

SOUTH CAROLINA ELECTRIC & GAS COMPANY

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T. C. NICHOLS, JR.
VICE PRESIDENT AND GROUP EXECUTIVE
NUCLEAR OPERATIONS

March 6, 1981



Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Virgil C. Sumner Nuclear Station
Docket No. 50/395
Seismic Qualification Review Team
Follow-Up Information

Dear Mr. Denton:

In our November 20, 1980 letter, South Carolina Electric and Gas Company (SCE&G) provided follow-up information from the October 14-17, 1980 seismic audit. In that letter we identified several items on which information still needed to be provided. In January, 1981, South Carolina Electric and Gas Company was given a copy of a memorandum from Mr. Arnold Lee to Mr. Zoltan R. Rosztoczy. This memorandum provided us with a request for additional information. This letter provides the requested information. Where information is unavailable, a discussion is provided to elaborate on any problems and to give a projected schedule as to when the information can be provided.

The January, 1981 memorandum provides a total list of information required. This list will be used in this letter as a format for our response.

1. Identify all equipment still to be qualified and provide documentation to demonstrate the completion of the qualification program. Provide SQRT forms for this equipment and update the forms provided for the site visit.

RESPONSE: A list of 24 pieces of equipment still to be qualified was provided in our November 20, 1980 letter. The following items have been deleted from the list.

- a. Heat Tracing Panels - This item was mistakenly included on the list. The entire heat tracing system as described in our FSAR is not safety-related or seismically designed. No credit is taken for operation of this system to prevent and mitigate accidents. It should, therefore, be deleted.
- b. 2" Motor Operated Valves (Rockwell) - This item was mistakenly included on the list. There are no 2" Rockwell Motor Operated Valves at the V. C. Sumner Nuclear Station. It should, therefore, be deleted.

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Mr. Harold R. Denton
March 6, 1981
Page Two

The status of the remaining items is provided in Attachment I to this letter. Note that H₂ Analyzer Panels have been added. SQRT information sheets for most of these items are included in this Attachment. A summary of their status is given on the above sheet.

A copy of SQRT forms for the items noted are provided as an Attachment to this letter

2. Review and revise, as necessary, FSAR tables in Chapter 3 to include updated information on all safety-related systems and components.

RESPONSE: These tables have been reviewed and all information is provided in the current FSAR tables.

3. Provide a copy of the revised SQRT tables which include a list of equipment and the summary of the qualification program.

RESPONSE:: This information was provided in the November 20, 1980 letter.

4. For all safety-related valves describe the design procedure used to demonstrate that the accelerations used in the valve qualification equal or exceed the accelerations obtained in the final as-built piping analysis. Provide specific information for the valves reviewed by SQRT.

RESPONSE: The procedure was provided in the November 20, 1980 letter. Specific valve information is provided as Attachment II to this letter.

5. Provide qualification reports for the four pieces of equipment not available during the visit and the three additional pieces of equipment selected by the staff at the conclusion of the visit.

RESPONSE: All requested reports were provided (as described in the November 20, 1980 letter) except those listed below:

- a. Reactor Building Cooling Unit Bypass Damper Actuator - The seismic report is attached to this letter. One copy is provided to the Nuclear Regulatory Commission Staff and one copy is attached to the copy of the cover letter sent to Brookhaven Laboratory.
- b. Hydrogen Analyzer Panels - A seismic report has been received and is currently in engineering review. It is projected that the review will be completed in two to three months.

Mr. Harold R. Denton
March 6, 1981
Page Three

- c. Radiation Monitor Systems Panel - A revised report was received on February 9, 1981 and is currently being reviewed. It is projected that the review will be completed in two to three months.
 - d. PAM Indicators - The review of the seismic design of this item is ongoing. No projected date is available at this time.
6. Provide confirmation that Westinghouse's generic response spectra for equipment qualification envelop the corresponding plant specific required response spectra.

RESPONSE: The response to this item was provided in our November 20, 1981 letter in item 6f.

7. Clarify details as discussed in Attachments III and IV concerning the qualification of Component Cooling Water Pump and Motor, Turbine Appurtenances for Turbine Driven Emergency Feedwater Pump, Charging Pump, Battery Chargers, Control Valves and Pressure and Differential Pressure Transmitters.

RESPONSE: Responses were provided in our November 20, 1980 letter for the component cooling water pump and motor, RHR pumps, battery chargers and pressure and differential pressure transmitters. Other items are addressed below.

- a. Turbine Driven Emergency Feedwater Pump - Information regarding loose bolting during seismic tests was provided in our November 20, 1981 letter. Regarding the loose drain lines discovered during that audit, these lines are presently dismantled for maintenance. Upon replacement, they will be supported to meet design requirements. Regarding the 6" unsupported line discovered during the audit, the support of this line was verified after the audit as a part of the design verification walkdown. Revised drawings have been issued to provide additional supports. These supports will be installed prior to fuel loading.
- b. Charging Pumps - Information regarding natural frequency was provided in our November 20, 1980 letter. Regarding the concern about small lines used for monitoring pressure or temperature at different locations, this function is not a safety-related function. If during a seismic event, the equipment used to monitor these parameters failed, it would not impede the safety function of the charging pump.

Regarding the small unsupported tubes or pipes, the missing charging pump skid mounted "U" bolts will be replaced under the construction work request program (CWR-4792). Several temporary tubing runs in the charging pump rooms which were in place during the audit will

Mr. Harold R. Denton
March 6, 1981
Page Four

be removed after start-up testing is completed.

- c. Control Valves - Information requested for control valves is provided in item 4 of this letter.

In summary, the following information remains to be sent to the Nuclear Regulatory Commission:

Seismic Reports still due:

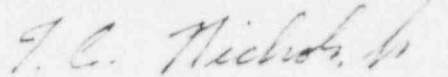
PAM Indicators
H₂ Analyzer Panels
Radiation Monitoring System Panels

SQRT Information Sheets still due:

Filter Plenums
Radiation Monitoring Panels
H₂ Analyzer Panel
PAM Indicators
Core Subcooling Monitors
Critical Systems Leak Monitoring Equipment

This letter should provide you with sufficient information to close the majority of the remaining seismic qualification items. It also provides you with a list and projected schedule for completion of those small number of remaining items. If you have any questions, please let us know.

Very truly yours,



T. C. Nichols, Jr.

RBC:TCN:rh

Enclosures

cc: V. C. Summer
G. H. Fischer
T. C. Nichols, Jr.
C. A. Price
D. A. Nauman
W. A. Williams, Jr.
R. B. Clary
A. R. Koon
A. A. Smith

H. N. Cyrus
J. B. Knotts, Jr.
J. L. Skolds
B. A. Bursey
O. S. Bradham
Brookhaven Laboratory
ISEG
PRS
NPCF
File

ATTACHMENT I

EQUIPMENT SUMMARY SHEET

<u>EQUIPMENT ITEM</u>	<u>SEISMIC REVIEW STATUS</u>	<u>SQRT FORM INCLUDED</u>
1. FIRE DAMPERS	SEISMIC REVIEW IN PROGRESS WITH MINOR EXCEPTIONS	YES
2. LIMIT SWITCHES FOR HVAC	SEISMIC REVIEW IN PROGRESS WITH MINOR EXCEPTIONS	YES
3. BECK ELECTRIC MOTOR ACTUATORS FOR DAMPERS	SEISMIC REVIEW IN PROGRESS WITH MINOR EXCEPTIONS	YES
4. ROOF VENTILATORS	SEISMIC REVIEW IN PROGRESS WITH MINOR EXCEPTIONS	YES
5. BETTIS DAMPER ACTUATORS	SEISMIC REVIEW COMPLETE	YES
6. ASCO SOLENOID VALVES FOR REACTOR BUILDING COOLING UNIT	SEISMIC REVIEW COMPLETE	YES
7. FILTER PLENUMS	SEISMIC REVIEW IN PROGRESS	YES (PRELIMINARY)
8. SOLENOID VALVES AND LIMIT SWITCHES FOR POSI-SEAL PURGE ISOLATION VALVES	SEISMIC REVIEW COMPLETE	YES
9. SOLENOID VALVES FOR AIR HANDLING UNITS	SEISMIC REVIEW COMPLETE	YES
10. NAMCO LIMIT SWITCHES ON ANCHOR-DARLING VALVES	SEISMIC REVIEW COMPLETE	YES
11. SOLENOID VALVE PANEL FOR M.S. ISOLATION VALVE	SEISMIC REVIEW IN PROGRESS	YES
12. TERRY TURBINE FOR EFW PUMP	SEISMIC REVIEW IN PROGRESS WITH MINOR EXCEPTIONS	YES

ATTACHMENT I - CONT.

EQUIPMENT SUMMARY SHEET

<u>EQUIPMENT ITEM</u>	<u>SEISMIC REVIEW STATUS</u>	<u>SQRT FORM INCLUDED</u>
13. LIMIT SWITCHES FOR ROCKWELL VALVES	SEISMIC REVIEW COMPLETE	YES
14. 1" EPG BALL VALVE ACTUATOR	SEISMIC REVIEW COMPLETE	YES
15. SODIUM HYDROXIDE TANK	SEISMIC REVIEW COMPLETE	YES
16. FUEL OIL STORAGE TANK	SEISMIC REVIEW COMPLETE	YES
17. RADIATION MONITOR PANEL	SEISMIC REVIEW IN PROGRESS	NO (SEE ITEM 5c)
18. LOCAL CONTROL PANELS	SEISMIC REVIEW COMPLETE	YES
19. HYDROGEN ANALYZER PANEL	SEISMIC REVIEW IN PROGRESS	NO (PRELIMINARY SQRT FORM PREVIOUSLY SUPPLIED)
20. REACTOR TRIP SWITCHGEAR	SEISMIC REVIEW COMPLETE	YES
21. PAM INDICATORS	SEISMIC REVIEW IN PROGRESS	NO (SEE ITEM 5d)
22. CORE SUBCOOLING MONITOR	SEISMIC REVIEW IN PROGRESS	NO
23. CRITICAL SYSTEMS LEAK MONITORING	SEISMIC REVIEW IN PROGRESS	NO

ATTACHMENT II

V. C. SUMMER NUCLEAR STATION, UNIT 1
ACCELERATION VALUES FROM AS-BUILT PIPING ANALYSIS**

<u>DESCRIPTION</u>	<u>VALVE NO.</u>	<u>ACCELERATION</u>	<u>ALLOWABLE</u>
Main Feedwater Isolation Valves	XVG-1611A-FW	Vert. (A _{2T}) 0.56	3
		Horizontal 1.857	3
		" " 0.036	3
	XVG-1611B-FW	Vert. (A _{2T}) 0.948	3
		Horizontal 0.593	3
		" " 1.438	3
	XVG-1611C-FW	Vert. (A _{2T}) 0.948	3
		Horizontal 0.593	3
		" " 1.438	3
Control Valve	IFV-2030-MS	Vert. (A _{2T}) 0.923	1
		*Horizontal 0.839	1.5
		*Horizontal = (A _{1T}) ² + (A _{3T}) ²	
Main Steam Isolation Valves	XVM-2801A-MS	Vert. (A _{2T}) 0.275	3
		Horizontal 0.874	3
		" " 0.661	3
	XVM-2801B-MS	Vert. (A _{2T}) 0.036	3
		Horizontal 1.241	3
		" " 0.007	3
	XVM-2801C-MS	Vert. (A _{2T}) 0.108	3
		Horizontal 1.844	3
		" " 0.017	3
Main Steam Safety Valves	XVS-2806A-MS	Vert. (A _{2T}) 0.01	3
		Horizontal 1.309	3
		" " 1.725	3
	XVS-2806B-MS	Vert. (A _{2T}) 0.020	3
		Horizontal 1.484	3
		" " 1.528	3
	XVS-2806C-MS	Vert. (A _{2T}) 0.055	3
		Horizontal 1.352	3
		" " 1.739	3

ATTACHMENT II - CONT.

<u>DESCRIPTION</u>	<u>VALVE NO.</u>	<u>ACCELERATION</u>	<u>ALLOWABLE</u>
(Continued)	XVS-2806D-MS	Vert. (A_{2T}) 0.036	3
		Horizontal 1.441	3
		" " 1.765	3
	XVS-2806E-MS	Vert. (A_{2T}) 0.678	3
		Horizontal 1.805	3
		" " 2.085	3
	XVS-2806F-MS	Vert. (A_{2T}) 0.17	3
		Horizontal 1.514	3
		" " 1.254	3
	XVS-2806G-MS	Vert. (A_{2T}) 0.054	3
		Horizontal 1.364	3
		" "	
	XVS-2806H-MS	Vert. (A_{2T}) 0.022	3
		Horizontal 1.199	3
		" " 0.825	3
	XVS-2806I-MS	Vert. (A_{2T}) 0.020	3
		Horizontal 1.165	3
		" " 0.751	3
	XVS-2806J-MS	Vert. (A_{2T}) 0.052	3
		Horizontal 1.253	3
		" " 0.836	3
	XVS-2806K-MS	Vert. (A_{2T}) 0.026	3
		Horizontal 1.795	3
		" " 2.249	3
	XVS-2806L-MS	Vert. (A_{2T}) 0.004	3
		Horizontal 1.692	3
		" " 2.100	3
	XVS-2806M-MS	Vert. (A_{2T}) 0.008	
		Horizontal 1.757	
		" " 2.052	
	XVS-2806N-MS	Vert. (A_{2T}) 0.026	
		Horizontal 1.605	
		" " 2.016	
	XVS-2806P-MS	Vert. (A_{2T}) 0.086	
		Horizontal 1.336	
		" " 1.965	

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type: _____
 1. Utility: SCE&G PWR X
 2. NSSS: Westinghouse 3. A/E: GAI BWR _____

II. Component Name Fire Dampers

1. Scope: ☐ NSSS ☒ BOP
2. Model Number: 119AL and 319W Quantity: 147
3. Vendor: Air Balance Inc.
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description
 - a. Appearance Curtain Type Dampers
 - b. Dimensions 24" x 24" (Test Specimen)
 - c. Weight Variable - Depending on Size
6. Location: Building: Several
 Elevation: Several
7. Field Mounting Conditions ☒ Bolt (No. 12" O.C., Size 1/4")
☐ Weld (Length _____)
☐ _____
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
 Any natural frequency below 33 Hz are listed.
 [Pos.) S/S: 17 Hz (Unit in Vertical) F/B: 22 Hz (Unit in Vertical) V: 23 Hz (Unit in Horizontal Position)
 29 Hz (Unit in Horiz. Position) Vertical Position)
9. a. Functional Description: Close off air duct in case of fire.
- b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☒ Both _____
10. Pertinent Reference Design Specifications: SP-221-04461-000

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: x

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Bahnson Co./Gaynes Testing Lab Inc.
(name of Company or Laboratory & Report No.)
Job #79601

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): N/A

3. Required Acceleration in Each Direction:

S/S = 5.3g's F/B = 5.3g's Y = 2.8g's

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat

2. ☒ Single Axis ☐ Multi-Axis ☐ _____

3. No. of Qualification Tests: OBE _____ SSE _____ Other below 33 Hz
(specify) 20 sec. @ each Natural Freq.

4. Frequency Range: 1 Hz to 33 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs)
N/A because input excitation levels are given. ☒ No

6. Input g-level Test at S/S = 5.3g's F/B = 5.3g's Y = 2.8g's

7. Laboratory Mounting:

1. ☒ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____

8. Functional operability verified: ☐ Yes ☒ No ☐ Not Applicable

9. Test Results including modifications made: Test results are satisfactory for the test performed for both one S/S and Y and one F/B and V

10. Other tests performed (such as fragility test, including results): NONE

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type: _____
 1. Utility: SCE&G PWR X
 2. NSSS: Westinghouse 3. A/E: GAI BWR _____

II. Component Name Namco Limit Switches

1. Scope: ☐ NSSS ☒ BOP
2. Model Number: EA 180 Quantity: As Required
3. Vendor: Namco Controls
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description
 - a. Appearance Switch enclosure with actuating arm.
 - b. Dimensions Enveloped by 5" x 7" x 3"
 - c. Weight 4.5 lb.
6. Location: Building: Various
 Elevation: Various
7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Valve/Damper by Bolting
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
 S/S: > 35 Hz F/B: > 35 Hz V: > 35 Hz
9. a. Functional Description: The Limit Switch is used in the seal portion of IE solenoid valve control circuit.
 b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☒ Both _____
10. Pertinent Reference Design Specifications: SP-702-04461-000

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Acme-Cleveland Development Company 9/7/78
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☒ Absolute Sum ☐ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): N/A - Fragility Test

3. Required Acceleration in Each Direction:

S/S $\left[\begin{array}{l} 1 \text{ to } 4 \text{ Hz } (.6 \text{ to } 9.529 \text{ g's}) \\ > 4 \text{ Hz } (9.529 \text{ g's}) \end{array} \right] \text{ F/B} = \text{Same as S/S} \quad \text{Y} = \text{Same as S/S}$

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat

2. ☒ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other 54 Distinct Vib. Tests with 60 sec. each (specify)

4. Frequency Range: 1 to 35 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs) ☒ No

6. Input g-level Test at $\left[\begin{array}{l} 1 \text{ to } 4 \text{ Hz } (.6 \text{ to } 9.529 \text{ g's}) \\ > 4 \text{ Hz } (9.529 \text{ g's}) \end{array} \right] \text{ S/S} = \text{Same as S/S} \quad \text{F/B} = \text{Same as S/S} \quad \text{Y} = \text{Same as S/S}$

7. Laboratory Mounting:

1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☒ Mounted on Shake Table

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: The test results show that the limit switches are qualified to withstand the test input acceleration which is below the acceleration imposed by the valves on which they are mounted.

10. Other tests performed (such as fragility test, including results): The test results indicate that the fragility level of the limit switches is above the maximum capability of the test table.

Qualification Summary of Equipment

I. Plant Name:

V. C. Summer

Type:

1. Utility: SCE&G

PWR X

2. NSSS: Westinghouse

3. A/E: GAI

BWR

II. Component Name

Electric Motor Actuators for Dampers

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: 11-153

Quantity: 4

3. Vendor: BECK

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Rectangular Housing

b. Dimensions 16" x 14 3/8" x 12 3/4"

c. Weight 50 lbs.

6. Location: Building: Intermediate

Elevation: 420'

7. Field Mounting Conditions ☒ Bolt (No. 4, Size 3/8")
☐ Weld (Length)
☐

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
Not Available

S/S:

F/B:

V:

9. a. Functional Description: Open and Close Dampers

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown

☒ Both

10. Pertinent Reference Design Specifications:

SP-221-044461-000

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Wyle Lab. Report 43539-1
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☒ Absolute Sum ☐ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): _____

3. Required Acceleration in Each Direction:

S/S = .4247 g ZPA F/B = .7145 g ZPA V = .3441 g ZPA

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☒ Multi-Frequency: ☒ random ☐ sine beat

2. ☐ Single Axis ☒ Multi-Axis

3. No. of Qualification Tests: OBE 5 SSE 1 Other _____
(specify)

4. Frequency Range: 1 HZ to 40 HZ

5. TRS enveloping RRS using Multi-Frequency Test ☒ Yes (Plot TRS on RRS graphs)
☐ No

6. Input g-level Test at S/S = 3.5 g's ZPA F/B = 4 g's ZPA V = 3.5 g's ZPA

7. Laboratory Mounting:

1. ☐ Bolt (No. _____, Size _____) ☒ Weld (Length unknown) ☐ _____

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: It was demonstrated that the equipment possessed sufficient integrity to withstand, without loss of function, the prescribed seismic input..

10. Other tests performed (such as fragility test, including results): NONE

M.C. SUMMER UNIT
RESPONSE SPECTRUM ENVELOPE
FOR OBE

INTERMEDIATE BUILDING
ELEV 436'-0" X-QUAKE
FIGURE 62X

REV 3 MAY 15, 1975

ACTUAL BANDWIDTH

0.005 EQUIPMENT DAMPING

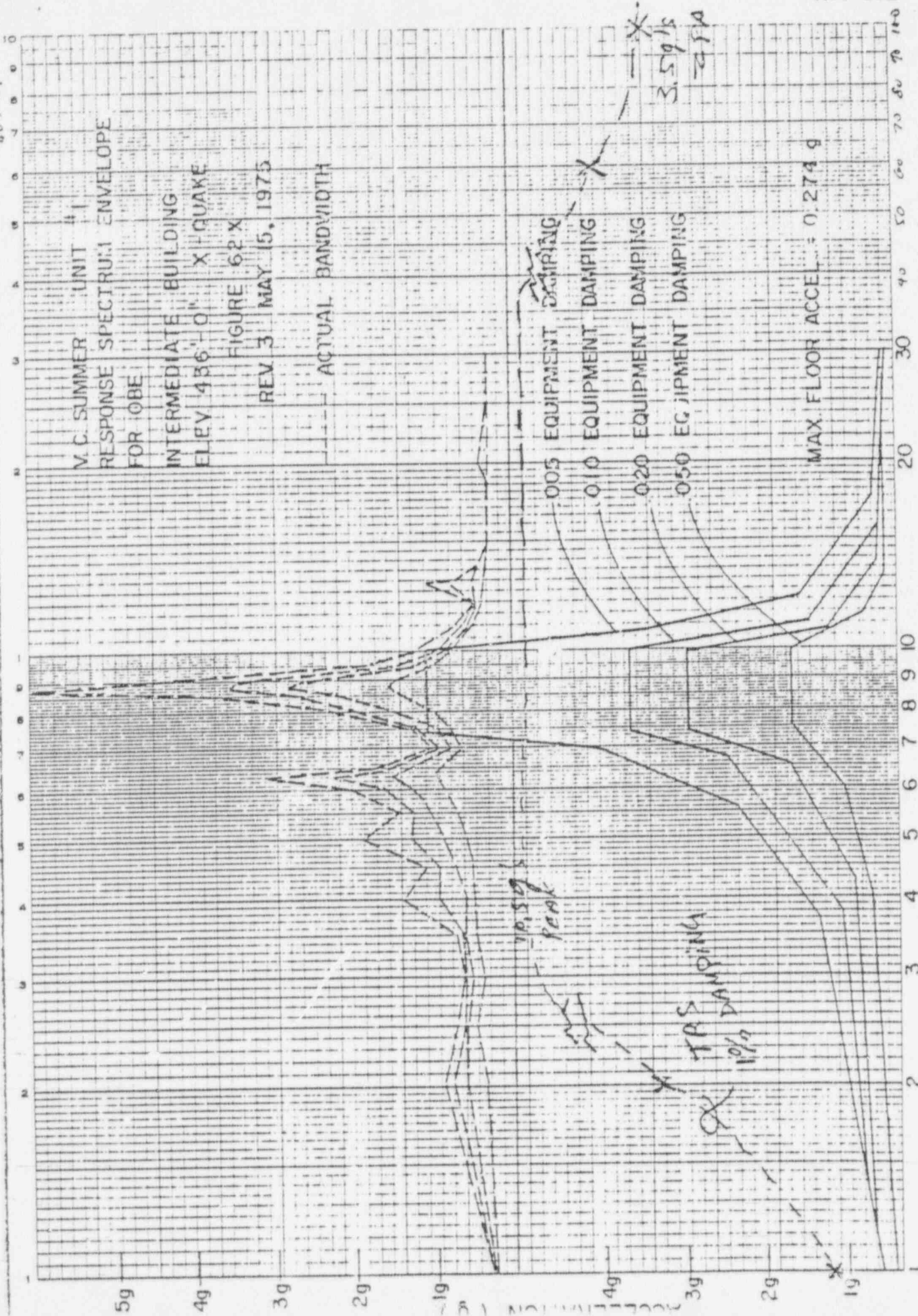
0.010 EQUIPMENT DAMPING

0.020 EQUIPMENT DAMPING

0.050 EQUIPMENT DAMPING

MAX FLOOR ACCEL = 0.274 g

FREQUENCY (CPS)



V. C. SUMMER UNIT
RESPONSE SPECTRUM ENVELOPE
FOR OBE

INTERMEDIATE BUILDING
ELEV 436'-0" Y-QUAKE

FIGURE 62Y
REV. 3 MAY 15, 1975

ACTUAL BANDWIDTH

2095
PEAK

TRS
1%
DAMPING

005 EQUIPMENT DAMPING

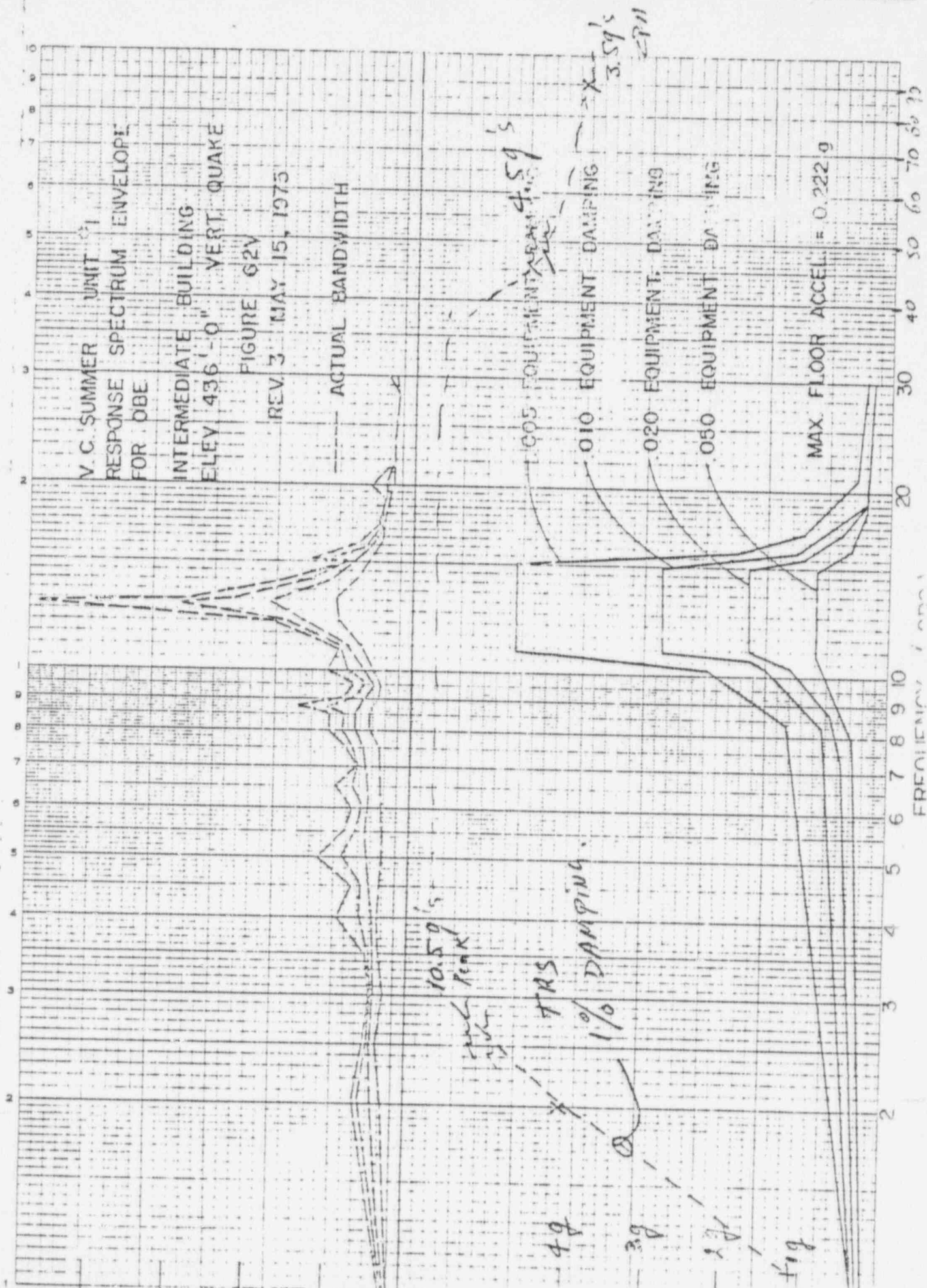
010 EQUIPMENT DAMPING

020 EQUIPMENT DAMPING

050 EQUIPMENT DAMPING

MAX FLOOR ACCEL = 0.4610

254
ZPA



Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type: _____
 1. Utility: SCE&G PWR X
 2. NSSS: Westinghouse 3. A/E: GAI BWR _____

II. Component Name Roof Ventilators

1. Scope: ☐ NSSS ☒ BOP
2. Model Number: Custom Fab Quantity: 4
3. Vendor: Bahnson
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description
 - a. Appearance Penthouse Ventilator
 - b. Dimensions 6'-6" x 4'-6" x 3', 2'-8" x 2'-8" x 2', 3' x 3' x 2'
 - c. Weight Not Available
6. Location: Building: Control/Intermediate
 Elevation: 505'/463'
7. Field Mounting Conditions

<input checked="" type="checkbox"/>	Bolt (No. <u>6"</u> O.C., Size <u>1/4"</u>)
<input type="checkbox"/>	Weld (Length _____)
<input type="checkbox"/>	_____
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
 Overall Natural Freq.: 28.37 Hz, 73.83 Hz, 76.92 Hz, 95.21 Hz
 S/S: _____ F/B: _____ Y: _____
9. a. Functional Description: Air Intake and Exhaust Heads

 b. Is the equipment required for ☒ Hot Standby ☐ Cold Shutdown
☒ Both _____
10. Pertinent Reference Design Specifications: SP-221-04461-000

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: _____

Analysis: x

Combination of Test and Analysis: _____

Test and/or Analysis by Bahnson Company/Corporate Consulting and Development Company
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☐ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only
4. ☐ Other (Specify) _____ 5. ☒ Combination of Seismic
Weight, Wind, and

6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify) _____

2. Required Response Spectra (attach the graphs): Figure 27 X, Y, and V (see GAI SP-702)

3. Required Acceleration in Each Direction: ZPA for OBE (ZPA for DBE: 1.55 x OBE)

S/S = .429g F/B = .433g Y = .137g

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat
2. ☐ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other _____
(specify)

4. Frequency Range: _____

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs) ☐ No

6. Input g-level Test at S/S = _____ F/B = _____ Y = _____

7. Laboratory Mounting:

1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____

8. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: _____

10. Other tests performed (such as fragility test, including results): _____

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

1. Description of Test including Results: No test was performed. Equivalent Static Analysis was performed on the finite element model.

2. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☒ Dynamic Analysis: ☐ Time-History
☒ Response Spectrum

3. Model Type: ☒ 3D ☐ 2D ☐ 1D
☒ Finite Element ☐ Beam ☐ Closed Form Solution

4. ☒ Computer Codes: STARDYNE

Frequency Range and No. of modes considered: 28.37Hz. Equipment was considered rigid. No mode consideration was made.
☐ Hand Calculations

5. Method of Combining Dynamic Responses: ☐ Absolute Sum ☒ SRSS
☐ Other: _____ (specify)

6. Damping: N/A Basis for the damping used: Rigid Equipment

7. Support Considerations in the model: Completely fixed at the base.

8. Critical Structural Elements:

A. Identification—Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab
Node 28 (Vertical Beam) (considered to be stressed the most among the rest of finite elements.)	Wind, Weight and Seismic		29,666	32,400
Louver Blade		8.753	25,574	32,400

B. Max. Deflection Location Effect Upon Functional Operability

Not considered to be significant.

Qualification Summary of Equipment

I. Plant Name:

V. C. Summer

Type:

1. Utility: SCE&G

PWR X

2. NSSS: Westinghouse

3. A/E: GAI

BWR

II. Component Name

Reactor Building Cooling Unit Damper Actuators

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: NT 312B - SR4-12 Quantity: 4

3. Vendor: BETTIS

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance: Pneumatic Actuator

b. Dimensions: 72" Long x 15" Max. Diam.

c. Weight: 393 LB

6. Location: Building: Reactor

Elevation: 543'

7. Field Mounting Conditions ☒ Bolt (No. 4, Size 3/4")
☐ Weld (Length)
☐

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

S/S: 17Hz F/B: 17Hz V: 42Hz

9. a. Functional Description: Open and Close HEPA Filter Bypass Damper.

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☒ Both

10. Pertinent Reference Design Specifications:

SP-534-044461-000

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: x

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Southwest Research Institute 02-4854-RPT-1
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☒ Absolute Sum ☐ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): _____

3. Required Acceleration in Each Direction:

S/S = .615g ZPA F/B = .618g ZPA V = .4464g ZPA

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☒ Multi-Frequency: ☒ random ☐ sine beat ☐ _____

2. ☐ Single Axis ☒ Multi-Axis

3. No. of Qualification Tests: OBE 5 SSE 1 Other _____
(specify)

4. Frequency Range: 1 to 100 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☒ Yes (Plot TRS on RRS graphs) ☐ No

6. Input g-level Test at S/S = 3g's ZPA F/B = 3g's ZPA V = 3g's ZPA

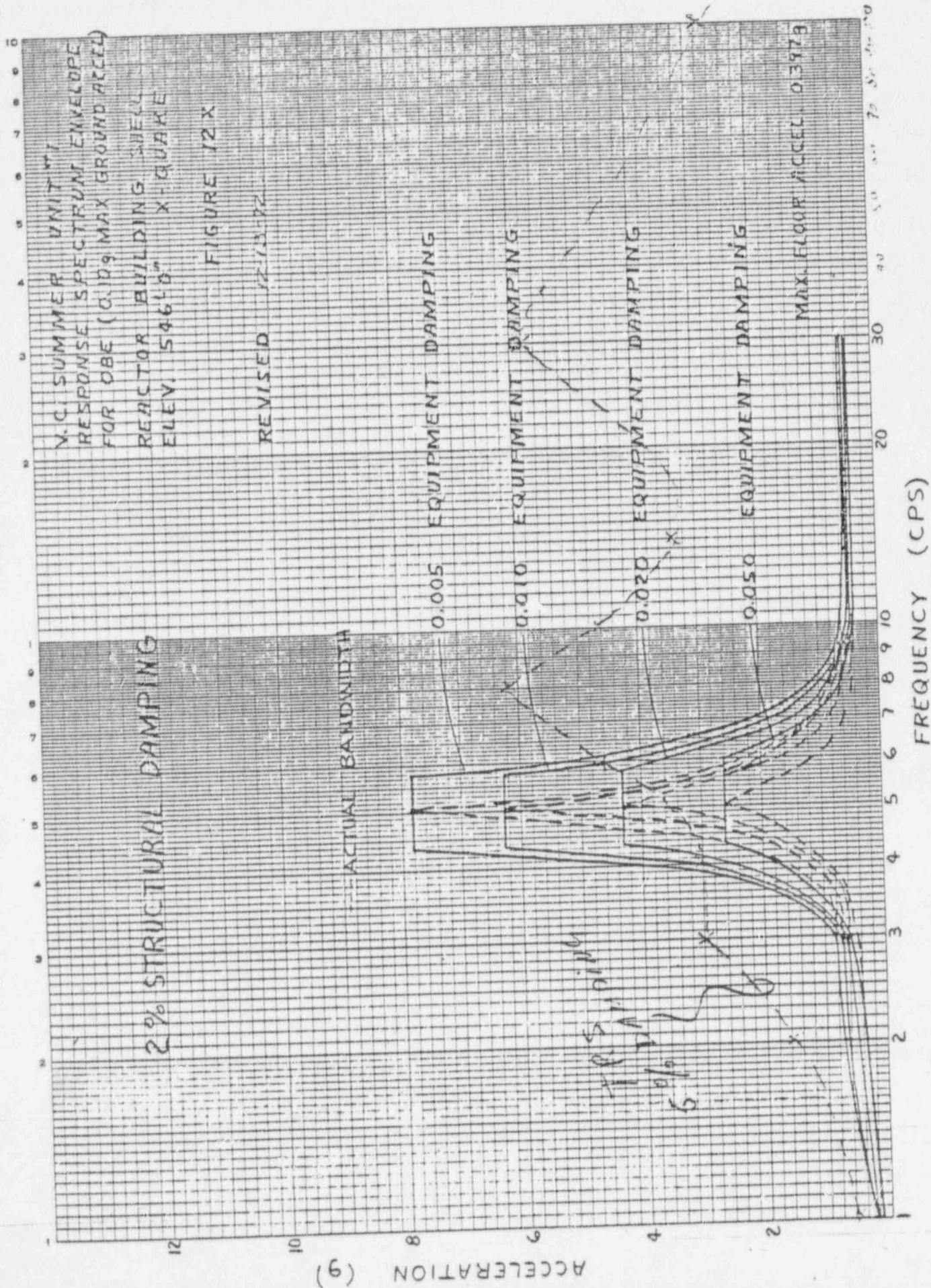
7. Laboratory Mounting: Same as for normal service.

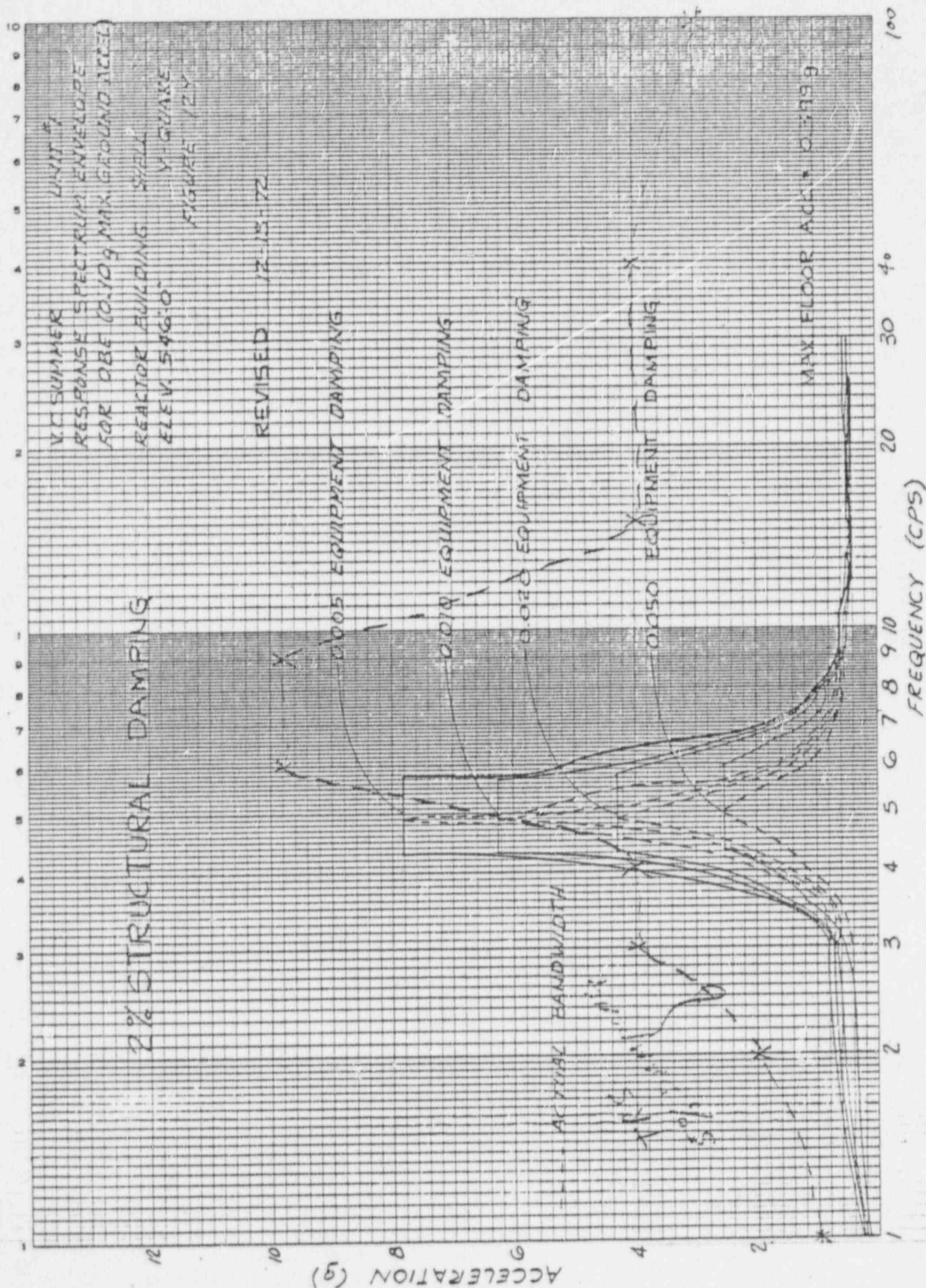
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____

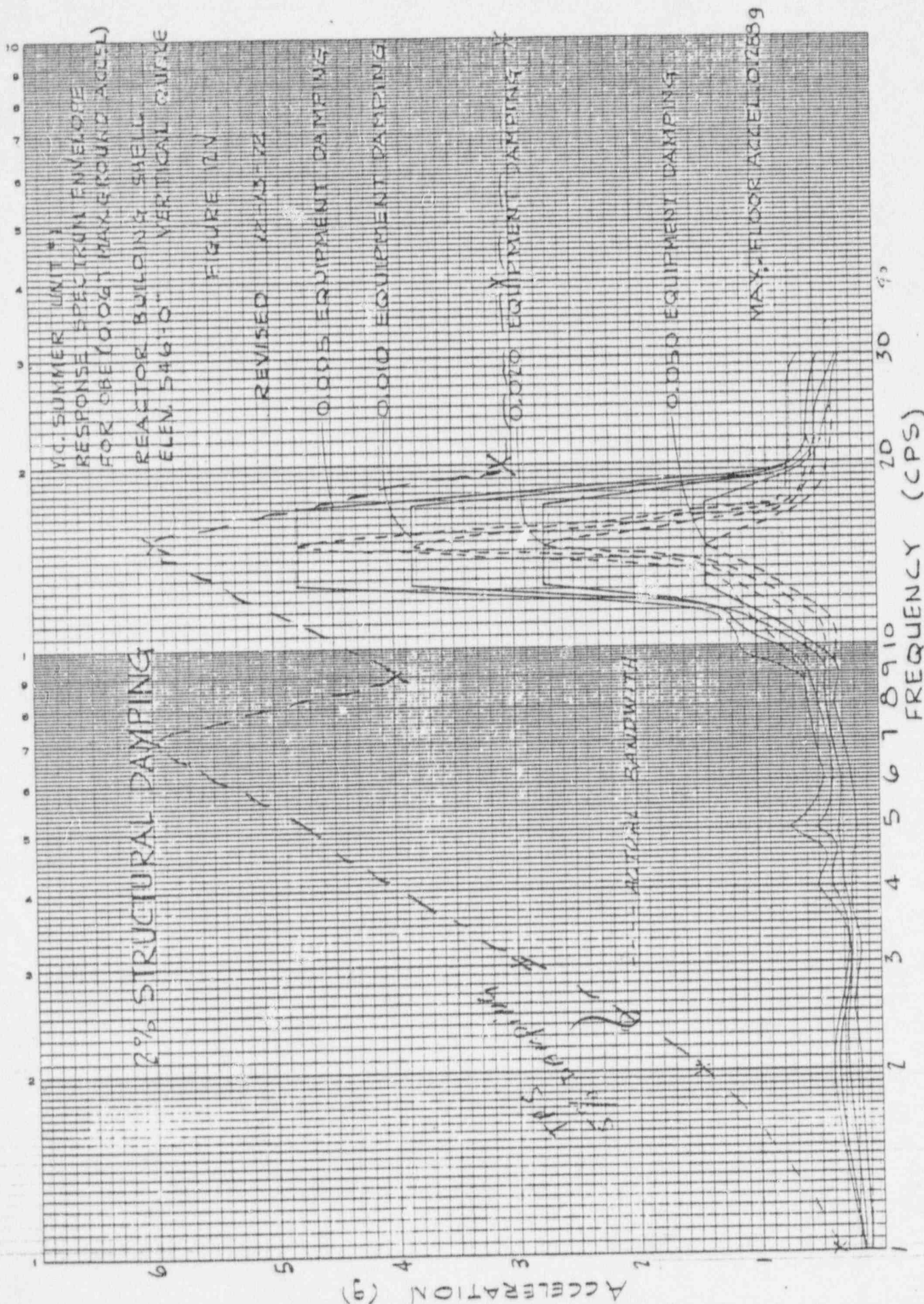
8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: The result of the test indicates
that the equipment will perform normally during and after seismic disturbance.

10. Other tests performed (such as fragility test, including results): NONE







Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type: _____
 1. Utility: SCE&G PWR X
 2. NSSS: Westinghouse 3. A/E: GAI BWR _____

II. Component Name Solenoid Valves

1. Scope: ☐ NSSS ☒ BOP
2. Model Number: Various Quantity: As Required
3. Vendor: ASCO
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description
 - a. Appearance 3-Way Solenoid Valve
 - b. Dimensions Enveloped by 6" x 8" x 7"
 - c. Weight < 11 lb.
6. Location: Building: Various
 Elevation: Various
7. Field Mounting Conditions

<input type="checkbox"/>	Bolt (No. _____, Size _____)
<input type="checkbox"/>	Weld (Length _____)
<input checked="" type="checkbox"/>	Valve/Damper or Wall Mounted
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
 *See Below.
 S/S: approximately 15 to 100 Hz F/B: Same as S/S Y: Same as S/S
9. a. Functional Description: 3-Way Pilot Valve Operated by a Solenoid Coil to Supply Air or Nitrogen to a Valve or Damper.
 b. Is the equipment required for ☒ Hot Standby ☐ Cold Shutdown
☒ Both _____
10. Pertinent Reference Design Specifications: SP-702-04461-000

*Approximately 15 Hz to 100 Hz depending on Model #, each application reviewed individually.

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Isomedix AQS-21678
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify) _____

2. Required Response Spectra (attach the graphs): N/A Fragility Test

3. Required Acceleration in Each Direction: N/A Fragility Test

S/S = N/A F/B = N/A V = N/A

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat

2. ☒ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE 1 SSE _____ Other Combined SSE and Fragility Test
(specify)

4. Frequency Range: 1 to 33 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs)

6. Input g-level Test at *5" d.a. to 1.8" d.a. N/A No
S/S = from 1Hz to 8Hz F/B = Same as S/S V = Same as S/S
7g's from 10Hz to 33Hz

7. Laboratory Mounting:

1. ☒ Bolt (No. unknown, Size unknown) ☐ Weld (Length unknown) ☐ _____

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: See item 10 below.

10. Other tests performed (such as fragility test, including results): Test results indicate that the solenoid valve can supply or remove air or nitrogen pressure when subjected to input vibration.

*d.a. (double amplitude)

Expecting CVI's resubmittal
of seis. analysis report
based on their rework

Qualification Summary of Equipment

I. Plant Name:

V. C. Summer

Type:

1. Utility: SCE&G

PWR X

2. NSSS: Westinghouse

3. A/E: GAI

BWR

II. Component Name

Filter Plenum

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: Custom Fab.

Quantity: 24

3. Vendor: CVI

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Rectangular Housing

b. Dimensions 50" x 61" x 40: to 20'-8" x 11'-0" x 9'-4".

c. Weight 1320 - 14,200 lb.

6. Location: Building: Auxiliary, control, intermediate, reactor

Elevation: 463' & 485' 482' 463' 514'

7. Field Mounting Conditions ☐ Bolt (No. ^{variable} , Size 1")
☐ Weld (Length)
☐

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

S/S:

F/B:

V:

9. a. Functional Description: Filter and in some cases heat ventilation air.

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown

☒ Both

10. Pertinent Reference Design Specifications:

SP-537-044461-000

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: _____

Analysis: X

Combination of Test and Analysis: _____

Test and/or Analysis by _____
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☐ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☐ Absolute Sum ☐ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): _____

3. Required Acceleration in Each Direction:

S/S = _____ F/B = _____ V = _____

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☐ Multi-Frequency: ☐ random
☐ sine beat

2. ☐ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other _____
(specify)

4. Frequency Range: _____

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs)
☐ No

6. Input g-level Test at S/S = _____ F/B = _____ V = _____

7. Laboratory Mounting:

1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____

8. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: _____

10. Other tests performed (such as fragility test, including results): _____

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: SCE&G Co.

PWR X

2. NSSS: Westinghouse

3. A/E: GAI

BWR

II. Component Name

Namco Limit Switches and ASCO Solenoid Valves Used on Posi-seal

Purge Isolation Valves.

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: EA 180; NP831665E

Quantity: 4 sets

3. Vendor: Namco / ASCO / Posi-Seal

4. If the component is a cabinet or panel, name and model No. of the devices included: Note: For details of tests on Namco limit switches and ASCO valves, see generic "Qualification Summary" for these comments.

5. Physical Description a. Appearance Limit Switch & Solenoid Valve

mounted on 36" Purge Isolation Valve.

b. Dimensions 70" High x 86" wide x 8" thick

c. Weight 2461 lbs.

6. Location: Building: Reactor Building (Inside and Outside)

Elevation: 485' - 0"

7. Field Mounting Conditions ☒ Bolt (No. _____, Size _____) Components
☒ Weld (Length _____) Valve to pipe
☐ _____

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

S/S: 14, 15, 17, 22, 25Hz F/B: 15, 18, 20, 25, 30Hz V: 18.5, 22, 25, 29Hz

9. a. Functional Description: Reactor Building Purge Isolation Valve

with pilot solenoid valves and control limit switches

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown

☒ Both Containment Isolation

10. Pertinent Reference Design Specifications: SP-542-044461-000

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: _____

Analysis: _____

Combination of Test and Analysis: ☒ X

-Wyle Laboratories, Report No. 54598

Test and/or Analysis by-Isomedix, Report No. AQS21678/TR.

(name of Company or Laboratory & Report No.)

-Acme-Cleveland, Qual. of NAMCO Model EA-180

dated Sept. 5, 1978.

-Gilbert Assoc. Inc. Report No. 2269

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only
4. ☐ Other (Specify) _____ 5. ☐ Combination of _____
6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify) _____
2. Required Response Spectra (attach the graphs): For Posi Seal Valve-Fig. 10x, Y & V
3. Required Acceleration in Each Direction: (SSE, ZPA)

S/S = .0444 g F/B = 0.444 g V = 0.363 g

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat
2. ☐ Single Axis ☒ Multi-Axis ☒ Resonance Search
X Resonant Dwell
3. No. of Qualification Tests: OBE _____ SSE _____ Other 22 Resonant Dwell's
(specify)
4. Frequency Range: 2 to 40 Hz
5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs)
☒ No
6. Input g-level Test at S/S = ≥ 3.0g's F/B = ≥ 3.0g's V = ≥ 3.0g's
7. Laboratory Mounting:
 1. ☒ Bolt (No. 28, ^{QTY. of} Not listed in ^{report} Size ☐ Weld (Length _____) ☐ _____
8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable
9. Test Results including modifications made: Valve and operator performed correctly.
10. Other tests performed (such as fragility test, including results): NONE

1. Description of Test including Results: Refer to generic qualification summary for tests on Namco limit switch and ASCO solenoid valve.

2. Method of Analysis: Correction of test results on Posi-Seal valve to input acceleration for Namco limit switch and ASCO solenoid valves.
[X] Static Analysis [] Equivalent Static Analysis
[] Dynamic Analysis: [] Time-History
 [] Response Spectrum

3. Model Type: [] 3D [] 2D [] 1D
 [] Finite Element [X] Beam [] Closed Form Solution

4. [] Computer Codes: _____
Frequency Range and No. of modes considered: _____
[X] Hand Calculations

5. Method of Combining Dynamic Responses: [] Absolute Sum [] SRSS
 [X] Other: Not Applicable
 (specify)

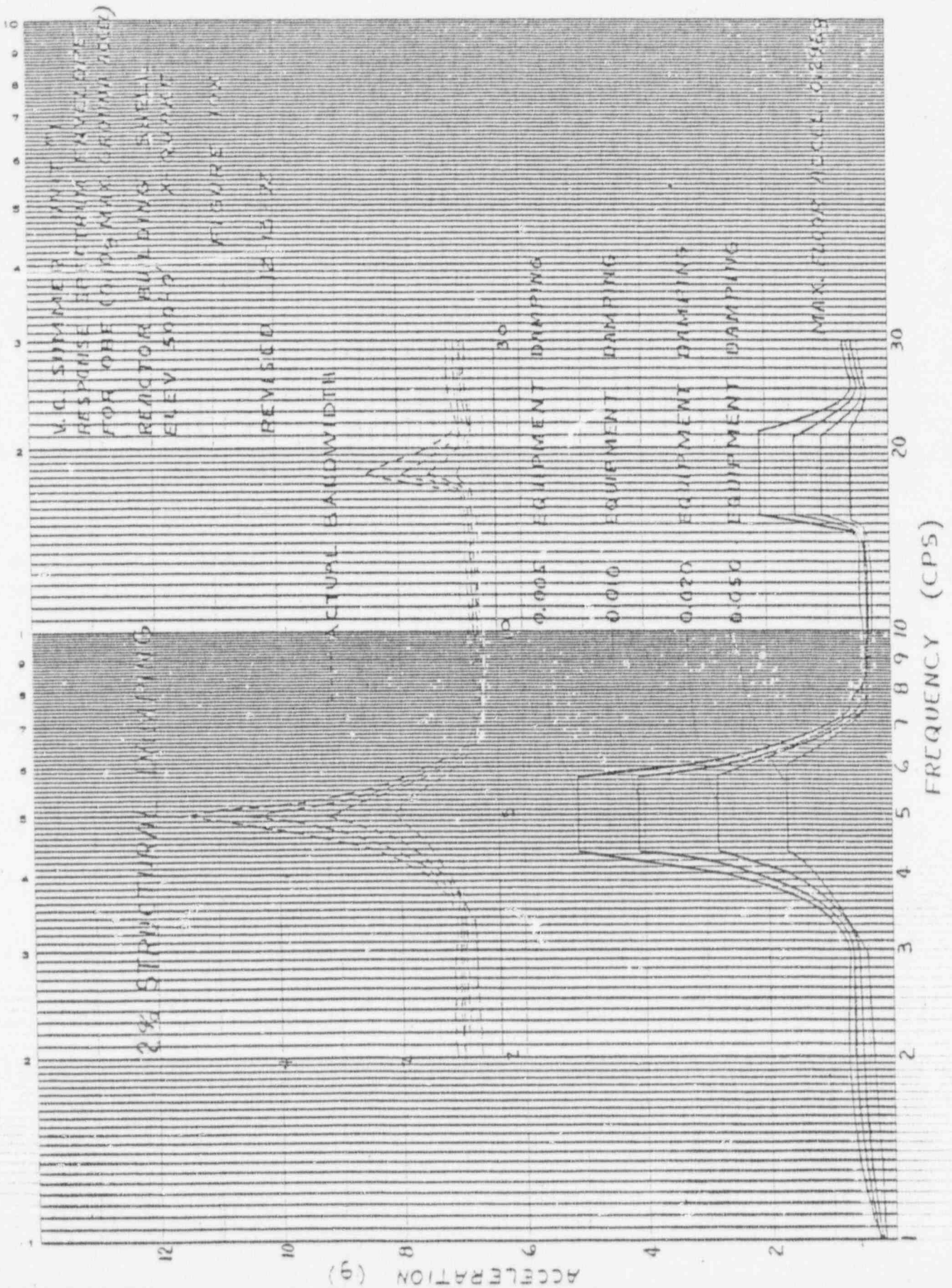
6. Damping: 5% Basis for the damping used: Half power points of resonant search indicate 10% or more damping.

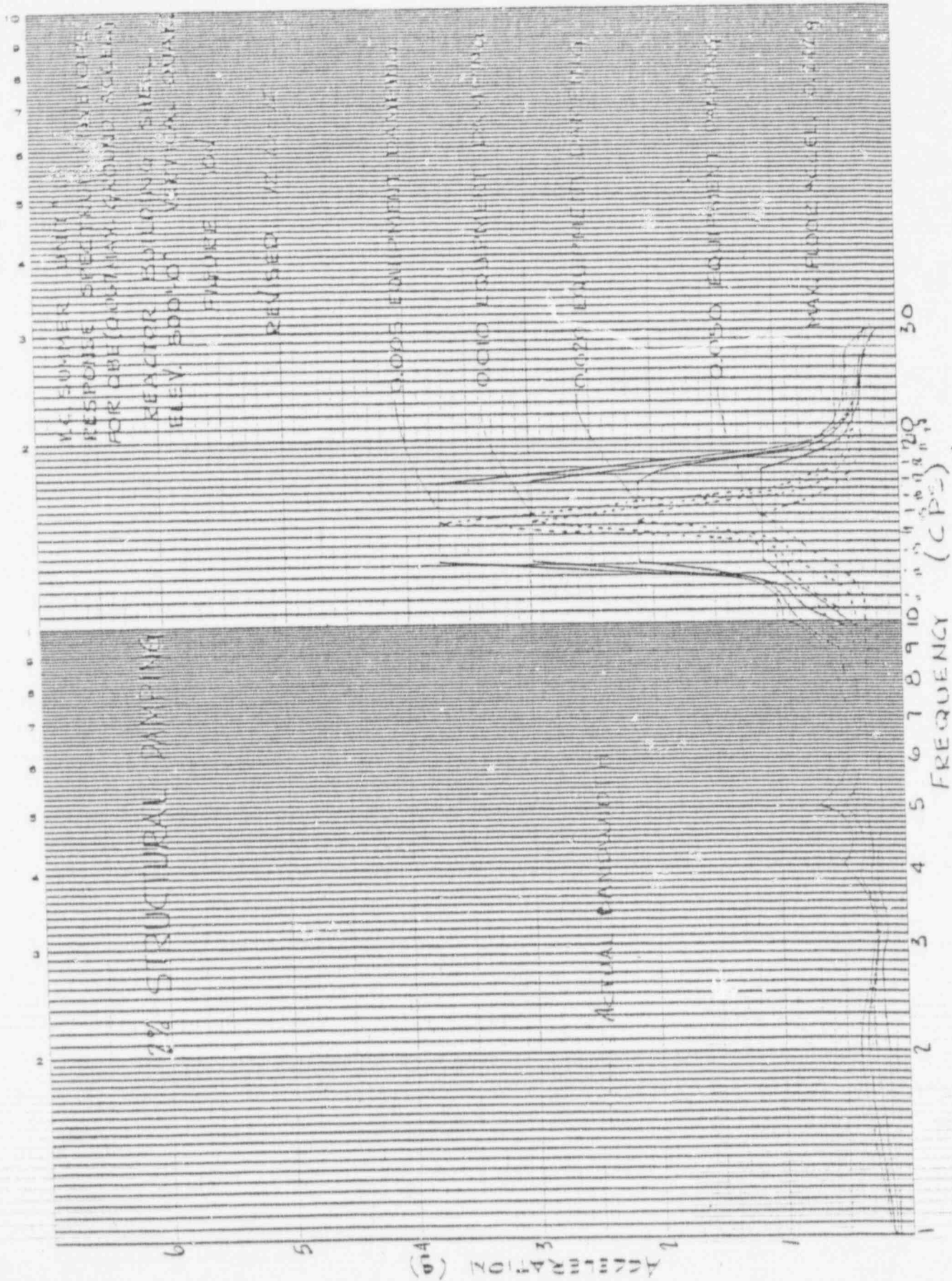
7. Support Considerations in the model: Fixed

8. Critical Structural Elements: Not Applicable

A. Identification—Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab
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Effect Upon Functional Operability





Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name Namco Limit Switches

1. Scope: ☐ NSSS ☒ BDP
2. Model Number: EA 180 Quantity: As Required
3. Vendor: Namco Controls
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description
 - a. Appearance Switch enclosure with actuating arm.
 - b. Dimensions Enveloped by 5" x 7" x 3"
 - c. Weight 4.5 lb.
6. Location: Building: Various
Elevation: Various
7. Field Mounting Conditions ☐ Bolt (No. , Size)
☐ Weld (Length)
☒ Valve/Damper by Bolting
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
S/S: > 35 Hz F/B: > 35 Hz V: > 35 Hz
9. a. Functional Description: The Limit Switch is used in the seal portion of IE solenoid valve control circuit.
b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☒ Both
10. Pertinent Reference Design Specifications: SP-702-04461-000

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: x

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Acme-Cleveland Development Company 9/7/78
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☒ Absolute Sum ☐ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): N/A - Fragility Test

3. Required Acceleration in Each Direction:

S/S $\left[\begin{array}{l} 1 \text{ to } 4 \text{ Hz } (.6 \text{ to } 9.529 \text{ g's}) \\ > 4 \text{ Hz } (9.529 \text{ g's}) \end{array} \right] \text{ F/B} = \text{Same as S/S} \quad \text{V} = \text{Same as S/S}$

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat

2. ☒ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other 54 Distinct Vib. Tests with 60 sec. each
(specify)

4. Frequency Range: 1 to 35 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs) ☒ No

6. Input g-level Test at $\left[\begin{array}{l} 1 \text{ to } 4 \text{ Hz } (.6 \text{ to } 9.529 \text{ g's}) \\ > 4 \text{ Hz } (9.529 \text{ g's}) \end{array} \right] \text{ F/B} = \text{Same as S/S} \quad \text{V} = \text{Same as S/S}$

7. Laboratory Mounting:

1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☒ Shake Table Mounted on

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: The test results show that the limit switches are qualified to withstand the test input acceleration which is below the acceleration imposed by the valves on which they are mounted.

10. Other tests performed (such as fragility test, including results): The test results indicate that the fragility level of the limit switches is above the maximum capability of the test table.

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: SCE&G

PWR X

2. NSSS: Westinghouse 3. A/E: GAI

BWR _____

II. Component Name Solenoid Valves

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: Various Quantity: As Required

3. Vendor: ASCO

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance 3-Way Solenoid Valve

b. Dimensions Enveloped by 6" x 8" x 7"

c. Weight < 11 lb.

6. Location: Building: Various

Elevation: Various

7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Valve/Damper or Wall Mounted

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

*See Below.

S/S: approximately F/B: Same as S/S Y: Same as S/S

15 to 100 Hz

9. a. Functional Description: 3-Way Pilot Valve Operated by a Solenoid Coil to Supply Air or Nitrogen to a Valve or Damper.

b. Is the equipment required for ☒ Hot Standby ☐ Cold Shutdown

☒ Both _____

10. Pertinent Reference Design Specifications: SP-702-04461-000

*Approximately 15 Hz to 100 Hz depending on Model #, each application reviewed individually.

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Isomedix AQS-21678

(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify) _____

2. Required Response Spectra (attach the graphs): N/A Fragility Test

3. Required Acceleration in Each Direction: N/A Fragility Test

S/S = N/A F/B = N/A Y = N/A

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat

2. ☒ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE 1 SSE _____ Other Combined SSE and Fragility Test
(specify) _____

4. Frequency Range: 1 to 33 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs) ☒ No

6. Input g-level Test at *6" d.a. to 1.8" d.a. S/S = from 1Hz to 8Hz F/B = Same as S/S Y = Same as S/S
7g's from 10Hz to 33Hz

7. Laboratory Mounting:

1. ☒ Bolt (No. unknown, Size unknown) ☐ Weld (Length _____) ☐ _____

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: See item 10 below.

10. Other tests performed (such as fragility test, including results): Test results indicate that the solenoid valve can supply or remove air or nitrogen pressure when subjected to input vibration.

*d.a. (double amplitude)

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: SCE&G

PWR X

2. NSSS: Westinghouse

3. A/E: GAI

BWR _____

II. Component Name

Solenoid Valves

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: Various

Quantity: As Required

3. Vendor: ASCO

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance 3-Way Solenoid Valve

b. Dimensions Enveloped by 6" x 8" x 7"

c. Weight < 11 lb.

6. Location: Building: Various

Elevation: Various

7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Valve/Damper or Wall Mounted

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

*See Below.

S/S: approximately
15 to 100 Hz

F/B: Same as S/S

V: Same as S/S

9. a. Functional Description: 3-Way Pilot Valve Operated by a Solenoid
Coil to Supply Air or Nitrogen to a Valve or Damper.

b. Is the equipment required for ☒ Hot Standby ☐ Cold Shutdown
☒ Both

10. Pertinent Reference Design Specifications: SP-702-04461-000

*Approximately 15 Hz to 100 Hz depending on Model #, each application reviewed individually.

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Isomedix AQS-21678
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify)

2. Required Response Spectra (attach the graphs): N/A Fragility Test

3. Required Acceleration in Each Direction: N/A Fragility Test

S/S = N/A F/B = N/A V = N/A

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat

2. ☒ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE 1 SSE _____ Other Combined SSE and Fragility Test
(specify)

4. Frequency Range: 1 to 33 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs)

6. Input g-level Test at *6" d.a. to 1.8" d.a. N/A No
S/S = from 1Hz to 8Hz F/B = Same as S/S V = Same as S/S
7g's from 10Hz to 33Hz

7. Laboratory Mounting:

1. ☒ Bolt (No. unknown, Size unknown) ☐ Weld (Length) ☐ _____

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: See item 10 below.

10. Other tests performed (such as fragility test, including results): Test results indicate that the solenoid valve can supply or remove air or nitrogen pressure when subjected to input vibration.

*d.a. (double amplitude)

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: SCE&G

PWR X

2. NSSS: Westinghouse

3. A/E: GAI

BWR _____

II. Component Name Namco Limit Switches

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: EA 180

Quantity: As Required

3. Vendor: Namco Controls

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Switch enclosure with actuating arm.

b. Dimensions Enveloped by 5" x 7" x 3"

c. Weight 4.5 lb.

6. Location: Building: Various

Elevation: Various

7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Valve/Damper by Bolting

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

S/S: > 35 Hz F/B: > 35 Hz V: > 35 Hz

9. a. Functional Description: The Limit Switch is used in the seal portion of IE solenoid valve control circuit.

b. Is the equipment required for ☒ Hot Standby ☐ Cold Shutdown
☒ Both

10. Pertinent Reference Design Specifications: SP-702-04461-000

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Acme-Cleveland Development Company 9/7/78
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☒ Absolute Sum ☐ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): N/A - Fragility Test

3. Required Acceleration in Each Direction:

S/S $\begin{bmatrix} 1 \text{ to } 4 \text{ Hz } (.6 \text{ to } 9.529 \text{ g's}) \\ > 4 \text{ Hz } (9.52 \text{ g's}) \end{bmatrix}$ F/B = Same as S/S Y = Same as S/S

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat ☐ _____

2. ☒ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other 54 Distinct Vib. Tests with 60 sec. each (specify)

4. Frequency Range: 1 to 35 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs) ☒ No

6. Input g-level Test at $\begin{bmatrix} 1 \text{ to } 4 \text{ Hz } (.6 \text{ to } 9.529 \text{ g's}) \\ > 4 \text{ Hz } (9.52 \text{ g's}) \end{bmatrix}$ F/B = Same as S/S Y = Same as S/S

7. Laboratory Mounting:

1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☒ Mounted on Shake Table

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: The test results show that the limit switches are qualified to withstand the test input acceleration which is below the acceleration imposed by the valves on which they are mounted.

10. Other tests performed (such as fragility test, including results): The test results indicate that the fragility level of the limit switches is above the maximum capability of the test table.

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: South Carolina Electric & Gas

PWR XX

2. NSSS: Westinghouse

3. A/E: Gilbert Associates

BWR

II. Component Name

Solenoid Valve Panel for MSIV's

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: A10VS

Quantity: 3

3. Vendor: Atwood & Morrill

4. If the component is a cabinet or panel, name and model No. of the devices included: Solenoid Valves

5. Physical Description a. Appearance Metal Enclosure

b. Dimensions 28"X 23"X 17"

c. Weight -

6. Location: Building: Intermediate

Elevation: 436'

7. Field Mounting Conditions ☒ Bolt (No. 8, Size 1/2")
☐ Weld (Length)
☐

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

Not separate measurement

S/S:

F/B:

V:

9. a. Functional Description: Holding solenoid valves in place

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown

☒ Both

10. Pertinent Reference Design Specifications:

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: XXXXX

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Atwood Morrill Co., Inc./American Environ.Co.
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only
4. ☐ Other (Specify) _____ 5. ☐ Combination of _____
6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify)
2. Required Response Spectra (attach the graphs): FIG. 62 X, Y & V (See GAI SP-702)
3. Required Acceleration in Each Direction: ZPA for OBE (ZPA for DBE:
1.55 X OBE)
S/S = .274g F/B = .461g V = .222g

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat
2. ☐ Single Axis ☒ Multi-Axis Excitation
axis of 34° from the horizontal
3. No. of Qualification Tests: OBE _____ SSE _____ Other _____
30 Sec. at each integer freq. up
(specify) to 35HZ
4. Frequency Range: 1 to 35 HZ
5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs)
N/A ☐ No
6. Input g-level Test at S/S = _____ F/B = _____ V = _____
Linearly increasing to 14.4g up to 10 HZ. and then kept at the same level thereafter.
7. Laboratory Mounting:
Normal in-service mounting
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
8. Functional operability verified: ☐ Yes ☐ No ☒ Not Applicable
9. Test Results including modifications made: Satisfactory

10. Other tests performed (such as fragility test, including results): None

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: South Carolina Electric & Gas

PWR XXX

2. NSSS: Westinghouse 3. A/E: Gilbert Assoc.

BWR

II. Component Name

Terry Turbine for EFW Pumps

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: Type GS-2N Quantity: 1

3. Vendor: Terry Steam Turbine Company

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Horizontal Turbine

b. Dimensions 63" X 90" X 45"

c. Weight 2800 lbs.

6. Location: Building: Intermediate

Elevation: 412'

7. Field Mounting Conditions ☒ Bolt (No. $\frac{4}{2}$, Size $\frac{3}{4}$)
☐ Weld (Length)
☐

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

64.7HZ (obtained from the analysis of the turbine-pump combination)

S/S: F/B: V:

9. a. Functional Description: Driving EFW Pump

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown

☒ Both

10. Pertinent Reference Design Specifications:

DSP-508B-044461-000

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: XXXX

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Terry Corp./Wyle Labs, TM-134/58038
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only
4. ☐ Other (Specify) _____ 5. ☐ Combination of _____
6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify)
2. Required Response Spectra (attach the graphs): Fig. 61 X, Y & V (See GAI SP-702)
3. Required Acceleration in Each Direction: ZPA for OBE (ZPA for DBE:
1.55 X OBE)
S/S = .18g F/B = .308g V = .209g

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☒ Multi-Frequency: ☒ random ☐ sine beat
2. ☐ Single Axis ☒ Multi-Axis BIAXIAL
3. No. of Qualification Tests: OBE 9 SSE 1 Other _____
(specify)
4. Frequency Range: 1 to 100 HZ
5. TRS enveloping RRS using Multi-Frequency Test ☒ Yes (Plot TRS on RRS graphs)
☐ No
6. Input g-level Test at (ZPA) S/S = 3g's F/B = 3g's V = 5g's
7. Laboratory Mounting: Bolted to the plate using six 1" bolts. The plate
was then welded to the test table.
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable
9. Test Results including modifications made: One minor component (trip and
throttle valve latch spring) required modification.
10. Other tests performed (such as fragility test, including results): None

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type: _____
 1. Utility: SCE&G PWR X
 2. NSSS: Westinghouse 3. A/E: GAI BWR _____

II. Component Name Namco Limit Switches

1. Scope: ☐ NSSS ☒ BOP
2. Model Number: EA 180 Quantity: As Required
3. Vendor: Namco Controls
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description
 - a. Appearance Switch enclosure with actuating arm.
 - b. Dimensions Enveloped by 5" x 7" x 3"
 - c. Weight 4.5 lb.
6. Location: Building: Various
 Elevation: Various
7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Valve/Damper by Bolting
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
 S/S: > 35 Hz F/B: > 35 Hz V: > 35 Hz
9. a. Functional Description: The Limit Switch is used in the seal portion of IE solenoid valve control circuit.
 b. Is the equipment required for ☒ Hot Standby ☐ Cold Shutdown
☒ Both _____
10. Pertinent Reference Design Specifications: SP-702-04461-000

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: x

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Acme-Cleveland Development Company 9/7/78
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☒ Absolute Sum ☐ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): N/A - Fragility Test

3. Required Acceleration in Each Direction:

$S/S \left[\begin{array}{l} 1 \text{ to } 4 \text{ Hz } (.6 \text{ to } 9.529 \text{ g's}) \\ > 4 \text{ Hz } (9.529 \text{ g's}) \end{array} \right] F/B = \text{Same as S/S} \quad Y = \text{Same as S/S}$

VI. If Qualification by Test, then Complete:

1. ☒ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat ☐ _____

2. ☒ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other 54 Distinct Vib. Tests with 60 sec. each (specify)

4. Frequency Range: 1 to 35 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs) ☒ No

6. Input g-level Test at $\left[\begin{array}{l} 1 \text{ to } 4 \text{ Hz } (.6 \text{ to } 9.529 \text{ g's}) \\ > 4 \text{ Hz } (9.529 \text{ g's}) \end{array} \right] F/B = \text{Same as S/S} \quad Y = \text{Same as S/S}$

7. Laboratory Mounting:

1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☒ Mounted on Shake Table

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: The test results show that the limit switches are qualified to withstand the test input acceleration which is below the acceleration imposed by the valves on which they are mounted.

10. Other tests performed (such as fragility test, including results): The test results indicate that the fragility level of the limit switches is above the maximum capability of the test table.

Qualification Summary of EquipmentI. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: SCE&GPWR X2. NSSS: Westinghouse3. A/E: GAI

BWR _____

II. Component Name Actuators for 1" Ball Valves1. Scope: ☐ NSSS ☒ BOP2. Model Number: NCB-315-SR60-16-12 Quantity: 43. Vendor: Bettis

4. If the component is a cabinet or panel, name and model No. of the devices included: _____

5. Physical Description a. Appearance _____

b. Dimensions 4" x 12"c. Weight 63 lb.6. Location: Building: Reactor/Penetration Access AreaElevation: 463'/463'7. Field Mounting Conditions ☒ Bolt (No. 9, Size 3/8")
☐ Weld (Length _____)
☐ _____

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

S/S: 73 Hz F/B: 38 Hz V: 91 Hz9. a. Functional Description: Containment Isolation Valves for Reactor Building Particulate Radiation Monitorsb. Is the equipment required for ☒ Hot Standby ☐ Cold Shutdown☒ Containment Isolation10. Pertinent Reference Design Specifications: DSP-589-044461-000

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: _____

Analysis: X

Combination of Test and Analysis: _____

Test and/or Analysis by Energy Products Group ER-105-79
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☐ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only
4. ☐ Other (Specify) _____ 5. ☒ Combination of Load
6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify)
2. Required Response Spectra (attach the graphs): N/A
3. Required Acceleration in Each Direction:
S/S = 3g's F/B = 3g's Y = 3g's

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat ☐ _____
2. ☐ Single Axis ☐ Multi-Axis
3. No. of Qualification Tests: OBE _____ SSE _____ Other _____
(specify)
4. Frequency Range: _____
5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs) ☐ No
6. Input g-level Test at S/S = _____ F/B = _____ Y = _____
7. Laboratory Mounting:
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
8. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable
9. Test Results including modifications made: _____

10. Other tests performed (such as fragility test, including results): _____

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

1. Description of Test including Results: Natural Frequency 38 Hz
2. Method of Analysis:
☒ Static Analysis ☐ Equivalent Static Analysis
☐ Dynamic Analysis: ☐ Time-History
☐ Response Spectrum
3. Model Type: ☐ 3D ☐ 2D ☐ 1D
☐ Finite Element ☒ Beam ☐ Closed Form Solution
4. ☐ Computer Codes: _____
 Frequency Range and No. of modes considered: _____
☒ Hand Calculations 5g input was used in analysis
5. Method of Combining Dynamic Responses: ☐ Absolute Sum ☐ SRSS
☒ Other: Static Analysis
 Static Analysis, Independent (specify)
6. Damping: of Damping Basis for the damping used: _____
7. Support Considerations in the model: Fixed
8. Critical Structural Elements:

A. Identification—Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab
Cylinder Connection	Center Bar Seismic and Operating Load	2.7ksi	63.9ksi	67ksi
Yoke Key	Seismic and Operating Load	2.3ksi	17.9ksi	47ksi

B. <u>Max. Deflection</u>	<u>Location</u>	<u>Effect Upon Functional Operability</u>
Not Available		

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: South Carolina Electric & Gas

PWR XXX

2. NSSS: Westinghouse

3. A/E: Gilbert Associates

BWR

II. Component Name Sodium Hydroxide Tank

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: XTK - 60 - SP Quantity: 1

3. Vendor: APCO

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Vertical tank - 3,300 gal.

b. Dimensions height 490"/outside dia. 45.5"

c. Weight 7,400 lbs. empty/34,889 lbs. full

6. Location: Building: AB

Elevation: 412'

7. Field Mounting Conditions ☒ Bolt (No. 3, Size 1")

☐ Weld (Length)

☒ Two lateral supports @ El. 435' & 448.5'

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

31.7HZ, 32.2HZ, 54.4HZ, 56.7HZ, 72.7HZ

S/S:

F/B:

V:

9. a. Functional Description: Supply NaOH for spray in containment

during LOCA and MSLB

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown

☒ Both

10. Pertinent Reference Design Specifications: DSP - 597-044461-000

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: _____

Analysis: XXX

Combination of Test and Analysis: _____

Test and/or Analysis by Applied Engineering Co./TR-2723-01-3
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☐ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only
4. ☐ Other (Specify) _____ 5. ☒ Combination of Seismic & Hydrodynamic
6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify)
2. Required Response Spectra (attach the graphs): FIG. 54, 55, and 56 See GAI SP-702
3. Required Acceleration in Each Direction: Worst ZPA @ 448'-6"
Corresponding to ZPA @ 463'
S/S = .501g F/B = .444g Y = .116g

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat
2. ☐ Single Axis ☐ Multi-Axis
3. No. of Qualification Tests: OBE _____ SSE _____ Other _____
(specify)
4. Frequency Range: _____
5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs)
☐ No
6. Input g-level Test at S/S = _____ F/B = _____ Y = _____
7. Laboratory Mounting:
 1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
8. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable
9. Test Results including modifications made: _____
10. Other tests performed (such as fragility test, including results): _____

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

1. Description of Test including Results: Static equivalent (rigid tank due to lateral supports) finite element analysis was successfully employed.
2. Method of Analysis:
 - ☐ Static Analysis ☐ Equivalent Static Analysis
 - ☒ Dynamic Analysis: ☐ Time-History
☒ Response Spectrum
3. Model Type: ☒ 3D ☐ 2D ☐ 1D
☒ Finite Element ☐ Beam ☐ Closed Form Solution
4. ☒ Computer Codes: EASE2 (SAP IV Version)
 Frequency Range and No. of modes considered: Above 31.7 HZ, Static Equivalent method (no model analysis) due to rigidity
☐ Hand Calculations
5. Method of Combining Dynamic Responses: ☐ Absolute Sum ☒ SRSS
☐ Other: _____ (specify)
6. Damping: N/A Basis for the damping used: _____
7. Support Considerations in the model: FIXED (6 D.O.F)
8. Critical Structural Elements:

A. Identification—Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab
Lowest Tank Shell	Seis. & Hydrodynamic		3,758 psi	17,500 (tensile) 14,950 (Comp.)
Stiffener Rings around restraints	" " " " "		22,183 39,135	23,760 (OBE) 44,669 (SSE)
Restraints	" " " " "		1,380	23,760
Shell near to Restraint	" " " " "		4,892	14,950 (Buckling)

B. MAX. DEFLECTION	LOCATION	EFFECT UPON FUNCTIONAL OPERABILITY
Insignificant		N/A

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: South Carolina Electric & Gas

PWR XXX

2. NSSS: Westinghouse

3. A/E: Gilbert Associates

BWR

II. Component Name F. O. Storage Tanks

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: XTK - 53A & B - DG

Quantity: 2

3. Vendor: APCO

4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance Horizontal - 52,000 gal.

b. Dimensions length 744" / outside dia. 144"

c. Weight 31,400 lbs. empty/413,000 lbs. full

6. Location: Building: Yard

Elevation: Underground

7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Buried

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

S/S: N/A

F/B: N/A

V: N/A

9. a. Functional Description: Storage of Diesel Fuel for Emergency Diesels.

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown

☒ Both

10. Pertinent Reference Design Specifications: DSP - 597-044461-000

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☐ Yes ☒ No

IV. Equipment Qualification Method: Test: _____

Analysis: XXX

Combination of Test and Analysis: _____

Test and/or Analysis by Gilbert Associates by Analysis
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): Not required

3. Required Acceleration in Each Direction:

S/S = 0.25g F/B = 0.25g V = 0.17g

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☐ Multi-Frequency: ☐ random ☐ sine beat

2. ☐ Single Axis ☐ Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other _____
(specify)

4. Frequency Range: _____

5. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Plot TRS on RRS graphs)

6. Input g-level Test at S/S = _____ F/B = _____ V = _____
☐ No

7. Laboratory Mounting:

1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____

8. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: _____

10. Other tests performed (such as fragility test, including results): _____

- 12 -

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

1. Description of Test including Results: N/A
2. Method of Analysis:
 - ☐ Static Analysis ☐ Equivalent Static Analysis
 - ☒ Dynamic Analysis: ☐ Time-History
☐ Response Spectrum
3. Model Type: ☐ 3D ☐ 2D ☐ 1D
☐ Finite Element ☒ Beam ☐ Closed Form Solution
4. ☐ Computer Codes: _____
 Frequency Range and No. of modes considered: _____
☒ Hand Calculations By Newmarks formula
5. Method of Combining Dynamic Responses: ☐ Absolute Sum ☒ SRSS
☐ Other: _____
 Use of Newmark's method does not require any (specify)
6. Damping: damping Basis for the damping used: _____
7. Support Considerations in the model: embedded in soil
8. Critical Structural Elements:

A. Identification—Location	Governing Load or Response Combination	Seismic Stress (KSI)	Total Stress (KSI)	Stress Allowable (KSI)
Combined Longitudinal and circumferential stresses		12.5	12.66 ⁽¹⁾	17.5 ⁽²⁾

- (1) Total stress given here is due to the seismic and the static overburden load only.
 (2) Code allowable stress is 17.5 KSI as per D. Klinsiek's telephone memorandum, dated 10/16/79.

B. Max. Deflection	Location	Effect Upon Functional Operability
Relative displacement during a SSE Seismic event.	0.1 inch between two tanks; 0.05 inch between the soil and the tank.	No Effect

Qualification Summary of Equipment

I. Plant Name:

V. C. Summer Nuclear Station

Type:

1. Utility: SCE&G

PWR X

2. NSSS: W

3. A/E: Gilbert Associates Inc. BWR

II. Component Name

Local Control Panel

1. Scope: ☐ NSSS ☒ BOP

2. Model Number: None Quantity: 37

3. Vendor: Field Fabricated

4. If the component is a cabinet or panel, name and model No. of the devices included: See attached list

5. Physical Description a. Appearance Generally as Wall Mounted Panels

b. Dimensions 2'x2'x1' Typical

c. Weight Approximately 150 lbs., Typical

6. Location: Building: Various

Elevation: Various

7. Field Mounting Conditions ☒ Bolt (No. Varies, Size 1/2")
☒ Weld (Length Varies)
☐

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)

S/S: > 33 Hz F/B: > 33 Hz V: > 33 Hz

9. a. Functional Description: Local control stations, isolation fuse panels, relay panels, and filter capacitor bank

b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☒ Both

10. Pertinent Reference Design Specifications: None

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: Tests of most components

Analysis: Analysis of structure and extrapolation for certain components.

Combination of Test and Analysis: _____

Test and/or Analysis by Tests vary; Analysis by Gilbert Assoc.

(name of Company or Laboratory & Report No.)

See GAI Report No. 2138

V. Vibration Input:

1. Loads considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only
4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☐ Absolute Sum ☒ SRSS ☐ _____
(other, specify)

2. Required Response Spectra (attach the graphs): Varies with equipment

3. Required Acceleration in Each Direction:

Intermediate Bldg. El. 485'-0" is a worst case sample: Fig 65X,Y & V.
(SSE, ZPA worst case)

S/S = 0.840g F/B = 0.840g V = 0.375g

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency

☒ Multi-Frequency:

☒ random
☐ sine beat
☐ _____

2. ☐ Single Axis

☒ Multi-Axis

3. No. of Qualification Tests: OBE \geq 5 SSE \geq 1 Other _____

(specify)

4. Frequency Range: 1 to \geq 33 Hz

5. TRS enveloping RRS using Multi-Frequency Test ☒ Yes (Plot TRS on RRS graphs)

☐ No

6. Input g-level Test at

S/S = Varies

F/B = Varies

V = Varies

7. Laboratory Mounting: Manufactures standard hardware

1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: Components functional properly

during tests, no modifications required

10. Other tests performed (such as fragility test, including results): None

1. Description of Test including Results: For component testing see Section VI
and attached response spectra

[] Dynamic Analysis: [] Time-History
[] Response Spectrum

4. [X] Computer Codes: Strudl Dynal, -for frame
Stardyne - for composite panel and frame
Frequency Range and No. of modes considered: > 36Hz

5. Method of Combining Dynamic Responses: ☐ Absolute Sum ☒ SRSS
☐ Other: _____
(specify)

7. Support Considerations in the model:

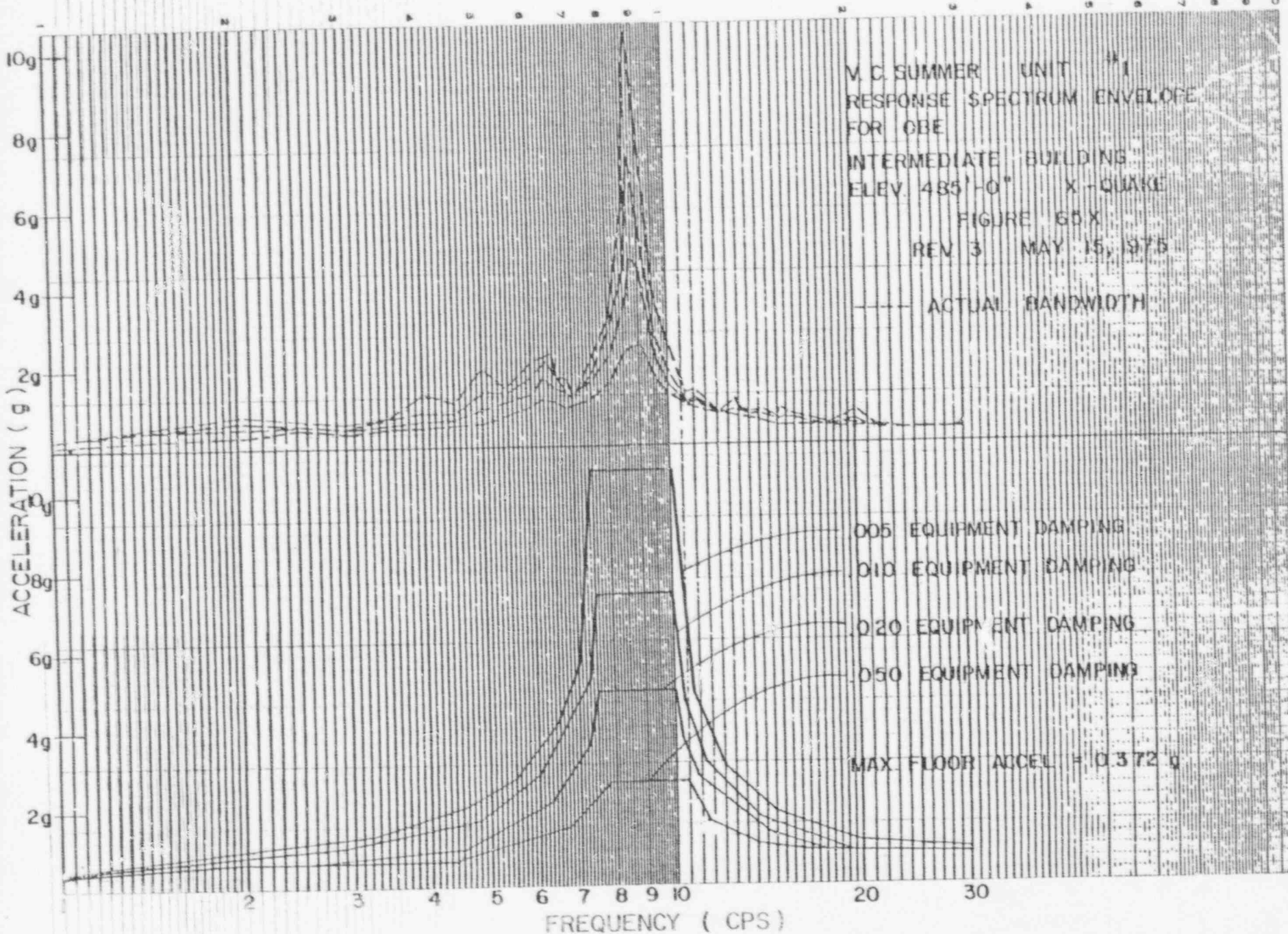
	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab
A. Identification—Location				

Effect Upon Functional Operability

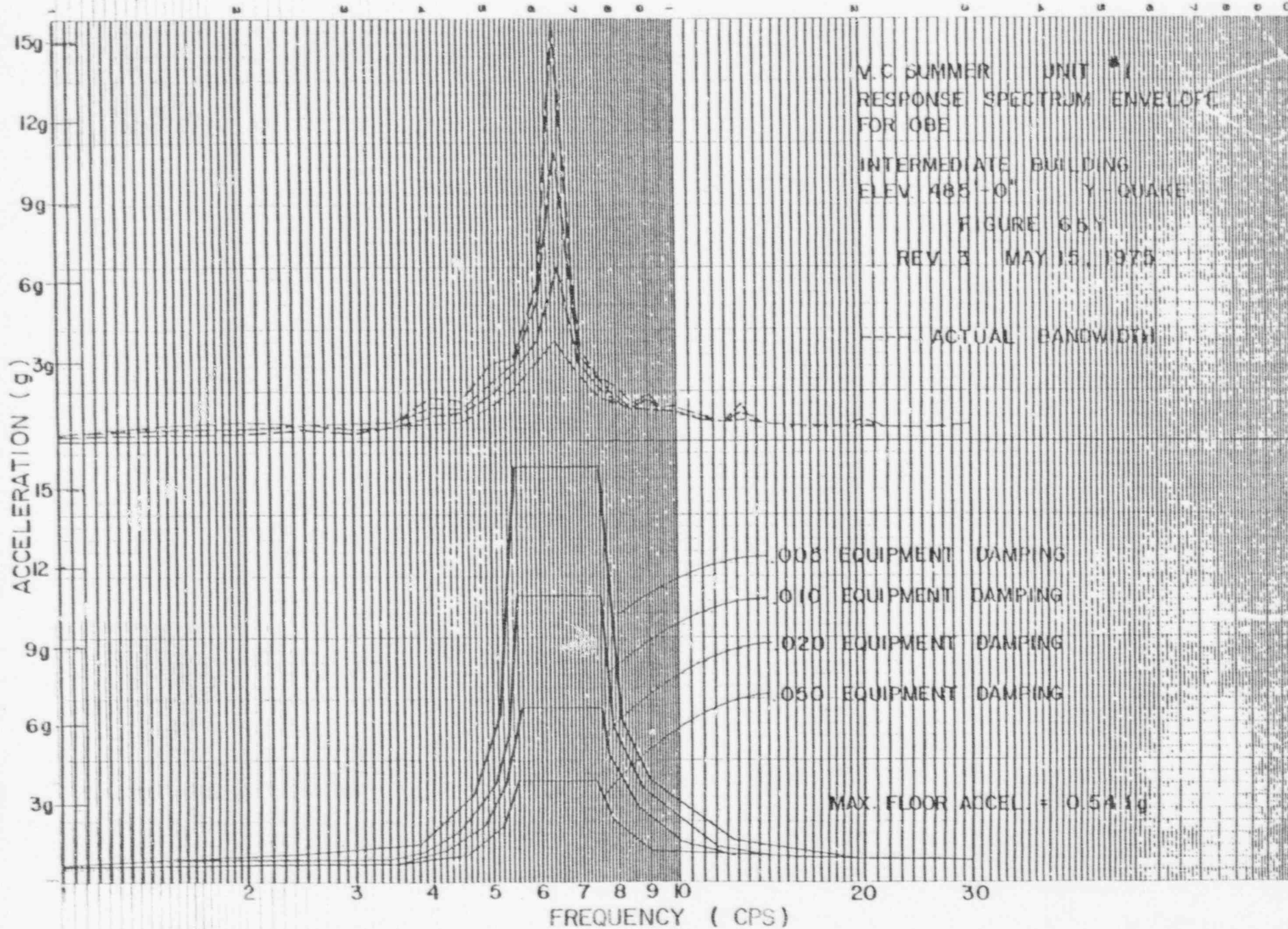
II.4 Name and Model No. of the devices included:

Westinghouse OT1V9C switch
Westinghouse OT1Z9C switch
Westinghouse OT1S1 switch
Westinghouse OT1V1C switch
Cutler-Hammer D26MRD30A1 relay
Cutler-Hammer D2640A relay
Cutler-Hammer D26MRD70A1 relay
Cutler-Hammer D26MR80A relay
Cutler-Hammer D26MR40A relay
Cutler-Hammer D26MRD20A1 relay
Cutler-Hammer D26MRD40A1 relay
General Electric ET16 indicating lights
General Electric GE8421-3 fuse blocks
Micro Switch CMC-910-AEA-53-1 switch
Micro Switch CMC-910-AEB-53-1 switch
Square D Magnetic Contactor, B/M EG4i.
Square D Magnetic Starter, B/M EG4j.
Square D Transformer, B/M EG4b.
Square D Fuse Block, B/M EG4d.
States Terminal Block - Cat. No. ZWM25112
States Terminal Block - Cat. No. M25006
States Terminal Block - Cat. No. M25012
States Terminal Block - Cat. No. ZWM25106
Marathon Fuse Block - F30A2S
Marathon Fuse Block - F60A2S
Marathon Fuse Block - F200A1B
Marathon Fuse Block - R1DOA2B
Agastat Relay E7012 series
Agastat Relay E7022 series
Agastat Relay E7024 series
General Electric Relay NGV17A2
Gould-Chase - Shawmut fuses - form 600
Gould-Chase - Shawmut fuses - form 101
Gould-Brown-Boveri relay - Cat. No. 211B4175

101 XT



102 21



101 Y7

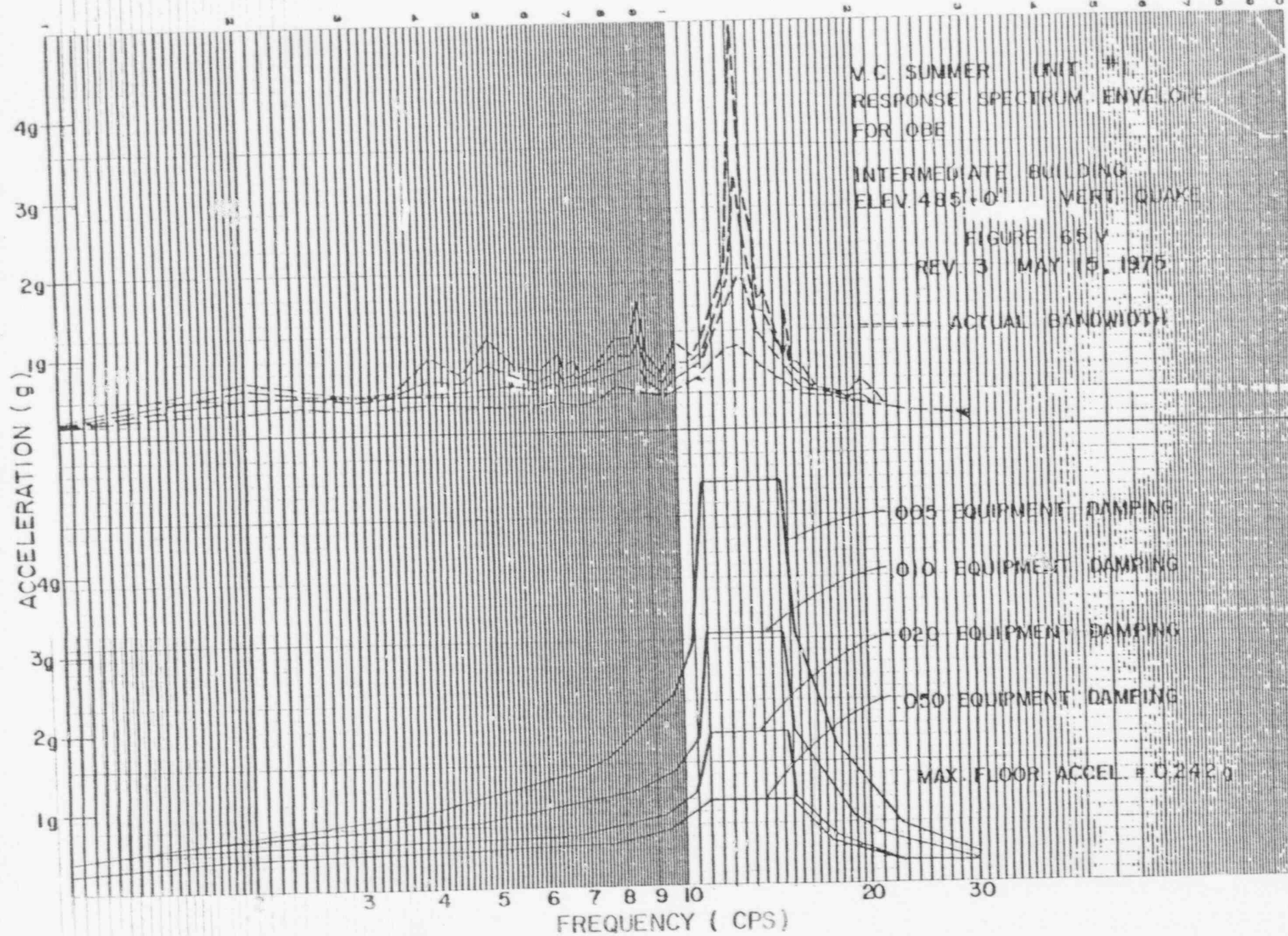
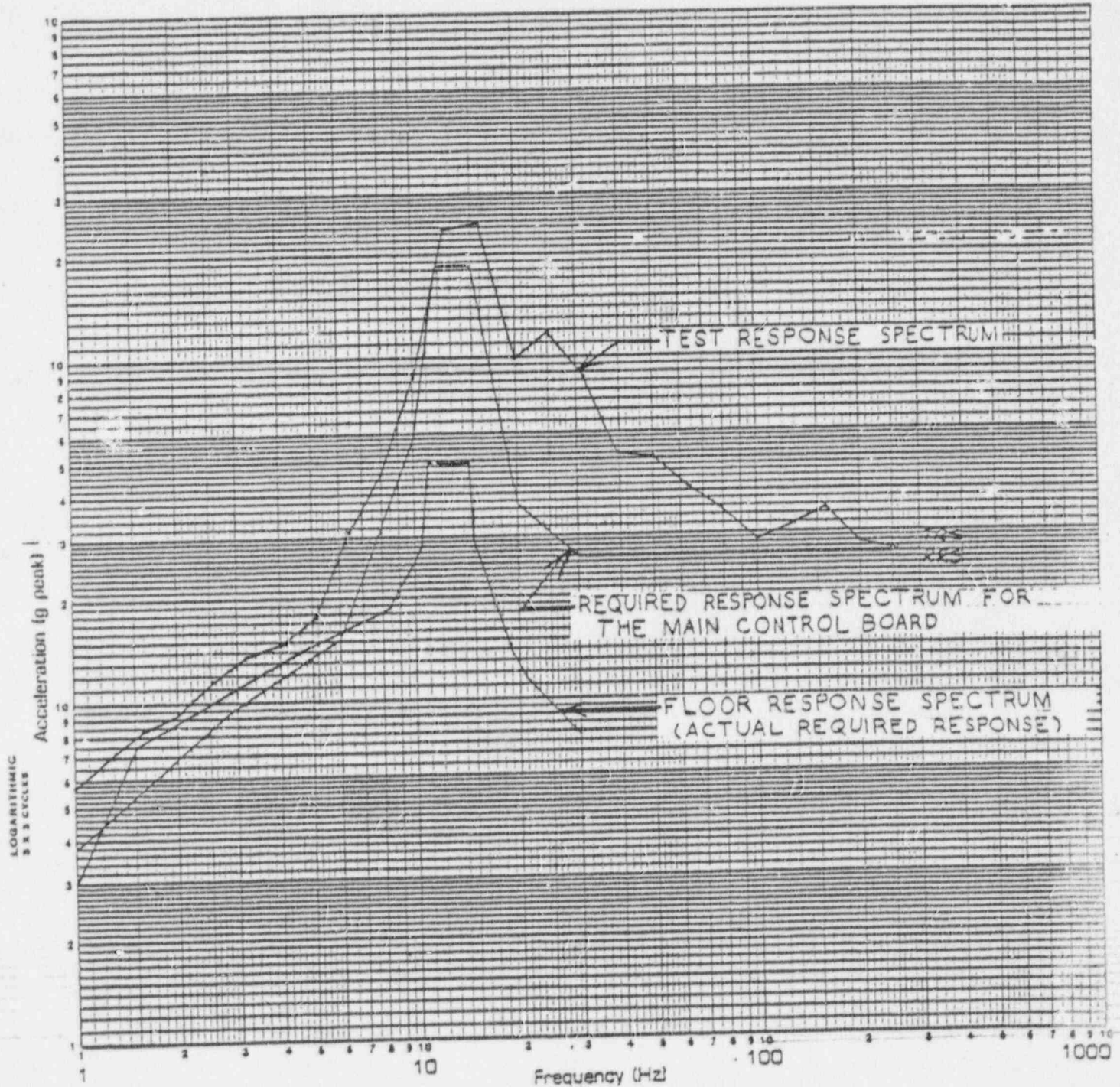


FIGURE IV
FULL SCALE SHOCK SPECTRUM (g Peak)

Page XII-20
Report 43703-4

1.0 □ 10 □ 100 □ 1000 □

DAMPING 1%



SPECIMEN _____

LOCATION NO. VCA

AXIS VERT

TEST RUN NO. 9

COMPARISON OF THE VERTICAL SSE RRS (IB, 485 FT.) TO THE
VERTICAL SSE OF THE MCB TEST SPECIMEN

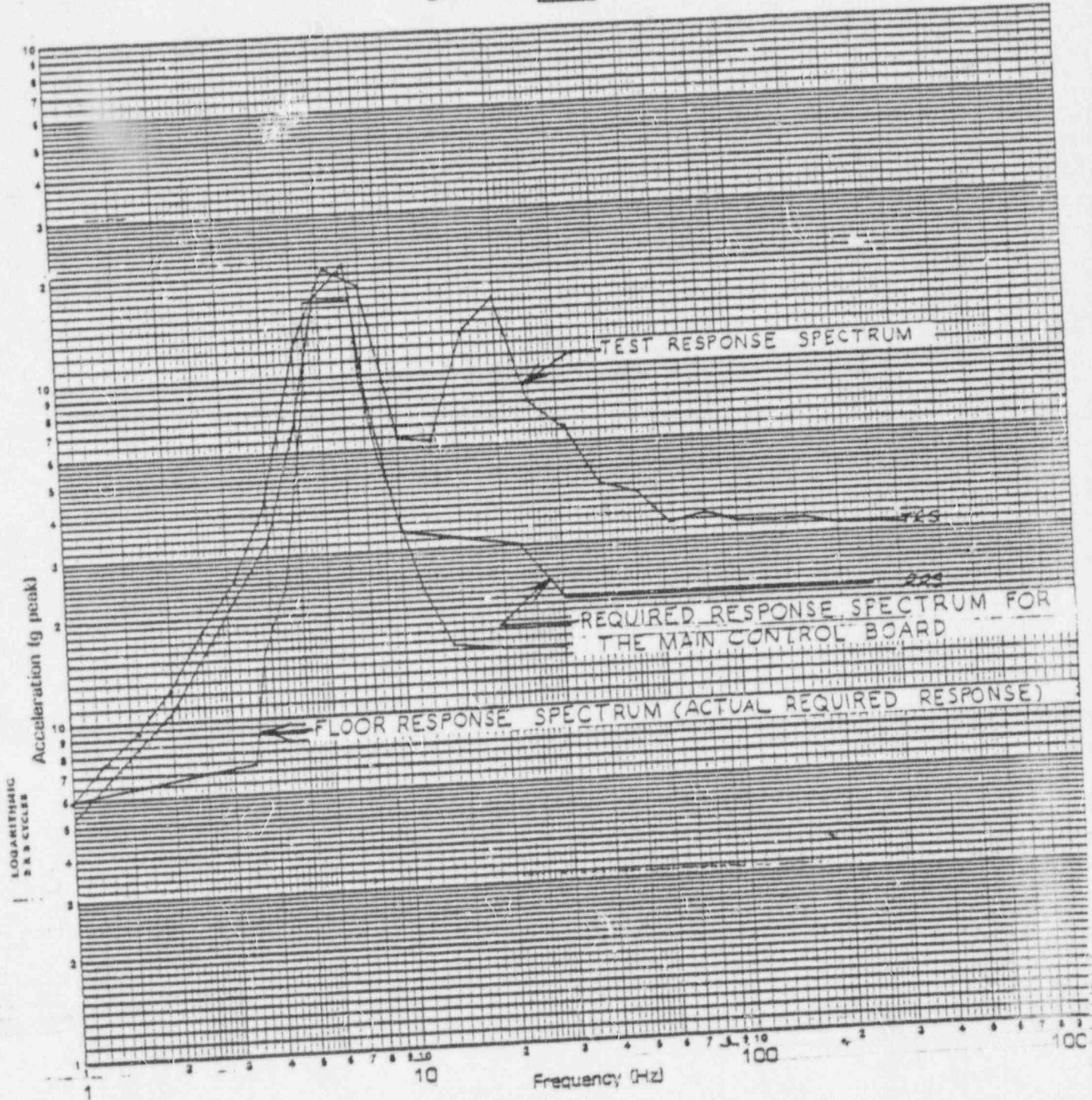
VCA: VERTICAL CONTROL ACCELEROMETER

FIGURE 1H
FULL SCALE SHOCK SPECTRUM (g Peak)

Page XII-19
Report 43703-1

1.0 ☐ 10 ☐ 100 ☒ 10000 ☐

DAMPING ☐ 1 % ☐



SPECIMEN _____

LOCATION NO. 4CA

AXIS F-B VERT

TEST RUN NO. 9

COMPARISON OF THE HORIZONTAL SEE RKS (IB, 485 FT.) TO THE
HORIZONTAL FRONT-TO-BACK TRS OF THE MCB TEST SPECIMEN

FIGURE 2H
 Spectrum Reference Source;
 Test Program No. 43827-1
 Run Nos. 10, 11 and 12
 HCA, 5%, (SSE)

SEISMIC CERTIFICATION REPORT
 Gould S.O. No. 33-51452
 Page 31 of 34

Figure 1

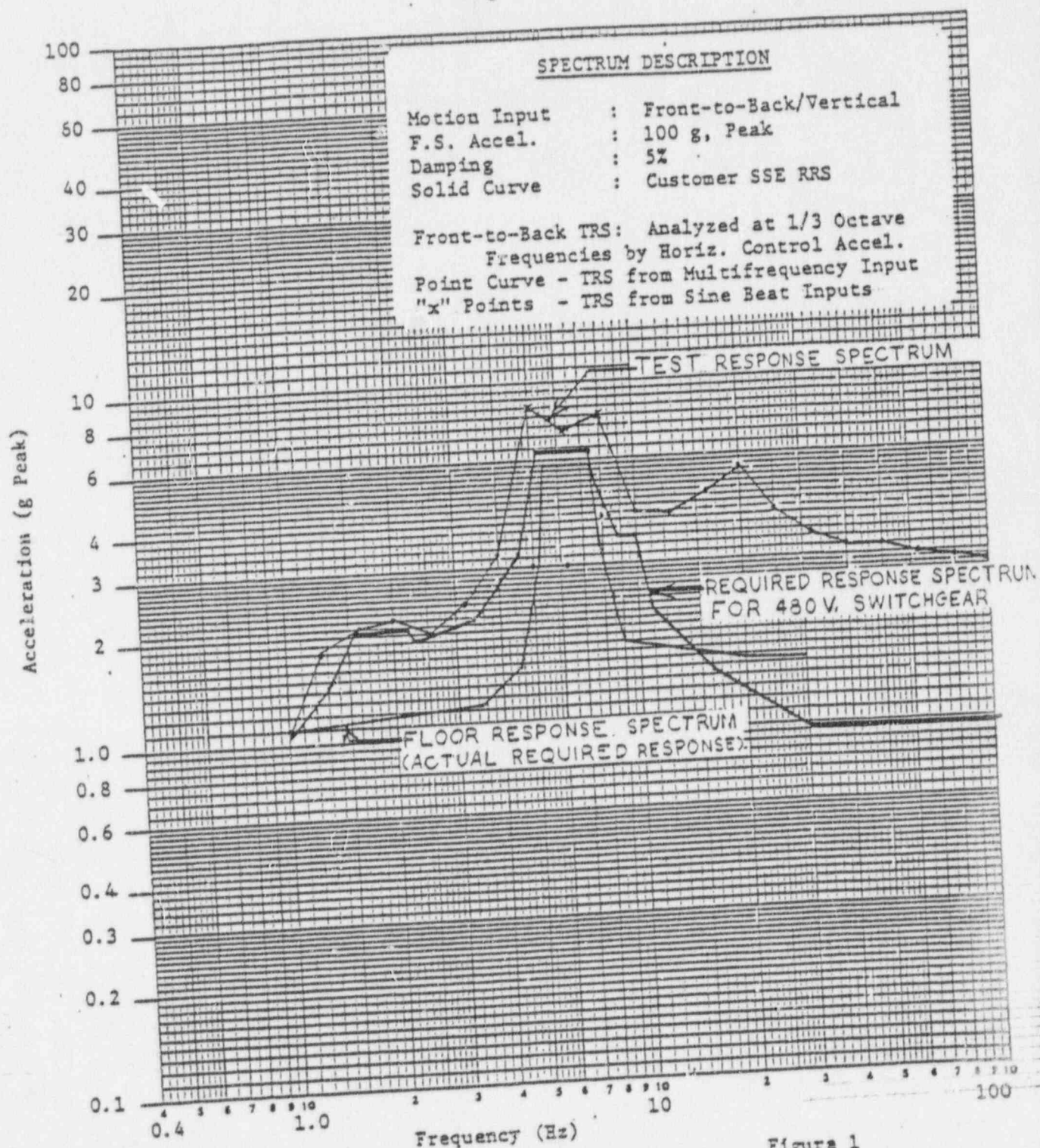


Figure 1

COMPARISON OF THE CUSTOMER'S HORIZONTAL SSE RRS TO THE HORIZONTAL FRONT-TO-BACK TRS OF THE K-LINE SWITCHGEAR TEST SPECIMEN

COMPARISON OF THE HORIZONTAL SSE RRS (IB, 485 FT.) TO THE HORIZONTAL FRONT-TO-BACK TRS OF THE 480V. SWITCHGEAR TEST SPECIMEN

FIGURE 2V

Spectrum Reference Source:-
 Test Program No. 43827-1
 Run No. 23, VCA, 5% (SSE)

SEISMIC CERTIFICATION REPORT
 Gould S.O. No. 33-51452
 Page 33 of 34

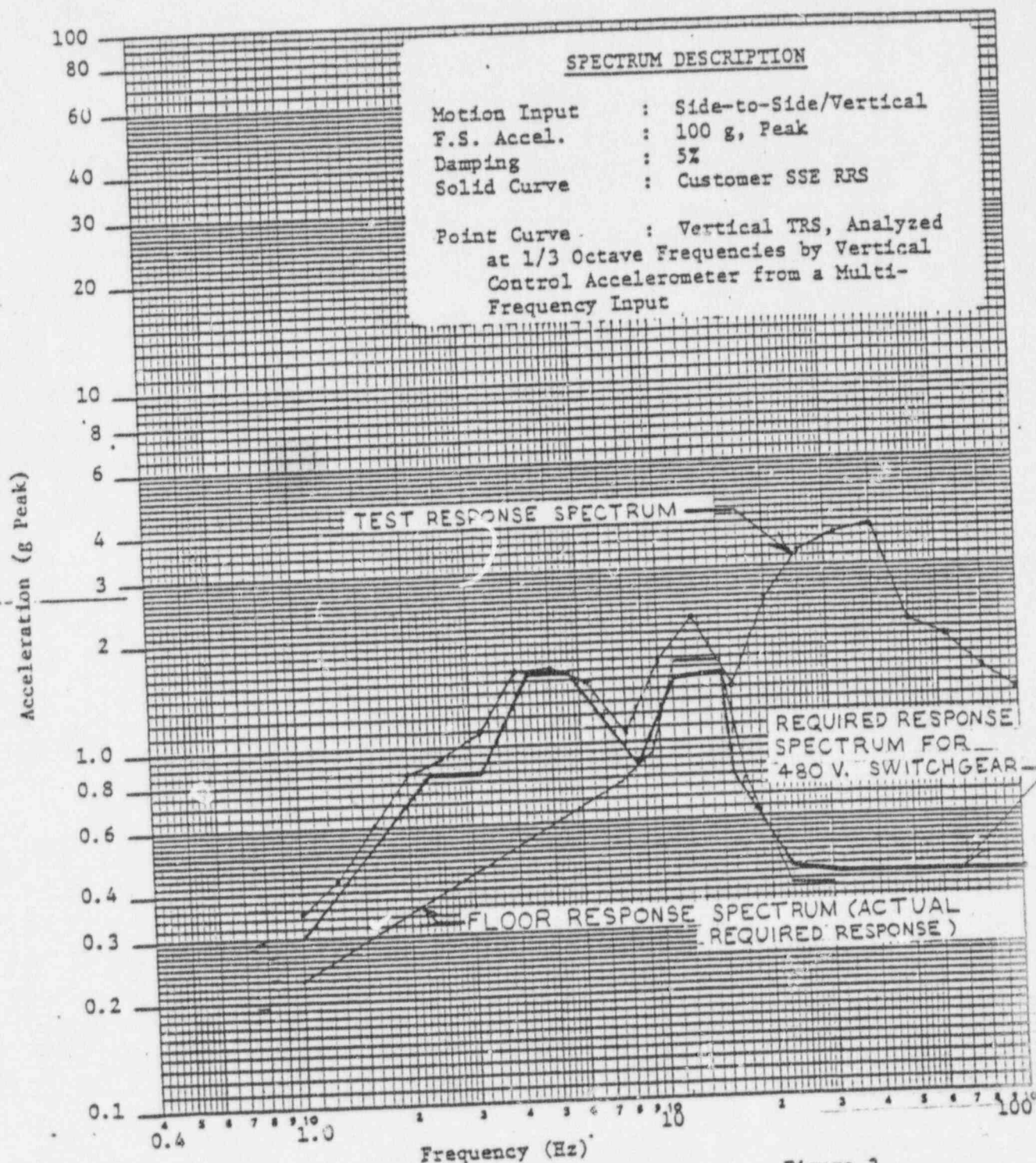
~~Figure 3~~

Figure 3

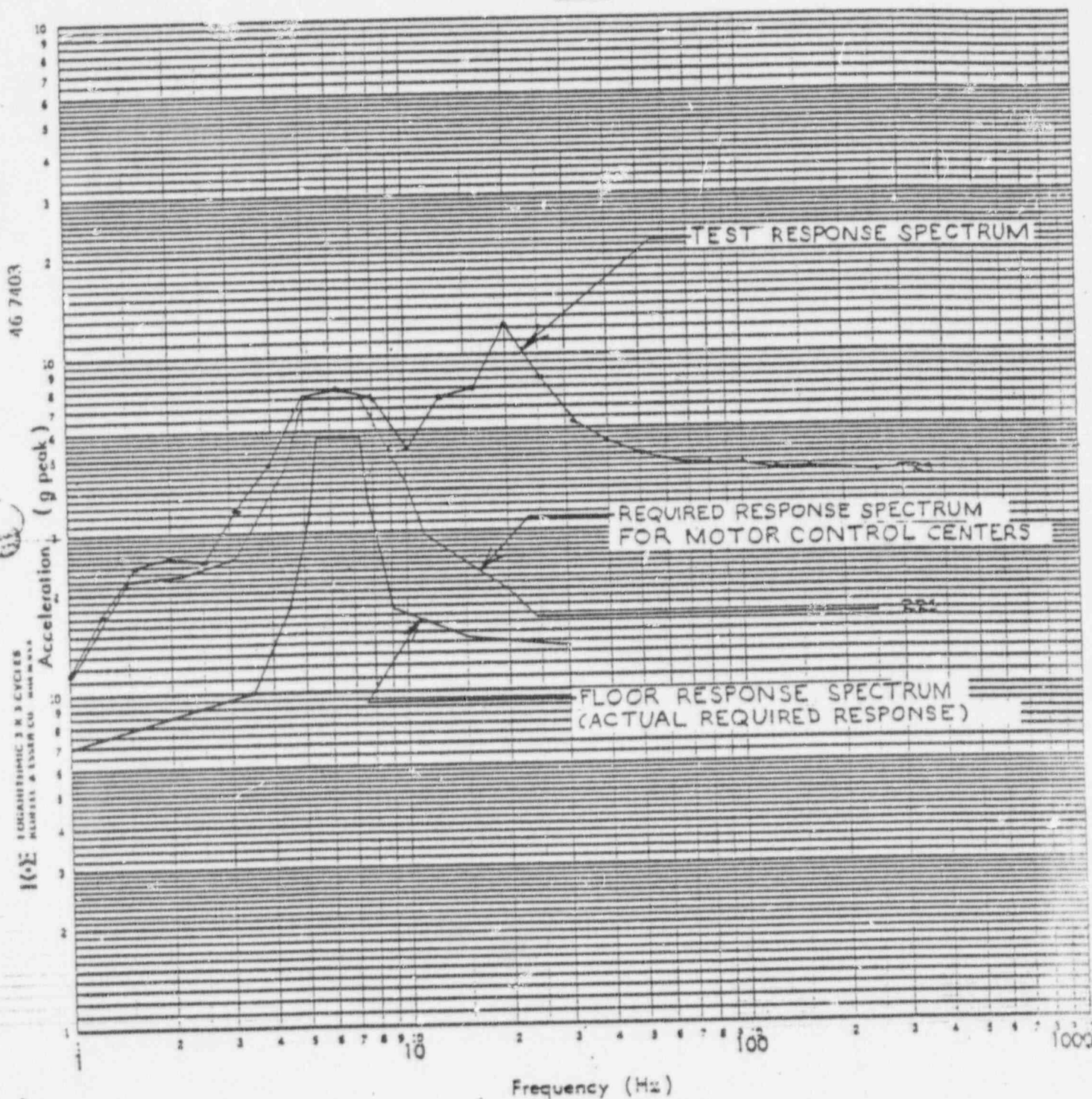
COMPARISON OF THE CUSTOMER'S VERTICAL SSE RRS TO THE
 VERTICAL TRS OF THE K-LINE SWITCHGEAR TEST SPECIMEN

COMPARISON OF THE VERTICAL SSE RRS (IB, 485 FT.) TO THE VERTICAL
 TRS OF THE 480V. SWITCHGEAR TEST SPECIMEN

FIGURE 3H
FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING ☐ 5% ☒



AXIS F-B/V-

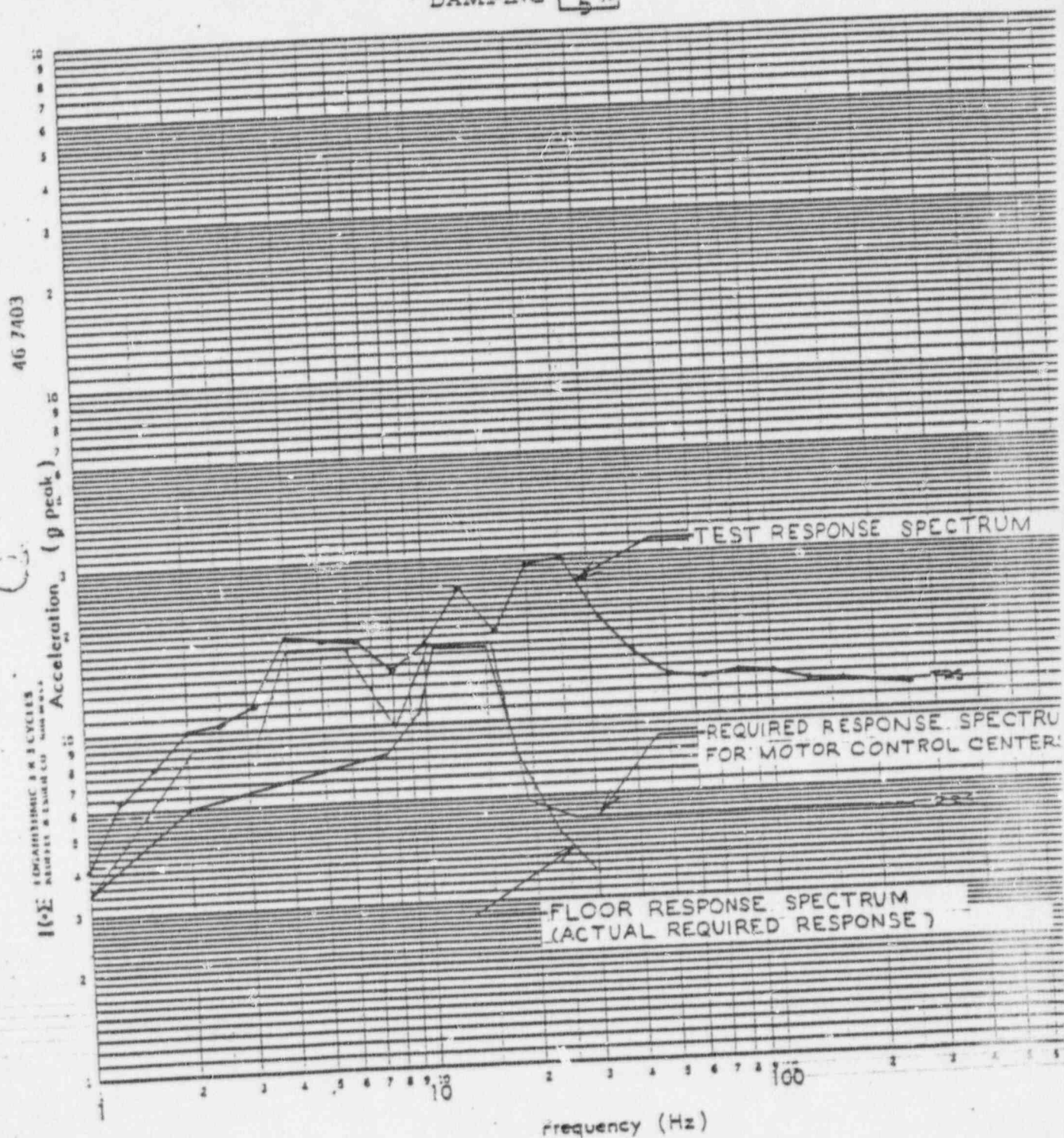
LOCATION NO. H/A

TEST RUN NO. 20

COMPARISON OF THE HORIZONTAL SSE RRS (IB, 485 FT.) TO THE HORIZONTAL FRONT-TO-BACK TRS OF THE MCC TEST SPECIMEN

FIGURE 3V

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐DAMPING ☒ 5%

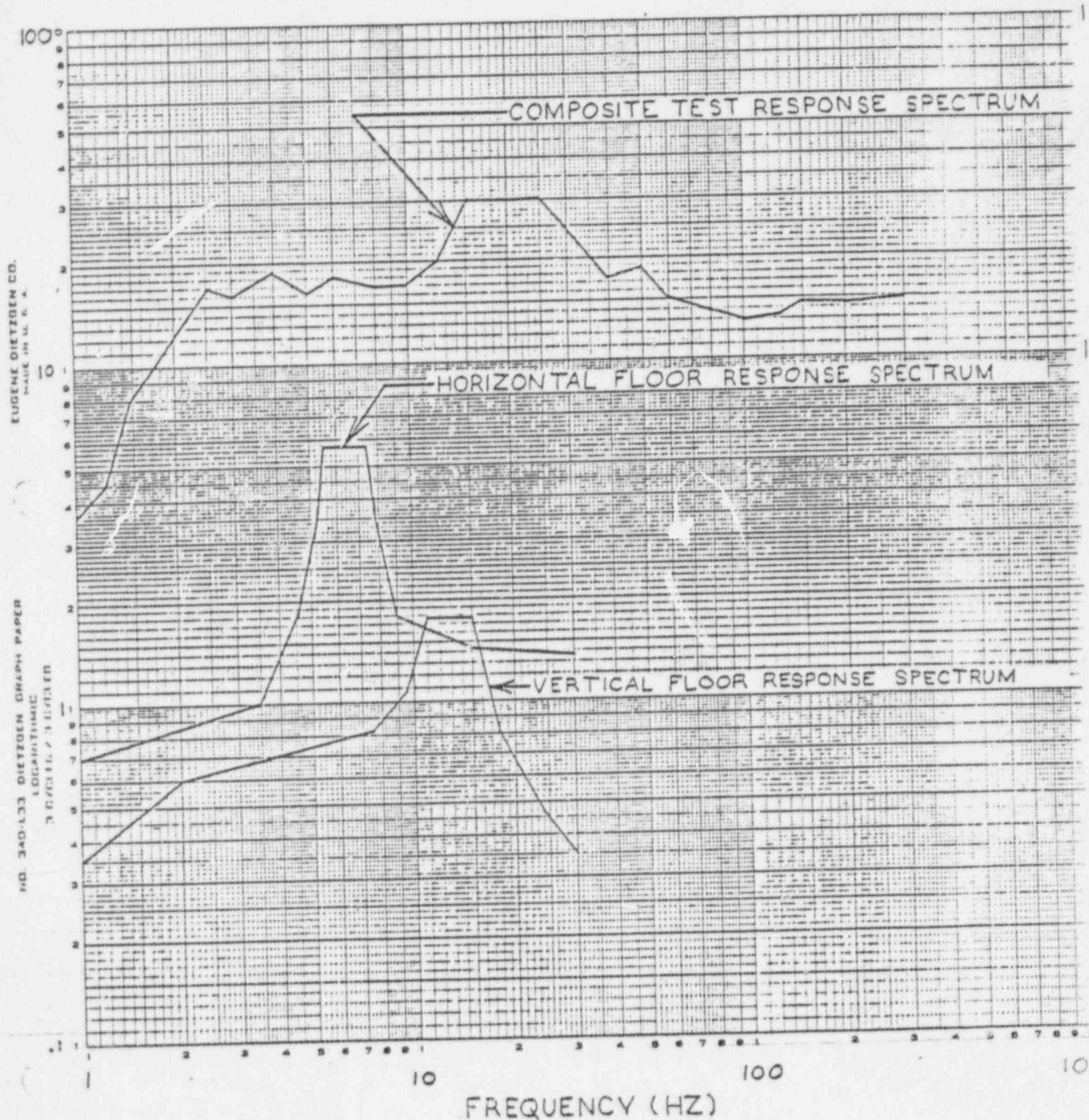
AXIS F-B/V

LOCATION NO. V-00

TEST RUN NO. 20

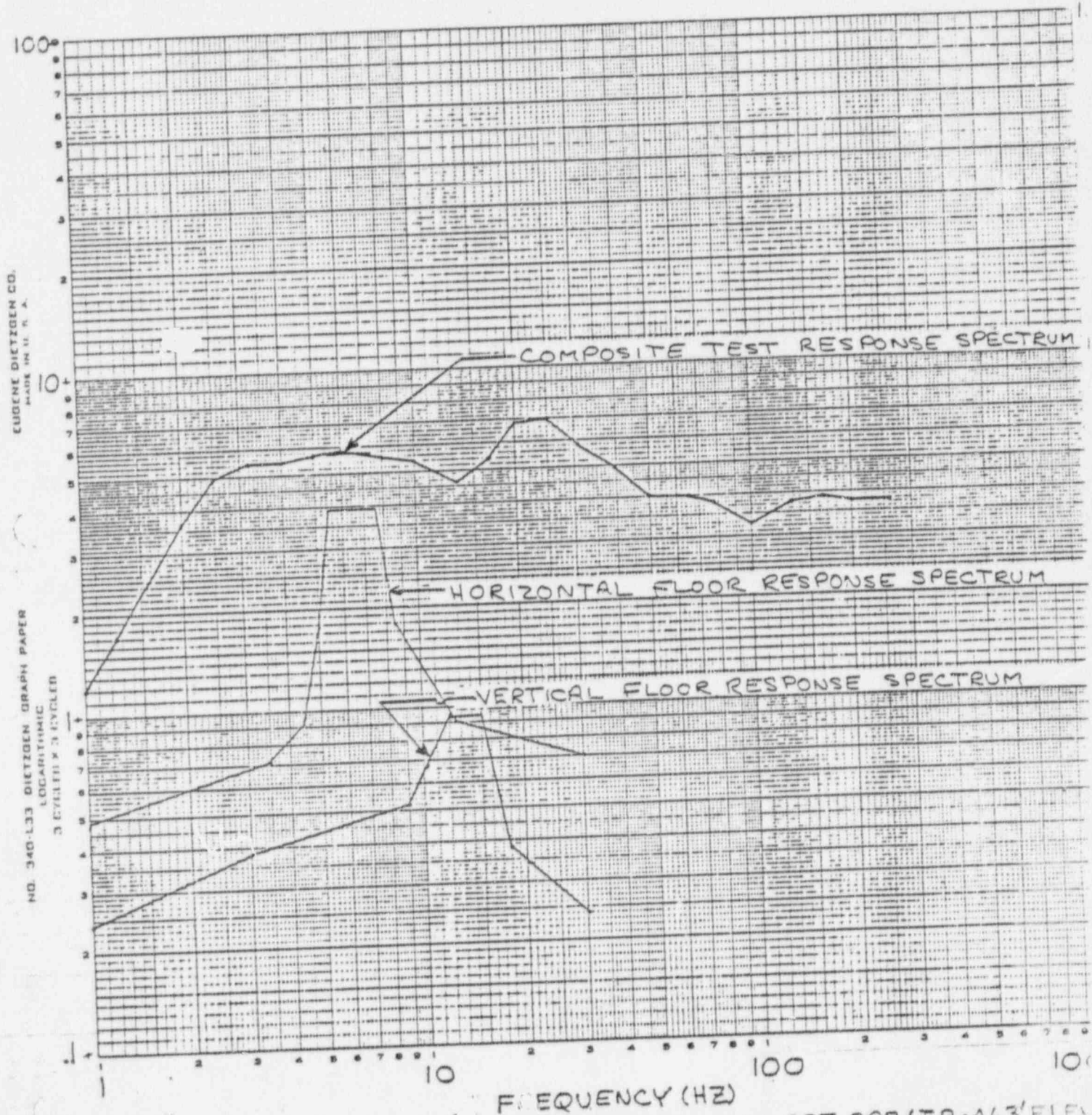
COMPARISON OF THE VERTICAL SSE RRS (1B, 485 FT.) TO THE VERTICAL
TES OF THE MCC TEST SPECIMEN

FIGURE 4



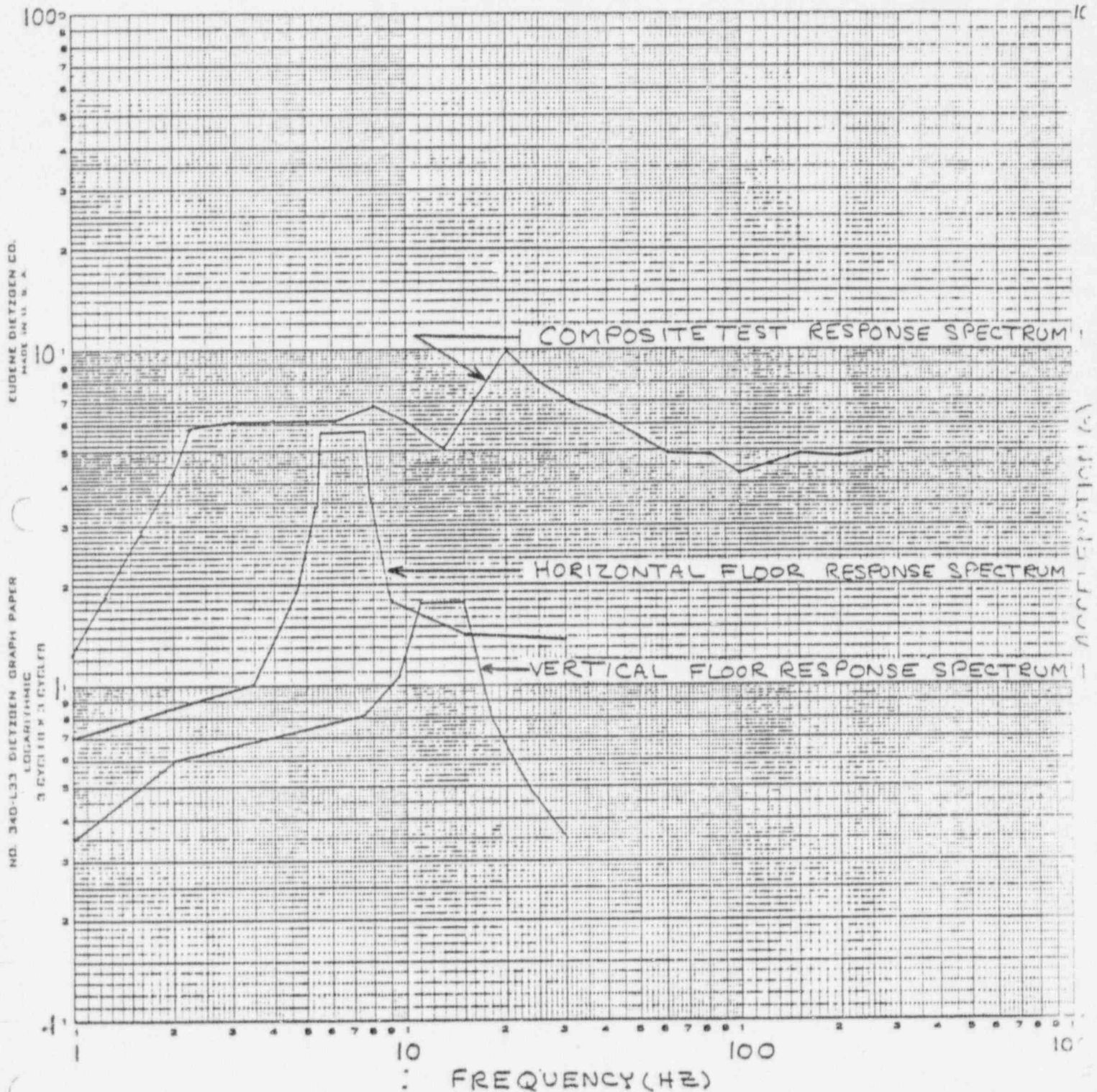
COMPARISON OF THE HORIZONTAL AND VERTICAL SSE RRS (IB, 435 FT)
TO THE COMPOSITE TRS OF THE E7012 AGASTAT RELAYS
5% DAMPING

FIGURE 5



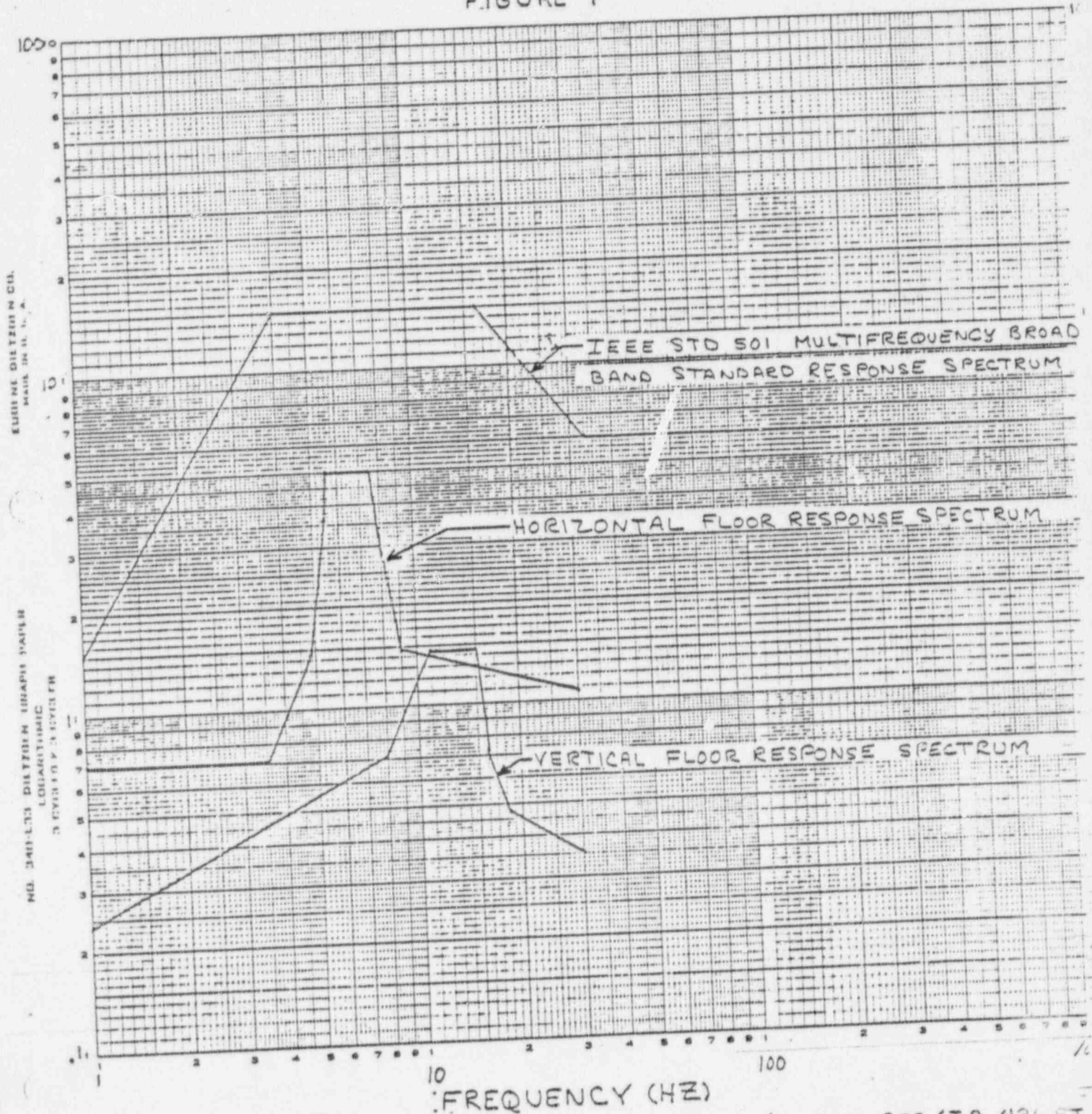
COMPARISON OF THE HORIZONTAL AND VERTICAL SSE RRS (IB-463'ELEV
THE VICINITY OF PANEL XPN 5275) TO THE COMPOSITE TRS OF THE
R7022 AGASTAT RELAYS 5% DAMPING

FIGURE 6



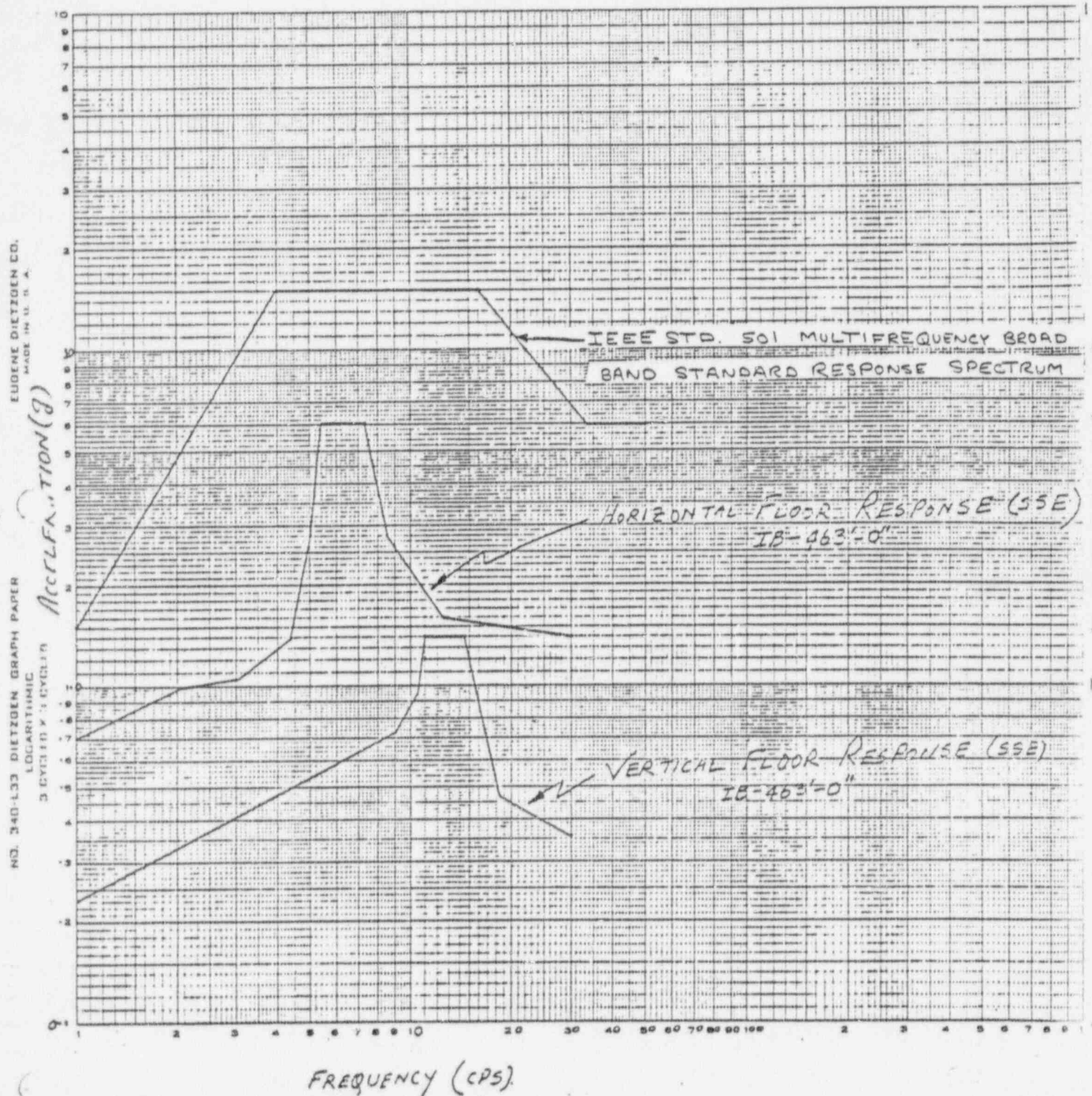
COMPARISON OF THE HORIZONTAL AND VERTICAL SSE RRS (IB, 485) TO THE COMPOSITE TRS OF THE E7024 AGASTAT RELAYS 5% DAMPING

FIGURE 7



COMPARISON OF THE HORIZONTAL AND VERTICAL SSE RRS (IB, 436 FT.
 TO THE STD. RESPONSE SPECTRUM OF THE NGV 17A G.E. RELAYS 5% DAMPING

FIGURE-8



COMPARISON OF THE HORIZONTAL AND VERTICAL FLOOR RESPONSE
(SSE - IB-463'-0") TO THE MULTIFREQUENCY BROAD BAND STANDARD
RESPONSE SPECTRUM PER IEEE STD 501 FOR TYPE 211B4175.
I.T.E. UNDER VOLTAGE RELAY - 5% DAMPING

- 10 -

Qualification Summary of Equipment

I. Plant Name: VIRGIL C. SUMMER CGF Type:

1. Utility: S. CAROLINA ELECTRIC AND GAS PWR - X

2. NSSS: WESTINGHOUSE 3. A/E: GILBERT SWR

II. Component Name REACTOR TRIP SWITCHGEAR

1. Scope: ☒ NSSS ☐ BOP
2. Model Number: SEISMIC MODIFIED 2 CABINET ASM Quantity: 1
WITH DS 416 BREAKER AS PER FCN 10560
3. Vendor: WESTINGHOUSE EAST PITTSBURGH
4. If the component is a cabinet or panel, name and model No. of the devices included: SEE WESTINGHOUSE REPORT WCAP 3687-SUPP 2-E20B
5. Physical Description & Appearance CABINETS
 - b. Dimensions 60.12" H. X 42" W. X 58.63" Deep
 - c. Weight 3400 POUNDS
6. Location: Building: INTERMEDIATE BUILDING
Elevation: 462
7. Field Mounting Conditions ☒ Bolt (No. 6, Size 3/8-16)
☐ Weld (Length)
☐
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
S/S: N/A F/B: N/A V: N/A
9. a. Functional Description: DISCONNECT POWER TO ROD CONTROL SYSTEM
- b. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☒ Both
10. Pertinent Reference Design Specifications: PER MATERIALS AND
STANDARDS ON BASE LINE DESIGN DWG. 6986D30 REV. 6

- 11 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by W NTD REPORT # WCAP-8687 SUPP 2-E20B
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Load considered: 1. ☒ Seismic only 2. ☐ Hydrodynamic only 3. ☐ Explosive only

4. ☐ Other (Specify) _____ 5. ☐ Combination of _____

6. Method of combining RRS: ☐ Absolute Sum ☐ SRSS ☐ N/A
(other, specify)

2. Required Response Spectra (attach the graphs): ATTACHED GRAPH

3. Required Acceleration in Each Direction:

S/S = N/A F/B = N/A Y = N/A

VI. If Qualification by Test, then Complete:

1. ☐ Single Frequency ☒ Multi-frequency: ☐ random ☐ sine beat

2. ☐ Single Axis ☒ Multi-Axis

3. No. of Qualification Tests: OBE 5 SSE 4 Other _____
(specify)

4. Frequency Range: 1-35-HZ

5. Trailing enveloping RRS using Multi-Frequency Test ☒ Yes (Plot TRS on RRS graphs) ☐ No

6. Input g-level Test at S/S = N/A F/B = N/A Y = N/A

7. Laboratory Mounting:

1 ☒ Bolt (No. 6, Size 3/8"-16) ☐ Weld (Length _____) ☐ _____

8. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable

9. Test Results including modifications made: PERFORMED REQUIRED CAPABILITY

WHEN SUBJECTED TO SEISMIC CONDITIONS USING SEISMIC MODIFICATIONS AS LISTED IN ABOVE
REFERENCED REPORT.

10. Other tests performed (such as fragility test, including results): N/A

- 12 -

VII. If Qualification by Analysis or by the Combination of Test and Analysis, thenComplete: NOT APPLICABLE

1. Description of Test including Results: _____

2. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis☐ Dynamic Analysis: ☐ Time-History
☐ Response Spectrum3. Model Type: ☐ 3D ☐ 2D ☐ 1D
☐ Finite Element ☐ Beam ☐ Closed Form Solution4. ☐ Computer Codes: _____

Frequency Range and No. of modes considered: _____

☐ Hand Calculations5. Method of Combining Dynamic Responses: ☐ Absolute Sum ☐ SRSS
☐ Other: _____
(specify)

6. Damping: _____ Basis for the damping used: _____

7. Support Considerations in the model: _____

8. Critical Structural Elements:

A. Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowed

B.

Max. Deflection	Location

Effect Upon Functional
Operability