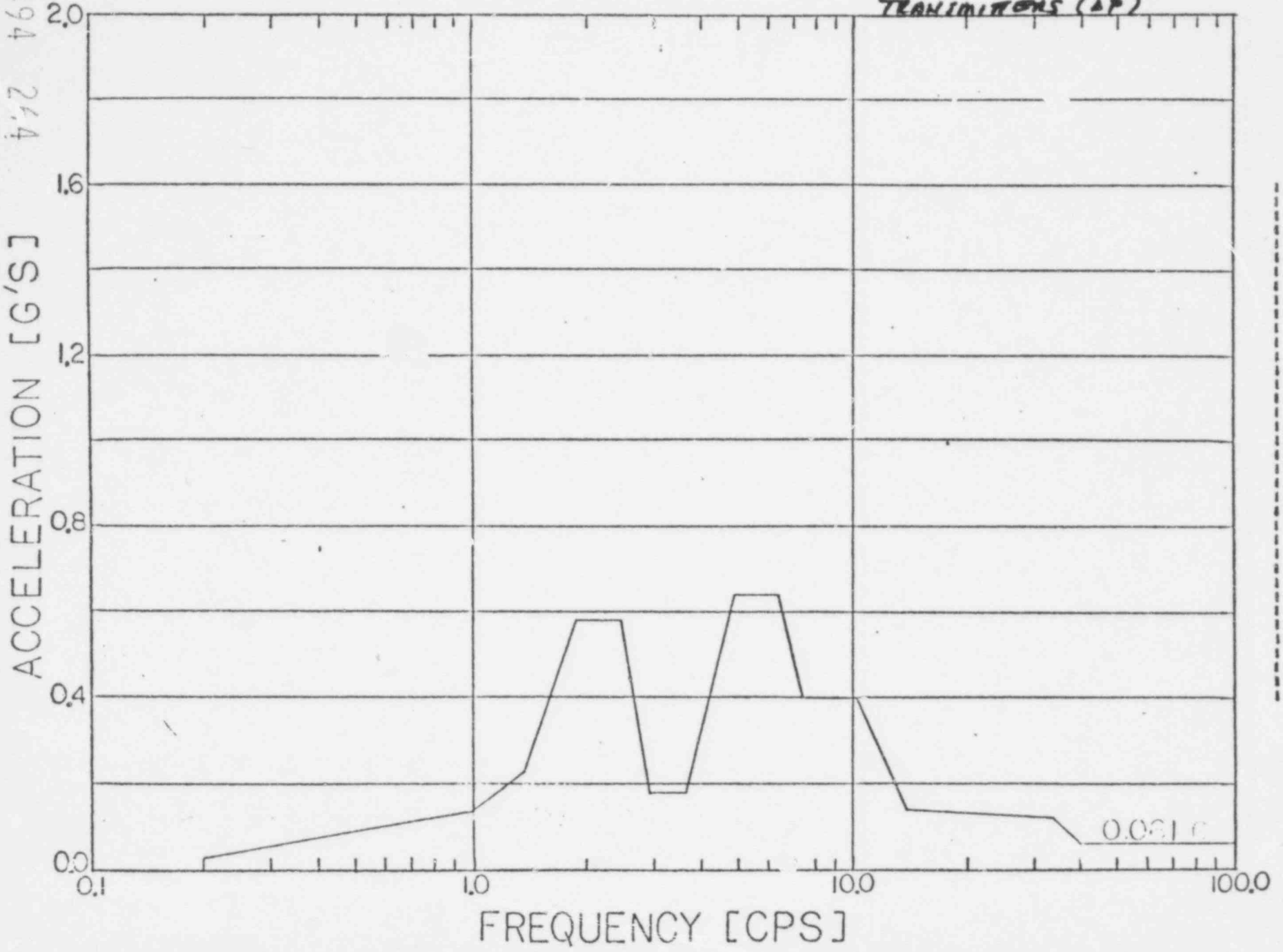


FIGURE NO: 47

4944 214

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 10 AT ELEV. 640'-0"
EAST-WEST DIRECTION

OBE 5 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSMITTERS (ΔP)

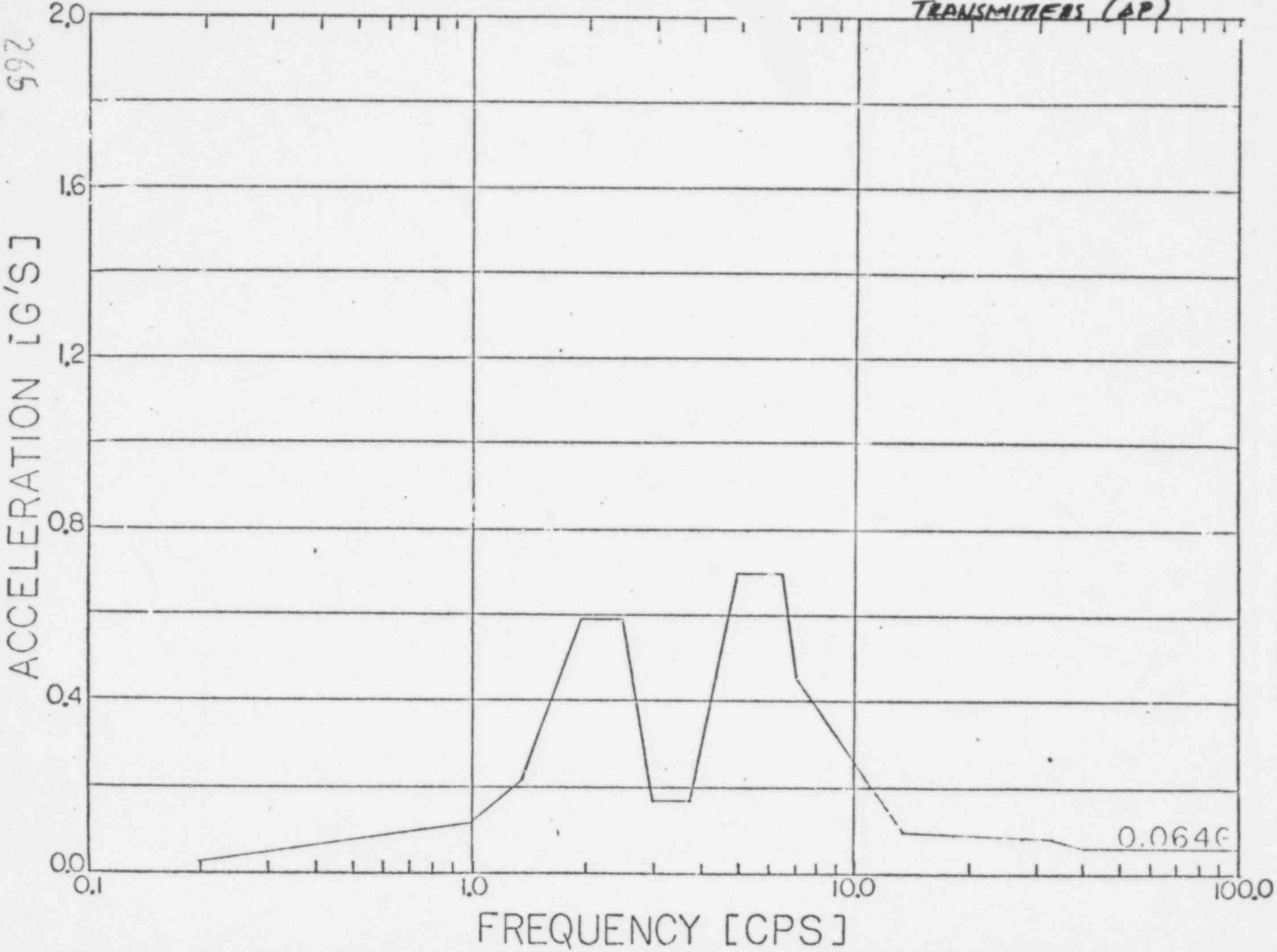


FIGURE NO: 112

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 10 AT ELEV. 640'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%
TRANSMITTERS (ΔP)

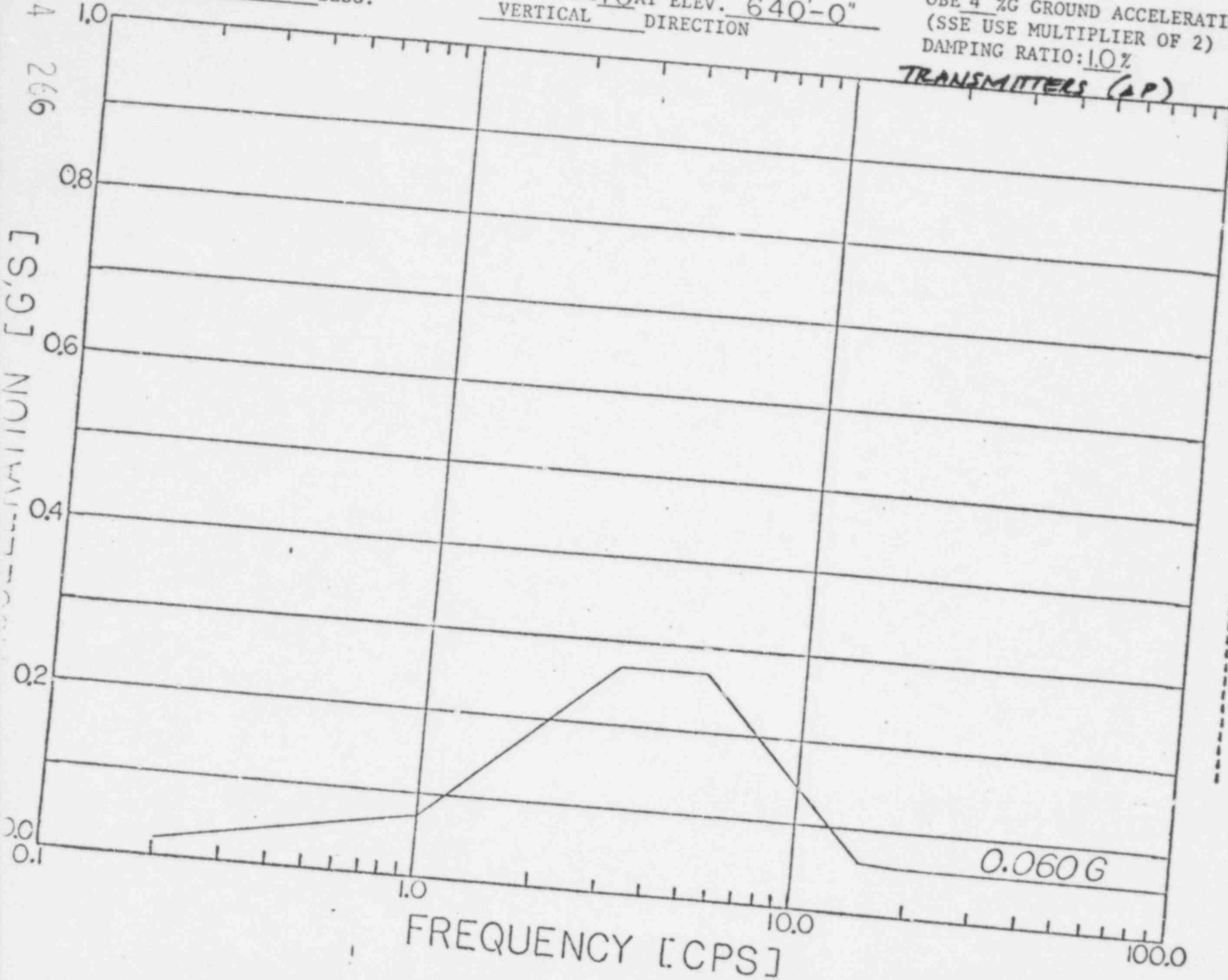


FIGURE NO: 177

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 12 AT ELEV. 603'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSMITTERS (ΔP)

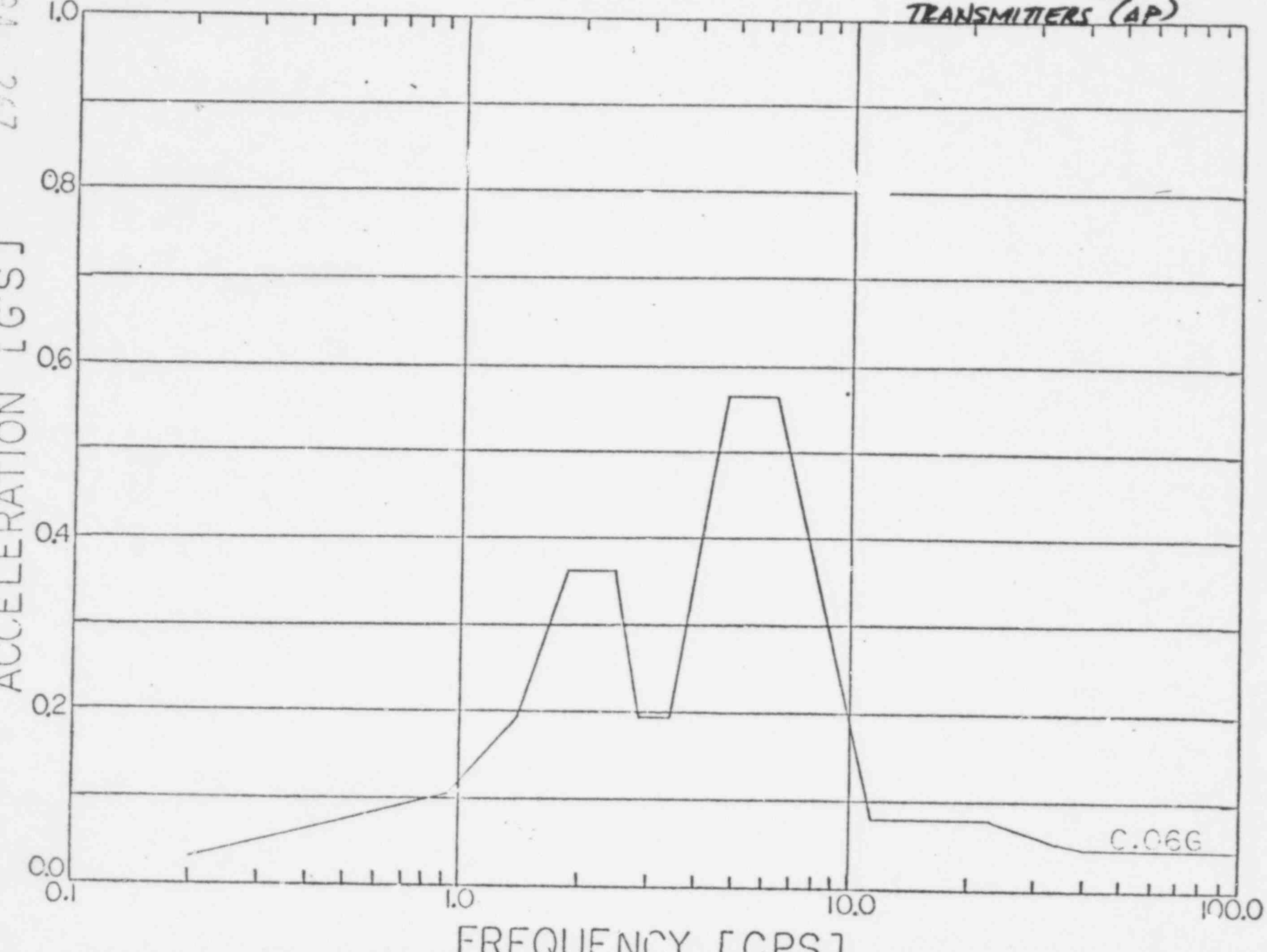


FIGURE NO.: 57

CHECKED BY: ______ DATE: ______

Calc no. ______

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 12 ELEV. 603'-0"
EAST-WEST DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 10%

TRANSMITTERS (DP)

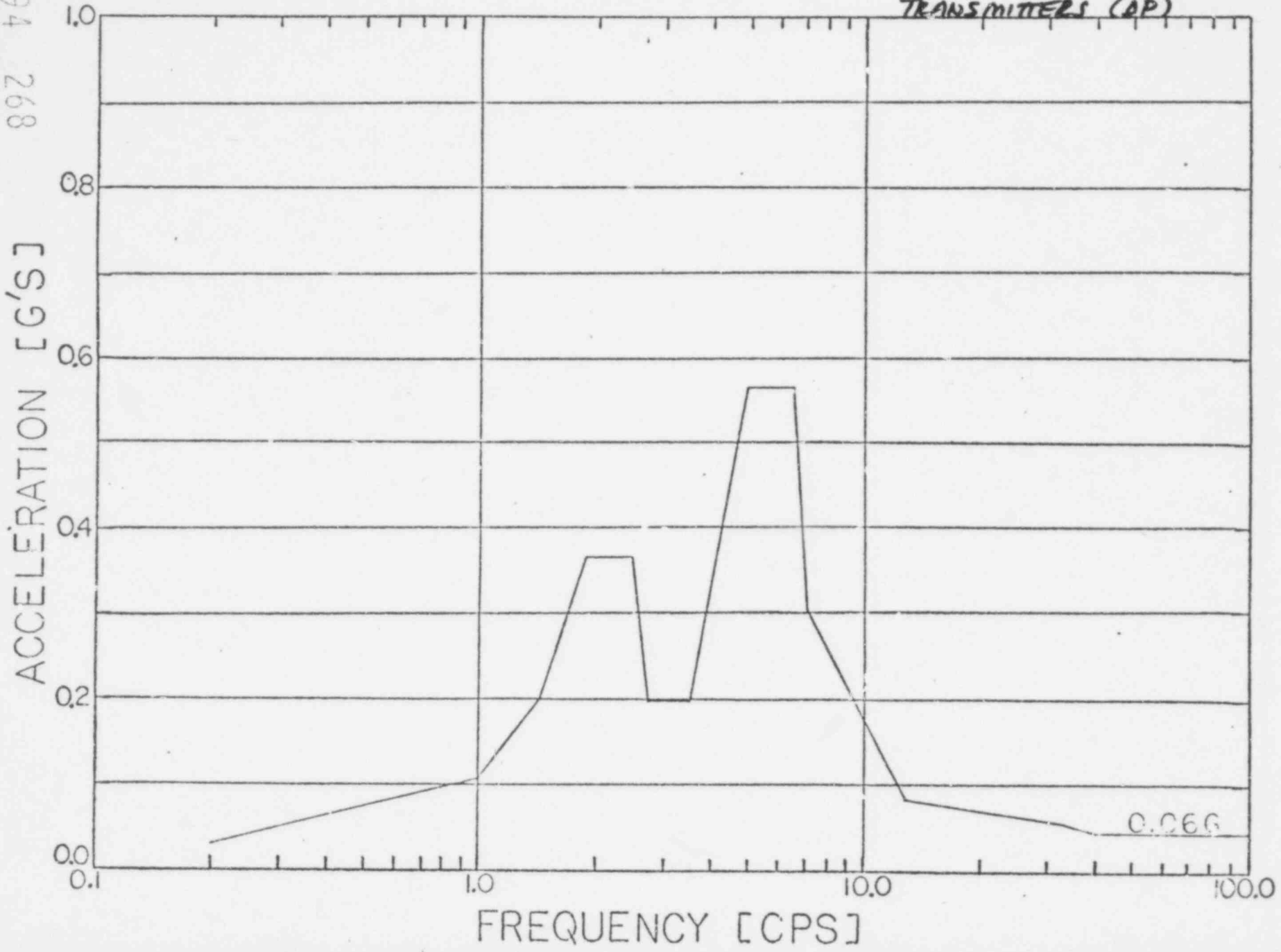


FIGURE NO. 122

494 892 268

[illegible]

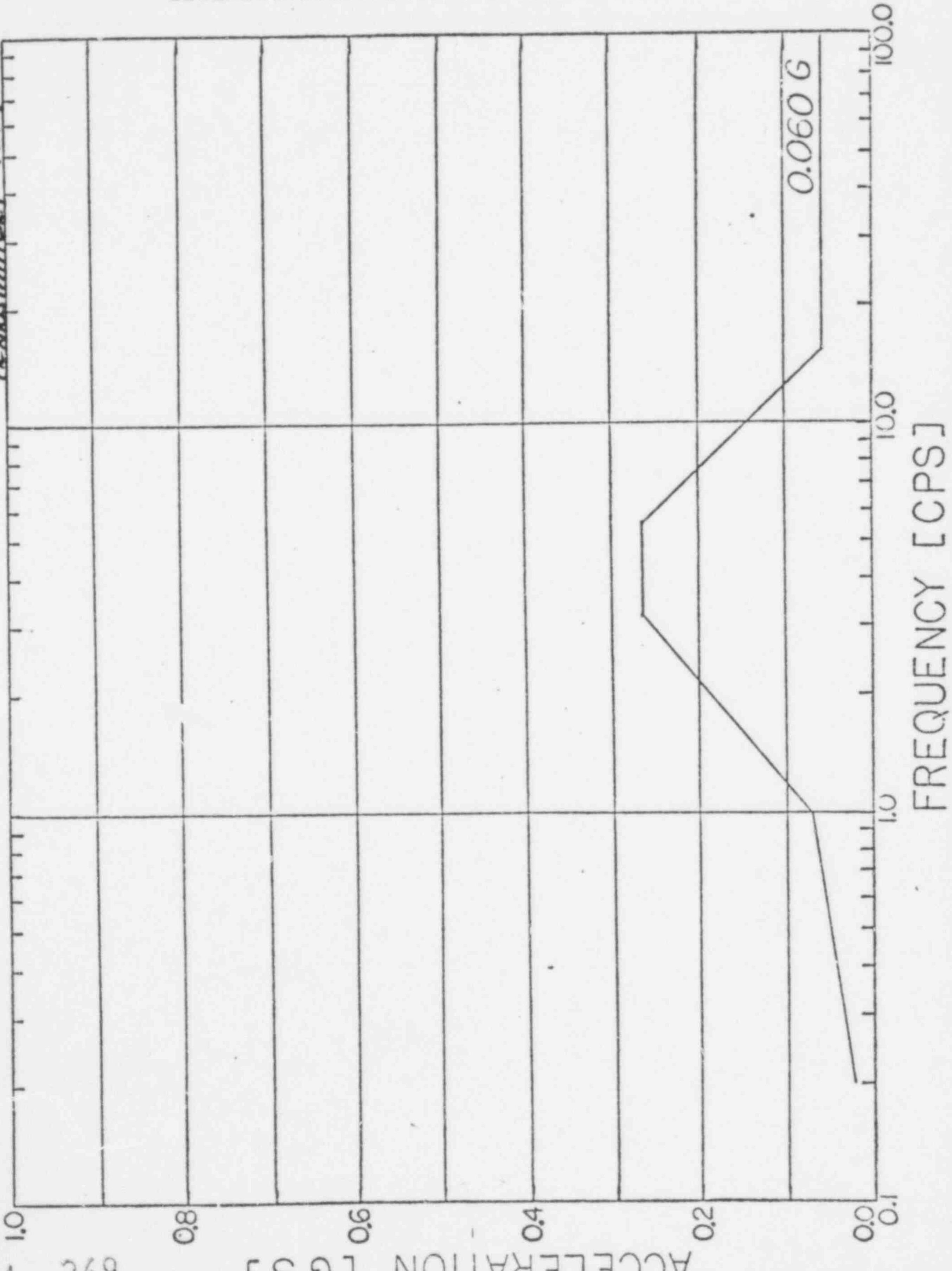
CHECKED BY: [illegible] DATE: 4-15-79 ... 5

FIGURE NO: 187

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
REACTOR BLDG:

FLOOR RESPONSE SPECTRUM
MASS POINT 12 AT ELEV. 603'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%
TRANSMITTERS (ΔP)



494 269

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Units 1&2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: Decay heat pump motor

1. Model Number: 8110 Quantity: 2 per unit

2. Vendor: General Electric

3. Physical Description 400 hp induction-type motor

4. Location: Building: Auxiliary building - decay heat/RB spray pump room

(In Plant) Elevation: 568'

5. Natural Frequencies in Each Direction: Peak spectral accelerations used in axial and transverse directions. Vertical direction is 22 cps.

6. Functional Description:

7. Pertinent Reference Design Specifications: 08-1125000007-01

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments: All but one motor is available onsite. The remaining motor will be used to test the pump and will be shipped later.

IV. Seismic Qualification Method: Test: _____

Analysis: X

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: North-to-south = 1.45g; east-to-west = 1.1g (SSE valves)

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency ( ) Multi-Frequency

2. ( ) Single Axis ( ) Multi-Axis

3. Frequency Range: _____

4. TRS enveloping RRS using Multi-Frequency Test ( ) Yes (attach TRS graphs)

5. g-level Test at h_1 = _____ h_2 = _____ V = _____

6. g-level Required h_1 = _____ h_2 = _____ V = _____

7. Mounting:

   1. Seismic Report: _____

   2. Field Check: _____

8. Functional Verification Performed ( ) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

2. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis ( ) Dynamic Analysis

(X) Response Spectrum ( ) Time-History

3. Model Type (each direction); Finite element and lumped mass

4. Computer Codes: Non-commercial

5. Damping: 1%

6. Support Considerations: Base-bolted

7. Critical Structural Elements:

A.

Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Stress Allowable
Frame			Applied stress is 8% of allowable		
Rotor			Applied stress is 45% of allowable.		

B.

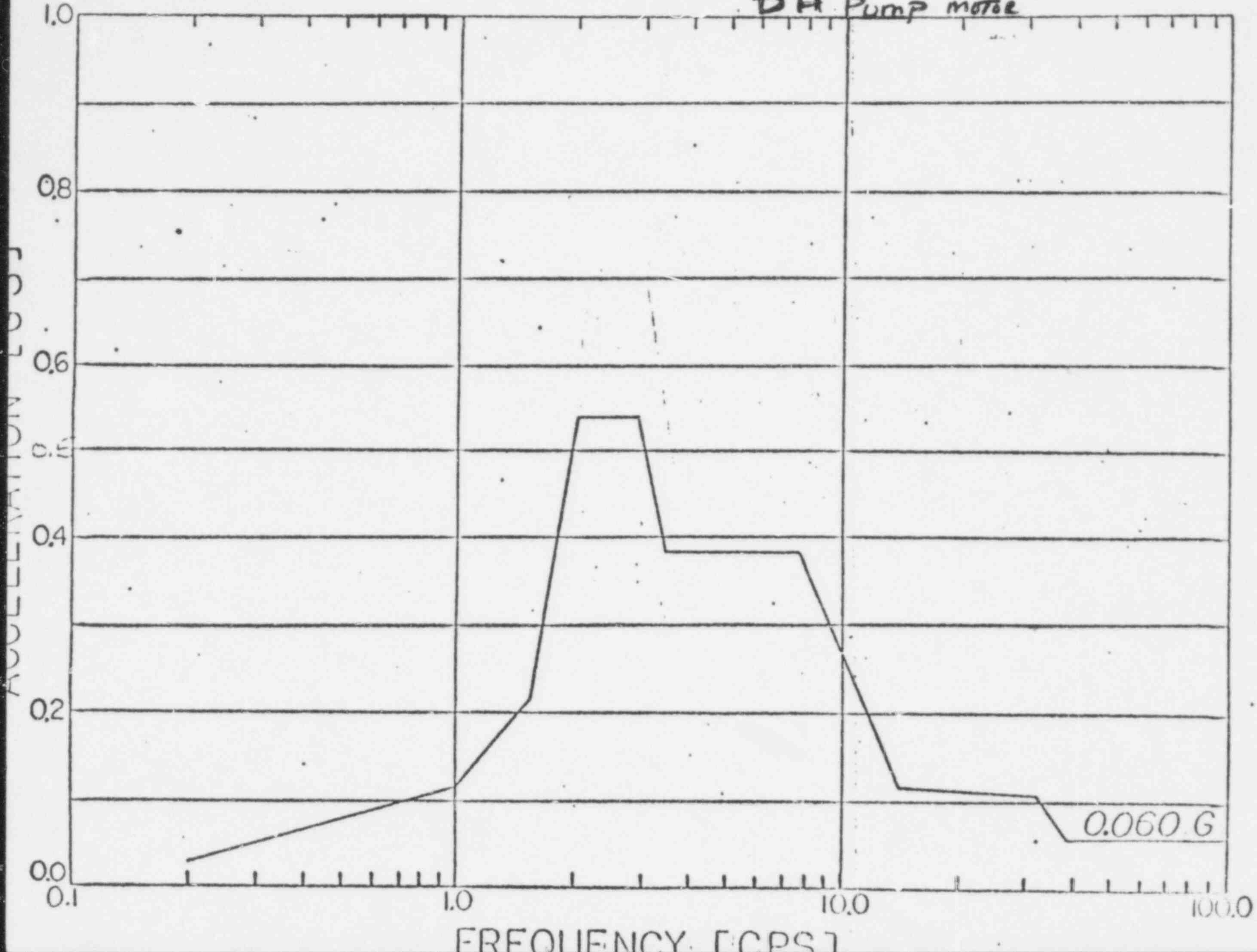
Max. Deflection	Location	Effect Upon Functional Operability
Rotor	Center	None. Closure is 7% of air gap.

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 15 AT ELEV. 565'-0"
EAST-WEST DIRECTION

OBE 6 % GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%

DH Pump motor



CHECKED BY: AJ Tsang DATE: 4-15-82 REV. NO: 5
FIGURE NO: 167

494 273

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM:
MASS POINT 19 AT ELEV. 565'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0 %

DH PUMP MOTOR

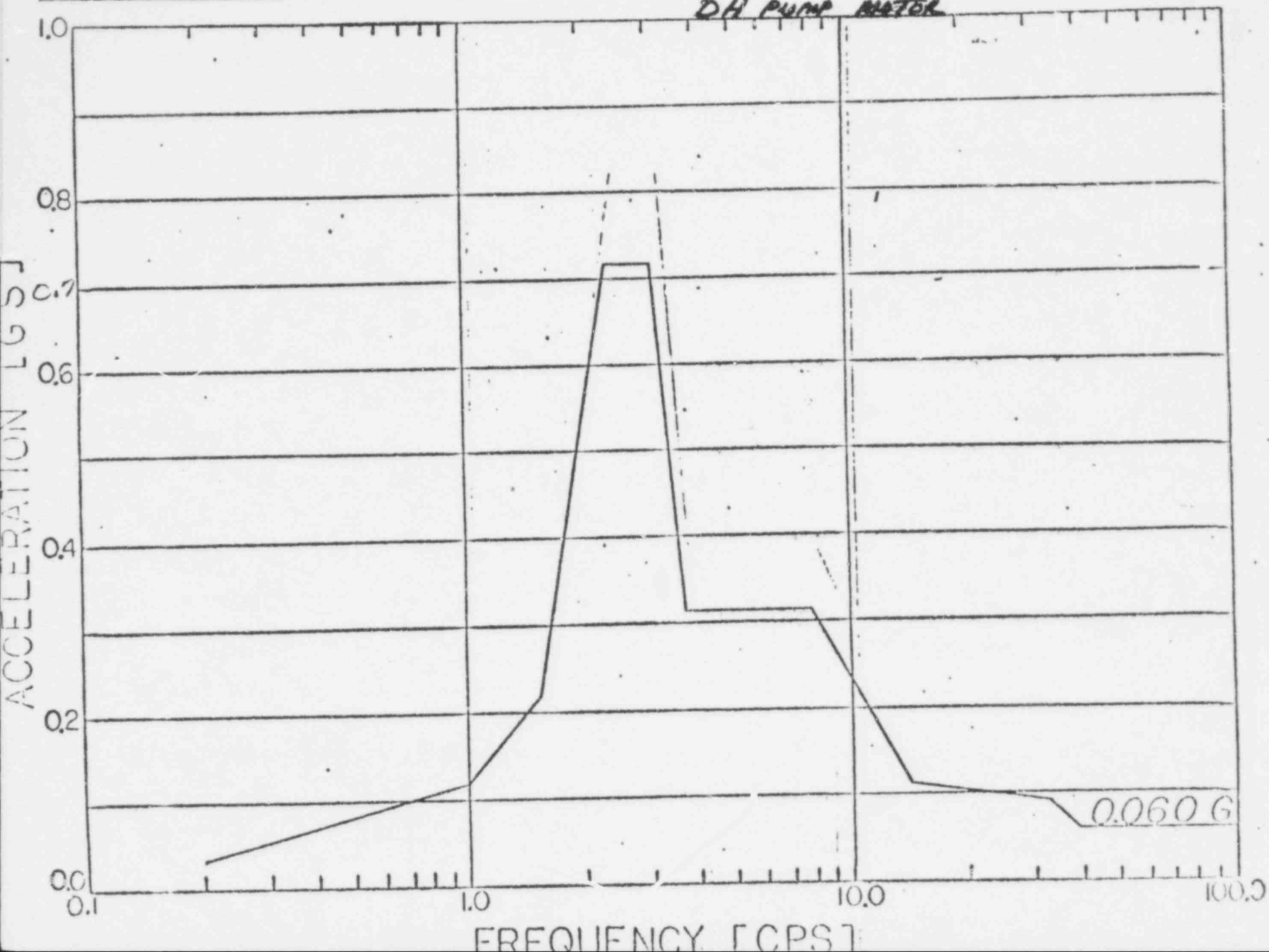


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FIGURE NO: 92

494 274

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 15 AT ELEV. 565'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 1.0%

DH Pump MOTOR

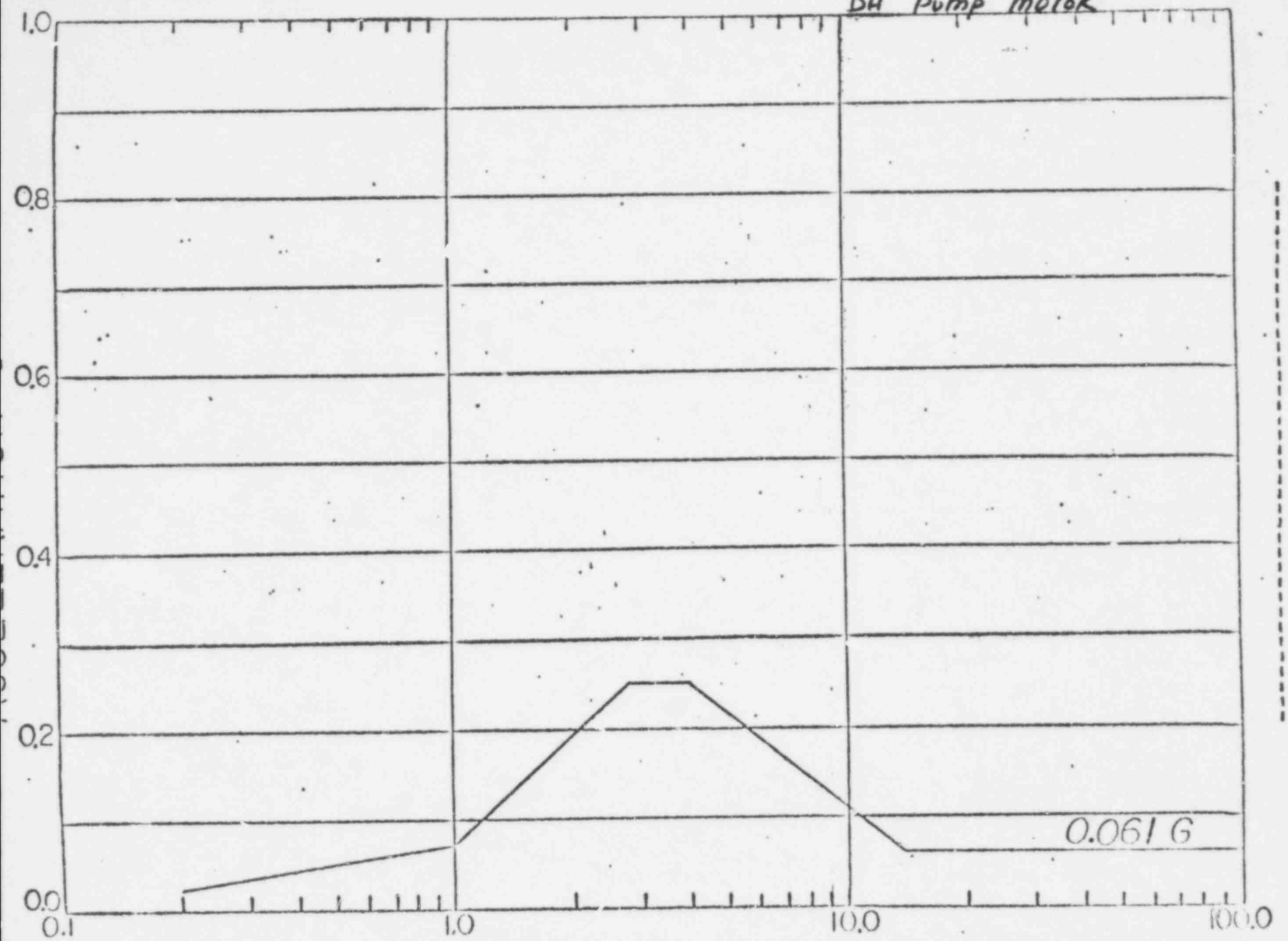


FIGURE NO: 242

CHECKED BY: [illegible] DATE: [illegible] REV. NO: 5

494 275

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and ECCAS cabinet-mounted modules: redesigned and retested using single axis/sine sweep method

1. Model Number: 880 and 881 systems (1) Quantity: 1 per unit

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description NI/RPS and ECCAS modules mounted within the NI/RPS and ECCAS cabinet enclosures

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: See Table 1 attached.

6. Functional Description: Process electronic signals and provide electrical power

7. Pertinent Reference Design Specifications: "Remainder 880/881 System Modules, TRS-3101-Cons 1 & 2" - qualification test result summary

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

(1)
1 Contact buffer - retested
2 2/4 logic buffer - redesigned and tested
3 2/4 trip logic - redesigned and tested
4 Intermediate range test - retested
5 Source range pre-amp - retested
6 Bistable - retested
7 Auctioneer - retested
8 Fan failure detector - retested
9 Power supply - retested
10 AC power distribution panel - retested

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. (X) Single Frequency ( ) Multi-Frequency

2. (X) Single Axis ( ) Multi-Axis

3. Frequency Range: 1 - 35 Hz

4. TRS enveloping RRS using Multi-Frequency Test ( ) Yes (attach TRS graphs)

5. g-level Test at h_1 = 1 g h_2 = 1 g V = 1 g

6. g-level Required h_1 = <0.4 g h_2 = <0.6 g V = <0.3 g
(for worst case module)

7. Mounting:

1. Seismic Report: Simulated in-cabinet mounting

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

TABLE I

NATURAL FREQUENCIES (Hz)

Equipment	Direction		
	Vertical	Front to Back	Side to Side
881 contact buffer	11	6	None*
2/4 logic buffer (881)	28	None*	None*
2/4 trip logic (881)	20	25	29
Intermediate range test (880)	None*	None*	None*
Source range pre-amp (880)	None*	12	17
880 bistable	16	None*	None*
880 auctioneer	19	None*	None*
880 fan failure detector	4	4.7	14
880 power supply	16	12	28
AC power distribution panel	34	12	17

* No natural frequencies below 34 Hz

494 279

NI/RPS & ECCAS MODULES & ENCLOSURES

SIDE TO SIDE

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 5.0%

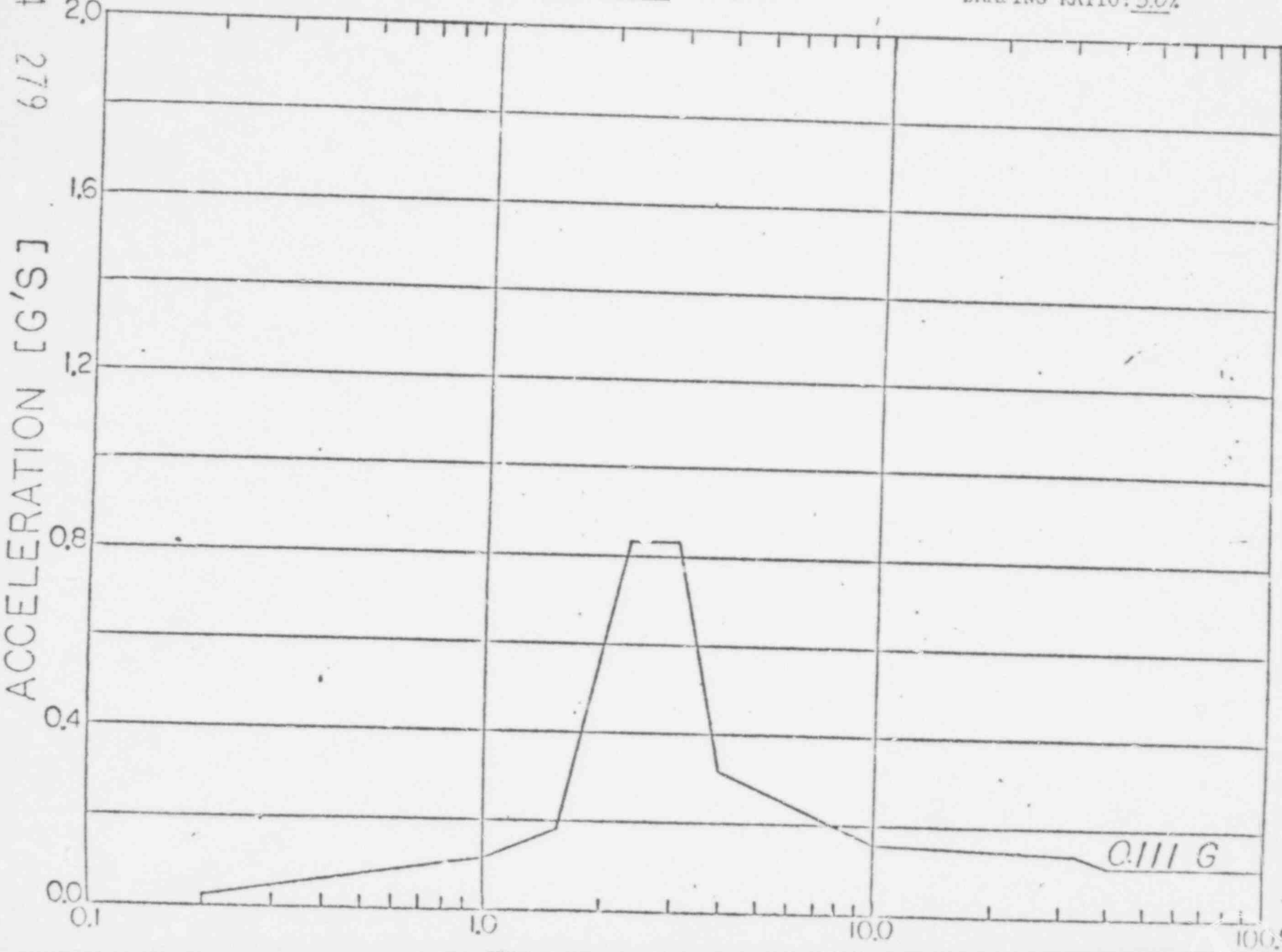


FIGURE NO: 10

CHECKED BY: DATE: REV. NO: 5

494 280

ORIGINATOR: S.C. FOCLEEE DATE: 4-15-77 FILE NO: 45179

CHECKED BY: W. Tseng DATE: 4-15-77 REV. NO:

FIGURE NO: 180

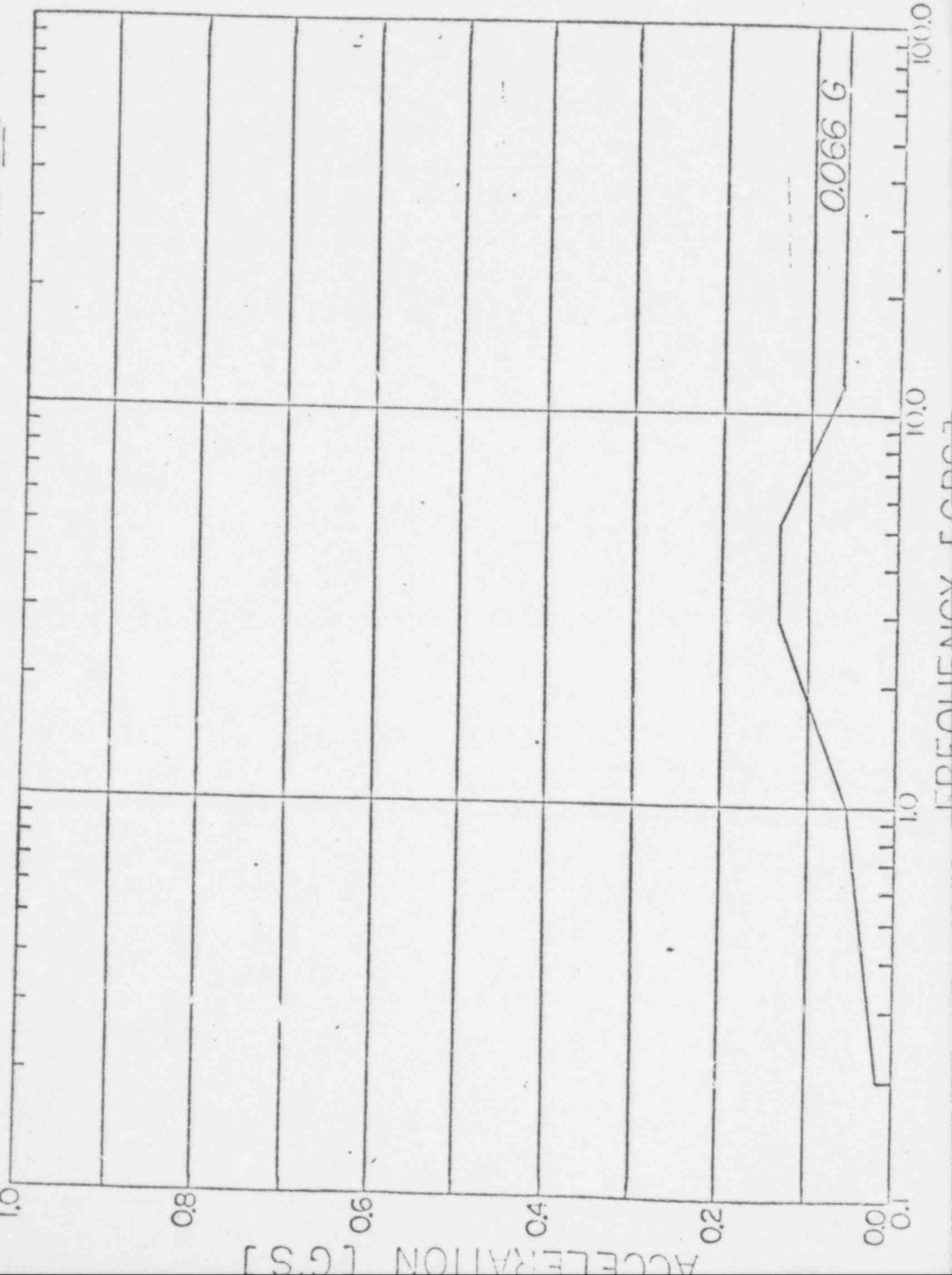
UP & DOWN

NI/RPS & ECCAS MODULES & ENCLOSURES

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 5.0%



NI/RIS & ECCAS MODULES & ENCLOSURES

FRONT TO BACK

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
EAST-WEST DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 3.0%

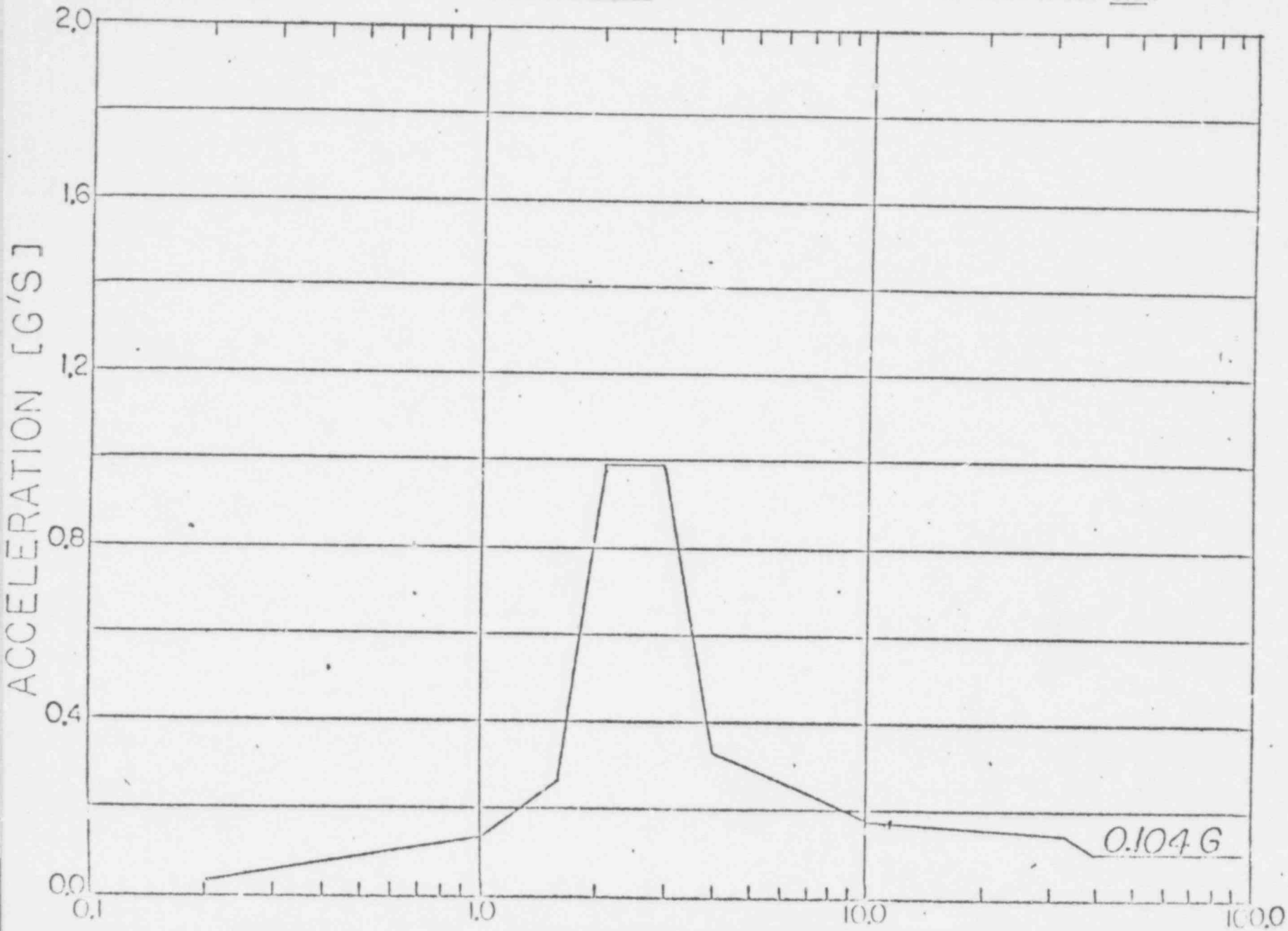


FIGURE NO: 104

ORIGINATOR: S.C. FOLLNER DATE: 4/5/83
CHECKED BY: [illegible] DATE: [illegible]

494 241

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: RC flow select panel

1. Model Number: 6623534A2 Quantity: 1 per unit

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description The RC flow select panel is mounted in an RPS cabinet. The panel contains three connectors.

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: None below 34 Hz.

6. Functional Description: The panel allows RC flow information from either RPS Subsystem 1 or RPS Subsystem 2 to be transmitted to the plant computer.

7. Pertinent Reference Design Specifications: B&W Document 58-0209-01; BCCO Seismic Report QR-4101-CAB (BCCO analysis on file at BCCO for audit.)

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: _____

Analysis: _____

Combination of Test and Analysis: X

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (2) Yes (attach TRS graphs)

5. g-level Test at h_1 = >1 g ZPA h_2 = >1 g ZPA V = >1 g ZPA

6. g-level Required h_1 = <0.4 g h_2 = <0.4 g V = <0.2 g

7. Mounting:

1. Seismic Report: Mounting brackets used on Midland are differen from those tested with the panel. Therefore,
2. Field Check: the Midland brackets were qualified by analysis.

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable
Continuity testing was performed.

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: See Section VI.1-7.

2. Method of Analysis:

( ) Static Analysis (X) Equivalent Static Analysis ( ) Dynamic Analysis

( ) Response Spectrum ( ) Time-History

3. Model Type (each direction); Beam - both ends restricted, concentrated load at center

4. Computer Codes: None

5. Damping: NA

6. Support Considerations: Restricted ends of beam

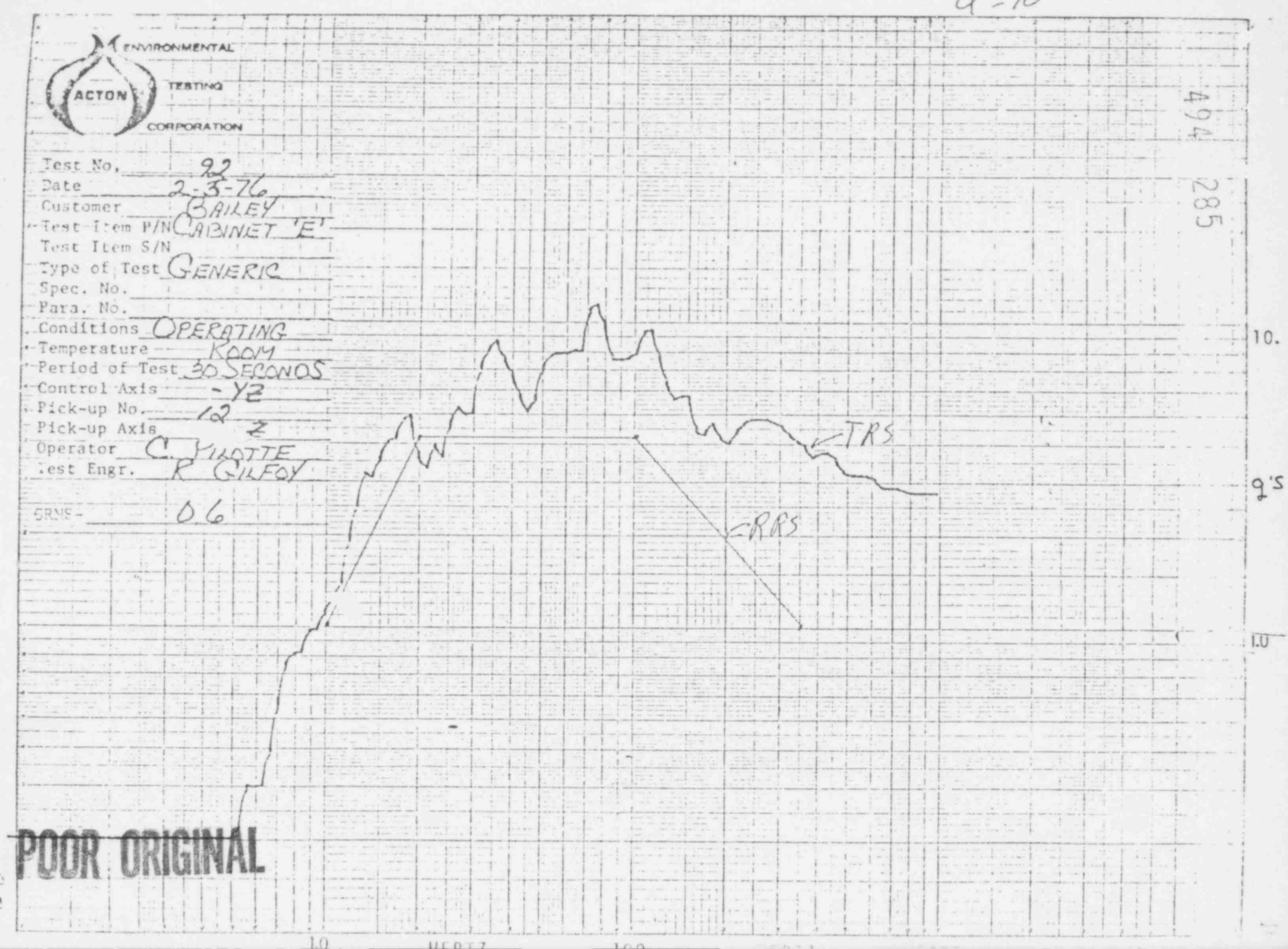
7. Critical Structural Elements:

A.

Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Stress Allowable
Panel	At Supports (brackets)			7,013 psi	28,000 psi

B.

Max. Deflection	Location	Effect Upon Functional Operability
0.00177 in	Center of panel	None

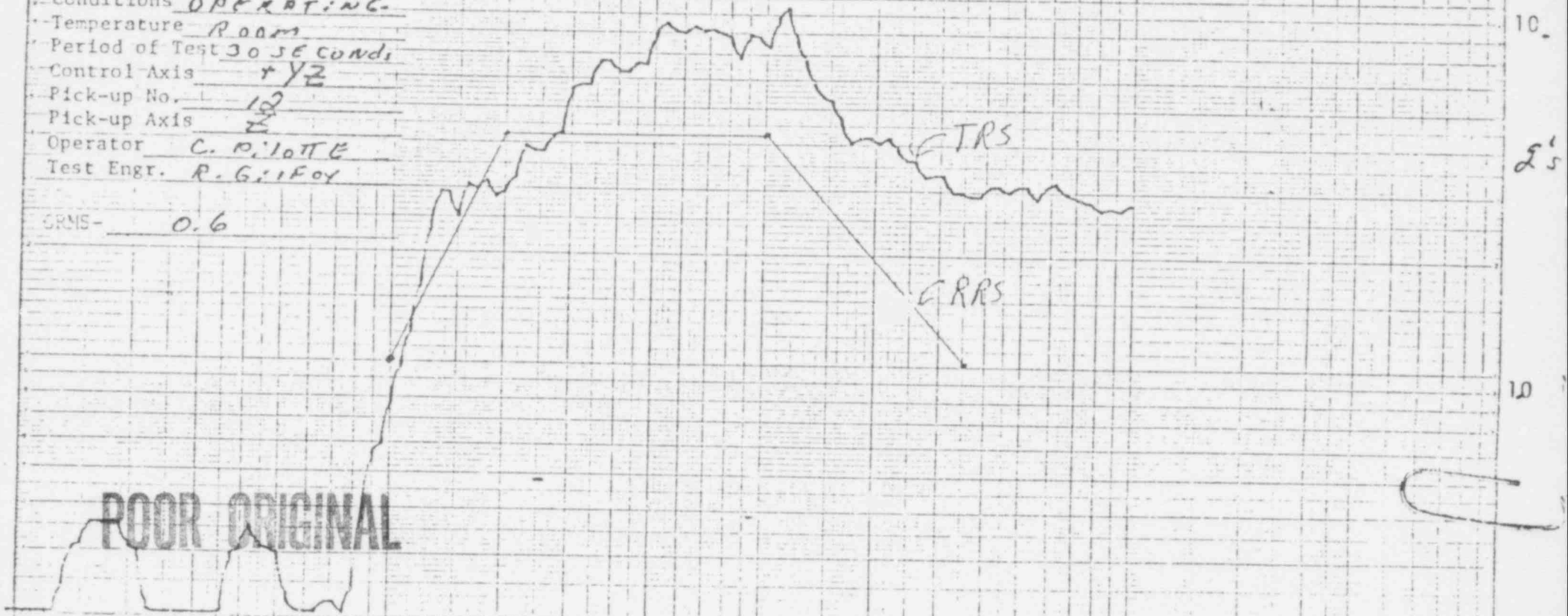

Q=10
ENVIRONMENTAL
ACTON
TESTING
CORPORATION
494 285
Test No. 22
Date 2-3-76
Customer BAILEY
Test Item P/N CABINET 'E'
Test Item S/N
Type of Test GENERIC
Spec. No.
Para. No.
Conditions OPERATING
Temperature ROOM
Period of Test 30 SECONDS
Control Axis -YZ
Pick-up No. 12
Pick-up Axis Z
Operator C. MIOTTE
Test Engr. R GILFOY
SRMS- 0.6
TRS
RRS
10.
g's
1.0
10
HERTZ
100
POOR ORIGINAL

ENVIRONMENTAL TESTING CORPORATION

ACTON

Test No. 88
Date 2-5-76
Customer BOEING
Test Item P/N CABINET 'E'
Test Item S/N
Type of Test GENERIC
Spec. No.
Para. No.
Conditions OPERATING
Temperature ROOM
Period of Test 30 SECONDS
Control Axis +YZ
Pick-up No. 12
Pick-up Axis Z
Operator C. PILOTTE
Test Engr. R. GILFOY

GRMS- 0.6



10.
2's
10

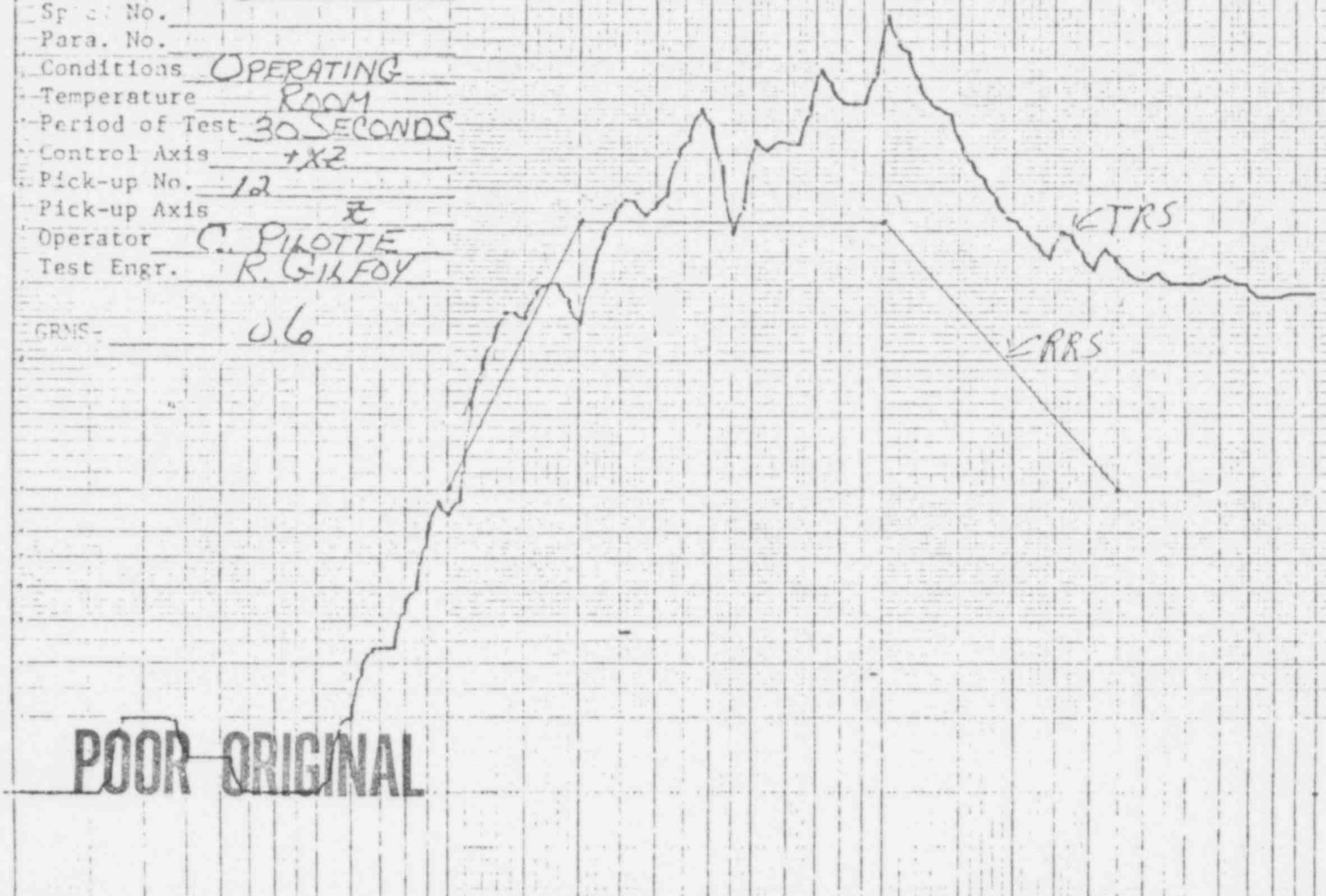
494 286

Q=10

ACTON ENVIRONMENTAL TESTING CORPORATION

Test No. 84
Date 2-4-76
Customer BAILEY
Test Item P/N CABINET 'E'
Test Item S/N
Type of Test GENERIC
Spec No.
Para. No.
Conditions OPERATING
Temperature ROOM
Period of Test 30 SECONDS
Control Axis +X2
Pick-up No. 12
Pick-up Axis Z
Operator C. PILOTTE
Test Engr. R. GILFOY

GRMS- 0.6

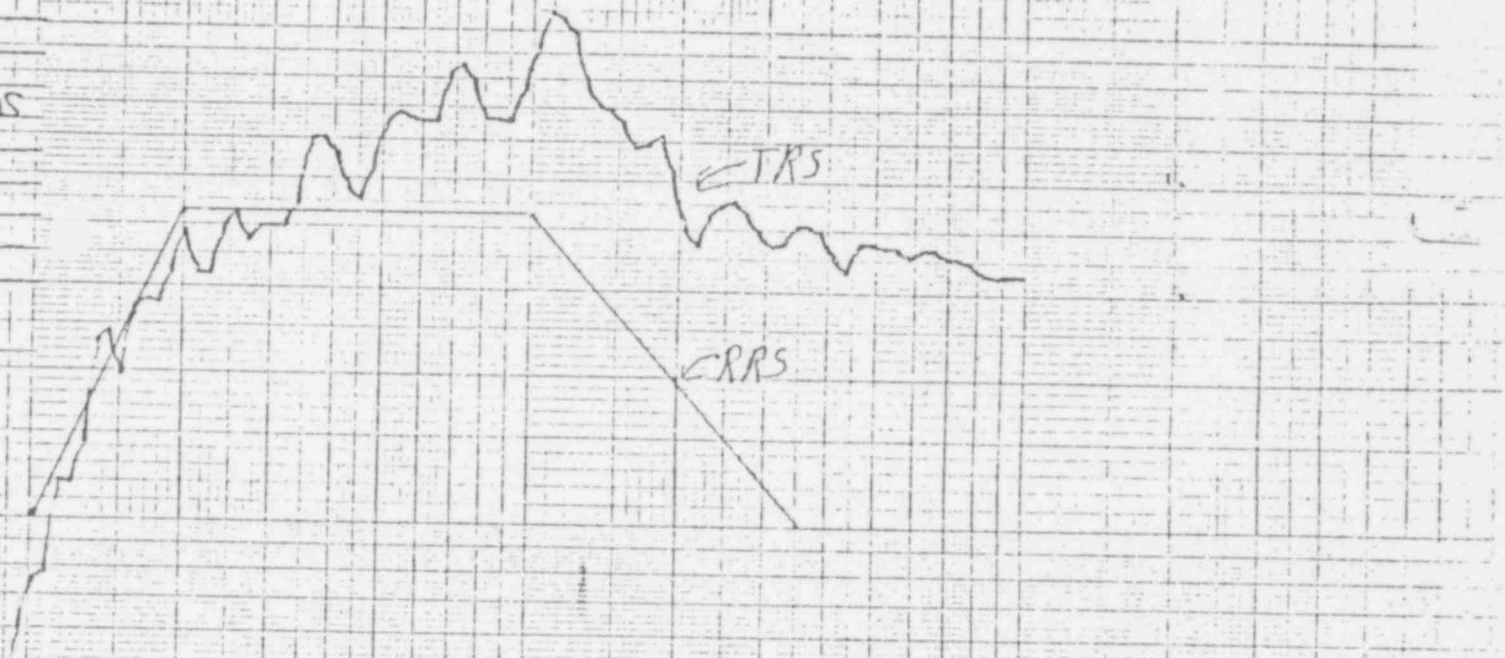


494 287

A-1

ENVIRONMENTAL
ACTON TESTING
CORPORATION

Test No. 81
Date 2-4-76
Customer BAILEY
Test Item P/N CABINET 'E'
Test Item S/N
Type of Test GENERIC
Spec. No.
Para. No.
Conditions OPERATING
Temperature ROOM
Period of Test 30 SECONDS
Control Axis -X2
Pick-up No. 12
Pick-up Axis Z
Operator C. PILOTTE
Test Engr. R. GILROY
GRMS- 0.6



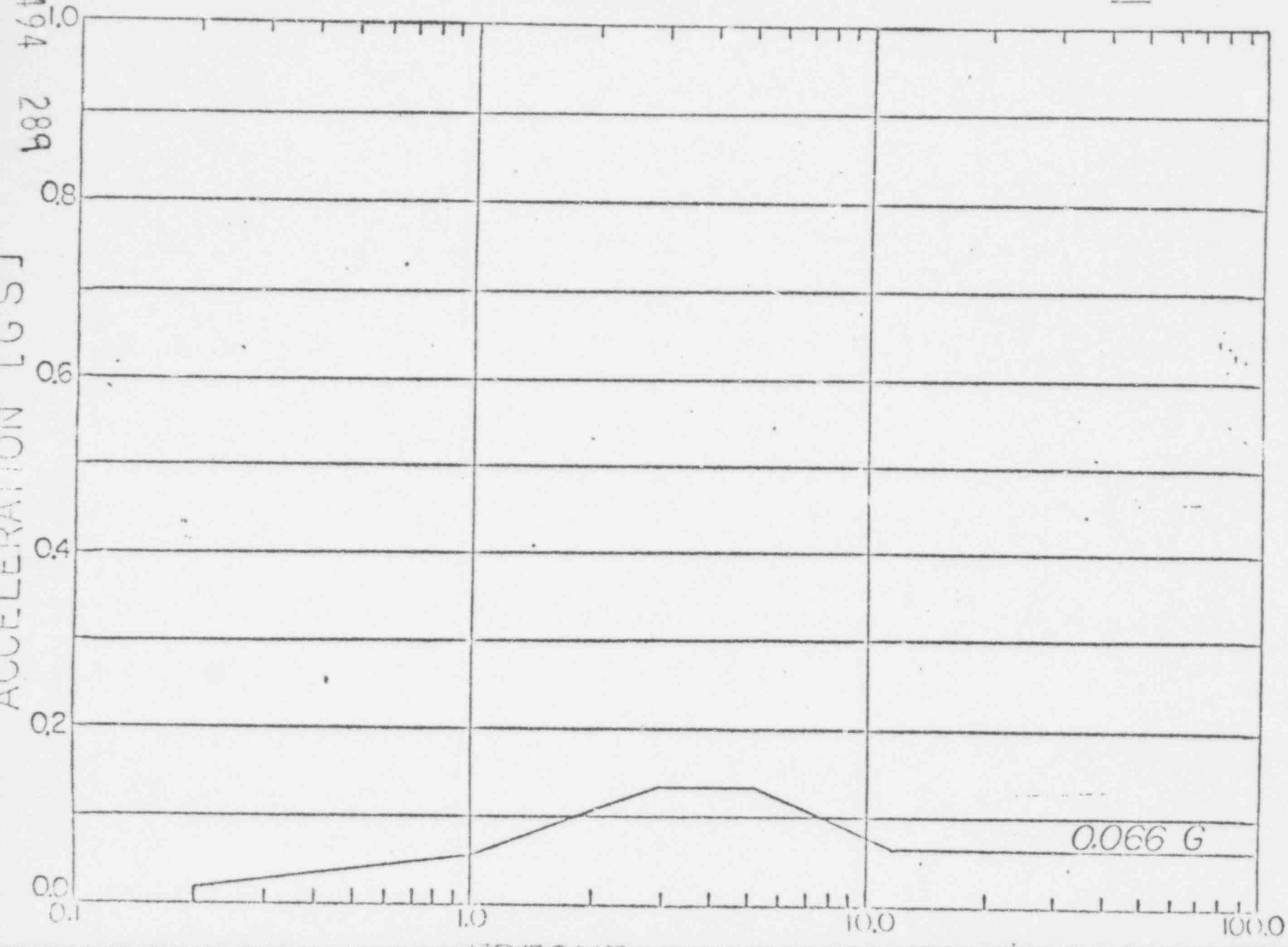
NI/RPS & ECCAS MODULES & ENCLOSURES

UP & DOWN

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 5.0%



ORIGINATOR: S.C. FOLLNER DATE: 4/15/77 FILE NO: 45-179

CHECKED BY: DATE: 4-15-77 REV. NO:

FIGURE NO: 180

ORIGINATOR: S.C. FOLLER DATE: 4-15-77 FILE NO: 4510 3

CHECKED BY: W. TSENG DATE: 4-15-77 REV. NO: 5

FIGURE NO: 104

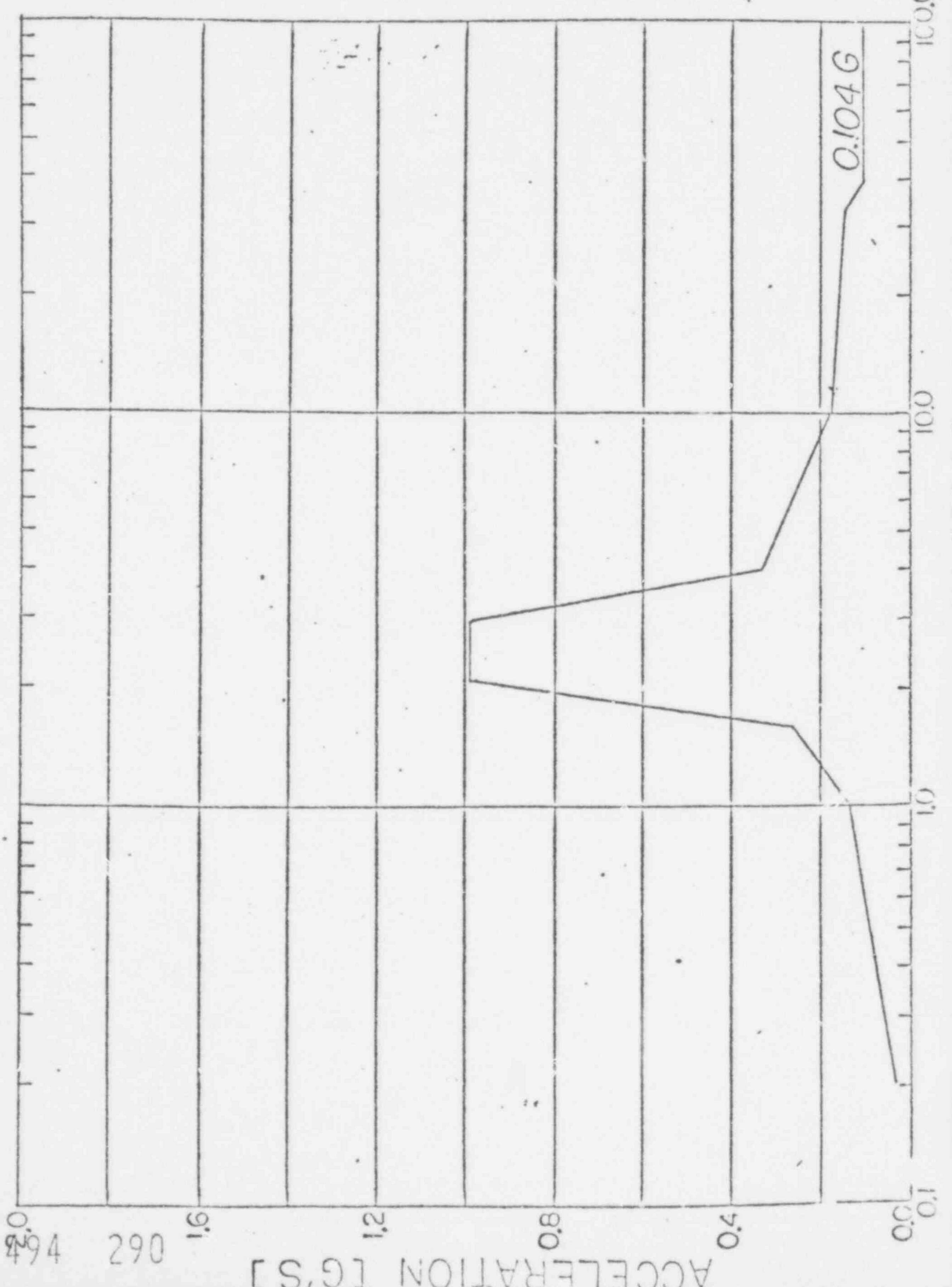
MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

NI/RIS & ECCAS MODULES & ENCLOSURES

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
EAST-WEST DIRECTION

FRONT TO BACK

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 3.0%



494 290

NI/RPS & ECCAS MODULES & ENCLOSURES

SIDE TO SIDE

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 5.0%

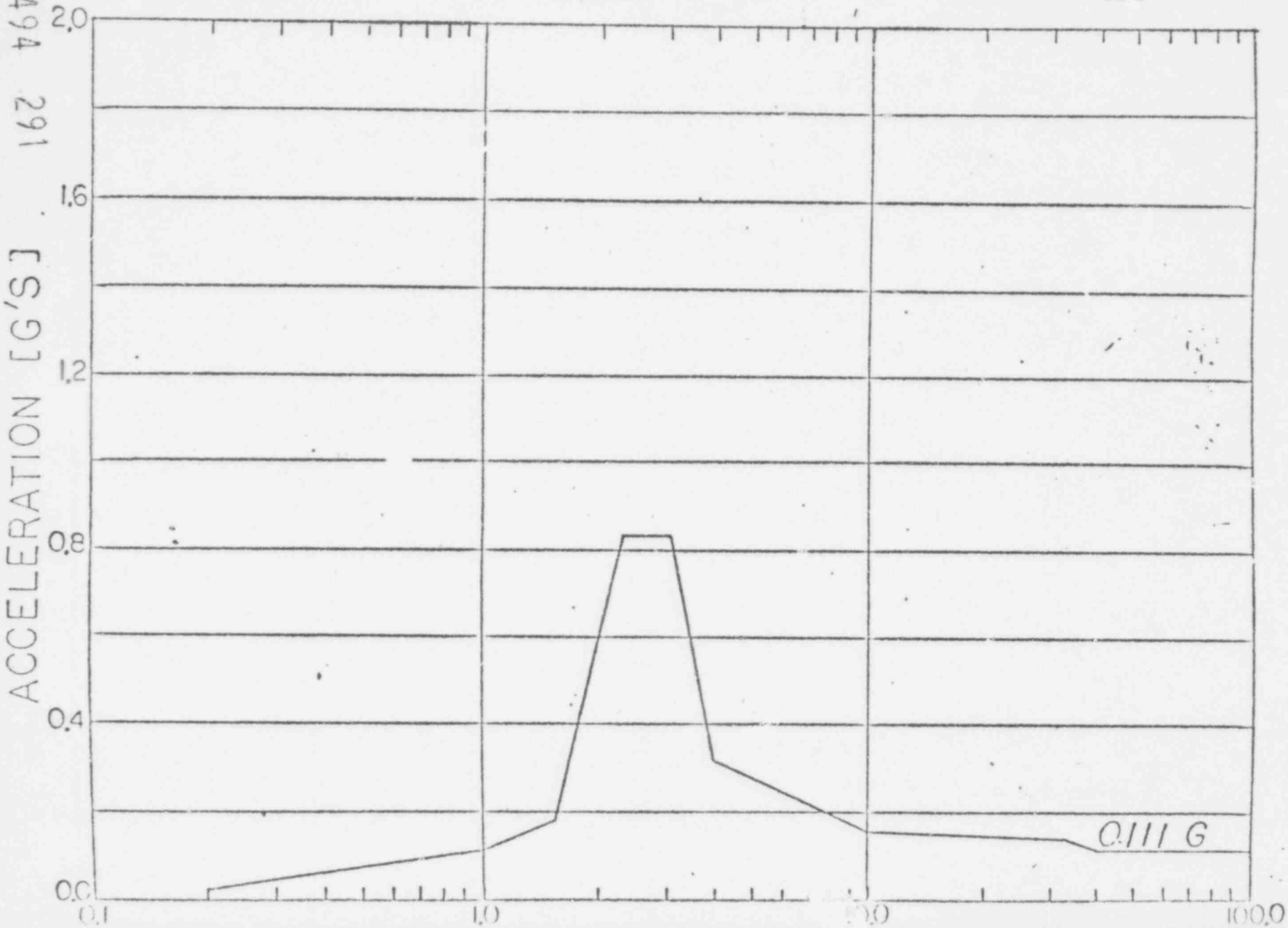


FIGURE NO: 10

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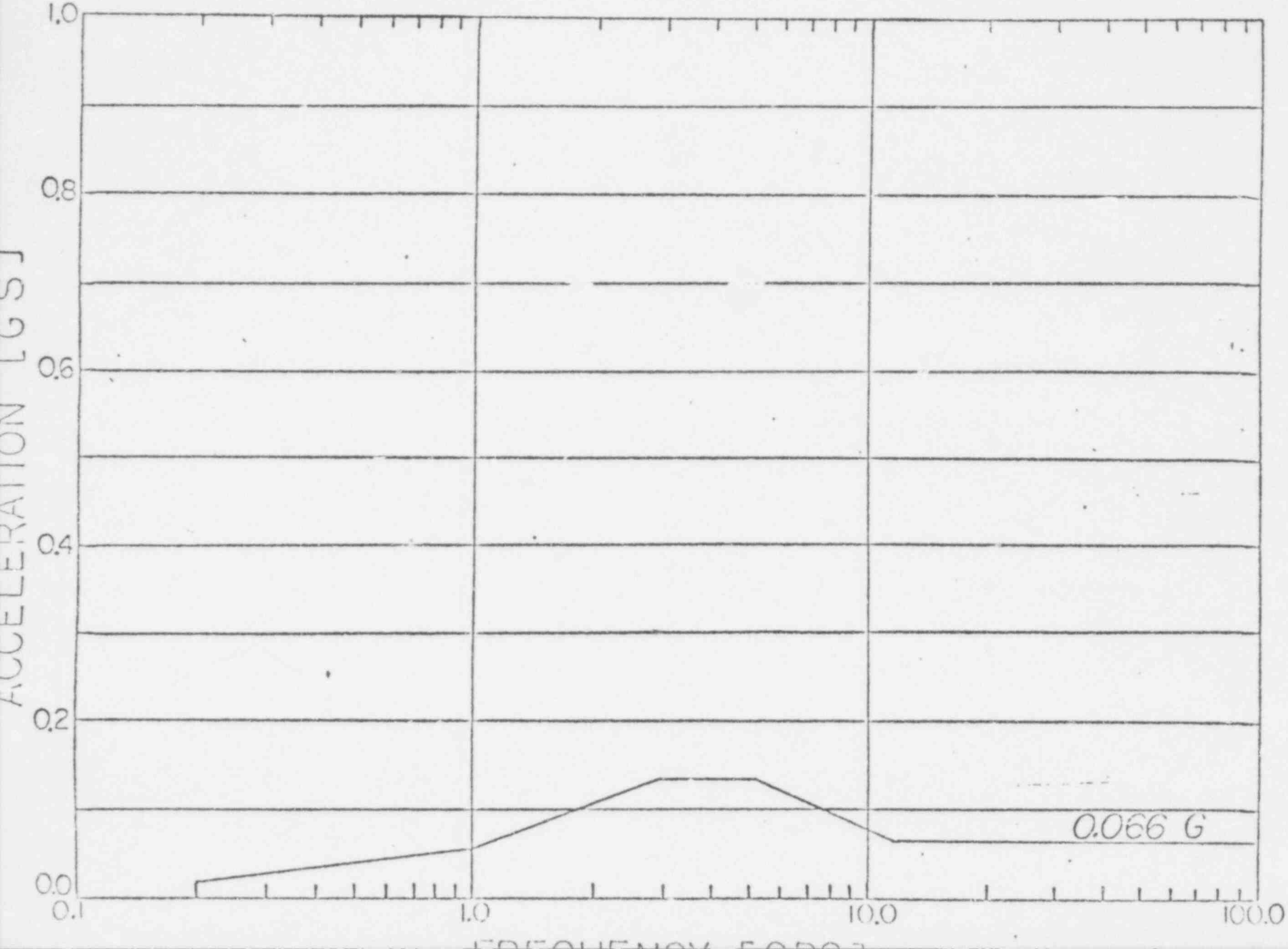
NI/RPS & ECCAS MODULES & ENCLOSURES

UP & DOWN

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
VERTICAL DIRECTION

OBE 4 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 5.0%



ORIGINATOR: S.C. FOELLER DATE: 4/15/77 FILE ID: 45-179

CHECKED BY: W. Tsang DATE: ____ REV. ID: ____

FIGURE NO: 180

494 292

NI/RIS & ECCAS MODULES & ENCLOSURES

FRONT TO BACK

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
EAST-WEST DIRECTION

OBE & ZG GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 3.0%

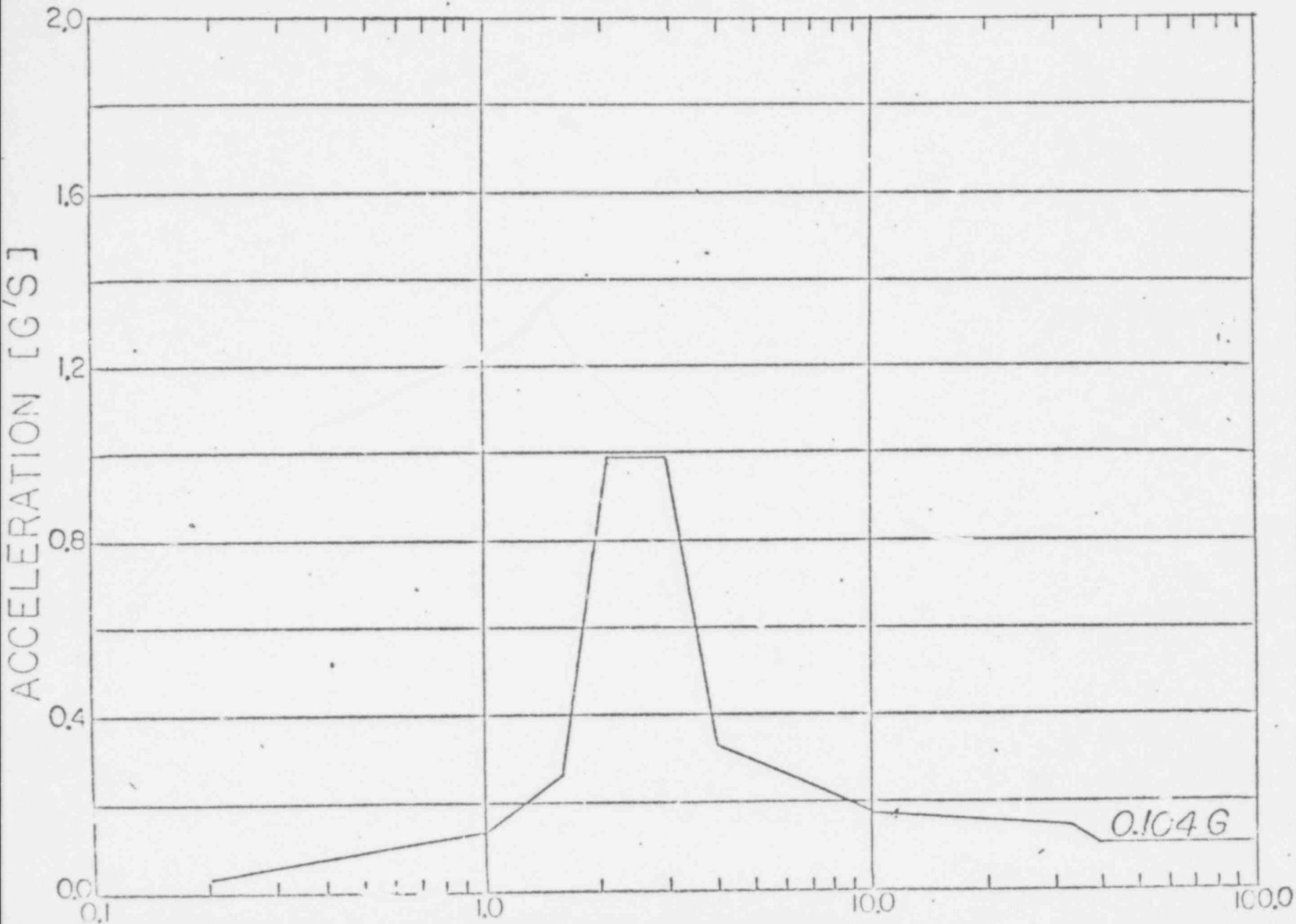


FIGURE NO: 104

CHECKED BY: [illegible] DATE: [illegible] REV. NO: 5

494 293

(21)

NI/RPS & ECCAS MODULES & ENCLOSURES

SIDE TO SIDE

MIDLAND PLANT UNITS 1 & 2
JOB NO. 7220
AUXILIARY BLDG.

FLOOR RESPONSE SPECTRUM
MASS POINT 2 AT ELEV. 659'-0"
NORTH-SOUTH DIRECTION

OBE 6 %G GROUND ACCELERATION
(SSE USE MULTIPLIER OF 2)
DAMPING RATIO: 5.0%

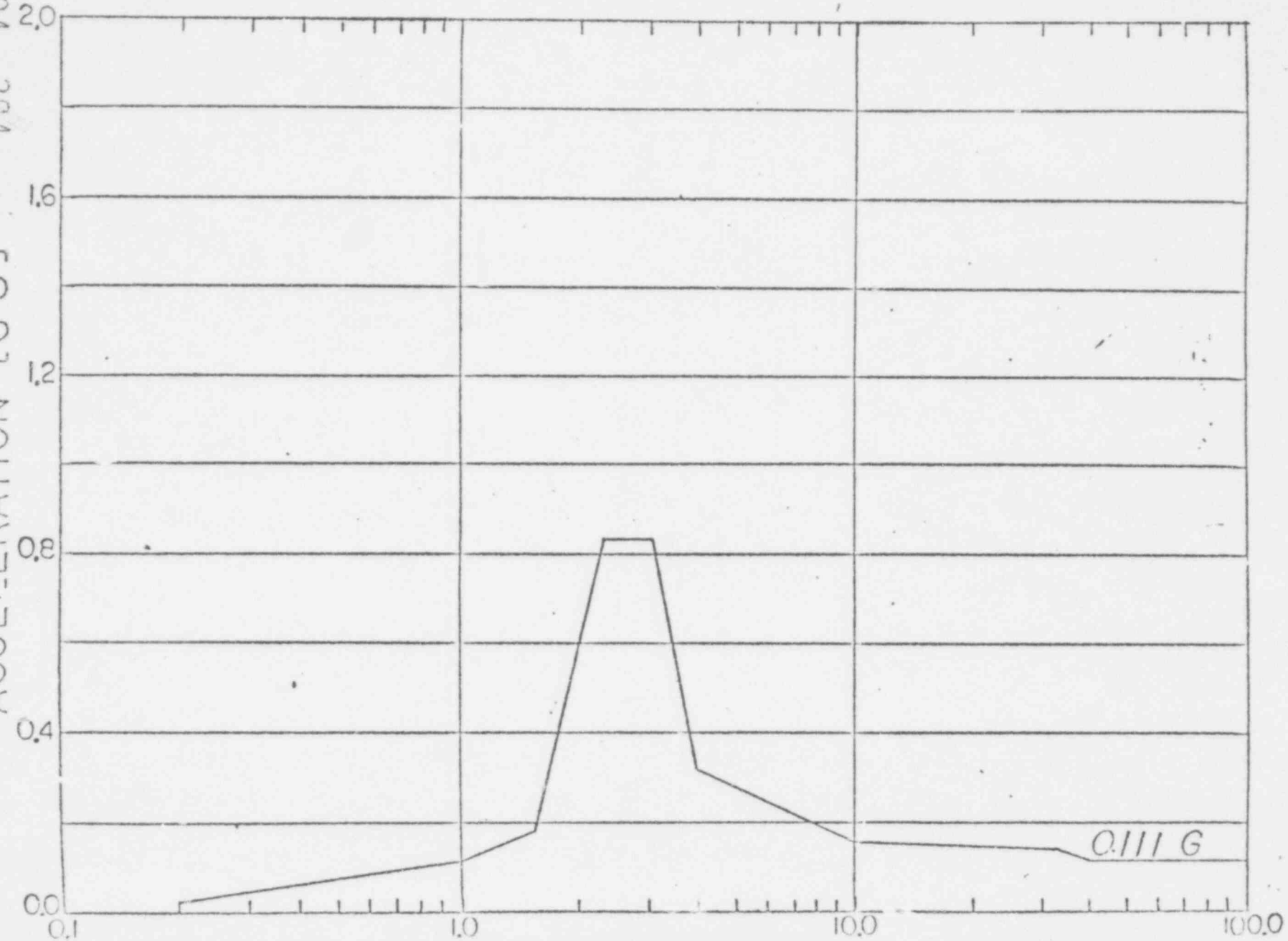


FIGURE NO: 10

CHECKED BY: [illegible] DATE: [illegible] REV. NO: 5

494 294

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and/or ECCAS cabinet-mounted module qualified by multi-axis random shake

1. Model Number: 881 unit control module Quantity: 19 per ECC

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description The unit control module is a BCCO standard two-unit wide module designed for plug-in mounting in the BCCO ECCAS cabinet.

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: Vertical: 13.5 Hz; front-to-back: 29 Hz; side-to-side: 2 Hz

6. Functional Description: The unit control module provides a buffer for the output trip signal between the trip logic and the control circuit of an action device or devices.

7. Pertinent Reference Design Specifications: B&W Document 58-0376-02, BCCO Seismic Report QR-4100-SEI -TVA-Unit Control

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = >2.5 g h_2 = >2.5 g V = >2.5 g

6. g-level Required h_1 = <1.4 g h_2 = <0.4 g V = <0.2 g

7. Mounting:

   1. Seismic Report: Simultated in-cabinet mounting

   2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

Plotted by: N. Shenkman

Checked by: Russell C. Kelley

Date: 11-23-77 Time: 11:20

Babcock&Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: UNIT CONTROL

Item P/N: 662880A1

Item S/N: QT-882-4A

Ref. Spec.: QP-4100 SEIS

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 84°F 30%

Test Type: TVA/SSE

Duration: 30 sec

Sweep Speed: _____ oct/minute

Damping: 1.5%

Pickup Sensing Axis: Z Control

Pickup Sensitivity: 100 my peak / g peak

Vibration Axis: -YZ

☑ Live ☐ Tape

Graph Number: 6

Tolerance: ±6dB

Plotted by: M Sheldtman

Checked by: Russell C Kelley

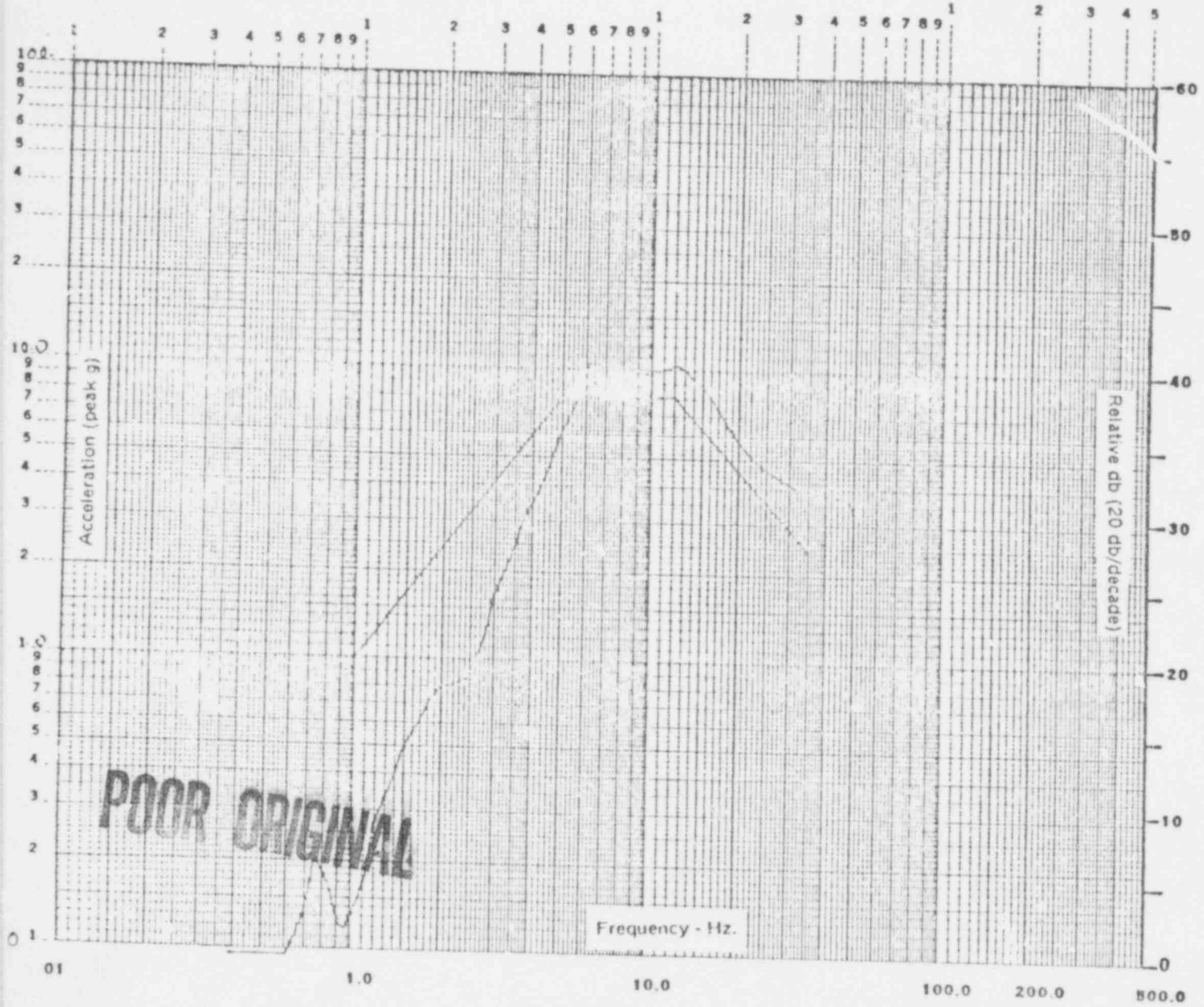
Date: 11-23-77 Time: 1135

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: UNIT CONTROL

Item P/N: 662888041

Item S/N: QT-832-4A



Ref. Spec.: QP-4100-SEIS

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 84°F, 30%

Test Type: TVA/SSE

Duration: 30 sec

Sweep Speed: - oct/minute

Damping: .5%

Pickup Sensing Axis: Z Control

Pickup Sensitivity: 100 my peak / g peak

Vibration Axis: +XZ

☑ Live ☐ Tape

Graph Number: 8

Tolerance: +6 db

Plotted by: M. Sheckhamer

Checked by: Russell C. Kallay

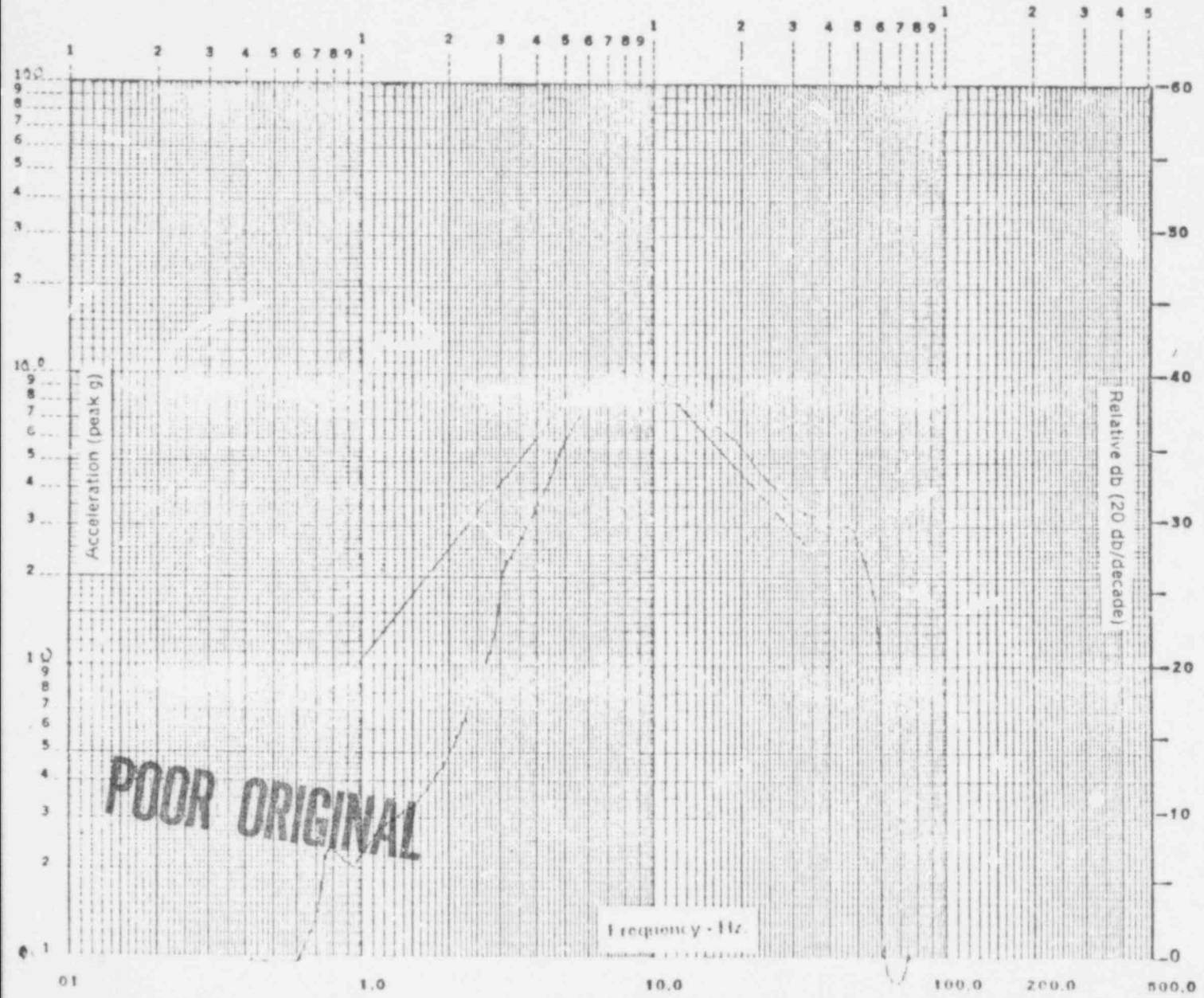
Date: 11-23-77 Time: 12.40

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: UNIT CONTROL

Item P/N: 662880A1

Item S/N: QT-882-4A



Ref. Spec.: QP-4100-SEIS

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 84°F, 30%

Test Type: TVA/SSE

Duration: 30 sec

Sweep Speed: — oct/minute

Damping: .5%

Pickup Sensing Axis: Z Control

Pickup Sensitivity: 100 my peak / g peak

Vibration Axis: +yz

☑ Live ☐ Tape

Graph Number: 10

Tolerance: +6 dB

401 299

POOR ORIGINAL

Page 34 of 25

Plotted by: M Sheridan

Checked by: Russell C. Kelley

Date: 11-23-77 Time: 12.55

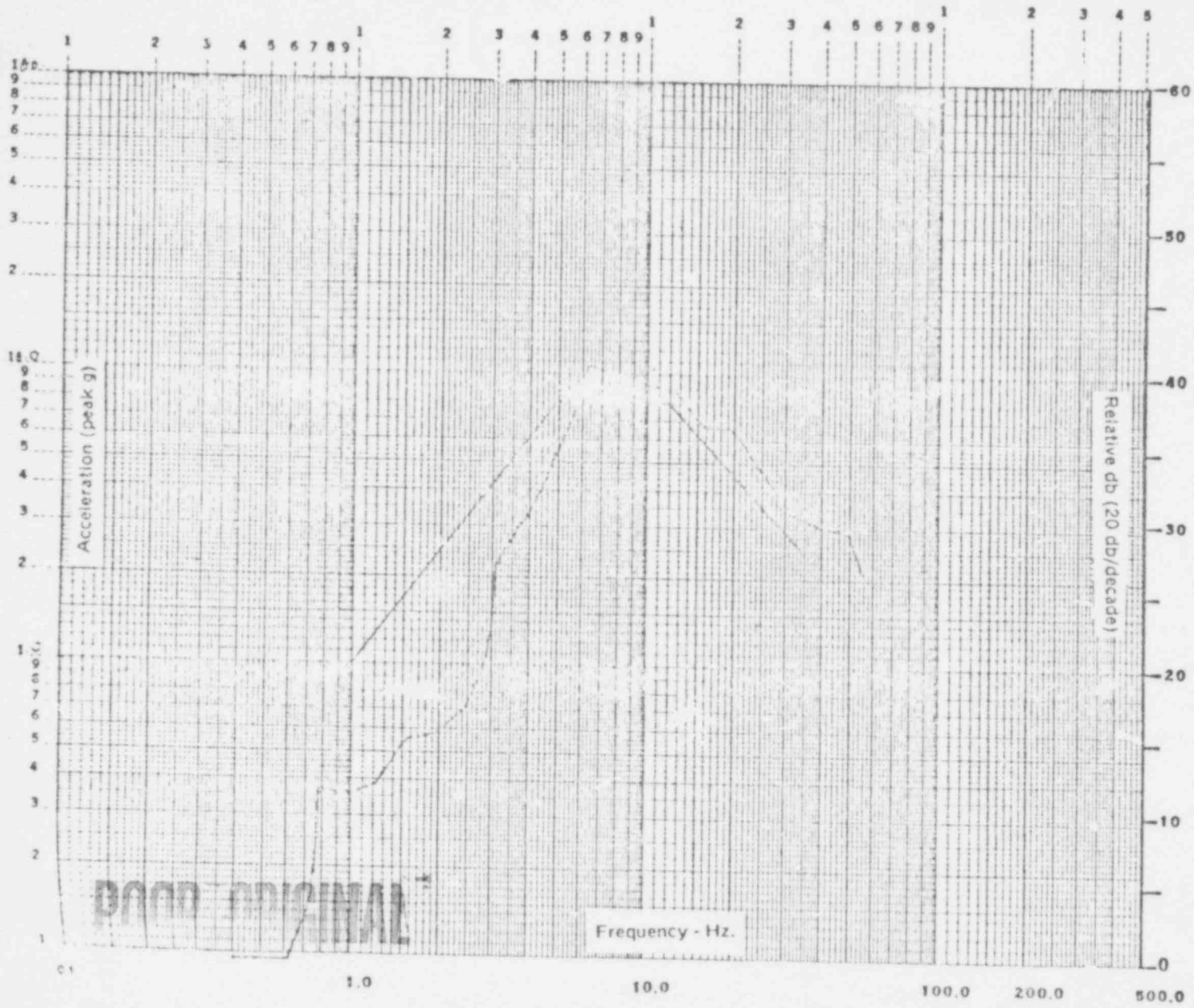
Babcock & Wilcox
Bailey Meter Company, U.S.A.

QUALIFICATION TEST LAB.

Test Item: Unit Control

Item P/N: 6628880A1

Item S/N: QT-882-4A



Ref. Spec.: QP-4100-SE1S

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 84°F 30%

Test Type: TVA/SSF

Duration: 30 sec

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z Control

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -X

☑ Live ☐ Tape

Graph Number: 12

Tolerance: ± 6 db

494 300

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2

Type:

1. Utility: Consumers Power Company — PWR X

2. NSSS: Babcock & Wilcox — BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and/or ECCAS cabinet-mounted module qualified by multi-axis random shake

1. Model Number: 880 keylock module — Quantity: 4 per RPS

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description: The keylock module is a BCCO standard two-unit wide module designed for plug-in mounting in the BCCO RPS cabinet.

4. Location: Building: Auxiliary build[illegible]

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: None below 34 Hz

6. Functional Description: Provides a shutdown bypass capability

7. Pertinent Reference Design Specifications: B&W Document 58-0345-00, BCCO Seismic Report QR-4100-SEIS-TVA-Keylock Switch

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TPS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = >5 g ZPA h_2 = >5 g ZPA V = >3 g ZPA

6. g-level Required h_1 = <0.4 g h_2 = <0.4 g V = <0.2 g

7. Mounting:

1. Seismic Report: Simulated in-cabinet mounting

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

Plotted by: [illegible]

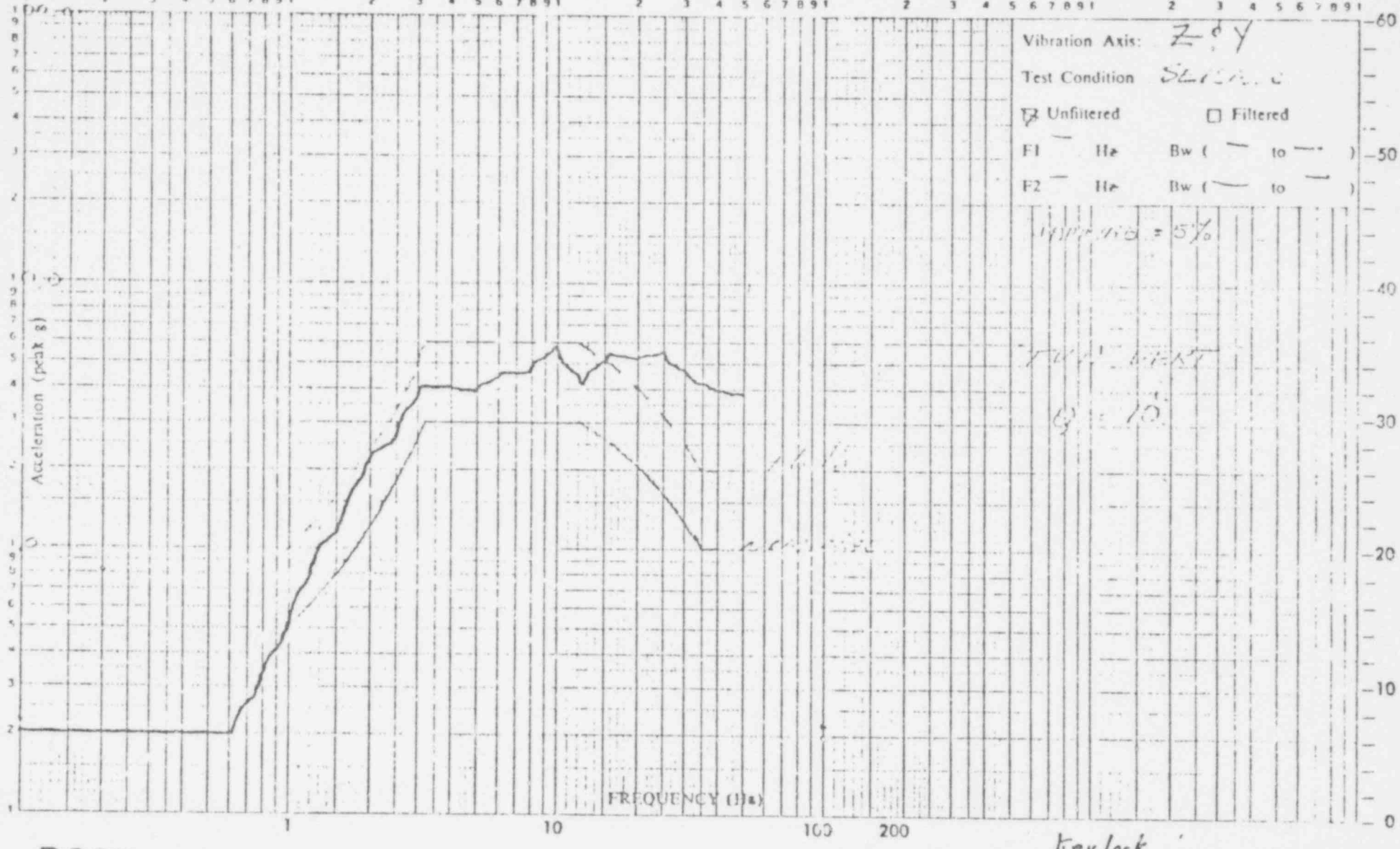
Checked by: [illegible]

DAYTON T. BROWN INC.
Testing Laboratories

Test Item: [illegible]

Serial Number(s): [illegible]

Unit: Operational ☒ Non-operational ☐



494 303

1095 Enc 1 Pg 20

Lab Form D-24

POOR ORIGINAL

Keylock

Pickup Serial Number: [illegible]

Pickup Location: [illegible]

Pickup Sensing Axis: [illegible]

Pickup Sensitivity: 10.0 mv peak / g peak

Sweep Speed: — oct/minute

☒ Live ☐ Tape

Job Number: [illegible]

Date: [illegible]

Time: [illegible]

29

Plotted by: [illegible]

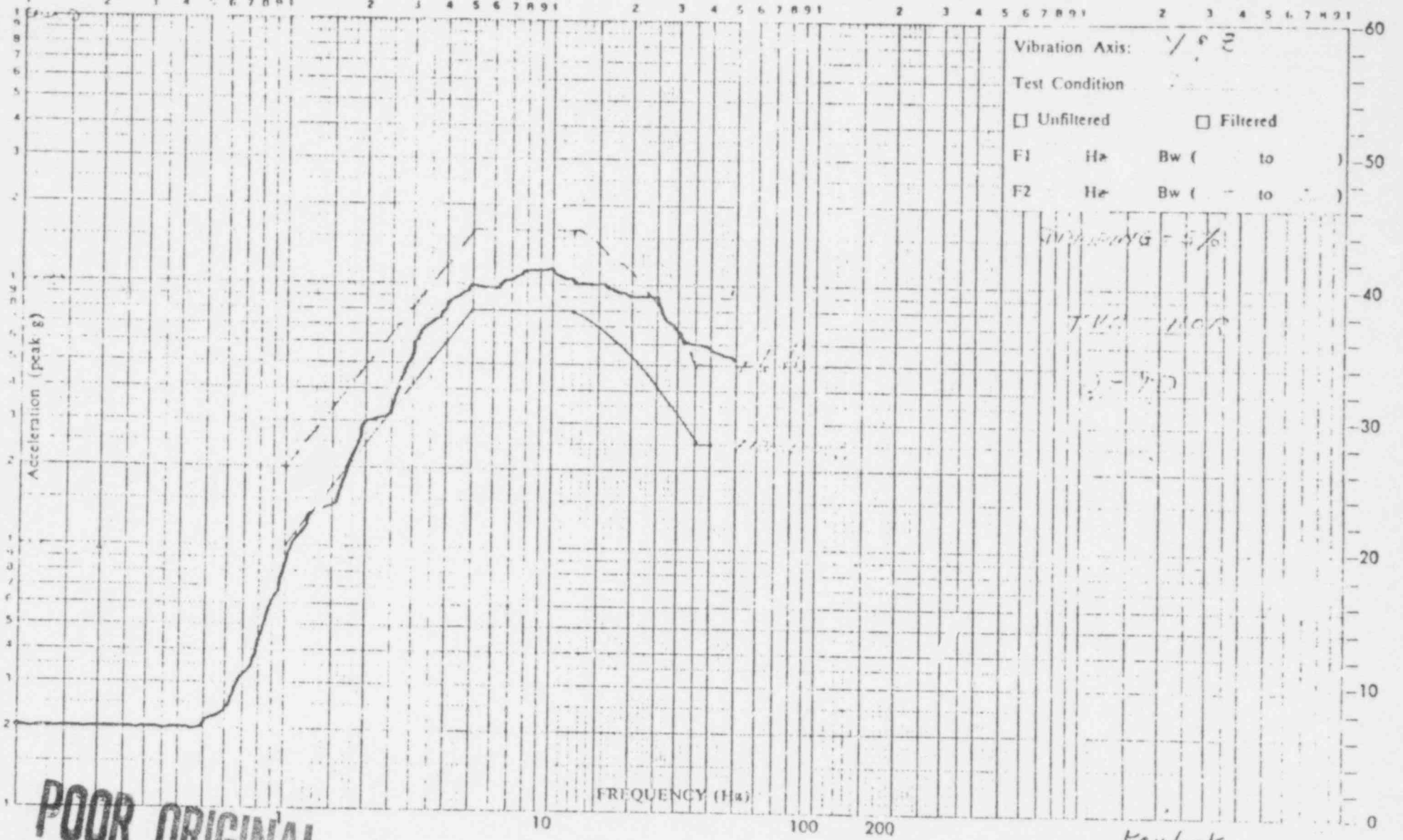
Checked by: [illegible]

DAYTON T. BROWN INC
Testing Laboratories

Test Item: [illegible]

Serial Number(s): [illegible]

Unit: Operational ☐ Non-operational ☐



POOR ORIGINAL

Keylock

Pickup Serial Number: [illegible]

Pickup Location: [illegible]

Pickup Sensing Axis: [illegible]

Pickup Sensitivity: 10.0 mv peak / g peak

Sweep Speed: [illegible] oct/minute

☒ Live ☐ Tape

Job Number: [illegible]

Date: [illegible]

Time: [illegible]

494 304

1095 Enc 1 Pg 21

Lab Form D-24

Plotted by: [illegible]

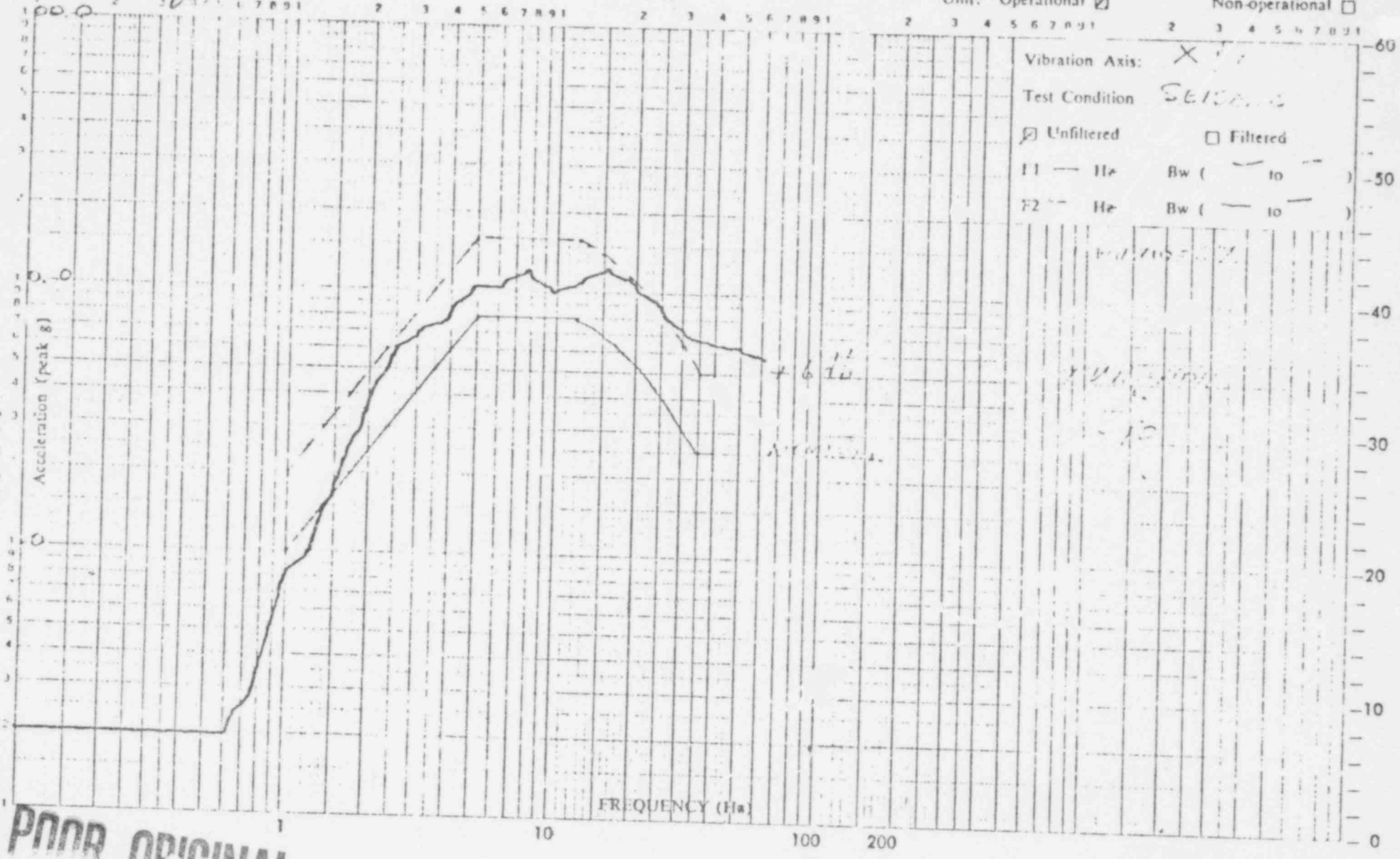
Checked by: [illegible]

DAYTON T. BROWN INC
Testing Laboratories

Test Item: [illegible]

Serial Number(s): [illegible]

Unit: Operational ☑ Non-operational ☐



Vibration Axis: [illegible]

Test Condition [illegible]

☑ Unfiltered ☐ Filtered

F1 — Hz Bw (— to —)

F2 — Hz Bw (— to —)

Pickup Serial Number: [illegible]

Pickup Location: [illegible]

Pickup Sensing Axis: [illegible]

Pickup Sensitivity: 10.0 mv peak / g peak

Sweep Speed: — oct/minute

☑ Live ☐ Tape

Job Number: [illegible]

Date: [illegible]

Time: [illegible]

Plotted by: [illegible]

Checked by: WS

DAYTON T. BROWN INC.
Testing Laboratories

Test Item: [illegible]

Serial Number(s): DTB #1-7

Unit: Operational ☒ Non-operational ☐

Vibration Axis: Z

Test Condition: CLIMAX

☒ Unfiltered ☐ Filtered

F1 — Hz Bw (— to —)

F2 — Hz Bw (— to —)

Dynamic 5%

TYPICAL CURVE

Q = 10

Acceleration (peak g)

FREQUENCY (Hz)

1 10 100 200

60 50 40 30 20 10 0

Key lock

Pickup Serial Number: [illegible]

Pickup Location: [illegible]

Pickup Sensing Axis: [illegible]

Pickup Sensitivity: 10.0 mv peak / g peak

Sweep Speed: — oct/minute

☒ Live ☐ Tape

Job Number: [illegible]

Date: [illegible]

Time: [illegible]

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and/or ECCAS cabinet-mounted module qualified by multi-axis/random shake

1. Model Number: 880 transformer module Quantity: 1 per RPS

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description The transformer module consists of a maximum of 12 isolation transformers mounted in 3 rows, 4 to each row.

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: Vertical: 27 Hz; front-to-back and side-to-side: none below 34 Hz

6. Functional Description: The module functions to isolate and operate recorders and module lamps. The transformers output 26 V ac with a current rating of 26 mA.

7. Pertinent Reference Design Specifications: B&W Document 58-0524-00, BCCO Seismic Report QR-4100-SEIS-Transformer Module

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = ≥2.5 g h_2 = >2.5 g V = >2.5 g

6. g-level Required h_1 = <0.4 g h_2 = <0.4 g V = <0.2 g

7. Mounting:

   1. Seismic Report: Simultated in-cabinet mounting

   2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

Plotted by: M. Shuldman

Checked by: Thomas Fischer

Date: 10-16-78 Time: 10:00

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: 880 SYSTEM TRANSFORMER MOD

Item P/N: 661720 E A12

Item S/N: 0317 1

Ref. Spec.: [illegible]-SEIS

Unit: Operational ☐ Non-operational ☐

Temp. & Humidity: 73°F · 31%

Test Type: [illegible]A/SSE

Duration: [illegible]0 seconds

Sweep Speed: — oct/minute

Damping: [illegible]5

Pickup Sensing Axis: Z

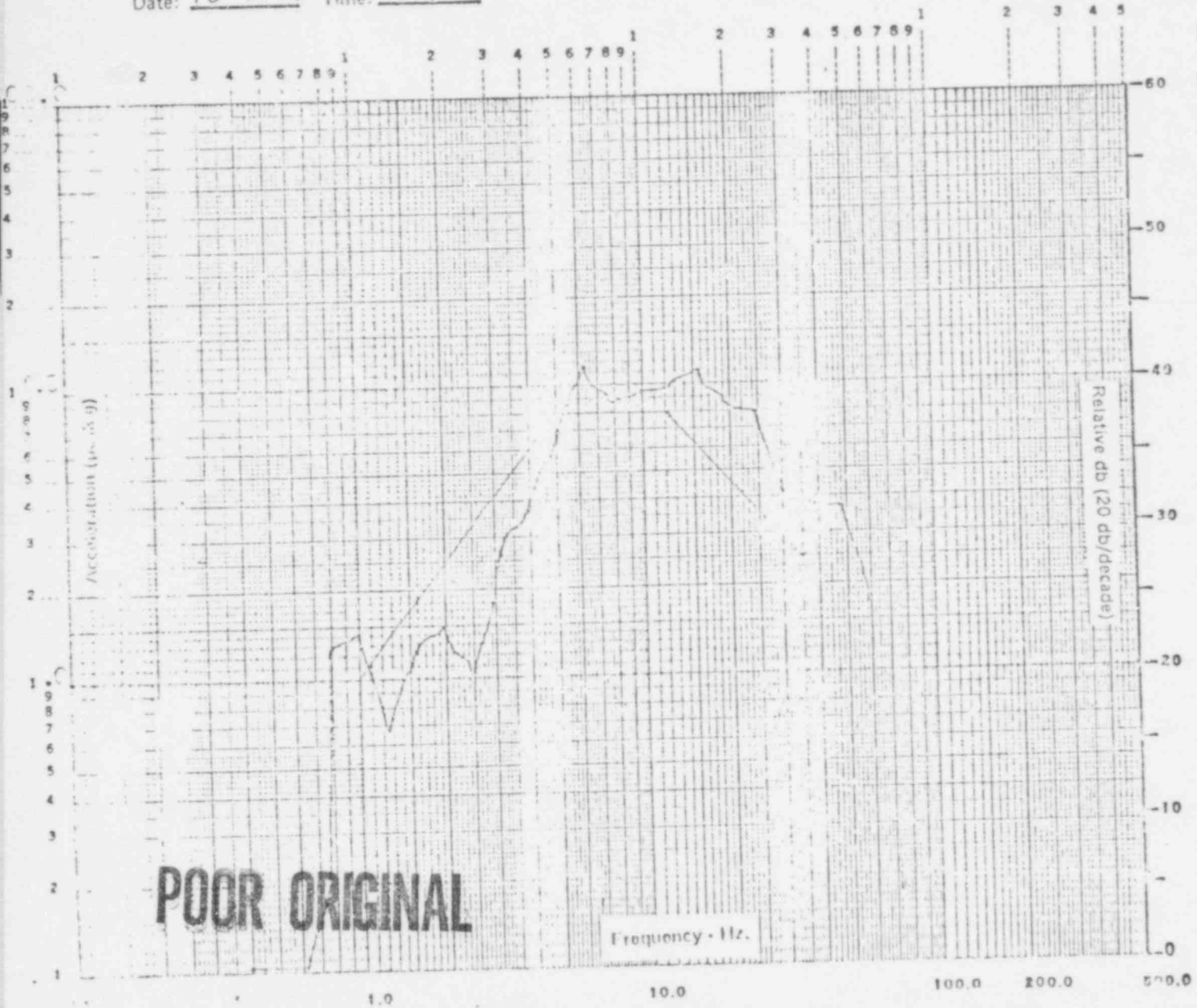
Pickup Sensitivity: 100mv peak / g peak

Vibration Axis: -XZ

☐ Live ☐ Tape

Graph Number: 7

Tolerance: +6db



494 309

POOR ORIGINAL

Plotted by: M. Sleutra

Checked by: Thomas Fischer

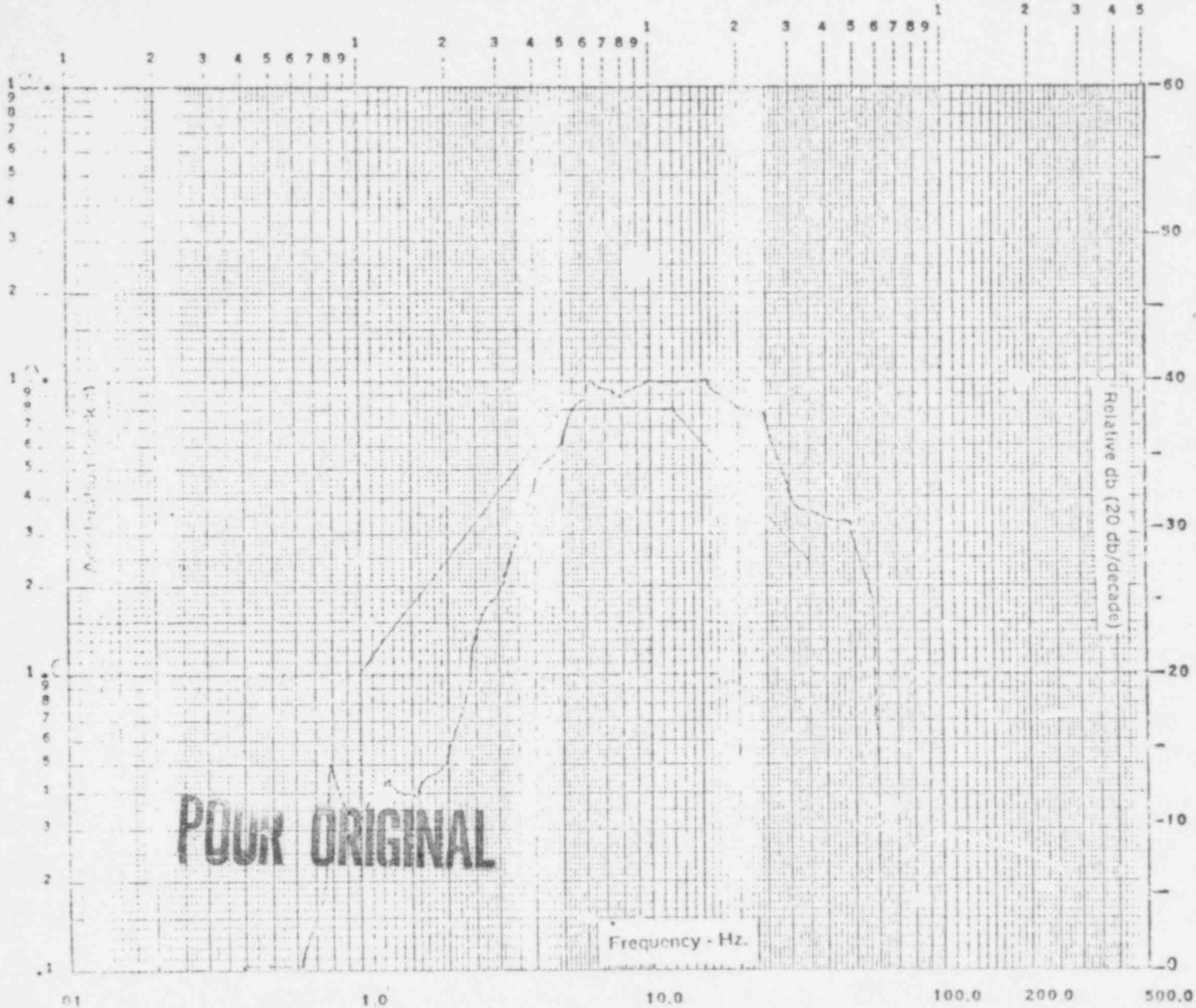
Date: 10-16-78 Time: 10:25

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: 880 SYSTEM TRANSFORMER MOD

Item P/N: 6617203 A12

Item S/N: Q317 1



Ref. Spec.: QP-[illegible]0-SEIS

Unit: Operational ☐ Non-operational ☐

Temp. & Humidity: 79°F · 31%

Test Type: [illegible]M/SSE

Duration: [illegible]0 seconds

Sweep Speed: — oct/minute

Damping: 5

Pickup Sensing Axis: Z

Pickup Sensitivity: 100mv peak / g peak

Vibration Axis: +U Z

☑ Live ☐ Tape

Graph Number: 9

Tolerance: +6db

494 310

POOR ORIGINAL

FORM NO. VTC-1-1176

36

Plotted by: M. Sheridan

Checked by: Thomas Fischer

Date: 10-16-78 Time: 10:50

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: 880 SYSTEM TRANSFORMER MOD

Item P/N: 6617203 12

Item S/N: Q317 1

Ref. Spec.: 3P-[illegible]0-SEIS

Unit: Operational ☐ Non-operational ☐

Temp. & Humidity: 79°F 31%

Test Type: OBE/SSE

Duration: [illegible]0 seconds

Sweep Speed: — oct/minute

Damping: [illegible]%

Pickup Sensing Axis: [illegible]

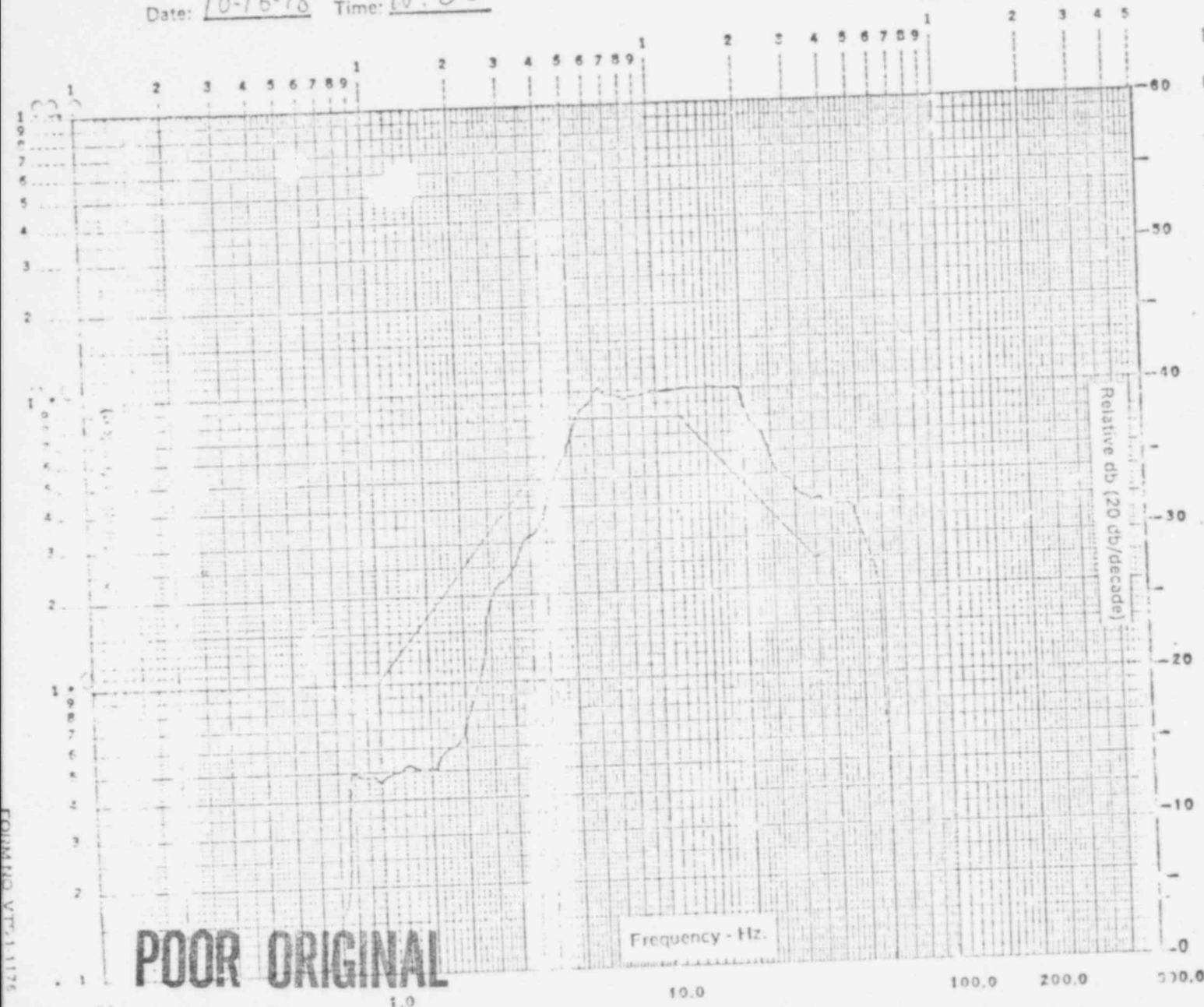
Pickup Sensitivity: 100mv peak / g peak

Vibration Axis: +X

☐ Live ☐ Tape

Graph Number: 11

Tolerance: +6db



POOR ORIGINAL

Tested by: M. Shuler

Checked by: Thomas Fischer

Date: 10-16-78 Time: 11:30

Babcock Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: 880 SYSTEM TRANSFORMER MOD

Item P/N: 6617703 A12

Item S/N: Q3171

Ref. Spec.: G-1100-SEIS

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 79°F ; 31%

Test Type: TVA/SSE

Duration: 30 seconds

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -Y Z

☒ Line ☐ Tape

Graph Number: 13

Tolerance: +6db

494 312

POOR ORIGINAL

FORM NO. VTD-1176

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and/or ECCAS cabinet-mounted module qualified by multi-axis/random shake

1. Model Number: Buffer amplifier (880/881) Quantity: 16

2. Vendor: Bailey Controls Company(BCCO)

3. Physical Description The buffer amplifier is a plug-in module consisting of an input filter, reference power supply, input stage amplifier, and up to nine isolation amplifiers.

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: Vertical: 14.5 Hz; front-to-back and side-to-side: none below 34 Hz

6. Functional Description: The amplifier's input stage operates directly on the input variable to provide a unity gain (single input mode) or a gain of 0.5 (two input mode).

7. Pertinent Reference Design Specifications: B&W Document 58-0455-00 buffer amplifier with isolation amplifier, BCCO Seismic Report QR-4100-SEIS-TVA-880 Buffer Amplifier

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = >2.5 g ZPA h_2 = >2.5 g ZPA V = >2.5 g ZPA

6. g-level Required h_1 = <0.4 g h_2 = < 0.4 g V = <0.4 g

7. Mounting:

1. Seismic Report: Simulated in-cabinet mounting

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

Plotted by: W. Sherman

Checked by: Russell C Killay

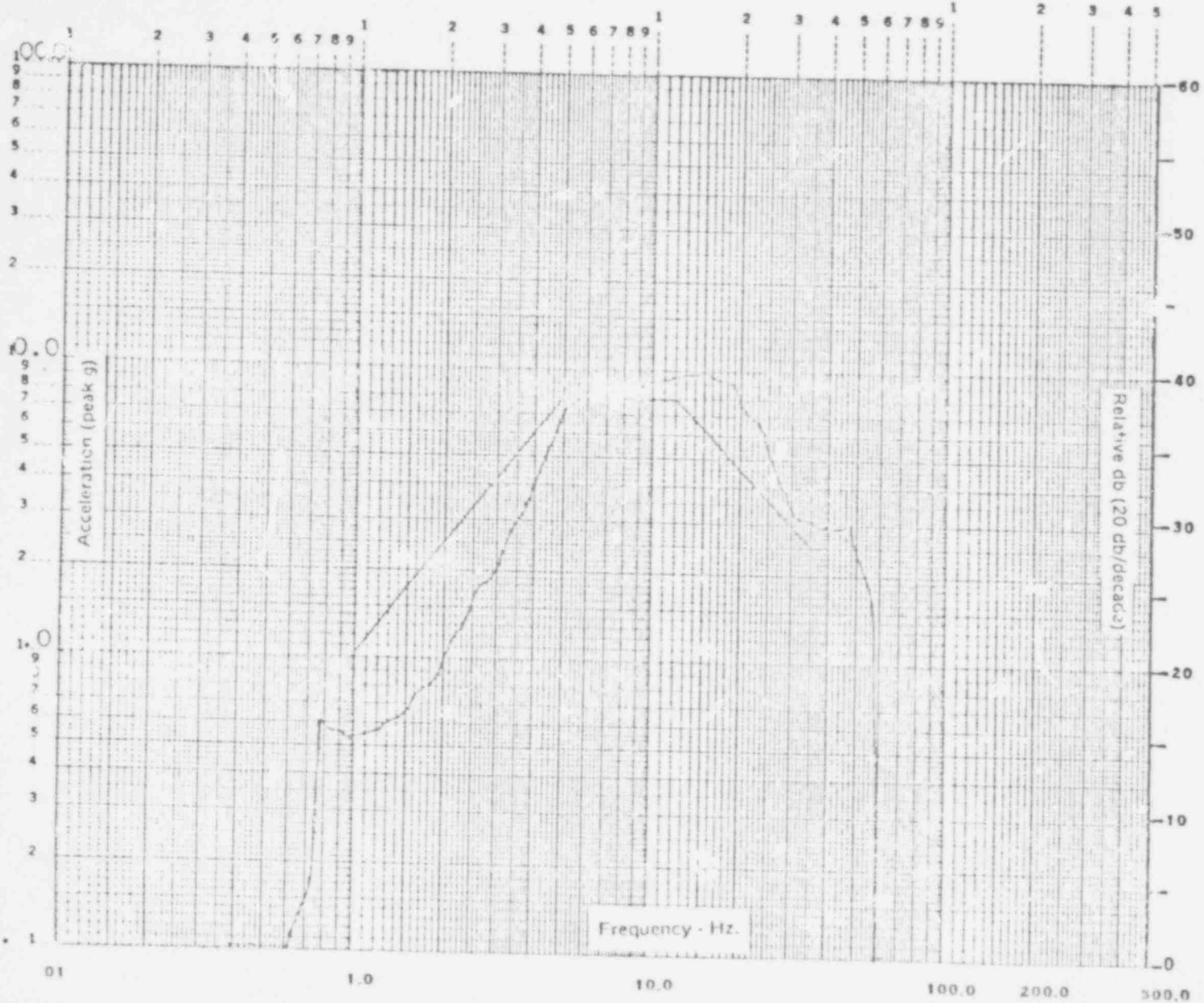
Date: 6-9-78 Time: 9:15

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: BUFFER AMPLIFIER

Item P/N: 6621670 A1132

Item S/N: QT 885-20A / Q2731



Ref. Spec.: QP-4100-SEIS

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 74°F 49%

Test Type: TVA/SSE

Duration: 30 seconds

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +YZ

☒ Live ☐ Tape

Graph Number: 7

Tolerance: +6db

494 315

POOR ORIGINAL

Page No. 41

Plotted by: M. Shackelford

Checked by: Russell C. Kallay

Date: 6-9-78 Time: 9 AC

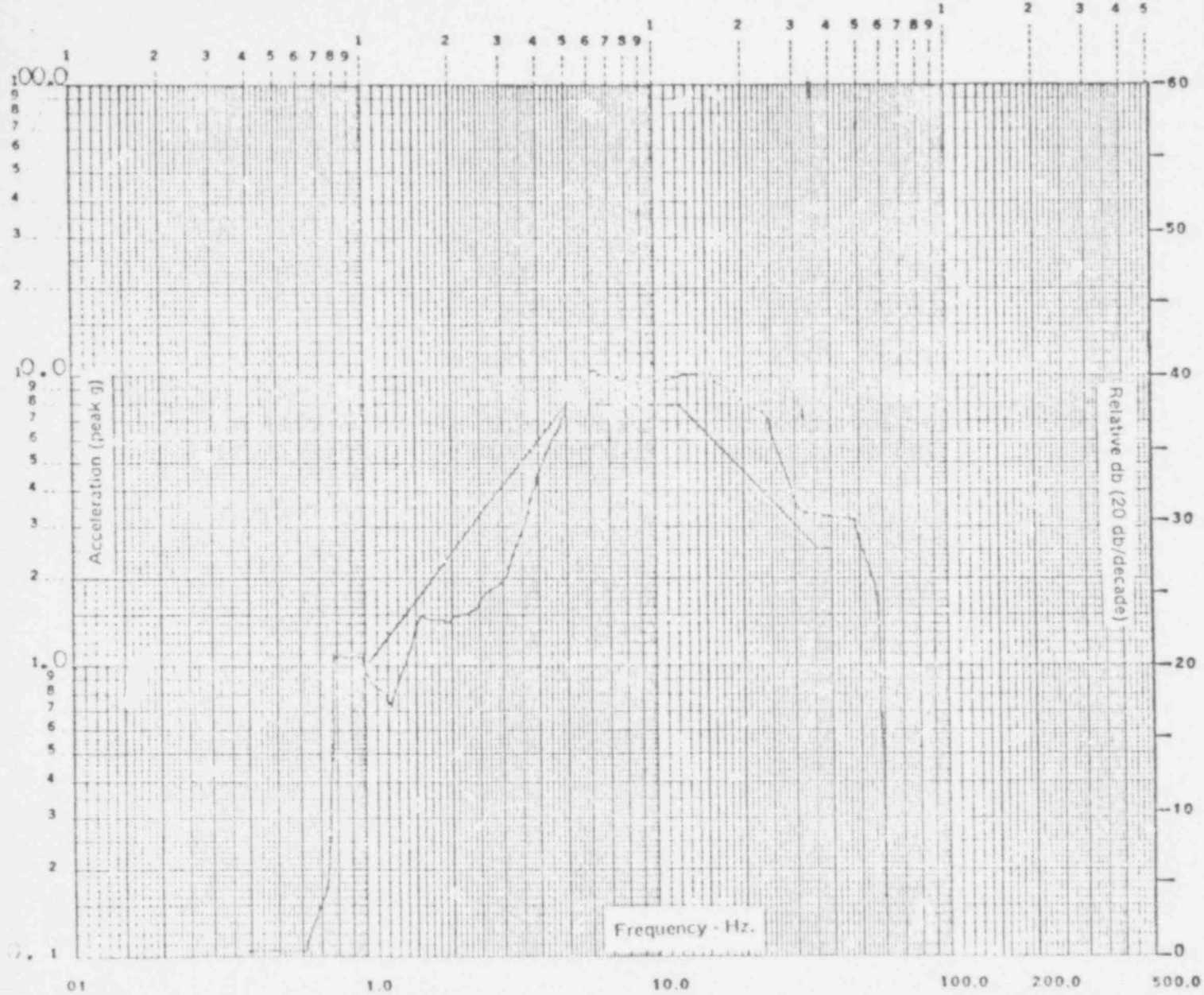
Bailey Meter Company, U.S.A.

QUALIFICATION TEST LAB.

Test Item: BUFFER AMPLIFIER

Item P/N: GG21670 A1132

Item S/N: QT 885-20A / G2731



Ref. Spec.: QP-4100-SEIS

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 74°F 49%

Test Type: TVA/SSE

Duration: 30 seconds

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +XZ

☒ Live ☐ Tape

494 316

Graph Number: 9

Tolerance: +6db

POOR ORIGINAL

Plotted by: M Shuler

Checked by: Russell C. Kelley

Date: 6-9-78 Time: 9:55

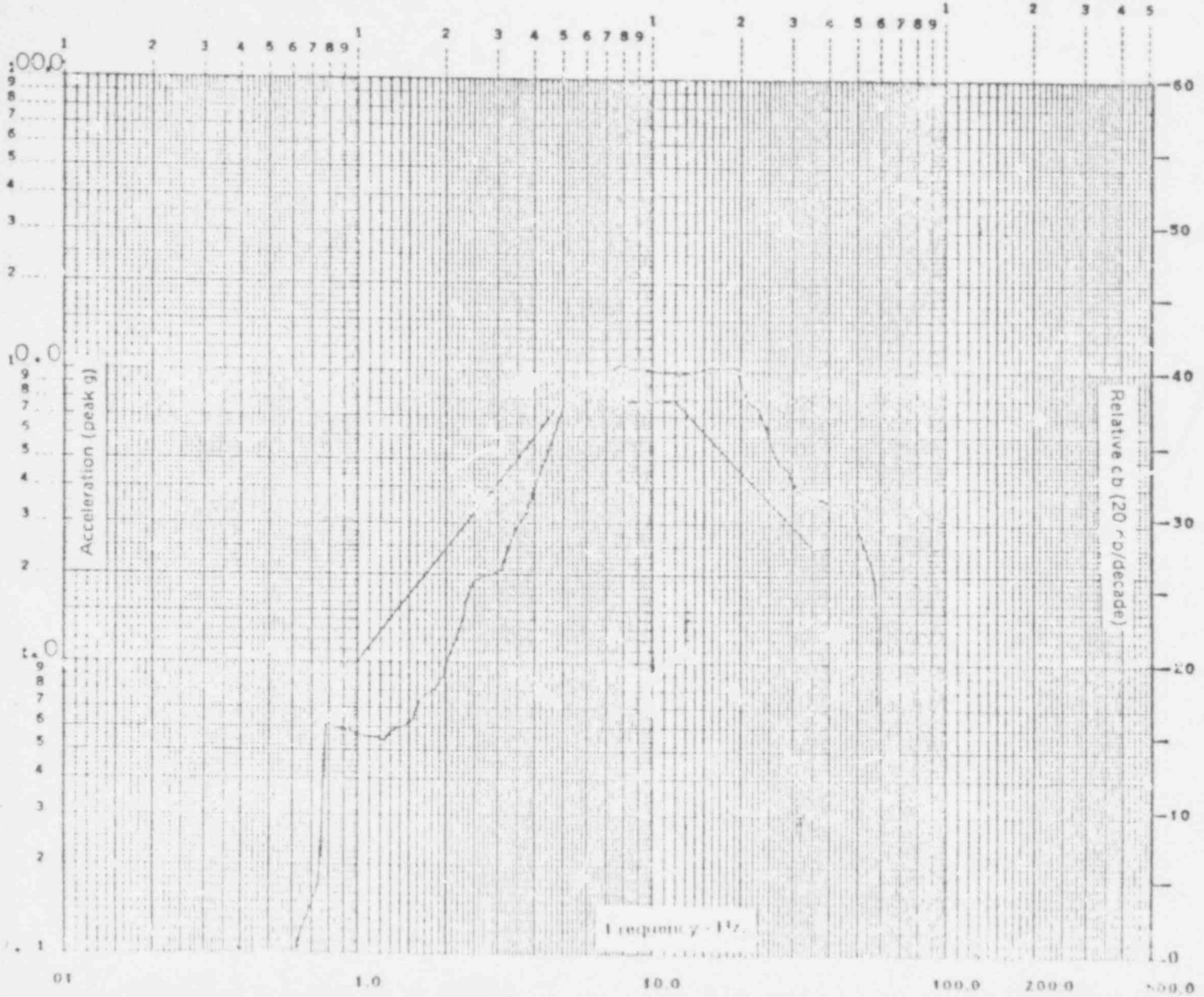
Bailey Meter Company, U.S.A.

QUALIFICATION TEST LAB.

Test Item: BUFFER AMPLIFIER

Item P/N: 6621670 A1132

Item S/N: QT 885-20A/Q2731



Ref. Spec.: QP-4100-SEIS

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 74°F 49%

Test Type: TVA/SSE

Duration: 30 seconds

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -YZ

☒ Live ☐ Tape

494 317

Graph Number: 11

Tolerance: +6db

Plotted by: M. Shepherd

Checked by: Russell C. Kelley

Date: 6-9-78 Time: 10:00

Bailey Meter Company, U.S.A.

QUALIFICATION TEST LAB.

Test Item: BUFFER AMPLIFIER

Item P/N: 6621670 A1132

Item S/N: QT 885-20A / Q2731

Ref. Spec.: QP-4100-SEIS

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 74°F 49%

Test Type: TVA/SSE

Duration: 30 seconds

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -XZ

☒ Live ☐ Tape

Graph Number: 13

Tolerance: +6db

494 318

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2

Type:

1. Utility: Consumers Power Company — PWR X

2. NSSS: Babcock & Wilcox — BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and/or ECCAS cabinet-mounted module qualified by multi-axis/random shake

1. Model Number: 880 scaled difference amplifier Quantity: 4 per RPS

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description The scaled difference amplifier is a standard three-unit wide module designed for plug-in mounting in a BCCO RPS cabinet.

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: None below 34 Hz

6. Functional Description: The scaled difference amplifier is used in the power range channel to process signals indicative of the axial power difference in the upper and lower levels of the reactor core.

7. Pertinent Reference Design Specifications: B&W Document 58-0215-00, BCCO Seismic Report QR-4100-SEIS-Scaled Difference Amplifier

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. ( ) Single Fi (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = >5 g ZPA h_2 = >5 g ZPA V = >4.7 g ZPA

6. g-level Required h_1 = <0.4 g h_2 = <0.4 g V = <0.2 g

7. Mounting:

1. Seismic Report: Simulated in-cabinet mounting

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

Plotted by: R. [illegible]

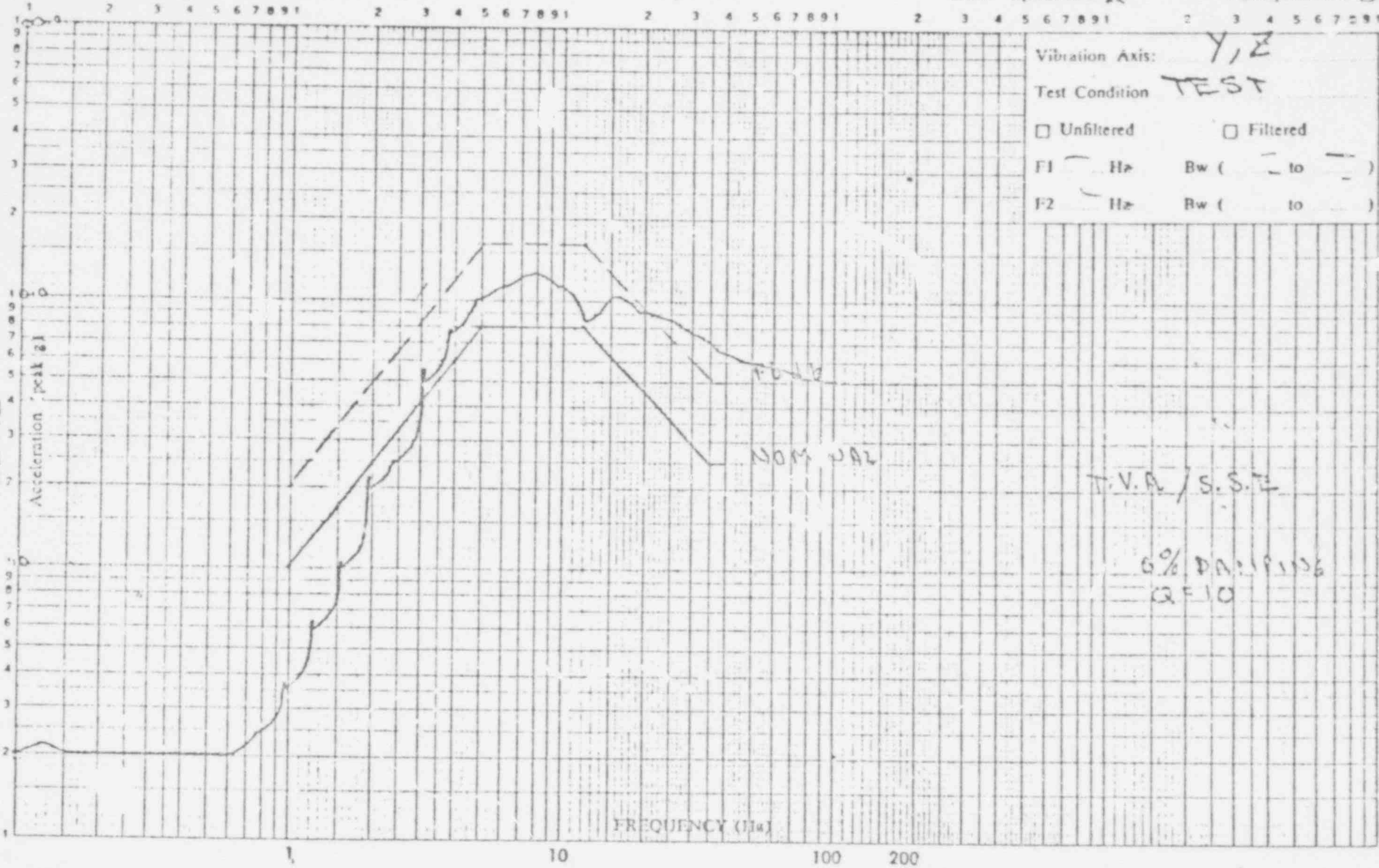
Checked by: [illegible]

DAYTON T. BROWN INC. Testing Laboratories

Test Item: BUFFER AMP, VOLT.: CURR. BUFFER SIG. CONV., SCALED DIFF AMP

Serial Number(s): QT885-20A QT920-140 QT885-4A QT885-32A

Unit: Operational ☒ Non-operational ☐



Graph Number: 1C

Pickup Serial Number: TA08

Pickup Location: CONTROL

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Sweep Speed: — oct/minute

☒ Live [ ] Tape S.D.A.

Job Number: 40130

Date: 9/4/76

Time: 1030

POOR ORIGINAL

Lab Form D-24

494 321

47

494 322

Plotted by: R. RANKIN

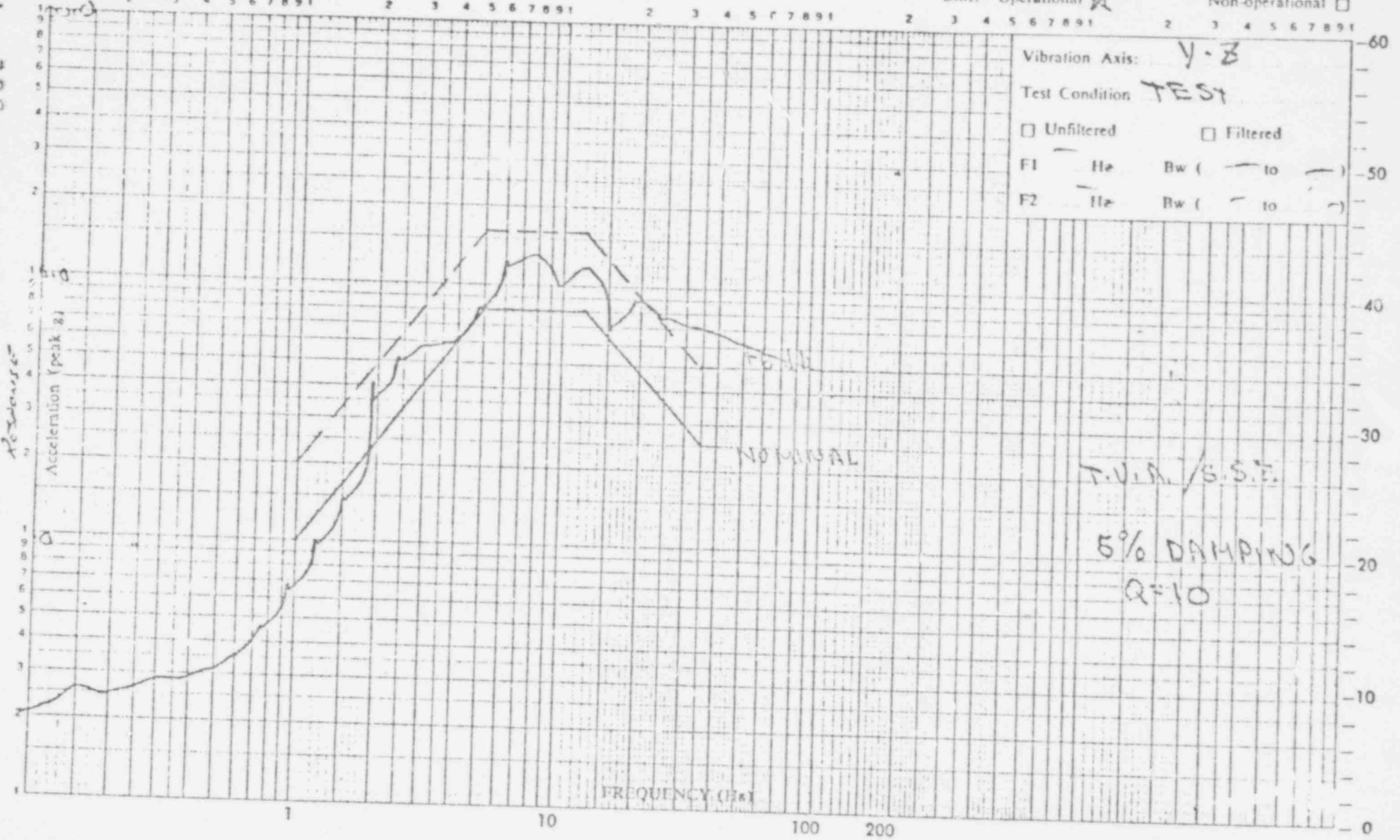
Checked by: WB

DAYTON T. BROWN INC.
Testing Laboratories

Test Item: BUFFER AMP, VOLT. SUPPR. BUFFER SIG. CONV., SCALED DIFF. AMP.

Serial Number(s): QT885-20A QT820-140
QT885-4A QT865-32A

Unit: Operational ☒ Non-operational ☐



Relative db (20 db/ scale)

Graph Number: 12

Pickup Serial Number: NB76

Pickup Location: CONT. 20L

Pickup Sensing Axis: Y

Pickup Sensitivity: 100 mv peak / g peak

Sweep Speed: — oct/minute

☒ Live ☐ Tape S.D.A.

Job Number: 401301

Date: 9/4/76

Time: 1042

POOR ORIGINAL

1268 Enc 1 Pg 17

Lab Form D-2

Plotted by: R. RANKIN

Checked by:

DAYTON T. BROWN, INC.
Testing Laboratories

DIFF. AMP, VOLTAGE OFF.
Test Item: SIG. CONV., SCALE 1 DIFF AMP

Serial Number(s): QT885-20A QT820-1A0
QT885-4A QT885-32 A

Unit: Operational [X] Non-operational [ ]

494 323

Vibration Axis: X, Z

Test Condition TEST

[ ] Unfiltered [ ] Filtered

F1 — Hz Bw (— to —)

F2 — Hz Bw (— to —)

+6db

NOMINAL

T.V.A / S.S.E

5% DAMPING

Q = 10

Acceleration (g peak)

FREQUENCY (Hz)

Relative db (20 db/decade)

Graph Number: 1-C

1268 Enc 1 Pg 18

Lab Form D-24

Pickup Serial Number: N876

Pickup Location: CONTROL

Pickup Sensitivity: 100

Sweep Speed: —

[X] Live [ ] Tape S.D.A

mv peak / g peak

oct/minute

Job Number: 401[illegible]

Date: 9/4/76

Time: 1049

Plotted by: R. Alvarado

Checked by: WS

DAYTON T. BROWN INC.
Testing Laboratories

Test Item: SIG. CONU, SCALED. DIFF AMP. DIFF. AMP, VOLTAGE DIFF

Serial Number(s): QT885-20A QT820-140 QT885-4A QT885-32A

Unit: Operational ☒ Non-operational ☐

494 324

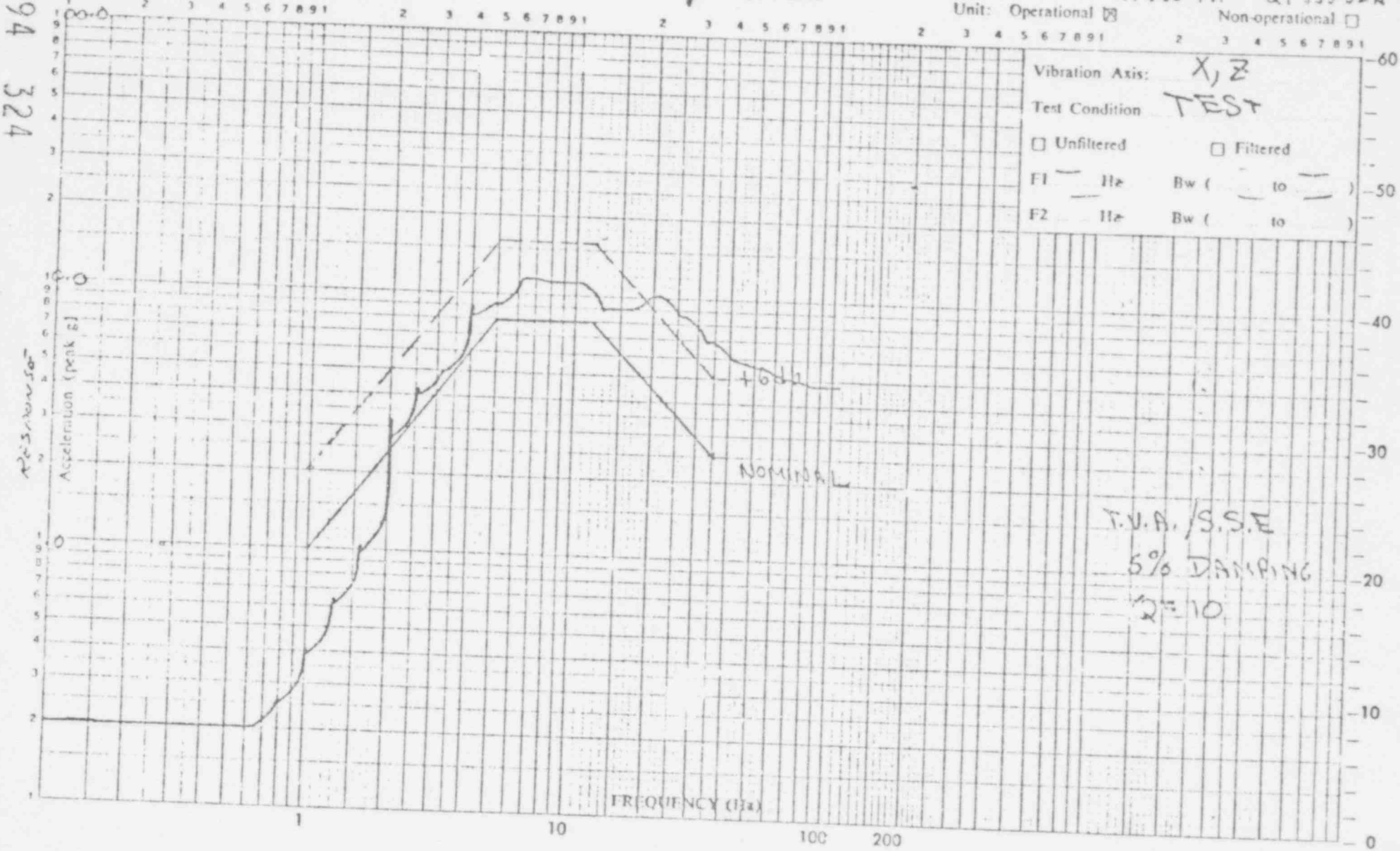
Vibration Axis: X, Z

Test Condition TEST

☐ Unfiltered ☐ Filtered

F1 ___ Hz Bw (___ to ___)

F2 ___ Hz Bw (___ to ___)



Pickup Serial Number: TA08

Pickup Location: CONTROL

Pickup Sensitivity: 100 mv peak / g peak

Sweep Speed: ___ oct/minute

[X] Live [ ] Tape S.D.A.

Job Number: 401301

Date: 9/4/76

Time: 1053

Graph Number: 17

POOR ORIGINAL

1268 Enc 1 Pg 16

Lab Form 0121

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and/or ECCAS cabinet-mounted module qualified by multi-axis/random shake

1. Model Number: 880 power range test Quantity: 4 per RPS

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description The power range test is a three-unit wide module designed for plug-in mounting in a BCCO RPS cabinet.

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: Vertical: 15.5 Hz; front-to-back: 29 Hz; side-to-side: none

6. Functional Description: The power range test provides online analysis and offline tests to be performed on the neutron power range channel.

7. Pertinent Reference Design Specifications: B&W Document 58-0443-01, BCCO Seismic Report QR-4100-SEIS-TVA-Power Range Test

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = 2.5 g ZPA h_2 = 2.5 g ZPA V = 2.5 g ZPA

6. g-level Required h_1 = <0.4 g h_2 = <0.4 g V = <0.2 g

7. Mounting:

1. Seismic Report: Simulated in-cabinet mounting

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

404 327

Plotted by: N. P. Monte

Checked by: Russell C. Kelley

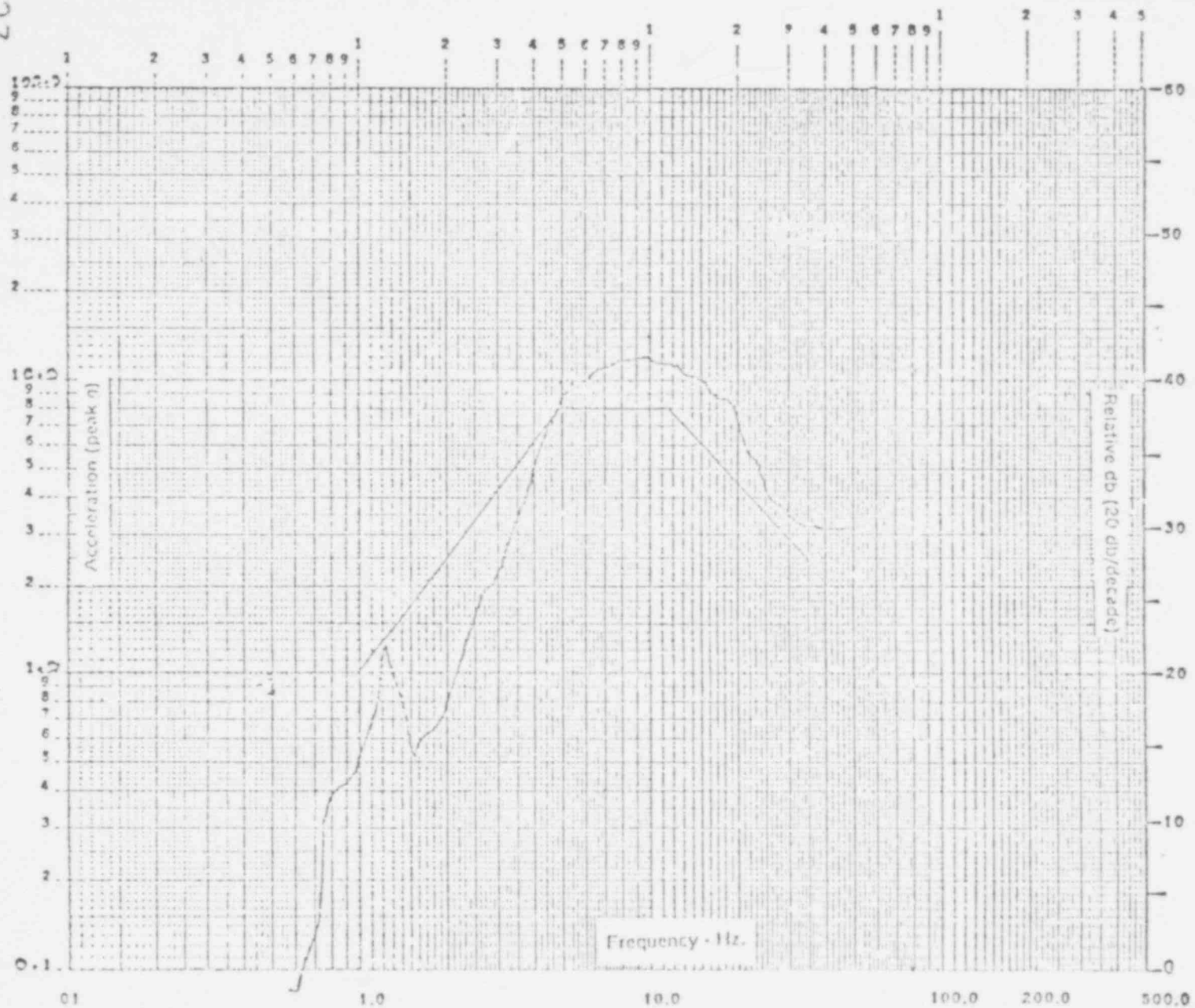
Date: 4-7-78 Time: 13:10

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: Tower Range Test / S.G. Module

Item P/N: 662521552 / 623518A1

Item S/N: Q161-1 / Q303-1,2



Ref. Spec.: QF-4100-3EUS

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 79°F, 31% R

Test Type: TVA/SSE

Duration: 30 Seconds

Sweep Speed: — oct/minu

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv pea g pea

Vibration Axis: -Y Z

☒ Live ☐ Tape

Graph Number: 14

Tolerance: +6 d b

POOR ORIGINAL

FORM NO. V 251-1126

Plotted by: N.P. Monta

Checked by: Russell C. Kelley

Date: 4-7-78 Time: 13:27

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: TOWER RANGE TEST / E.S. MODULE

Item P/N: 6625215F2 / 6235198A1

Item S/N: 7161-1 / Q303-1,2

Ref. Spec.: QP-4100-SCTS

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 79°F @ 31% RH

Test Type: TVA / SSE

Duration: 30 Sec.

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +X Z

☒ Live ☐ Tape

Graph Number: 16

Tolerance: +6DB

494 328

POOR ORIGINAL

FORM NO. VTS-1-1176

Plotted by: H.P. Maestz

Checked by: Russell C. Kallday

Date: 4-7-78 Time: 13:45

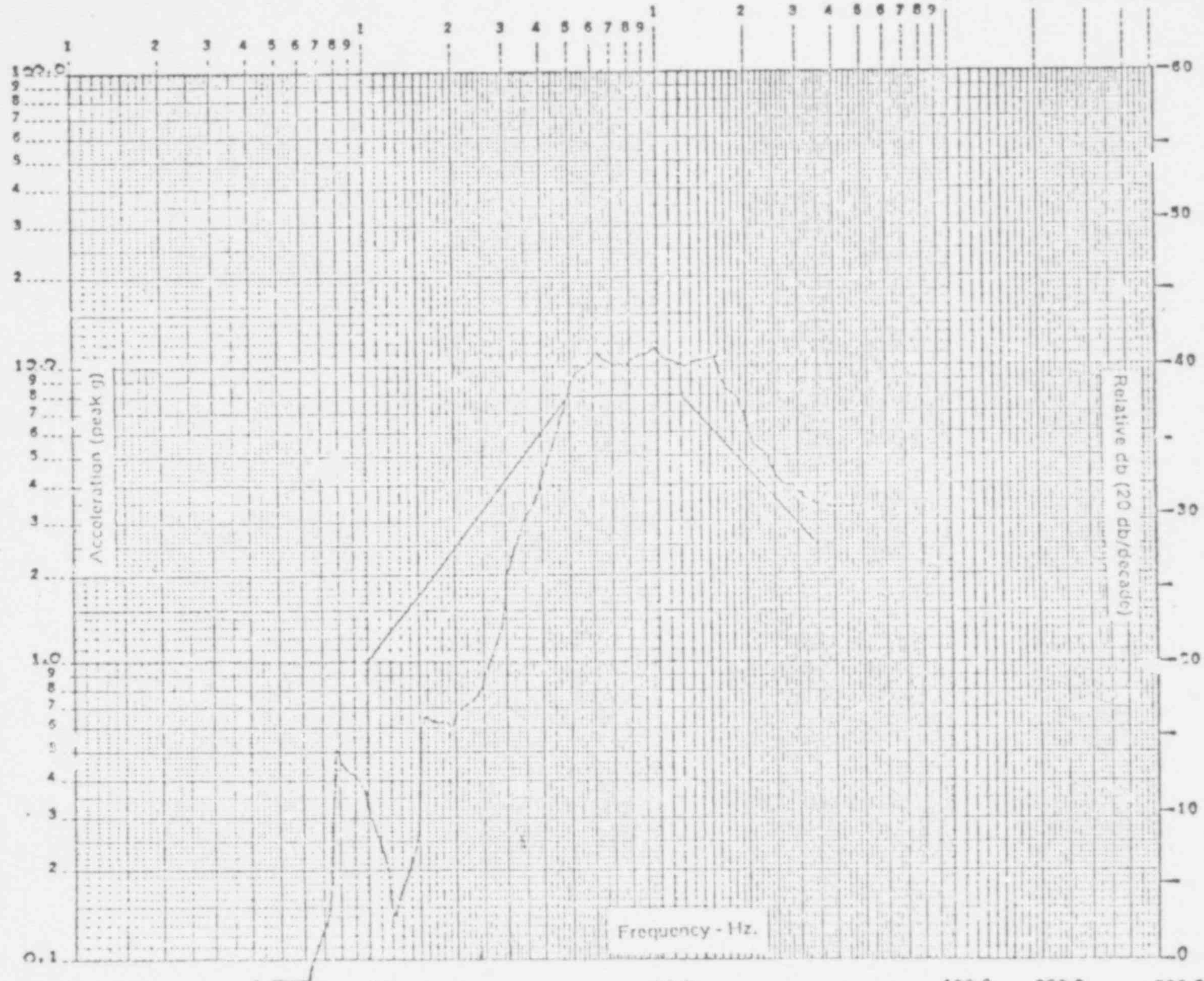
Babcock & Wilcox
Bailey Meter Company, U.S.A.

QUALIFICATION TEST LAB.

Test Item: POWER RANGE TEST / E.S. MODULE

Item P/N: 6625215E2 / 6235191A1

Item S/N: Q161-1 / Q303-1,2



Ref. Spec.: QP-4100-SE15

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 79°F, 32%

Test Type: TVA/SSE

Duration: 30 seconds

Sweep Speed: — oct/min

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv per g

Vibration Axis: +Y Z

494 329

☐ Live ☐ Tape

Graph Number: 13

Tolerance: +6db

POOR ORIGINAL

55

FORM NO. VTS-1-1176

Plotted by: N.P. Hunter

Checked by: Russell C. Valley

Date: 4-7-78 Time: 13:55

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: Power Range Test / E.S. Module

Item P/N: 6625215 E2 / 623518 A1

Item S/N: Q161-1 / Q303-1,2

Ref. Spec.: QF-4100-5E13

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 79°F; 32.%R

Test Type: TVA/SSE

Duration: 30 Seconds

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -X Z

☒ Live ☐ Tape

Graph Number: 20

Tolerance: +6db

494 330

POOR ORIGINAL

FORM NO. VTS-1176

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and/or ECCAS cabinet-mounted module qualified by multi-axis/random shake

1. Model Number: 880/881 transmitter power supply Quantity: 8

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description The power supply is panel-mounted, two supplies may be placed in a single panel. The panels are mounted in BCCO safety grade cabinets.

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: None below 3#

6. Functional Description: The current transmitter power supply provides an adjustable voltage from 21.5 V dc to 28 V dc.

7. Pertinent Reference Design Specifications: B&W Document 58-0431-00, BCCO Seismic Report QR-4100-SEIS-TVA-Power Supply Panel

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test ( ) Yes (attach TRS graphs)

5. g-level Test at h_1 = >3 g ZPA h_2 = >3 g ZPA V = >3 g ZPA

6. g-level Required h_1 = <0.4 g h_2 = <0.4 g V = <0.2 g

7. Mounting:

1. Seismic Report: Simulated in-cabinet mounting

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

DAYTON T. BROWN INC. Testing Laboratories

Plotted by: [illegible]

Checked by: [illegible]

Test Item: Power Sup[illegible]

Serial Number(s): EMC / [illegible]-2

Unit: Operational ☒ Non-operational ☐

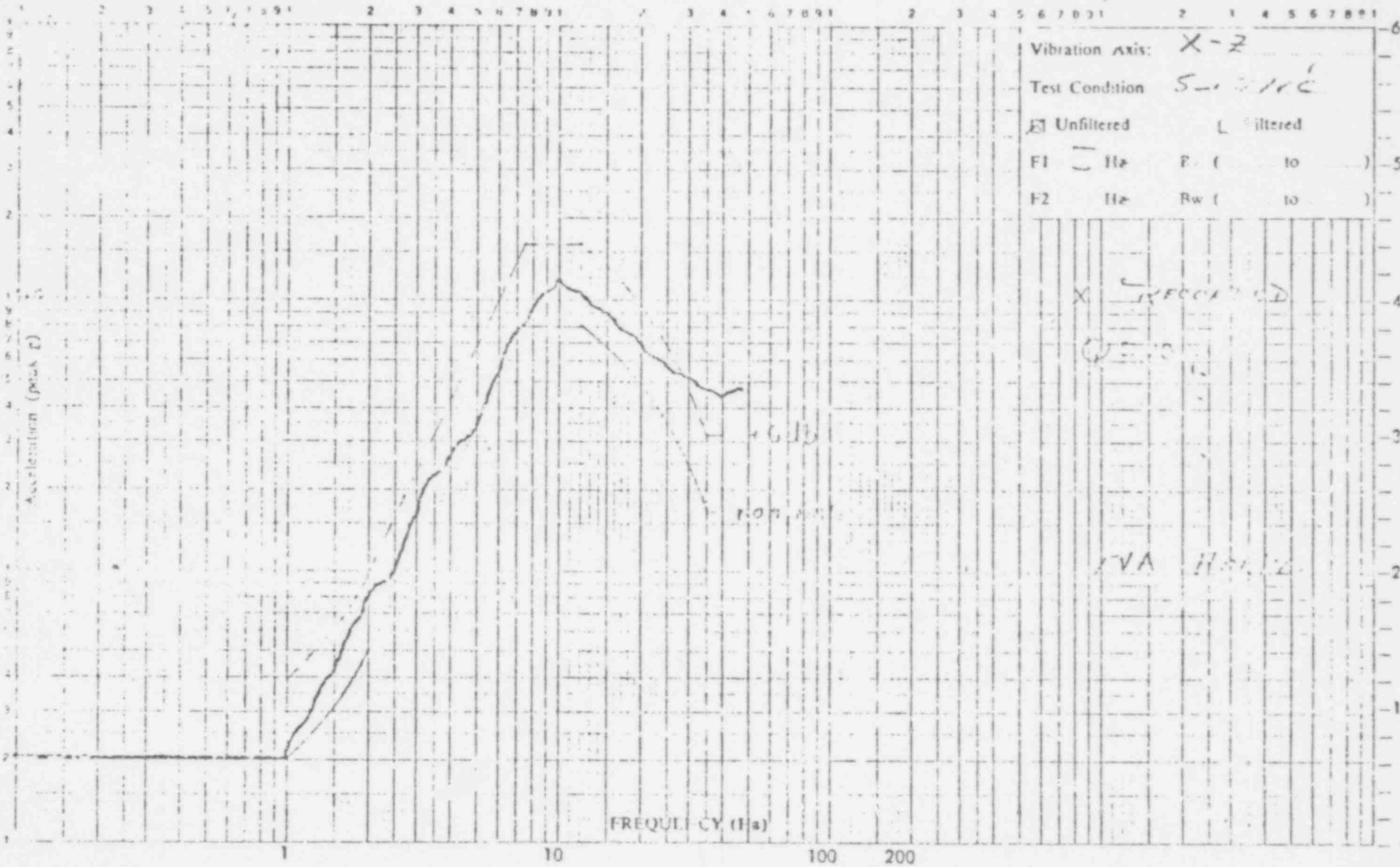
Vibration Axis: X-Z

Test Condition: [illegible]

☒ Unfiltered ☐ Filtered

F1 — Hz F (to)

F2 Hz Bw (to)



Pickup Serial Number: [illegible] Pickup Sensitivity: 100 mv peak / g peak Job Number: [illegible]

Pickup Location: [illegible] Sweep Speed: — oct/minute Date: [illegible]

Pickup Sensing Axis: [illegible] ☐ Live ☐ Tape AMTR [illegible] Time: [illegible]

POOR ORIGINAL

494 333

Lab Form D-24

494 334

0540 Enc 1 Pg 35

Plotted by: W. [illegible]

Checked by: [illegible]

DAYTON T. BROWN INC
Testing Laboratories

Test Item: [illegible]

Serial Number(s): [illegible]

Unit: Operational ☒ Non-operational ☐

Vibration Axis: [illegible]

Test Condition [illegible]

☒ Unfiltered ☐ Filtered

F1 [illegible] Hz Bw (to)

F2 [illegible] Hz Bw (to)

Acceleration (peak g)

FREQUENCY (Hz)

1 10 100 200

60 50 40 30 20 10 0

Pickup Serial Number: [illegible]

Pickup Location: [illegible]

Pickup Sensitivity: [illegible] mv peak / g peak

Sweep Speed: [illegible] oct/minute

☒ Live ☐ Tape [illegible]

Job Number: [illegible]

Date: [illegible]

Time: [illegible]

POOR ORIGINAL

LaR Form D-2

Plotted by:

Checked by:

BAYTON T. BROWN INC.
Testing Laboratories

Test Item: Power Supply BMC

Serial Number(s):

Unit: Operational ☒ Non-operational ☐

Vibration Axis: Z - Y

Test Condition:

☒ Unfiltered ☐ Filtered

F1 — Hz Bw (to)

F2 — Hz Bw (to)

Z RECORDED

Q = 10

FM

Acceleration (peak g)

FREQUENCY (Hz)

1 10 100 200

60 50 40 30 20 10 0

Pickup Serial Number: 7103

Pickup Location:

Pickup Sensing Axis:

Pickup Sensitivity: 105.0 mv peak / g peak

Sweep Speed: — oct/minute

☒ Live ☐ Tape MOTR PLT

Job Number: 4009

Date: 8 APR 76

Time: 1115

494 335

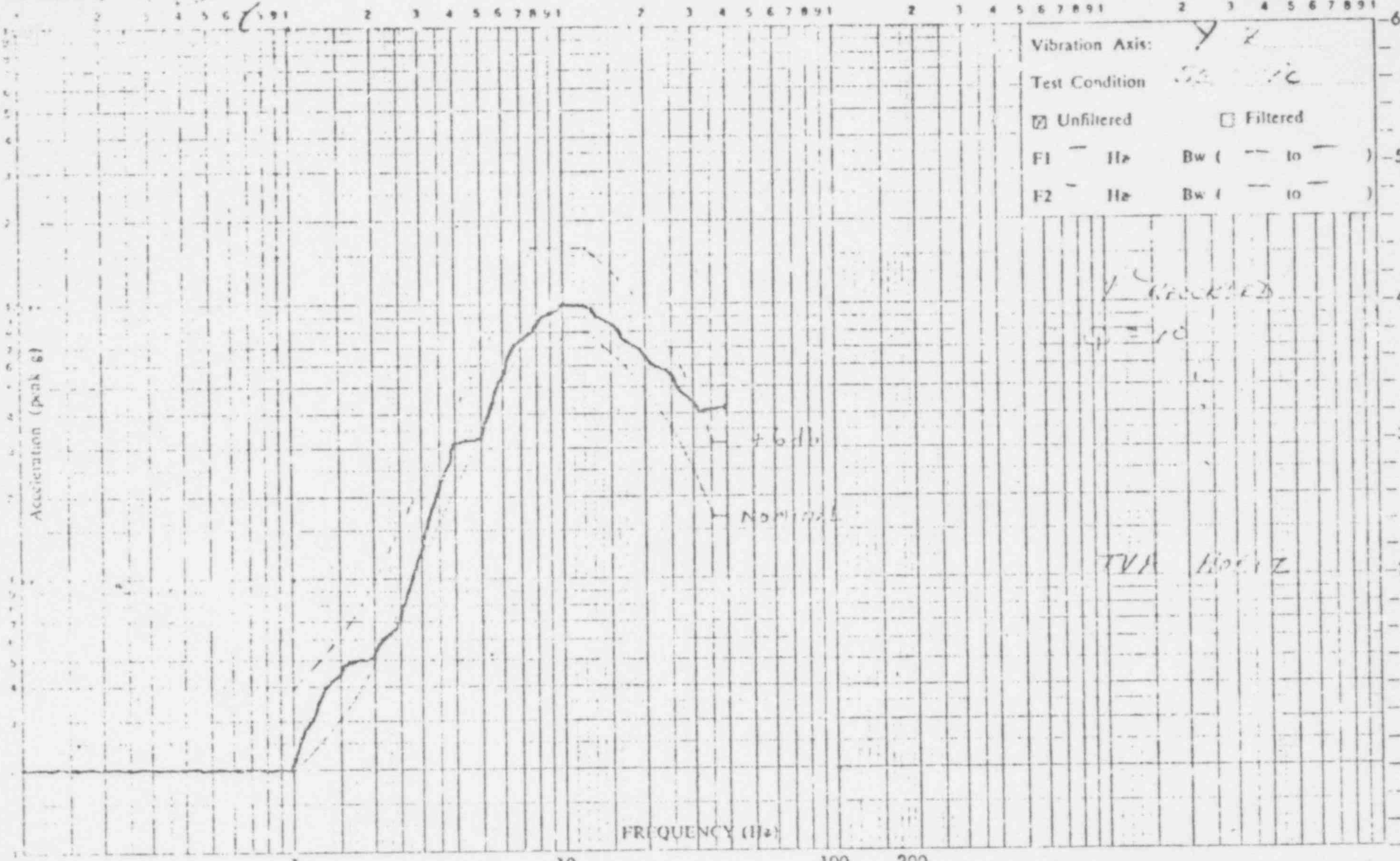
0540 Enc 1 Pg 54

Tab Form D22

DAYTON T. BROWN INC.
Testing Laboratories

Plotted by: [illegible]
Checked by: [illegible]

Test Item: Power [illegible] BMC
Serial Number(s): 1-2
Unit: Operational ☒ Non-operational ☐



Pickup Serial Number: NB76 Pickup Sensitivity: 100 G mv peak / g peak Job Number: 40099
Pickup Location: CONT Sweep Speed: — oct/minute Date: 8 Mar
Pickup Sensing Axis: Y ☐ Live ☐ Tape Video Run Time: 1113

POOR ORIGINAL

494 336

0540 Enc 1 Pg 53

Lab Form D-24

SEISMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. Plant Name: Midland Plant Units 1 & 2 Type:

1. Utility: Consumers Power Company PWR X

2. NSSS: Babcock & Wilcox BWR

3. A-E: Bechtel

II. Component Name: NI/RPS and/or ECCAS cabinet-mounted module qualified by multi-axis/random shake

1. Model Number: Logic test module Quantity: 2 per ECCA

2. Vendor: Bailey Controls Company (BCCO)

3. Physical Description The logic test module is a standard three-unit wide module designed for plug-in mounting in the BCCO ECCAS cabinet.

4. Location: Building: Auxiliary building

(In Plant) Elevation: 659'

5. Natural Frequencies in Each Direction: Vertical: 9 Hz; front-to-back: 8.6 Hz; side-to-side: 9.4 Hz

6. Functional Description: The module generates test signals to various points within the ECCAS logic channel and indicates proper or improper status.

7. Pertinent Reference Design Specifications: B&W Document 58-0407-01 Logic Test Module, BCCO Seismic Report QR-4100-SEIS-TVA-2/3 Logic Test

III. Is Equipment Available for Inspection in the Plant: (X) Yes ( ) No

Comments:

IV. Seismic Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

V. Seismic Input:

1. Required Response Spectra (attach the graphs): Attached

2. Required Acceleration in each Direction: See Section VI.6.

VI. If Qualification by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency

2. ( ) Single Axis (X) Multi-Axis

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test (X) Yes (attach TRS graphs)

5. g-level Test at h_1 = >2.5 g ZPA h_2 = >2.5 g ZPA V = >2.5 g ZPA

6. g-level Required h_1 = <0.4 g h_2 = <0.6 g V = <0.2 g

7. Mounting:

1. Seismic Report: Simulated in-cabinet mounting

2. Field Check: _____

8. Functional Verification Performed (X) Yes ( ) No ( ) Not Applicable

VII. If Qualification by Analysis or by the Combination of Test and Analysis then, Complete

1. Description of Test including Results: _____

494 339

Plotted by: CM Sheldon

Checked by: Russell C. Kallay

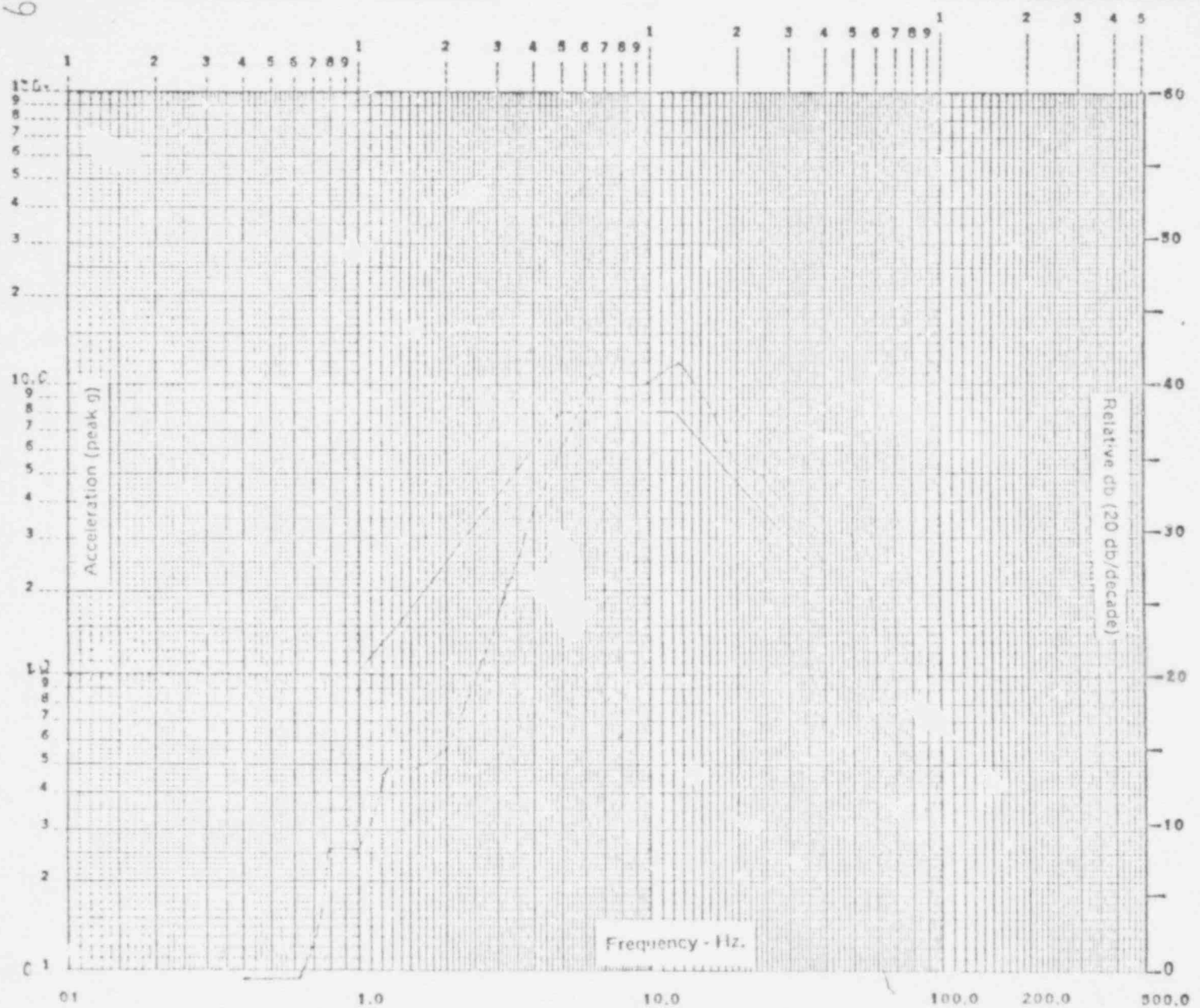
Date: 12-2-77 Time: 13 35

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: 2/3 Logic Test

Item P/N: 662892-3A1

Item S/N: QT-882-2A



Ref. Spec.: QP-4100 SEIS

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 80°F 27%

Test Type: TVA/SSE

Duration: 30 sec

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 my peak / g peak

Vibration Axis: -YZ

☑ Live ☐ Tape

Graph Number: 6

Tolerance: +6 dB

POOR ORIGINAL

Page No. 27

FORM NO. VTS-1-1176

494 340

Plotted by: [illegible]

Checked by: Russell C. Kelley

Date: 12-2-7. Time: 13:55

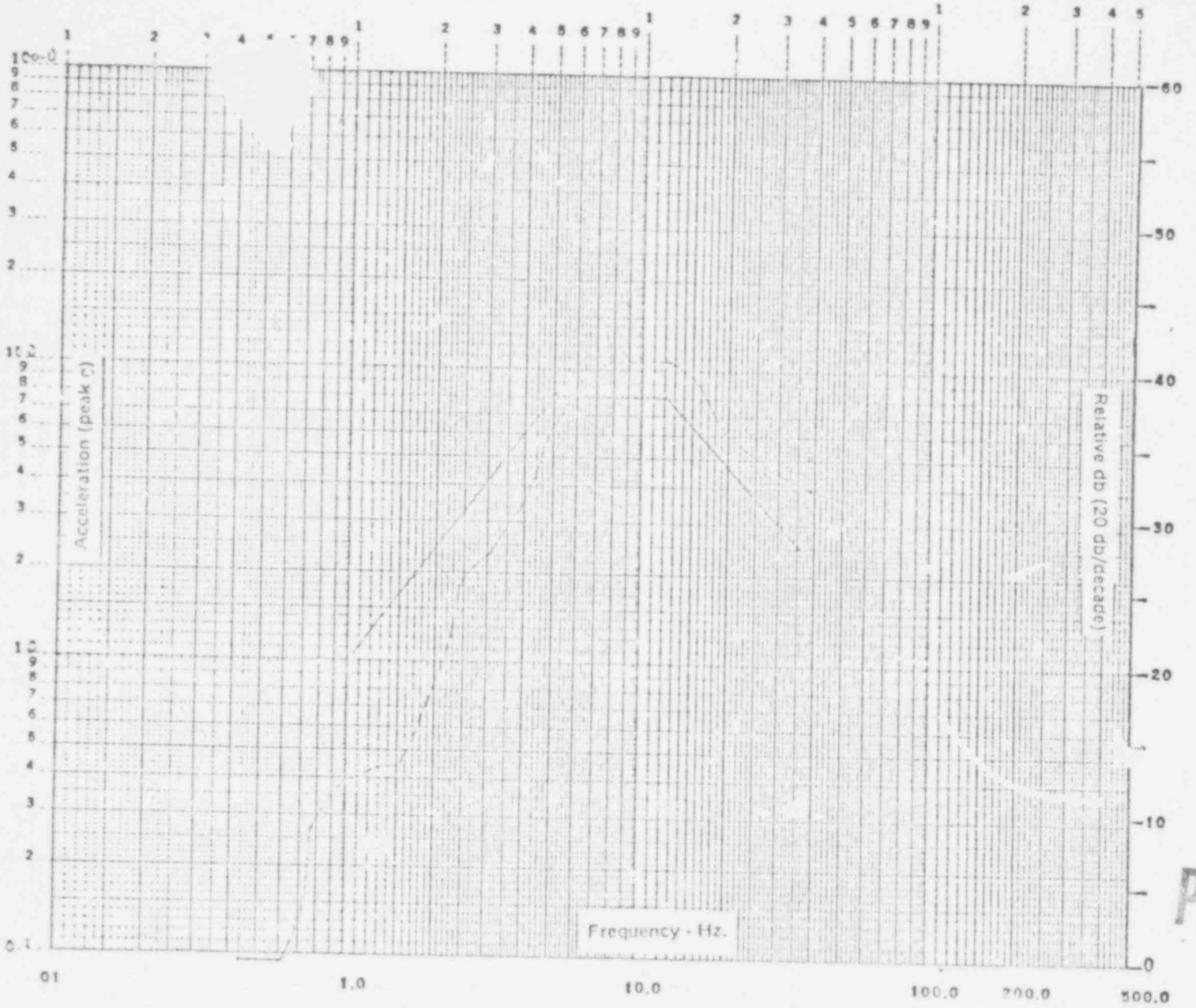
Babcock & Wilcox
Bailey Meter Company, U.S.A.

QUALIFICATION TEST LAB.

Test Item: 2/3 Logic TEST

Item P/N: 662892 3A1

Item S/N: QT882-2A



Ref. Spec.: QP-4100 SEIS

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 79°F 27%

Test Type: TVA/SSE

Duration: 30 sec

Sweep Speed: _____ oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 my peak / g peak

Vibration Axis: -X Z

☑ Live ☐ Tape

Graph Number: 8

Tolerance: ±dB

POOR ORIGINAL

Page No. 29

FORM NO. VTS-1-1176

494 341

Plotted by: CM. Shekelman

Checked by: Russell C. Killay

Date: 12-2-77 Time: 14:10

Babcock & Wilcox
Bailey Meter Company, U.S.A.

QUALIFICATION TEST LAB.

Test Item: 2/3 Logic TEST

Item P/N: 6628923A1

Item S/N: QT882-2A

Ref. Spec.: QP-4100 SEIS

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 79°F, 27%

Test Type: TVA/SSE

Duration: 30 sec

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +YZ

☑ Live ☐ Tape

Graph Number: 10

Tolerance: +6 dB

POOR ORIGINAL

494 342

Plotted by: CM [illegible]

Checked by: Russell C. Talley

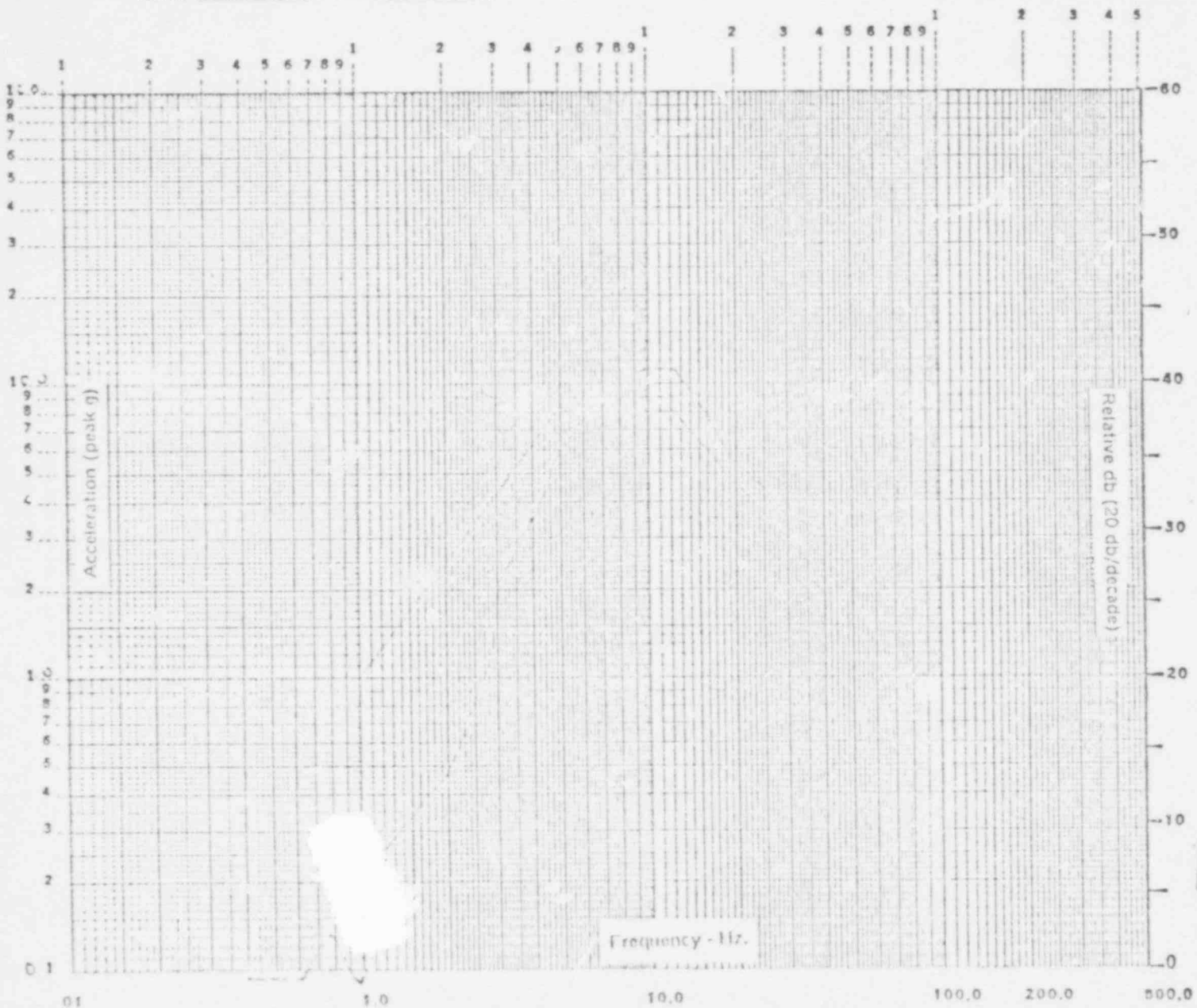
Date: 12-2-77 Time: 14:28

Babcock & Wilcox
Bailey Meter Company, U.S.A.
QUALIFICATION TEST LAB.

Test Item: 2/3 Logic Test

Item P/N: 662892-3A1

Item S/N: QT882-2A



Ref. Spec.: QP-4100 SEIS

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 79°F 27%

Test Type: TVA/SSE

Duration: 30 sec

Sweep Speed: — oct/minute

Damping: 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 my peak / g peak

Vibration Axis: +Y Z

☑ Live ☐ Tape

Graph Number: 12

Tolerance: +6dB

Page No. 54

FORM NO. VTS-1172