THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

P.O. BOX 5000 - CLEVELAND, OHIO 44101 - TELEPHONE (216) 622-9800 - ILLUMINATING BLDG. — 55 PUBLIC SQUARE

Serving The Best Location in the Nation

MURRAY R. EDELMAN
VICE PRESIDENT
NUCLEAR

July 25, 1984
PY-CEI/NRR-0126 L

Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washingtion, D. C. 20555

Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
SQRT and PVORT Form Submittal

Dear Mr. Youngblood:

This submittal forwards copies of the summary forms on each item of equipment selected for the Seismic Qualification Review Team (SQRT) and Pump and Valve Operability Review Team (PVORT) audits by the NRC Equipment Qualification Branch. Also included are the Floor Response Spectra relating to the audit of selected SQRT equipment, and the Valve Qualification Program Description which provides the requirements on seismic inputs for valves qualified by our architect-engineer.

This information is provided at this time to assist the review teams in their preparation for the upcoming audits. If there are additional questions, please feel free to call.

Very truly yours,

Murray R Edelman

Murray R. Edelman
Vice President
Nuclear Group

MRE:njc

Attachments

cc: J. Silberg, Esq.
J. Grobe, NRC Resident
J. Stefano w/attachments
G. Bagchi, NRC, w/attachments
J. Singh, E.G. & G. Idaho w/SQRT attachments
C. Kido, E.G. & G. Idaho w/PVORT attachments

B001
1/1

Limited Dist

8408030145 840725
PDR ADOCK 05000440
A PDR

Attachment 1

The attached SQRT and PVORT forms address the following equipment:

SEISMIC (SQRT)		OPERABILITY (PVORT)	
NSSS	BOP	NSSS	BOP
1E22F0010	0P47C0001B	1E51C0001	0P47C0001B
1C71S0003G	1N11F0020A	1E21C0001	1P45F0571A
1H22P0072	1R42S0003	1E22F0010	1P50F0140
1C11F0180	1M51F0010B	1B21F0047B	1E12F0006A
1C41F0004B	0H51P0077A		1M51F0110
1E51C0002	1R24S0032		1M16F0020A
1H13P0702	1P45C0002		
1H13P0618	0H51P0177A		
1H13P0870	1M39B0004		
1H13P0680	1M51S0002		
0G41F0085	0C41N0415B		
1E12N0057	1R72S0002		
	Limitorque Actuators		

Please note that CEI review and approval is documented as follows:
For NSSS qualified items a signature stamp appears on the front page;
For A/E qualified items approval is shown on the signature block of the last page.

G-2
REV. 1-82

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
PERRY NUCLEAR POWER PLANT
MEMORANDUM SO/10913

☐ I no longer wish to receive this material

TO SQRT Audit File

FROM H. A. Putre

DATE July 25, 1984

SUBJECT Seismic Requirements for Valves Qualified by Gilbert Associates

We are submitting to the NRC the attached "Perry Nuclear Power Plant Valve Qualification Program Description" Sec. 1 and 2. These seismic requirements are specified in lieu of Floor Response Spectra for the valves qualified by Gilbert Associates. These apply to the following Audit Valves:

1N11F0020A
1M51F0010B
0641F0085
1E22F0010
1P45F0571A
1P50F0140
1E12F006A
1M51F0110
1M16F0020A

H. A. Putre
Senior Engineer, EQ

PERRY NUCLEAR POWER PLANT

VALVE QUALIFICATION PROGRAM DESCRIPTION
REV. 4

F. C. Rosch
July 26, 1983

19 Aug. 83
8-51

1. Qualification Specifications

The following specifications include all of the valves qualified under this description.

SP		
301	General Electric (Anchor Darling)	HPCS Valves
521-01	TRW	2 1/2" Check Valves
521-02	Borg Warner	Gates, Globes & Checks 2 1/2"
521-03	Rockwell, Raleigh	Gates, Globes & Checks 2 1/2"
523	Target Rock	Safety & Relief Valves
524	Contromatics	Butterfly & Ball Valves
531-01	Dresser	Gates, Globes & Checks 2"
531-02	Borg Warner	Gates, Globes & Checks 2"
531-03	Dragon	CRD Vent Valves 1" & 1 1/4"
531-04	Kerotest	Gates, Globes & Checks 2"
531-06	Rockwell, Sulphur Springs	Gate, Globe & Check Valves
635	GPE	Containment & Drywell Vacuum Relief Valves
639	Anderson-Greenwood	Vacuum Breaker and Check Valve

2. Valve - Actuator Assembly Dynamic Load Capability

The following description outlines the requirements and procedures for qualification for seismic and new loads.

REQUIREMENTS

USNRC Regulatory Guide 1.48
All of the qualification procedures and requirements are in accordance with the requirements of Reg. Guide 1.48.

Equipment Qualification Review List (EQRL)
The EQRL lists all of the Seismic Category I active valves for qualification.

FSAR
Qualification was performed in accordance with the requirements described in paragraphs 3.9.3.2.

Code Requirements
Paragraph NB 3524 W77 Section III of the ASME B&PV Code states: "Where valves are provided with operators having extended structures and these structures are essential to maintaining pressure integrity, an analysis, when required by the Design Specifications may be performed based on static forces resulting from equivalent earthquake accelerations acting at the centers of gravity of the extended masses."

Seismic Qualification

The specific valve specifications require that all of the valves have a fundamental frequency greater than 33Hz and be capable of withstanding at least a simultaneous 3g load on each orthogonal axis. General test and analysis procedural requirements are included in GAI specifications SP-750-4549-00. The vendor was allowed to demonstrate compliance by test or analysis.

Analyses were generally provided to demonstrate compliance with the specification. Analyses also were generally based on modal vibration techniques except that equivalent static analyses were allowed when the fundamental frequency was demonstrated to be above the range of application.

Tests were performed to either the appropriate Floor Response Spectrum or to 3g using a 10 cycle sine beat.

The valve seismic response was reviewed to assure that it did not exceed the 3g capability required by the specification.

The valve capability was reviewed for locations where the response exceeded 3g to determine if the valve capability was less than or equal to the response. Failure of the valve to meet the response requirements would require upgrading of the valve to an acceptable level or rearrangement of piping supports to lower the response.

Hydrodynamic Loads Qualification ("New Loads")

(Safety/Relief Valve Discharge and LOCA and all associated pressure and hydrodynamic loads such as Chug and Condensate Oscillation)

The valve specifications for New Loads require a "fragility analysis" to determine the valve capability particularly in the area of the fundamental frequency. This analysis assumes all of the input energy at the frequency analyzed and thus generally indicates relatively low capability.

The Piping Analysts were asked to provide the actual valve response where the fragility analysis indicated that loads might be too high. Piping Analysis was able to develop a procedure to determine the valve-actuator assembly response based on analysis of systems with detailed models. The valve response is based on the actual input loads across the whole spectrum for the piping system. The piping analysis calculation defines the appropriate floor (required) response spectra used for the system input loads. These calculations are on file organized by systems.* The valve response can be compared to the equivalent static load analysis to determine if the valve is capable of withstanding the loads. It was frequently necessary to extrapolate the static analysis to determine the maximum allowable hydrodynamic and seismic loads (these calculations followed formal project procedures and are incorporated into the project documentation).* It would be necessary to increase the valve capability or rearrange supports to lower the response to the capability for locations where the response initially exceeded the capability.

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*GAI Files, Reading, PA

RJC-1

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

MPL# E22F0010

I. PLANT NAME: PERRY NUCLEAR POWER PLANT   TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING   PWR: ______

2. NSSS: GENERAL ELECTRIC   BWR: X

3. A/E: GILBERT/COMMONWEALTH   Other ______

II. COMPONENT NAME: TEST BY-PASS VALVE TO CONDENSATE STORAGE

1. Scope: ☒ NSSS   ☒ BOP   ☐ Other

2. Model Number: NOT ASSIGNED BY VENDOR   Quantity: 1 UNIT 1, 1 UNIT 2

3. Size or Range: 10" ANSI CLASS 900

4. Vendor: ANCHOR DARLING

5. If the component is a cabinet or panel, name and model Number of the devices included:

   N/A

6. Physical Description: LIMITORQUE SMB-4-200

   a. Appearance: MOTOR OPERATED GLOBE VALVE

   b. Dimensions: H= 93", W= 21' L = 33"

   c. Weight: 3600 LBS. INCLUDING ACTUATOR

7. Location: Building: AUXILIARY

   Elevation: 574'

8. Field Mounting Conditions   ☐ Bolt (No. ____, Size ____)
   ☒ Weld (Length CIRCUM)
   ☐ ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

   PIPE MOUNTED WITH STEM VERTICAL

10. a. System in which located: E22- HIGH PRESSURE CORE SPRAY

    b. Functional Description: SYSTEM FLOW SHUT OFF WHEN CLOSED, THROTTLE WHEN OPEN, PRESSURE RETENTION.

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

    ☐ Both   ☒ Neither   ☒ Other TEST

II. Pertinent Reference Design Specifications for Qualification Requirements:
SPEC. SP-301-4508-00, REV I, 10-11-73; G.E. DOCUMENT NO 21A9457 REV.3, 1-9-78; G.E. DOCUMENT NO. 21A8717 REV. 1, 10-31-73

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: DESIGN CALCULATION FOR 10" 900LB GLOBE VALVE
(No., Title and Date): WITH SMB-4-200 MOTOR OPERATOR, 2-15-83

Company that Prepared Report: ANCHOR DARLING

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: ASME B&PV CODE SECTION III, NB 3200 & NC 3500, 1971 EDITION, ADDENDA TO WINTER 1973.
(FOR ACTUATOR - SEE LIMITORQUE VALVE ACTUATOR SQRT)

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☐ SRSS ☐ N/A
(other, specify)

3. Required Response Spectra ** (attach the graphs): SEE PNPP VALVE QUALIFICATION PROGRAM DESCRIPTION (TAB 6)

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

4. Damping Corresponding to RRS: N/A OBE ______ SSE ______

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other PEAK *
(specify)

OBBA or OBE S/S = ≤ SSBA F/B = ≤ SSBA V = ≤ SSBA

[✓ SSBA] or SSE S/S = 0.418g F/B = 0.726g V = 0.287g

6. Were fatigue effects considered:

☒ Yes ☐ No

If yes, describe how they were treated in overall qualification program: SEE PNPP VALVE FATIGUE LOADING ANALYSIS (TAB 6)

* MAXIMUM ACCELERATION FROM PIPING ANALYSIS.

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other ______
(specify)

4. Frequency Range: ______

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

S/S = ______ F/B = ______ V = ______

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test:

OBBA or OBE S/S = ______________ F/B = ______________ V = ______________

SSBA or SSE S/S = ______________ F/B = ______________ V = ______________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____ , Size ____)

☐ Weld (Length ____) ☐ ______________

b. Orientation and Fixturing: ______________

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ______________

____

12. Other tests performed (such as aging or fragility test, including results):

____

____

13. Failure Modes (If appropriate) ______________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☒ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = 34 Hz F/B = 34 Hz V = —

3. Model Type: ☐ 3D ☐ 2D ☒ 1D

☐ Finite Element ☒ Beam

☐ Closed Form Solution ☐ Other ______________

4. ☐ Computer Codes: N/A

Frequency Range and No. of Modes N/A

☒ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads: N/A (see 8.a below)

☐ Absolute Sum ☐ SRSS ☐ Other: ______________ (specify)

6. Damping:

OBE N/A SSE N/A Basis for the damping used: N/A

7. Support Considerations in the model: FIXED AT WELD ENDS

8. Critical Structural Elements:

a.

~~Identification Location~~	~~Governing Load or Response Combination~~	~~Seismic Stress~~	~~Total Stress~~	~~Stress Allowable~~
MAXIMUM ACCELERATIONS FROM PIPING ANALYSIS	Asis 0.418g	AF/B 0.726g	Av 0.287g	
ACCELERATIONS USED IN REPORT (FOR STRESSES SEE REPORT PG 30)	4.5g	0	4.0g	

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.0048 IN.	ACTUATOR ADAPTER FLANGE	0.020 IN.

9. Failure Modes: PERMANENT DEFORMATION OR FAILURE OF YOKE LEGS

10. Margins Available: ☐ Input Spectrum ☒ Stress or Deflection

REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/	/	/	
	/	/	/	
	/	/	/	

REVIEWED BY J.A. DAISE / 6-23-83

CHECKED BY J. D. CAHERLY / 6-23-83

APPROVED BY H. A. Peters / 7-23-84

EAS 7-23-84

PERRY NUCLEAR POWER STATION UNIT 1

CEI
REVIEWED BY
/ 7-21-87
APPROVED BY
/ 7-21-87

SEISMIC QUALIFICATION REEVALUATION CLASS 1E EQUIPMENT

COMPONENT NAME: ELECTRICAL PROTECTION ASSEMBLY

PPD. NO.: 21A3120

MPL REFERENCE: C71-S003 A-H, (G)

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

PREPARED BY: N.H. ANDERSEN N. H. Andersen DATE 4-6-84

ORGANIZATION: GENERAL ELECTRIC CO., QUALIFICATION & CONTROL EQUIPMENT DESIGN ENGINEERING

REVIEWED BY: R.W. HARDY RW Hardy DATE 5/18/84
SQRT PROGRAM MANAGER

APPROVED BY: N.G. LURIA NG Luria DATE 4/11/84
QUALIFICATION ANALYSIS AND DESIGN ENGINEERING MANAGER

See Book M02 (Tab 6) for Introduction to SQRT.
6-6-84

GENERAL ELECTRIC

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Perry

1. Utility: Cleveland Electric Illuminating Co
2. NSSS: General Electric Co.
3. A/E: Gilbert/Commonwealth

Type:
PWR
BWR- 6 MK III
Other

II. Component Name Electrical Protection Assembly

1. Scope: [x] NSSS [ ] BOP [ ] Other
2. Model Number: GE DWG 914E175 Quantity: 8
3. Size or Range: 13.7 KVA
4. Vendor: General Electric
5. If the component is a cabinet or panel, name and model number of the devices included: See Parts List of drawing 914E175 (Attachment 1)
6. Physical Description:
   a. Appearance: Metal Enclosure
   b. Dimensions: 16" x 20" x 8"
   c. Weight: 150#(EST)
7. Location: Building: See Attachment 5, CONTROL COMPLEX
   Elevation: See Attachment 5, 620
8. Field Mounting Conditions [×] Bolt (No. 4, Size 3/8"φ)
   [ ] Weld (Length ___)
   [x] See Attachment 5
9. Mounting Orientation [e.g., on floor, cantilevered, suspended, etc.]
   See Attachment 5, WALL MOUNTED
10. a. System in which located: Process Radiation Monitoring System
    b. Functional Description: Performs 1E Function
    c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [x] Both [ ] Neither [ ] Other ___

II. Pertinent Reference Design Specification for Qualification Requirements: Gilbert/Commonwealth Letter PY-GAI/GEN-2904

a. [x] Seismic Input
b. [ ] Hydrodynamic Load Input
c. [x] Fatigue Considerations
d. [ ] Service Conditions
e. [ ] Qualified Life

III. Is Equipment Available for Inspection in the Plant:

[x] Yes [ ] No [ ] Partial or limited availability

IV. Equipment Qualification Method:

[x] Test [ ] Analysis [ ] Combination of Test and Analysis

Qualification Report*: Final Test Report-Electrical Protection Assembly
(No., Title and Date): DRF C71-00044
Company that Prepared Report: General Electric
Company that Reviewed Report: General Electric
Where Report is filed or available: General Electric
Applicable Codes and/or Standards: IEEE 344-1975

V. Vibration Input:

1. Loads considered:
   a. [ ] Seismic only
   b. [ ] Hydrodynamic only
   c. [ ] Vibration from normal operation
   d. [x] Combination of (a), (b), and (c)
2. Method of Combining RRS:
   [ ] Absolute Sum [x] SRSS [ ] ____________ (other, specify)
3. Required Response Spectra** (attach the graphs): See Attachment 2

NOTE:

* If more than one report complete Items IV thru VII for each report.

** If other than RRS is used, describe methods.

4. Damping Corresponding to RRS: OBE 2% SSE 4%

5. Required Acceleration in Each Direction:

[x] ZPA [ ] Other ____________ (specify)

OBE S/S = .213 F/B = .213 V = .36

SSE S/S = .33 F/B = .33 V = .58

6. Were fatigue effects considered:

[X] Yes [ ] No

If yes, describe how they were treated in overall qualification program: SRV and Hydrodamic loads were considered in RRS sent to test lab

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [x] Multi-Frequency [x]random
[ ] sine beat
[ ] ________

2. [ ] Single Axis [x] Multi-Axis
[ ] Independent Axis [x] In-phase motions

3. Number of Qualifications Tests:

OBE 10 SSE 4 Other ________

5 in phase, 5 out of phase 2 in phase,2out of phase (specify)

4. Frequency Range: 3-100 Hz

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

S/S = 54.5 F/B = 61 V = 54.5

6. Method of Determining Natural Frequencies:

[x] Lab Test [ ] In-Situ Test [ ] Analysis

7. TRS enveloping RRS using Multi-Frequency Test:

[X] Yes (Attach TRS & RRS graphs) See Attachment 4

[ ] No

8. Maximum Input g Level Test:

OBE S/S = 5.4 F/B = 8.0 V = 7.0

SSE S/S = 11.0 F/B = 10.07 V = 8.9

9. Laboratory Mounting:

RAJ

A. [X] Bolt (No. 4, Size 5/8"φ-11) and clamped

[ ] Weld (Length ____) [ ] __________

B. Orientation and Fixturing: __________

10. Functional operability verified:

[X] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made:

See Qualification Summary

12. Other tests performed (such as aging or fragility test, including results):

No Seismic Aging or Fragility Testing Performed

13. Failure Modes (If appropriate See Qualification Summary

14. Margins Available: [X] Input Spectrum [ ] Fragility

VII. If Qualification by Analysis, then complete: N/A

1. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

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

S/S = ________ F/B = ________ V = ________

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam

[ ] Closed Form Solution [ ] Other ________

4. [ ] Computer Codes: ____________________
Frequency Range and No. of modes
[ ] Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:
[ ] Absolute Sum [ ] SRSS [ ] Other: ____________ (specify)

6. Damping:
OBE ______ SSE ______ Basis for damping used: ______

7. Support Considerations in the model: ______ ______

8. Critical Structural Elements:

A.

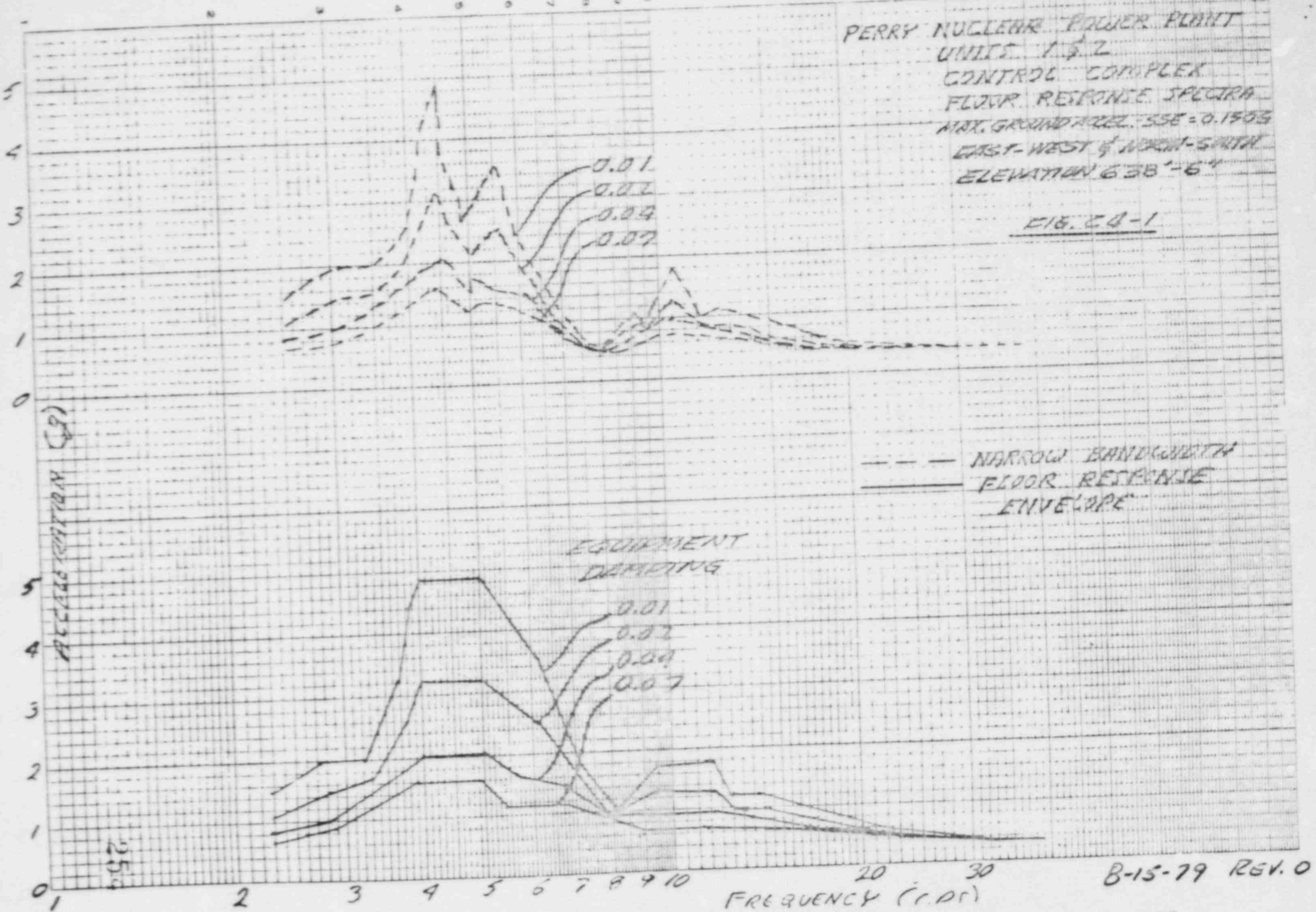
Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ____________________

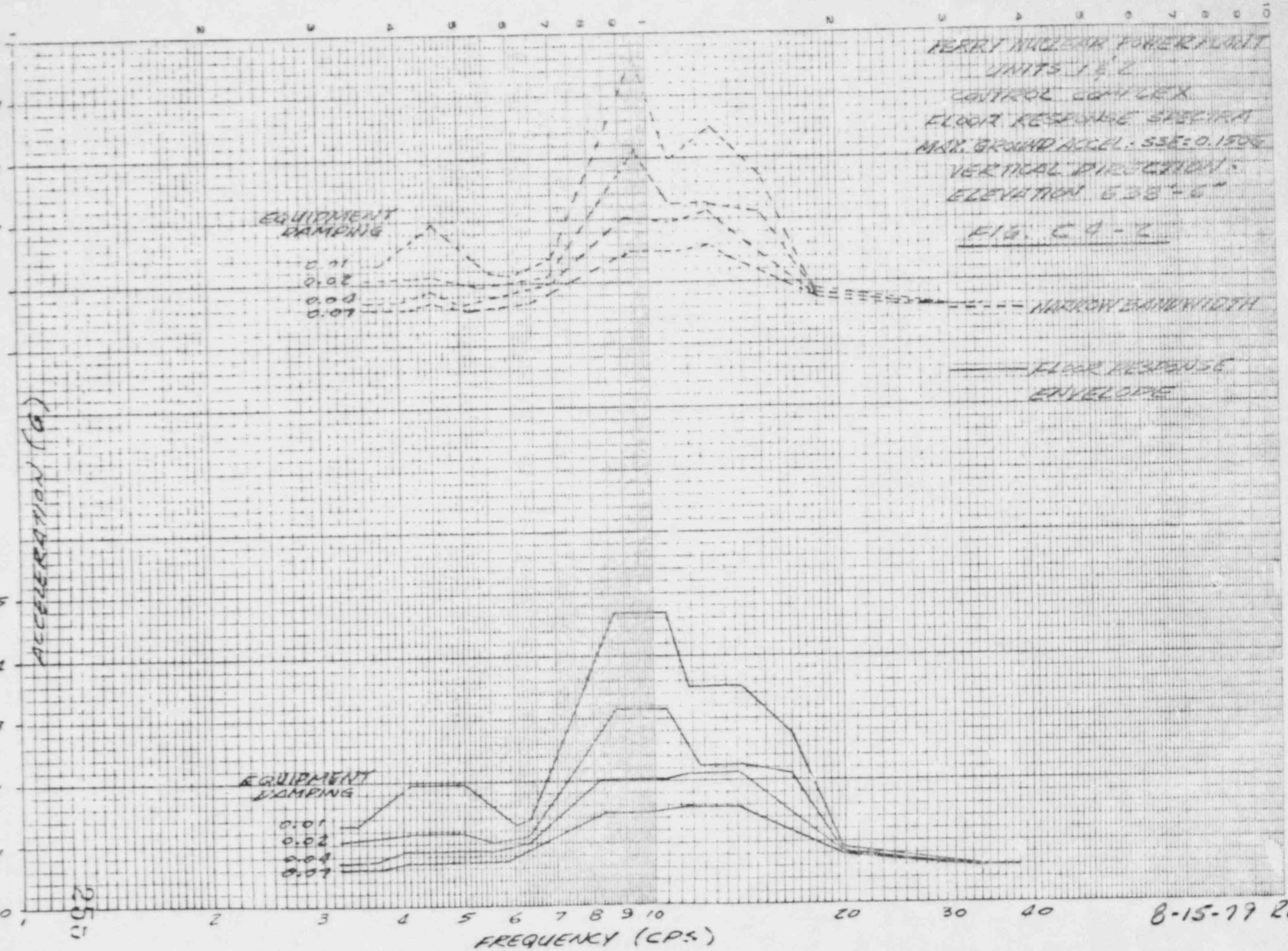
10. Margins Available: [ ] Input Spectrum
[ ] Stress or Deflection



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. SSE = 0.150g
EAST-WEST & NORTH-SOUTH
ELEVATION 638'-6"

FIG. C4-1

8-15-79 REV. 0

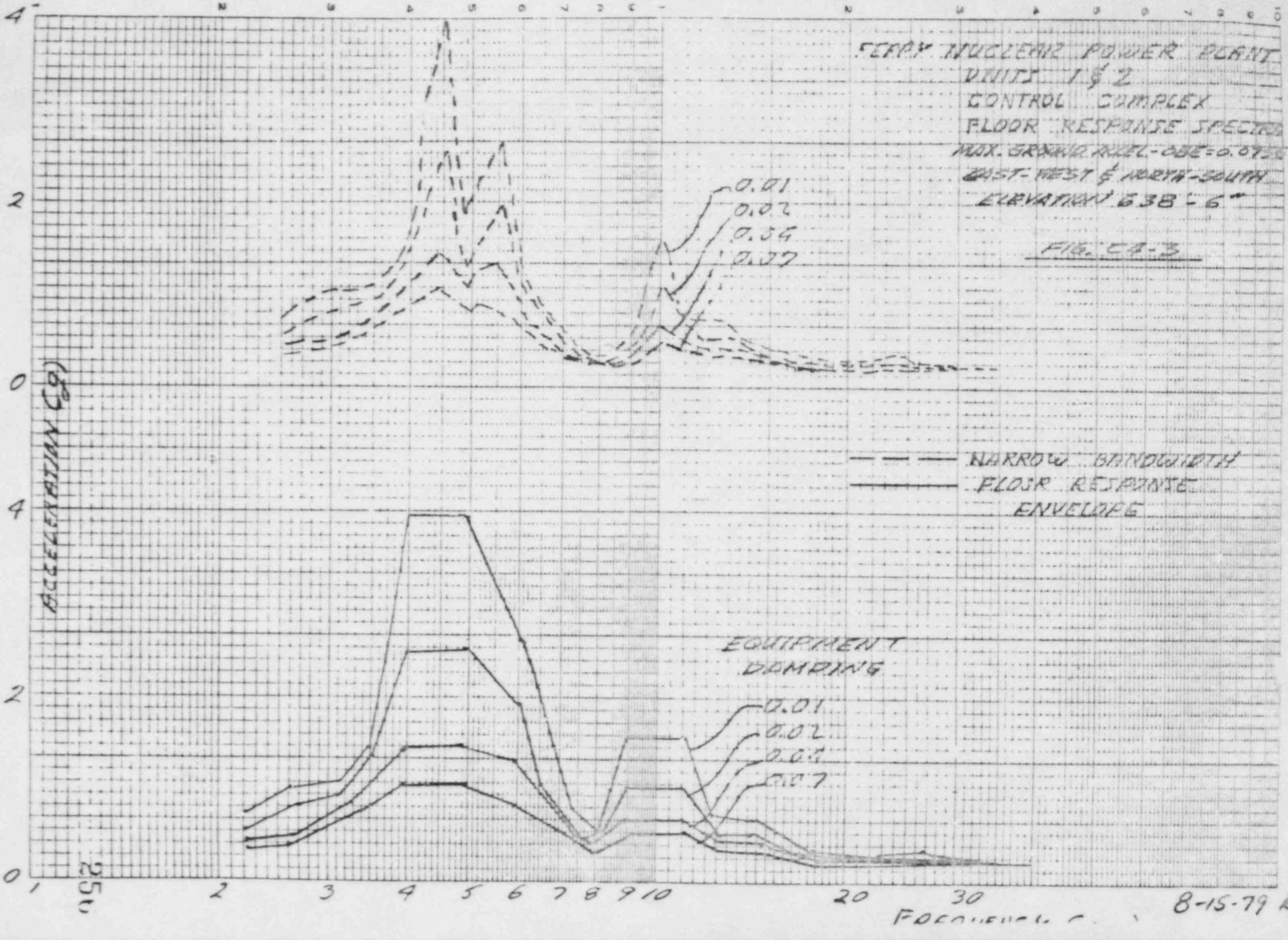


PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL.: SSE=0.150G
VERTICAL DIRECTION
ELEVATION 638'-6"

FIG. C4-2

8-15-79 REV.

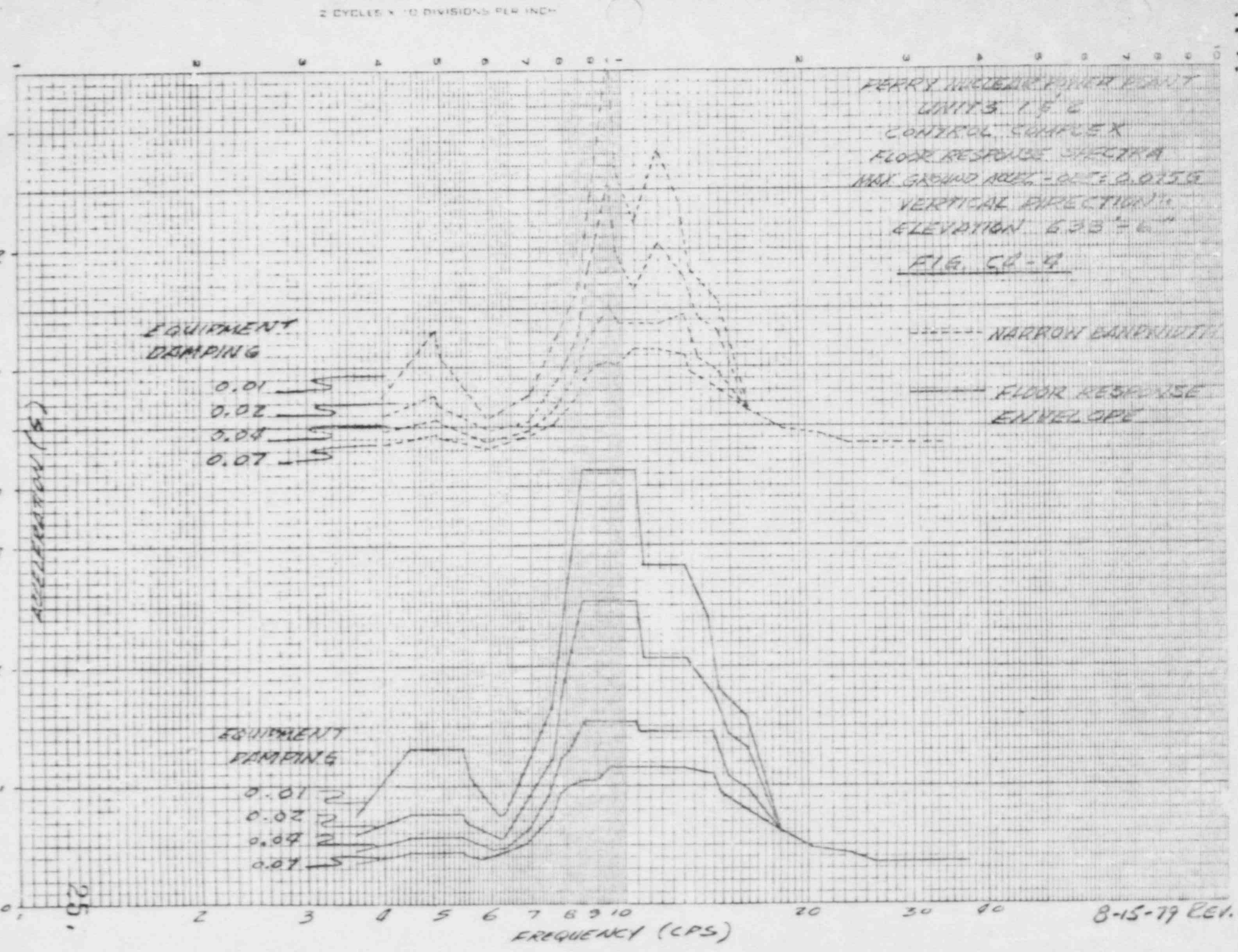
250



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL.-OBE=0.075
EAST-WEST & NORTH-SOUTH
ELEVATION 638'-6"

FIG. C4-3

8-15-79 REV.



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX GROUND ACCEL - OBE = 0.075G
VERTICAL DIRECTION
ELEVATION 638'-6"
FIG. CC-4

8-15-79 REV. 0

CEI
Conditionally REVIEWED BY
/ 7.23.84
Conditionally APPROVED BY
/ 7-23-84

Subject to GE Resolution of
PY-GAI/GEN-3113 of 5.7.84
RH

QUALIFICATION SUMMARY

1. Component Name: Position Multiplexer Cabinet

2. A. MPL or EDL Item No.: H22-P071/72
   B. GE Drawing No.: 865E133AA

3. Qualification Documentation

A. Qualification Summary of Equipment (SQRT Form Attached)

B. Reference Documents

Reference Number	Document Identification	Date	Title
1	A00-794-8	3-18-80	BWR 6 Rod Control and information system, Index A
2	NEDC 30387 Book No. C27	April 1984	Rod Position Multiplexer Cabinet H22-P071/72

4. Requirements

The Rod Position Multiplexer Cabinet is required to transmit correct rod position information or to fail safely during normal plant operation or after a seismic event. During a seismic event and after a design basis event, the Multiplexer Cabinet must not fail in a way that violates divisional separation.

5. Demonstrated Capability

This equipment has been seismically tested to levels that exceed the requirements of the Perry plant. Test data was analysed to 23 Hz. Test levels reached 20 g and exceed the Perry RRS in the 2-23 Hz range. A failure modes analysis has shown that none of the failure modes identified can prevent the Position Multiplexer from failing safely or can have a detrimental impact on the bus supplying power to this equipment.

6. Rationale for Qualification

The P071/72 cabinets have demonstrated structural integrity when subjected to seismic levels that exceed the Perry requirements in magnitude. Additional test or analysis is not required since it was shown that the identified failure modes will cause the position multiplexer to fail safely and will not jeopardize the bus supplying power to these units.

MPL: H22-P071/P072

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Perry-Unit 1 — Type:

1. Utility: Cleveland Electric Illuminating Co. — PWR ____
2. NSSS: General Electric Co. — BWR 6-Mark III
3. A/E: Gilbert Associates Inc. — Other ____

II. Component Name ROD POSITION MULTIPLEXER CABINET

1. Scope: [X] NSSS [ ] BOP [ ] Other
2. Model Number: H22-P071 Quantity: 1 Each
3. Size or Range: N/A
4. Vendor: General Electric Co.
5. If the component is a cabinet or panel, name and model number of the devices included: As shown on attached device list
6. Physical Description:
   - a. Appearance: Rack
   - b. Dimensions: 72"W x 53"H x 30"D
   - c. Weight: 1500 lbs. (approx.)
7. Location: Building: Containment
   Elevation: 620'0"
8. Field Mounting Conditions [X] Bolt (No. 12, Size 9/16"ϕ) RH
   [ ] Weld (Length ___)
   ~~[X] Provided by others 12 – 9/16"ϕ~~ RH
9. Mounting Orientation [e.g., on floor, cantilevered, suspended, etc.]
   Floor mounted
10. a. System in which located: POSITION MULTIPLEXER
    b. Functional Description: Instrument Support
    c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both [ ] Neither [ ] Other ____

II. Pertinent Reference Design Specification for Qualification
Requirements: GE Drwg. 22A3746-Design Spec, Local Instrument Panel; EDLPL865E133BAG001, Rev.6 ; ASSY 865E133BA, Rev. 2

a. [X] Seismic Input　　d. [ ] Service Conditions
b. [X] Hydrodynamic Load Input　　e. [ ] Qualified Life
c. [ ] Fatigue Considerations

III. Is Equipment Available for Inspection in the Plant:
[X] Yes　[ ] No　　[ ] Partial or limited availability

IV. Equipment Qualification Method:
[X] Test　　[ ] Analysis　　[ ] Combination of Test and Analysis
Qualification Report*: GE DRF #A00-794-8 BWR 6 Rod Control & Information System
(No., Title and Date): PANELS, Dated 3/18/1980
Company that Prepared Report: General Electric Co.
Company that Reviewed Report: General Electric Co.
Where Report is filed or available: General Electric Co., Valley Forge, PA
Applicable Codes and/or Standards: IEEE 344-1975

V. Vibration Input:
1. Loads considered:
   a. [X] Seismic only　　Combination of a & b
   b. [X] Hydrodynamic only
   c. [ ] Vibration from normal operation
   d. [ ] Combination of (a), (b), and (c)
2. Method of Combining RRS:
   [ ] Absolute Sum　[X] SRSS　[ ] ________________
   (other, specify)
3. Required Response Spectra** (attach the graphs): See attached graphs

NOTE:
* If more than one report complete Items IV thru VII for each report.
** If other than RRS is used, describe methods.

MPL: H22-P071/P072

4. Damping Corresponding to RRS: OBE 0.03 SSE 0.03

5. Required Acceleration in Each Direction:

[X] ZPA [ ] Other ____________ (specify)

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

SSE S/S = * g F/B = * g V = * g

* see RRS RH

6. Were fatigue effects considered:

[ ] Yes [X] No RAJ

If yes, describe how they were treated in overall qualification program: ____________

____

____

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency [X] random

[ ] sine beat

[ ] ________

2. [ ] Single Axis [ ] Multi-Axis [X] Dependent biaxial in and out of phase

[ ] Independent Axis [ ] In-phase motions

3. Number of Qualifications Tests:

OBE 5 . SSE 1 Other ____________ (specify)

4. Frequency Range: 2-22 Hz

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

S/S = None below 33 F/B = 28.0 Hz V = None below 33 Hz

6. Method of Determining Natural Frequencies:

[X] Lab Test [ ] In-Situ Test [ ] Analysis

7. TRS envelping RRS using Multi-Frequency Test:

[X] Yes (Attach TRS & RRS graphs)

[ ] No

MPL: H22-P071/P072

8. Maximum Input g Level Test:

OBE S/S = 9 g F/B = 10 g V = 10 g

SSE S/S = 20 g F/B = 20 g V = 20 g

9. Laboratory Mounting:

A. [X] Bolt (No. ___ Size ___

[ ] Weld (Length ___) [ ] ___________

B. Orientation and Fixturing: Longitudinal & lateral on table

10. Functional operability verified:

[X] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made:

Demonstrated structural and functional integrity.

12. Other tests performed (such as aging or fragility test, including results):

____

13. Failure Modes (If appropriate) None

14. Margins Available: [X] Input Spectrum [X] Fragility

VII. If Qualification by Analysis, then complete: NOT APPLICABLE

1. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

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

S/S = ___________ F/B = ___________ V = ___________

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam

[ ] Closed Form Solution [ ] Other ___________

4. [ ] Computer Codes: ____________________
   Frequency Range and No. of modes ____________________
   [ ] Hand Calculations
5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:
   [ ] Absolute Sum [ ] SRSS [ ] Other: __________ (specify)
6. Damping:
   OBE ______ SSE ____ Basis for damping used: __________
7. Support Considerations in the model: ____________________
8. Critical Structural Elements:

A.

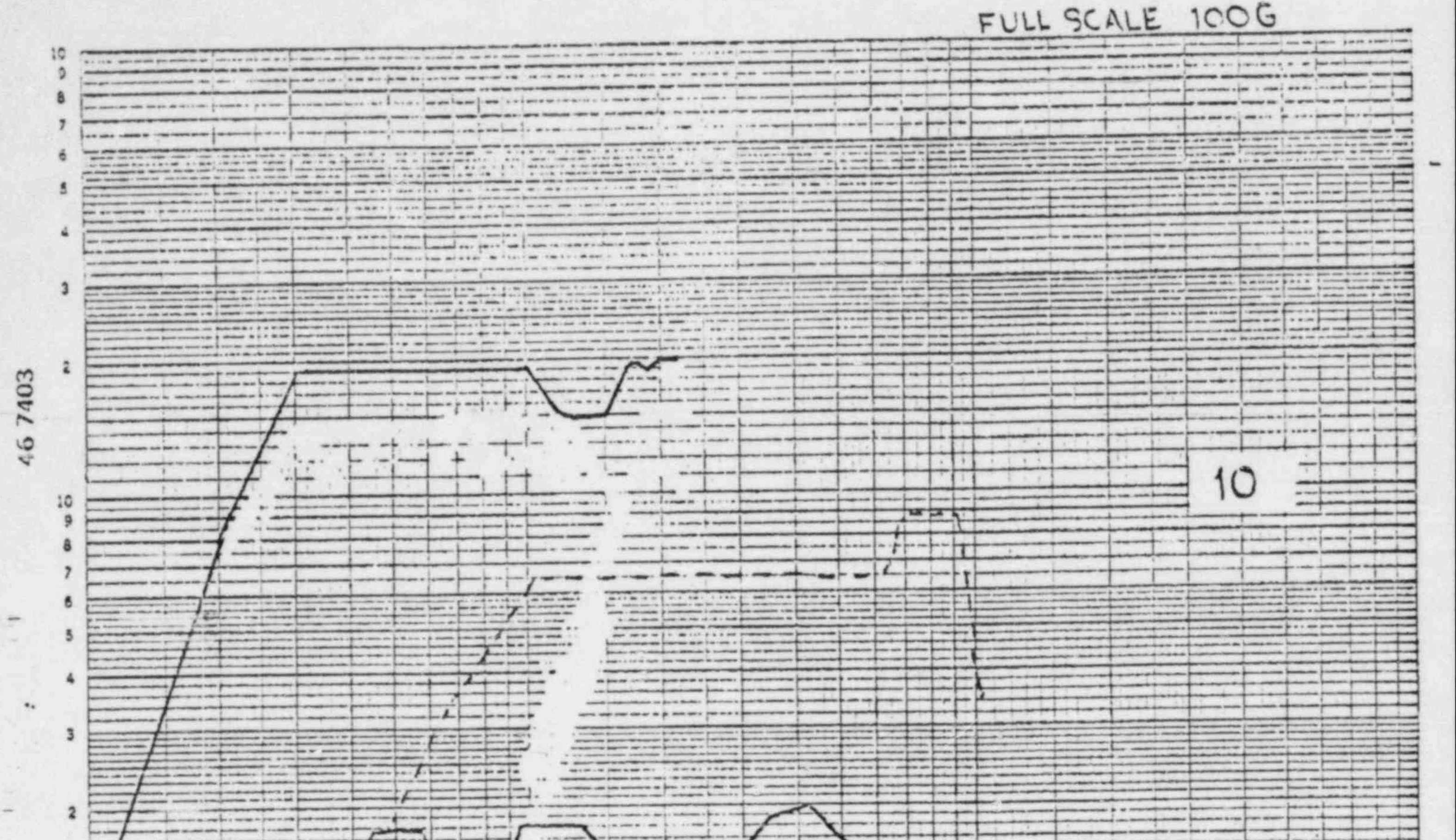
Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ____________________
10. Margins Available: [ ] Input Spectrum
    [ ] Stress or Deflection

POSITION MULTIPLEXER CABINET H22-P071/72 TRS (3% DAMPING) VS.
PERRY-CT 3 CONTAINMENT ELEVATION 620'0" (SEE BELOW)



REV. 1
KL1- C11 - F010/F18

PERRY NUCLEAR POWER PLANT
UNITS 1 AND 2

CEI
REVIEWED BY
RARtli 7-21-84
APPROVED BY
7-21-84

DYNAMIC QUALIFICATION

COMPONENT NAME: CONTROL ROD DRIVE VENT VALVE

MPL OR EDL ITEM NO.: C11-F010/F180

MPL REFERENCE: 283X318CA, REV. 13

EQUIPMENT CLASSIFICATION: ☒ ACTIVE ☐ PASSIVE

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

PREPARED BY: S.Y. Koh DATE 7-16-84

ORGANIZATION GENERAL ELECTRIC CO. — NEBO

REVIEWED BY: G.I. Samstad DATE 7/18/84
SQRT PROGRAM MANAGER

APPROVED BY: K.C. Yee for DATE 7-17-84
RESPONSIBLE DESIGN ENGINEER

GENERAL ELECTRIC

MPL: C11-F010/F180

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Perry 1 & 2 Type:

1. Utility: Cleveland Electric PWR

2. NSSS: General Electric BWR 6 - Mark III

3. A/E: Gilbert Associates, Inc. Other

II. Component Name CRD Scram Discharge Volume Vent Valve

1. Scope: [X] NSSS [ ] BOP [ ] Other

2. Model Number: 522FRR62HAZ9 Quantity: 2

3. Size or Range: 1 inch

4. Vendor: ITT Hammel Dahl

5. If the component is a cabinet or panel, name and model number of the devices included: N/A

6. Physical Description:

   a. Appearance: Air Operated Globe Valve

   b. Dimensions: 34" ± 2" High and 10" Wide

   c. Weight: 215#

7. Location: Building: Inside Containment

   Elevation: approx 642' RH

8. Field Mounting Conditions [ ] Bolt (No. ___, Size ___)

   [ ] Weld (Length ____)

   [X] Socket Weld

9. Mounting Orientation [e.g., on floor, cantilevered, suspended, etc.]

   Pipe mounted on SDV piping.

10. a. System in which located: CRD

    b. Functional Description: Valve normally open, required to close when scram occurs.

    c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both [ ] Neither [ ] Other _______

*To be determined during field check.

RH:rm/A09104*-1
9/23/82

MPL C11-F010/F180

II. Pertinent Reference Design Specification for Qualification Requirements: 22A6924, 22A6924AA, 23A1331

a. [x] Seismic Input
b. [x] Hydrodynamic Load Input
c. [x] Fatigue Considerations
d. [x] Service Conditions
e. [ ] Qualified Life

III. Is Equipment Available for Inspection in the Plant:

[x] Yes [ ] No [ ] Partial or limited availability

IV. Equipment Qualification Method:

[x] Test [ ] Analysis [ ] Combination of Test and Analysis

Qualification Report*: #58840 Rev. B 2/5/84

(No., Title and Date): "Qualification Testing of CRD Vent and Drain Valves for GE"

Company that Prepared Report: Wyle Laboratories

Company that Reviewed Report: General Electric

Where Report is filed or available: VPF #5485-71(1), (2)

Applicable Codes and/or Standards: IEE 344-1975, IEEE 382-1980

V. Vibration Input:

1. Loads considered:
   a. [ ] Seismic only
   b. [ ] Hydrodynamic only
   c. [ ] Vibration from normal operation
   d. [x] Combination of (a), (b), and (c)
2. Method of Combining RRS:
   [ ] Absolute Sum [x] SRSS [ ] ______ (other, specify)
3. Required Response Spectra** (attach the graphs): See Note 1

NOTE 1:
- RRS for OBE (upset) for Perry 1 & 2 and test are on Figures 2 (Horizontal) and 3 (vertical)
- RRS for SSE (faulted) for Perry 1 & 2 and test are on Figures 4 (Horizontal) and 5 (vertical)

NOTE:

* If more than one report complete Items IV thru VII for each report.

** If other than RRS is used, describe methods.

RH: rm/A09104*-2

4. Damping Corresponding to RRS: OBE 2% SSE 5%
5. Required Acceleration in Each Direction:

[ ] ZPA [X] Other N/A (specify) SEE NOTE ON PAGE 1
RH

OBE S/S = ____ F/B = ____ V = ____

SSE S/S = ____ F/B = ____ V = ____

6. Were fatigue effects considered:

[X] Yes [ ] No

If yes, describe how they were treated in overall qualification program: a) A 90 minute vibration aging in each orthogonal axis was performed with a 0.75g sinusoidal input from 5 Hz to 200 Hz to 5 Hz at a rate of 2 octaves/minute.

b) A biaxial 15 minute SRV cycling fatigue aging was conducted in each of the horizontal axes separately but simultaneously with the vertical axis.

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [x] Multi-Frequency [x]random

[ ] sine beat

[ ] ____

2. [ ] Single Axis [x] Multi-Axis

[X] Independent Axis [ ] In-phase motions

3. Number of Qualifications Tests:

OBE 5 SSE 1 Other ____ (specify)

4. Frequency Range: 1.25 to 100 Hz
5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):

S/S = 20 Hz (lateral) F/B = 60 Hz (long) V = greater than 100 Hz

6. Method of Determining Natural Frequencies:

[X] Lab Test [ ] In-Situ Test [ ] Analysis

7. TRS enveloping RRS using Multi-Frequency Test:

[x] Yes (Attach TRS & RRS graphs)

[ ] No

8. Maximum Input g Level Test: *

OBE S/S = ______ F/B = ______ V = ______

SSE S/S = ______ F/B = ______ V = ______

*N/A - RRS used during test

9. Laboratory Mounting:

A. [x] Bolt (No. 8 per nozzle Size ___)

[x] Socket Weld (Length ___) [ ] ______

B. Orientation and Fixturing: TO SIMULATE FIELD CONDITION RH

10. Functional operability verified:

[x] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made:

There were no modifications made. Valve stroking times prior, during and after the test were within the specified limits.

12. Other tests performed (such as aging or fragility test, including results):

Prior to seismic (upset and faulted) test, the valve was subjected to a 90 minute vibration aging and 15 minute SRV cycling fatigue aging in each of the axes (see answer to Section V, question 6). The tests were successful.**

13. Failure Modes (If appropriate) None Identified

14. Margins Available: [X] Input Spectrum [ ] Fragility

VII. If Qualification by Analysis, then complete: N/A

1. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

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

S/S = ______ F/B = ______ V = ______

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam

[ ] Closed Form Solution [ ] Other ______

**Thermal aging analyses have also shown that the aging mechanism does not affect the valve performance under dynamic conditions.

MPL: C11-F010/F180

4. [ ] Computer Codes: ____________________

Frequency Range and No. of modes ____________________

[ ] Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

[ ] Absolute Sum [ ] SRSS [ ] Other: ____________ (specify)

6. Damping:

OBE ______ SSE _____ Basis for 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 Allowable

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ____________________

10. Margins Available: [ ] Input Spectrum

[ ] Stress or Deflection

FIGURE 2

OBE (Upset) Required Response Spectra

Horizontal Direction

C11-F010/F180

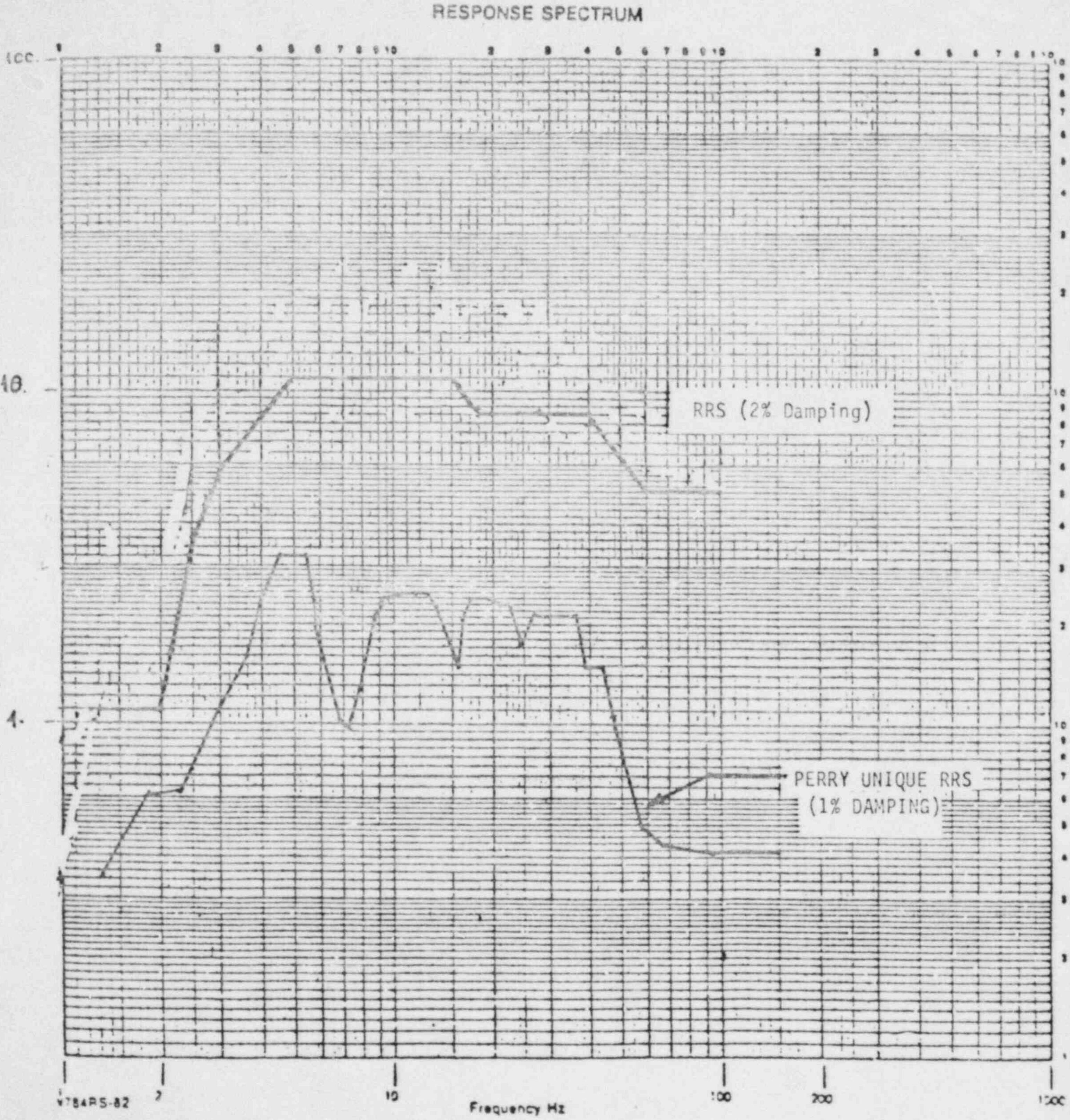


FIGURE 3

OBE (Upset) Required Response Spectra

Vertical Direction

C11-F010/F180

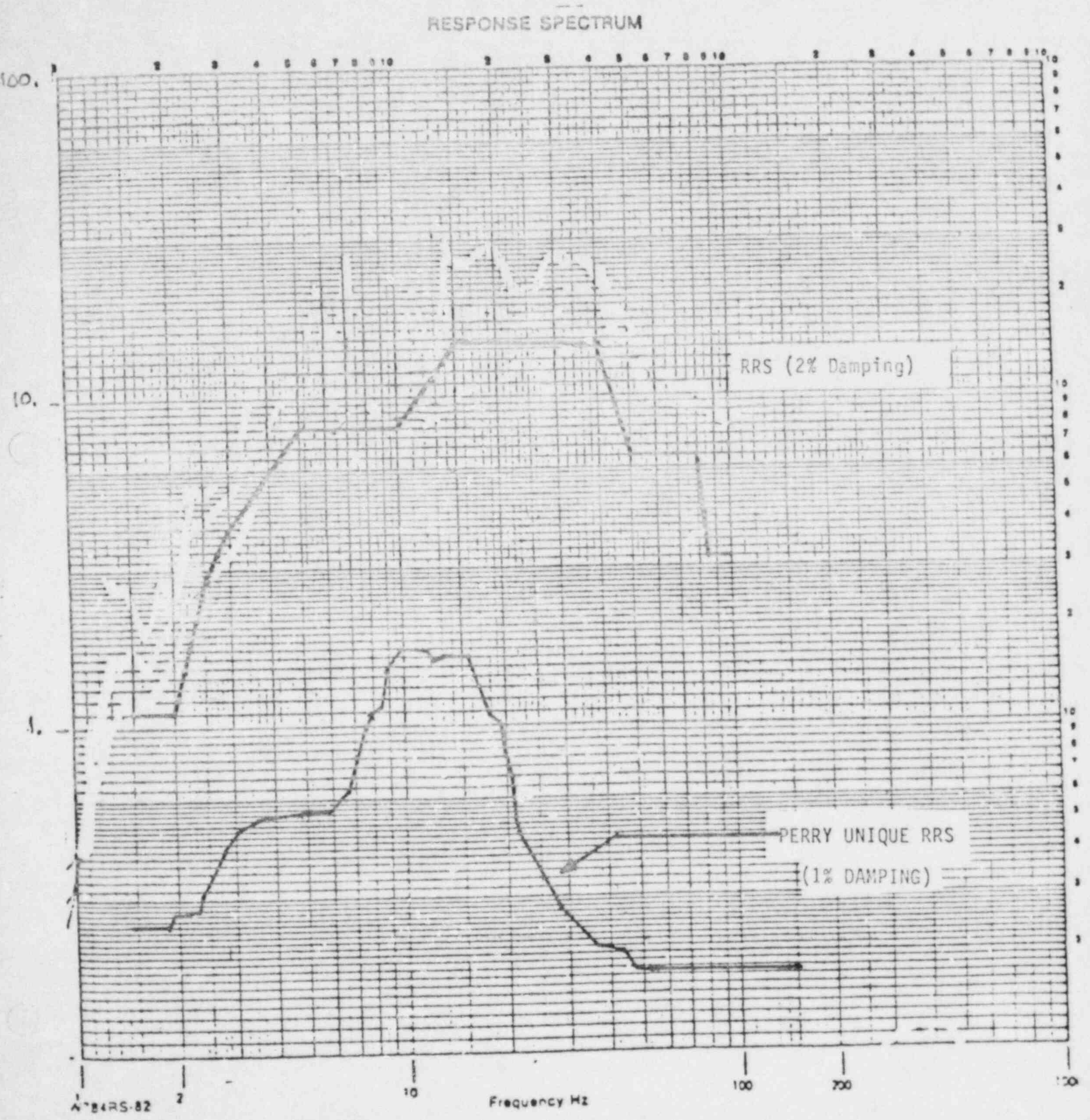


FIGURE 4

SSE (Faulted) Required Response Spectra

Horizontal Direction

C11-F010/F180

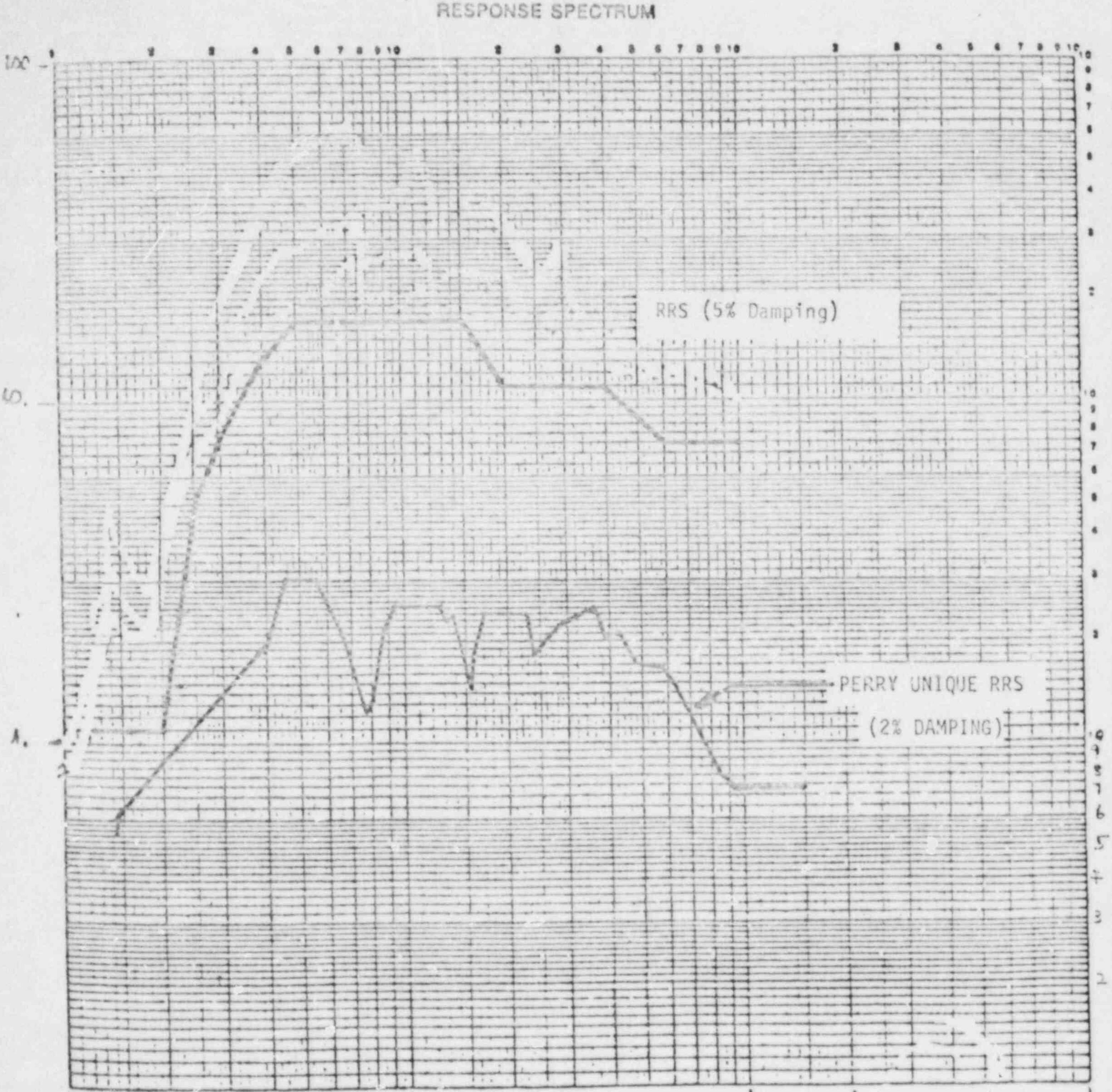


FIGURE 5

WYLE LABORATORIES SCIENTIFIC SERVICES & SYSTEMS GROUP

SSE(Faulted) RRS
Vertical Direction

REPORT NO. 58840
PAGE NO. III-295

CUSTOMER G.E. Job No. 58840 Date 6-3-83

Specimen 1" VENT VALVE {2" ~~DRAIN VALVE~~, 2500 LBS, C11/12 - F180} F181 Axis of Test Z-Y

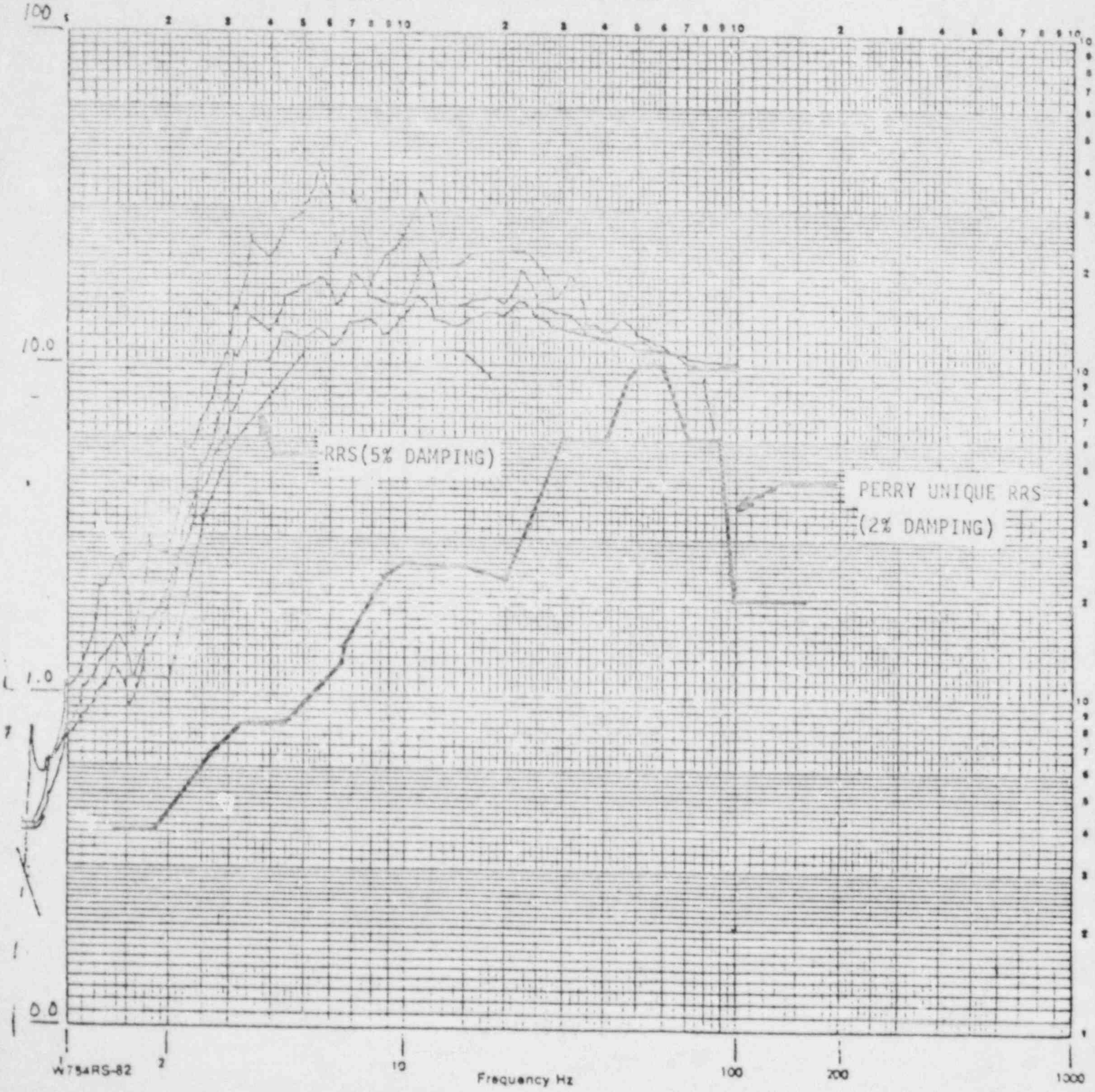
Accel. No. 2 Axis VERT. Control (✓) Response ( ) OBE ( ) SSE (✓) DBE ( )

Full Scale 100 g Damping 1, 3, (5)% Run No. 12

Operator GEETERMAN Engineer C. C. Lee

* NEW VALVES, S/N 005 {006

RESPONSE SPECTRUM



SP501-S11.00

KL1- C41-F004

PERRY NUCLEAR POWER PLANT
UNITS 1 AND 2

CEI
REVIEWED BY
EASitch , 7-21-8
APPROVED BY
7-21-8

DYNAMIC QUALIFICATION

COMPONENT NAME: SLCS (Explosive) Valve A, B

MPL OR EDL ITEM NO.: C41-F004 A, B

MPL REFERENCE: 283X224CA Rev. 14

EQUIPMENT CLASSIFICATION: ☒ ACTIVE ☐ PASSIVE

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

PREPARED BY W. J. Roit W J Roit DATE 2/24/84

ORGANIZATION GENERAL ELECTRIC CO. — NEBO

REVIEWED BY: DATE 2/24/84
SQRT PROGRAM MANAGER

APPROVED BY G. L. Moore G. L. Moore DATE 2-24-84
RESPONSIBLE DESIGN ENGINEER

GENERAL ELECTRIC

PY-CEN/CEI-2072

MPL: C41-F004

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Perry

Type:

1. Utility: Cleveland Electric Illum. Co.

PWR

2. NSSS: General Electric Co.

BWR 6, Mark III

3. A/E: Gilbert Associates

Other

II. Component Name Standby Liquid Control System Explosive Valve

1. Scope: [X] NSSS [ ] BOP [ ] Other
2. Model Number: 1832-159-01 Quantity: 2
3. Size or Range: 1400 psi, $C_v \geq 13$
4. Vendor: Conax
5. If the component is a cabinet or panel, name and model number of the devices included: N/A
6. Physical Description:
    a. Appearance: Cylindrical Valve
    b. Dimensions: 4.5 in. Long x 7 in. O.D.
    c. Weight: 40 lbs.
7. Location: Building: Reactor Building, outside dyrwell
    Elevation: Approx. 644 ft.
8. Field Mounting Conditions [X] Bolt (No. 4, Size 1") (Between Flanges
    [ ] Weld (Length ___)
    [ ]
9. Mounting Orientation [e.g., on floor, cantilevered, suspended, etc.]
    The valve is mounted between 2 flanges attached to 1 1/2" pipe
10. a. System in which located: Standby Liquid Control System (SLC)
    b. Functional Description: Provide Leaktight shutoff of SLC until fired
    c. Is the equipment required for [ ] Hot Standby [X] Cold Shutdown [ ] Both [ ] Neither [ ] Other

RH: rm/A09104*-1
9/23/82

MPL C41-F004

11. Pertinent Reference Design Specification for Qualification Requirements: 21A9370AB Rev. 7 & 21A9370 Rev. 6

a. [X] Seismic Input
b. [X] Hydrodynamic Load Input
c. [X] Fatigue Considerations
d. [X] Service Conditions
e. [X] Qualified Life

III. Is Equipment Available for Inspection in the Plant:

[X] Yes [ ] No [ ] Partial or limited availability

IV. Equipment Qualification Method:

[X] Test [ ] Analysis [ ] Combination of Test and Analysis

Qualification Report*: NEDC-30207

(No., Title and Date): Environmental Qualification Report, SLCS (Explosive) Valve (Oct. 1983)

Company that Prepared Report: General Electric

Company that Reviewed Report: General Electric

Where Report is filed or available: General Electric - NEBO

Applicable Codes and/or Standards: NUREG-0588, Category I ; ASME B&PV Code

V. Vibration Input:

1. Loads considered:
   a. [ ] Seismic only
   b. [ ] Hydrodynamic only
   c. [ ] Vibration from normal operation
   d. [X] Combination of (a), (b), and (c)
2. Method of Combining RRS:
   [ ] Absolute Sum [ ] SRSS [X] Customer Provided RRS (other, specify)
3. Required Response Spectra** (attach the graphs): See Attachment A

NOTE:

* If more than one report complete Items IV thru VII for each report.

** If other than RRS is used, describe methods.

RH: rm/A09104*-2

MPL: C41-F004

4. Damping Corresponding to RRS: OBE N/A (Note 1) SSE N/A (Note 1)

5. Required Acceleration in Each Direction:

[X] ZPA [ ] Other ______ (specify)

OBE S/S = .3g F/B = .3g V = .2g

SSE S/S = .45g F/B = .45g V = 2g

6. Were fatigue effects considered:

[X] Yes [ ] No

If yes, describe how they were treated in overall qualification program: The valve was aged 90 minutes per axis in a .75g 5 to 200 hz sine sweep, while pressurized to 1400 psi. The valve was also aged 15 minutes each axis at 4.5g peak (min.) acceleration by the sine beat method. At least 8 minutes per axis was performed at the test setup natural frequency.

VI. If Qualification by Test, then Complete:

1. [X] Single Frequency [ ] Multi-Frequency [ ] random

[X] sine beat

[ ] ______

2. [X] Single Axis [ ] Multi-Axis

[ ] Independent Axis [ ] In-phase motions

3. Number of Qualifications Tests:

OBE 5 per axis SSE 1 per axis Other ______ (specify)

4. Frequency Range: 5-200 hz during aging; 5-20 hz, 45-60hz, and 90-100 hz for OBE & SSE

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): (See Note 1)

S/S = >100 hz F/B = >100 hz V = >100 hz

6. Method of Determining Natural Frequencies:

[ ] Lab Test [ ] In-Situ Test [X] Analysis (Attachment C)

7. TRS enveloping RRS using Multi-Frequency Test:

[ ] Yes (Attach TRS & RRS graphs) RRS attached as Attachment A

TIM attached as Attachment B

[X] No --TIM envelopes RIM by single frequency tests (See Note 1)

NOTE 1: The valve is very compact and massive; therefore it has an inherent high natural frequency. The trigger sub-assembly has the lowest natural frequency as identified in Attachment C where its natural frequency is determined to be >100 hz. Due to the high natural frequency, RIM (for ZPA) testing is justified and damping is not pertinent.

MPL: C41-F004

8. Maximum Input g Level Test:

OBE S/S = 4.5g F/B = 4.5g V = 4.5g

SSE S/S = 6.75g F/B = 6.75g V = 6.75g

9. Laboratory Mounting:

A. [X] Bolt (No. 4 , Size 1") Bolted between two mating flanges

[ ] Weld (Length ____) [ ] __________

B. Orientation and Fixturing: Attached to 2-11" lengths of 1 1/2" pipe

10. Functional operability verified:

[X] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made:

The valve did not sustain any functional or structural damage during or after test. The valve fired successfully during later environmental testing.

12. Other tests performed (such as aging or fragility test, including results):

The valve was thermally and radiation aged prior to dynamic testing. The valve was later successfully tested during DBE (LOCA) testing.

13. Failure Modes (If appropriate) None Identified

14. Margins Available: [X] Input Spectrum [ ] Fragility

VII. If Qualification by Analysis, then complete: N/A

1. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

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

S/S = __________ F/B = __________ V = __________

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam

[ ] Closed Form Solution [ ] Other __________

MPL: C41-F004

4. [ ] Computer Codes: ____________________
Frequency Range and No. of modes ____________________
[ ] Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:
[ ] Absolute Sum [ ] SRSS [ ] Other: ____________ (specify)

6. Damping:
OBE ______ SSE _____ Basis for 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 Allowable

B. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ____________________

10. Margins Available: [ ] Input Spectrum
[ ] Stress or Deflection

J - ACCIDENT - Seismic and Dynamic Loads

Acceleration Response Spectra Data Sheet

I. LOAD COMBINATION: OBBA/SSBA DIRECTION: H-HORIZONTAL V-VERTICAL

COMBINATION METHOD: SRSS X ABS ______

II. SPECTRA TO BE ~~DESCRIBED HEREIN~~ (or provided on sheets attached)

AS NOTED BELOW:

OBBA = OBE + SRV, 2%	EQ-644-1-H,V, REV 0
DE1 = SSE + PS, 3%	EQ-644-2-H,V, REV.
LC3 = SSE + SRV + CO, 3%	EQ-644-3-H,V, REV
LC4 = SSE + SRV + CHUG, 3%	EQ-644-4,H,V, REV.
DE2 = HIGHER OF LC3 OR LC4, 3%	EQ-644-3/4,H,V, REV.
SSBA = HIGHER OF DE1 OR DE2, 3%	EQ-644-2/3/4-H,V, REV
FATIGUE CURVES:	
SRV (DURATION BY GE)	EQ-642-SRVH,V, REV 0
CHUGGING (DURATION BY GE)	EQ-642-CH,V, REV. 0

3

Acceleration

Frequency (Hz)

PIPE MOUNTING EQUIPMENT SHALL ALSO BE QUALIFIED TO A REQUIRED INPUT MOTION (RIM) OF 6g FROM 1 TO 100 HZ. FOR EQUIP. THAT IS SUBJECT TO NEW LOADS.

3

III SPECIAL INSTRUCTION: and derivation details:

FIELD MOUNTING/ORIENTATION IS IN ACCORDANCE WITH MANUFACTURERS AND/OR GE. INTERFACE RECOMMENDATIONS

IV. REFERENCES:

1. FOR DURATION OF SRV AND CHUGGING LOADS SEE GE. LTR. NEDE 24326-P

3

PWA 424923 REV 0

PAGE 69 OF 340

NOTES:

(1) EQUIPMENT LOCATION - Define location of equipment within the plant e.g., room #, zone designation, panels, elevation, etc.

(2) SERVICE CONDITION - Environmental, power, and signal conditions expected as a result of normal opeation requirements and expected non-accident transients requirements.

Parameter values should represent environmental conditions in the vicinity of the equipment. Heating sources (pipes, cooling fans, etc.) and area stratification should be included in establishing temperature.

Parameters Margins as defined in NUREG 0588 should not be included. If test margins are included, they shall be identified and described.

(3) SIGNIFICANT ENVIRONMENTAL VARIATIONS - Those environmental variations resulting from postulated operating events which have impact on the equipment. Events to be considered in variations during normal plant operation, test and non-accident transients.

(4) CYCLES - Defined as number of occurances.

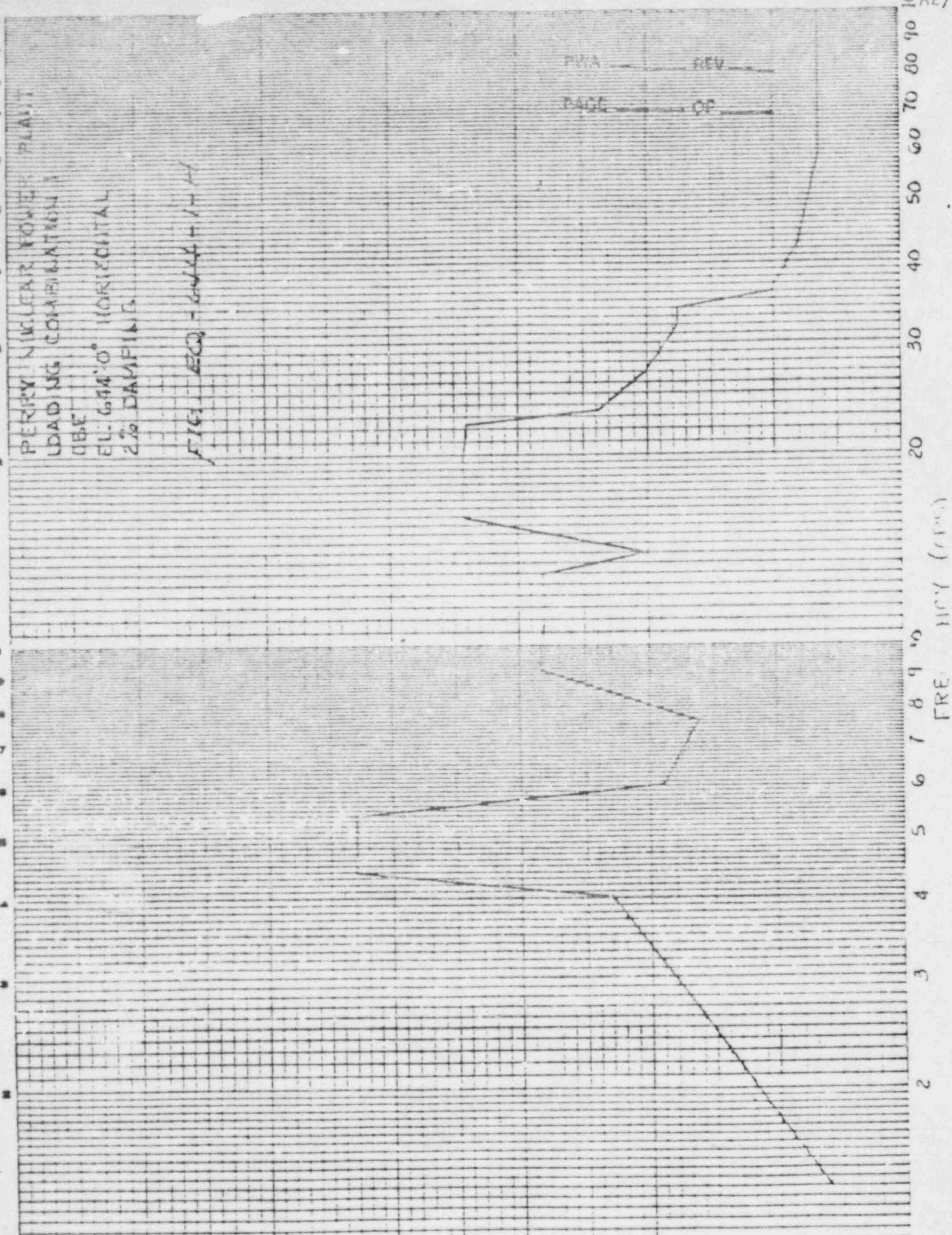
PROJECT: PNPP
EQUIP. LOC: CT-4
PPD NO. : 21A9370AB

REV 2 W.F.B 8-9-82
REV. 3 KJM 11-15-82

21A.9370AB-3

70 of 340

A2/17



21A9370 AB-4

71 of 340

A3/17

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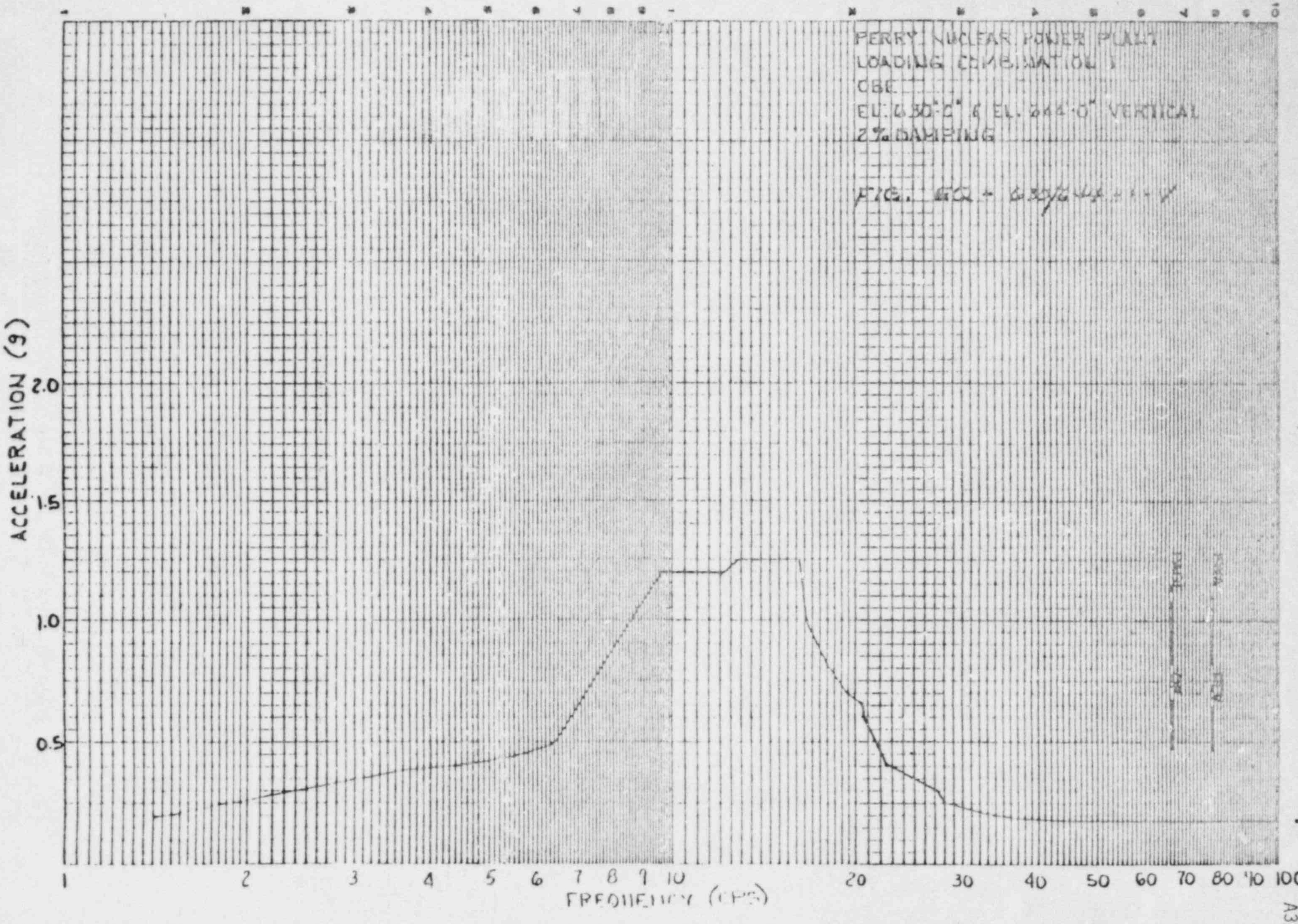
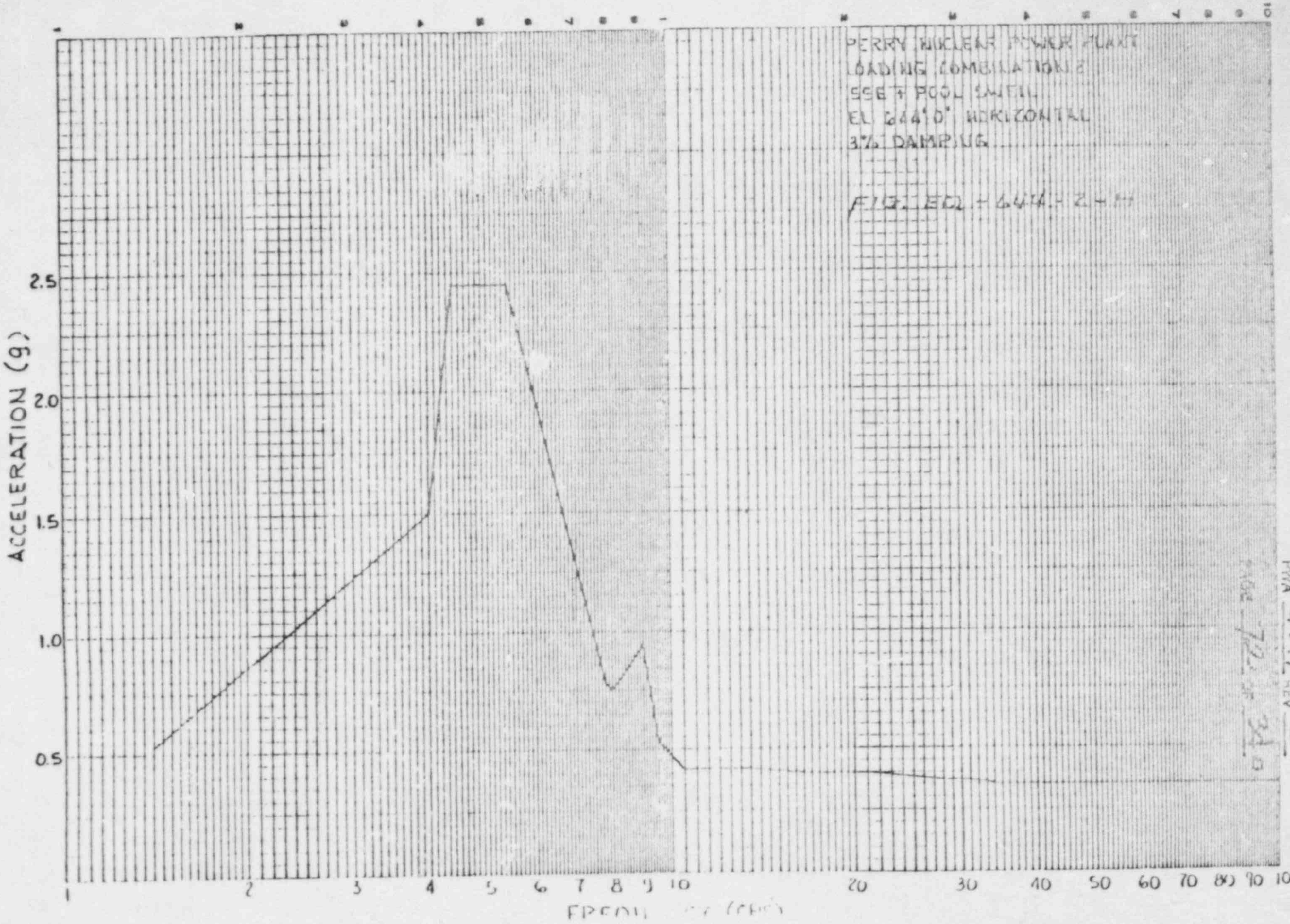
DIETZGEN CORPORATION
MADE IN U.S.A.



PERRY NUCLEAR POWER PLANT
LOADING COMBINATION 1
OBE
EL. 630'-0" & EL. 644'-0" VERTICAL
2% DAMPING

FIG. EQ - 630/644-1-V

21A9370AB-5



PERRY NUCLEAR POWER PLANT
LOADING COMBINATION 2
SSE + POOL SWELL
EL 644'0" HORIZONTAL
3% DAMPING

FIG. EQ-644-2-H

PWA 4345^{28} REV 0
PAGE 72 OF 340

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21A9370 AB-6

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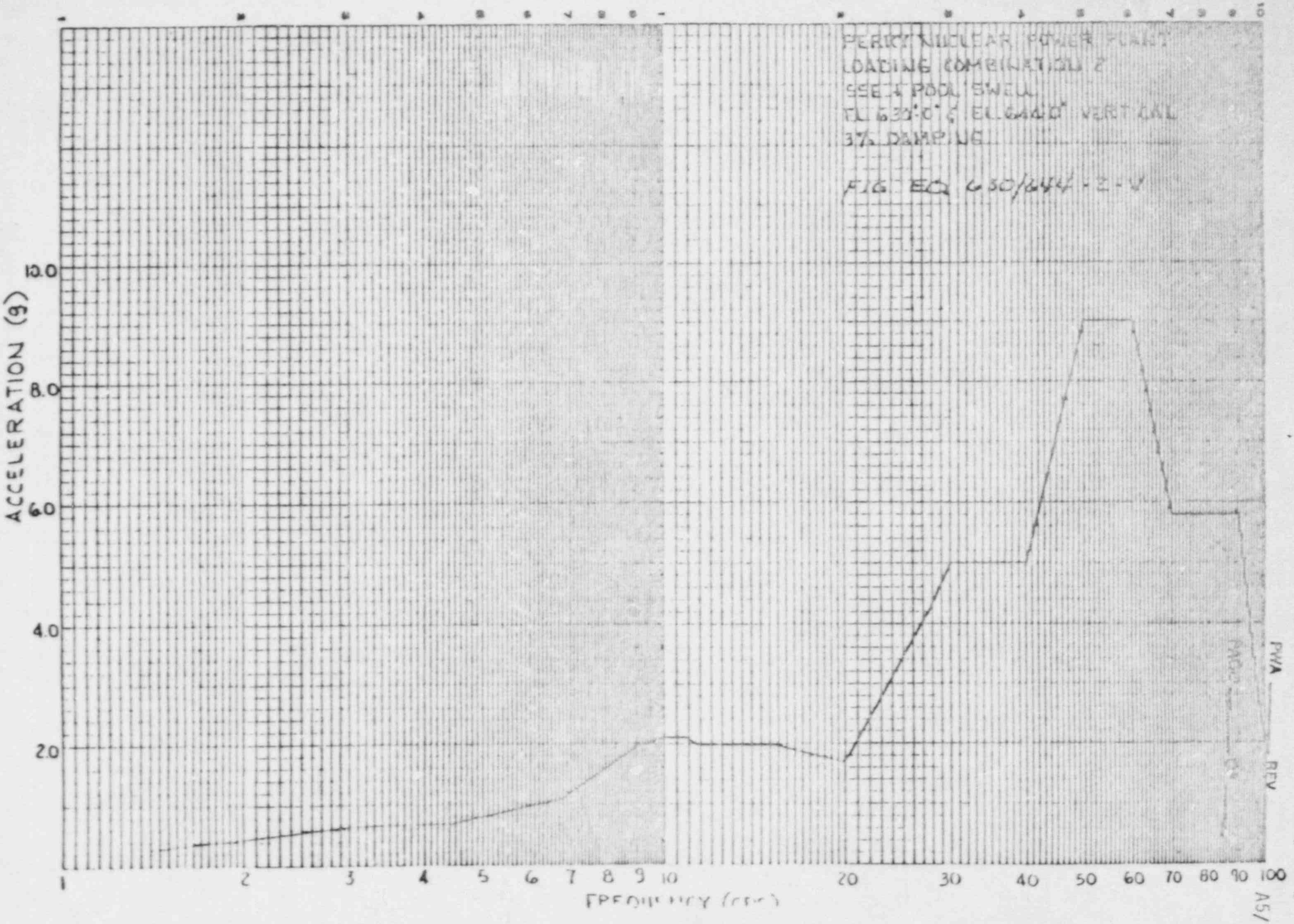

PERRY NUCLEAR POWER PLANT
LOADING COMBINATION 2
SSE + POOL SWELL
EL 630'-0" & EL 644'-0" VERTICAL
3% DAMPING

FIG EQ 630/644-2-V

PWA ____ REV ____
PAGE ____ OF ____

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21A9370 AB-7

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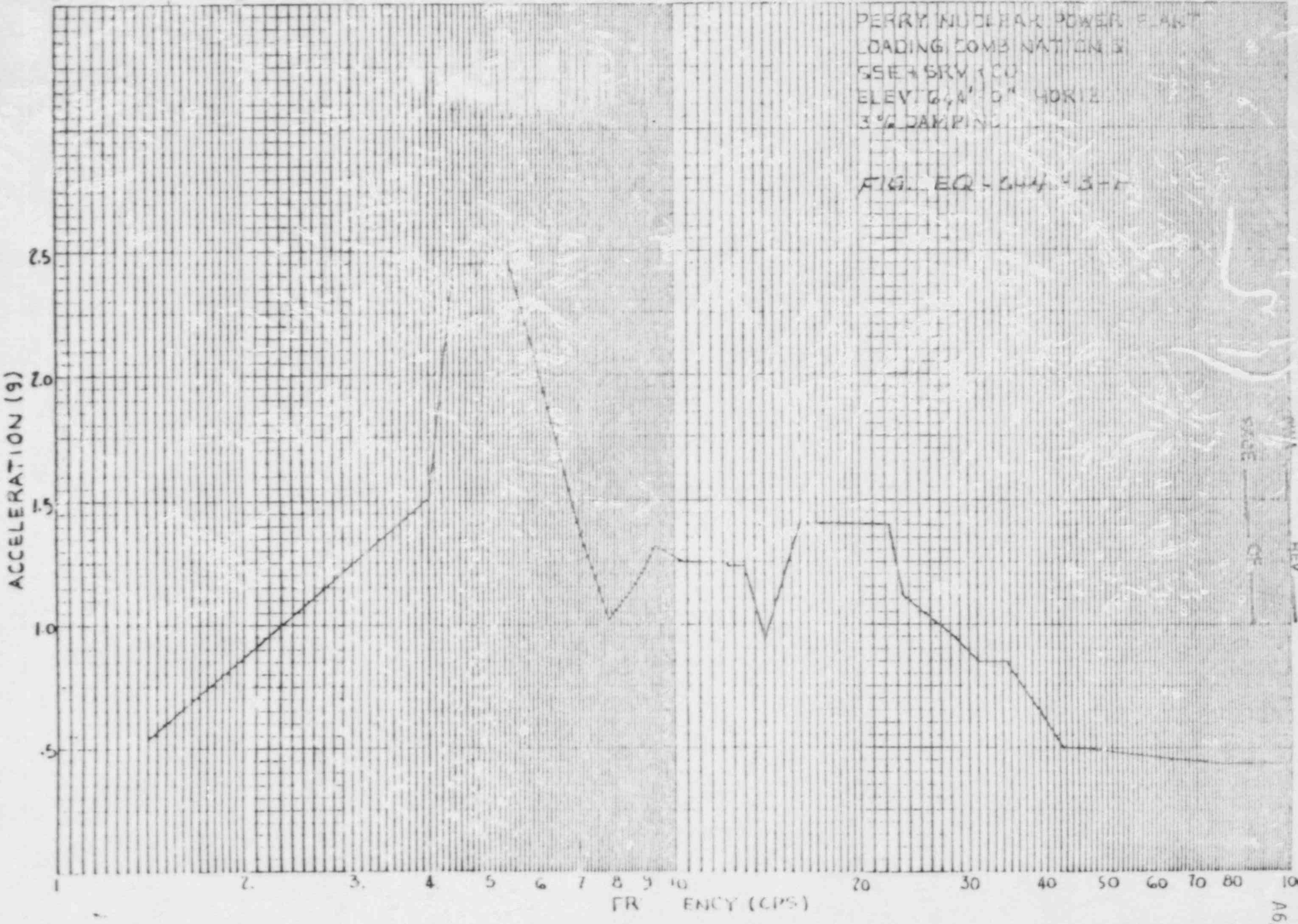
A6/17



21A 9370 AB-8

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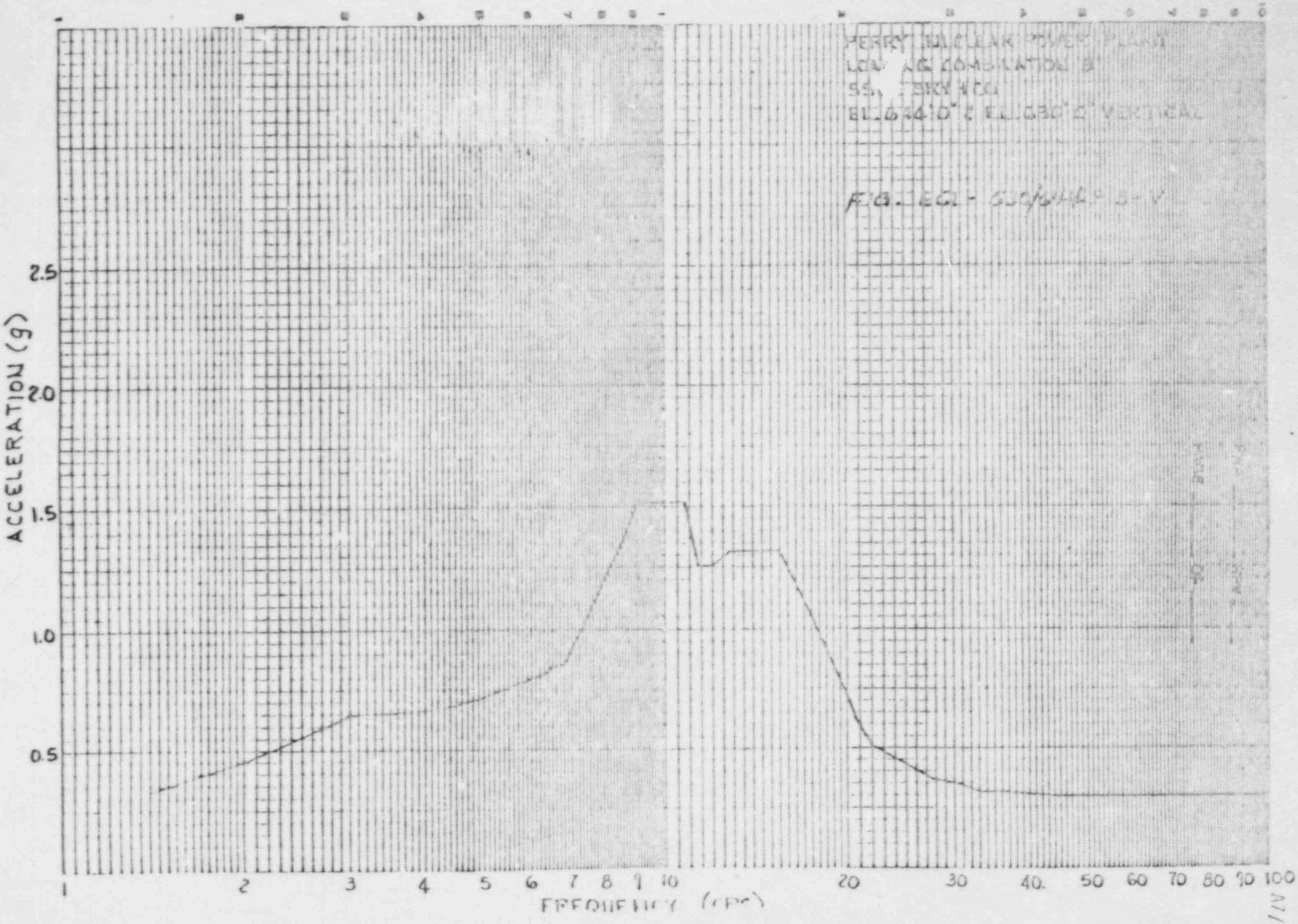
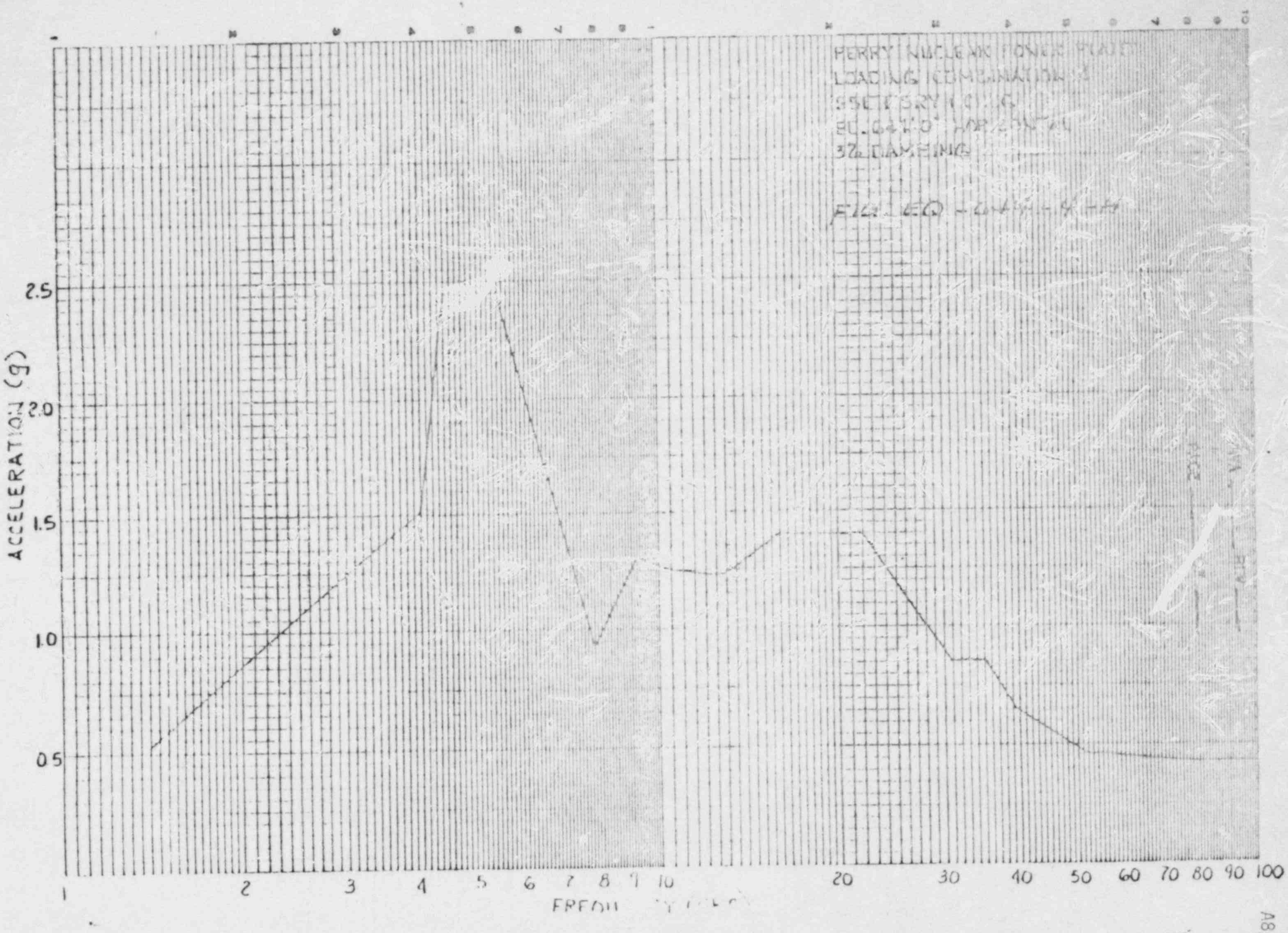
A7/17



NO. 340-L210 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
2 CYCLES X 10 DIVISIONS PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.



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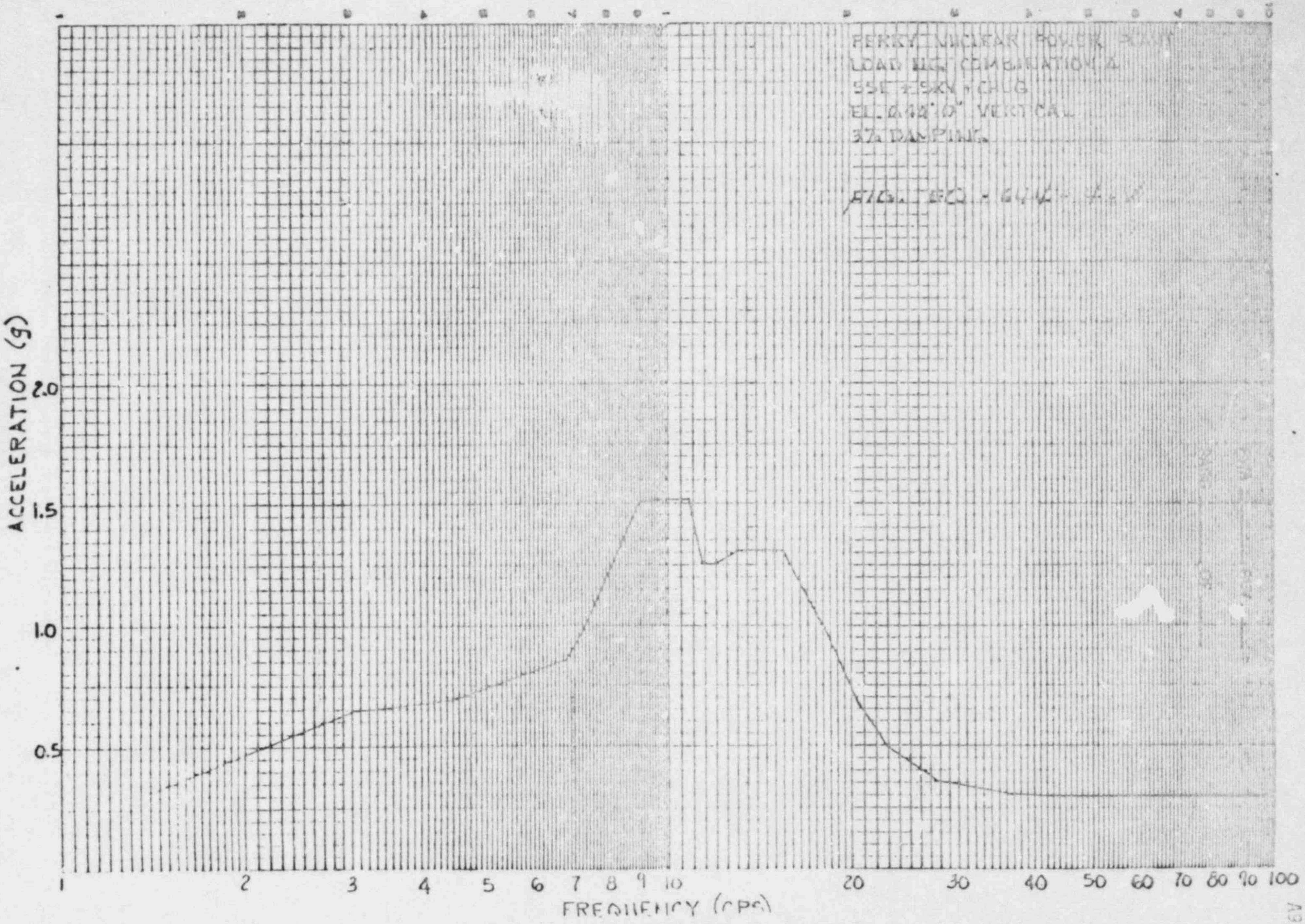
21A9370AB-10



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21A9370-1

SSBA

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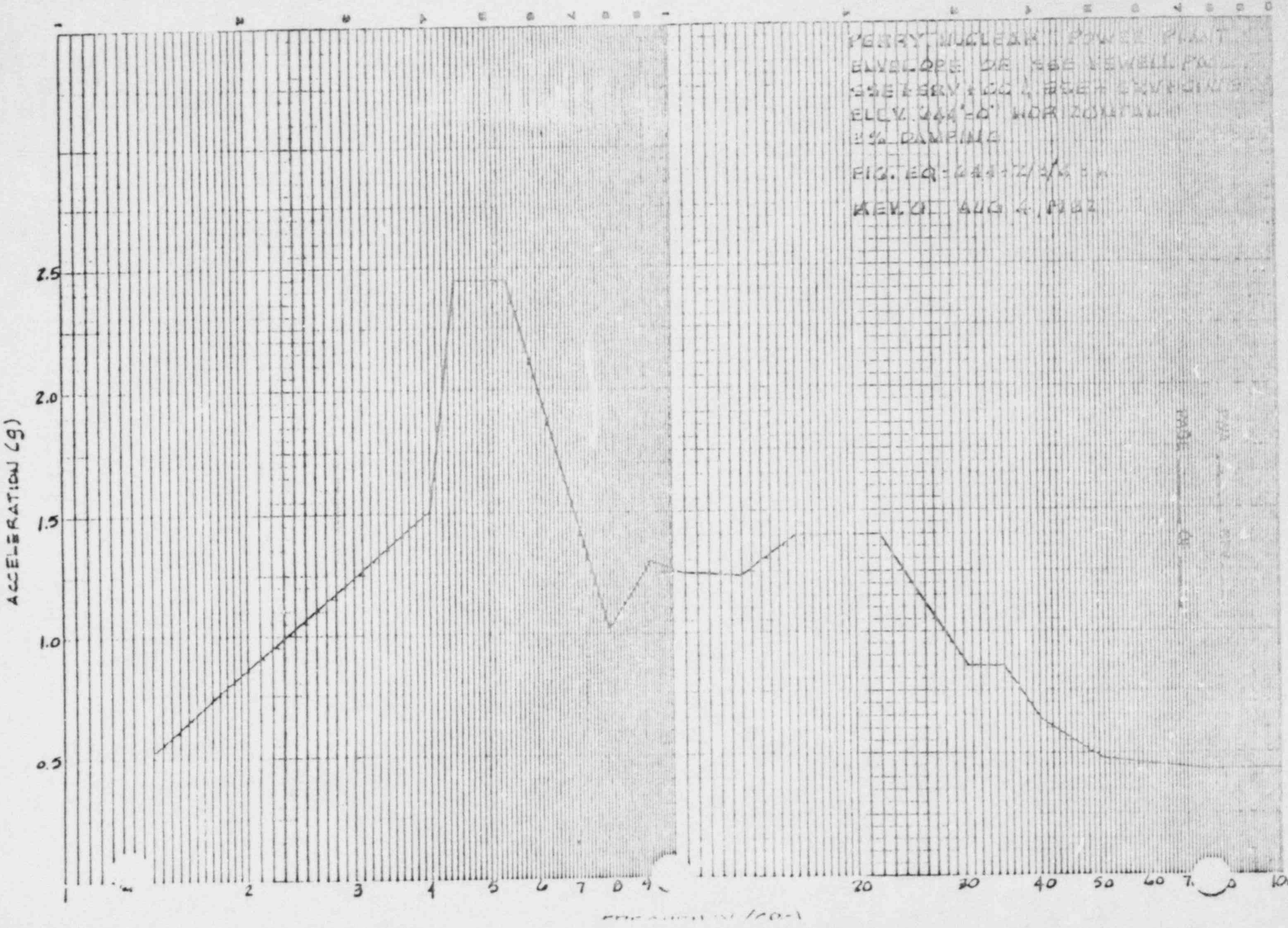

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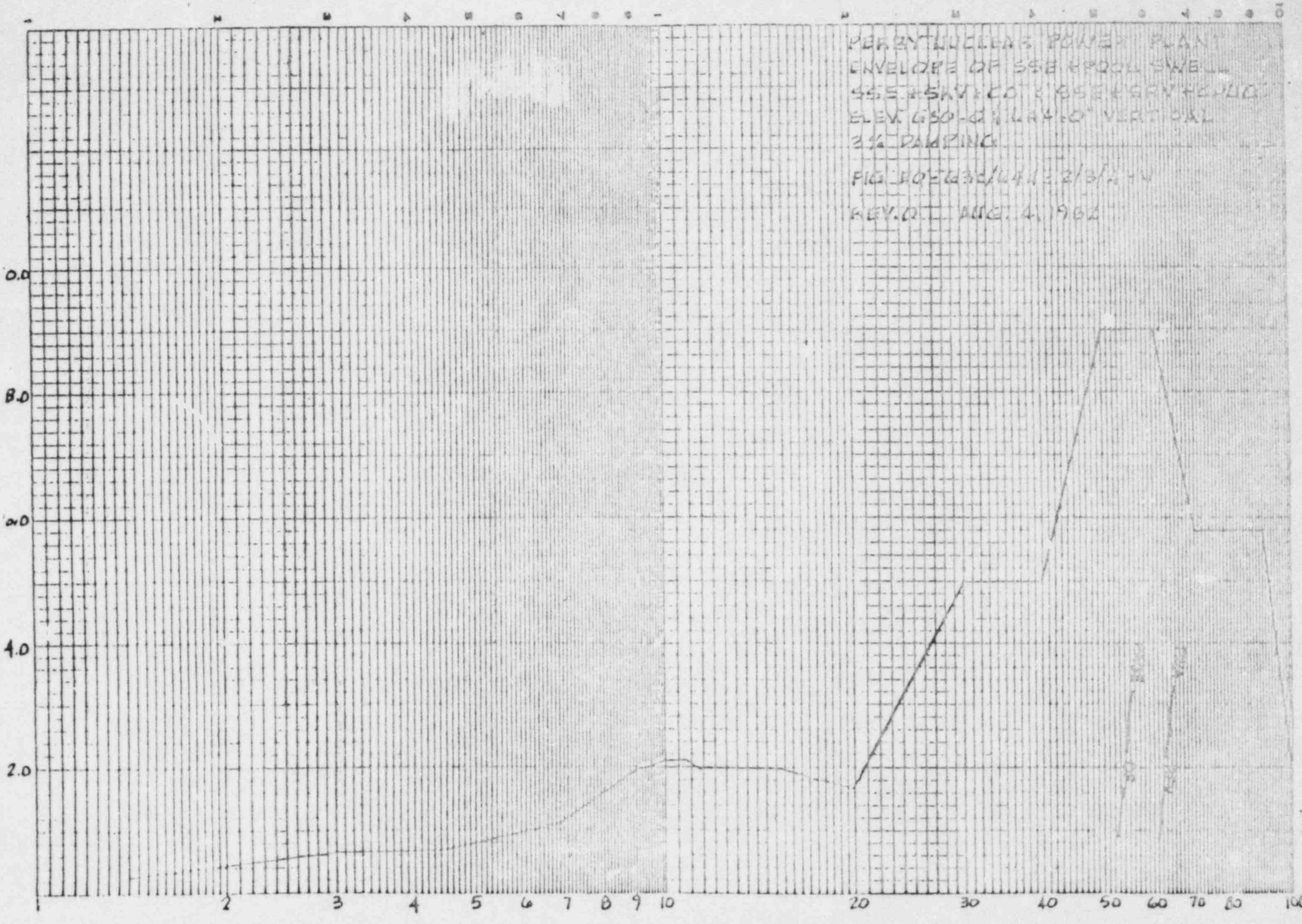
SSEA

72



PERRY NUCLEAR POWER PLANT
ENVELOPE OF SSE + POOL SWELL
SSE + SRV-CO & OBE + SRV-ADS
ELEV. 650-0 & 644-0" VERTICAL
2% DAMPING
FIG. 40E 632/644 2/3/4 4V
REV. 0 AUG. 4, 1982

21A9370-13

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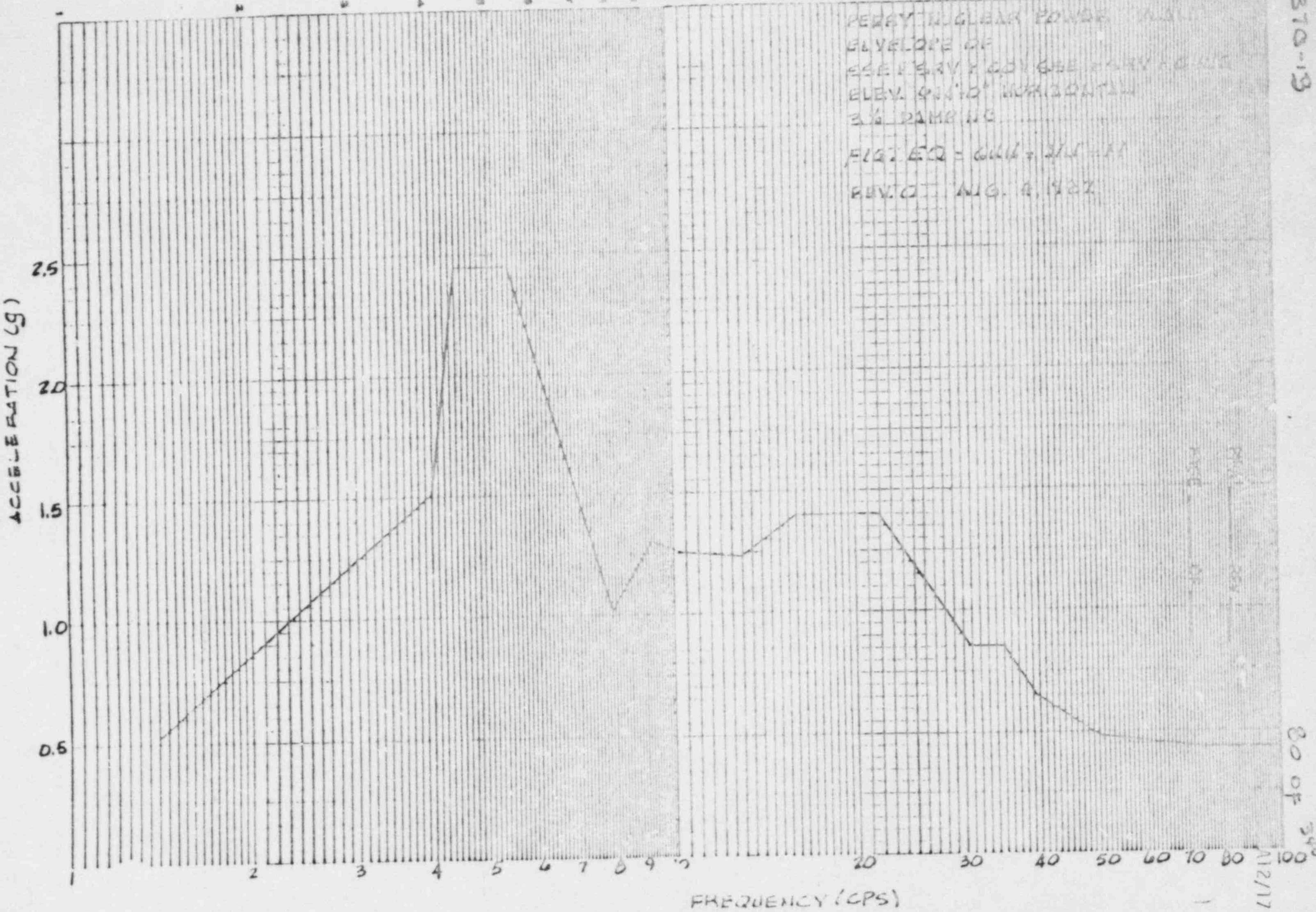
A12/17

NO. 340-L210 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
2 CYCLES X 10 DIVISIONS PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.

DEL



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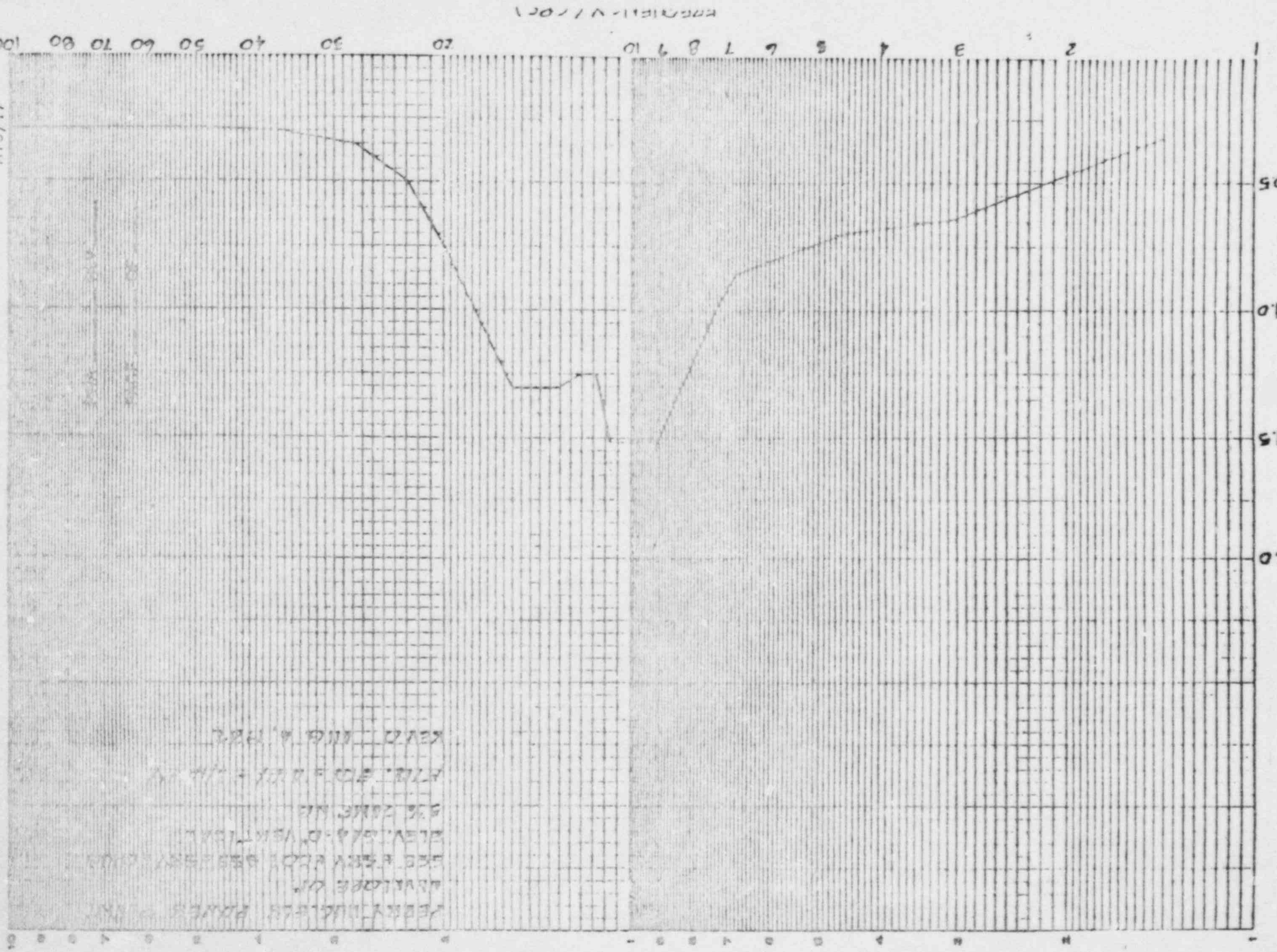
A13/17



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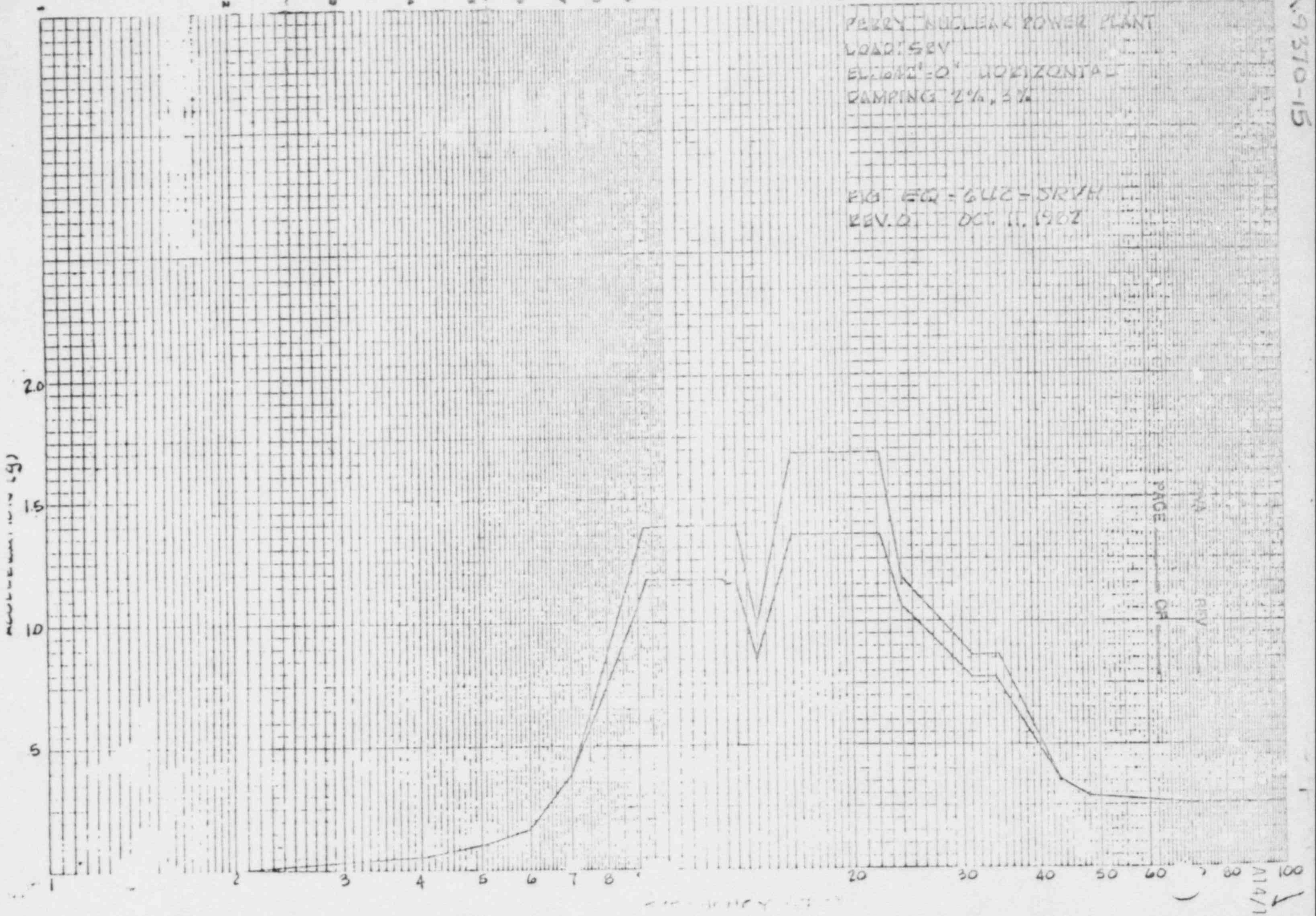

PERRY NUCLEAR POWER PLANT
LOAD: SRV
EL. 642'-0" HORIZONTAL
DAMPING 2%, 5%

FIG. EQ-642-SRVH
REV. 0 OCT. 11, 1982

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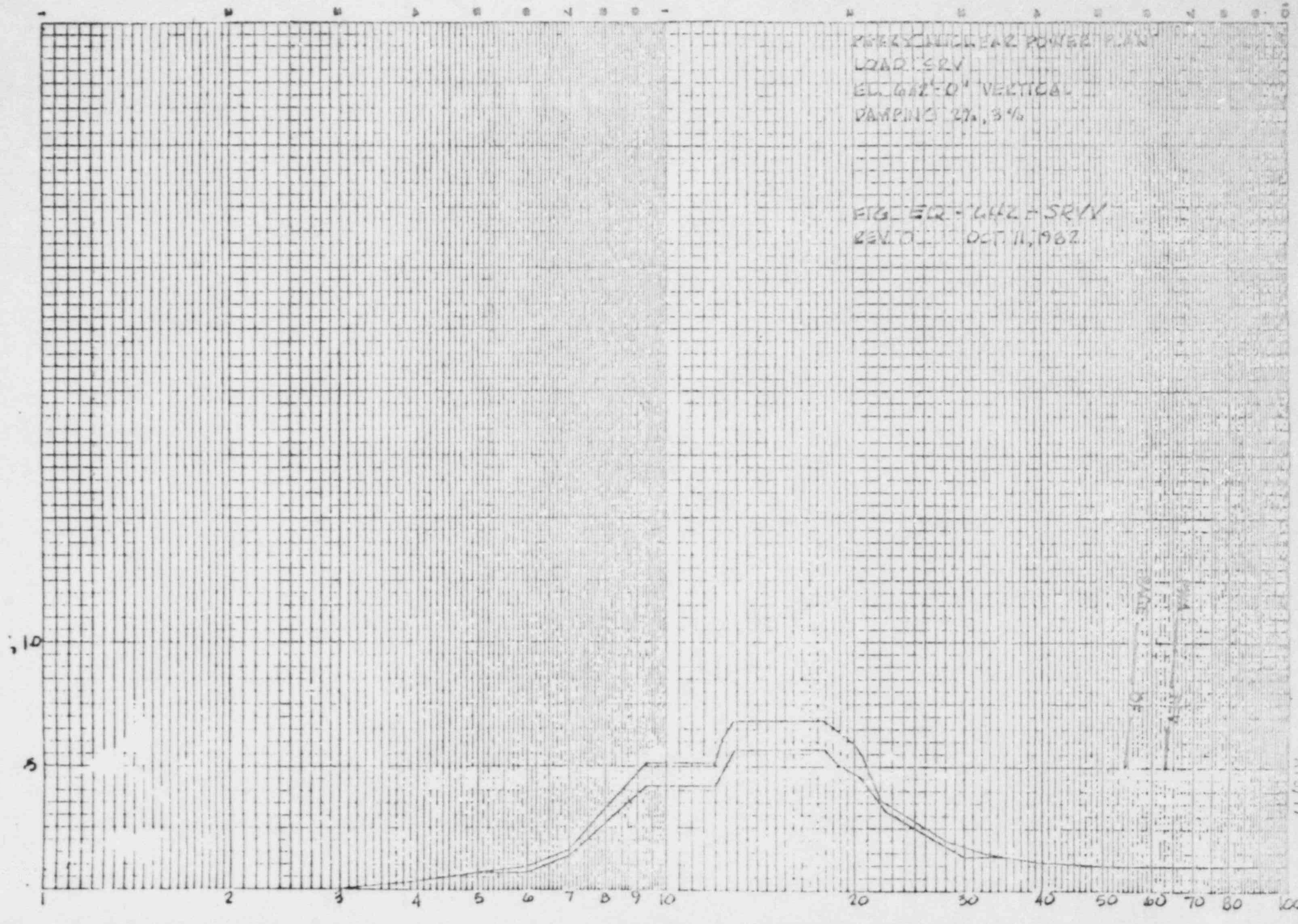
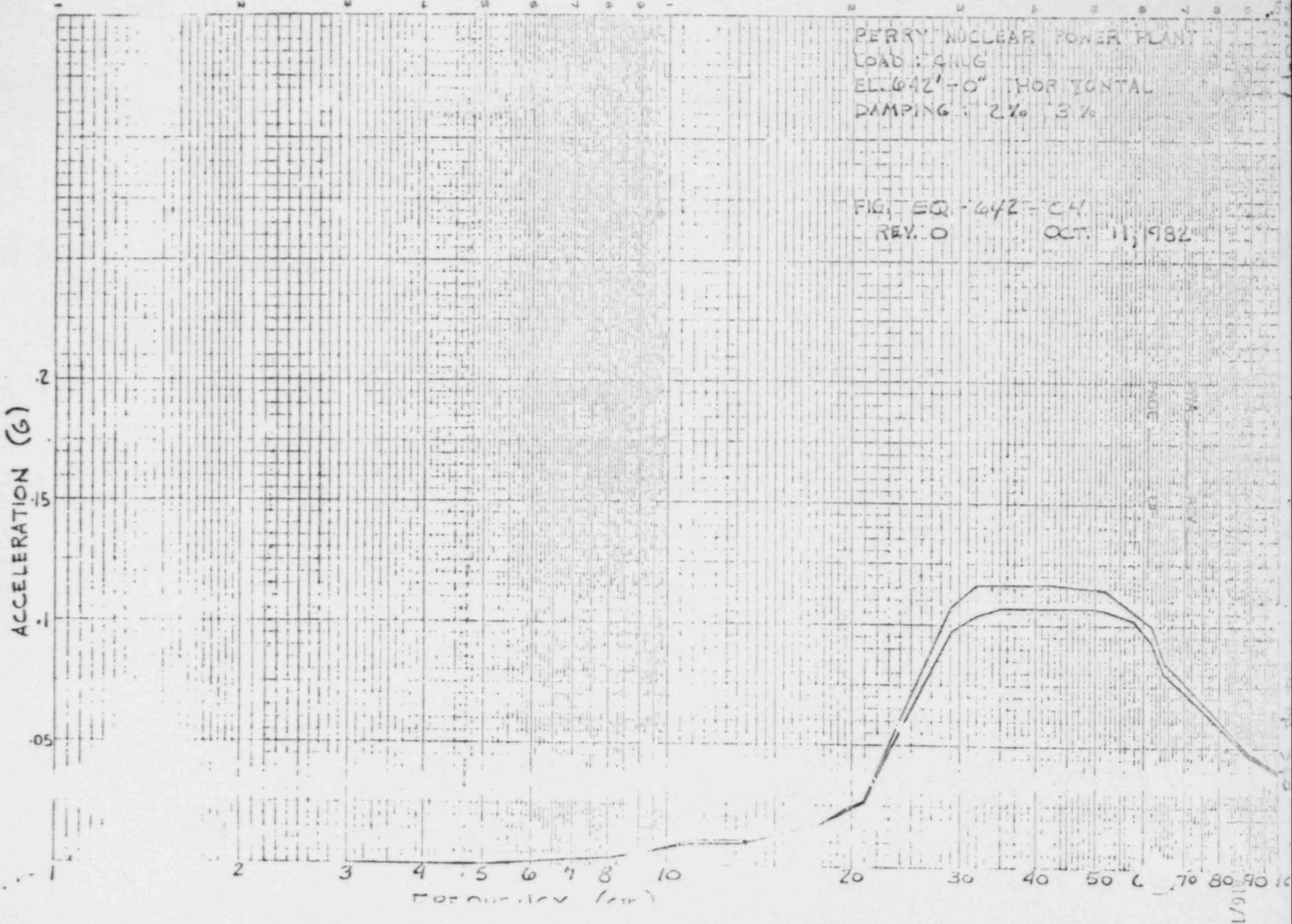


PERRY NUCLEAR POWER PLANT
LOAD: SRV
EL. 642'-0" VERTICAL
DAMPING 2%, 3%

FIG. EQ - 642 - SRVV
REV 0 OCT 11, 1982

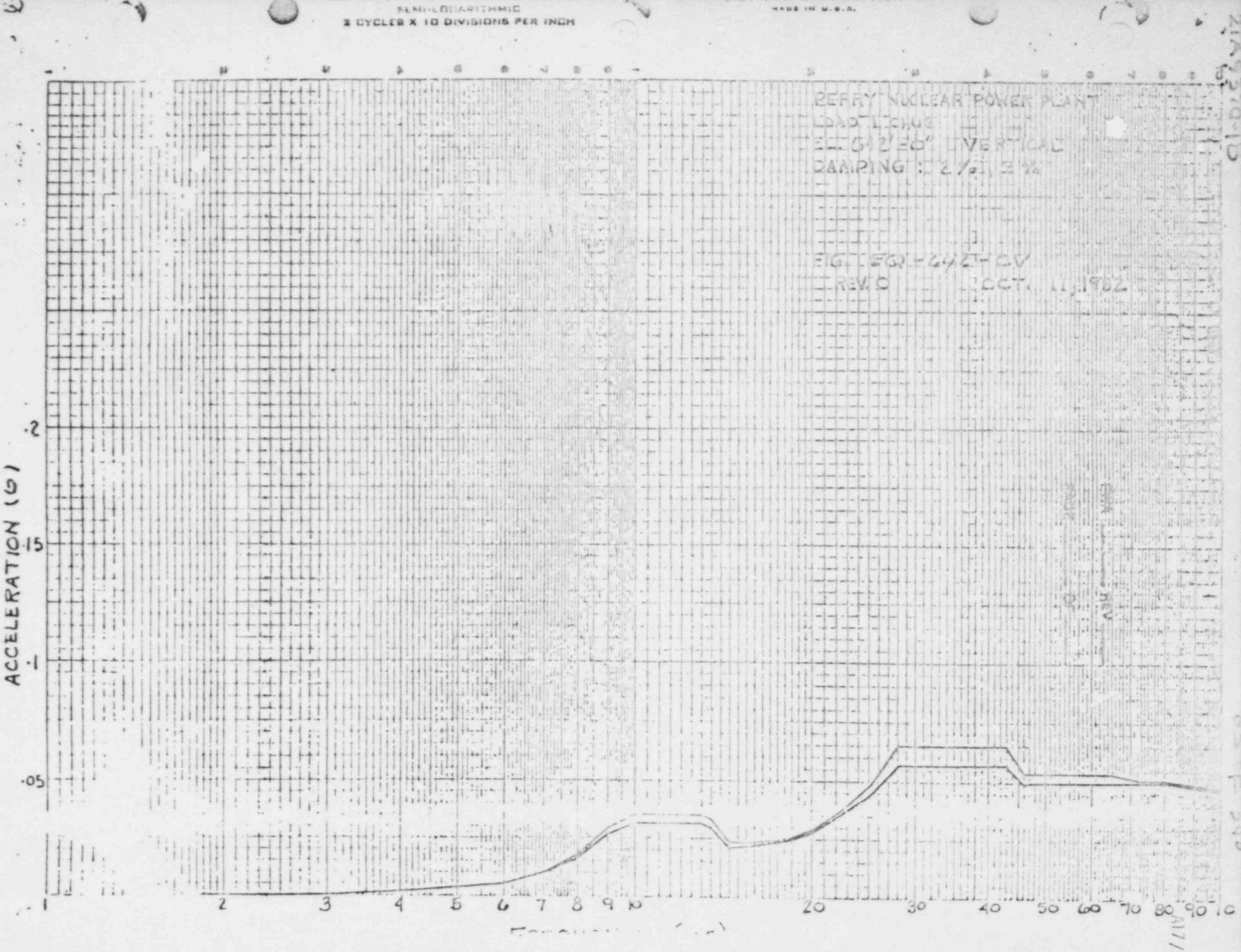


PERRY NUCLEAR POWER PLANT
LOAD : 411G
EL. 642'-0" HORIZONTAL
DAMPING : 2%, 3%

FIG. EQ-642-CH
REV. 0 OCT. 11, 1982

16/1

21A9370-10



A17/1

KL1- E51-C002

REVISION 0

PERRY NUCLEAR POWER PLANT
UNITS 1 AND 2

CEI
REVIEWED BY
/ 7.21.87
APPROVED BY
/ 7-21-87

DYNAMIC QUALIFICATION

COMPONENT NAME: RCIC STEAM TURBINE ASSEMBLY

MPL OR EDL ITEM NO.: E51-C002

MPL REFERENCE: 283X239CA Rev. 15

EQUIPMENT CLASSIFICATION: ☒ ACTIVE ☐ PASSIVE

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

PREPARED BY: J.C. Kelso JC Kelso DATE 9-14-83
Responsible Design Engineer

ORGANIZATION GENERAL ELECTRIC CO. — NEBO

REVIEWED BY: G.I. Samstad, Jr. DATE 9/16/83
SQRT PROGRAM MANAGER

APPROVED BY: C.W. Dillmann DATE 9/16/83
RESPONSIBLE DESIGN ENGINEER
Manager

GENERAL ELECTRIC

PY-GEN/CEI-1960

MPL: E51-C002

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Perry NPP, Unit 1 & 2 Type:

1. Utility: Cleveland Electric PWR:
2. NSSS: General Electric BWR: 6, Mark III
3. A/E: Gilbert Assoc., Inc. Other

II. Component Name: Reactor Core Isolatior Cooling Steam Turbine Assembly

1. Scope: [X] NSSS [ ] BOP [ ] Other
2. Model Number: GS-2N Quantity: 1 per unit
3. Size or Range: See item 6, below
4. Vendor: Terry Corporation
5. If the component is a cabinet or panel, name and model number of the devices included: N/A
6. Physical Description:
   a. Appearance: Base mounted, single wheel steam turbine
   b. Dimensions: 7 ft. long X 6 ft. wide X 5 ft. high
   c. Weight: 5000 lbs., approximate
7. Location: Building: Auxiliary Building, AB-3 & AB-6
   Elevation: Between 568' 4" & 599' 0" / used 599' 0" RRS
8. Field Mounting Conditions [xx] Bolt (No. 6, Size 1")
   [ ] Weld (Length ___)
   [ ] ______
9. Mounting Orientation [e.g., on floor, cantilevered, suspended, etc.]
   Floor mounted
10. a. System in which located: Reactor Core Isolation Cooling
    b. Functional Description: Drives RCIC Pump Assembly
    c. Is the equipment required for [X] Hot Standby [ ] Cold Shutdown
    [ ] Both [ ] Neither [ ] Other ______

RWH:1m/14R-1
3/25/82

II. Pertinent Reference Design Specifications for Qualification Requirements: Purchase Spec. 21A9526, Rev. 2; Data Sheet 21A9526AE, Rev. 3; Qual Test Spec. E/L 20397, Rev. 4 (VPF 3622-491-1)

[✓ a.] Seismic Input
b. Hydrodynamic Load Input
c. Fatigue Considerations
[✓ d.] Service Conditions
e. Qualified Life

SEE "REQUIREMENTS" ON 2ND PAGE OF SEISMIC SUMMARY. RAJ 5.16.83

III. Is Equipment Available for Inspection in the Plant:

☒ Yes ☐ No ☐ Partial or limited availability

IV. Equipment Qualification Method:

☐ Test ☐ Analysis ☒ Combination of Test and Analysis

Qualification Report*: Environmental Qualification Report
(No., Title and Date): E/L 20458^{2}, Rev. 1, dated 4-21-80
Company that Prepared Report: Wyle Laboratory & Terry Corporation
Company that Reviewed Report: General Electric Company
Where Report is filed or available: GE Vendor Print File 3622-527-1
Applicable Codes and/or Standards: IEEE 344-1975

V. Vibration Input:

1. Loads considered:
   a. ☒ Seismic only
   b. ☐ Hydrodynamic only
   c. ☐ Vibration from normal operation
   d. ☐ Combination of (a), (b), and (c)
2. Method of Combining RRS:
   ☐ Absolute Sum ☐ SRSS ☒ Seismic is the only dynamic load on turbine (other, specify)
3. Required Response Spectra** (attach the graphs): RRS is attached

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

RWH:lm/14R-2
3/25/82

4. Damping Corresponding to RRS: OBE 2.0% SSE 2.0%

5. Required Acceleration in Each Direction:

   ☐ ZPA ☒ Other See attached RRS ✓ (specify) Fig A2-1 thru A2-6 match RRS

   OBE S/S = RRS F/B = RRS V = RRS

   SSE S/S = RRS F/B = RRS V = RRS

6. Were fatigue effects considered:

   ☐ Yes ☒ No

   If yes, describe how they were treated in overall qualification program: ________

VI. If Qualification by Test, then Complete:

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

2. ☐ Single Axis ☒ Multi-~~Frequency~~ Axis
   ☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

   OBE 5 SSE 1 Other None (specify)

4. Frequ ncy Range: 1 Hz to 60 Hz input, 1 Hz to 100 Hz analyzed

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

   S/S = 17 Hz, 24 Hz F/B = 16 Hz, 22 Hz V = 18 Hz, 33 Hz

6. Method of Determining Natural Frequencies:

   ☒ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test:

   ☒ Yes (Attach TRS & RRS graphs)

   ☐ No

8. Maximum Input g Level Test:

OBE S/S = * F/B = * V = *

OBE S/S = * F/B = * V = *

9. Laboratory Mounting:

A. [X] Bolt (No. 6, Size 1")

[ ] Weld (Length ____) [ ] ________

B. Orientation and Fixturing: Simulated installed equipment

10. Functional operability verified:

[X] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made: Supports were added to the turbine auxiliary piping. Following these modifications, dynamic qualification was successfully demonstrated.

12. Other tests performed (such as aging or fragility test, including results): Prior to dynamic test qualification, the turbine components were subjected to radiation aging, and thermal and mechanical aging, in order to simulate their "end of life" condition.

13. Failure Modes (If appropriate) None evaluated

14. Margins Available: [X] Input Spectrum [ ] Fragility

VII. If Qualification by Analysis, then complete:

1. Method of Analysis: (required for nozzle load evaluation only)

[ ] Static Analysis [X] Equivalent Static Analysis, using test accel data.

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

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

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

3. Model Type: [X] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam

[ ] Closed Form Solution [ ] Other ________

* As required to generate "test response spectra".

MPL: E51-C002

4. [ ] Computer Codes: None used

Frequency Range and No. of modes

[X] Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

[ ] Absolute Sum [ ] SRSS [X] Other: Seismic is the only dynamic load on turbine.
(specify)

6. Damping:

OBE N/A SSE 2.0% * Basis for damping used: G.E. Specification 385HA603, Table 4.2

7. Support Considerations in the model: Bolted interface to welded pedestals and to concrete pad

8. Critical Structural Elements:

A.

Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress (kips) /inch²	Stress Allowable (kips) /inch² ch
Pedestal Bolts, Coup. End	Tension	4.0gV	24.16	25.00
Taper Pins, Coup. End	Shear	4.0gH	12.14	14.22
Guide Block Weld, Gov. End	Shear	4.0gH	15.49	27.30

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.014 inch	Turbine Shaft	0.125 inch

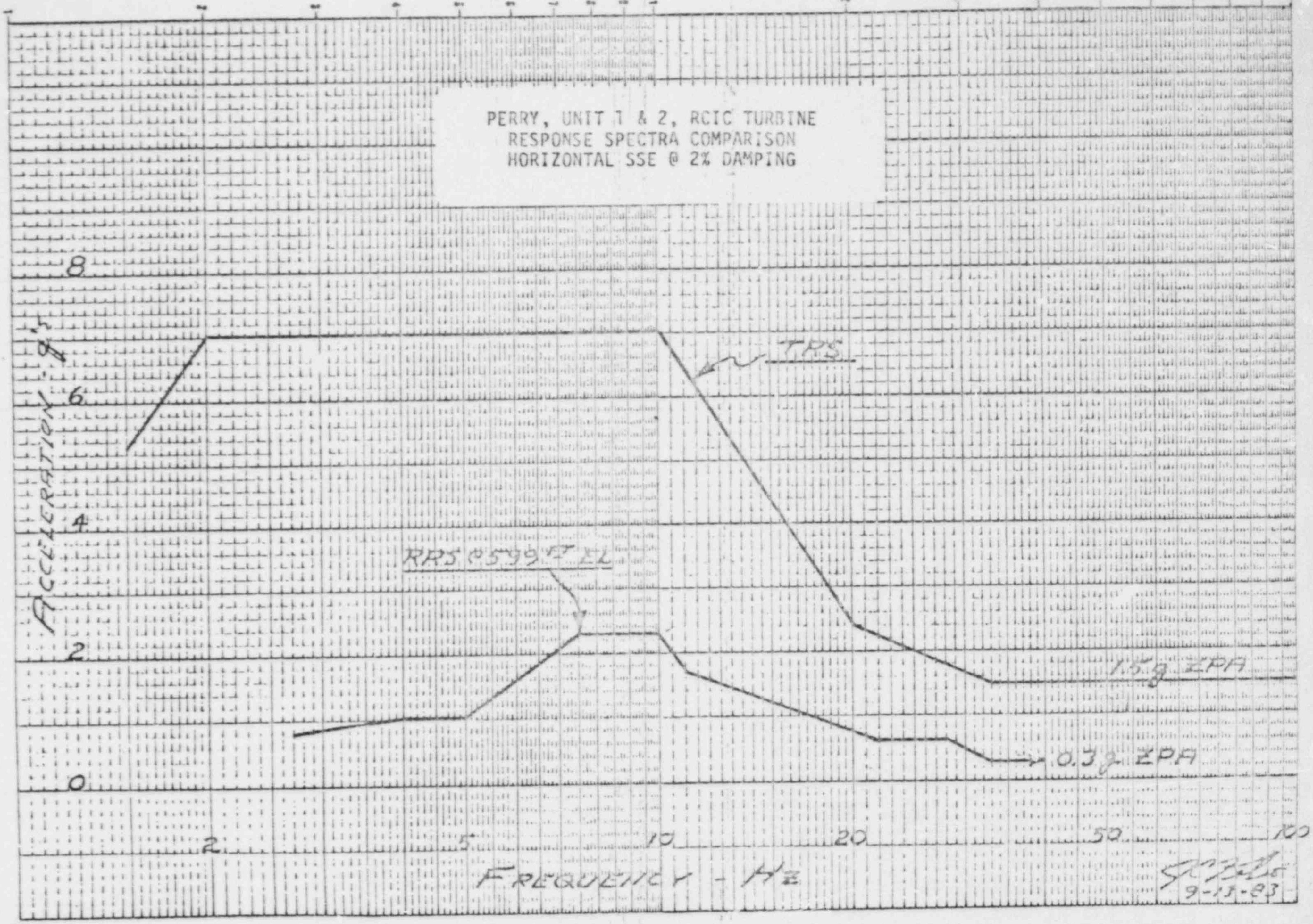
9. Failure Modes: None evaluated

10. Margins Available: [ ] Input Spectrum

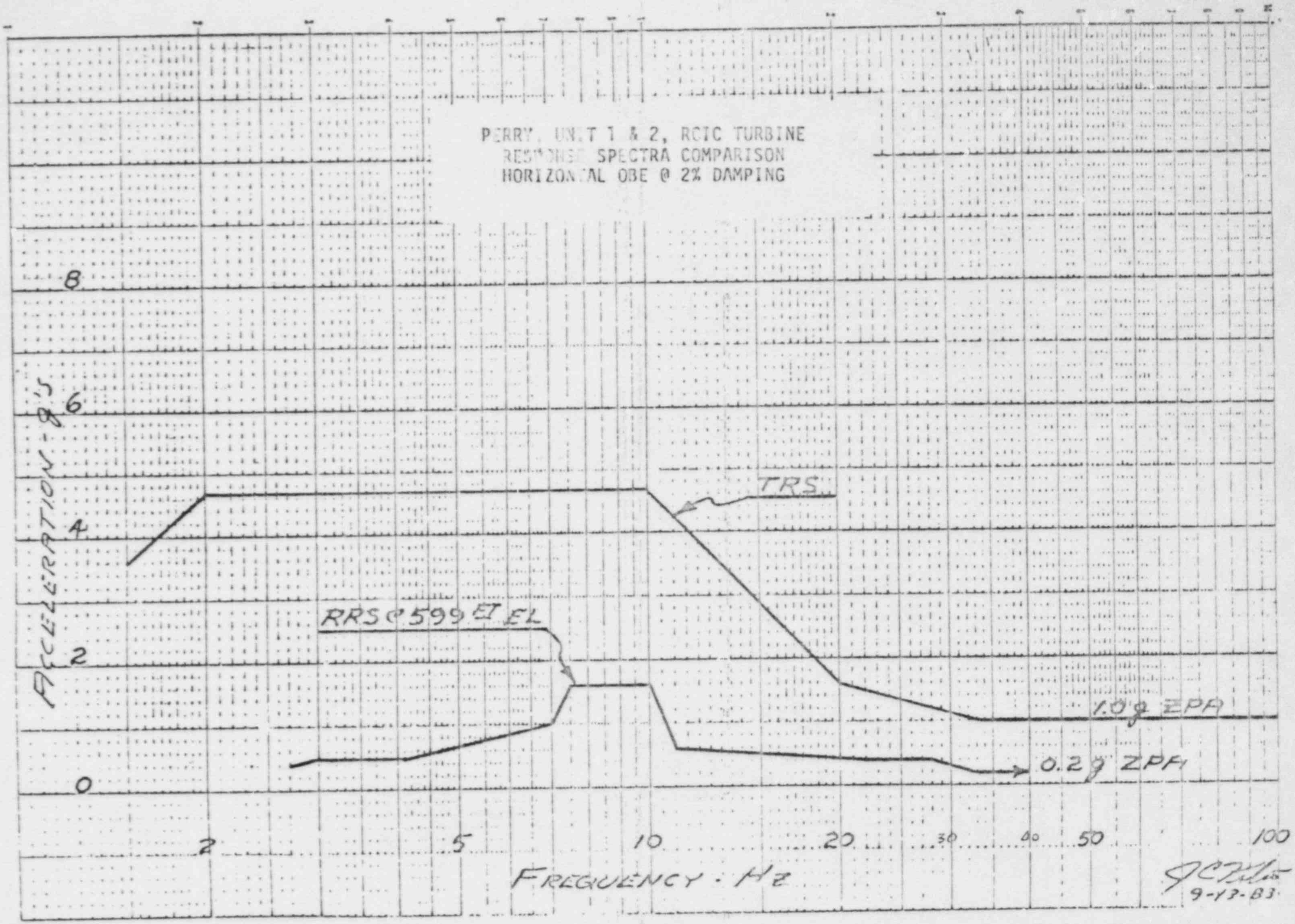
[X] Stress or Deflection

* Specification 385HA603 identifies 3.0% damping. However, 2.0% was used for added conservatism.

RWH:lm/14R-5
3/25/82

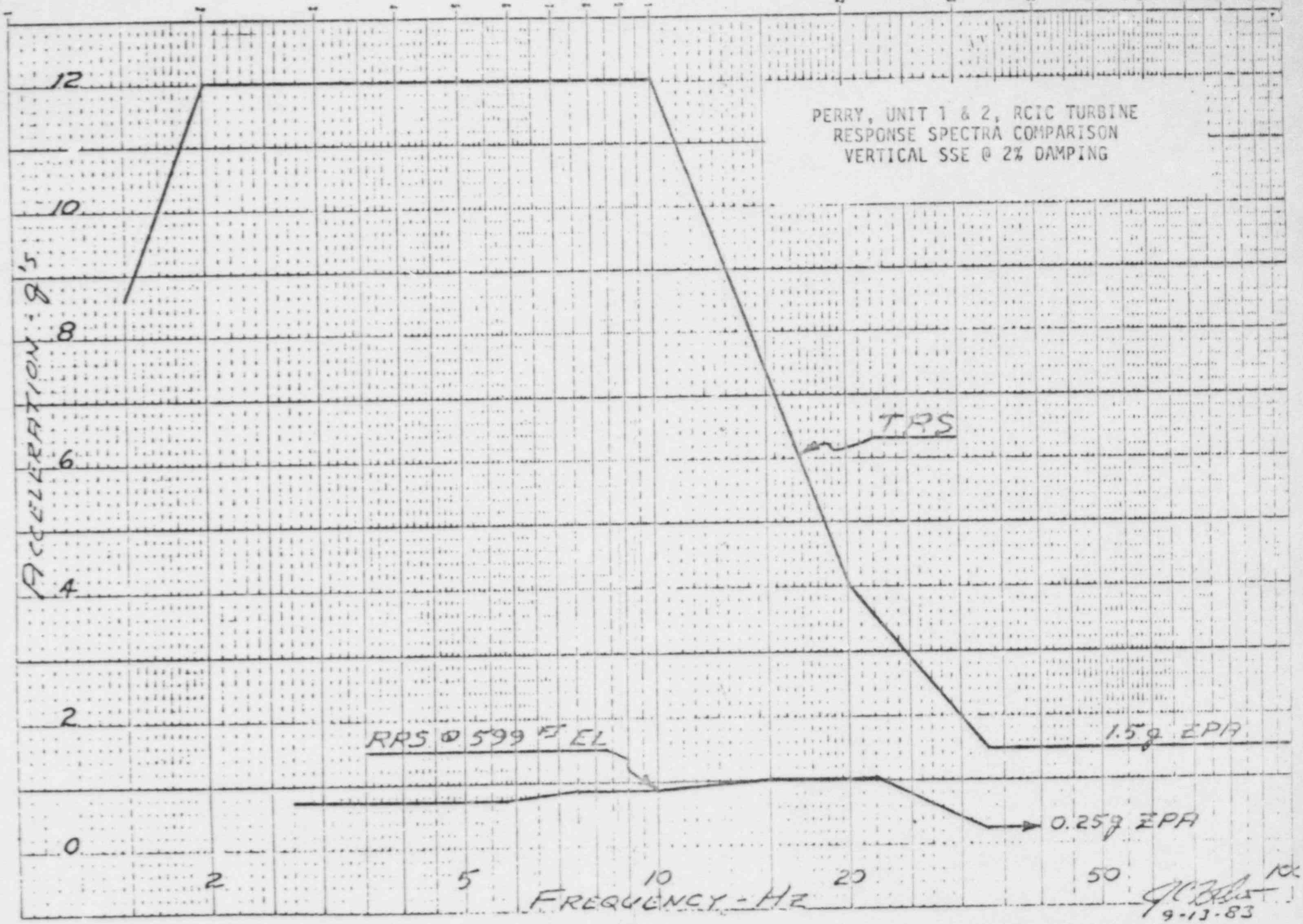


PERRY, UNIT 1 & 2, RCIC TURBINE
RESPONSE SPECTRA COMPARISON
HORIZONTAL SSE @ 2% DAMPING



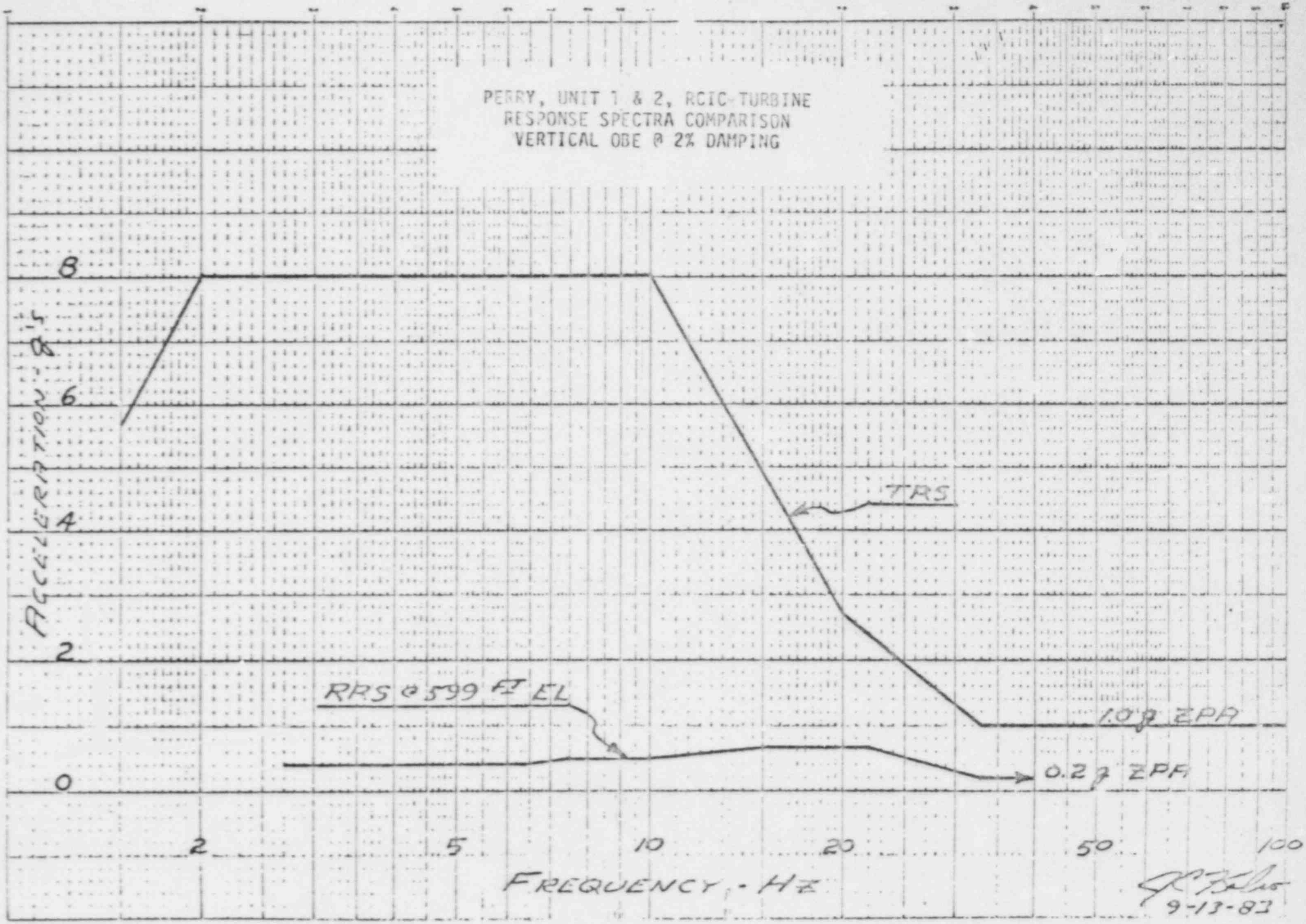
PERRY, UNIT 1 & 2, RCIC TURBINE
RESPONSE SPECTRA COMPARISON
HORIZONTAL OBE @ 2% DAMPING

9-13-83



PERRY, UNIT 1 & 2, RCIC TURBINE
RESPONSE SPECTRA COMPARISON
VERTICAL SSE @ 2% DAMPING

9-13-83



PERRY, UNIT 1 & 2, RCIC-TURBINE
RESPONSE SPECTRA COMPARISON
VERTICAL OBE @ 2% DAMPING

9-13-83

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REVIEWED BY
/ 7.21.87
APPROVED BY
/ 7-21-87

PERRY NUCLEAR POWER PLANT

UNIT 1

SEISMIC QUALIFICATION REEVALUATION

CLASS 1E EQUIPMENT

COMPONENT NAME: TERMINATION CABINETS

MPL OR EDL ITEM NO.: AS ATTACHED

MPL REFERENCE: H13-P701, P702, P703, P704, P706, P707, P710, P711, P712, P713, P714, P715, P717, P730, P740, P741, P743, P744, P745, P746, P747, P748

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

PREPARED BY: D.B. SHAMIS D B Shamis DATE 10-29-82

ORGANIZATION: GENERAL ELECTRIC COMPANY, CONTROL ROOM DESIGN ENGINEERING

REVIEWED BY: R.W. HARDY RW Hardy DATE 1/6/83
SQRT PROGRAM MANAGER

APPROVED BY: N.G. LURIA N G Luria DATE 10/29/82
RESPONSIBLE DESIGN ENGINEER

GENERAL ELECTRIC

11951-3

Qualification Summary of Equipment

MPL: H13-P701,-P702,-P703,
-P704,-P706,-P707,-P710,P711,
-P712,-P713,-P714,-P715 -P717
-P730,-P740,-P741,-P743, P744
-P745,-P746,-P747,-P748

I. Plant Name: Perry

Type:

1. Utility: Cleveland Electric Illuminating Co.

PWR ______

2. NSSS: GE   3. A/E: Gilbert Associates Inc.

BWR- 6 MK 3

II. Component Name Control Room Panel

1. Scope: [x] NSSS [ ] BOP

2. Model Number: See MPL list, above   Quantity: 23

3. Vendor: General Electric

4. If the component is a cabinet or panel, name and model No. of the devices included: Termination Modules, Junction Boxes and Cables

5. Physical Description a. Appearance 4 Bay Panels, 2 Sets of Double Doors

b. Dimensions 96" W x 102" H x 36"D

c. Weight N/A ~2400# CAS

6. Location: Building: Control Complex

Elevation: 654'-6"

7. Field Mounting Conditions [x] Bolt (No. 24, Size 5/8")12" centers
[ ] Weld (Length ____)
[ ] ________

8. a. System in which located: Various Systems

b. Functional Description: House Termination Modules, Junction Boxes & Cables

c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[x] Both [ ] Neither

9. Pertinent Reference Design Specifications: G.E. Assembly Dwg.s 137D7665 through 137D7687

III. Is Equipment Available for Inspection in the Plant: [x] Yes [ ] No

IV. Equipment Qualification Method:

[x] Test [ ] Analysis [ ] Combination of Test and Analysis

Qualification Report*: GE DRF A00-794-5-1

(No., Title and Date) Seismic Qualification Test Report - Oct. 1, 1980

Company that Prepared Report: David M. Rheuble & Associates

Company that Reviewed Report: General Electric

V. Vibration Input:

1. Loads considered: a. [X] Seismic only R41
   b. [ ] Hydrodynamic only
   c. ~~[x]~~ Combination of (a) and (b) R41

2. Method of Combining RRS: [ ] Absolute Sum [x] SRSS [ ] ______ (other, specify)

3. Required Response Spectra (attach the graphs): Figure 4.2

4. Damping Corresponding to RRS: OBE N/A SSE 4%

5. Required Acceleration in Each Direction: [x] ZPA [ ] Other ______ (specify)

   OBE S/S = ~~N/A~~ 0.43g F/B = ~~N/A~~ 0.43g V = ~~N/A~~ 0.40g OBE = 2/3 SSE
   SSE S/S = 0.64g's** F/B = 0.64g's** V = 0.6g's R41

6. Were fatigue effects or other vibration loads considered?

   [ ] Yes [x] No

   If yes, describe loads considered and how they were treated in overall qualification program: N/A

*NOTE: If more than one report complete items IV thru VII for each report.

**0.64g's is the combined (SRSS) horizontal ZPA.

VI. If Qualification by Test, then Complete*:

1. [ ] Single Frequency [x] Multi-Frequency: [x] random
   [ ] sine beat
   [x] In and out of phase

2. [ ] Single Axis [x] Multi-Axis

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

4. Frequency Range: 1-45 Hz

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

   S/S = 25 Hz F/B = 20 Hz V = None below 60 Hz

6. Method of Determining Natural Frequencies

   [x] Lab Test [ ] In-Situ Test [ ] Analysis

7. TRS enveloping RRS using Multi-Frequency Test [x] Yes (Attach TRS & RRS graphs)
   See Figure 4.2. [ ] No

8. Input g-level Test: OBE S/S = N/A F/B = N/A V = N/A

   **Dual axis combined SSE S/S = 8g's F/B = 15g's V = ** SEE APPX I to A00-794-5-1 R41
   Vertical in-phase

9. Laboratory Mounting:

   1. [x] Bolt (No. 16 Size 5/8") [ ] Weld (Length ______) [ ] ______

10. Functional operability verified: [x] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made: The TRS envelops the RRS in the frequency range of 0 to 45 Hz. ~~The high frequency cutoff curve envelops the RRS from 45 Hz to 100 Hz.~~ R45

12. Other test performed (such as aging or fragility test, including results):

    None

*Note: If qualification by a combination of test and analysis also complete Item VII.

VII. If Qualification by Analysis, then complete:

1. Method of Analysis: N/A

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = ____________ F/B = ____________ V = ____________

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☐ Beam ☐ Closed Form Solution

4. ☐ Computer Codes: ______________________________

Frequency Range and No. of modes considered: ______________

☐ Hand Calculations

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

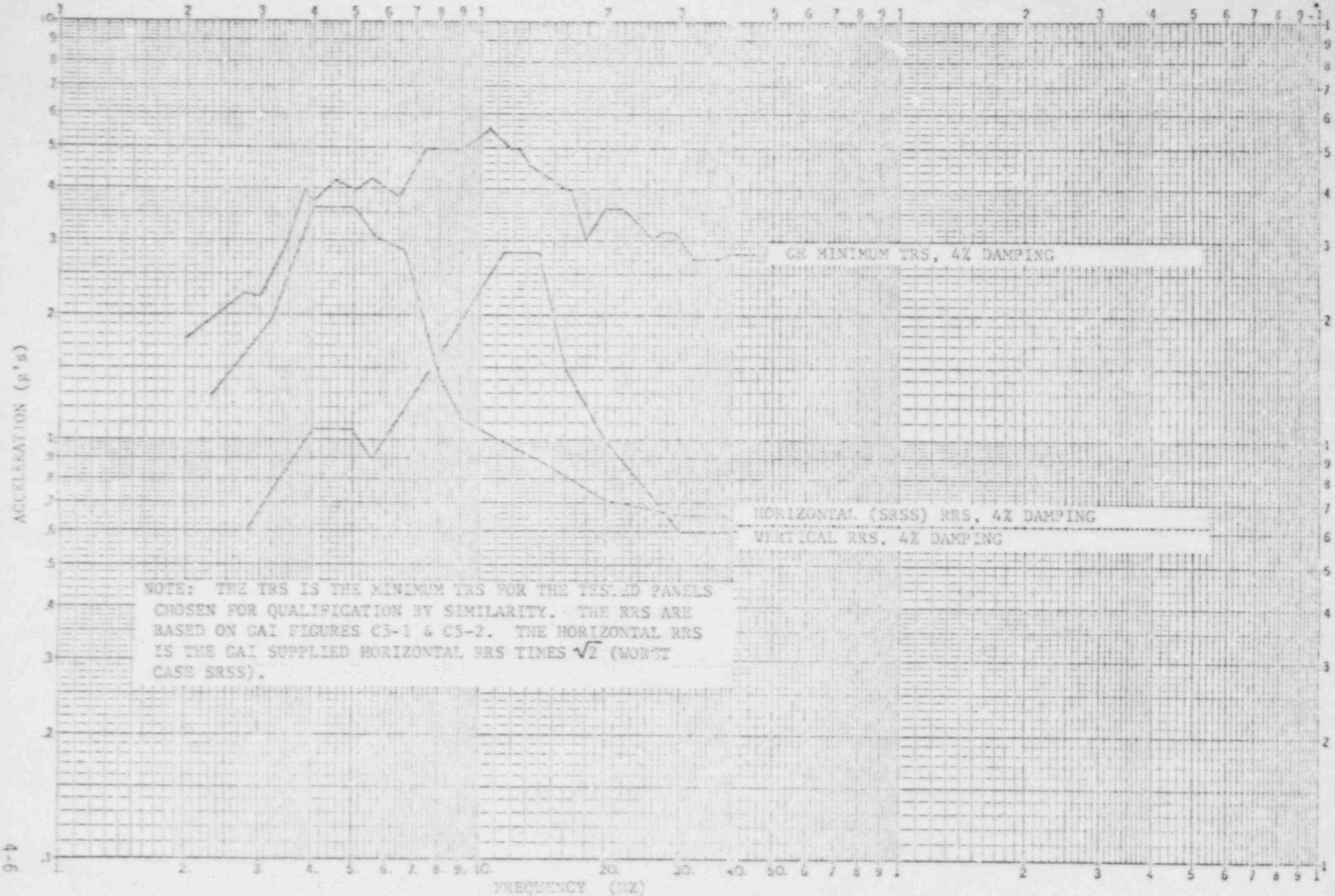
6. Damping: OBE ________ SSE ________ Basis for the damping used: ____________

7. Support Considerations in the model: ______________________

8. Critical Structural Elements:

A. Identification	Location	Governing Load or Reponse Combination	Seismic Stress	Total Stress	Stress Allowable

B. Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability



NOTE: THE TRS IS THE MINIMUM TRS FOR THE TESTED PANELS CHOSEN FOR QUALIFICATION BY SIMILARITY. THE RRS ARE BASED ON GAI FIGURES C5-1 & C5-2. THE HORIZONTAL RRS IS THE GAI SUPPLIED HORIZONTAL RRS TIMES $\sqrt{2}$ (WORST CASE SRSS).

FIGURE 4-2. COMPARISON OF GE MINIMUM TRS WITH PERRY RRS, CONTROL COMPLEX, 654'-6" ELEVATION

CEI
REVIEWED BY
RAStall 12.21.8
APPROVED BY
PAPito 12-21-8

PERRY NUCLEAR POWER PLANT

UNIT 1

SEISMIC QUALIFICATION REEVALUATION

CLASS 1E EQUIPMENT

COMPONENT NAME: CONTROL ROOM PANEL
MPL OR EDL ITEM NO.: AS ATTACHED
MPL REFERENCE: H13-P618

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

PREPARED BY: D.B. SHAMIS DBShamis DATE 10-29-82

ORGANIZATION: GENERAL ELECTRIC COMPANY, CONTROL ROOM DESIGN ENGINEERING

REVIEWED BY: R.W. HARDY RWHardy DATE 1/6/83
SQRT PROGRAM MANAGER

APPROVED BY: N.G. LURIA NGLuria DATE 10/29/82
RESPONSIBLE DESIGN ENGINEER

GENERAL ELECTRIC

Qualification Summary of Equipment MPL: H13-P618

I. Plant Name: Perry

Type:

PWR

BWR- 6 MK 3

1. Utility: Cleveland Electric Illuminating Co.

2. NSSS: GE 3. A/E: Gilbert Associates Inc.

II. Component Name Control Room Panel

1. Scope: [x] NSSS [ ] BOP

2. Model Number: H13-P618 Quantity: 1 each

3. Vendor: General Electric

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

5. Physical Description a. Appearance Vertical Board

b. Dimensions 96" W x 36" D x 90"H

c. Weight ~~N/A~~ ~2400# RH

6. Location: Building: Control Room

Elevation: 654'-6"

7. Field Mounting Conditions [x] Bolt (No. 16 , Size 1/2")
[ ] Weld (Length ___)
[ ] ________

8. a. System in which located: Low Pressure Core Spray & Residual Heat Removal

b. Functional Description: LPCS & RHR Relay Vertical Board

c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[x] Both [ ] Neither

9. Pertinent Reference Design Specifications: See reference 4.

12/80

III. Is Equipment Available for Inspection in the Plant: [x] Yes [ ] No

IV. Equipment Qualification Method:

[x] Test [ ] Analysis [ ] Combination of Test and Analysis

Qualification Report*: GE DRF A00-1138

(No., Title and Date) CSI-P001 Seismic Test, Index A

Company that Prepared Report: General Electric

Company that Reviewed Report: General Electric

V. Vibration Input:

1. Loads considered: a. [x] Seismic only

   b. [ ] Hydrodynamic only

   c. [ ] Combination of (a) and (b)

2. Method of Combining RRS: [ ] Absolute Sum [x] SRSS [ ] ______ (other, specify)

3. Required Response Spectra (attach the graphs): See Figure 4.2

4. Damping Corresponding to RRS: OBE N/A SSE 4%

5. Required Acceleration in Each Direction: [x] ZPA [ ] Other ______ (specify)

OBE S/S = ~~N/A~~ 0.43g's F/B = ~~N/A~~ 0.43g's V = ~~N/A~~ 0.40g's

SSE S/S = 0.64g's** F/B = 0.64g's** V = 0.6g's

OBE = 2/3 SSE
RAH

6. Were fatigue effects or other vibration loads considered?

[ ] Yes [x] No

If yes, describe loads considered and how they were treated in overall qualification program: N/A

*NOTE: If more than one report complete items IV thru VII for each report.

**0.64g's is the combined (SRSS) horizontal ZPA.

12/80

VI. If Qualification by Test, then Complete*:

1. [ ] Single Frequency [x] Multi-Frequency: [x] random
[ ] sine beat
[x] In and out of phase

2. [ ] Single Axis [x] Multi-Axis

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

4. Frequency Range: 1-45 Hz

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

S/S = 20 Hz F/B = 22 Hz V = 33 Hz

6 Method of Determining Natural Frequencies

[x] Lab Test [ ] In-Situ Test [ ] Analysis

7. TRS enveloping RRS using Multi-Frequency Test [x] Yes (Attach TRS & RRS graphs)
See Figure 4.1. [ ] No

8. Input g-level Test: OBE S/S = N/A F/B = N/A V = N/A

**Dual axis combined SSE S/S = 2.7g's F/B = 2.7g's V = **
Vertical in-phase

9. Laboratory Mounting:

1. [x] Bolt (No. 16 Size 5/8") [ ] Weld (Length ______) [ ] ______

10. Functional operability verified: [x] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made: Panel structural integrity was maintained & class 1E devices functioned as required.

12. Other test performed (such as aging or fragility test, including results): Fragility test results were applied as noted on device sheets to establish seismic capability.

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

VII. If Qualification by Analysis, then complete:

1. Method of Analysis: N/A

   [ ] Static Analysis [ ] Equivalent Static Analysis

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

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

   S/S = ____________ F/B = ____________ V = ____________

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

   [ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: ____________

   Frequency Range and No. of modes considered: ____________

   [ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
   [ ] Other: ____________
   (specify)

6. Damping: OBE ________ SSE ________ Basis for the damping used: ____________

7. Support Considerations in the model: ____________

8. Critical Structural Elements:

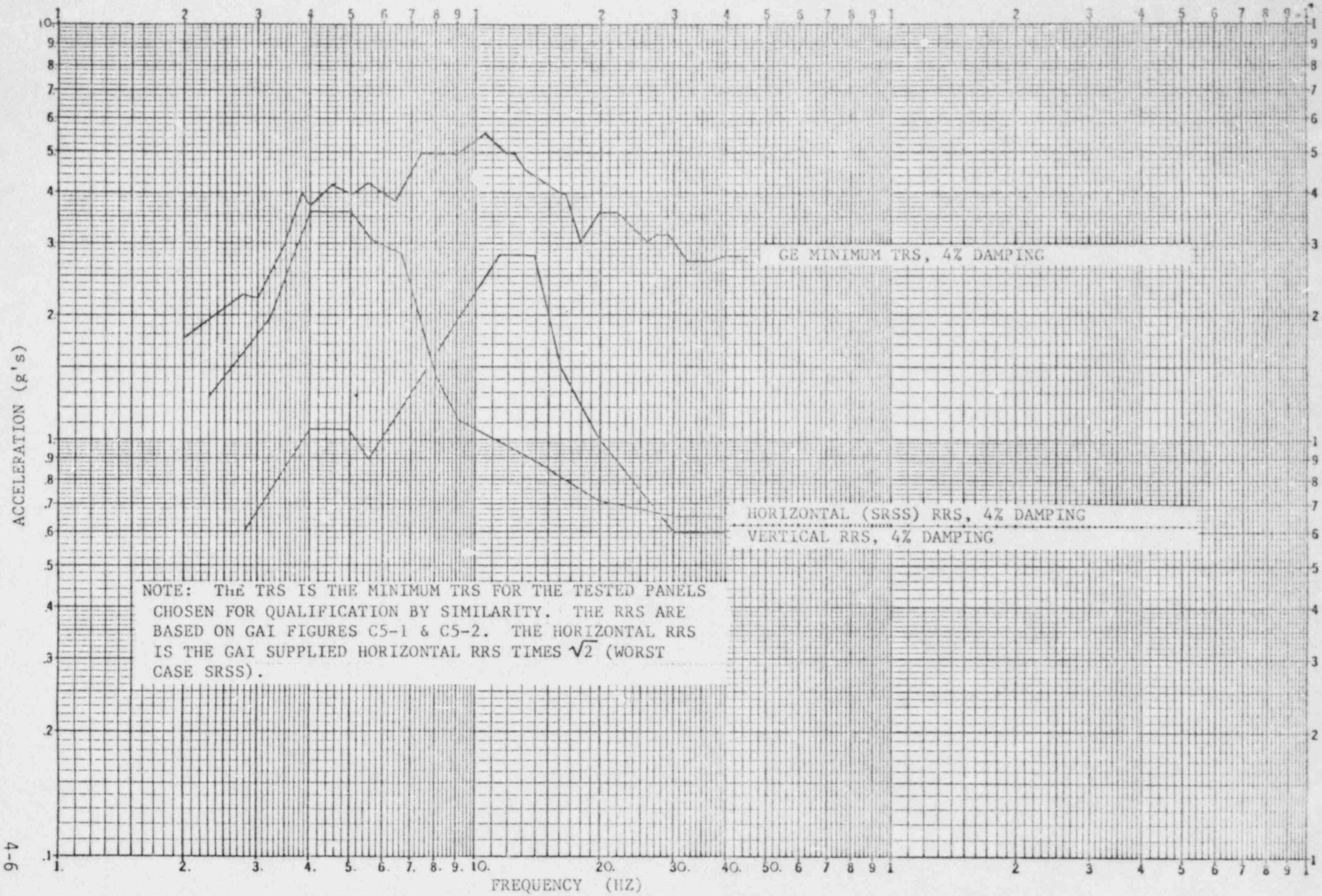
A.

Identification	Location	Governing Load or Reponse Combination	Seismic Stress	Total Stress	Stress Allowable

B.

Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

12/80



NOTE: THE TRS IS THE MINIMUM TRS FOR THE TESTED PANELS CHOSEN FOR QUALIFICATION BY SIMILARITY. THE RRS ARE BASED ON GAI FIGURES C5-1 & C5-2. THE HORIZONTAL RRS IS THE GAI SUPPLIED HORIZONTAL RRS TIMES $\sqrt{2}$ (WORST CASE SRSS).

FIGURE 4-2. COMPARISON OF GE MINIMUM TRS WITH PERRY RRS , CONTROL COMPLEX, 654'-6" ELEVATION

PERRY NUCLEAR
POWER PLANT
UNIT 1

CEI
REVIEWED BY
RASmith 12.21.87
APPROVED BY
12-21-87

SEISMIC QUALIFICATION REEVALUATION

CLASS 1E EQUIPMENT

COMPONENT NAME: CONTROL ROOM PANEL
MPL OR EDL ITEM NO.: AS ATTACHED
MPL REFERENCE: H13-P870

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

PREPARED BY: D.B. SHAMIS DB Shamis DATE 10-29-82
ORGANIZATION: GENERAL ELECTRIC COMPANY, CONTROL ROOM DESIGN ENGINEERING

REVIEWED BY: R.W. HARDY RW Hardy DATE 1/6/83
SQRT PROGRAM MANAGER

APPROVED BY: N.G. LURIA NG Luria DATE 10/29/82
RESPONSIBLE DESIGN ENGINEER

GENERAL ELECTRIC

11381-1

Qualification Summary of Equipment MPL: H13-P870

I. Plant Name: Perry Type:

1. Utility: Cleveland Electric Illuminating Co. PWR

2. NSSS: GE 3. A/E: Gilbert Associates Inc. BWR- 6 MK 3

II. Component Name Control Room Panel

1. Scope: [x] NSSS [ ] BOP

2. Model Number: H13-P870 Quantity: 1 each

3. Vendor: General Electric

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

5. Physical Description a. Appearance BenchBoard

b. Dimensions 252" W x 36" D x 90"H

c. Weight ~~N/A~~ ~7560 #

6. Location: Building: Control Room

Elevation: 654'-6"

7. Field Mounting Conditions [x] Bolt (No. ~~42~~ 84, Size 1/2") RAJ
[ ] Weld (Length)
[ ]

8. a. System in which located: Long Response

b. Functional Description: Long Response BenchBoard

c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown

[X] Both ~~[x]~~ Neither RAJ

9. Pertinent Reference Design Specifications: See reference 4.

12/80

III. Is Equipment Available for Inspection in the Plant: [x] Yes [ ] No

IV. Equipment Qualification Method:

[x] Test [ ] Analysis [ ] Combination of Test and Analysis

Qualification Report*: GE DRF A00-1138

(No., Title and Date) H13-P870 Seismic Test, Index I

Company that Prepared Report: General Electric

Company that Reviewed Report: General Electric

V. Vibration Input:

1. Loads considered: a. [x] Seismic only

   b. [ ] Hydrodynamic only

   c. [ ] Combination of (a) and (b)

2. Method of Combining RRS: [ ] Absolute Sum [x] SRSS [ ] ______ (other, specify)

3. Required Response Spectra (attach the graphs): See Figure 4.2

4. Damping Corresponding to RRS: OBE N/A SSE 4%

5. Required Acceleration in Each Direction: [x] ZPA [ ] Other ______ (specify)

   OBE S/S = ~~N/A~~ 0.43g F/B = ~~N/A~~ 0.43g V = ~~N/A~~ 0.40g OBE = 2/3 SSE
   SSE S/S = 0.64g's** F/B = 0.64g's** V = 0.6g's RAI

6. Were fatigue effects or other vibration loads considered?

   [ ] Yes [x] No

   If yes, describe loads considered and how they were treated in overall qualification program: N/A

*NOTE: If more than one report complete items IV thru VII for each report.

**0.64g's is the combined (SRSS) horizontal ZPA.

12/80

710-16-01a

VI. If Qualification by Test, then Complete*:

1. [ ] Single Frequency [x] Multi-Frequency: [x] random
[ ] sine beat
[x] In and out of phase

2. [ ] Single Axis [x] Multi-Axis

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

4. Frequency Range: 1-45 Hz

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

S/S = 14 Hz F/B = 17.5 Hz V = None below 33 Hz

6. Method of Determining Natural Frequencies

[x] Lab Test [ ] In-Situ Test [ ] Analysis

7. TRS enveloping RRS using Multi-Frequency Test [x] Yes (Attach TRS & RRS graphs)
See Figure 4.2. [ ] No

8. Input g-level Test: OBE S/S = N/A F/B = N/A V = N/A

**Dual axis combined SSE S/S = 2.7g's F/B = 2.7g's V = **
Vertical in-phase

9. Laboratory Mounting: (SUBSECTION TEST MOUNTING SIMULATED SERVICE CONDITIONS) RAH

1. [x] Bolt (No. ~~26~~ ~~Size~~ ~~5/8"~~) [ ] Weld (Length ______) [ ] ______

10. Functional operability verified: [x] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made: Panel structural integrity was maintained & class 1E devices functioned as required.

12. Other test performed (such as aging or fragility test, including results): Fragility test results were applied as noted on device sheets to establish seismic capability.

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

VII. If Qualification by Analysis, then complete:

1. Method of Analysis: N/A

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = __________ F/B = __________ V = __________

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☐ Beam ☐ Closed Form Solution

4. ☐ Computer Codes: ____________________

Frequency Range and No. of modes considered: ____________________

☐ Hand Calculations

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

6. Damping: OBE ________ SSE ________ Basis for the damping used: __________

7. Support Considerations in the model: ____________________

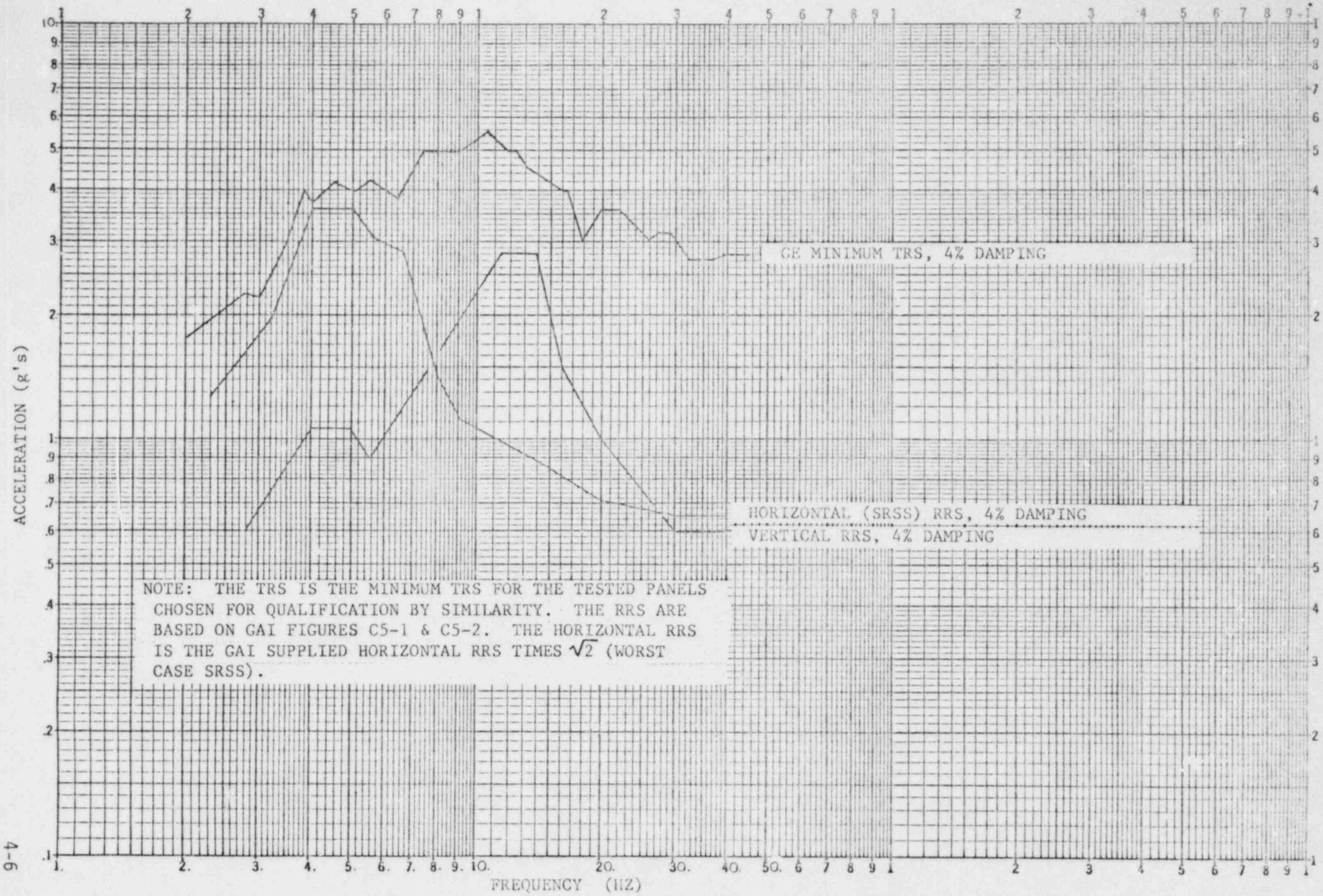
8. Critical Structural Elements:

A.

Identification	Location	Governing Load or Reponse Combination	Seismic Stress	Total Stress	Stress Allowable

B.

Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability



NOTE: THE TRS IS THE MINIMUM TRS FOR THE TESTED PANELS CHOSEN FOR QUALIFICATION BY SIMILARITY. THE RRS ARE BASED ON GAI FIGURES C5-1 & C5-2. THE HORIZONTAL RRS IS THE GAI SUPPLIED HORIZONTAL RRS TIMES $\sqrt{2}$ (WORST CASE SRSS).

FIGURE 4-2. COMPARISON OF GE MINIMUM TRS WITH PERRY RRS ,CONTROL COMPLEX, 654'-6" ELEVATION

CEI
REVIEWED BY
RAShith 12.21.84
APPROVED BY
DWPutre 12-21-84

PERRY NUCLEAR POWER PLANT

UNIT 1

SEISMIC QUALIFICATION REEVALUATION

CLASS 1E EQUIPMENT

COMPONENT NAME: CONTROL ROOM PANEL
MPL OR EDL ITEM NO.: AS ATTACHED
MPL REFERENCE: H13-P680

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

PREPARED BY: D.B. SHAMIS DBShamis DATE 10-29-82

ORGANIZATION: GENERAL ELECTRIC COMPANY, CONTROL ROOM DESIGN ENGINEERING

REVIEWED BY: R.W. HARDY RWHardy DATE 1/6/83
SQRT PROGRAM MANAGER

APPROVED BY: N.G. LURIA DATE 10/29/82
RESPONSIBLE DESIGN ENGINEER

GENERAL ELECTRIC

Qualification Summary of Equipment MPL: H13-P680

I. Plant Name: Perry Type:

1. Utility: Cleveland Electric Illuminating Co. PWR

2. NSSS: GE 3. A/E: Gilbert Associates Inc. BWR- 6 MK 3

II. Component Name Control Room Panel

1. Scope: [X] NSSS [ ] BOP

2. Model Number: H13-P680 Quantity: 1 each

3. Vendor: General Electric

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

5. Physical Description a. Appearance Console

b. Dimensions 240" W x 33" D x 63.5"H (irregular)

c. Weight ~~N/A~~ ~7200# RAS

6. Location: Building: Control Room

Elevation: 654'-6"

7. Field Mounting Conditions ~~[x] Bolt (No. 4 , Size 1/2")~~
[ ] Weld (Length ____)
[X] WELDED @ EACH SUPPORT BEAM RAS

8. a. System in which located: Principle Plant Control

b. Functional Description: Principle Plant Control Console

c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown

[x] Both [ ] Neither

9. Pertinent Reference Design Specifications: See reference 4.

12/80

III. Is Equipment Available for Inspection in the Plant: [x] Yes [ ] No

IV. Equipment Qualification Method:

[x] Test [ ] Analysis [ ] Combination of Test and Analysis

Qualification Report*: GE DRF A00-1138

(No., Title and Date) H13-P680 Seismic Test, Index T

Company that Prepared Report: General Electric

Company that Reviewed Report: General Electric

V. Vibration Input:

1. Loads considered: a. [x] Seismic only

   b. [ ] Hydrodynamic only

   c. [ ] Combination of (a) and (b)

2. Method of Combining RRS: [ ] Absolute Sum [x] SRSS [ ] ______ (other, specify)

3. Required Response Spectra (attach the graphs): See Figure 4.2

4. Damping Corresponding to RRS: OBE N/A SSE 4%

5. Required Acceleration in Each Direction: [x] ZPA [ ] Other ______ (specify)

   OBE S/S = ~~N/A~~ 0.43g F/B = ~~N/A~~ 0.43g V = ~~N/A~~ 0.40g

   SSE S/S = 0.64g's** F/B = 0.64g's** V = 0.6g's

   OBE = ⅔ SSE
   RH

6. Were fatigue effects or other vibration loads considered?

   [ ] Yes [x] No

   If yes, describe loads considered and how they were treated in overall qualification program: N/A

*NOTE: If more than one report complete items IV thru VII for each report.

**0.64g's is the combined (SRSS) horizontal ZPA.

VI. If Qualification by Test, then Complete*:

1. [ ] Single Frequency [x] Multi-Frequency: [x] random
   [ ] sine beat
   [x] In and out of phase

2. [ ] Single Axis [x] Multi-Axis

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

4. Frequency Range: 1-45 Hz

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

   S/S = 24 Hz F/B = 19.5 Hz V = 28 Hz

6. Method of Determining Natural Frequencies

   [x] Lab Test [ ] In-Situ Test [ ] Analysis

7. TRS enveloping RRS using Multi-Frequency Test [x] Yes (Attach TRS & RRS graphs)
   See Figure 4.2. [ ] No

8. Input g-level Test: OBE S/S = N/A F/B = N/A V = N/A

   **Dual axis combined SSE S/S = 2.7g's F/B = 2.7g's V = **
   Vertical in-phase

9. Laboratory Mounting:

   1. [x] Bolt (No. 12 Size 5/8") [ ] Weld (Length ____)
      [x] clamps

10. Functional operability verified: [x] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made: Panel structural integrity was maintained & class 1E devices functioned as required.

12. Other test performed (such as aging or fragility test, including results): Fragility test results were applied as noted on device sheets to establish seismic capability.

*Note: If qualification by a combination of test and analysis also complete Item VII.

VII. If Qualification by Analysis, then complete:

1. Method of Analysis: N/A

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = ______ F/B = ______ V = ______

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☐ Beam ☐ Closed Form Solution

4. ☐ Computer Codes: ______

Frequency Range and No. of modes considered: ______

☐ Hand Calculations

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

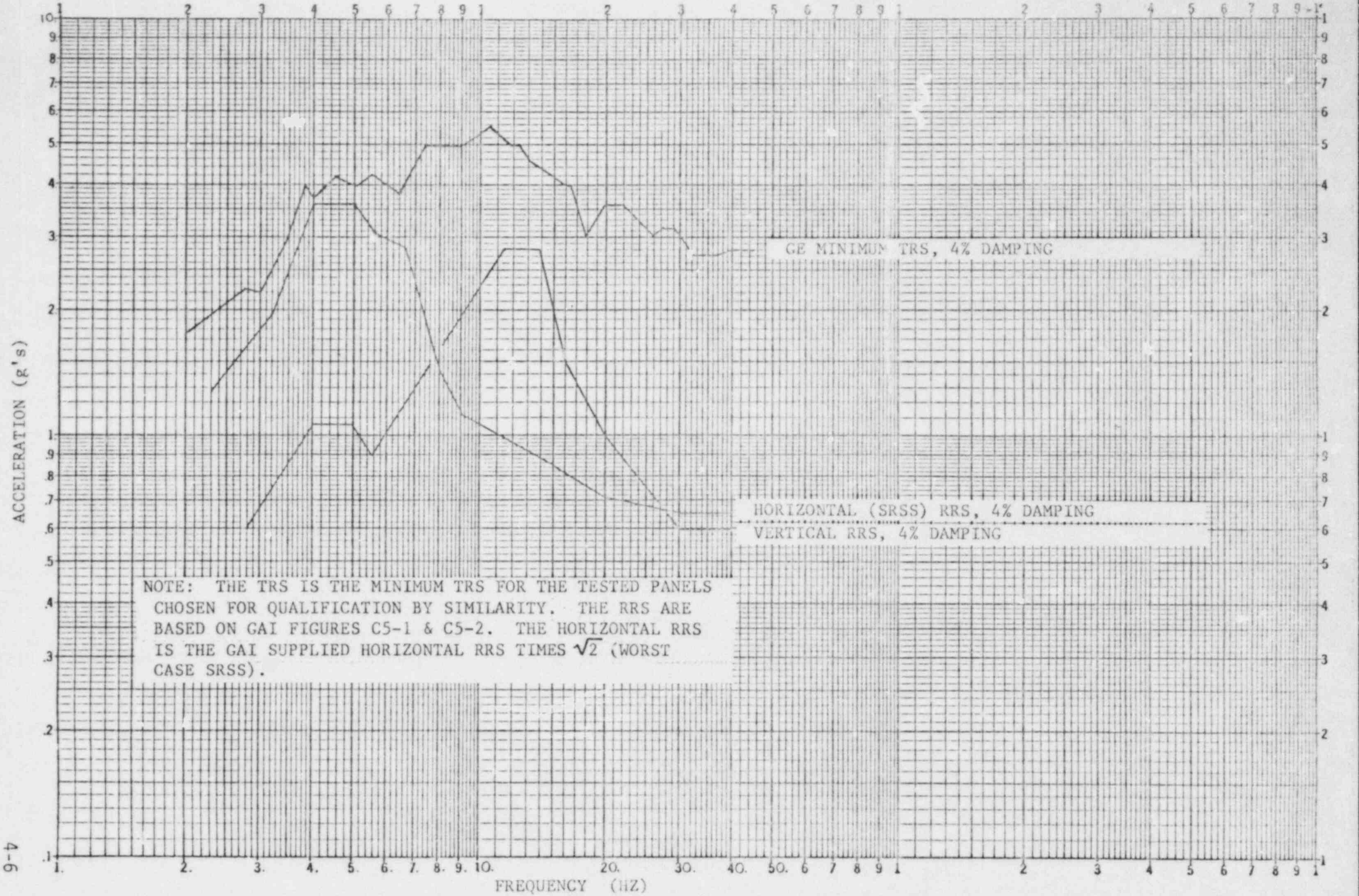
6. Damping: OBE ______ SSE ______ Basis for the damping used: ______

7. Support Considerations in the model: ______

8. Critical Structural Elements:

A. Identification	Location	Governing Load or Reponse Combination	Seismic Stress	Total Stress	Stress Allowable

B. Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability



NOTE: THE TRS IS THE MINIMUM TRS FOR THE TESTED PANELS CHOSEN FOR QUALIFICATION BY SIMILARITY. THE RRS ARE BASED ON GAI FIGURES C5-1 & C5-2. THE HORIZONTAL RRS IS THE GAI SUPPLIED HORIZONTAL RRS TIMES $\sqrt{2}$ (WORST CASE SRSS).

FIGURE 4-2. COMPARISON OF GE MINIMUM TRS WITH PERRY RRS, CONTROL COMPLEX, 654'-6" ELEVATION

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

MPL No. 0G41F0085 BM. No. RNG7

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: RETURN LINE TO FUEL POOL, FLOW CONTROL VALVE

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: C-W2566-CC Quantity: 1
3. Size or Range: 10" - 150 LB CLASS
4. Vendor: CONTROMATICS CORP.
5. If the component is a cabinet or panel, name and model Number of the devices included:

NOT A CABINET OR PANEL

6. Physical Description:

REF DWG GAI FILE No 0-10-0221-001

a. Appearance: BUTTERFLY VALVE - S.S. W/LIMITORQUE ACTUATOR SMB-002/H0BC *

b. Dimensions: FACE TO FACE = $2\frac{13}{16}$", WD = 28", HT = 41"

c. Weight: 345 LB W/ACTUATOR

7. Location: Building: INTERMEDIATE

Elevation: 599

8. Field Mounting Conditions ☒ Bolt (No. 12, Size 7/8") T 7

☐ Weld (Length ______)

☐ ______

REF DWG GAI FILE No 01-4549 D304-658

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

PIPE MOUNTED BETWEEN FLANGES WITH STEM HORIZONTAL

10. a. System in which located: G41 - FUEL POOL COOLING & CLEANUP

b. Functional Description: OPEN FOR THROTTLED FLOW, CLOSE TO SHUTOFF FLOW.

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

☐ Both ☒ Neither ☒ Other THROTTLING

* SEE:

SEPERATE SQRT FOR LIMITORQUE

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP 524-4549-00

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: 12875-1 SEISMIC VIBRATION TESTING OF ONE 10"
(No., Title and Date): STAINLESS STEEL BUTTERFLY VALVE WITH LIMITORQUE ACTUATOR, 4/27/77

Company that Prepared Report: ACTON ENVIRONMENTAL TESTING CORP.

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: USNRC REGULATORY GUIDE 1.48
ASME B&PV CODE SECTION III, CLASS 3

V VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☐ SRSS ☐ N/A (RRS NOT USED)
(other, specify)

3. Required Response Spectra ** (attach the graphs): N/A (RIM TEST PERFORMED)

NOTE:

*If more than one report complete Items IV thru VII for each report.
**If other than RRS is used, describe method.

4. Damping Corresponding to RRS: OBE N/A SSE N/A
SEE V 3.

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other RIM (REQUIRED INPUT MOTION)
(specify)

OBBA or [✓ OBE] S/S = 1.014 g F/B = 0.522g V= 0.307 g

SSBA or [✓ SSE] S/S = 1.014 g F/B = 0.522g V= 0.307g
ACCELERATIONS FROM PIPING ANALYSIS G41G13A

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program: N/A

VI. IF QUALIFICATION BY TEST, THEN COMPLETE: (ACTON REPORT 12875-1)

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

2. ☐ Single Axis ☒ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:
TESTING WAS PEFORMED AT ALL DEFINED NATURAL FREQUENCIES

OBE — SSE — Other PLUS 1, 5, 10, 15, 20, 25, 30, & 33 HZ.
(specify)

4. Frequency Range: 1~50 HZ

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

S/S = 22.8 HZ F/B = NONE V = NONE

6. Method of Determining Natural Frequencies

☒ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No N/A (RIM TEST PERFORMED)

8. Maximum Input g Level Test: (RIM TEST)

OBBA or [✓ OBE] S/S = 3.0g F/B = 3.0g V = 3.0g

SSBA or [✓ SSE] S/S = 3.0g F/B = 3.0g V = 3.0g

9. Laboratory Mounting:

a. ☒ Bolt (No. 12, Size 7/8"-9

☐ Weld (Length ______) ☐ ______________

b. Orientation and Fixturing: VALVE MOUNTED TO A RIGID TEST FIXTURE WHICH WAS SECURELY ATTACHED TO THE LARGE BIAXIAL TEST TABLE OF THE AETC 45° BIAXIAL SEISMIC TEST FACILITY

10. Functional operability verified:
OPERATED AT LEAST ONCE AT EACH FREQUENCY OF THE SINE BEAT TEST

☒ Yes ☐ No ☐ Not Applicable

SEE ALSO * AT BOTTOM OF PAGE.

11. Test Results including modifications made: ALL SEISMIC TESTING WAS SUCCESSFULLY COMPLETED WITH NO MODIFICATIONS.

12. Other tests performed (such as aging or fragility test, including results):

THE VALVE WAS PRESSURIZED TO 16.5 PSI DURING THE TESTING. NO LEAKS WERE FOUND DURING OR AFTER THE TESTING.

13. Failure Modes (If appropriate) NONE

14. Margins Available: ☒ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE: (NONE)

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = ______________ F/B = ______________ V = ______________

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ______________

* SPECIFICATION 524 REQUIRES AN OPERATING TIME OF 30 SECONDS. WHILE ACTON REPORT 12875-1 DID NOT INCLUDE THIS DATA IN THAT REPORT, ACTON TEST REPORT 12243-3 FOR A 10" STAINLESS STEEL VALVE WITH LIMITORQUE ACTION (NEW-LOADS REPORT) DID SHOW OPEN AND CLOSE TIME IN LESS THAN 30 SECONDS.

4. ☐ Computer Codes: ____________________

Frequency Range and No. of Modes

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☐ Other: ____________________ (specify)

6. Damping:

OBE __________ SSE __________ 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 Allowable

b. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ____________________

10. Margins Available: ☐ Input Spectrum ☐ Stress or Deflection

REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/		/	/
	/		/	/
	/		/	/

REVIEWED BY R. H. Yeaman 7/16/84

CHECKED BY V D Caberly 7/17/84

APPROVED BY ~~RJS~~ 7.23.84 THA Peter 7/24/84

PERRY NUCLEAR POWER STATION
UNIT 1

CEI
REVIEWED BY
/ 7.2184
APPROVED BY
/ 7-21-8

SEISMIC QUALIFICATION REEVALUATION
CLASS 1E EQUIPMENT

COMPONENT NAME: TRANSMITTER

PPD. NO.: 163C 1563

MPL REFERENCE: E12 N057

THE SEISMIC QUALIFICATION REPORT(S) IDENTIFIED HEREIN HAVE BEEN EVALUATED AND REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT IS CAPABLE OF MEETING THE NUCLEAR REGULATORY COMMISSION SEISMIC QUALIFICATION REVIEW TEAM (SQRT) REQUIREMENTS.

N. H. Andersen
PREPARED BY: N.H. ANDERSEN DATE 2-2-84

ORGANIZATION: GENERAL ELECTRIC CO., QUALIFICATION
& CONTROL EQUIPMENT DESIGN ENGINEERING

REVIEWED BY: R.W. HARDY RW Hardy DATE 2/15/84
SQRT PROGRAM MANAGER

APPROVED BY: N.G. LURIA N G Luria DATE 2/8/84
QUALIFICATION ANALYSIS AND DESIGN
ENGINEERING MANAGER

GENERAL ELECTRIC

GE PPD # 163C1563
MPL: E12-N057

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Perry Type:
1. Utility: Cleveland Electric Illuminating Co PWR
2. NSSS: General Electric Co BWR- 6 - MKIII
3. A/E: Gilbert/Commonwealth Other

II. Component Name Transmitter, Differential Pressure
1. Scope: [X] NSSS [ ] BOP [ ] Other
2. Model Number: 1151 Quantity: 1
3. Size or Range: 0-120 to 0-1000 psig
4. Vendor: Rosemount
5. If the component is a cabinet or panel, name and model number of the devices included: N/A
6. Physical Description:
   a. Appearance: See Drawing Attachment 1
   b. Dimensions: See Drawing Attachment 1
   c. Weight: 11.9 LB
7. Location: Building: Auxiliary
   Elevation 568 FT 4 IN
8. Field Mounting Conditions [X] Bolt (No. 4, Size 1/4"ϕ)
   [ ] Weld (Length ____)
   [X] See Attachment 5
9. Mounting Orientation [e.g., on floor, cantilevered, suspended, etc.]
   See Attachment 5 ON STEEL CHANNEL MOUNTED TO WALL
10. a. System in which located: Residual Heat Removal (RHR)
    b. Functional Description: Instrument Performs 1E Function
    c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both [ ] Neither [ ] Other

GE PPD # 163C1563

MPL: E12-N057

11. Pertinent Reference Design Specification for Qualification Requirements:* Gilbert/Commonwealth Letter PY-GAI/CEI-13916

a. [X] Seismic Input
b. [X] Hydrodynamic Load Input
c. [X] Fatigue Considerations
d. [X] Service Conditions
e. [ ] Qualified Life

* RRS @ THIS LEVEL INCLUDES NO HYDRODYNAMIC EFFECT. IF ANY ARE PROVIDED IT IS TO BE ASSUMED FOR AS NOT REQUIRED BUT MORE CONSERVATIVE
5.15.84

III. Is Equipment Available for Inspection in the Plant:

[X] Yes [ ] No [ ] Partial or limited availability

IV. Equipment Qualification Method:

[X] Test [ ] Analysis [ ] Combination of Test and Analysis

Qualification Report*: G.E. DRF NO. A00-794-10

(No., Title and Date): H22 Local Panels Qual Report

Company that Prepared Report: General Electric

Company that Reviewed Report: General Electric

Where Report is filed or available: General Electric

Applicable Codes and/or Standards: IEEE 344-1975

V. Vibration Input:

1. Loads considered:
   a. [ ] Seismic only
   b. [ ] Hydrodynamic only
   c. [ ] Vibration from normal operation
   d. [X] Combination of (a), (b), and (c)* NOTE ABOVE
2. Method of Combining RRS:
   [ ] Absolute Sum [X] SRSS [ ] ______ (other, specify)
3. Required Response Spectra** (attach the graphs): See Attachment 2

NOTE:

* If more than one report complete Items IV thru VII for each report.

** If other than RRS is used, describe methods.

4. Damping Corresponding to RRS: OBE *4% SSE *4%

5. Required Acceleration in Each Direction:

[X] ZPA [ ] Other ________ (specify)

OBE S/S = .28 F/B = .28 V = .22

SSE S/S = .35 F/B = .35 V = .3

NOTE: SS Represents N-S, FB represent E-W

6. Were fatigue effects considered:

[X] Yes [ ] No

If yes, describe how they were treated in overall qualification program: SRV and hydrodynamic loads were considered in RRS FOR CONSERVATISM ONLY. RH

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [x] Multi-Frequency [x] random
   [ ] sine beat
   [ ] ________

2. [ ] Single Axis [X] Multi-Axis
   [X] Independent Axis [ ] In-phase motions

3. Number of Qualifications Tests:
   OBE 5 SSE 1 Other ________ (specify)

4. Frequency Range: 1.0 to 250 Hz

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): **As noted in Paragraph 6, Rationale for Qualification
   S/S = ** F/B = ** V = **

6. Method of Determining Natural Frequencies:
   [X] Lab Test [ ] In-Situ Test [ ] Analysis

7. TRS envelping RRS using Multi-Frequency Test:
   [X] Yes (Attach TRS & RRS graphs) SEE ATTACHMENT 4
   [ ] No

* RRS Damping Coefficient selected to be as similar as possible to TRS (4% / 5%)

8. Maximum Input g Level Test: (ZPA) Floor Response Spectra for Panel Mounted Device

OBE S/S = 5.4 F/B = 6.0 V = 5.8

SSE S/S = 7.5 F/B = 6.5 V = 7.5

9. Laboratory Mounting:

A. [X] Bolt (No. ___, Size 3/4-10) 100 ft lb torque.

[ ] Weld (Length ____) [ ] ____________

B. Orientation and Fixturing: See Attachment 3 [illegible]

10. Functional operability verified:

[X] Yes [ ] No [ ] Not Applicable

11. Test Results including modifications made: Before, during and after seismic testing instruments were functionally monitored. Transmitter output varied with respect to panel size and position. Pressure intergrity was maintained throughout.

12. Other tests performed (such as aging or fragility test, including results):

No seismic aging or fragility tests were performed

13. Failure Modes (If appropriate) N/A

14. Margins Available: [X] Input Spectrum [ ] Fragility

VII. If Qualification by Analysis, then complete: N/A

~~1. Method of Analysis:~~

~~[ ] Static Analysis [ ] Equivalent Static Analysis~~

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

~~2. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):~~

~~S/S = ______ F/B = ______ V = ______~~

~~3. Model Type: [ ] 3D [ ] 2D [ ] 1D~~

[ ] Finite Element [ ] Beam

[ ] Closed Form Solution [ ] Other ______

4. ☐ Computer Codes: ____________________

Frequency Range and No. of modes ____________________

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☐ Other: ____________
(specify)

6. Damping:

OBE ______ SSE ______ Basis for 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 Allowable

B.

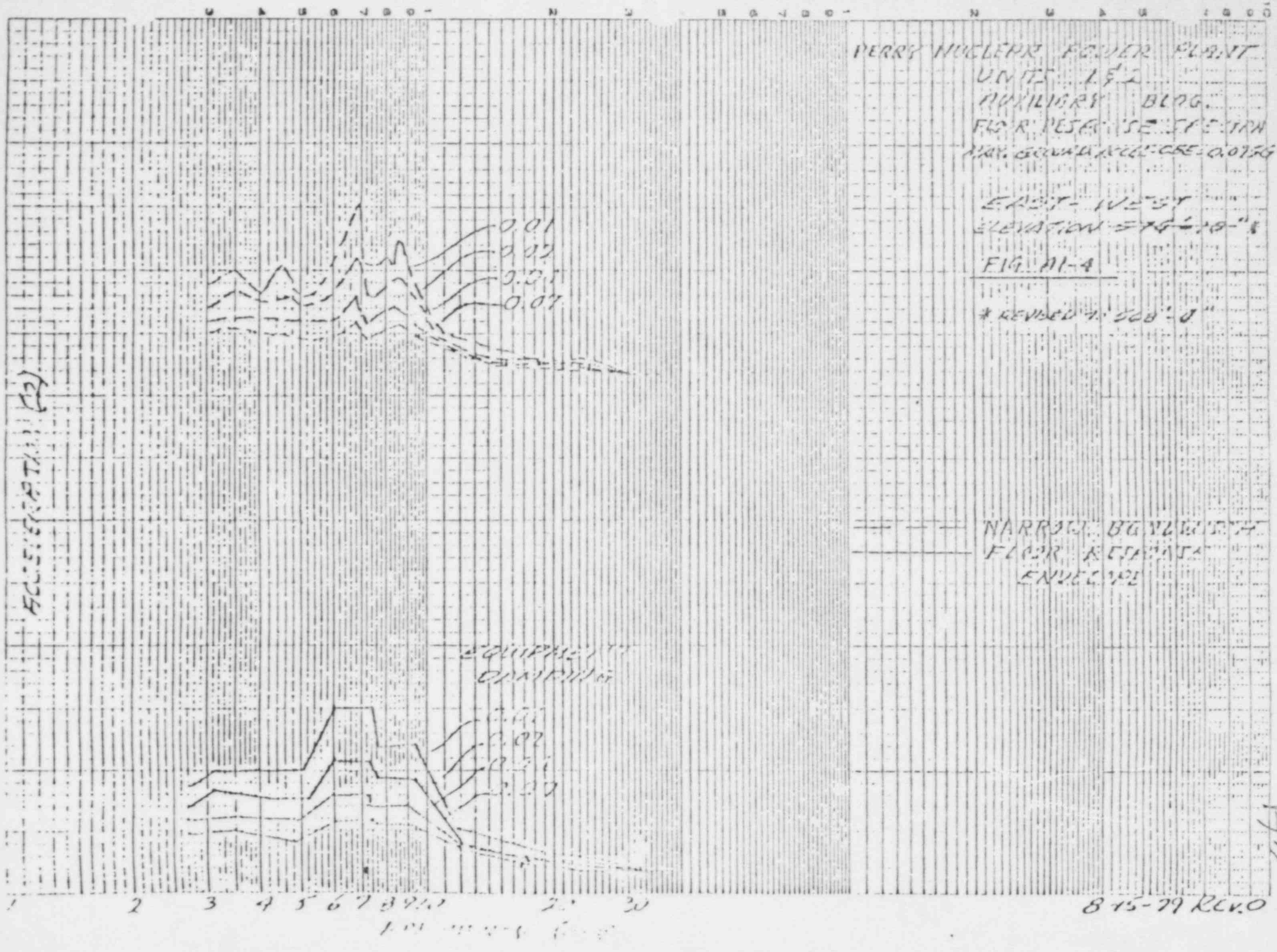
Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ____________________

10. Margins Available: ☐ Input Spectrum
☐ Stress or Deflection

162-1563-7

Pg77



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRUM
MAX. GROUND ACCEL = 0.075G

EAST - WEST
ELEVATION = 574'-10"*

FIG. A1-4

* REVISED TO 568'-0"

8-15-79 REV.0

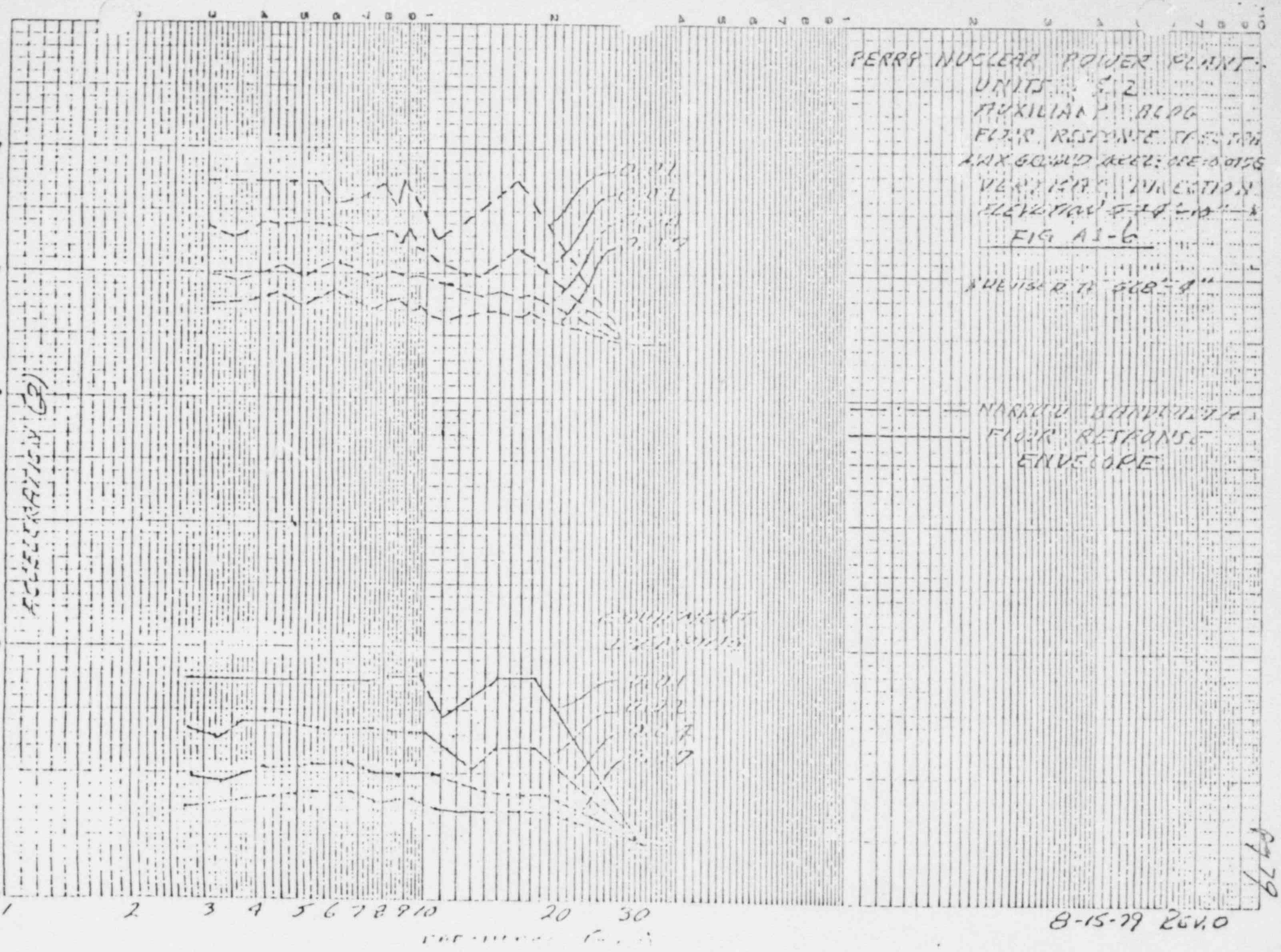
PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BUILDING
RESPONSE SPECTRA
MAX GROUND ACCEL - C.X 0.075G

NORTH - SOUTH
ELEVATION 574'-10"*
FIG A1-5

* REVISED TO SGR - 4"

8-15-79 REV.0

Pg 78



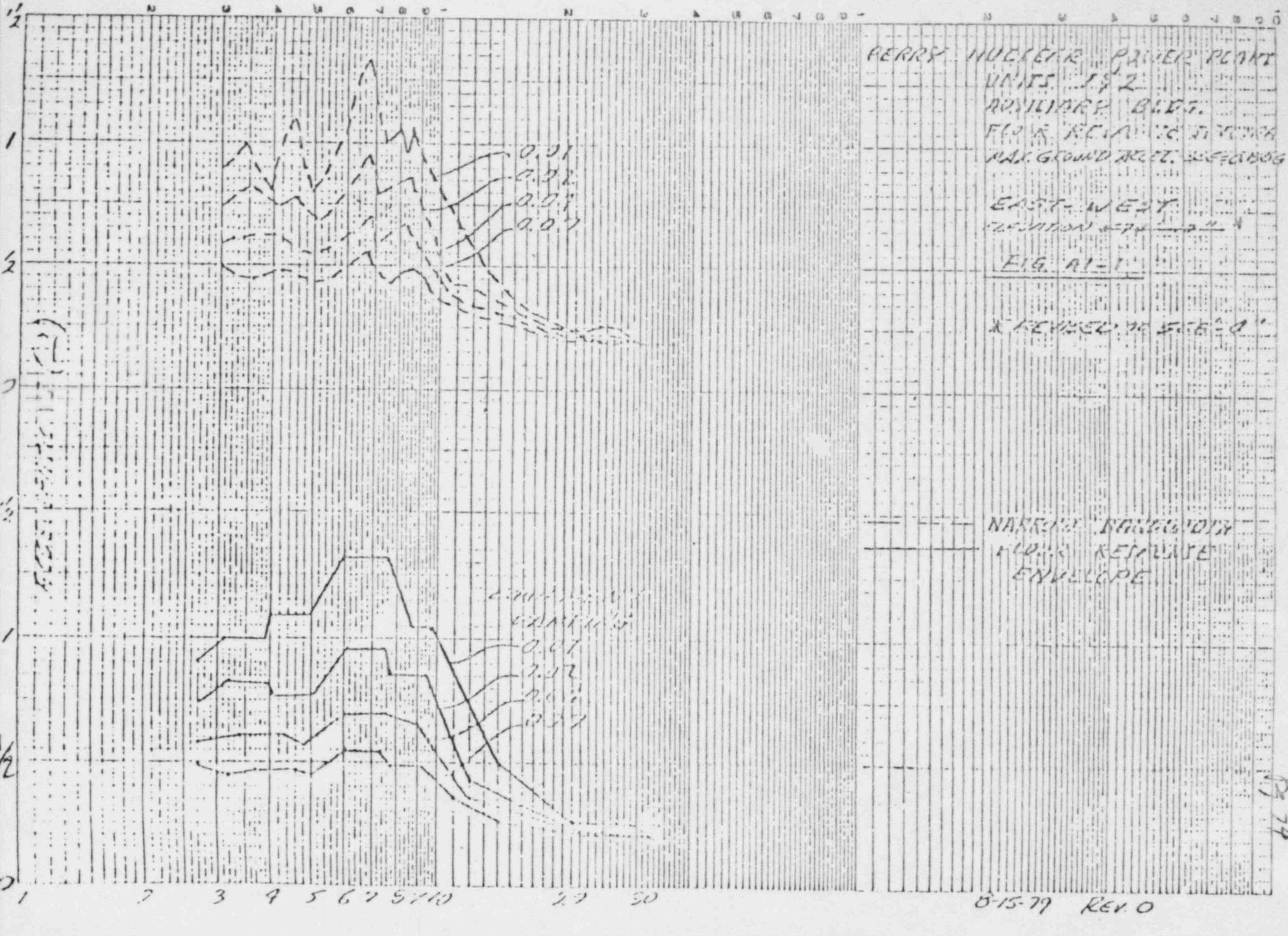
PERRY NUCLEAR POWER PLANT.
UNITS 1 & 2
AUXILIARY BLDG
FLOOR RESPONSE SPECTRA
MAX GROUND ACCEL: OBE=0.075G
VERTICAL DIRECTION
ELEVATION [illegible]

FIG A1-6

*REVISED TO 568'-4"

8-15-79 REV.0

6979



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. [illegible]

EAST-WEST
ELEVATION [illegible]

FIG. A1-1

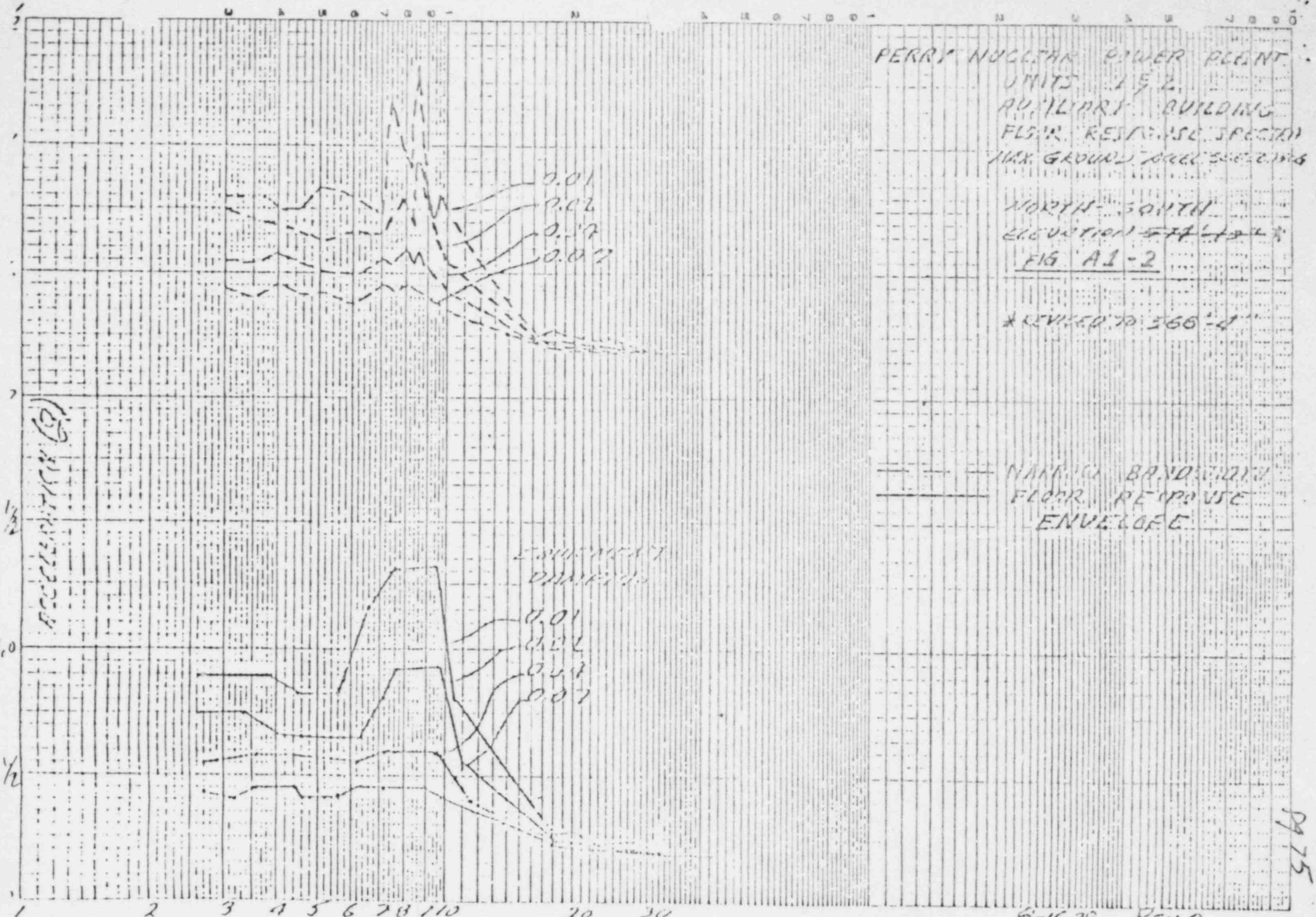
X REVISED [illegible]

NARROW BAND [illegible]
FLOOR RESPONSE
ENVELOPE

8-15-79 REV. 0

Pg 74

P975



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BUILDING
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL 0.15G
NORTH - SOUTH
ELEVATION ~~577'-[illegible]~~ *
FIG A1-2

* REVISED TO 568'-4"

6-15-79 REV 0

PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL SSE = 0.15 G
VERTICAL DIRECTION
ELEVATION ~~574'-10"~~ *
FIG A1-3

* REVISED TO 568'-0"

NARROW BANDWIDTH
FLOOR RESPONSE
ENVELOPE

8-15-79 REV 0

Pg 76

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: CONTROL COMPLEX CHILLED WATER PUMPS OP47-C001A,[✓ B],C | I

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: 8X14 SD Quantity: 3
3. Size or Range: 1600 GPM @ 1750 RPM | 1
4. Vendor: INGERSOLL -RAND COMPANY
5. If the component is a cabinet or panel, name and model Number of the devices included:

   N/A

6. Physical Description:

   a. Appearance: HORIZONTAL PUMP

   b. Dimensions: 35" x 39.13" x 40.13" Rf p7 of 94Q 211-2.

   c. Weight: 1,060 lbs Rf p1-2 of IR INSTRUCTION MANU

7. Location: Building: CONTROL COMPLEX Rf GAI Dwg D-923-002

   Elevation: 574'-10"

8. Field Mounting Conditions (ANCHOR BOLTS TO FLOOR) ☒ Bolt (No. 6, Size 7/8") Rf p7 of 94Q-211-2 | I

   ☐ Weld (Length ______)

   ☐ ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

   MOUNTED ON BEDPLATE WHICH IS ANCHORED TO CONCRETE FLOOR

10. a. System in which located: CONTROL COMPLEX CHILLED WATER SYSTEM | 1

    b. Functional Description: SUPPLY COOLING WATER FOR CONTROL ROOM CHILLERS |

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

    ☐ Both ☐ Neither ☒ Other ALL PLANT MODES

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP-644-4549-00

SP-750-4549-00

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

~~☐ Test~~ ☒ Analysis ~~☐ Combination of Test and Analysis~~

Qualification Report*: STRUCTURAL INTEGRITY AND OPERABILITY ANALYSIS OF 8X14SD PUMP

(No., Title and Date): 94Q-211-2 NOVEMBER 23, 1982

Company that Prepared Report: INGERSOLL-RAND COMPANY

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: ASME SECTION III SUBSECTION ND, ASME SECTION IX, ASME SECTION XI, ANSI B16.5 REG GUIDE 1.48

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

   ☐ Absolute Sum ☒ SRSS ☐ ____________ I

   (other, specify)

3. Required Response Spectra ** (attach the graphs): ATTACHMENT 2

NOTE:

**If more than one report complete Items IV thru VII for each report.*

***If other than RRS is used, describe method.*

4. Damping Corresponding to RRS: OBE 2% SSE 3%

5. Required Acceleration in Each Direct:

☒ ZPA ☐ Other ______________
(specify)

~~OBBA~~ or [✓ OBE] S/S = 0.09 G F/B = 0.09 G V = 0.09 G

~~SSBA~~ or [✓ SSE] S/S = 0.18 G F/B = 0.18 G V = 0.18 G

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program: N/A

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ______________ SSE ______________ Other ______________
(specify)

4. Frequency Range: ______________

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

S/S = ______________ F/B = ______________ V = ______________

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test:

OBBA or OBE S/S = ____ F/B = ____ V = ____

SSBA or SSE S/S = ____ F/B = ____ V = ____

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ____) ☐ ____

b. Orientation and Fixturing: ____

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ____

12. Other tests performed (such as aging or fragility test, including results):

13. Failure Modes (If appropriate) ____

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☒ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

Ref p1 of 94Q 211-2

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

S/S = > 33 HZ F/B = > 33 HZ V = > 33 HZ

Ref p4 of 94Q-211-2

3. Model Type: ☒ 3D ☐ 2D ☐ 1D

☐ Finite Element ☒ Beam (3-D ELASTIC BEAM)

☐ Closed Form Solution ☐ Other ____

Ref pE-2 of 94Q-211-2

4. ☒ Computer Codes: ANSYS COMPUTER PROGRAM — Ref p B-2 of 94Q-211-2

Frequency Range and No. of Modes

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☒ Other: NA ONLY SEISMIC LOADS INVOLVED (specify) — Ref p 1 of 94Q 211-2

6. Damping:

OBE — SSE — Basis for the damping used: EQUIVALENT STATIC ANALYSIS USED

7. Support Considerations in the model: BED PLATE AND ANCHOR BOLTS

8. Critical Structural Elements:

a.

Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
ATTACHMENT 1 GIVES CALCULATED VERSUS ALLOWABLE STRESSES				
FEET SHEAR PINS	DW+T+NOZZLE+E'		15752 psi	16800 psi

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
NONE GIVEN		

9. Failure Modes: FEET SHEAR PINS HAVE LOWEST MARGIN BETWEEN ALLOWABLE AND CALCULATED STRESSES

10. Margins Available: ☒ Input Spectrum ☒ Stress or Deflection

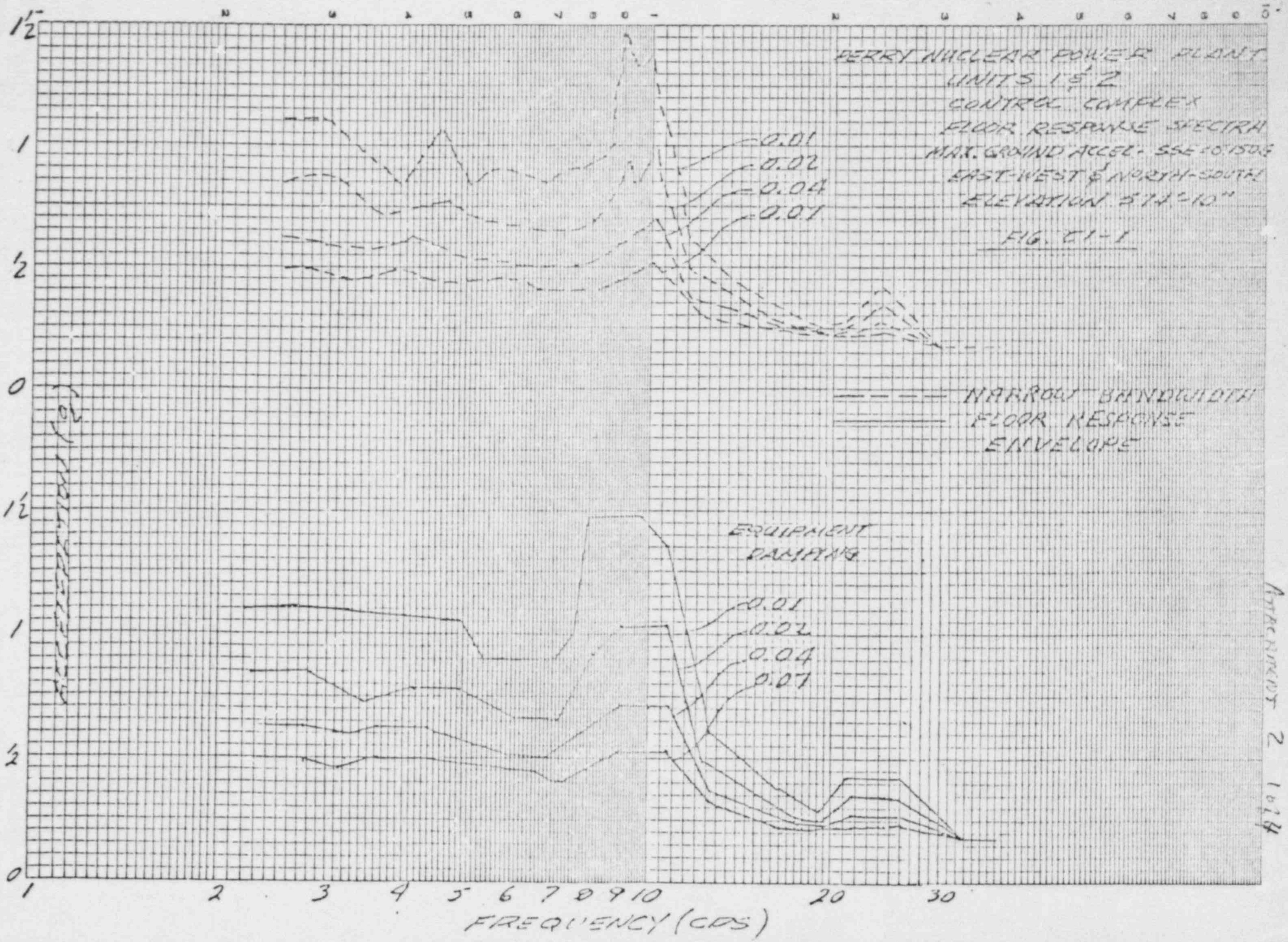
REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
I	7-21-84		RAS 7-21-84	

REVIEWED BY JSSmith 1-14-83

CHECKED BY FJ Lahorski 1-14-83

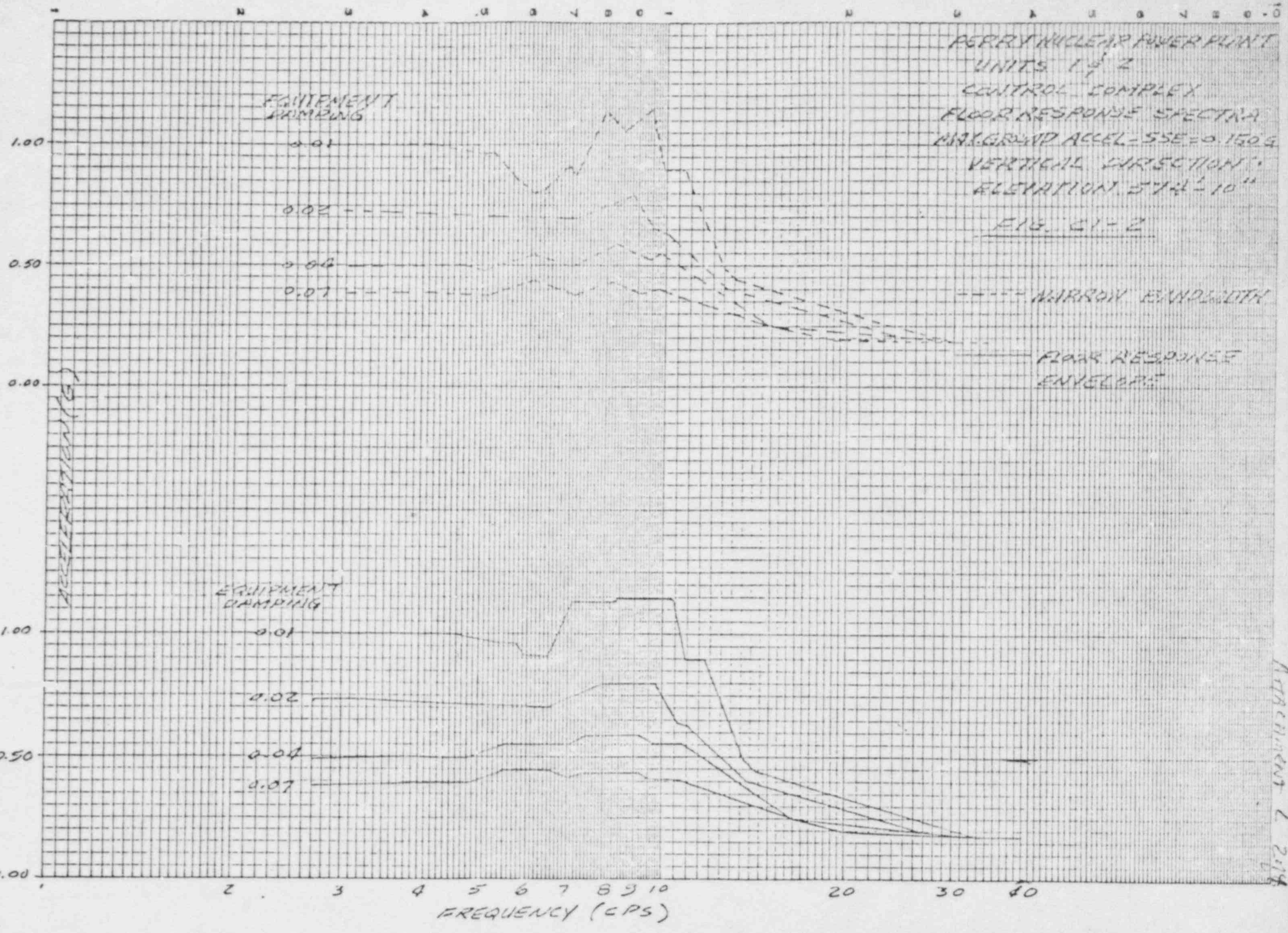
APPROVED BY KA Matheny 10/7/83

Attachment 2 1 of 4



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL - SSE = 0.15 g
EAST-WEST & NORTH-SOUTH
ELEVATION 574'-10"

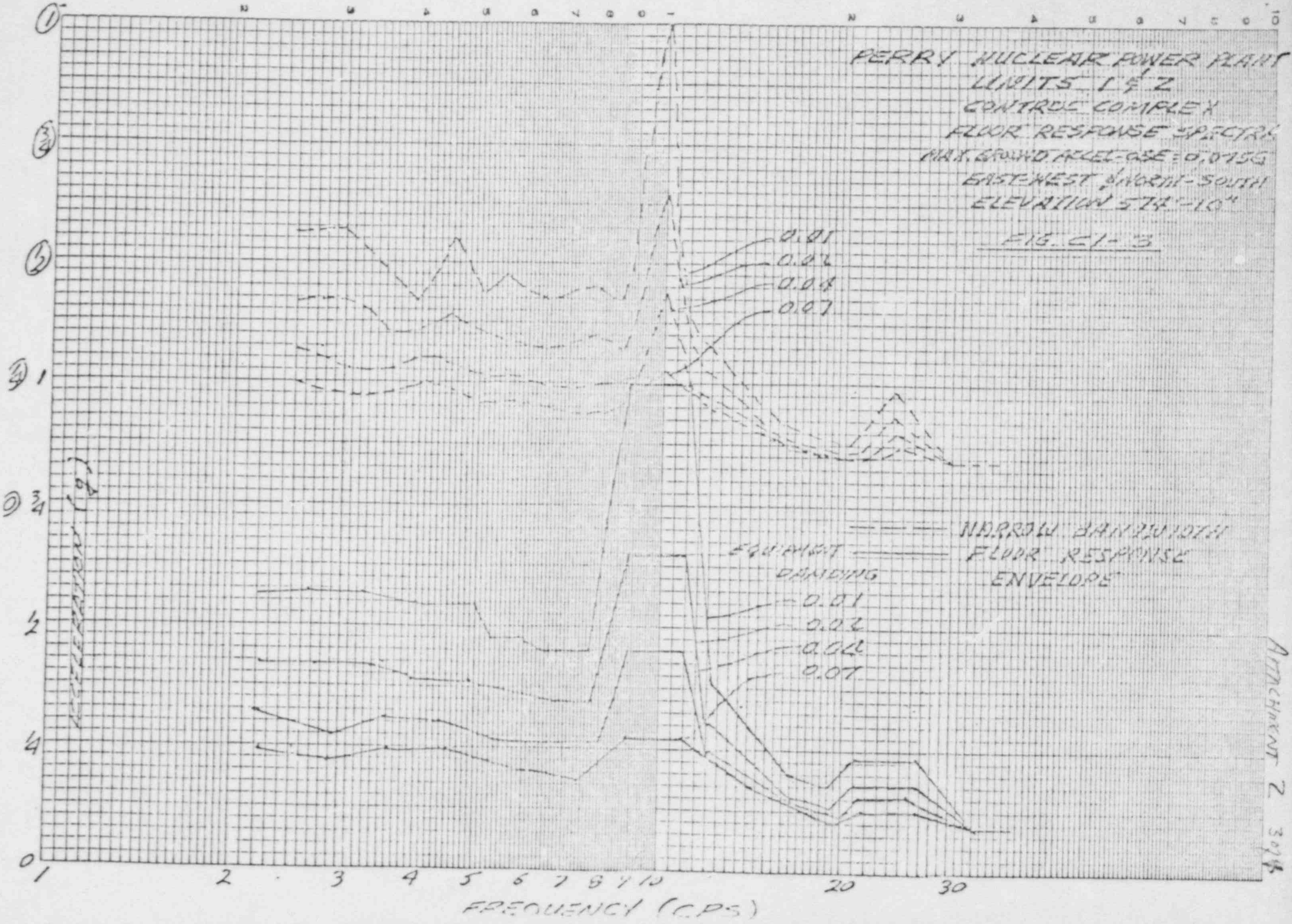
FIG. C1-1



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. - SSE = 0.150 G
VERTICAL DIRECTION:
ELEVATION 574'-10"

FIG. C1-2

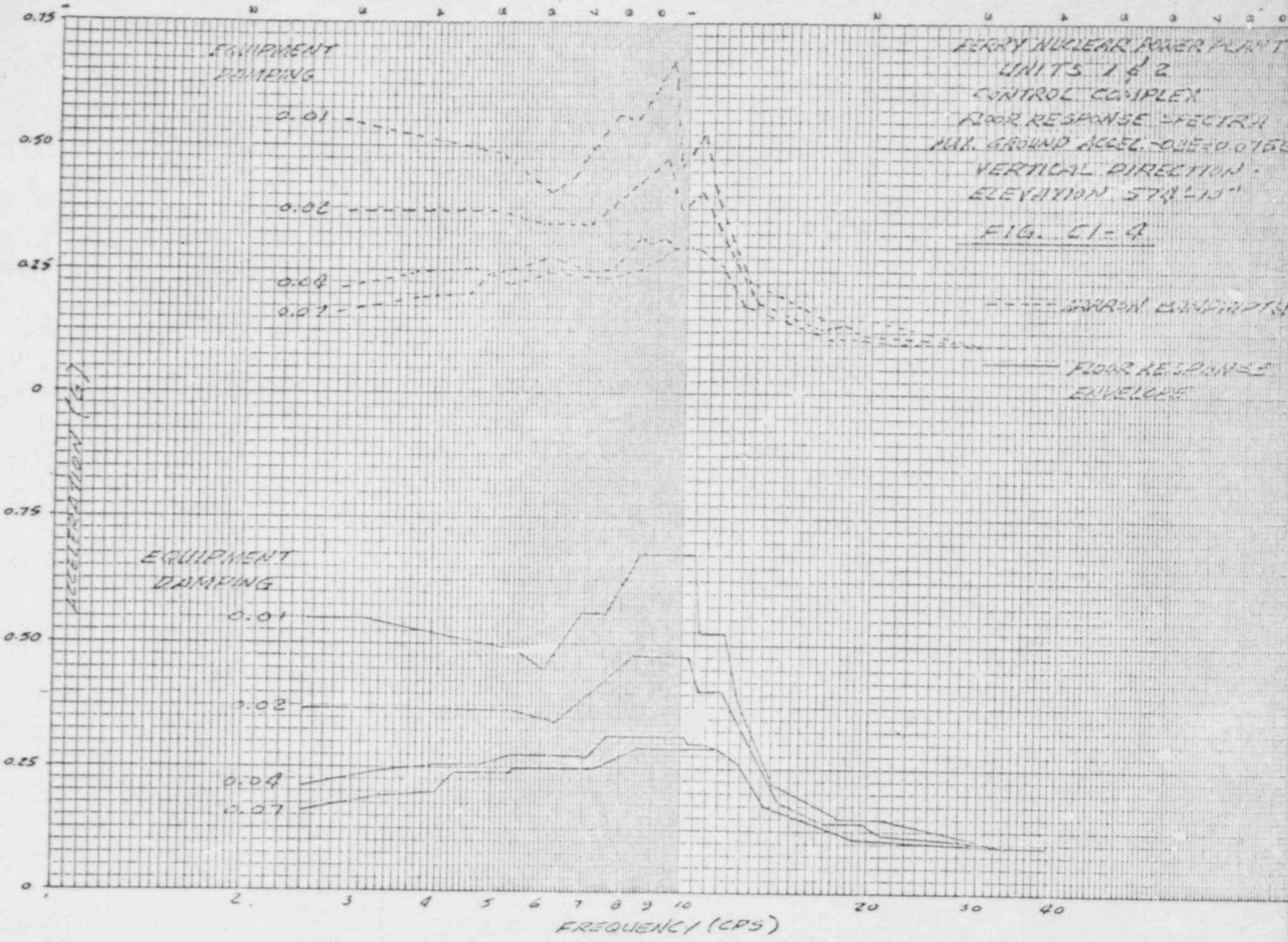
ATTACHMENT 2 2.14



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL-OBE = 0.075G
EAST-WEST & NORTH-SOUTH
ELEVATION 574'-10"

FIG. C1-3

ATTACHMENT 2 3 of 4



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL.-OBE=0.075G
VERTICAL DIRECTION -
ELEVATION 574'-10"

FIG. C1-4

SQRT 644-2

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

MPL# 0P47-C001B

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: MOTORS FOR ① CONTROL COMPLEX CHILLED WATER PUMPS ② EMERGENCY CLOSED COOLING PUMPS

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: TADP Quantity: 5 UNIT 1 2 UNIT 2
3. Size or Range: 100 HP 1775 RPM p6 Report No AL50037 It A
4. Vendor: WESTINGHOUSE
5. If the component is a cabinet or panel, name and model Number of the devices included:

N/A

6. Physical Description:

a. Appearance: SEE ATTACHED p6-7 of REPORT No AL50037 It. A (ATTACHMENT 3)

b. Dimensions: SEE ATTACHED p6-7 OF REPORT No AL50037 It. A (ATTACHMENT 3)
~36" x 19"ϕ KAB

c. Weight: 915 lbs p6 Report No. AL50037 It. A

7. Location: Building: CONTROL COMPLEX Ref GAI Dwg D-923-002 D-304-621

Elevation: 574'-10"

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

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

MOUNTED ON SKID TO FLOOR

10. a. System in which located: ① CONTROL COMPLEX CHILLED WATER ② EMERGENCY CLOSED COOLING

b. Functional Description: ① SUPPLY COOLING WATER FOR CONTROL ROOM CHILLERS
② PROVIDE COOLING WATER FOR SAFETY RELATED COMPONENTS

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

☐ Both ☐ Neither ☒ Other ① ALL PLANT MODES
② HOT STANDBY, NORMAL SHUTDOWN, CONTINUATION OF NORMAL SHUTDOWN AND POST ACCIDENT

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP-644-4549-00 SP-750-4549-00

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: SEISMIC ANALYSIS

(No., Title and Date): ALS0037 IT. A 6-16-83

Company that Prepared Report: WESTINGHOUSE

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE 344-1975

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☒ SRSS ☐ ________ (other, specify)

p15 Report No ALS0037 It. A

3. Required Response Spectra ** (attach the graphs): ATTACHMENT 2 (C-1)

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

SQRT 644-2

4. Damping Corresponding to RRS: OBE 2% SSE 3%

5. Required Acceleration in Each Direct:

☒ ZPA ☐ Other ____________ (specify)

OBBA or [✓ OBE] S/S = 0.09G F/B = 0.09G V = 0.09G SEE ATTACHED RRS

SSBA or [✓ SSE] S/S = 0.18G F/B = 0.18G V = 0.18G SEE ATTACHE RRS

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program: N/A

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Independent Axis ☐ Multi-Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ________ SSE ________ Other ________ (specify)

4. Frequency Range: ________

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

S/S = ________ F/B = ________ V = ________

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test:

OBBA or OBE S/S = ____________ F/B = ____________ V = ____________

SSBA or SSE S/S = ____________ F/B = ____________ V = ____________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____ , Size _____)

☐ Weld (Length ______) ☐ ____________

b. Orientation and Fixturing: ____________

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ____________

12. Other tests performed (such as aging or fragility test, including results):

Equipment qualifie w/ IEEE-STD 323-1974 (see HM-9112) RB 9/21/87

13. Failure Modes (If appropriate) ____________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

fH E-1-83

☒ Static Analysis ☒ Equivalent Static Analysis

p2 Report No AL50037 IT. A

☐ Dynamic Analysis: ☐ Time–History ☐ Response Spectrum

2. * Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):

S/S = GREATER THAN 33 HZ F/B = GREATER THAN 33 HZ V = GREATER THAN 33 HZ

p 37 Report No AL50037 IT. A

3. Model Type: ☐ 3D ☐ 2D ☒ 1D

☐ Finite Element ☒ Beam

☐ Closed Form Solution ☐ Other ____________

p27 Report No. AL50037 IT. A

* PAGE 3 of REPORT No AL50037 IT. A INDICATES THE MOTOR WILL BE MODELED AS A "RIGID" MASS. IT IS REQUIRED THAT THE MOTOR WILL BE RIGIDLY MOUNTED TO THE BASE, IN ORDER TO MEET THE REQUIREMENT OF THE SPECIFICATION.

PLEASE REFER TO PAGE 1 OF INGERSOLL-RAND'S REPORT FOR BX1450 PUMPS WHERE IT IS STATED THE FUNDAMENTAL FREQUENCY OF THE PUMP-MOTOR-SUPPORT FRAME IS DEMONSTRATED TO BE ABOVE THE RIGID FREQUENCY.

SQRT 644-C

4. ☐ Computer Codes: N/A

Frequency Range and No. of Modes

☒ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☑ Other: NA
(specify)

6. Damping:

OBE — SSE — Basis for the damping used: EQUIVALENT STATIC ANALYSIS USED

7. Support Considerations in the model: MOTOR FOOT

8. Critical Structural Elements:

a.

Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
ATTACHMENT 1				
SHAFT		3,739 psi		36,000 psi

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
ATTACHMENT 1 SHAFT 0.0013"		0.0068"

9. Failure Modes: SHAFT STRESS

10. Margins Available: ☒ Input Spectrum ☒ Stress or Deflection

pg 7 Report No
ALS0037 Ir, A
Also Ref attached Stress
Comparisons

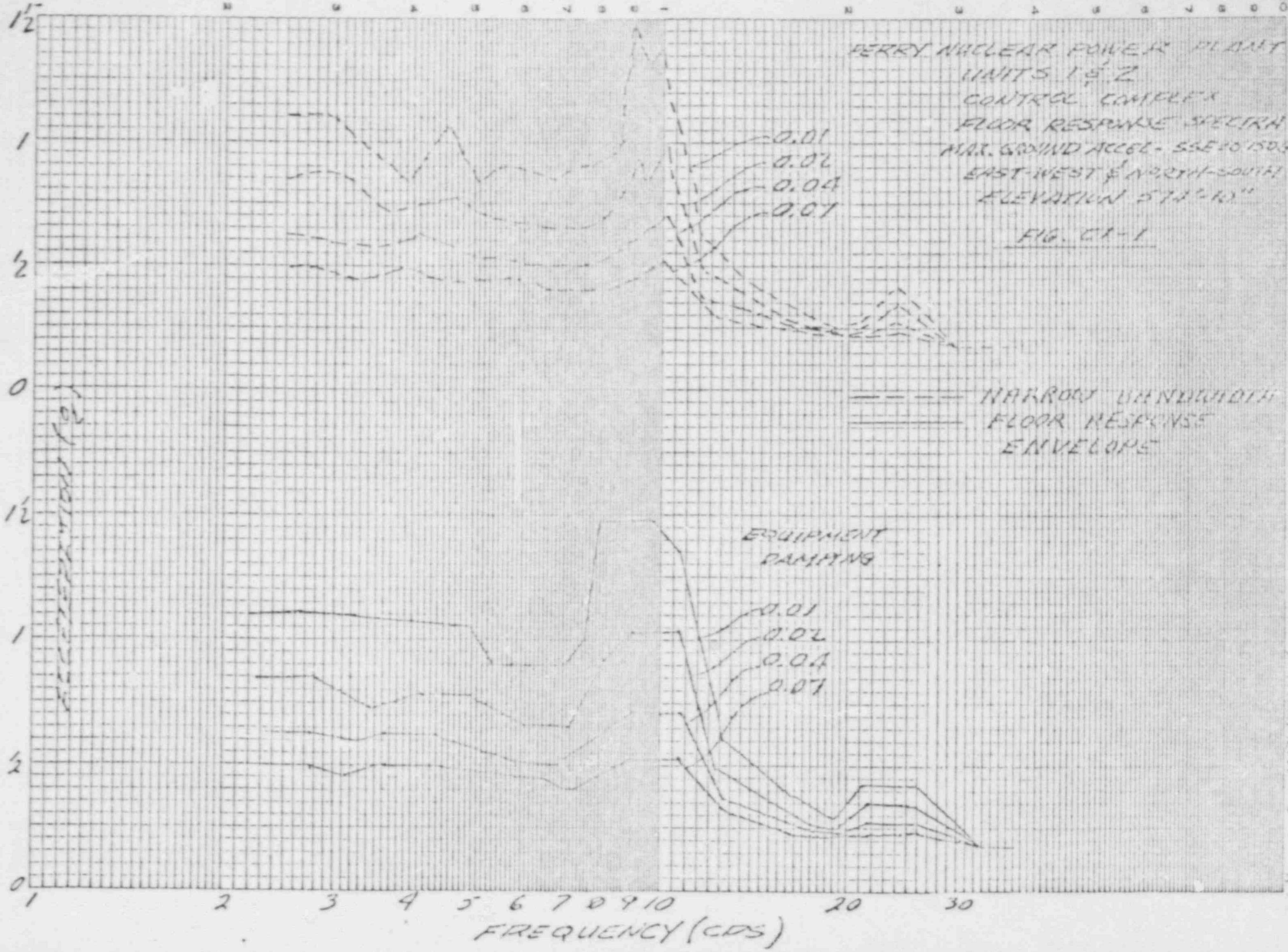
REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
/		/	/	
/		/	/	
/		/	/	

REVIEWED BY Jeffrey 7-15-83

CHECKED BY James D. Coberly 8/01/83

APPROVED BY D. A. Putre 7/24/84

SQRT 644 Z
ATTACHMENT 2 1 of 4



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL - SSE=0.15G
EAST-WEST & NORTH-SOUTH
ELEVATION 574'-10"

FIG. C1-1

SQRT 644-2
ATTACHMENT 2 2 of 4

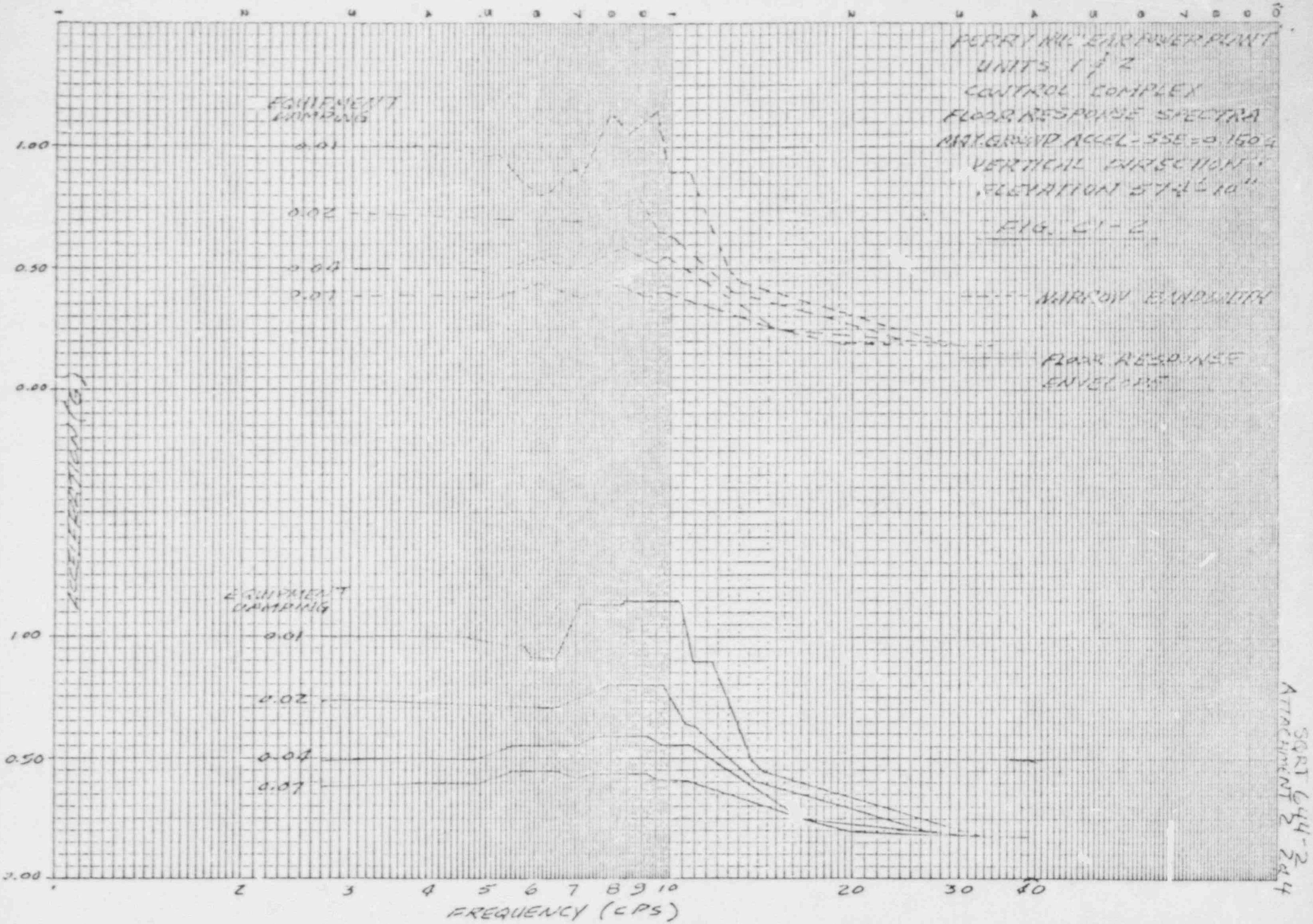
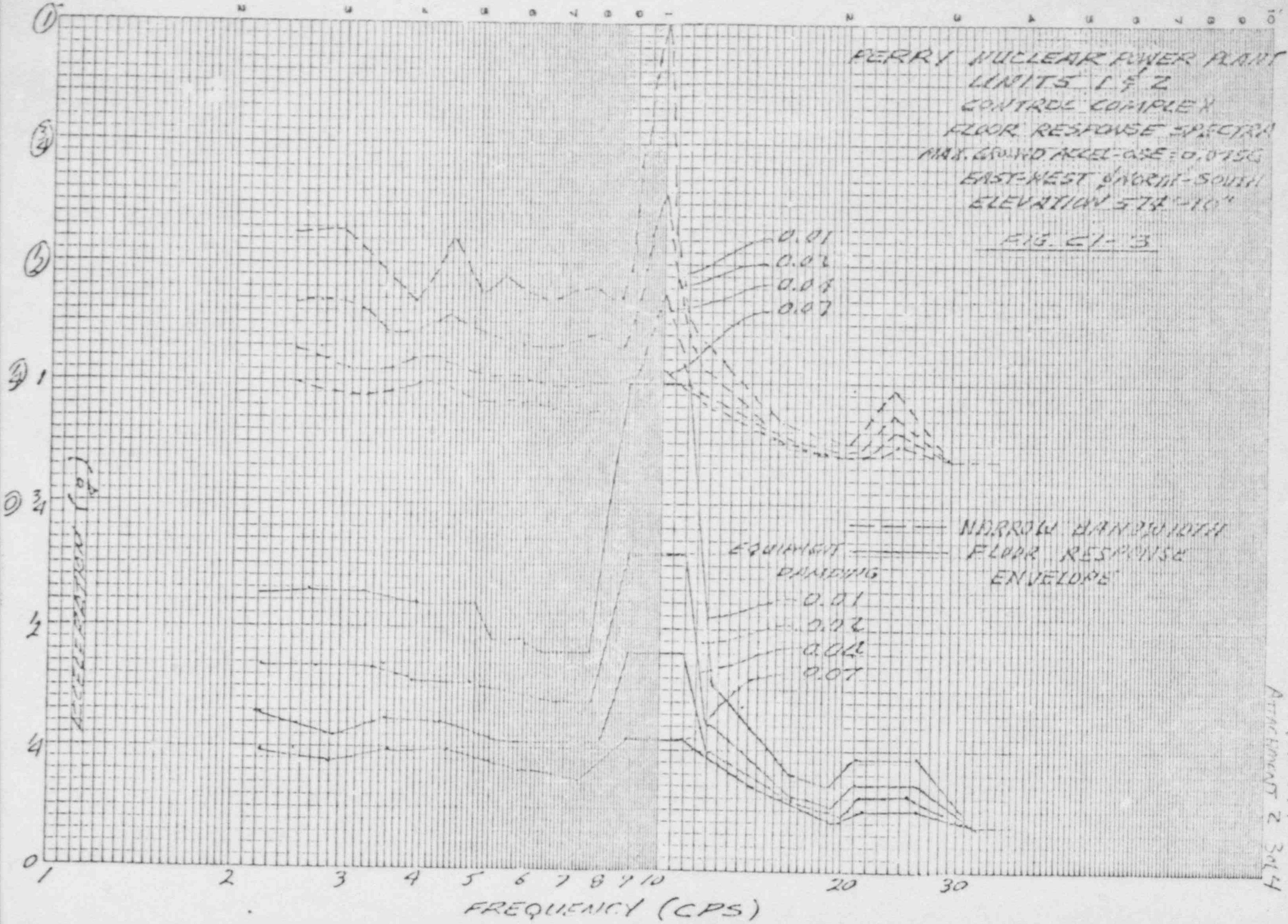

PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL - SSE = 0.15g
VERTICAL DIRECTION,
ELEVATION 574'-10"

FIG. C1-2

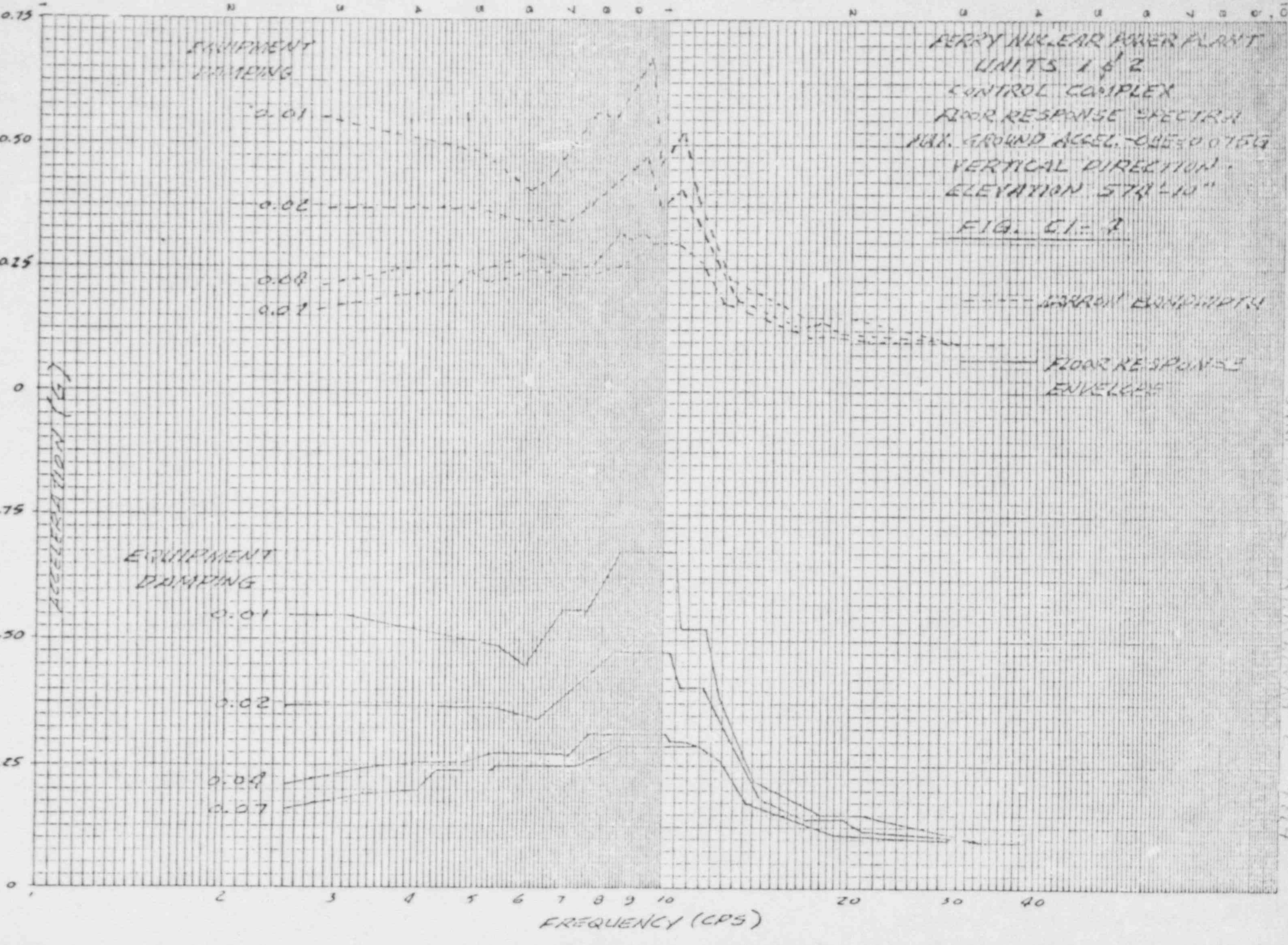
SQRT 644-2
ATTACHMENT 2 3 of 4



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL-OBE = 0.075G
EAST-WEST & NORTH-SOUTH
ELEVATION 574'-10"

FIG. C1-3

SSER Unit 2 Attachment C 4 of 4



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. – OBE = 0.075G
VERTICAL DIRECTION.
ELEVATION 574'-10"

FIG. C1-7

RNN-229

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: MAIN STEAM STOP 3RD ISOLATION VALVE 1N11F0020Ⓐ B,C,D

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: 81240 Quantity: 4 UNIT 1, 0 UNIT 2
3. Size or Range: 28" ANSI CLASS 900
4. Vendor: BORG - WARNER
5. If the component is a cabinet or panel, name and model Number of the devices included:

N/A

(NOT A CABINET OR PANEL)

6. Physical Description:

a. Appearance: GATE VALVE WITH SMB-4-200 LIMITORQUE ACTUATOR

b. Dimensions: H = 162" L = 90.75" W = 48"

c. Weight: 19,358 LBS. (VALVE), 1905 LBS. ACTUATOR

7. Location: Building: AUXILIARY BUILDING - STEAM TUNNEL

Elevation: 620'

8. Field Mounting Conditions

☐ Bolt (No. ____, Size ____)
☒ Weld (Length CIRCUM.)
☐ ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

MOUNTED IN HORIZONTAL PIPE RUN WITH STEM VERTICAL

10. a. System in which located: N11 - MAIN & REHEAT STEAM

b. Functional Description: SYSTEM FLOW SHUTOFF WHEN CLOSED, PASS FLOW WHEN OPEN

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

☐ Both ☒ Neither ☒ Other MAIN STEAM SHUTOFF

RNN-229

II. Pertinent Reference Design Specifications for Qualification Requirements:

SPEC. 521-02

[✓ a.] Seismic Input
b. Hydrodynamic Load Input
[✓ c.] Fatigue Considerations
[✓ d.] Service Conditions
[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: NSR 81240 REV D, 3-1-84, SEISMIC ANALYSIS OF
(No., Title and Date): 28" 900LB CARBON STEEL, MOTOR OPERATED, GATE VALVE

Company that Prepared Report: BORG-WARNER

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: ASME B&PV CODE, SECT III, NB-3500 & NC-3500
1971 EDITION, ADDENDA TO WINTER 1972

V. VIBRATION INPUT:

1. Loads considered:
   a. ☒ Seismic only
   b. ☐ Hydrodynamic only
   c. ☐ Vibration from normal operation
   d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☐ SRSS ☐ N/A RRS NOT USED
(other, specify)

3. Required Response Spectra ** (attach the graphs): SEE PNPP VALVE QUALIFICATION PROGRAM DESCRIPTION (TAB 6)

NOTE:

*If more than one report complete Items IV thru VII for each report.
**If other than RRS is used, describe method.

RNN-229

4. Damping Corresponding to RRS: OBE N/A SSE N/A
SEE SECTION VI of THIS SQRT

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other PEAK*
(specify)

OBBA or OBE S/S = < SSBA F/B = < SSBA V = < SSBA

[✓ SSBA] or SSE S/S = ≤ 3g F/B = ≤ 3g V = ≤ 3g
. SEE ATTACHMENT A, SECTION 4.

6. Were fatigue effects considered:

☒ Yes ☐ No

If yes, describe how they were treated in overall qualification program: SEE PNPP VALVE FATIGUE LOADING ANALYSIS (TAB 6)

* MAXIMUM ACCELERATIONS FROM PIPING ANALYSIS.

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ____ SSE ____ Other ____
(specify)

4. Frequency Range: ____

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

S/S = ____ F/B = ____ V = ____

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

RNN-229

8. Maximum Input g Level Test:

OBBA or OBE S/S = ____________ F/B = ____________ V = ____________

SSBA or SSE S/S = ____________ F/B = ____________ V = ____________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ____) ☐ ____________

b. Orientation and Fixturing: ____________

10. Functional operability verified:

☐ Yes ☐ No ☒ Not Applicable

11. Test Results including modifications made: ____________

12. Other tests performed (such as aging or fragility test, including results): ____________

13. Failure Modes (If appropriate) ____________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☒ Equivalent Static Analysis ①

☒ Dynamic Analysis: ② ☐ Time–History ☐ Response Spectrum

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

S/S = 47.5 F/B = 47.5 V = ____________

3. Model Type: ☐ 3D ☒ 2D ☐ 1D

☒ Finite Element ② ☒ Beam ①

☐ Closed Form Solution ☐ Other ____________

① EQUIVALENT STATIC - STRESS CALCULATION

② DYNAMIC ANALYSIS - DETERMINATION OF NATURAL FREQUENCY.

RNV-229

4. ☒ Computer Codes: MSC/NASTRAN

Frequency Range and No. of Modes 0-33HZ, 0 MODES IN FREQUENCY RANGE OF INTEREST

☐ Hand Calculations ABOVE 33HZ ANALYSIS CALCULATED 3 MODES OF 47.5HZ, 69.4HZ, AND 174HZ

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads: N/A

☐ Absolute Sum ☐ SRSS ☐ Other: ______ (specify)

6. Damping:

OBE N/A SSE N/A Basis for the damping used: NOT USED IN THE ANALYSIS

7. Support Considerations in the model: FIXED AT WELD ENDS ② SEE BOTTOM PG.4. SIMPLY SUPPORTED AT WELD ENDS ① SEE BOTTOM PG.4

8. Critical Structural Elements:

a.

Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable

FOR PIPING ACCELERATIONS SEE PG. 3

FOR STRESSES SEE REPORT NSR 81240 - SUMMARY SECTION PG. 8

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.0098"	CG OF ACTUATOR SEE NSR 81240 PG.61	*

9. Failure Modes: FAILURE OF BODY NECK

10. Margins Available: ☐ Input Spectrum ☒ Stress or Deflection

* MAXIMUM ALLOWABLE NOT GIVEN - MAXIMUM DISPLACEMENTS ARE SUFFICIENTLY SMALL AND VALVE MACHINING TOLERANCES ADEQUATELY ACCOMODATE MOVEMENTS. IN ADDITION, THE DYNAMIC MOVEMENT OF THE YOKE ASSEMBLY ASSOCIATED WITH A SEISMIC EVENT WOULD TEND TO FREE ANY BINDING THAT MIGHT OCCUR.

REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
1	7-27-83	JAD	JDC	KAM
2	4-27-83	SRM	RAS	HAP
3	7-18-84		RAS	7-24-84

SP-521-02

REVIEWED BY A. HIRSHBERGER 12-16-82

CHECKED BY F. J. LAHOVSKI 1-19-83

APPROVED BY K.A. MATHENY 4-22-83

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

MPL# 1R42S0002
(1R42S0003)

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: Lead Acid Electrical Storage Batteries and Racks

1. Scope: ☐ NSSS ☒ BOP ☐ Other

* 2. Model Number: 2GN-15 Quantity: 2 R

* 3. Size or Range: 125VDC, 1200 Ampere-hours (8 hour rating) R

4. Vendor: Exide Power Systems Division, ESB Corporation

5. If the component is a cabinet or panel, name and model Number of the devices included

N/A

6. Physical Description: R

* a. Appearance: Clear plastic battery cells mounted on open steel lattice rack

* b. Dimensions: 108" wide, 38.25" high, 48.75" deep R

c. Weight: 14550 LB. REF TELECON PY-GAI/CEI 8462T R

7. Location: Building: CC

Elevation: 638' 6"

* 8. Field Mounting Conditions

☐ Bolt (No. ____, Size ____)
☒ Weld (Length 2.5", 16 per rack, 5.0", 8 per rack
☐ ______ R

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

On floor

10. a. System in which located: 125Volt DC/Battery system

b. Functional Description: Provide 125VDC for DC System

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

☒ Both ☐ Neither ☐ Other ______

* REF. VENDOR LAYOUT DRAWING
EXIDE POWER SYSTEMS DRAWING
PH-47339
R1

II. Pertinent Reference Design Specifications for Qualification Requirements: SP-554-4549-00

[✓ a. Seismic Input]

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☐ Analysis ☒ Combination of Test and Analysis REF. TITLE PAGE |R1

Qualification Report*: TEST: Nuclear Environmental Qualification Program on Electrical Storage Batteries
Analysis: Comparison Test & Analysis of 2 step 3 bay high seismic Battery Rack

(No., Title and Date): TEST: 4500l-1 Jan. 18, 1982
Analysis: A-3-82 ; Feb. 10, 1982 ; A-4-82 , Feb. 10, 1982 (REF. TITLE PAGE) |R1

Company that Prepared Report: TEST: Wyle Laboratories
ANALYSIS: Flight Dynamics, Inc. REF. TITLE PAGE |R1

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE 323-1974, IEEE 344-1975

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☒ SRSS ☐ ______ (other, specify)

3. Required Response Spectra ** (attach the graphs): C4(-1 thru -4) |R1

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

4. Damping Corresponding to RRS: OBE 2% SSE 2%

5. Required Acceleration in Each Direct: REF. RRS C4 CURVES |R1

☐ ZPA ☒ Other Peak (specify)

OBBA or [✓ OBE] S/S = 2.53g F/B = 2.53g V = 2.53g

SSBA or [✓ SSE] S/S = 3.2g F/B = 3.2g V = 3.2g

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were trea :d in overall qualification program:

VI. IF QUALIFICATION BY TEST, THEN COMPLETE: REF. SEC. IV (of 45001-1 Wyle) RAS 5.22.83 |R1

1. ☐ Single Frequency ☒ Multi-Frequency REF. PARA. 2.3 & 3.3 RAS ☒ random ☐ sine beat ☐ |R1

2. ☐ Single Axis ☐ Independent Axis ☒ Multi-Axis REF. PARA. 2.3 & 3.3 RAS ☐ In-phase motions |R1

3. Number of Qualifications Tests: REF. PARA. 2.3 and 3.3 |R1

OBE 10 SSE 2 Other (specify)

in two components/directions each, ∴ resulting in 5 OBE & 1 SSE Qual. Test RAS 5.22.83

4. Frequency Range: 1 Hz to 200 Hz REF. PARA. 2.3 and 3.3 |R1

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): REF. APP. IV To Sec. IV |R1

S/S = 11.5 Hz F/B = 15.2 Hz V = 35 Hz

6. Method of Determining Natural Frequencies REF. PARA 2.2 & 3.2 |R1

☒ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test REF. APP. V To Sec IV |R1

☒ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test: REF. FIGS IN APP. V (SEE ATTACHED) |R1

OBBA or [✓ OBE] S/S = 6.25 F/B = 6.25 V = 6.95

SSBA or [✓ SSE] S/S = 10.0 F/B = 9.8 V = 7.4

9. Laboratory Mounting: REF. FIG. 3, SEC. VI, SEC. 3.1, SEC. IV |R1
pages VI-20 & 23; esp. Photo IV-1

a. ☐ Bolt (No. ___, Size ___)

☒ Weld (Length 2.5" / 5.0") ☐ 16 per rack / 8 per rack } welded to test fixture

b. Orientation and Fixturing: (on FIG 3 p VI-20) 5/20/83

10. Functional operability verified:

☒ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: No structural failures noted; REF SEC. 33.1 |R1
No voltage or current deviations were noted; REF, SEC. 3.7.1 |R1

12. Other tests performed (such as aging or fragility test, including results):

Aging: Batteries successfully passed tests after thermal and radiation aging procedures REF. SEC. I, II, III |R1

13. Failure Modes (If appropriate)

14. Margins Available: REF. FIGS. FROM APP. II OF SEC. IV |R1
☒ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE: *

1. Method of Analysis: REF A-3-82 4.0, 5.0; A-4-82 5.0 |R1

☐ Static Analysis ☐ Equivalent Static Analysis

☒ Dynamic Analysis: ☐ Time-History ☒ Response Spectrum

2. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): REF. A-3-82 TABLE 4.1 |R1

S/S = 11.17 Hz** F/B = 15.98 Hz** V = 34.51 Hz**

**Calculated From model

3. Model Type: ☒ 3D ☐ 2D ☐ 1D |R1
REF. A-3-82 4.0, 5.0

☒ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ___

* Analysis used to prove seizmic qualification of 15 battery rack; test was for 12 battery rack

4. ☒ Computer Codes: SAP IV REF. A-3-82 SEC. 5.0 |R1

Frequency Range and No. of Modes 1 Hz to 50HZ Vertical, 1Hz to 40Hz Horizontal; 3 modes

☐ Hand Calculations RAS

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads: REF. Sec. 5.0, A-4-82 |R1

☐ Absolute Sum ☒ SRSS GSK 7/24/83 ☒ Other: GSK 7/24/83 ~~N/A~~
(specify)

6. Damping: REF. A-4-82 FIG. 2.1, 2.2 |R1

OBE — SSE 2% Basis for the damping used: Used for test which provided data.

7. Support Considerations in the model: Model is assumed to be ~~welded to test fixture~~ fixed at the base – see input nodes 570 - 627 RAS 9/20/83 |R1

8. Critical Structural Elements: REF. A-4-82, 6.0

a.

Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
Support angle, elem. 416 lower left frame support (p23)	Static weight of batteries plus seismic (dynamic) load		950. 27,795	28,000 31,110

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
N/A RAS		

9. Failure Modes: Bending REF. A-4-82 6.0 |R1

10. Margins Available: ☒ Input Spectrum ☐ Stress or Deflection

REF. A-4-82 FIG. 2.1, 2.2 |R1

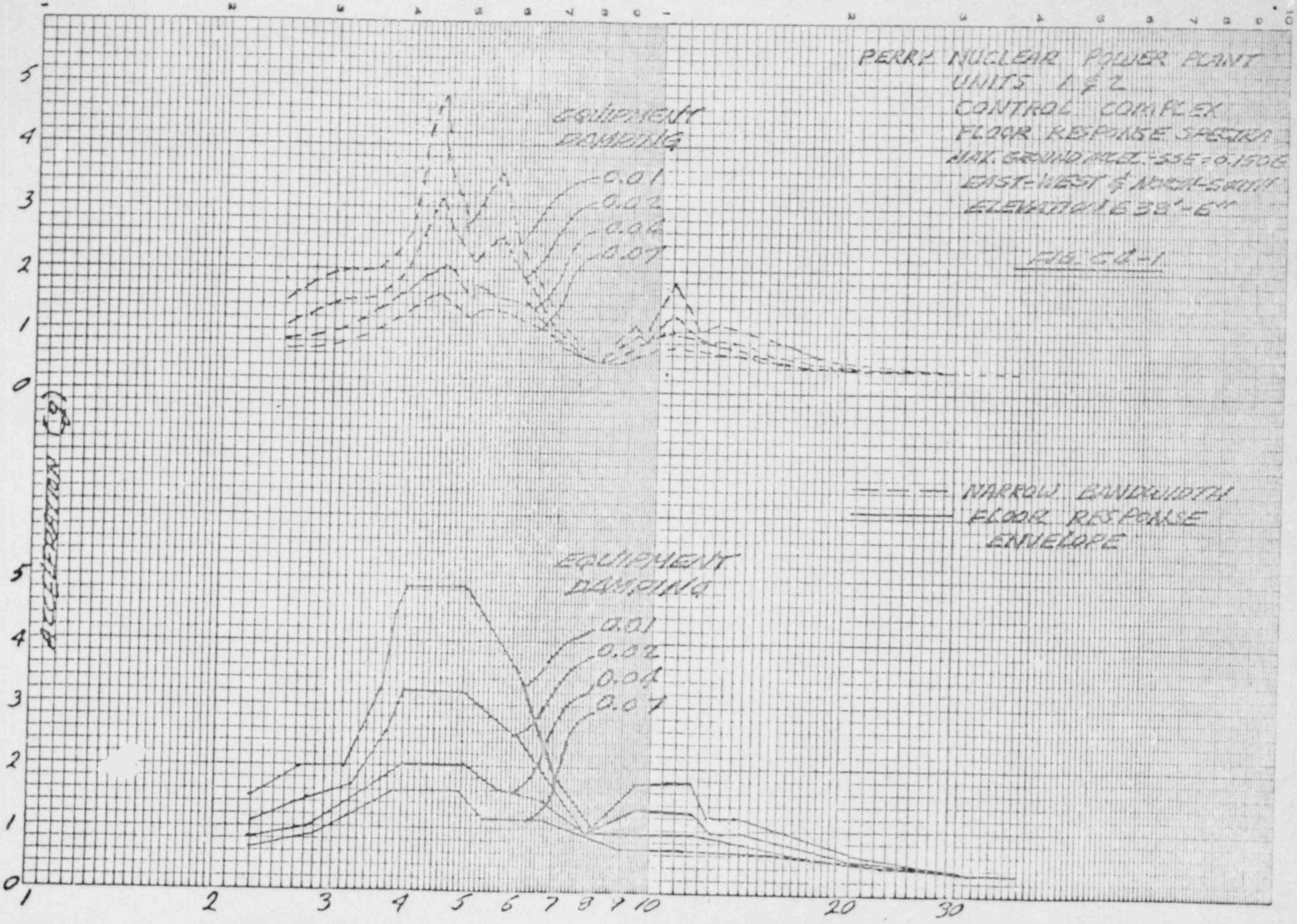
REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
1	7/24/83	ETB	GSK	KOM 10/7/83

REVIEWED BY Edward T. Burke 11/12/82

CHECKED BY D. J. Lahorski 11-15-82

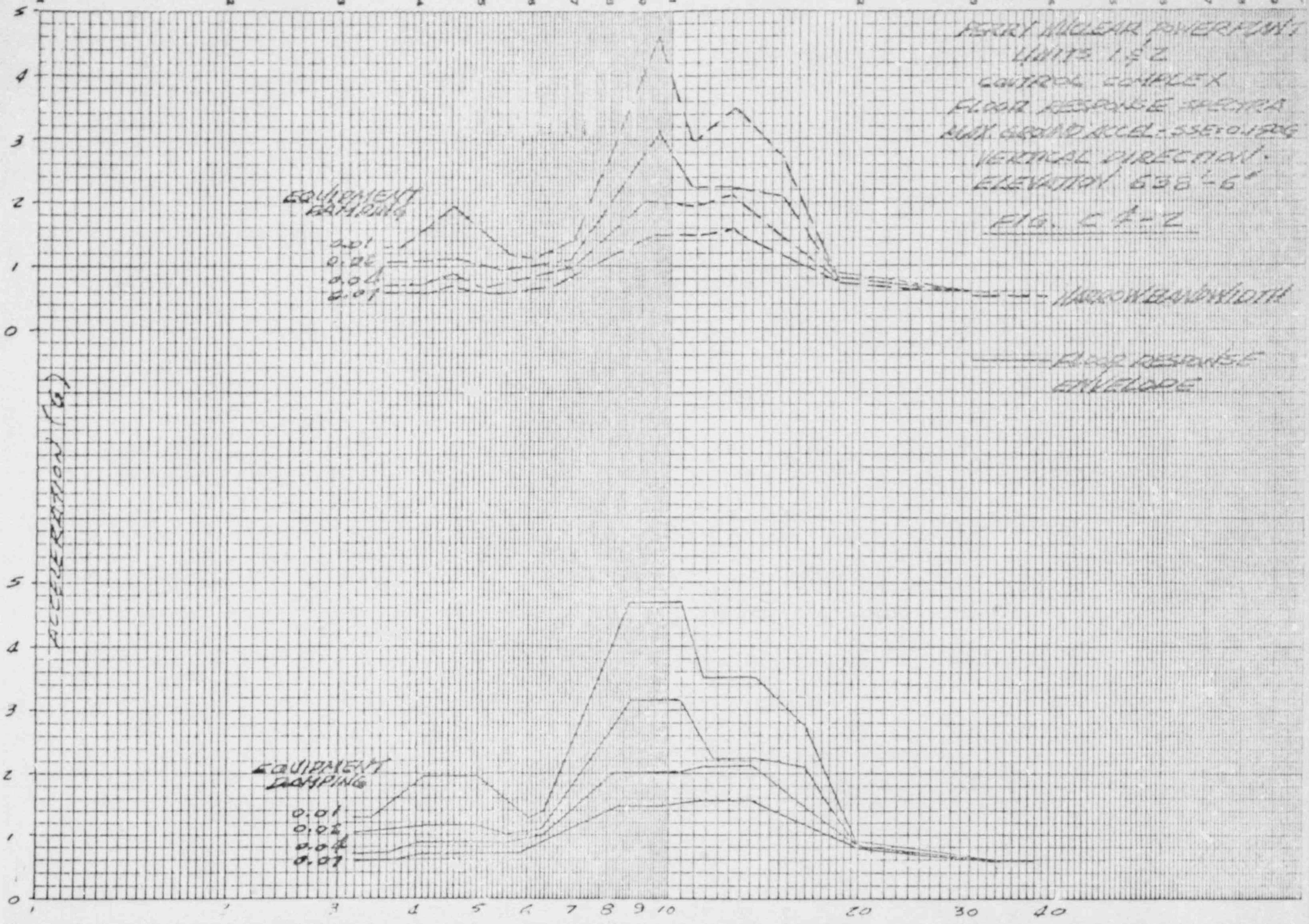
APPROVED BY Kenneth A. Matheny 12/11/82

Rev 1 ok RAS 9.28.83
Rev 1 ok JDC 01.09.84



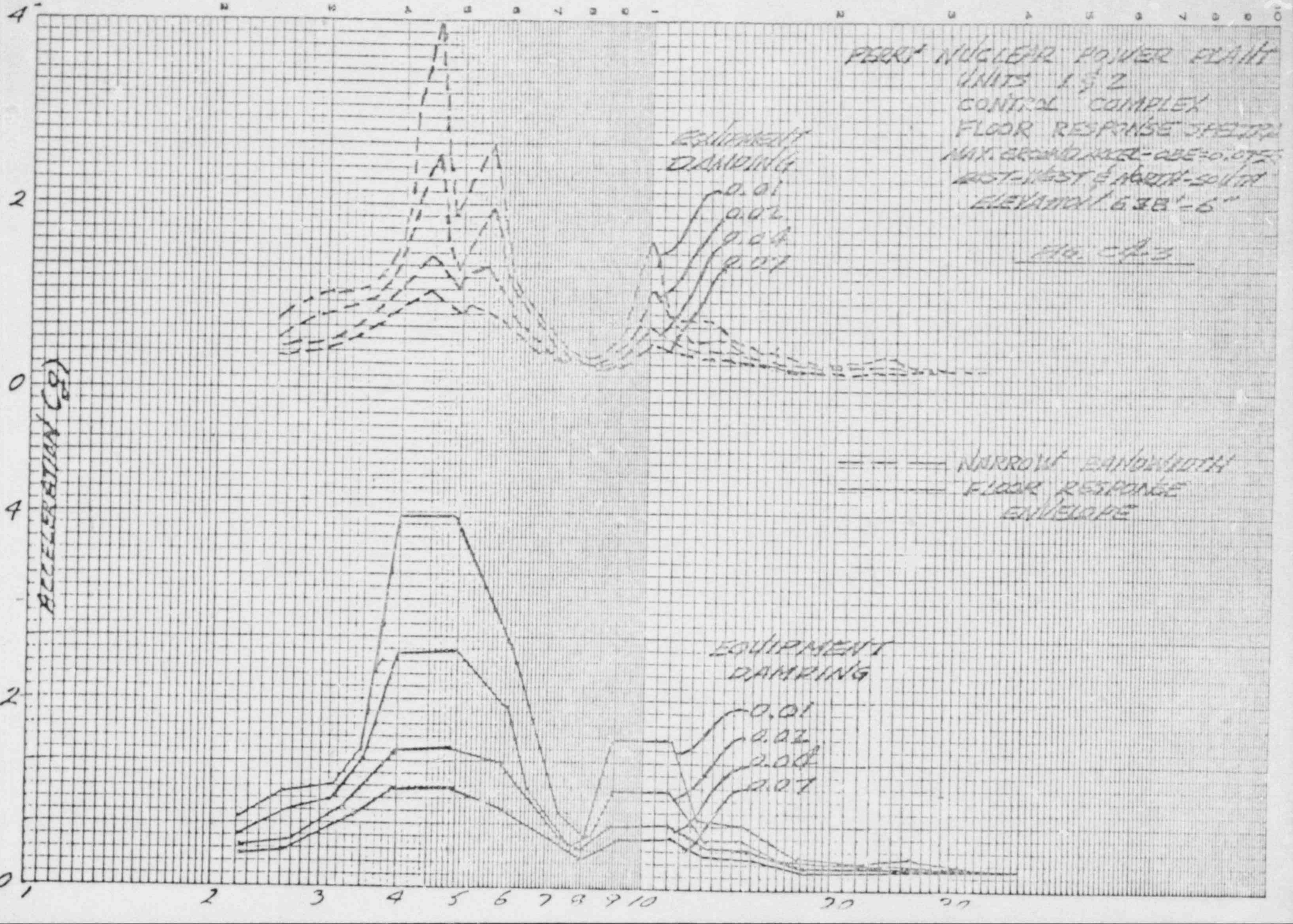
PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL.-SSE=0.150G
EAST-WEST & NORTH-SOUTH
ELEVATION 638'-6"

FIG. C2-1



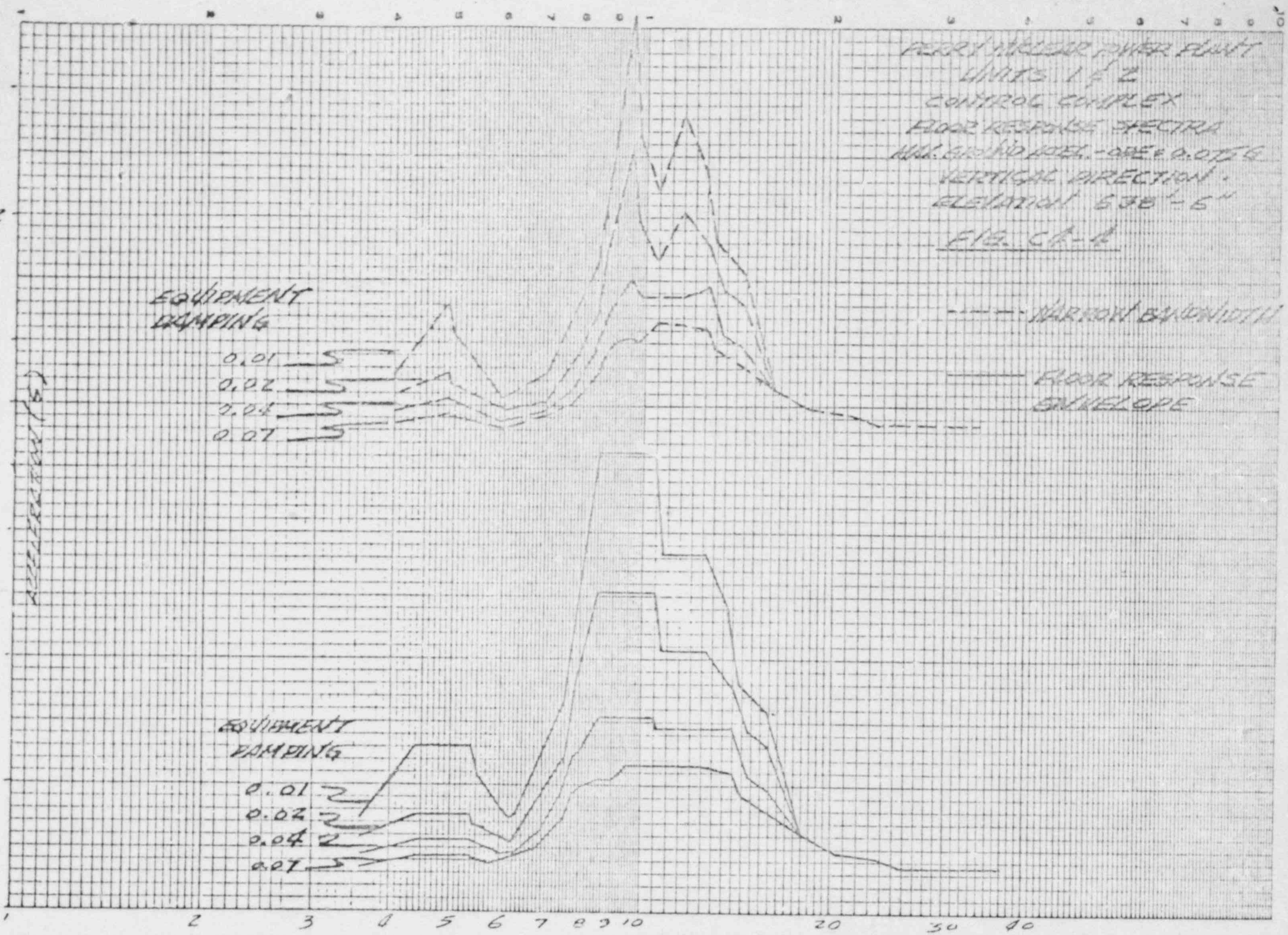
PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL - SSE: 0.15G
VERTICAL DIRECTION
ELEVATION 638'-6"

FIG. C 4-2



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL - OBE = 0.07g
EAST-WEST & NORTH-SOUTH
ELEVATION 638'-6"

FIG. C2-3



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. - OBE = 0.075G
VERTICAL DIRECTION
ELEVATION 638'-6"
FIG. CA-4

RNN 202

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______

2. NSSS: GENERAL ELECTRIC BWR: X

3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: VALVE FOR COMBUSTIBLE GAS PURGING UNIT M51F0010A(B)

1. Scope: ☐ NSSS ☒ BOP ☐ Other

2. Model Number: 8/300 Quantity: 2 UNIT 1, 2 UNIT 2

3. Size or Range: 4" ANSI CLASS 300

4. Vendor: BORG WARNER

5. If the component is a cabinet or panel, name and model Number of the devices included:

N/A (NOT A CABINET OR PANEL)

6. Physical Description: LIMITORQUE SMB-00-5

a. Appearance: MOTOR OPERATED GLOBE VALVE

b. Dimensions: END-TO-END = 34.625", WIDTH = 20.125", HEIGHT = 51"

c. Weight: 423 LBS. W. ACTUATOR

7. Location: Building: REACTOR

Elevation: 670 FT.

8. Field Mounting Conditions
☐ Bolt (No. ____, Size ____)
☒ Weld (Length CIRCUM)
☐ ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

PIPE MOUNTED WITH STEM VERTICAL

10. a. System in which located. M51-COMBUSTIBLE GAS CONTROL

b. Functional Description: SYSTEM FLOW SHUT-OFF WHEN CLOSED, THROTTLE WHEN OPEN, PRESSURE RETENTION

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

☒ Both ☐ Neither ☒ Other ACCIDENT

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP 521-02

ⓐ Seismic Input

ⓑ Hydrodynamic Load Input

ⓒ Fatigue Considerations

ⓓ Service Conditions

ⓔ Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: NSR 81300, REV. C, 4-7-82, SEISMIC ANALYSIS
(No., Title and Date): OF 4"- 300LB CARBON STEEL, MOTOR OPERATED GLOBE VALVE

Company that Prepared Report: BORG WARNER

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: ASME B&PV CODE SECTION III, NB3200 & NC-3500, 1971 EDITION, ADDENDA TO WINTER 1972

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☑ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☑ Combination of (a), & (b), ~~and (c)~~ →

2. Method of Combining RRS:

   ☐ Absolute Sum ☐ SRSS ☐ N/A (RRS NOT USED)
   (other, specify)

3. Required Response Spectra ** (attach the graphs): SEE PNPP VALVE QUALIFICATION PROGRAM DESCRIPTION, REV. 4, (TAB 6)

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

4. Damping Corresponding to RRS: OBE N/A SSE N/A
see V.3 page 2

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other PEAK *
(specify)

OBBA or OBE S/S = < SSBA F/B = < SSBA V = < SSBA

[✓ SSBA] or SSE S/S = ≤ 3g F/B = ≤ 3g V = ≤ 3g

SEE ATTACHMENT A, SECTION 4

6. Were fatigue effects considered:

☒ Yes ☐ No

If yes, describe how they were treated in overall qualification program: SEE PNPP VALVE FATIGUE LOADING ANALYSIS (TAB 6)

* MAXIMUM ACCELERATION FROM PIPING ANALYSIS.

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other ______ ______
(specify)

4 Frequency Range: ______

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

S/S = ______ F/B = ______ V = ______

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test:

OBBA or OBE S/S = ______ F/B = ______ V = ______

SSBA or SSE S/S = ______ F/B = ______ V = ______

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ______) ☐ ______

b. Orientation and Fixturing: ______

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ______

12. Other tests performed (such as aging or fragility test, including results):

13. Failure Modes (If appropriate) ______

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☒ Equivalent Static Analysis ①

☒ Dynamic Analysis: ② ☐ Time--History ☐ Response Spectrum

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

S/S = 40.57 F/B = 40.57 V = —

3. Model Type: ☐ 3D ☒ 2D ☐ 1D

☒ Finite Element ② ☒ Beam ①

☐ Closed Form Solution ☐ Other ______

(1.) EQUIVALENT STATIC ANALYSIS USED FOR STRESS CALCULATION

(2.) DYNAMIC ANALYSIS USED TO DETERMINE NATURAL FREQUENCIES

4. ☐ Computer Codes: SAP VI (DYNAMIC ANALYSIS)

Frequency Range and No. of Modes 0 – 100 Hz, 2 MODES OF INTEREST
0 – 110.5 Hz, 3 MODES ACTUALLY COMPUTED

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads: PIPING

☐ Absolute Sum ☒ SRSS ☐ Other: ____________ (specify)

6. Damping:

OBE N/A SSE N/A Basis for the damping used: NOT USED IN THIS ANALYSIS

7. Support Considerations in the model: FIXED AT WELD ENDS FOR fn
SIMPLY SUPPORTED for STRESS CALCULATIONS

8. Critical Structural Elements:

a.

~~Identification Location~~	~~Governing Load or Response Combination~~	~~Seismic Stress~~	~~Total Stress~~	~~Stress Allowable~~

FOR MAXIMUM ACCELERATION FROM PIPING ANALYSIS SEE PG. 3, FOR STRESSES SEE REPORT NSR 81300 – SUMMARY SECTION, PG. 9

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.0142" SEE NSR 81300 PG. 47	C.G. of ACTUATOR	*

9. Failure Modes: DEFORMATION OR FAILURE OF BONNET FLANGE

10. Margins Available: ☐ Input Spectrum ☒ Stress or Deflection

* MAXIMUM ALLOWABLE NOT GIVEN – MAXIMUM DISPLACEMENTS ARE SUFFICIENTLY SMALL AND VALVE MACHINING TOLERANCES ADEQUATELY ACCOMODATE MOVEMENTS. IN ADDITION, THE DYNAMIC MOVEMENT OF THE YOKE ASSEMBLY ASSOCIATED WITH A SEISMIC EVENT WOULD TEND TO FREE ANY BINDING THAT MIGHT OCCUR.

REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
1	7-25-83	JAD	JDC	KAM
2	7-18-84	FCR	RAP	

SP-521-02

REVIEWED BY J. A. DAISE / 4-4-83

CHECKED BY F. J. LAHOVSKI / 4-5-83

APPROVED BY K. A. MATHENY / 4-22-83

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______

2. NSSS: GENERAL ELECTRIC BWR: X

3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: EMERGENCY SERVICE WATER TRAVELING WATER SCREEN CONTROL PANEL 0H51-P077Ⓐ,B

1. Scope: ☐ NSSS ☒ BOP ☐ Other

2. Model Number: CONTROL BOX ON PEDESTAL CUSTOM MADE Quantity: 2

3. Size or Range: ATTACHMENT A (DRAWING OF BOX)

4. Vendor: REXNORD CONTROL PRODUCTS

5. If the component is a cabinet or panel, name and model Number of the devices included:

Ref GAI DWG 4549-22-074-1-5

8 ITE IMPERIAL RELAY'S #J10A4012, 7 ITE IMPERIAL RELAY'S #J10AC012, 3 GE SELECTOR SW #CR2940-45203E, 1 GE SELECTOR SW #CR2940Y8202G, 3 GE INDICATING LIGHT GRN ET-16, 4 GE INDICATING LIGHT RED ET-16, 2 GE TERMINAL BLK CR151-B4, 1 GE TERMINAL BLK CR151-B6, 3 GE TERMINAL BLK CR151-B2

6. Physical Description:

   a. Appearance: ATTACHMENT A

   b. Dimensions: ATTACHMENT A

   c. Weight: ATTACHMENT A

7 Location: Building: EMERGENCY SERVICE WATER PUMPHOUSE Ref GAI DWG E-015-002

   Elevation: 586'-6"

8. Field Mounting Conditions ☒ Bolt (No. 4, Size 1/2")
   ☐ Weld (Length ______)
   ☐ ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

PEDESTAL MOUNTED, TO CONCRETE FLOOR

10. a. System in which located: EMERGENCY SERVICE WATER SCREEN WASH

    b. Functional Description: CONTROL PANEL FOR TRAVELING WATER SCREEN

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

    ☒ Both ☐ Neither ☒ Other POST ACCIDENT AND CONTINUATION OF NORMAL SHUTDOWN

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP-505-4549-00 SP-750-4549-00

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: SEISMIC STRUCTURAL ANALYSIS AND REPORT FOR CONTROL PANEL

(No., Title and Date): JOB NUMBER 78321 REV. 1 5-31-79 99Q-369-1-0

RH 10.5.83

Company that Prepared Report: LEROY A LUTZ COMPUTERIZED STRUCTURAL DESIGN, INC.

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE 344-1975

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

   ☐ Absolute Sum ☒ SRSS ☐ ____________ (other, specify)

3. Required Response Spectra ** (attach the graphs): ATTACHMENT C

NOTE:

**If more than one report complete Items IV thru VII for each report.*
***If other than RRS is used, describe method.*

4. Damping Corresponding to RRS: OBE 2% SSE 3%

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other g levels at lowest natural frequencies
(specify)

OBBA or [✓ OBE] S/S = 0.75 F/B = 1.25 V = 0.48

SSBA or [✓ SSE] S/S = 0.96 F/B = 1.05 V = 0.68

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program: N/A

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ________ SSE ________ Other ________
(specify)

4. Frequency Range: ________

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

S/S = ________ F/B = ________ V = ________

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test:

OBBA or OBE S/S = ____________ F/B = ____________ V = ____________

SSBA or SSE S/S = ____________ F/B = ____________ V = ____________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ____) ☐ ____________

b. Orientation and Fixturing: ____________

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ____________

____

12. Other tests performed (such as aging or fragility test, including results):

____

____

13. Failure Modes (If appropriate) ____________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☒ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time--History ☐ Response Spectrum

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

S/S = 9.73 Hz F/B = 11.91 Hz V = 20.44 Hz p 11 Report #78320

3. Model Type: ☐ 3D ☒ 2D ☐ 1D

☐ Finite Element ☐ Beam p iii Report #78320

☐ Closed Form Solution ☐ Other ____________

piv of
Report 78320

4. ☒ Computer Codes: COMPUTER PROGRAM USED WERE WRITTEN BY ECOM ASSOCIATES FOR THE WANG 2200 AND WCS SYSTEMS AND SOLD NATIONALLY

Frequency Range and No. of Modes 4 MODES

☒ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads;

☐ Absolute Sum ☐ SRSS ☒ Other: NO OTHER DYNAMIC LOADS (specify)

6. Damping:

OBE * SSE * Basis for the damping used: STATIC ANALYSIS SP-750-4549-00, REG. GUIDE 1.61

7. Support Considerations in the model: PEDESTAL AND ANCHOR BOLTS TO CONCRETE FLOOR

8. Critical Structural Elements:

a.

Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
BASE PLATE ANCHOR BOLTS	(TENSION) OBE	162 #/BOLT		1000 lbs
	(TENSION) SSE	253.1 #/BOLT		1000 lbs
	(SHEAR) OBE	183 psi		1000 lbs
	(SHEAR) SSE	295 psi		1000 lbs

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: CRITICAL ITEMS RELATING TO STRUCTURAL INTEGRITY OF CONTROL PANEL ARE ANCHOR BOLTS 10 GAUGE PLATE ATOP THE WCXIS, STIFFENERS IN BACK OF PANEL, STIFFENERS AT 10 GAGE PLATE

10. Margins Available: ☐ Input Spectrum ☐ Stress or Deflection

* SEE ATTACHMENT B

<table>
<tr><th rowspan="2">REV.NO.</th><th rowspan="2">DATE</th><th colspan="3">INITIALS</th></tr>
<tr><th>REVIEW</th><th>CHECKED</th><th>APPROVED</th></tr>
<tr><td colspan="2">/</td><td colspan="3">/ /</td></tr>
<tr><td colspan="2">/</td><td colspan="3">/ /</td></tr>
<tr><td colspan="2">/</td><td colspan="3">/ /</td></tr>
</table>

SP-505
CONTROL PANEL

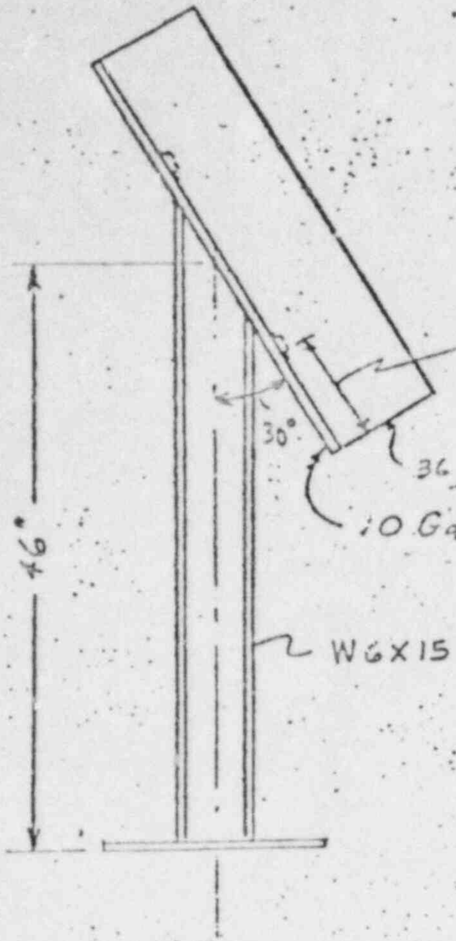
REVIEWED BY 4-25-83

CHECKED BY S. J. Zahorski 4-29-83

APPROVED BY RAJ 7-23-84 HA Putro 7-23-84

ATTACHMENT A

1/2



Weights -

Pedestal - $\frac{46}{12}(15) = 57.5^{\#}$

Top PL 2.5(3)(5.6) = 42

Box - 96 lbs

(22A @ 4.27)

Sub panel - 30lbs

Relays -

2-4 POLE 1.25 (8) = 10 lbs

6 POLE 1.5 (7) = 10.5 lbs

Switches & Pilot Lights 3lbs

Switches + Pilot lights - 3#

Terminals + Ducts - 2#

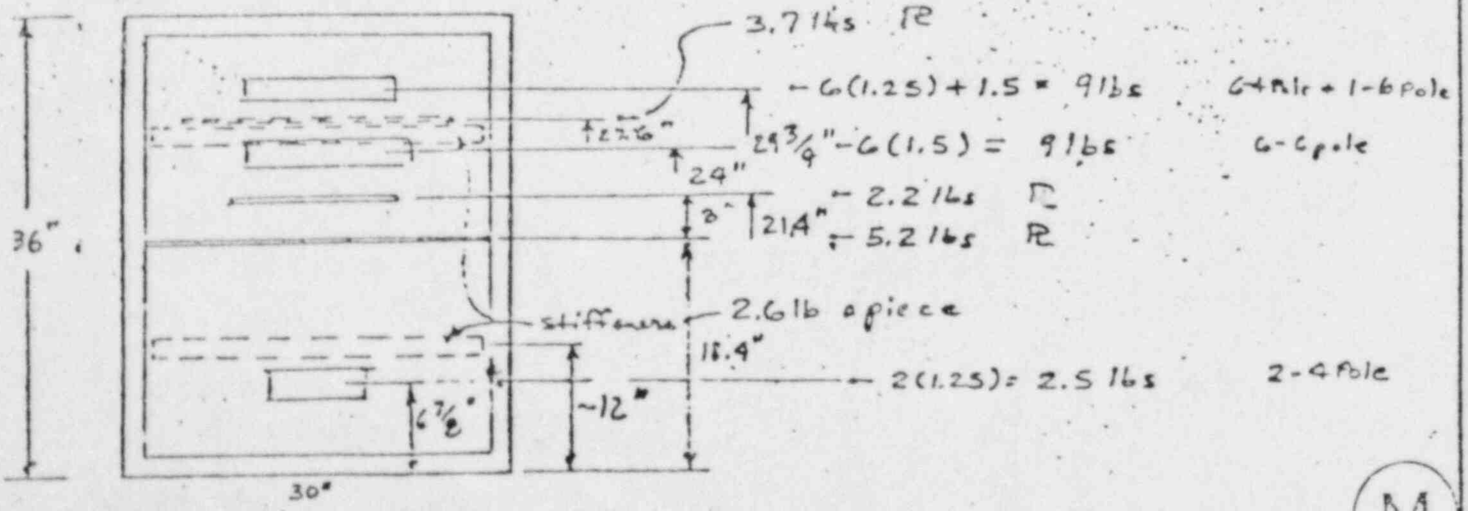
PL Added to cover -

$3\frac{1}{2}(\frac{3}{16})(1.667)(3.4) = 3.7$ lbs

PL's Added to sub panel -

$3\frac{1}{2} \times \frac{3}{16}(2.33)(3.4) = 5.2$ lbs

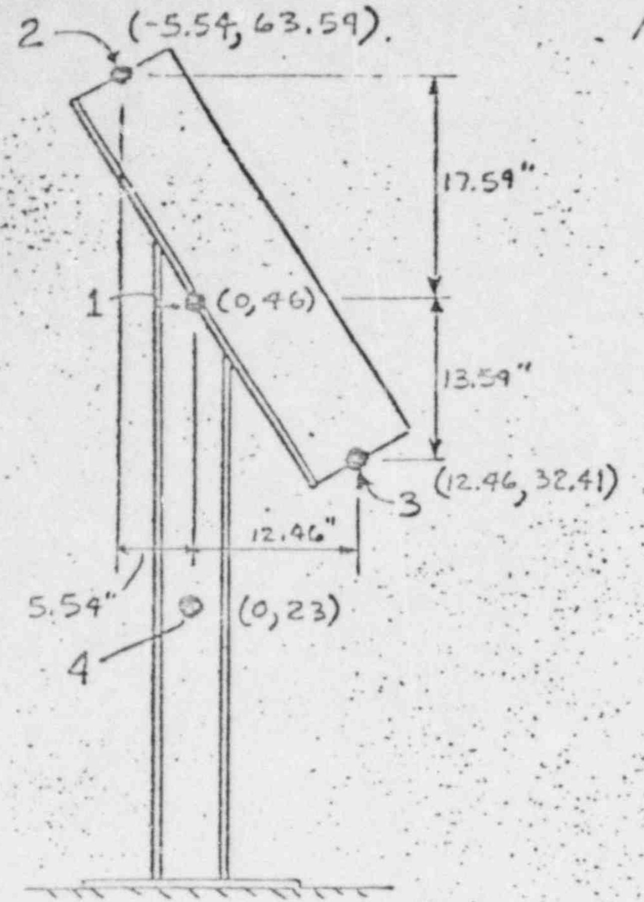
$3\frac{1}{2} \times \frac{3}{16}(1)(3.4) = 2.2$ lbs



M

ATTACHMENT A

2/2



18(.5) + 4(.866) = 12.46"

18(.866) - 4(.5) = 13.59"

18(.866) + 4(.5) = 17.59"

18(.5) - 4(.866) = 5.54"

Mass 1 -

$\frac{1}{4}(57.5)$ =	14.4 lbs	Pedestal
$\frac{2}{3}(42)$ =	28 lbs	Top R
$\frac{1}{2}(96)$ =	48 lbs	Box
$\frac{1}{2}(30)$ =	15 lbs	Subpanel
	105.4 lbs	
	24.5	
	129.9 lbs	

Component Breakdown -

Item.	2	1	3
Stiff: 2.6		1.7	0.9
" "	0.9	1.7	
5.2 R		5.2	
2.2 R	.4	1.8	
6-6 pole	3.0	6.0	
3.7 R	1.9	1.8	
6-4 Pole & 1-6 Pole	5.9	3.1	
2-4 Pole		1.0	1.5
Term & Dud	.6	1.0	.4
Switches & Pilot Lights	1.2	1.2	.6
	13.9#	24.5#	3.4#

Mass 2 -

$\frac{1}{4}(57.5) = 14.4$ lbs

$\frac{1}{6}(42) = 7.0$

$\frac{1}{4}(96) = 24.$

$\frac{1}{4}(30) = 7.5$

52.9 lbs

13.9

66.8 lbs

Mass 3 -

52.9

3.4

56.3#

Mass 4 -

$\frac{1}{2}(57.5) = 28.8$#

Mi

Gilbert Associates, Inc. Reading, Pennsylvania	SUBJECT AUDITABLE FILE PACKAGE PANEL		CISID SP-505-4549-00		PAGE 1 OF PAGES 2
CALCULATION	REV. 0	1	2	3	
	MICROFILMED				
	ORIGINATOR J S Smith				
	DATE 4-29-83				

ATTACHMENT B

The lowest natural frequencies for the control panel are as follows;

North / South	11.9 HZ
East / West	9.7 HZ
Vertical	20.44 HZ

Listed below is a comparison of g loads taken from GAI's RRS curves at the above listed frequencies and the g input values used for the analysis of the control panel.

	OBE @ 2% Damping	SSE @ 3% Damping
North / South	0.75 g	0.96 g
East / West	1.25 g	1.05 g
Vertical	0.48 g	0.68 g

	OBE Input	SSE Input
North / South	0.925 g	1.38 g
East / West	1.2 g	1.65 g
Vertical	0.44 g	0.73 g

It is apparent that the values used in the analysis for the SSE condition envelope the Perry requirements, as does the North / South direction for the OBE. However, the East / West

SUBJECT AUDITABLE FILE PACKAGE
CONTROL PANEL

CISID SP-505-4549

PAGE 2 OF PAGES 2

REV.	0	1	2	3
MICROFILMED				
ORIGINATOR	J S SMITH			
DATE	4-29-83			

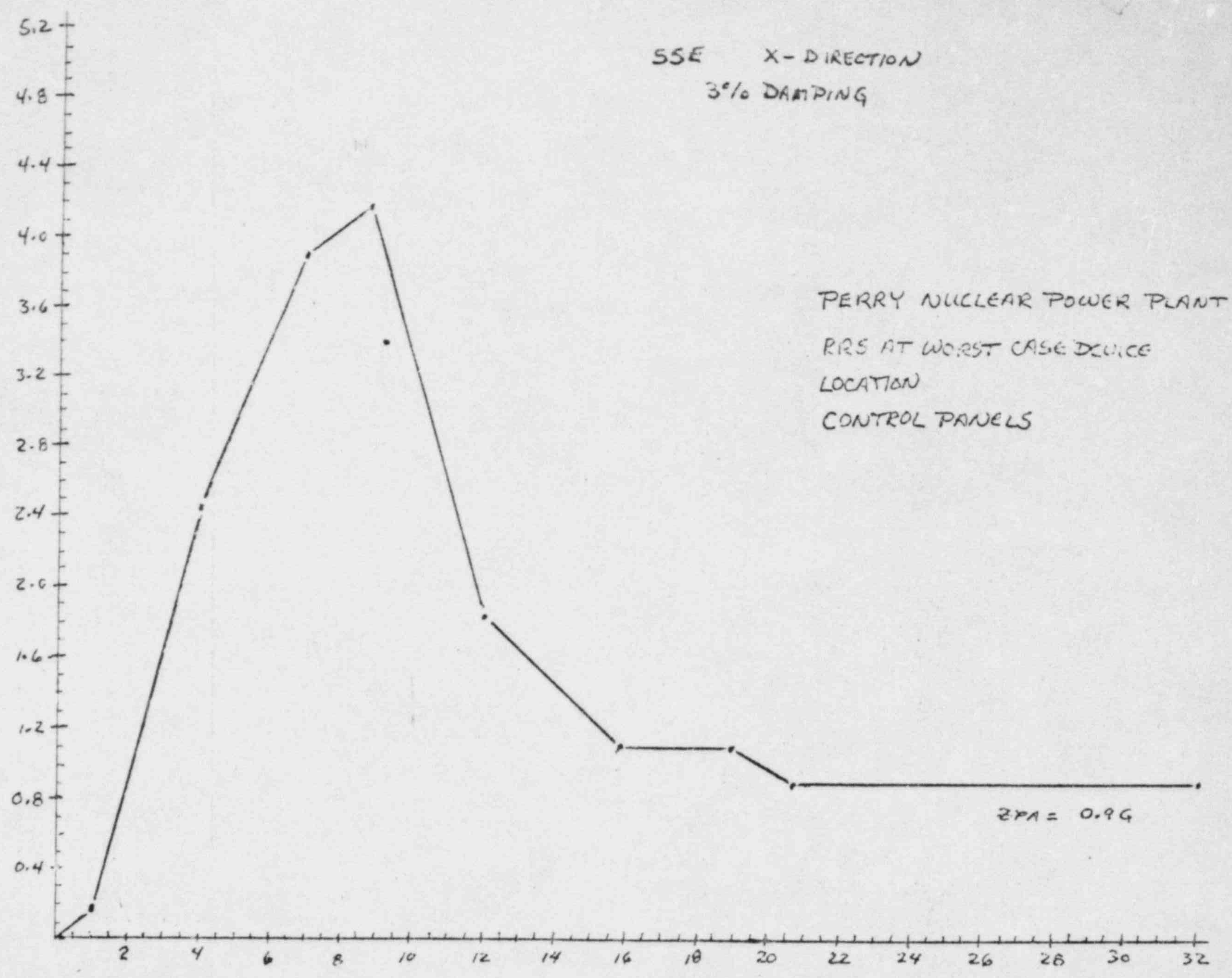
and vertical directions for the OBE ~~[illegible]~~ had g input values of 4% and 8.3% respectively, lower than design requirements. However, this is still considered qualified for OBE, because of the substantial margins on stresses in critical elements.

Jeffrey Smith
JEFFREY SMITH

GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS
READING, PENNA.

WORK ORDER	SIZE	DRAWING

MADE	CHK'D.	SQ. CP.	CP. DFN.	ENG.	REV. CH. APP. DATE



SSE X-DIRECTION
3% DAMPING

PERRY NUCLEAR POWER PLANT
RRS AT WORST CASE DEVICE
LOCATION
CONTROL PANELS

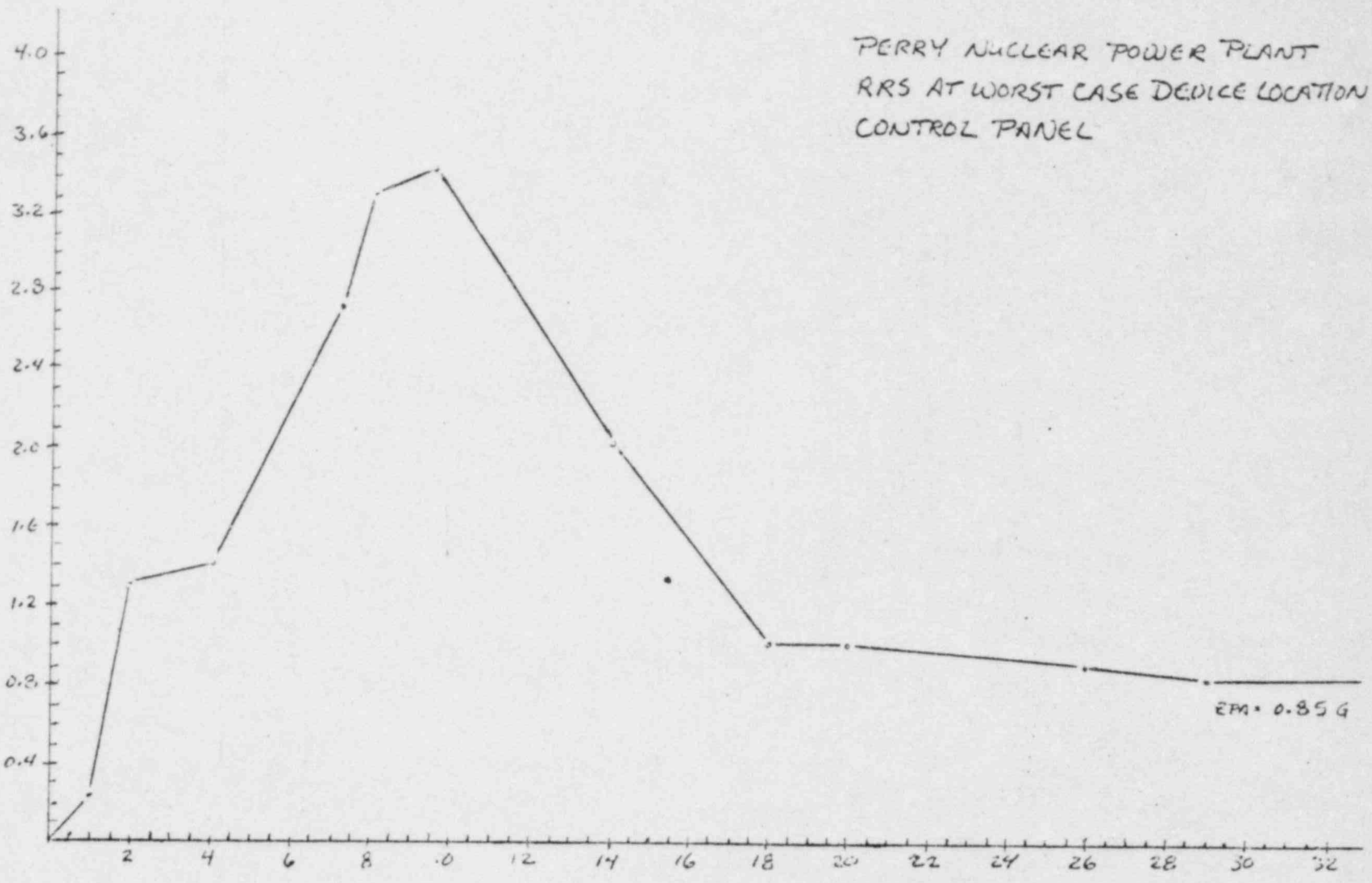
ZPA = 0.9G

GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS
READING, PENNA.

MADE
CHK'D.
SQ. CF.
CF. DFN.
ENG.
REV. CH. APP. DATE
WORK ORDER
SIZE
DRAWING
RE

SSE Y-DIRECTION
3% DAMPING

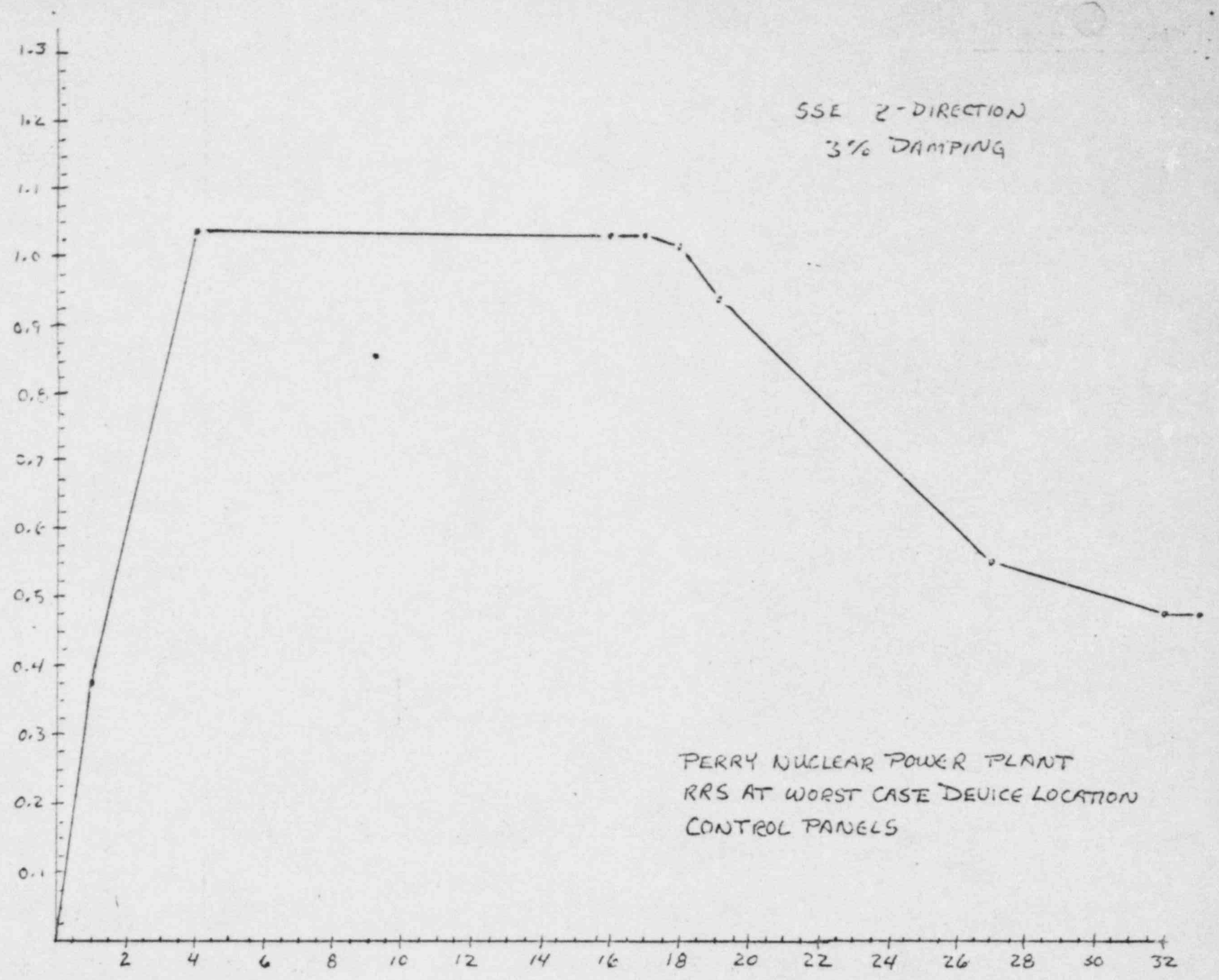
PERRY NUCLEAR POWER PLANT
RRS AT WORST CASE DEVICE LOCATION
CONTROL PANEL



GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS
READING, PENNA.

MADE
CHK'D.
SQ. CF.
CF. DPN.
ENG.
REV. CH. APP. DATE

WORK ORDER
SIZE
DRAWING



SSE Z-DIRECTION
3% DAMPING

PERRY NUCLEAR POWER PLANT
RRS AT WORST CASE DEVICE LOCATION
CONTROL PANELS

SP-557-00-5

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE: MPL # 1R24 S0032

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ________

2. NSSS: GENERAL ELECTRIC BWR: X

3. A/E GILBERT/COMMONWEALTH Other ________

II. COMPONENT NAME: 1E Motor Control Centers

1. Scope: ☐ NSSS ☒ BOP ☐ Other
   (5.0(Qual. Plan (SP 557-00-3)))

2. Model Number: F24S Quantity: 5 Common, 13 each unit

3. Size or Range: N/A

4. Vendor: Eaton/Cutler-Hammer

5. If the component is a cabinet or panel, name and model Number of the devices included:

6. Physical Description: See #6, sheet 1A of 5
   a. Appearance: Long Switchgear lineup
   b. Dimensions: ________
   c. Weight: ________

7. Location: Building: See #7, Sheet 1A of 5
   Elevation: ________

8. Field Mounting Conditions ☐ Bolt (No. ____, Size ____)
   See B 50-12158 (C-H) ☒ Weld (Length _____)
   and A 50-11119, sh 5 (C-H), attached ☐ ________

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   On Floor

10. a. System in which located: 480 Volt AC and 125 Volt DC systems
    b. Functional Description: Provide 480 Volt AC and 125 Volt DC to 1E electrical Equipment
    c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
    ☒ Both ☐ Neither ☐ Other ________

Gilbert Associates, Inc.
Reading, Pennsylvania

CALCULATION

SUBJECT Seismic and Dynamic Qualification Summary of Equipment

IDENTIFIER

PAGE 1A OF 5 PAGES

REV.	0	1	2	3
MICROFILMED				
ORIGINATOR	EHB			
DATE	6/9/83			

6 Physical Description

Motor Control Center	6b) Dimensions: L	W	H	6c) Weight: (560 lb/section 7.3.4.6, Test Report)
0R24S0020	120 in.	24 in.	90 in.	2,800 lb.
0R24S0025	336 "	" "	" "	7,840 "
0R24S0035	192 "	" "	" "	4,480 "
0R24S0036	144 "	" "	" "	3,360 "
0R24S0037	72 "	" "	" "	1,680 "
1R24S0018	456 "	" "	" "	10,640 "
1R24S0019	120 "	" "	" "	2,800 "
1R24S0021	456 "	" "	" "	10,640 "
1R24S0022	120 "	" "	" "	2,800 "
1R24S0023	456 "	" "	" "	10,640 "
1R24S0024	144 "	" "	" "	3,360 "
1R24S0026	456 "	" "	" "	10,640 "
1R24S0028	120 "	" "	" "	2,800 "
1R24S0029	192 "	" "	" "	4,480 "
1R24S0030	48 "	" "	" "	1,120 "
1R24S0031	96 "	" "	" "	2,240 "
1R24S0032	96 "	" "	" "	2,240 " ✓
1R42S0015	168 "	" "	" "	3,920 "

7 Location

MCC	Building	Elevation
0R24S0020	Control Complex	620'6"
0R24S0025	" "	" "
0R24S0035	" "	" "
0R24S0036	" "	" "
0R24S0037	" "	" "
1R24S0018	" "	" "
1R24S0019	" "	" "
1R24S0021	" "	" "
1R24S0022	" "	" "
1R24S0023	" "	" "
1R24S0024	" "	" "
1R24S0026	" "	" "
1R24S0028	" "	" "
1R24S0029	" "	" "
1R24S0030	Emergency Service Water Pumphouse	586'6"
1R24S0031	" " " "	" "
1R24S0032	" " " "	" " ✓
1R42S0015	Control Complex	638'6"

SP 557-00-5

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP-557-4549-00, SP-750-4549-00

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☐ Analysis ☒ Combination of Test and Analysis

Qualification Report*: Technical Report PEI-TR-83-9; Seismic Qualification (title Page of Pg i)

(No., Title and Date): **** of Class 1E MCC's for PNPP Units 1 and 2 ; 3/24/83

Company that Prepared Report: Patel Engineers, Inc. Huntsville Alabama

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE 344-1975

V VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

   ☐ Absolute Sum ☒ SRSS ☐ ______ (other, specify)

3. Required Response Spectra ** (attach the graphs): C4 ***

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

*** C4 RRS curves (Control Complex, Elevation 638'6") envelope C3 (Control Complex, elevation 620'6") and E1 (Emergency Service Water, Elevation 586') RRS curves.

**** Analysis of effects of top entry of cables by Calculation # 40.01-1 to 40.01-10 GAI, 6/8/83

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SEMI-LOGARITHMIC
3 CYCLES X 10 DIVISIONS PER INCH

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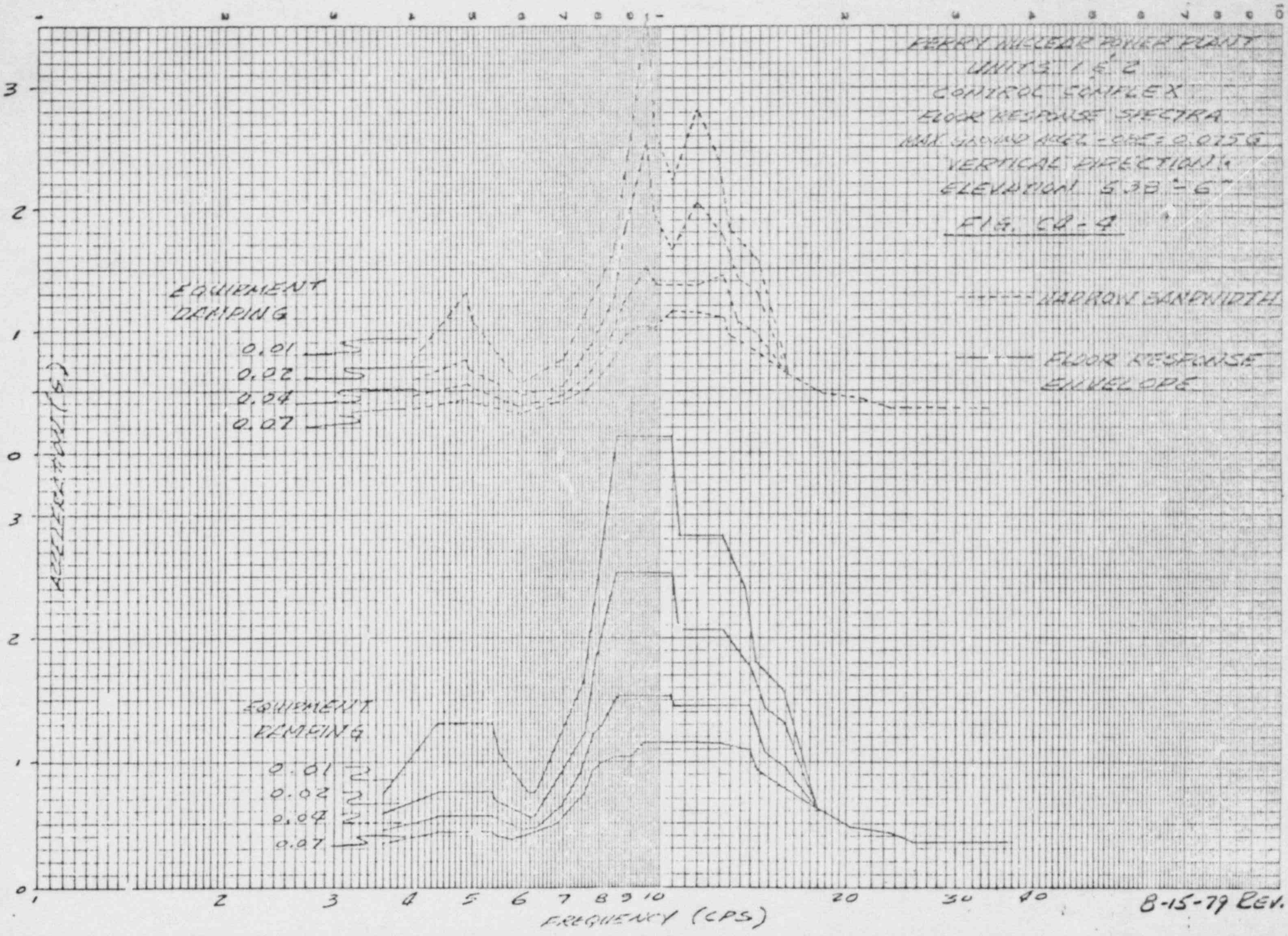
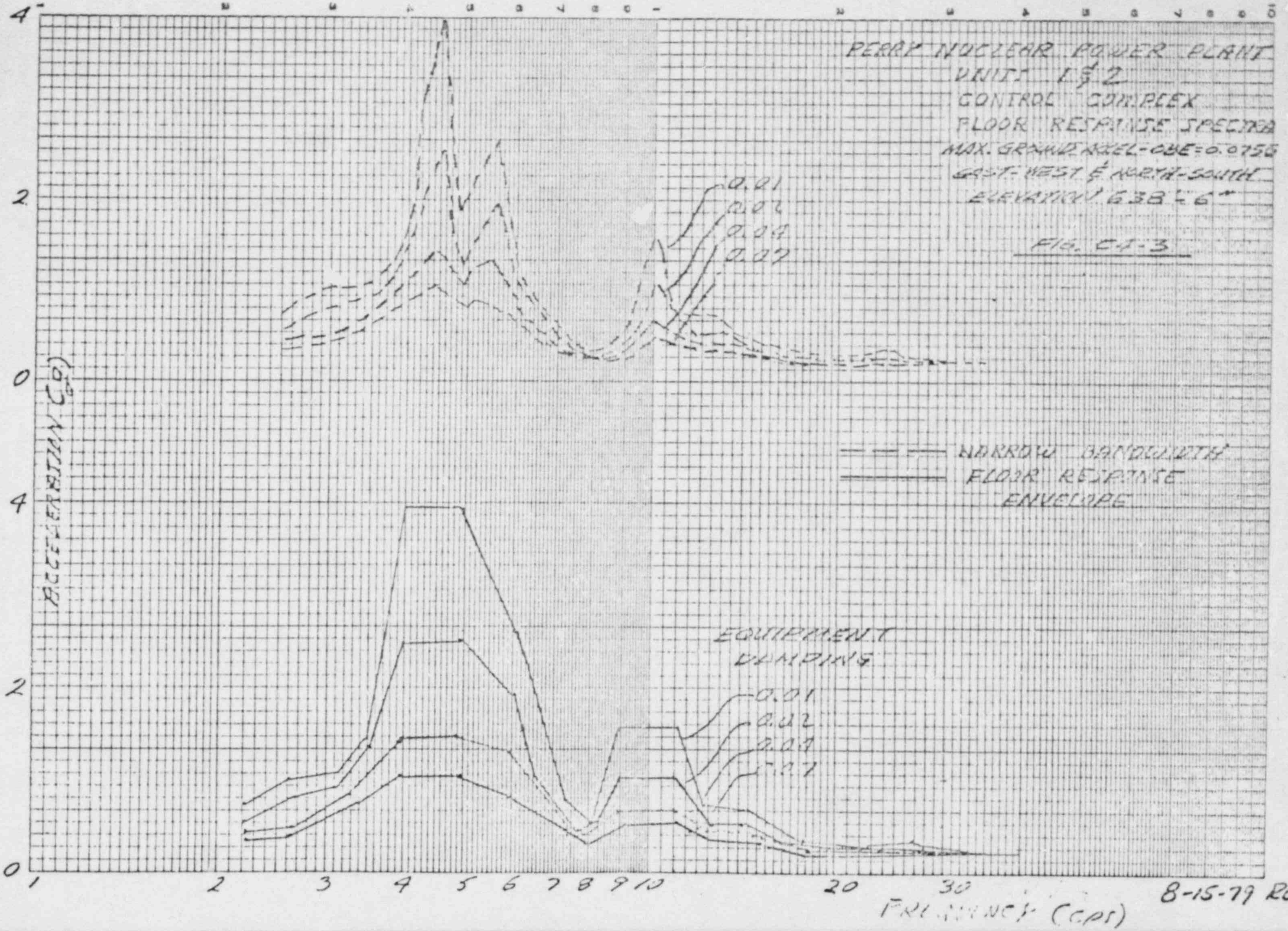


PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX GROUND ACCEL - OBE = 0.075G
VERTICAL DIRECTION
ELEVATION 538'-6"

FIG. CR-4

SP-557-00-5

8-15-79 REV. 0

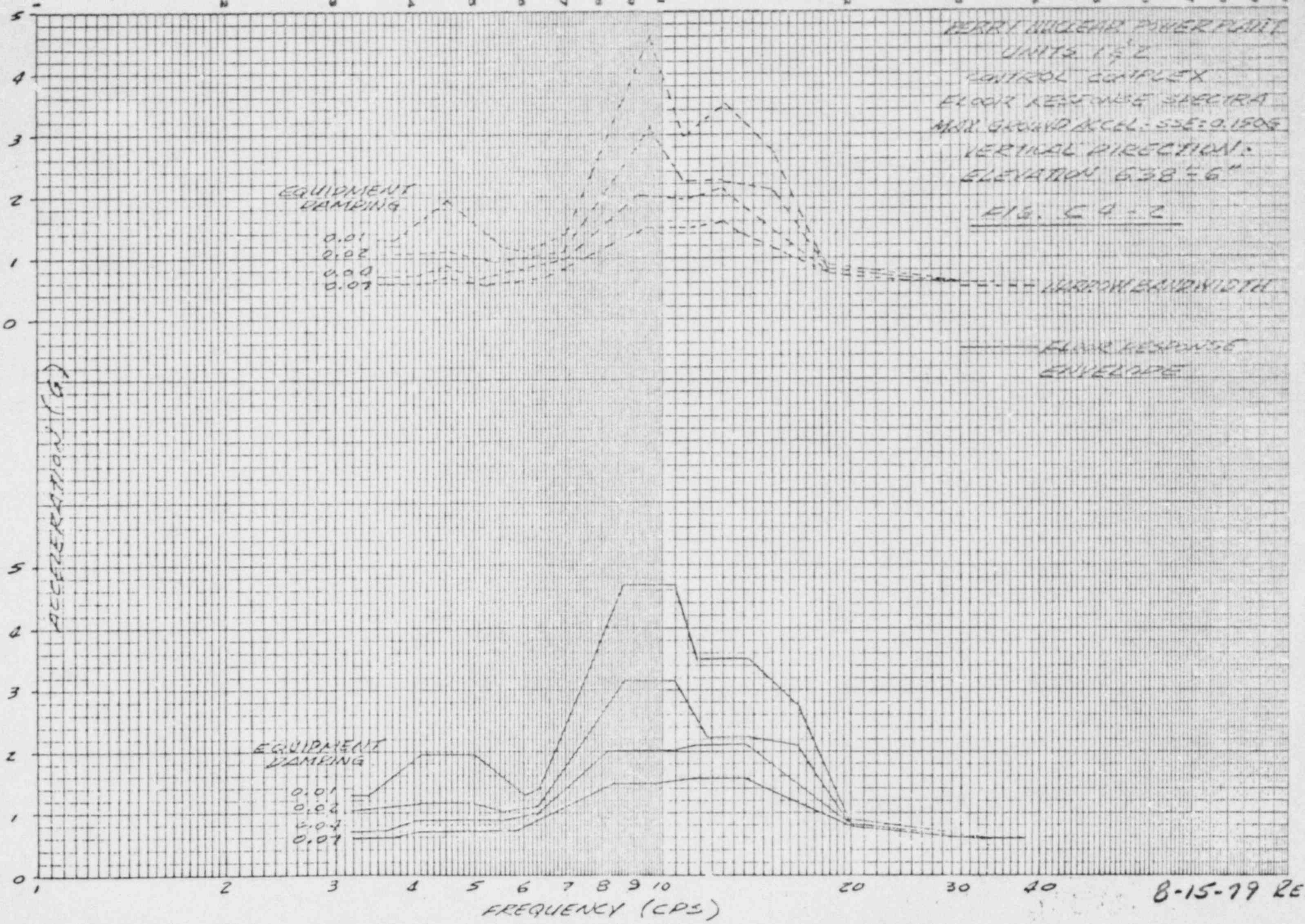


PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL-OBE=0.075G
EAST-WEST & NORTH-SOUTH
ELEVATION 638'-6"

FIG. C4-3

SP-557-00-5

8-15-79 REV.C



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL.- SSE: 0.150G
VERTICAL DIRECTION:
ELEVATION 638'-6"

FIG. C 4-2

SP-557-00-5

8-15-79 REV.0

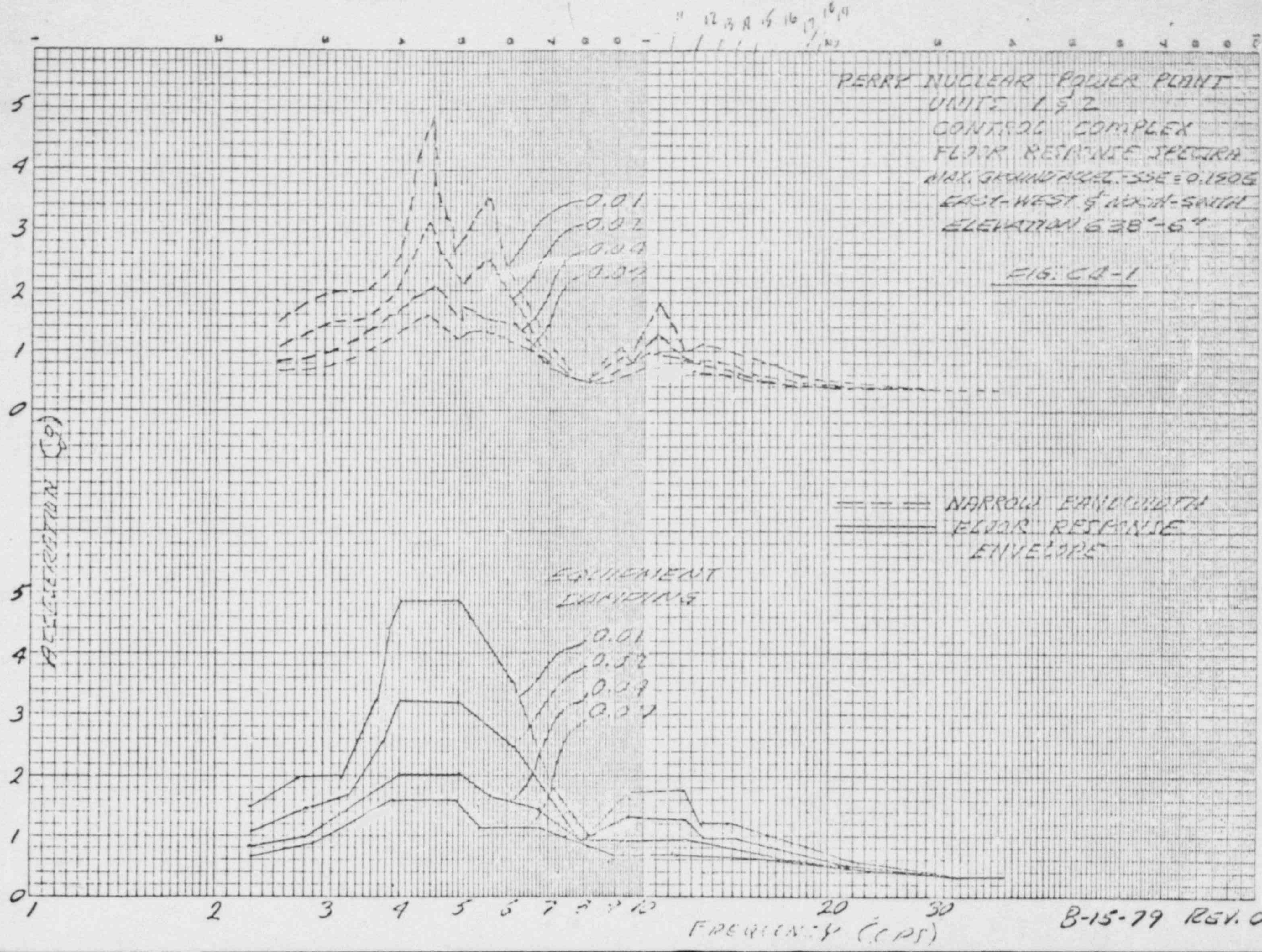


FIG. CB-1

8-15-79 REV. 0

SP-557-00-5

SP-557-00-5

4. Damping Corresponding to RRS: OBE 4% SSE 7%

5. Required Acceleration in Each Direct: REF. RRS CURVES C4 | R1

☐ ZPA ☒ Other Peak
(specify)

OBBA or [✓ OBE] S/S = 1.47g F/B = 1.47g V = 1.55g

SSBA or [✓ SSE] S/S = 1.6 g F/B = 1.6 g V = 1.55 g

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program:

VI. IF QUALIFICATION BY TEST, THEN COMPLETE: Ref. PEI-TR-83-9, APP. II, SEC. III.4.2 | R1

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

2. ☐ Single Axis ☒ Multi-Axis REF. SEC. III.4.2 | R1
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests: REF. SEC. III.4.2 p40. FIVE and ONE in each horz directn for a total of → RAS 2.18.83 | R1

OBE 10 SSE 2 Other
(specify)

4. Frequency Range: 1.0 Hz to 100 Hz REF. SEC. III.4.2d | R1

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): Tables IV.1.2b, Pg 80
IV.1.2a, Pg 79

S/S = 17.8 Hz F/B = 18.9 Hz V = No test run

6. Method of Determining Natural Frequencies REF. SEC. III.4.1 | R1

☒ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test REF. SEC. IV.2 | R1

☑ Yes (Attach TRS and RRS graphs)

☐ No

SP-557-00-5

8. Maximum Input g Level Test: REF. TRS GRAPHS SEC. IV.2 |R1

OBBA or [✓ OBE] S/S = 3.36 F/B = 4.49 V = 2.29

SSBA or [✓ SSE] S/S = 3.15 F/B = 2.41 V = 1.81

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☒ Weld (Length _____) ☐ __________

See Attached Drawing
SK021583 (Sec. 3.0)
Note Attachment A

b. Orientation and Fixturing: Welded to test table (Sec. ~~3.0~~ GSK 7/20/83 III.3) |R1

10. Functional operability verified: REF. SEC VI.5, VI.6 |R1

☒ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: Removed power line conditioning components - affected resonance of cabinets (Attachment A, Note 3) REF. SEC. III.4.1, VI.5, VI.6 |R1

12. Other tests performed (such as aging or fragility test, including results):

N/A |R1

13. Failure Modes (If appropriate) N/A

14. Margins Available: ☒ Input Spectrum ☐ Fragility |R1

REF. TRS GRAPHS SEC. IV.2

*VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE: Analysis performed to determine effects of top cable entry on MCC seismic qualification

1. Method of Analysis:

☒ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time--History ☐ Response Spectrum

2. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): N/A

S/S = ________ F/B = ________ V = ________

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☒ Beam

☒ Closed Form Solution ☐ Other ________

* GAI CALC. 40.01 (SEE SEC. 4 of AFP) |R1

SP-557-00-5

4. ☐ Computer Codes: N/A

Frequency Range and No. of Modes

☒ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads: N/A, not used

☐ Absolute Sum ☐ SRSS ☐ Other: (specify)

6. Damping: N/A, Damping not used

OBE ____ SSE ____ Basis for the damping used: ____

7. Support Considerations in the model: MCC welded to steel embedments in concrete floor

8. Critical Structural Elements: Malleable Iron liquid tight connector

a. Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
Top of MCC		19.82 KSI	19.82 KSI	27 KSI

b. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
N/A		

9. Failure Modes: Strain of malleable iron

10. Margins Available: ☐ Input Spectrum ☒ Stress or Deflection

REV. NO.	DATE	INITIALS REVIEW	CHECKED	APPROVED
1	7/20/83	ETB	GSK	KAM 8/18/83
	/		/	/
	/		/	/

REVIEWED BY Edward T. Burke 16/9/83

CHECKED BY James D. Cokerly 16/9/83

APPROVED BY LWR 8/18/83 K. A. Matheny 8/18/83

SQRT 501-1

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: VERTICAL PUMP [MPL] 1P45C002

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: VIT Quantity: 1
3. Size or Range: 8X12 JMC - ~~7~~ 5 STG EH 10.27.83
4. Vendor: GOULDS PUMPS
5. If the component is a cabinet or panel, name and model Number of the devices included:

______

______

6. Physical Description:
   a. Appearance: VERTICAL PUMP
   b. Dimensions: 11 3/8" DIAMETER 41'-9 1/8" HIGH GOULDS INS [illegible] [illegible] MANUAL DWG 23
   c. Weight: 2,930 lbs DRY 3,730 lbs FLOODED p2 ME 453
7. Location: Building: EMERGENCY SERVICE WATER PUMP HOUSE Reference GAI DWG E-015-002

   Elevation: 586"-6"
8. Field Mounting Conditions ☒ Bolt (No. 4, Size 1 1/8") p17 ME453 EH
   ☐ Weld (Length ______)
   ☐ ______
9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

   FLOOR
10. a. System in which located: EMERGENCY SERVICE WATER
    b. Functional Description: SUPPLY ADEQUATE HEAD AND FLOW FOR COMPONENT COOLING
    c. Is the equipment required for ☒ Hot Standby ☒ Cold Shutdown

       ☐ Both ☐ Neither ☒ Other POST-ACCIDENT

SRRT 501-1

II. Pertinent Reference Design Specifications for Qualification Requirements:

SPECIFICATIONS SP-750-4549-00 REV. 1 DATED 3/11/74

SP-501-4549-00 REV. 2 SECTIONS 2 AND 3 DATED 11/11/76

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: SEISMIC ANALYSIS OF VERTICAL PUMP

(No., Title and Date): ME-453 SEPTEMBER 16, 1977 {992-042-1-0 / 942-042-2-0} RAS

Company that Prepared Report: MCDONALD ENGINEERING ANALYSIS COMPANY, INC.

Company that Reviewed Report. GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: ASME SECTION III CLASS 3 SUMMER 1974 ADDENDA, AND SUBSECTION NF; AISC CODE

V. VIBRATION INPUT:

1. Loads considered
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☒ SRSS ☐ N/A (other, specify)

3. Required Response Spectra ** (attach the graphs): ATTACHMENT 2

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

SQAT 501-1

4. Damping Corresponding to RRS: OBE 2% SSE 3%

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other Required Acceleration Corresponding to natural frequencies
(specify)

OBBA or OBE S/S = ______ F/B = ______ V = ______

SSBA or SSE S/S = see attachment #3 F/B = ______ V = ______

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program: ______

______

______

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other ______
(specify)

4. Frequency Range: ______

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

S/S = ______ F/B = ______ V = ______

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

SQRT 501-1

8. Maximum Input g Level Test:

OBBA or OBE S/S = ________ F/B = ________ V = ________

SSBA or SSE S/S = ________ F/B = ________ V = ________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ____) ☐ ________

b. Orientation and Fixturing: ________

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ________

____

12. Other tests performed (such as aging or fragility test, including results):

____

____

13. Failure Modes (If appropriate) ________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

(1) ☒ Static Analysis ☐ Equivalent Static Analysis

(2) ☒ Dynamic Analysis: ☐ Time–History ☒ Response Spectrum

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

S/S = 13.6 cps F/B = 13.6 cps V = 48.9 cps pg mc 453

3. Model Type: ☐ 3D ☒ 2D ☐ 1D

☐ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ________

(1) VERTICAL

(2) LATERAL

4. ☒ Computer Codes: ICES - STRUDL p1 ME453

Frequency Range and No. of Modes LATERAL 18 MODES 13.6 - 2686 cps p6 ME-453
VERTICAL 21 MODES 46.9 - 3158 cps

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☒ SRSS ☐ Other: N/A (specify)

6. Damping:

OBE 2% SSE 2% Basis for the damping used: CONSERVATIVE INTERPRETATION OF SP-750-4549-00 ; RG 1.61 p10 ME 453

7. Support Considerations in the model: SEISMIC SUPPORTS AND BASE PLATE MODELED

8. Critical Structural Elements: ATTACHED

a. Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
ATTACHMENT 1				

b. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
ATTACHMENT 1		

9. Failure Modes: DISCHARGE HEAD BASE PLATE STRESS

10. Margins Available: ☒ Input Spectrum ☒ Stress or Deflection

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<tr><th>REVIEW</th><th>CHECKED</th><th>APPROVED</th></tr>
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SP-501
REVIEWED BY /10-21-82
CHECKED BY F. J. Zahorski /10-22-82
APPROVED BY F.A.Pate 7/18/84 /~~8-31-83~~
EAS 7-16-84

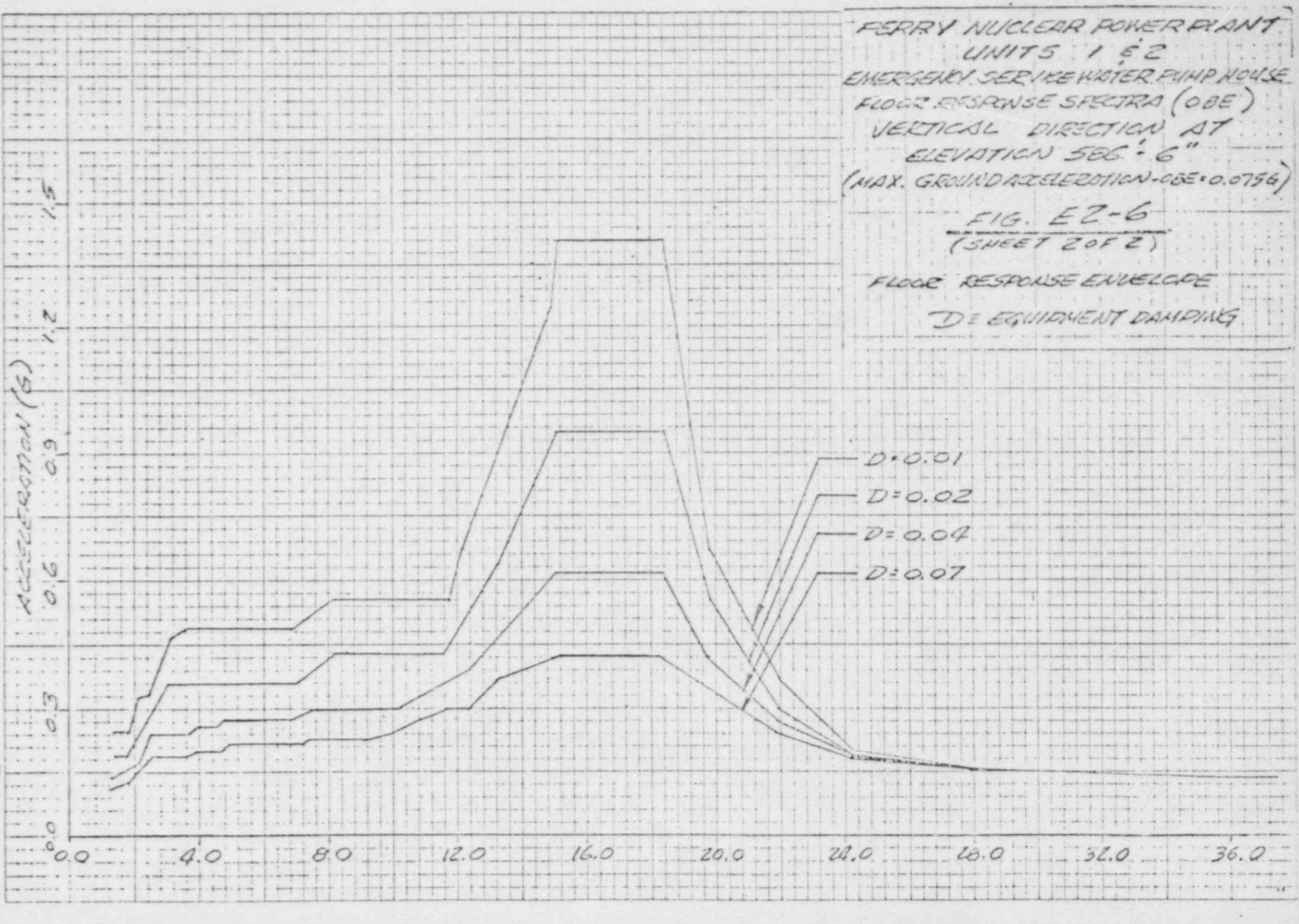
SQRT 501-1
ME-453 JH
~~ME-454~~ 10-18-82

2. SUMMARY OF RESULTS

ATTACHMENT 1
page 1 of 1

Components	Actual	Allowable
Maximum Column Stress, PSI	19,561	22,500
Maximum Column Flange Stress, PSI	25,993	26,250
Bolt Stress, PSI	34,240	37,500
Maximum Pump Casing Flange Stress, PSI	20,865	21,000
Bolt Stress, PSI	33,193	42,000
Nozzle Stress, PSI	7,916	22,500
Anchor Bolt Stress, PSI - Tensile	22,510	40,000
- Shear	6,157	12,320
Shaft Key Stress, PSI	18,321	20,000
Pump Hold Down Bolt Stress, PSI - Tensile	22,088	25,000
- Shear	3,142	12,500
Motor Hold Down Bolt Stress, PSI - Tensile	6,466	20,000
- Shear	3,349	10,000
Discharge Head Base Plate Stress, PSI	26,155	26,250
Discharge Head Stress, PSI	17,506	22,500
Shaft Stress, PSI	29,144	30,000
Discharge Nozzle Flange Pressure, PSIG	229	275
Pump Casing Stress, PSI	4,434	14,000
Impeller Clearance, Inches	.0013	.014
Shaft Deflection, Inches	.0292	.05
Motor Mounting Plate Stress, PSI	8,263	26,250
Motor Support Weld Stress	10,127	11,400

(M)



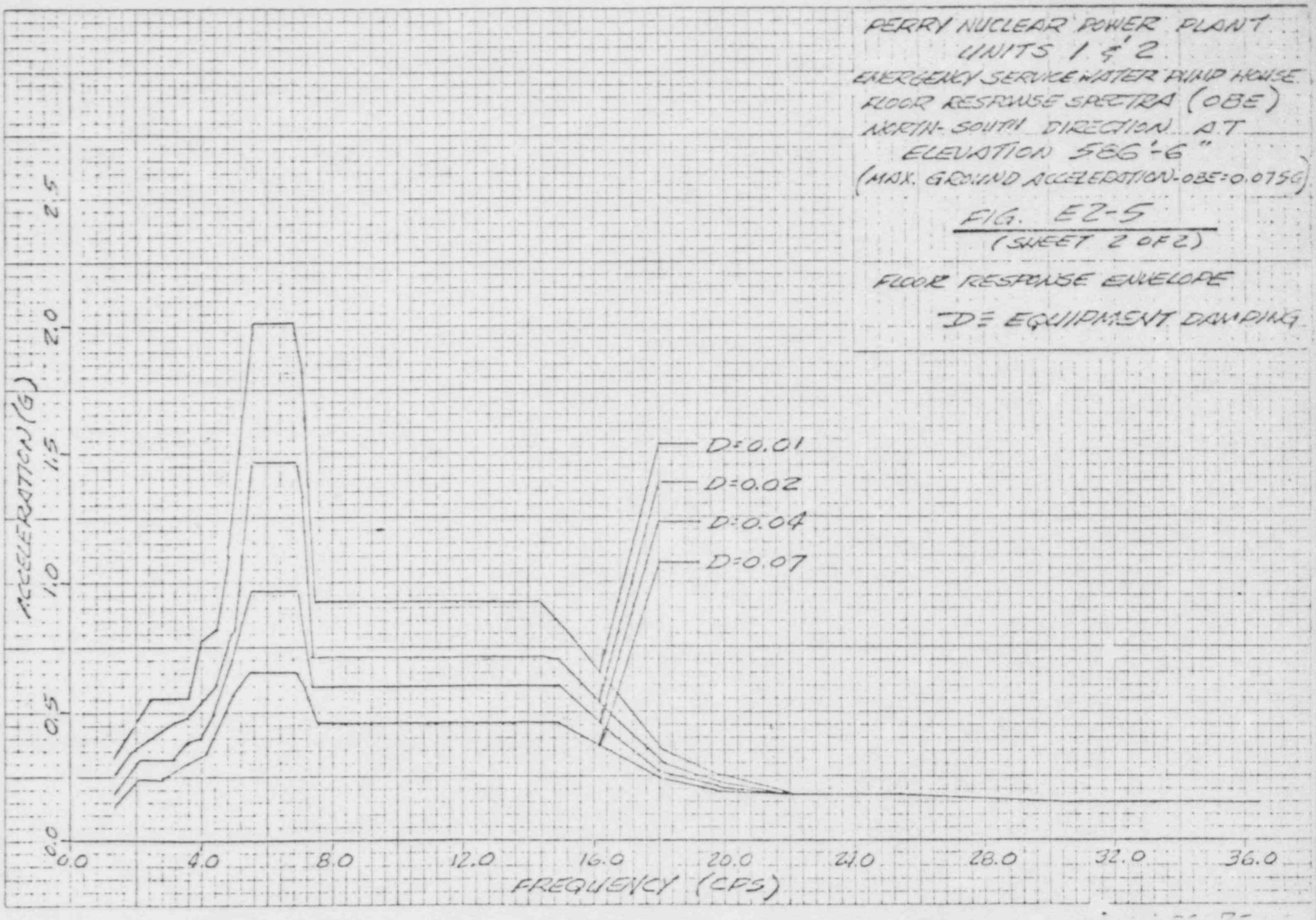
FERRY NUCLEAR POWER PLANT
UNITS 1 & 2
EMERGENCY SERVICE WATER PUMP HOUSE
FLOOR RESPONSE SPECTRA (OBE)
VERTICAL DIRECTION AT
ELEVATION 586'-6"
(MAX. GROUND ACCELERATION-OBE=0.075G)

FIG. E2-6
(SHEET 2 OF 2)

FLOOR RESPONSE ENVELOPE

D= EQUIPMENT DAMPING

SRRT 501-1 ATTACHMENT 2, 1 of 6



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
EMERGENCY SERVICE WATER PUMP HOUSE
FLOOR RESPONSE SPECTRA (OBE)
NORTH-SOUTH DIRECTION AT
ELEVATION 586'-6"
(MAX. GROUND ACCELERATION-OBE=0.075G)

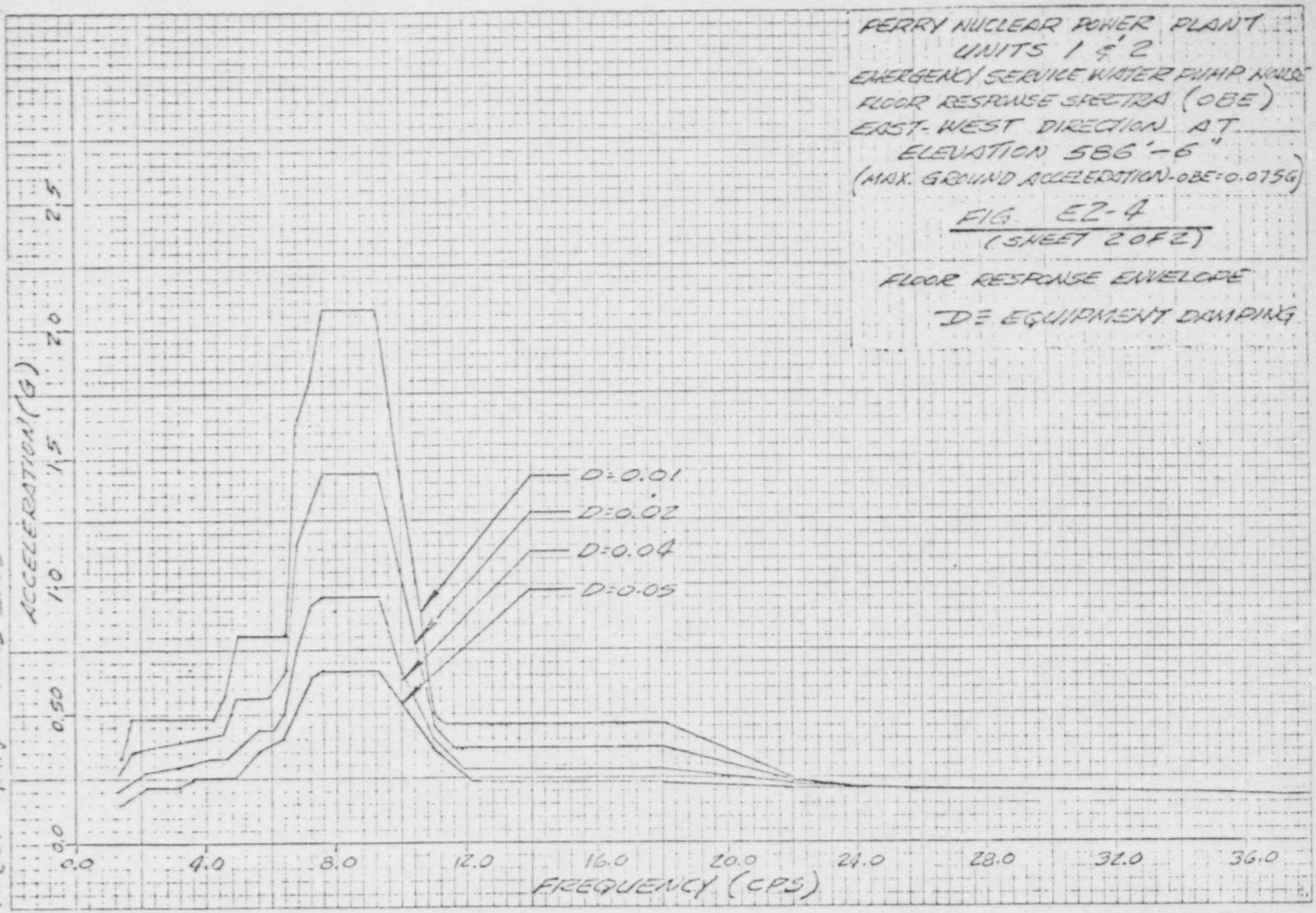
FIG. E2-5
(SHEET 2 OF 2)

FLOOR RESPONSE ENVELOPE

D= EQUIPMENT DAMPING

SQRT 501-1

Attachment 2, 2 of 6



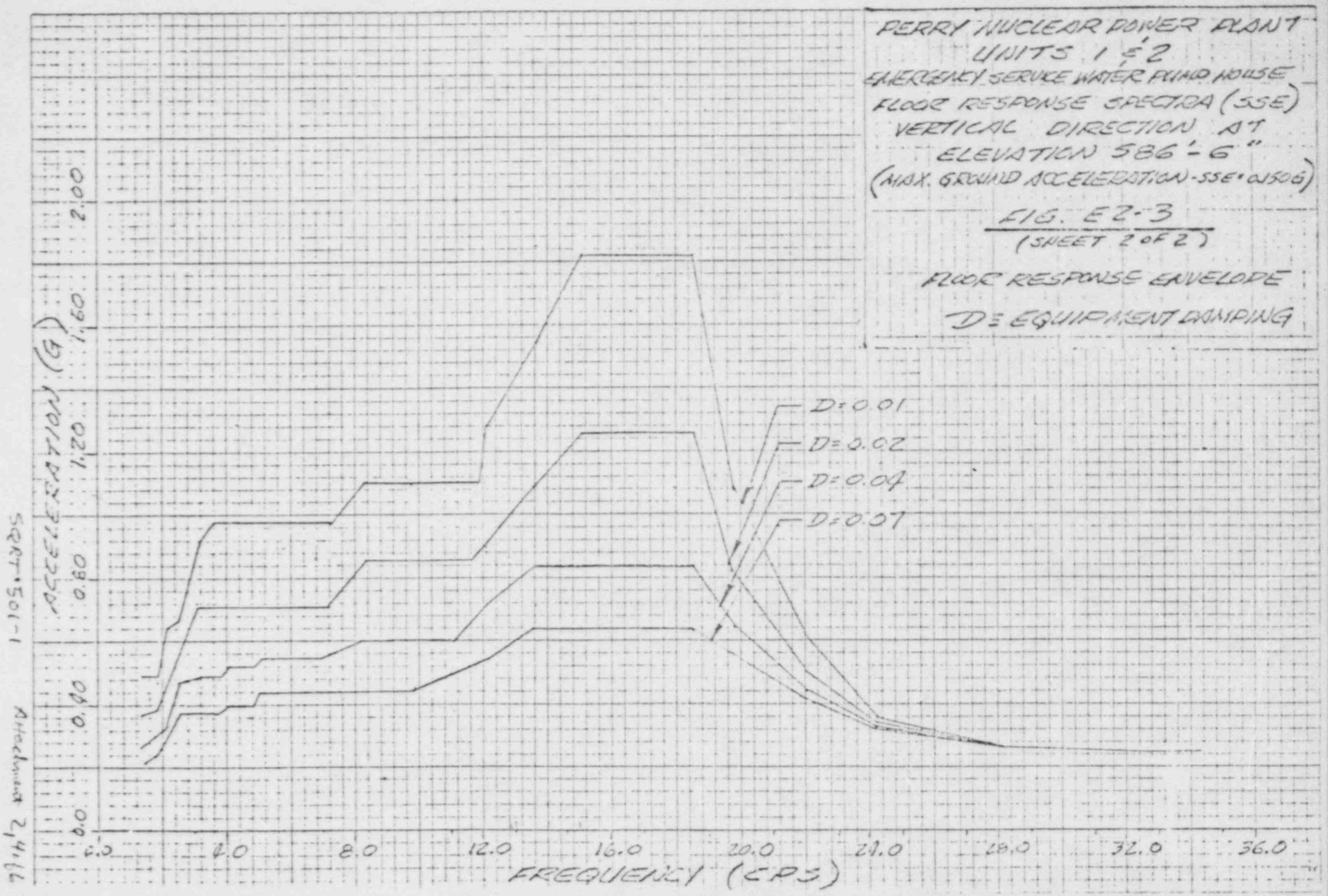
PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
EMERGENCY SERVICE WATER PUMP HOUSE
FLOOR RESPONSE SPECTRA (OBE)
EAST-WEST DIRECTION AT
ELEVATION 586'-6"
(MAX. GROUND ACCELERATION-OBE=0.075G)

FIG. E2-4
(SHEET 2 OF 2)

FLOOR RESPONSE ENVELOPE

D= EQUIPMENT DAMPING

SQRT 501-1 Attachment 2, 3 of 6



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
EMERGENCY SERVICE WATER PUMP HOUSE
FLOOR RESPONSE SPECTRA (SSE)
VERTICAL DIRECTION AT
ELEVATION 586'-6"
(MAX. GROUND ACCELERATION-SSE•0.150G)

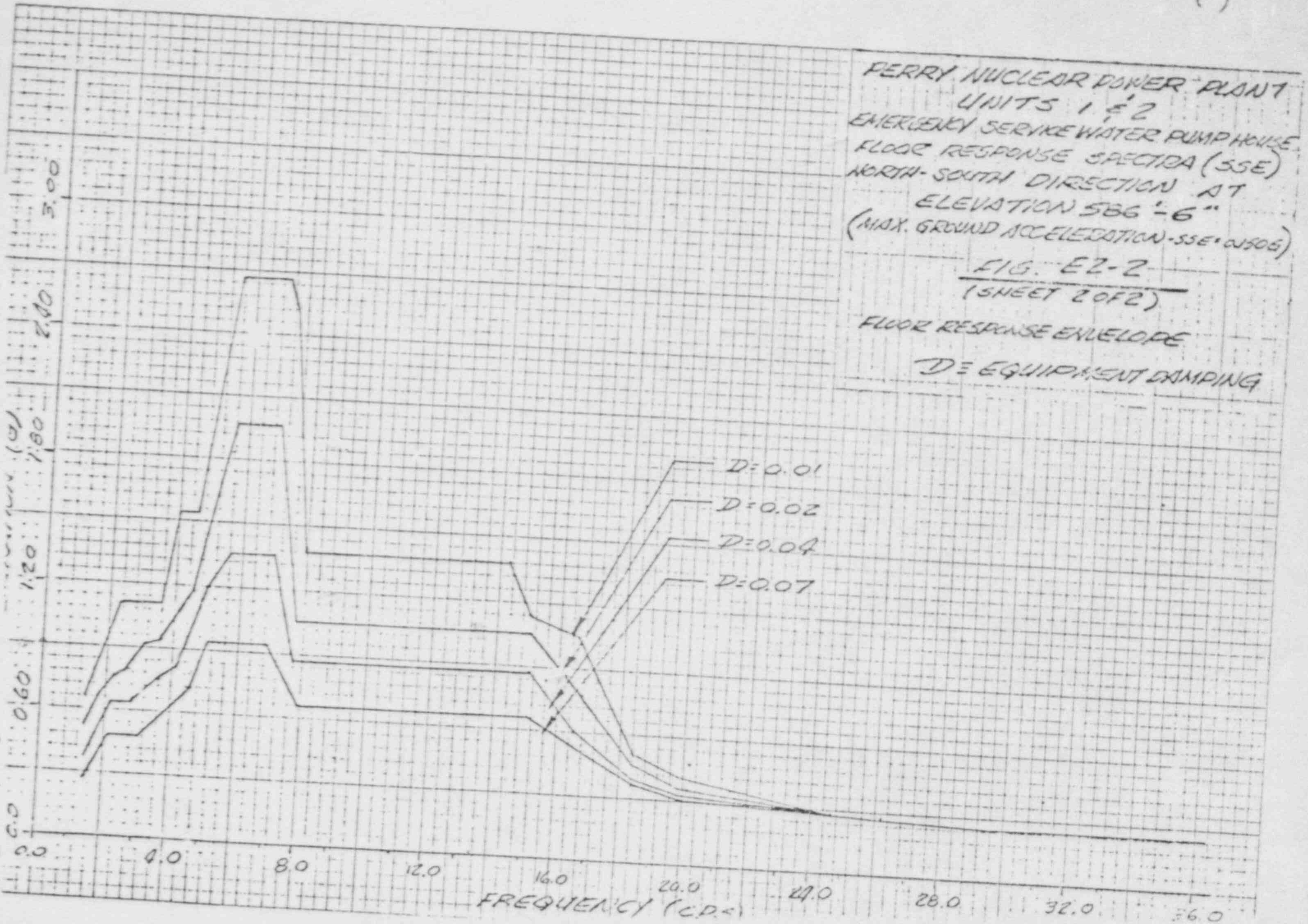
FIG. E2-3
(SHEET 2 OF 2)

FLOOR RESPONSE ENVELOPE

D= EQUIPMENT DAMPING

SQRT•501-1

Attachment 2,4.66



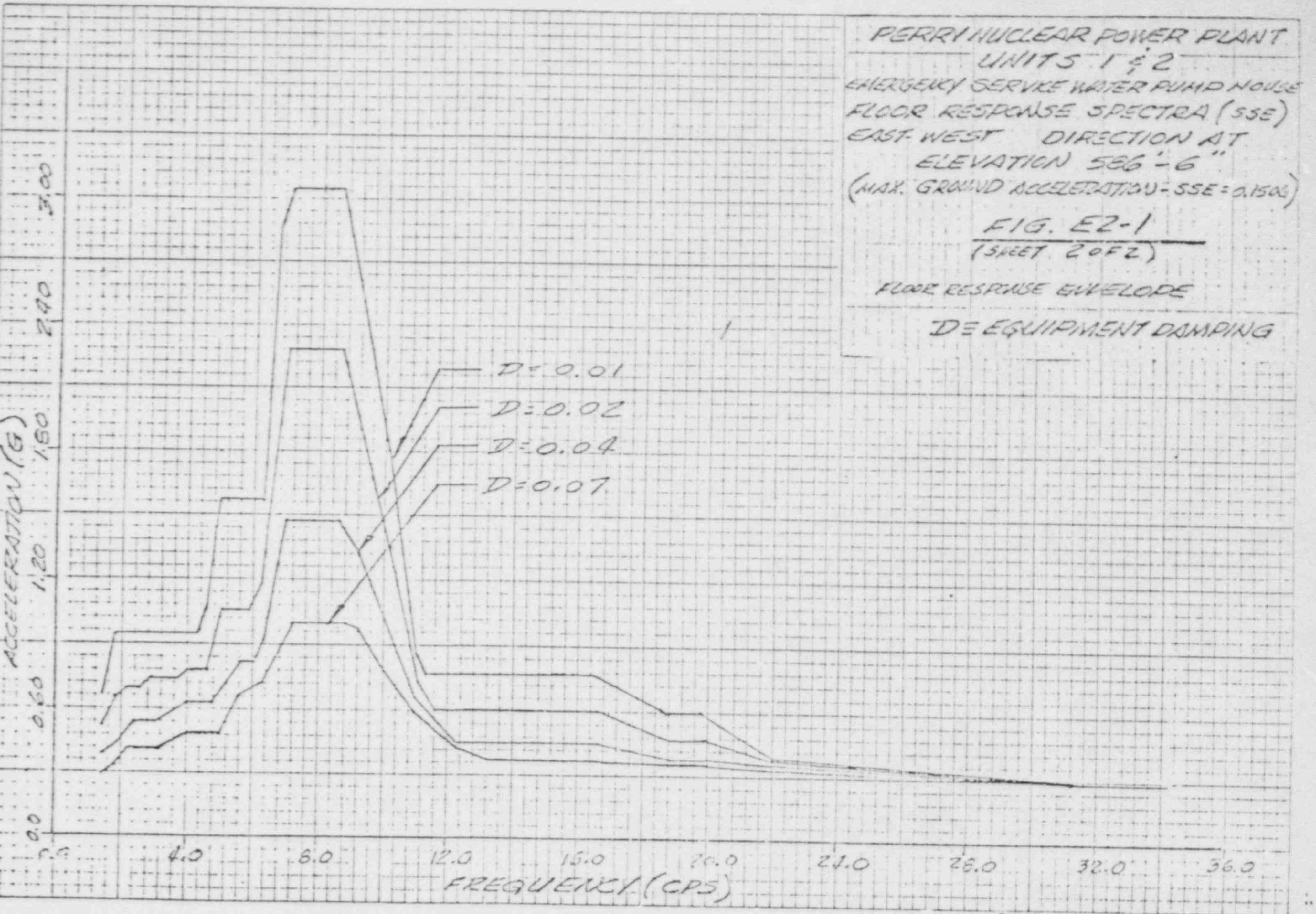
PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
EMERGENCY SERVICE WATER PUMP HOUSE
FLOOR RESPONSE SPECTRA (SSE)
NORTH-SOUTH DIRECTION AT
ELEVATION 586'-6"
(MAX. GROUND ACCELERATION-SSE=0.15G)

FIG. E2-2
(SHEET 2 OF 2)

FLOOR RESPONSE ENVELOPE

D= EQUIPMENT DAMPING

SQRT 501-1 Attachment 2, 5 of 6



PERRI NUCLEAR POWER PLANT
UNITS 1 & 2
EMERGENCY SERVICE WATER PUMP HOUSE
FLOOR RESPONSE SPECTRA (SSE)
EAST-WEST DIRECTION AT
ELEVATION 586'-6"
(MAX. GROUND ACCELERATION - SSE = 0.15G)

FIG. E2-1
(SHEET 2 OF 2)

FLOOR RESPONSE ENVELOPE

D= EQUIPMENT DAMPING

SQRT S01-1

ATTACHMENT #3

SEISMIC TABLE SSE

Natural Frequency	Corresponding Input Required 3% Damping			Analysis Input Used 2% Damping		
	N-S	E-W	Vertical	N-S	E-W	Vertical
13.6	.97	.52	.38	1.05	.72	.4
18.3	.44	.46	.38	.8	.6	.4
23.4	.30	.35	.38	.3	.35	.4
36.4	.24	.28	.38	.3	.3	.4
41.1	.24	.28	.38	.3	.3	.4
53.8	.24	.28	.38	.3	.3	.4

The Seismic Analysis performed uses acceleration levels from the Floor Response Spectra SSE curves at 2% damping. This input is determined at the frequencies corresponding to the natural frequencies of the assembly. The results of the seismic analysis are contained on attachment number 1 and show that the stresses developed in the components are all within allowable levels. The actual input accelerations required for qualification are those derived from the SSE curves at 3% damping (shown above). In all cases the accelerations used in the analysis are greater than the levels required. Thus, the analysis performed was conservative and as a result the assemblies are seismically qualified for our application.

SP-550-00-4 |R2

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT — TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING — PWR: ______
2. NSSS: GENERAL ELECTRIC — BWR: X
3. A/E: GILBERT/COMMONWEALTH — Other ______

II. COMPONENT NAME: FORM WOUND VERTICAL MOTOR

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: FRAME 404VP Quantity: 2 (one for each unit) RHS 9.27.83 |R1
3. Size or Range: 75 HP

Ref. Pg 8 (items 2–3)

4. Vendor: Siemens Allis
5. If the component is a cabinet or panel, name and model Number of the devices included:
   N/A
6. Physical Description:
   a. Appearance: SEE Attached Dwg.
   b. Dimensions: SEE Attached Dwg.
   c. Weight: 1041 Lbs REF. Pg. 8 |R1
7. Location: Building: ESW PUMPhouse
   Elevation: 540'-0
8. Field Mounting Conditions ☐ Bolt (No. 4, Size 5/8) REF. Pg. 8 |R1
   ☐ Weld (Length ______)
   ☐ ______
9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   Directly ON the PUMP
10. a. System in which located: EMERG. SERV. WATER SYSTEM
    b. Functional Description: SMAll ESW PUMP
    c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
    ☒ Both ☐ Neither ☒ Other PA

SP-550-00-4

R2

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP-550-4549 & 7504549

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: EL-8-S134-90309-01 Rev 2, dated 12/21/82

(No., Title and Date):

Company that Prepared Report: Siemens Allis

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE-344-1975

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☒ SRSS ☐ ____________ (other, specify)

3. Required Response Spectra ** (attach the graphs): Attached

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

R2

4. Damping Corresponding to RRS: OBE 2% SSE 2% REF. ATTACH. FIG. FI-1 R2

5. Required Acceleration in Each Direct:

OHB 11/16/83 OHB 11/16/83 Att. A, Note 1

☒ ZPA ~~☒ Other~~ PEAK (specify)

R2

OBBA or (OBE) S/S = .175 ~~0.478~~ F/B = .150 ~~0.398~~ V = .135 ~~0.538~~ OHB 11/16/83

SSBA or (SSE) S/S = 0.3 ~~0.848~~ OHB 11/16/83 F/B = 0.3 ~~0.808~~ OHB 11/16/83 V = 0.25 ~~0.988~~ OHB 11/16/83 } REF. ATTACH. FIG. FI-1

R1

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program: ______

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
   ☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other ______ (specify)

4. Frequency Range: ______ ______

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

S/S = ______ F/B = ______ V = ______

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

SP-550-00-4 |R2

8. Maximum Input g Level Test:

OBBA or OBE S/S = ____________ F/B = ____________ V = ____________

SSBA or SSE S/S = ____________ F/B = ____________ V = ____________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ____) ☐ ____________

b. Orientation and Fixturing: ____________

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ____________

12. Other tests performed (such as aging or fragility test, including results):

13. Failure Modes (If appropriate) ____________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☒ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time–History ☐ Response Spectrum

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

S/S = 74 Hz * F/B = > 74 HZ * V = > 74 HZ * |R1

3. Model Type: ☐ 3D ☐ 2D ☒ 1D

☐ Finite Element ☒ Beam

☐ Closed Form Solution ☐ Other ____________

* REF. Pg. 3 of TEST REPORT (SUMMARY OF CALCS.) |R1

4. ☐ Computer Codes: ~~NOT AVALAIBLE~~ See Attached Program description (Att. B) | R2

Frequency Range and No. of Modes

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☒ Absolute Sum ☒ SRSS Pg 12 to 16 of report ~~☒ Other~~ CHB 11/14/83 N/A (specify) | R2

6. Damping:

OBE 2% SSE 2% Basis for the damping used: PER FIG. FI-1

7. Support Considerations in the model: Bolted to a rigid body

8. Critical Structural Elements:

a. Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
SEE ATTACHED SUMMARY OF CALCULATIONS				

b. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
** 0.0010 IN.	rotor/stator GAP	** 0.004 IN.

| R1

9. Failure Modes: deflection of rotor to stator

10. Margins Available: ☐ Input Spectrum ☒ Stress or Deflection

REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
1	7/19/83	JRS	GSK	KAM
2	11/14/83	CHB	J.D.C.	12/14/83

REVIEWED BY 12/2/83

CHECKED BY S.J. Lehowski 12-7-83

APPROVED BY 12/14/83

** REF. Pg. 17 OF TEST REPORT | R1

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT SUPPLEMENTAL NOTES FOR SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT			IDENTIFIER SP-550-00-4	PAGE 1 OF PAGES 1
	REV. 0	1	2	3	
	MICROFILMED				
	ORIGINATOR EHB				
	DATE 11/16/83				

ATTACHMENT A

Note i ZPA is used because the lowest motor resonant frequency is 74 Hz. It was also necessary to revise the SSE ZPA values because the motor is mounted on the pump Copies of the resonant characteristics of the pump/motor assembly, taken from the pump qualification analysis, are included with the RRS curves attached to the motor SQRT form. Since no OBE data is provided in the pump report, the OBE RRS ZPA values used are those obtained from the floor response OBE curves. (The pumps were purchased by SP-501-4549-00.)

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______

2. NSSS: GENERAL ELECTRIC BWR: X

3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: HVAC CONTROL PANEL 0H51-P177A & 0H51-P177B

1. Scope: ☐ NSSS ☒ BOP ☐ Other

2. Model Number: B-809-076, B-209-081 Quantity: 2

3. Size or Range: SEE 6B

4. Vendor: COMSIP

5. If the component is a cabinet or panel, name and model Number of the devices included:

N/A

6. Physical Description:

a. Appearance: FREE STANDING INSTRUMENT PANEL

b. Dimensions: 90" x 36" x 24"

c. Weight: ~~1250 EA~~ [illegible] 617kg = 1360# ([illegible])

7. Location: Building: CONTROL COMPLEX

Elevation: 679

8. Field Mounting Conditions

☒ Bolt (No. 8, Size 1/2")

☐ Weld (Length ____)

☐ ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

FLOOR MOUNTING

10. a. System in which located: MCC ECT. HVAC AND BATT. RM EXH

b. Functional Description: DAMPER AND FAN CONTROL PANEL

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

☒ Both ☐ Neither ☐ Other ______

II. Pertinent Reference Design Specifications for Qualification Requirements:

GAI SP594

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes RB ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: DYNAMIC AND SEISMIC ANALYSIS OF CONTROL PANEL 1H51-P177A

(No., Title and Date): 3443.00/2680 SDS - APP475-5 REV 1

Company that Prepared Report: CETIM

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE 344, 1975

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS: N/A [illegible] 5.5.84

   ☐ Absolute Sum ☐ SRSS ☐ ____________ (other, specify)

3. Required Response Spectra ** (attach the graphs): *

NOTE: * C8 (EL 707' - ½) WERE CONSERVATIVELY USED RATHER THAN C7 (EL 679' 6")

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

4. Damping Corresponding to RRS: OBE 2% SSE 4%

5. Required Acceleration in Each Direct:

☒ ZPA ☐ Other ______________
(specify)

OBBA or [✓ OBE] S/S = .8G F/B = .8G V = .7G

SSBA or [✓ SSE] S/S = 1.2G F/B = 1.2G V = 1G

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program: ______________

VI IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Independent Axis ☐ Multi-Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other ______
(specify)

4. Frequency Range: ______________

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

S/S = ______ F/B = ______ V = ______

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test:

OBBA or OBE S/S = ____________ F/B = ____________ V = ____________

SSBA or SSE S/S = ____________ F/B = ____________ V = ____________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ____) ☐ ____________

b. Orientation and Fixturing: ____________

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ____________

____

12. Other tests performed (such as aging or fragility test, including results):

____

____

13. Failure Modes (If appropriate) ____________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

P8 ☒ Dynamic Analysis: ☐ Time–History ☒ Response Spectrum

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

P15 S/S = >35 HZ F/B = >77 HZ V = >77 HZ

3. Model Type: ☒ 3D ☐ 2D ☐ 1D

P8 ☒ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ____________

4. ☒ Computer Codes: CASTOR

Frequency Range and No. of Modes 77 HZ, 7 MODES

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

P21 ☐ Absolute Sum ☒ SRSS FOR X, Y AND Z COMPONENT ☐ Other: (specify)

6. Damping:

OBE * SSE 2% Basis for the damping used: RRS ***

7. Support Considerations in the model: 8 BOLTS FOR FLOOR MOUNTING

8. Critical Structural Elements:

a.

Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
STIFFENERS	SEISMIC	3.9 KSI	3.9 KSI	14.4 KSI

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
.0037"	**	NOT CRITICAL

9. Failure Modes: STRESS GREATER THAN ALLOWABLE

10. Margins Available: ☐ Input Spectrum ☒ Stress or Deflection

* OBE RRS WAS NOT USED IN THE ANALYSIS, SSE IS MORE SEVERE.

** AT THE CONDUIT CONNECTIONS

*** REG GUIDE 1.61 RECOMMENDS 4% FOR SSE, BUT USING 2% IS CONSERVATIVE

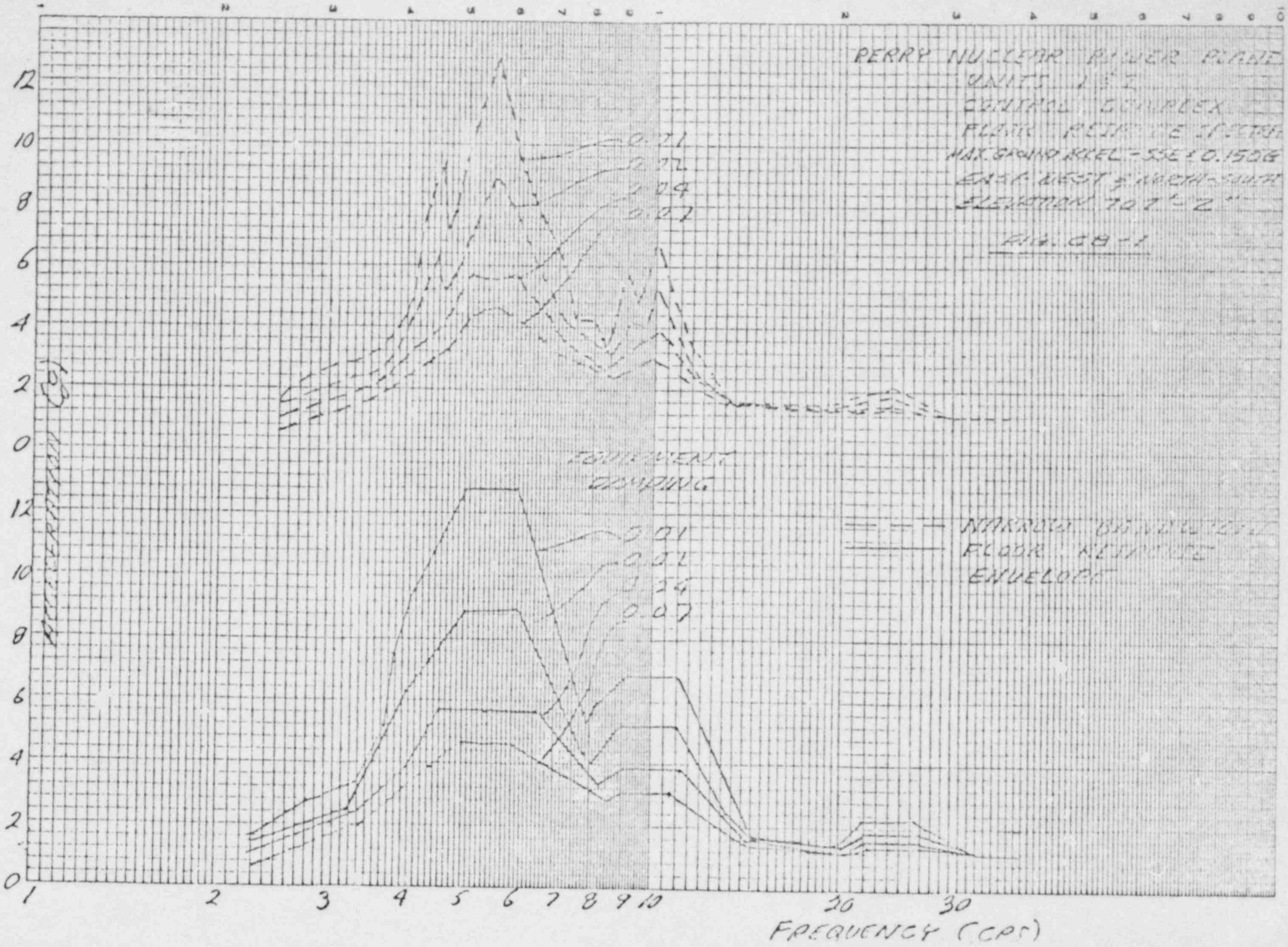
REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/		/	/
	/		/	/
	/		/	/

REVIEWED BY MAGED GABALLA 11/15/83

CHECKED BY James D. Cokerly 11/22/83

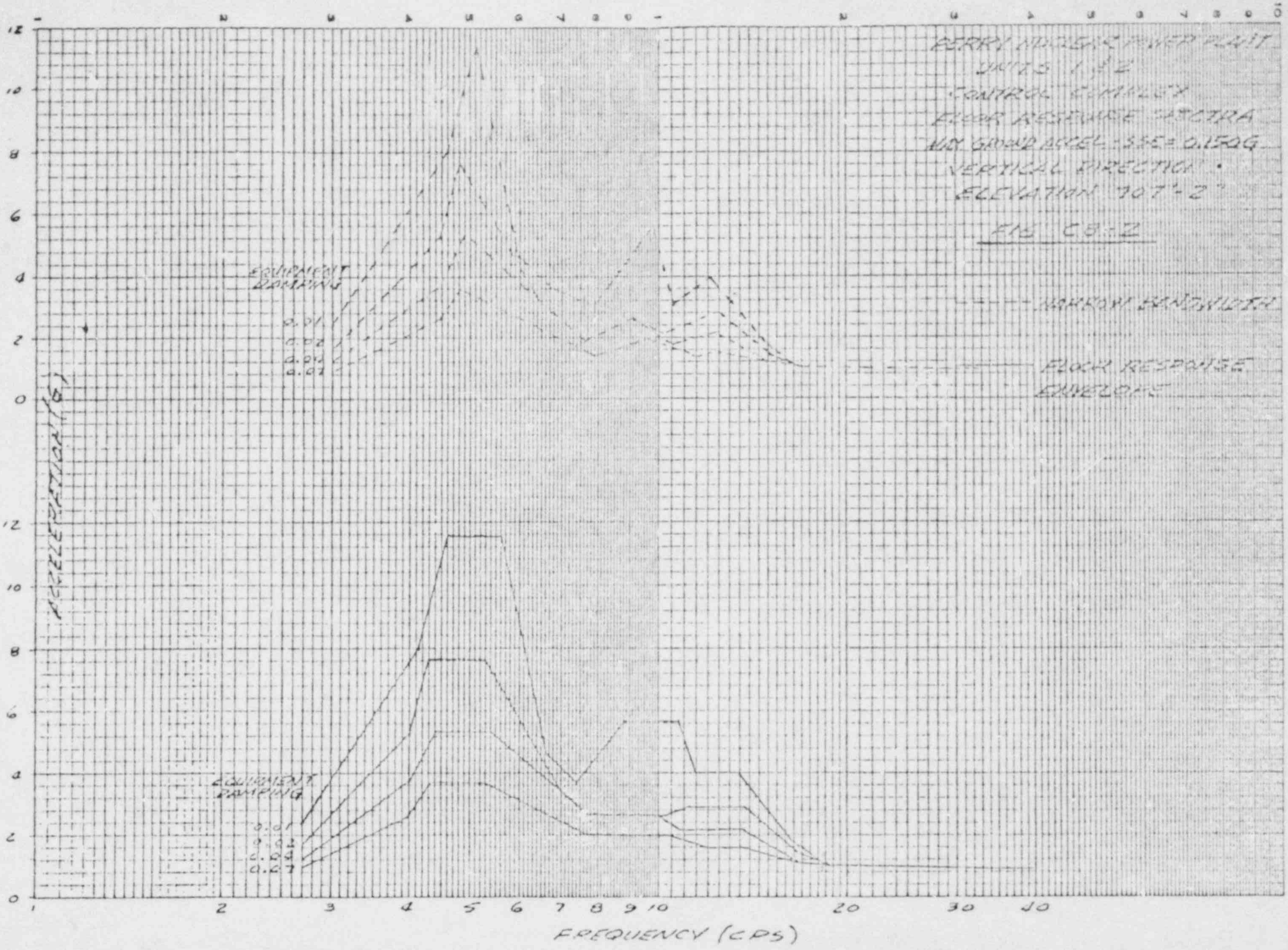
APPROVED BY D A Putre 5/8/87

RAS 3.30.87



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL - SSE = 0.150G
EAST-WEST & NORTH-SOUTH
ELEVATION 707'-2"

FIG. C8-1

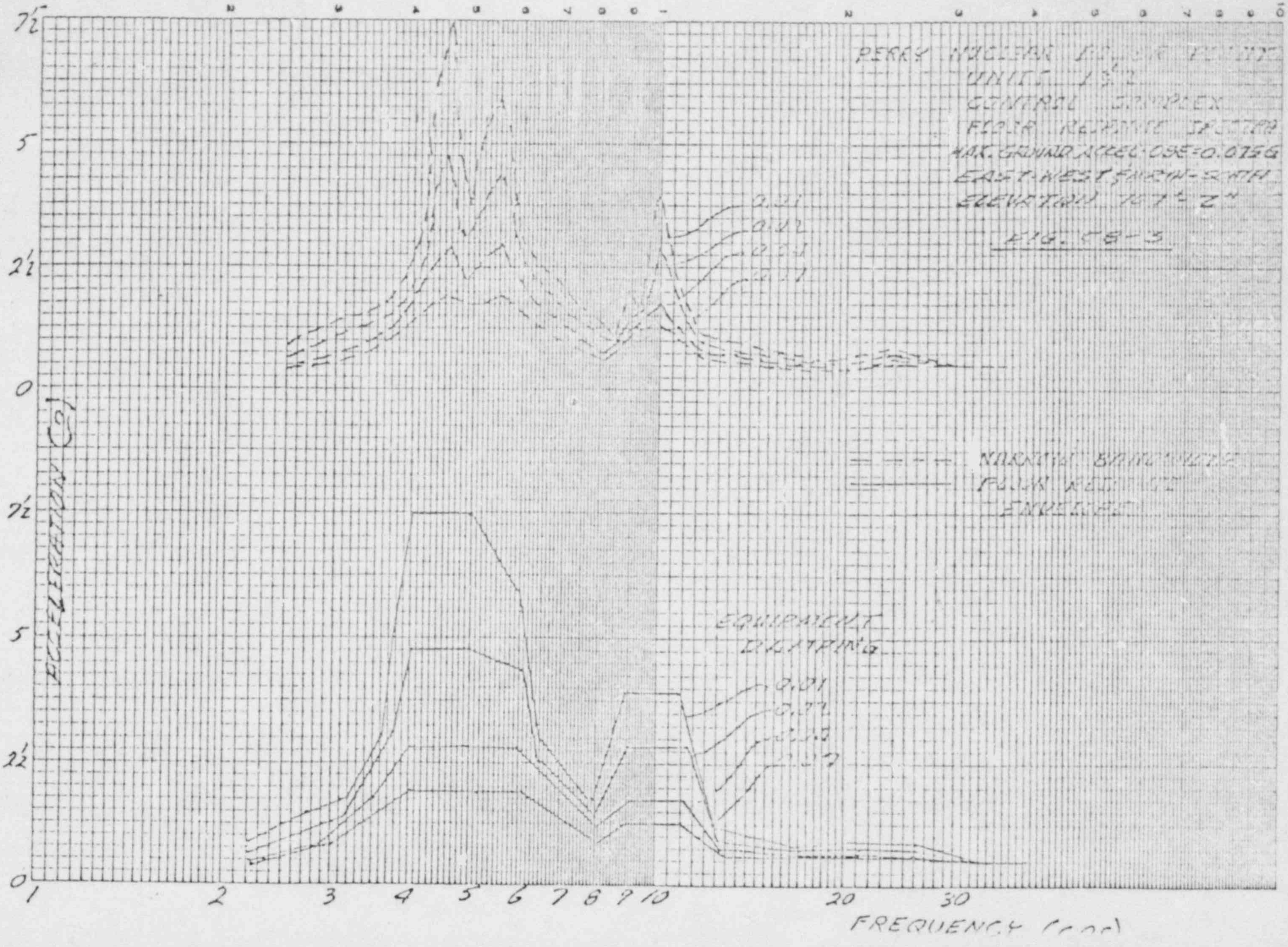


PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX GROUND ACCEL - SSE = 0.15G
VERTICAL DIRECTION
ELEVATION 707'-2"

FIG C8-2

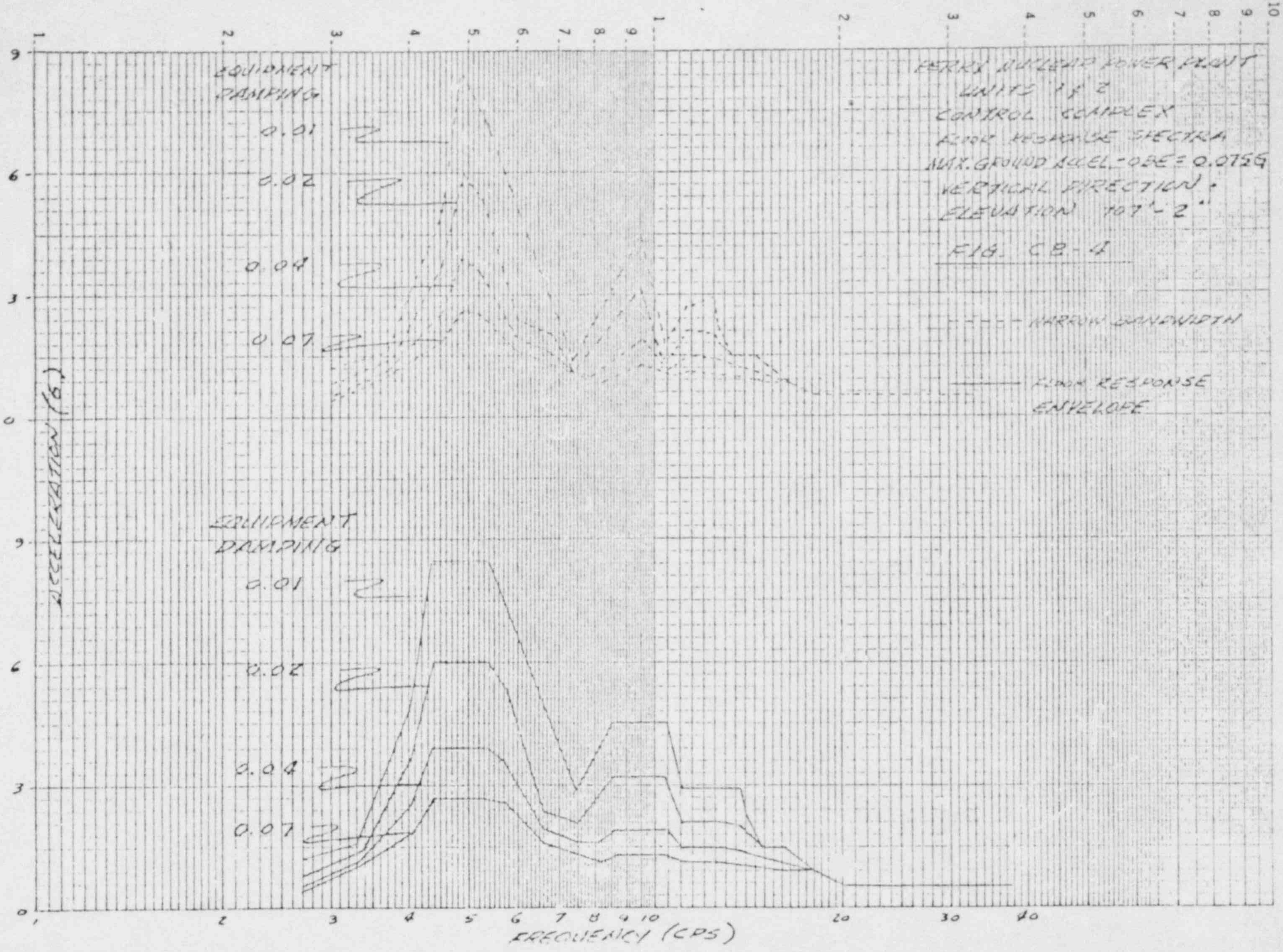
NO. 340-L210 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
2 CYCLES X 10 DIVISIONS PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.



K·E SEMI-LOGARITHMIC 2 CYCLES X 70 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.

46 4972



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
CONTROL COMPLEX
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL.-OBE = 0.075G
VERTICAL DIRECTION,
ELEVATION 707'-2"

FIG. CB-4

SC 6.46

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______

2. NSSS: GENERAL ELECTRIC BWR: X

3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: Air Handling Units / MPL#s 1&2 M39-B004

1. Scope: ☐ NSSS ☒ BOP ☐ Other

2. Model Number: 39BA050 Quantity: 2 Total (see Reference Sheet)

3. Size or Range: 2000 SCFM

4. Vendor: Carrier Air Conditioning Company

5. If the component is a cabinet or panel, name and model Number of the devices included:
N/A

6. Physical Description:

a. Appearance: See Attachment #1'

b. Dimensions: $11\frac{1}{8}$" dia. fan and See Attachment #1'

c. Weight: 705 lbs.

7. Location: Building: Auxiliary (AB-3)
Elevation: 574'

8. Field Mounting Conditions
☒ Bolt (No. 4, Size $\frac{1}{2}$" dia.)
☐ Weld (Length ____)
☐ ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
Floor mounted

10. a. System in which located: M39 ventilation system.

b. Functional Description: To supply ventilation air and cooling air.

c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☒ Both ☐ Neither ☒ Other All modes of plant operation.

II. Pertinent Reference Design Specifications for Qualification Requirements:

Spec. 646-4549-00, Spec. 750-4549-00

Spec. 551-4549-00

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: No. JHA-76-73A

(No., Title and Date): Seismic Analysis of the 39BA050 Model Air Handler, date 12-29-78.

Company that Prepared Report: John Henry Associates, Inc.

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE-344-75

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

   ☐ Absolute Sum ☒ SRSS ☐ ______ (other, specify)

3. Required Response Spectra ** (attach the graphs): See attached curves. (A1)

NOTE:

**If more than one report complete Items IV thru VII for each report.*

***If other than RRS is used, describe method.*

See Attachment #3'

4. Damping Corresponding to RRS: OBE 4% SSE 7%

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other "g" levels from RRS Curves at calculated frequencies.
(specify)

OBBA or [✓ OBE] S/S = from A1-4 RRS F/B = from A1-5 RRS V = from A1-6 RRS

SSBA or [✓ SSE] S/S = from A1-1 RRS F/B = from A1-2 RRS V = from A1-3 RRS

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program:

N/A

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE SSE Other
(specify)

4. Frequency Range:

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

S/S = F/B = V =

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test:

OBBA or OBE S/S = ____________ F/B = ____________ V = ____________

SSBA or SSE S/S = ____________ F/B = ____________ V = ____________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ____) ☐ ____________

b. Orientation and Fixturing: ____________

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test results including modifications made: ____________

____

12. Other tests performed (such as aging or fragility test, including results):

____

____

13. Failure Modes (If appropriate) ____________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☒ Dynamic Analysis: ☐ Time–History ☐ Response Spectrum

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

S/S = 28.8 Hz F/B = 14.6 Hz V = 6.1 Hz

3. Model Type: ☐ 3D ☐ 2D ☒ 1D

☒ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ____________

4. ☒ Computer Codes: CDC 6600 computer code, Stardyne.

Frequency Range and No. of Modes 6.1 To 68.2 Hz , 8 modes.

☒ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☒ SRSS ☐ Other: __________ (specify)

6. Damping:

OBE 4% SSE 7% Basis for the damping used: R.G. 1.61

7. Support Considerations in the model: Rigidly Mounted

8. Critical Structural Elements:

a. Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable

See Attachment 2a-b

b. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.0034"	Between Fan Wheel (ID) & Cone (OD)	0.25"

9. Failure Modes: Membrane plus bending

10. Margins Available: ☐ Input Spectrum ☒ Stress or Deflection

REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/		/	/
	/		/	/
	/		/	/

REVIEWED BY T.N. Rockwell 6-23-83

CHECKED BY V.D. Caherly 7-1-83

APPROVED BY R.A. Matheny 3/1/84
2-29-84

ATTACHMENT # 1

THE CLEVELAND ELECTRIC ILLUMINATING CO. PERRY NUCLEAR POWER PLANT UNIT 1	MADE JW DR. APP. JRG	CHK'D RGC ENG. APP. OTA	GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.
BUILDING SERVICE HVAC	DATE 3-22-74		04 4549 S-915-027 A
RCIC PP. RM. COOLING AIR HANDLING UNIT	W.O. 044549-000		DRAWING NUMBER / REV.
1M39-B004	REV. CH. APP. DATE		SCALE: $\frac{1}{4}$"=1'-0"

RELEASED FOR
BIDDING PURPOSES
CONSTRUCTION
ENGR. OTA
DATE 7-1-74

FOR REFERENCE ONLY.

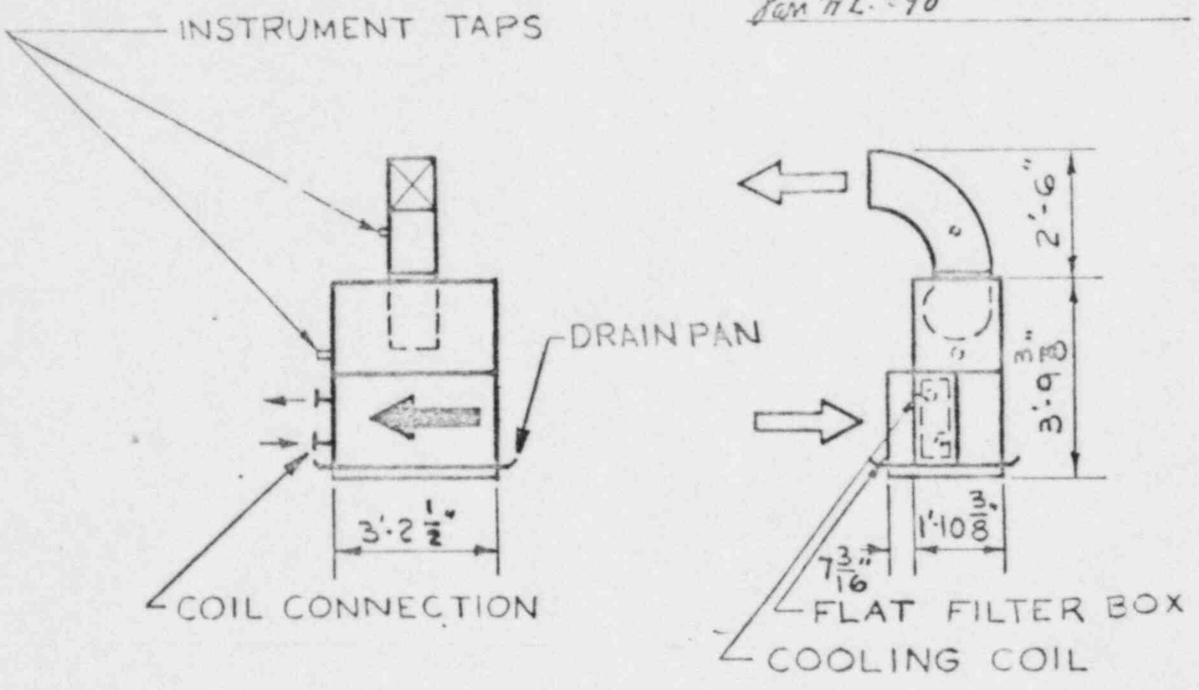
◀ COIL PULL DIRECTION

⇦ DENOTES AIR FLOW

1M39-B004

Assembly Weight = 705# †

Fan Wt. = 90#



FRONT VIEW SIDE VIEW

† Reference Specification SP 646-4549-00 Bill of Materials

ATTACHMENT 2a'

SECTION 2.0

SUMMARY OF RESULTS

LOWEST NATURAL FREQUENCIES (CPS)

FREQ.	DIRECTION	LOCATION	REF.
6.1	G3 V	NODE 149, FIG. 15	APP. C
14.6	G2 BP	NODE 151, FIG. 15	↓
17.8	G3 V	NODE 7, FIG. 3	
28.8	G1 SS	NODE 138, FIG. 15	

BEAM STRESSES (PSI)

BEAM	LOCATION	σ_{M+B}	ALLOW.	REF.
81	CS, FIG. 6	10491	18000	P. 62
		σ_V		
13	FLTS, FIG. 3	1481	15000	P. 62

PLATE STRESSES (PSI)

PLATE	LOCATION	σ_{M+B}	ALLOW.	REF.
$\boxed{36}$	FS, FIG. 14	7193	27000	P. 64
		σ_V		
$\boxed{36}$	FS, FIG. 14	5413	15000	P. 64

ANCHOR BOLT LOADS (LBS, IN-LBS)

LOCATION	TENSILE	SHEAR	TORQUE	REF.
FIG. 17	2262	1528	249	P. 69

ATTACHMENT 2b

SUBSECTION NF ANALYSIS SUMMARY

The results of the Subsection NF Analysis are summarized below. These results indicate that the support structure for the 050 size RCIC Pump Room Air Handling Unit satisfies the requirements of Subsection NF of the ASME Boiler and Pressure Vessel Code (Ref. 7) when subjected to the loadings of the design specification (Ref. 1)

ITEM	STRESS (PSI)	LIMIT (PSI)	REF. PAGE
Maximum Plate Stress	7193	18,500	79
Max. Beam Axial Stress	1655	16,200	87
Max. Beam Shear Stress	222	12,000	87
Max. Beam Bending Stress	5075	18,000	88
Max. Bolt Stress	22,500	25,800	91
Max. Weld Throat Stress	8,416	9,000	90
Max. Weld Contact Stress	11,900	24,000	90

Attachment #3'

The air handling units are rigidly mounted to the floor at elevation 574'-10". The difference in the analysis of this air handling unit (39BA050) as compared to that of units 39ED15 and 39ED18 is that this unit, 39BA050, has natural frequencies below 33 Hz thus requiring a dynamic analysis to be used.

RRS A1 Curves were used as the seismic input for the analysis since the base of the six foot high concrete platform is anchored to the floor at 568'-6" elevation.

Damping factors of 4% and 7% for OBE and SSE, respectively, were used since the air handling unit is basically a bolted structure consisting of beams, angle iron and plate.

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______

2. NSSS: GENERAL ELECTRIC BWR: X

3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: Horizontal A.C. Motor /MPL# 1&2 M39-B004

1. Scope: ☐ NSSS ☒ BOP ☐ Other

2. Model Number: Frame 184T Quantity: 2 Total

3. Size or Range: 5 HP

4. Vendor: Reliance Electric

5. If the component is a cabinet or panel, name and model Number of the devices included:

N/A

6. Physical Description:

a. Appearance: See Attachment # 1'''

b. Dimensions: " " # 1'''

c. Weight: 85 #

7. Location: Building: Auxiliary Building (A/B - 3)

Elevation: 574'-10"

8. Field Mounting Conditions

☐ Bolt (No. 4, Size 3/8" dia.

☐ Weld (Length ______)

☐ ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

Line mounted to the air handling unit

10. a. System in which located: M-39 cooling system

b. Functional Description: Motor to run cooling system fan

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

☐ Both ☐ Neither ☒ Other All modes of plant operation.

II. Pertinent Reference Design Specifications for Qualification Requirements:

Spec. 646-454900 ; Spec. 750-4549-00

Spec. 551-4549-00

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: #77-A-34

(No., Title and Date): Summary Report - Seismic Analysis, date 6-29-77

Company that Prepared Report: Reliance Electric

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE - 344- 1975

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☒ Absolute Sum ☐ SRSS ☐ ______ (other, specify)

3. Required Response Spectra ** (attach the graphs): See Attached Curves (A2)

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

4. Damping Corresponding to RRS: OBE 1% SSE 1%

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other acceleration at 14.6, 28.8, and 6.1 Hz (see ATTACH #3" and, 3-6 + C in SECTION 4)
(specify)

OBBA or OBE S/S = <0.80 g's F/B = <0.52 g's V = <1.05 g's

SSBA or [✓ SSE] S/S = 0.80 g's F/B = 0.52 g's V = 1.05 g's

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program:

N/A

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Multi-Axis
☐ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other ______
(specify)

4. Frequency Range: ______

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

S/S = ______ F/B = ______ V = ______

6. Method of Determining Natural Frequencies

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test:

OBBA or OBE S/S = ____________ F/B = ____________ V = ____________

SSBA or SSE S/S = ____________ F/B = ____________ V = ____________

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length ____) ☐ ____________

b. Orientation and Fixturing: ____________

10. Functional operability verified:

☐ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: ____________

____

12. Other tests performed (such as aging or fragility test, including results):

____

____

13. Failure Modes (If appropriate) ____________

14. Margins Available: ☐ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☒ Dynamic Analysis: ☐ Time–History ☐ Response Spectrum

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

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

3. Model Type: ☐ 3D ☐ 2D ☒ 1D

☐ Finite Element ☒ Beam

☐ Closed Form Solution ☐ Other ____________

4. ☐ Computer Codes: N/A (PROPRIETARY)

Frequency Range and No. of Modes

☒ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☒ Other: N/A (SEISMIC ONLY) (specify)

6. Damping:

OBE 1% SSE 1% Basis for the damping used: R. G. 1.61

7. Support Considerations in the model: bolted to ~~A RIGID~~ AHU w/ f_n = 28.8, 14.6, and 6.1 body BH 2.28.84

8. Critical Structural Elements:

a. Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable

SEE Attached (Attachment #2"a-e) computer sheets & Supporting Calculation (Sec. IV of AFP).

b. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.00388 in	rotor/stator air-gap	0.0694 in

9. Failure Modes: deflection of rotor relative to stator gap

10. Margins Available: ☐ Input Spectrum ☒ Stress or Deflection

REV. NO.	DATE	INITIALS. REVIEW	INITIALS. CHECKED	INITIALS. APPROVED
	/	/	/	
	/	/	/	
	/	/	/	

REVIEWED BY J R Solano 6/24/83

CHECKED BY J. D. Caherly 7/01/83

APPROVED BY BH 2.29.84 B. E. Matheny 3/1/84

ATTACHMENT # 1'''

DUTY MASTER ALTERNATING CURRENT MOTORS

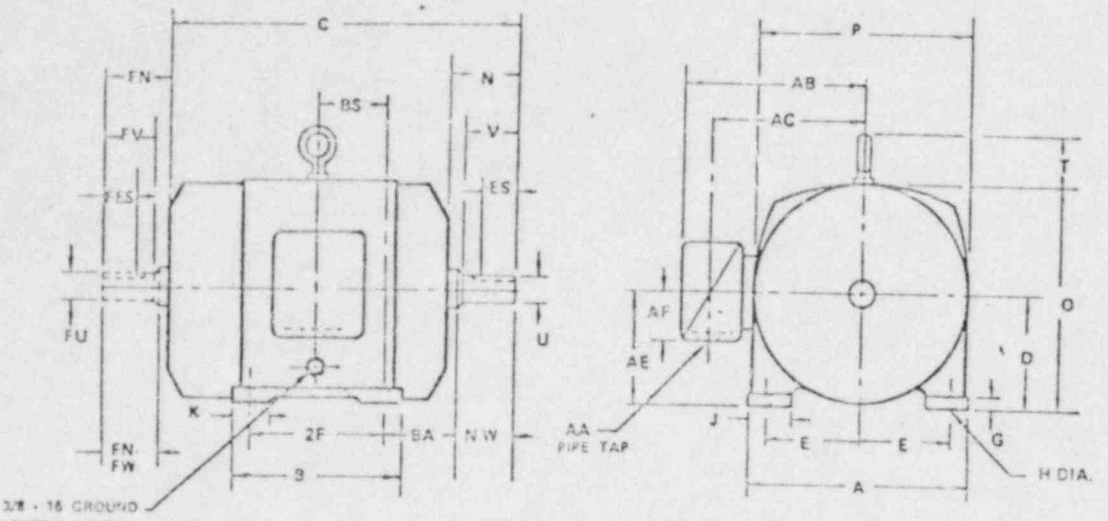
SQUIRREL-CAGE INDUCTION

ENCLOSURE: TOTALLY ENCLOSED COOLING: FAN COOLED

ONE SIZE LARGER CAST IRON CONDUIT BOX

MOUNTING: FOOT

FRAMES 140T THRU 440T



DIMENSIONS ARE IN INCHES

FRAME	A	D ②	E	G	H	J	O	P	AA	AB	AC	AF	BA	AE	K	T
182T - 184T	9.00	4.50	3.75	.44	.44	1.75	9.19	9.30	1	8.44	6.44	2.50	2.75	4.50	1.58	2.00
213T - 215T	10.50	5.25	4.25	.44	.44	2.00	10.69	10.63	1 1/4	10.15	7.75	3.00	3.50	5.25	1.78	2.00
254T - 256T	12.50	6.25	5.00	.62	.50	2.50	12.75	13.00	1 1/2	11.12	8.69	3.00	4.25	6.25	2.62	2.00
284T - 286TS	13.75	7.00	5.50	.62	.56	2.50	14.25	14.50	2	12.69	9.94	3.62	4.75	7.00	2.75	2.38
324T - 326TS	15.50	8.00	6.25	.62	.69	2.75	16.25	16.50	3	16.00	11.81	4.12	5.25	8.00	3.12	2.38
364T - 365TS	17.00	9.00	7.00	.83	.69	2.75	18.50	19.00	4	17.54	13.75	4.12	5.88	9.00	4.00	2.94
404T - 405TS	19.00	10.00	8.00	1.12	.81	3.25	21.31	21.75	4	15.78	15.00	4.12	6.62	10.00	3.25	2.94
444T - 445TS	21.00	11.00	9.00	1.12	.81	3.25	23.62	25.00	4	23.38	18.12	7.00	7.50	11.00	3.25	3.25
①																

FRAME	C	BS ④	B	2F	BACK END SHAFT AND KEYWAY					SQ	FRONT END SHAFT AND KEYWAY					SQ	WEIGHT
	TEFC				N	NW	U③	V	ES(MIN)	KEY	FN	FN-FW	FU③	FV	FES(MIN)	KEY	
182T	14.56	2.25	6.00	4.50	2.94	2.75	1.1250	2.50	1.78	.25	3.19	2.25	.8750	2.00	1.41	.19	65
184T	15.56	2.75	7.00	5.50	2.94	2.75	1.1250	2.50	1.78	.25	3.19	2.25	.8750	2.00	1.41	.19	85
213T	17.75	2.75	7.00	5.50	3.55	3.38	1.3750	3.12	2.41	.31	3.75	2.75	1.1250	2.50	1.78	.25	130
215T	19.25	3.50	8.50	7.00	3.56	3.38	1.3750	3.12	2.41	.31	3.75	2.75	1.1250	2.50	1.78	.25	140
254T	22.75	4.12	10.25	8.25	4.25	4.00	1.625	3.75	2.91	.38	4.62	3.38	1.3750	3.12	2.41	.31	210
256T	24.50	5.00	12.00	10.00	4.25	4.00	1.625	3.75	2.91	.38	4.62	3.38	1.3750	3.12	2.41	.31	230
284T	25.94	4.75	11.50	9.50	4.88	4.62	1.875	4.38	3.28	.50	5.50	4.00	1.625	3.75	2.91	.38	252
284TS	24.50	4.75	11.50	9.50	3.50	3.25	1.625	3.00	1.91	.38	4.75	3.25	1.625	3.00	1.91	.38	278
286T	27.44	5.50	13.00	11.00	4.88	4.62	1.875	4.38	3.28	.50	5.50	4.00	1.625	3.75	2.91	.38	330
286TS	25.06	5.50	12.00	11.00	3.50	3.25	1.625	3.00	1.91	.38	4.75	3.25	1.625	3.00	1.91	.39	328
324T	28.94	5.25	13.25	10.50	5.50	5.25	2.125	5.00	3.91	.50	6.12	4.62	1.875	4.38	3.28	.50	430
324TS	27.44	5.25	13.25	10.50	4.00	3.75	1.875	3.50	2.03	.50	5.25	3.75	1.875	3.50	2.03	.50	427
326T	30.44	6.00	14.75	12.00	5.50	5.25	2.125	5.00	3.91	.50	6.12	4.62	1.875	4.38	3.28	.50	433
326TS	28.94	6.00	14.75	12.00	4.00	3.75	1.875	3.50	2.03	.50	5.25	3.75	1.875	3.50	2.03	.50	477
364T	33.44	6.12	15.25	11.25	6.12	5.88	2.375	5.62	4.28	.62	6.50	4.62	1.875	4.38	3.28	.50	660
364TS	31.31	6.12	15.25	11.25	4.00	3.75	1.875	3.50	2.03	.50	5.62	3.75	1.875	3.50	2.03	.50	614
365T	33.44	6.12	15.25	12.25	6.12	5.88	2.375	5.62	4.28	.62	6.50	4.62	1.875	4.38	3.28	.50	700
365TS	31.31	6.12	15.25	12.25	4.00	3.75	1.875	3.50	2.03	.50	5.62	3.75	1.875	3.50	2.03	.50	674
404T	36.82	6.12	14.50	12.25	7.62	7.25	2.875	7.00	5.65	.75	8.00	5.25	2.125	5.00	3.91	.50	975
404TS	33.81	6.12	14.50	12.25	4.62	4.25	2.125	4.00	2.78	.50	7.00	4.25	2.125	4.00	2.78	.50	975
405T	38.31	6.88	16.00	13.75	7.62	7.25	2.875	7.00	5.65	.75	8.00	5.25	2.125	5.62	3.91	.50	1100
405TS	35.31	5.88	16.00	13.75	4.62	4.25	2.125	4.00	2.78	.50	7.00	4.25	2.125	4.50	2.78	.50	1100
444T	42.62	7.25	17.00	14.50	8.34	8.50	3.375	8.25	6.91	.88	6.88	5.88	2.375	5.62	4.28	.62	1350
444TS	38.88	7.25	17.00	14.50	5.19	4.75	2.375	4.50	3.03	.62	7.75	4.75	2.375	4.50	3.03	.62	1350
445T	44.62	8.25	19.00	16.50	8.94	8.50	3.375	8.25	6.91	.88	8.88	5.88	2.375	5.62	4.28	.62	1500
445TS	40.88	8.25	19.00	16.50	5.19	4.75	2.375	4.50	3.03	.62	7.75	4.75	2.375	4.50	3.03	.62	1500
①																	

(1) SPECIAL DIMENSIONS ON THIS LINE.

(2) "D" VARIES +.00, −.03.

(3) "U" & "FU" VARY UP TO 1.625 DIA. +.0000, −.0005. 1.625 AND LARGER +.000, −.001.

(4) CENTERLINE OF FOOT MOUNTING HOLE TO CENTERLINE OF TERMINAL HOUSING.

CONDUIT BOX LOCATED ON OPPOSITE SIDE WHEN F-2, W-1, W-4, W-5, W-7 OR C-1 MOUNTING IS SPECIFIED.

STANDARD DOUBLE SHAFT SUPPLIED ONLY WHEN SPECIFIED.

IF MOUNTING CLEARANCE DETAILS ARE REQUIRED, CONSULT FACTORY.

MAXIMUM PERMISSIBLE SHAFT RUNOUT WHEN MEASURED AT END OF STD. SHAFT EXTENSION IS .002 T.I.R. UP TO AND INCLUDING 1.625 DIA. AND .003 T.I.R. 1.625 TO 5 INCH DIA.

FRAME-________ TYPE-________ CERTIFIED FOR-________

ORDER-________ ITEM-________ HP-________ RPM-________ PH-________ HZ-________ VOLTS-________

RELIANCE SALES ORDER-________ APPROVED BY-________ DATE-________

RELIANCE ELECTRIC COMPANY
CLEVELAND, OHIO 44117 U.S.A.

DIMENSION SHEET 602531-682

APRIL 27, 1976

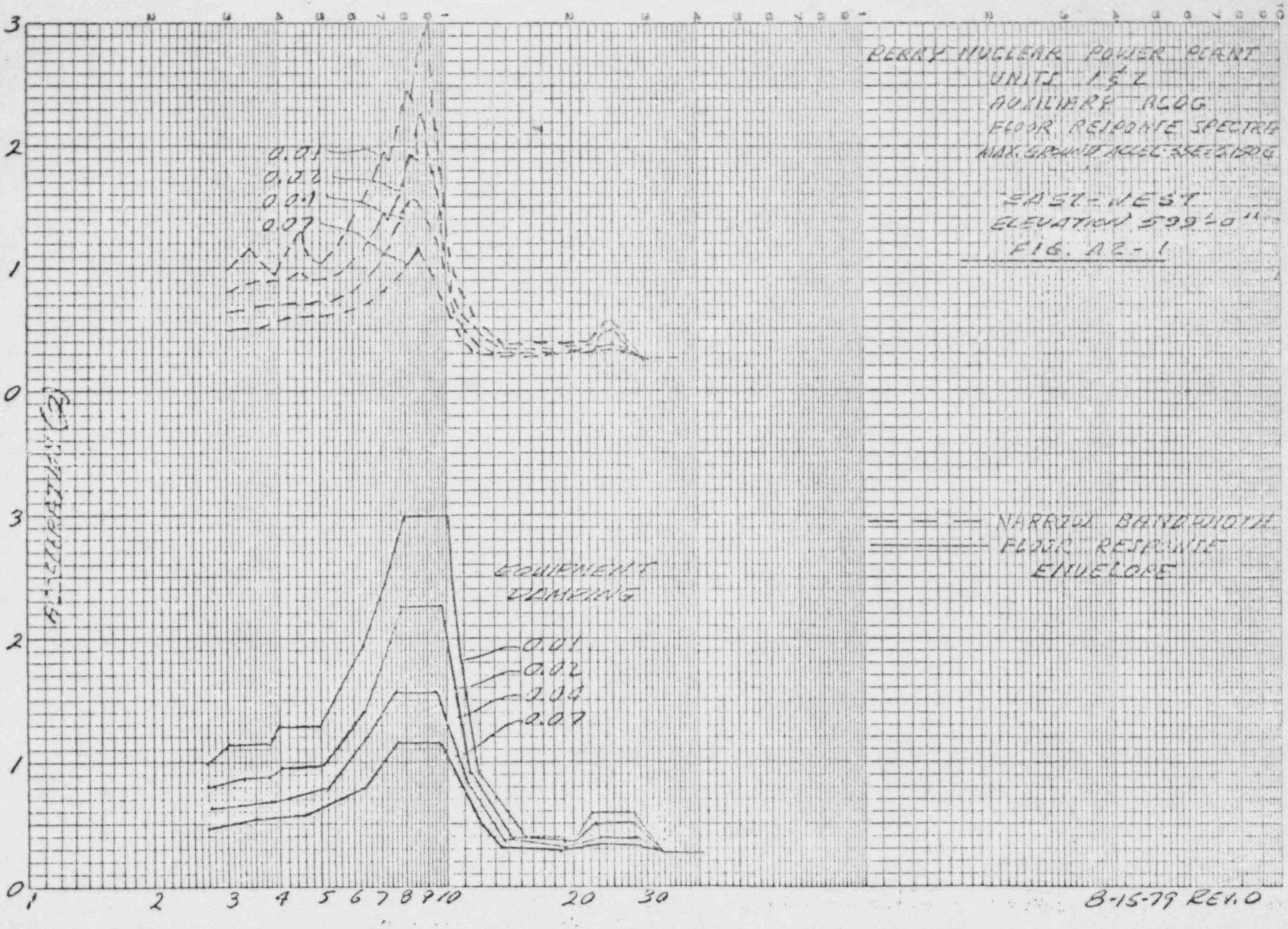
C-R 202936 DR. WST CK. AF APP. AF

Attachment # 3'''

These motors are mounted to the air handling units (1&2 M39-B004) that were analyzed to have natural frequencies below 33 Hz in the motor hold down brackets. The analysis in the Seismic Qualification Report (#77-A-34), assumed that the motors would be rigidly mounted and used a 0.3 g ZPA at 1% Damping. Since the motors are rigidly attached to the brackets, the 0.3g input had to be increased to the "g" level at the corresponding bracket natural frequency for the input to the motors. Also, to add more conservatism to the analysis, the RRS curves (A2) of the floor above 574'-10", elevation 599'-0", were used. This analysis is shown in Tab 4 of the AFP under "Supporting Calculations". The results of the analysis showed that there is still ample stress and deflection margin to qualify the equipment.

SEE p3,4,5&6 of 6

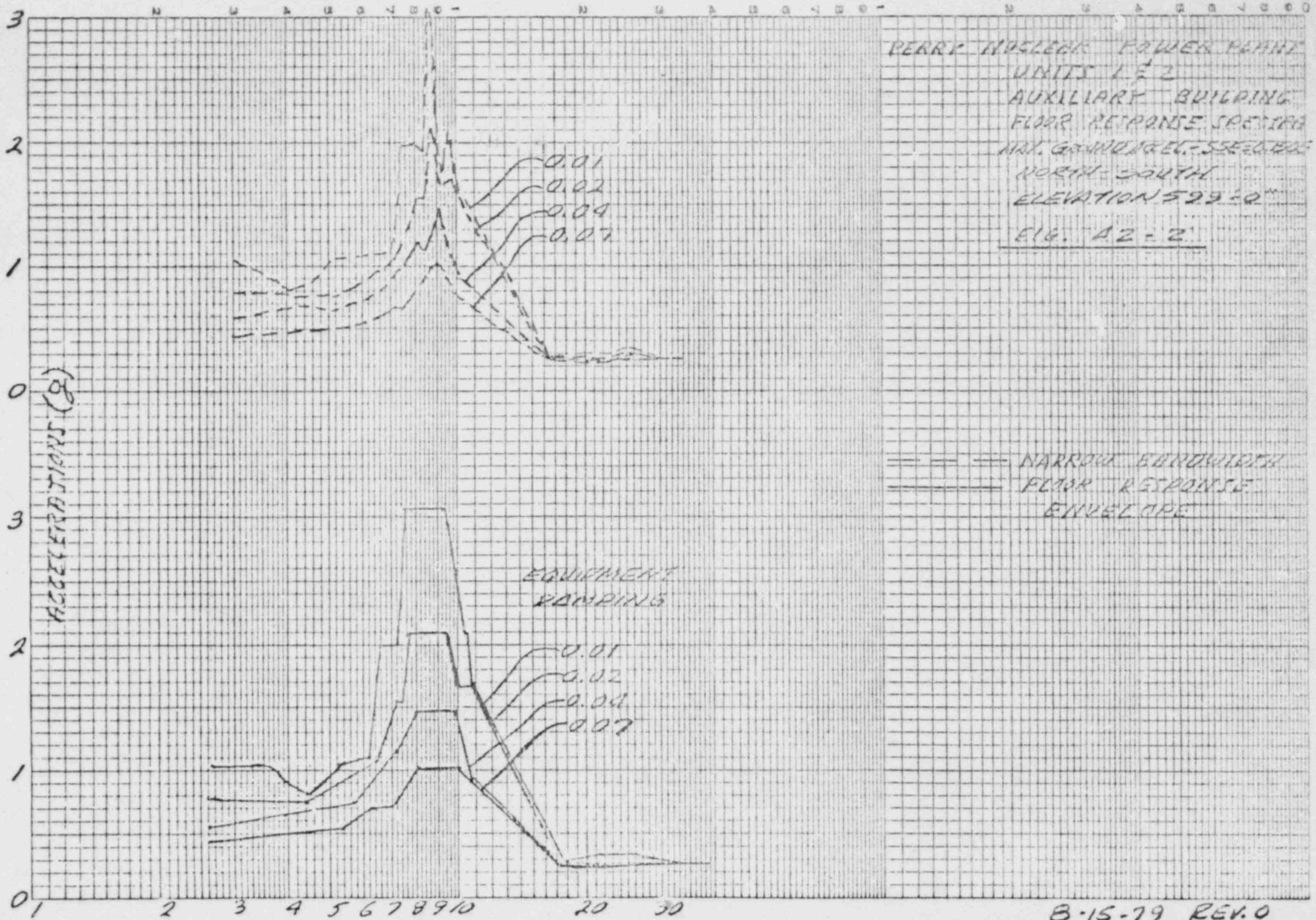
RAH. 2.28.84



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL.=SSE=0.15G

EAST-WEST
ELEVATION 599'-0"
FIG. A2-1

8-15-79 REV. 0

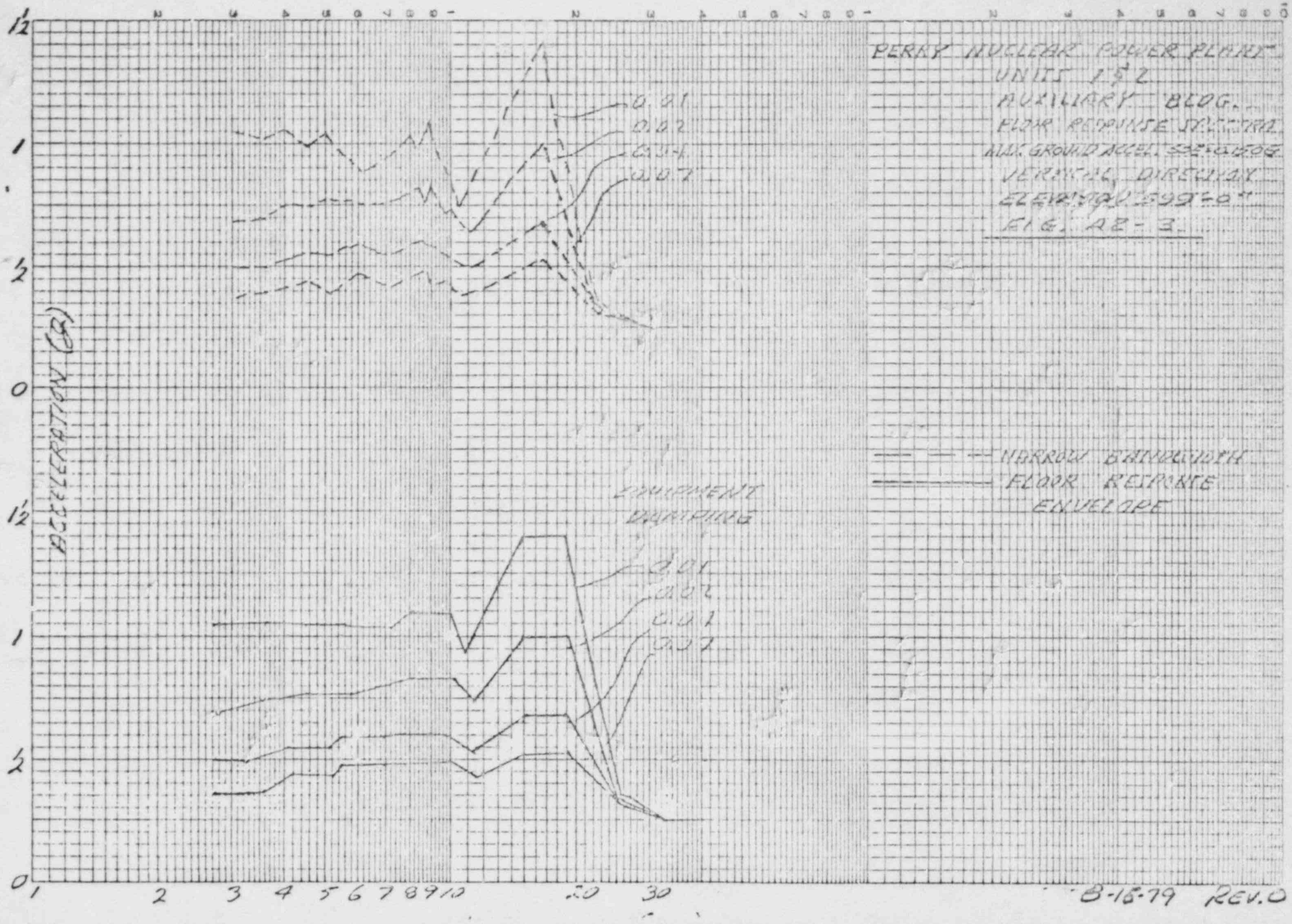


PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BUILDING
FLOOR RESPONSE SPECTRA
MAX. GRND ACCEL.-SSE-0.15G
NORTH-SOUTH
ELEVATION 599'-0"

FIG. A2-2

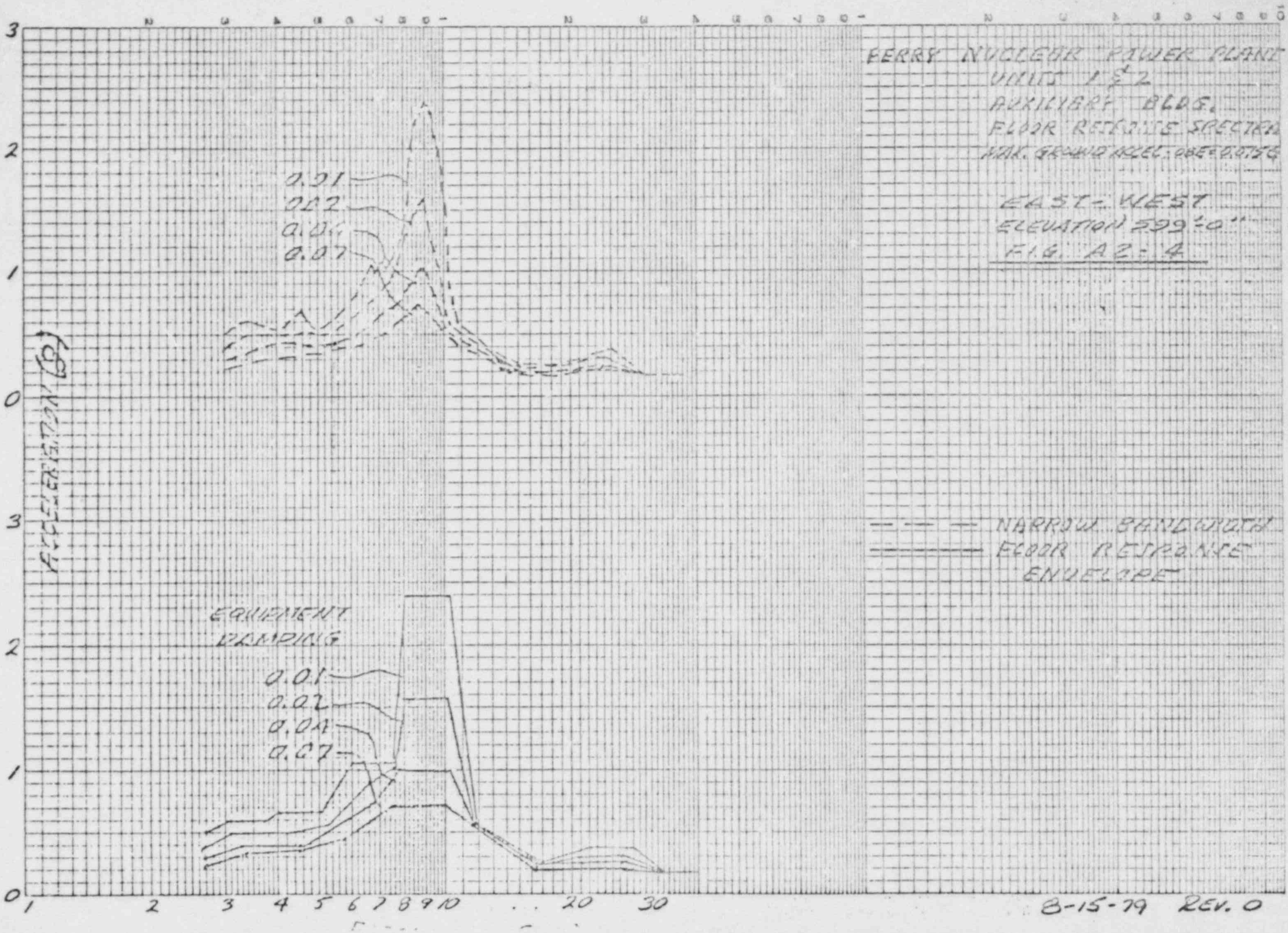
— — — NARROW BANDWIDTH
——— FLOOR RESPONSE
ENVELOPE

8-15-79 REV. 0



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. SSE=0.15G
VERTICAL DIRECTION
ELEVATION 599'-0"
FIG. AE-3

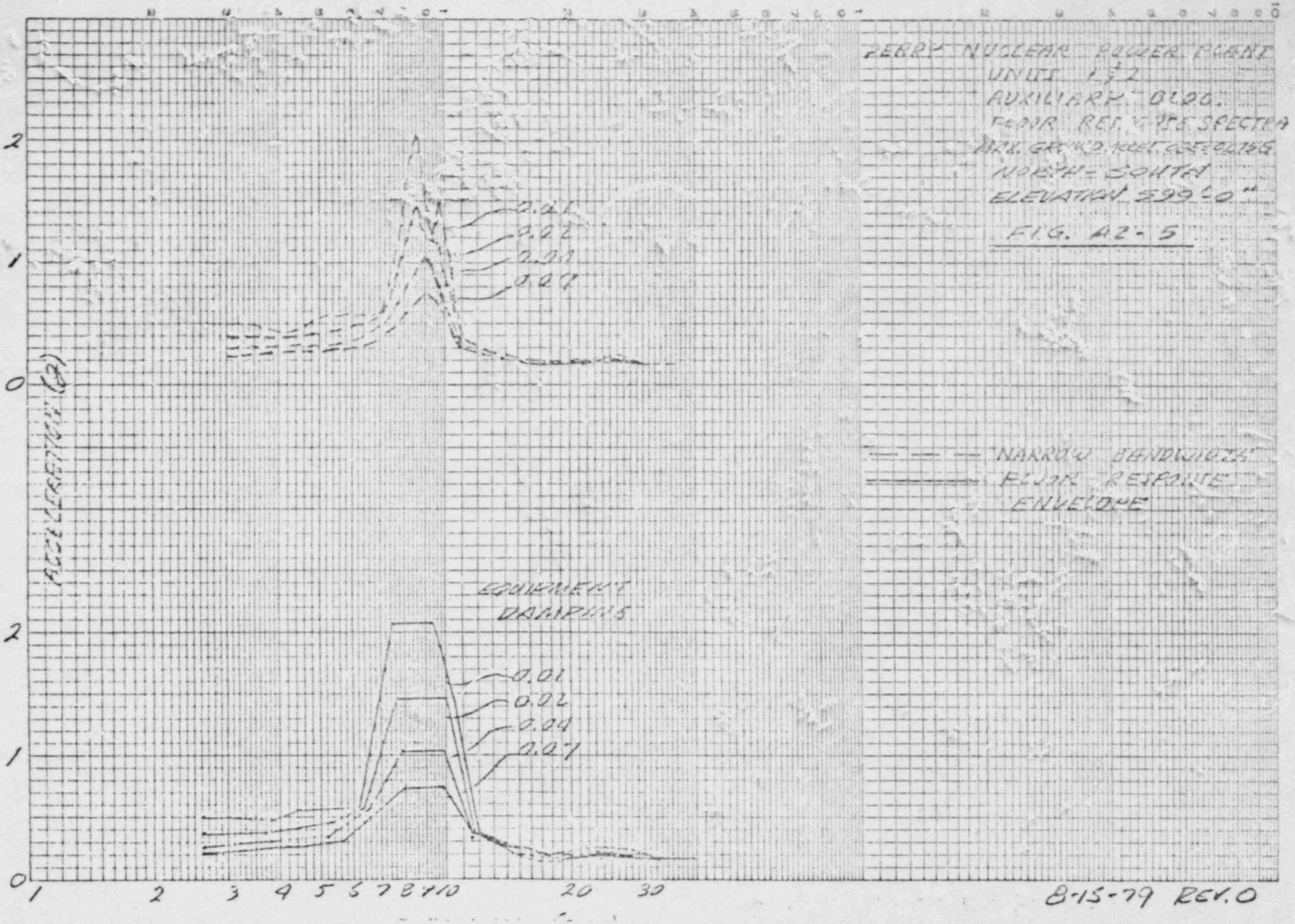
8-15-79 REV.0



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL: OBE=0.075G

EAST-WEST
ELEVATION 599'-0"
FIG. A2-4

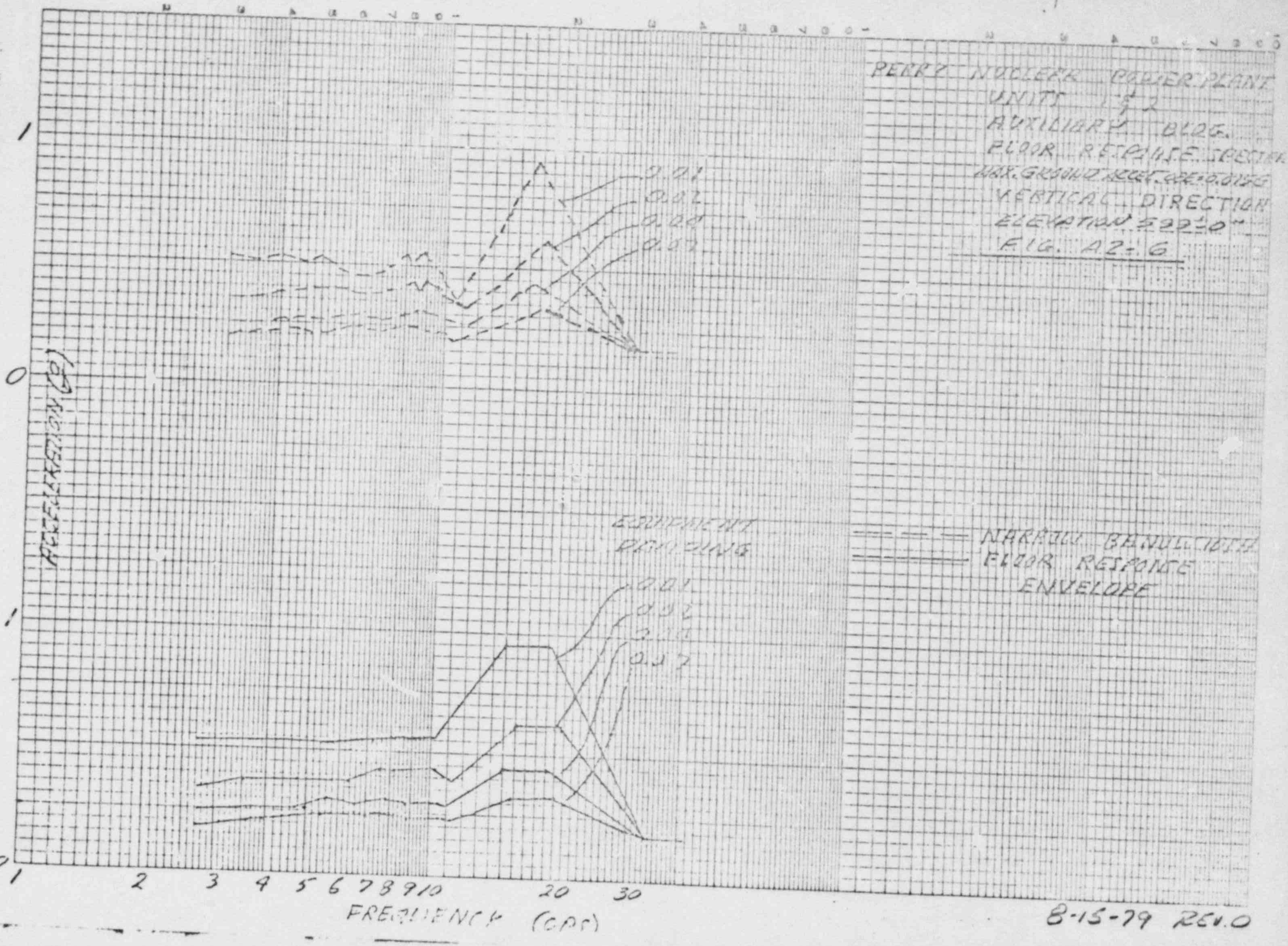
8-15-79 REV. 0



PERRY NUCLEAR POWER PLANT
UNIT 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. = 0.15G
NORTH - SOUTH
ELEVATION 599'-0"

FIG. A2-5

8-15-79 REV. 0



PERRY NUCLEAR POWER PLANT
UNIT 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. = 0.15G
VERTICAL DIRECTION
ELEVATION 599'-0"
FIG. A2-6

8-15-79 REV.0

SGRT 678-3

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

MPL # 1M51 S0001
1M51 S0002

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: POWER SUPPLY PANEL

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: N/A Quantity: 2
3. Size or Range: 75 kw (MAX. POWER)
4. Vendor: WESTINGHOUSE
5. If the component is a cabinet or panel, name and model Number of the devices included:
   WESTINGHOUSE DT-3 ISOLATION TRANSFORMER, EHR SCR PANEL HALMAR NO. 5201 — p1-9 HYDROGEN RECOMBINER TECHNICAL MANUAL
   WESTINGHOUSE AUXILIARY TRANSFORMER NO. 1F0791, WESTINGHOUSE MAGNETIC CONTACTOR TYPE A201
6. Physical Description:
   a. Appearance: STANDARD AMCO INSTRUMENT RACK
   b. Dimensions: LENGTH 61" WIDTH 34 5/16" DEPTH 23 1/2" — p1-11/1-12 HYDROGEN RECOMBINER TECHNICAL MANUAL
   c. Weight: 950 lbs
7. Location: Building: CONTROL BUILDING — GAI DWG. E-001-033
   Elevation: 620'-6"
8. Field Mounting Conditions ☒ Bolt (No. 8, Size 3/4")
   ☐ Weld (Length ______)
   ☐ ______
9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   FLOOR
10. a. System in which located: COMBUSTIBLE GAS CONTROL
    b. Functional Description: SUPPLIES POWER TO HYDROGEN RECOMBINER
    c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
       ☐ Both ☐ Neither ☒ Other POST LOCA

SQRT 628-3

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP-750-4549-00 SP-628-4549-00

[✓ a.] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

[✓ e.] Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: ELECTRIC HYDROGEN RECOMBINER

(No., Title and Date): WCAP 7709L AND SUPPLEMENTS 1-7

Company that Prepared Report: WESTINGHOUSE

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE 323-1974 IEEE 344-1975

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☒ SRSS ☐ ______ (other, specify)

3. Required Response Spectra ** (attach the graphs): ATTACHED

NOTE:

**If more than one report complete Items IV thru VII for each report.*

***If other than RRS is used, describe method.*

SQRT 628-3

4. Damping Corresponding to RRS: OBE 2% SSE 2%

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other MAX. G
(specify)

OBBA or [✓ OBE] S/S = 2.5 F/B = 2.55 V = 0.85

SSBA or [✓ SSE] S/S = ~~2.8~~ 3.4 F/B = ~~2.7~~ 3.2 V = ~~1.1~~ 1.3

SEE ATTACHED RRS CURVES

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program: N/A

VI IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☐ Single Axis ☐ Independent Axis ☒ Multi-Axis ☐ In-phase motions

p 3 WCAP 7709L SUPPLEMENT 7

, SEE ATTACHMENT A & p 3 WCAP 7709L SUPPLEMENT 7

3. Number of Qualifications Tests:

OBE 5 SSE 0 Other BIAXIAL SINE BEAT PREFORMED AT EACH RESONANCE FREQUENCY AND AT THE FOLLOWING FREQUENCIES 1.25, 1.75, 2.5 3.5, 5, 7, 9.5, 13, 18, 24.5, AND 33.5 HZ EACH SINE BEAT CONSISTED OF FIVE BEATS EACH CONTAINING TEN CYCLES.
(specify)

p 3 WCAP 7709L SUPPLEMENT 7

4. Frequency Range: ~~1~~ 1.25 - 35 HZ

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): Between 1.25 - 35 Hz

S/S = NONE F/B = 3.5 & 12.0 V = NONE

6. Method of Determining Natural Frequencies

☒ Lab Test ☐ In-Situ Test ☐ Analysis

p4 WCAP 7709L SUPPLEMENT 7

7. TRS enveloping RRS using Multi-Frequency Test

☒ Yes (Attach TRS and RRS graphs)

☐ No

SQRT 628-3

8. Maximum Input g Level Test:

OBBA or [✓ OBE] S/S = 8.0 F/B = 8.0 V = 5.3 SEE ATTACHED TRS CURVE

SSBA or [✓ SSE] S/S = 8.0 F/B = 8.0 V = 5.3

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size ____)

☐ Weld (Length _____) ☒ 8- 1/2" SOCKET HEAD CAP SCREWS SEE NOV. 9, 82 TELECON IN SECTION G

b. Orientation and Fixturing: MOUNTED ON DRIVE PLATE OF THE VIBRATION TABLE p 3 WCAP-7709 SUPPLEMENT

10. Functional operability verified:

☒ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: EACH TEST SHOWED THE EQUIPMENT TO BE IN OPERATING CONDITION p 3 WCAP 7709L SUPPLEMENT

12. Other tests performed (such as aging or fragility test, including results):

THERMAL AGING

13. Failure Modes (If appropriate) N/A

14. Margins Available: ☒ Input Spectrum ☐ Fragility SEE ATTACHED TRS AND RRS CURVES

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = ______ F/B = ______ V = ______

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ______

4. ☐ Computer Codes: ______________________________

Frequency Range and No. of Modes

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☐ Other: ____________________ (specify)

6. Damping:

OBE ______________ SSE ____________ 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 Allowable

b. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ______________________________

10. Margins Available: ☐ Input Spectrum ☐ Stress or Deflection

REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/	/	/	
	/	/	/	
	/	/	/	

Sp 628
REVIEWED BY / 11-12-82
CHECKED BY D. J. Zahorski / 11-23-82
APPROVED BY tp / 12/5/83

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT TESTING PERFORMED ON CONTROL PANEL AND POWER SUPPLY		CISID SQRT 628-3		PAGE 1 OF PAGES 1
	REV. 0	1	2	3	
	MICROFILMED				
	ORIGINATOR J S Smith				
	DATE 7-14-83				

ATTACHMENT A

Explaination of Testing Performed

The power supply and control panel which had previously undergone single-axis sine-beat testing while in the nonenergized mode, (reported in WCAP 7709-L Supplement 2), was subjected to an additional test series consisting of a resonance frequency search plus five OBE's followed by an SSE. The input for the five OBE's was a biaxial, random frequency while the SSE was a biaxial, sine beat input.

While a sine beat input is not preferable for supporting qualification it should be noted the TRS for the OBE envelopes the SSE RRS. As a result the SQRT forms have been filled out with the sine beat SSE described under "other" (page 3 item 3), and a zero entered under SSE.

GAI believes the five OBE tests, which envelope the SSE requirements, plus the sine beat tests performed under WCAP 7709L Supplement 2 & 7 provide adequate evidence of qualification.

Gilbert Associates, Inc.
Reading, Pennsylvania
CALCULATION

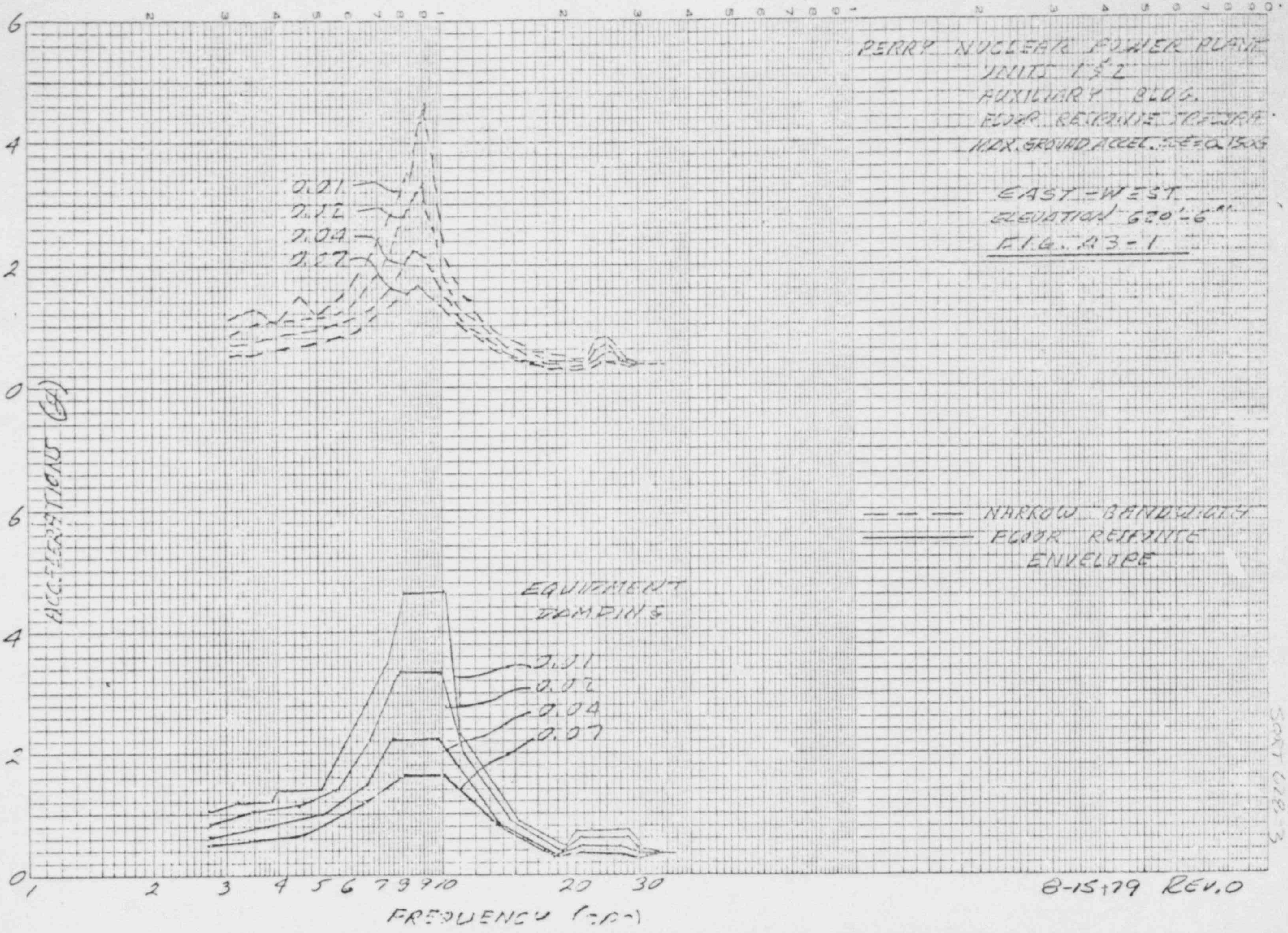
SUBJECT IN-TEST MODIFICATIONS			CISID SQRT 628-3		PAGE 1 OF PAGES 1
REV.	0	1	2	3	
MICROFILMED					
ORIGINATOR	J S Smith				
DATE	7-14-83				

ATTACHMENT B

IN-TEST MODIFICATIONS
WCAP 7709L SUPPLEMENT 7
SEISMIC TESTS OF POWER SUPPLY AND
CONTROL PANEL TO IEEE 344-1975

The sine beat test was run four times. (Once for each equipment mounting direction) without component failure. It was necessary to add one wiring harness strap and to modify the temperature indicator mounting bracket early in the sine beat test, however, a total of four consecutive test were run with the equipment in its final configuration.

GAI contacted W to ensure that the above modifications had been incorporated into the control panel and power supply supplied to CEI. W confirmed that the modifications were made.

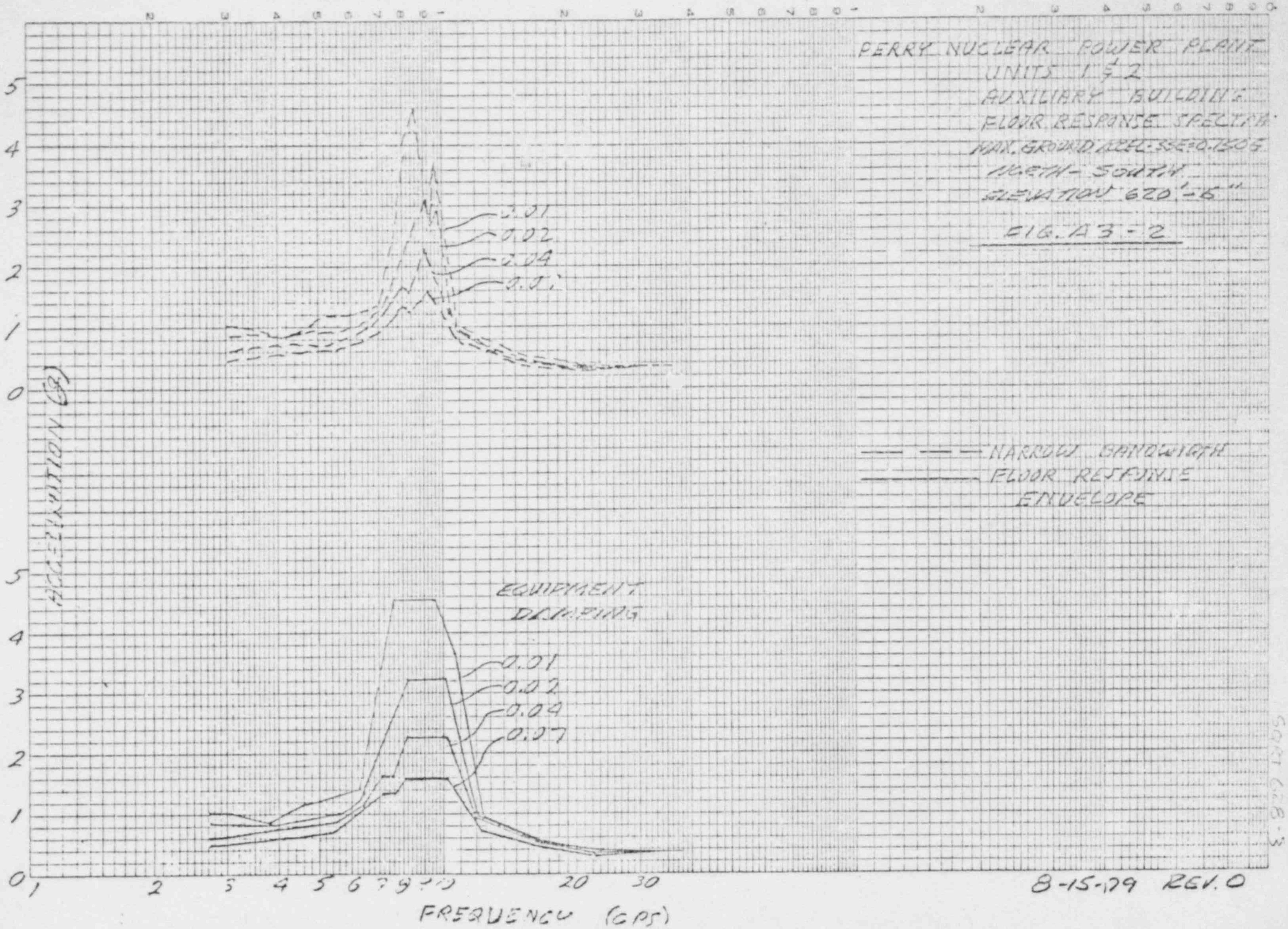


PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. SSE=0.15g

EAST-WEST
ELEVATION 620'-6"
FIG. A3-1

8-15-79 REV.0

SORT 628-3

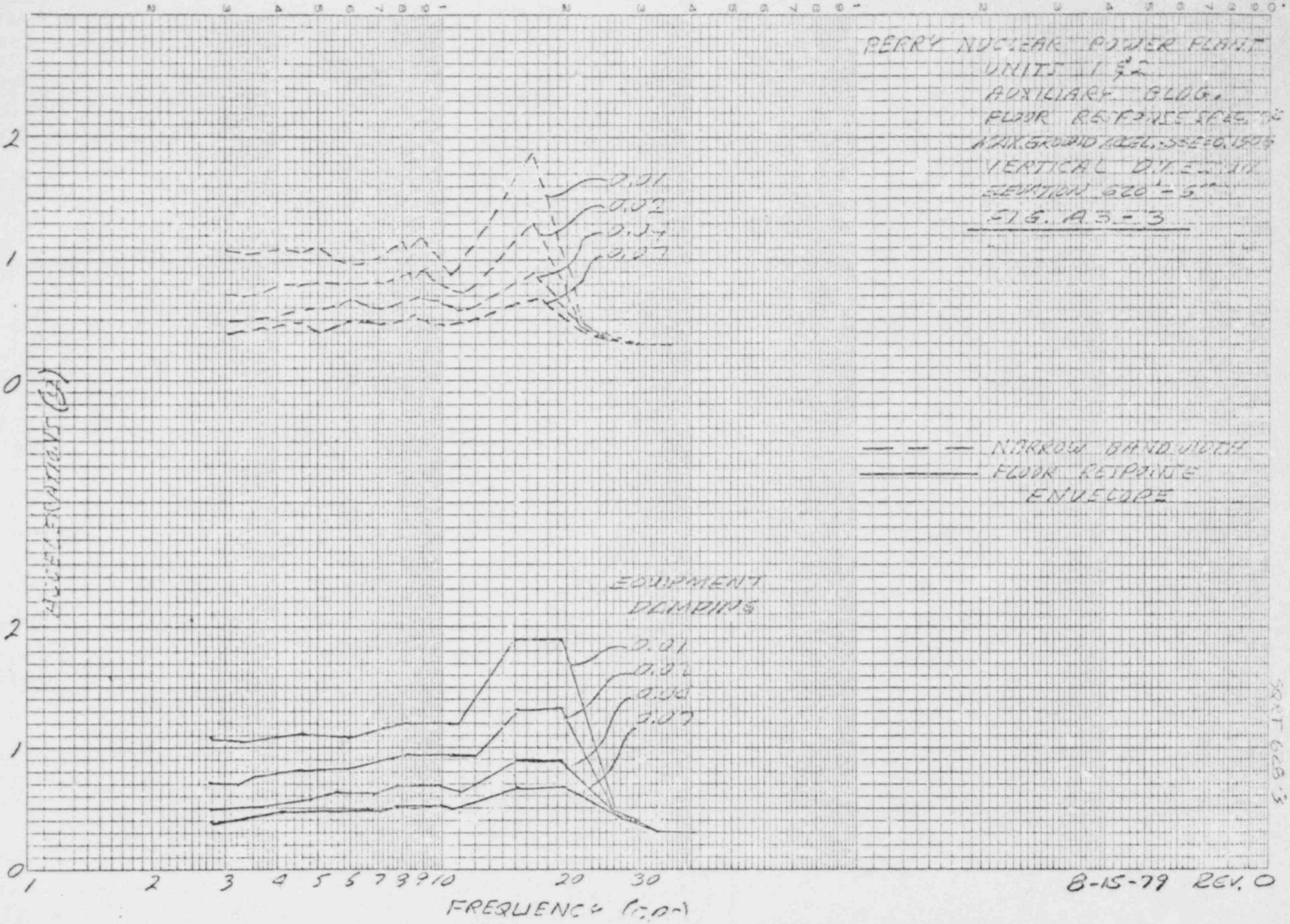


PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BUILDING
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL: SSE=0.150G
NORTH - SOUTH
ELEVATION 620'-6"

FIG. A3 - 2

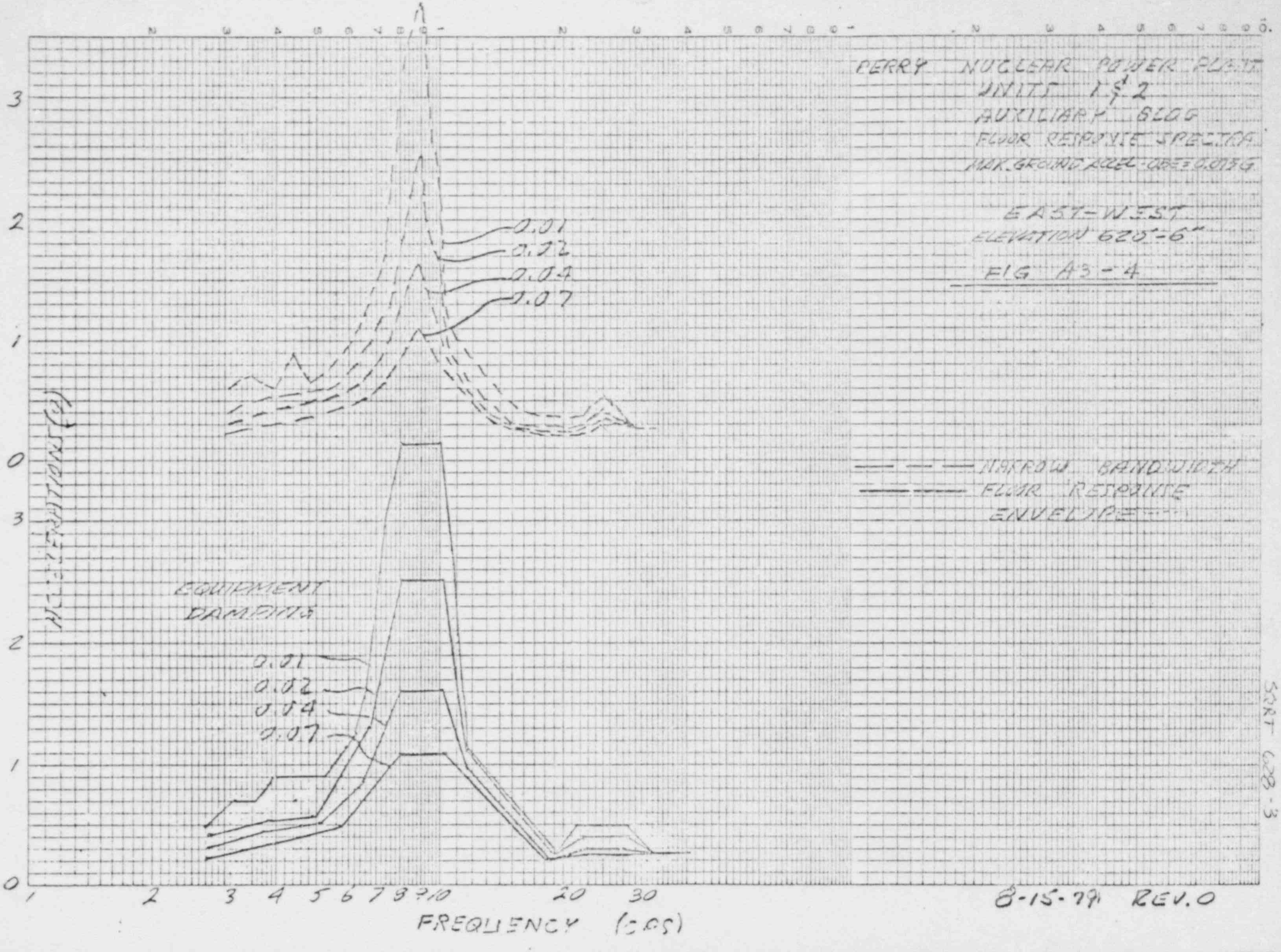
8-15-79 REV. 0

SQRT 628-3



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL. SSE=0.15g
VERTICAL DIRECTION
ELEVATION 620'-5"
FIG. A3-3

8-15-79 REV. 0



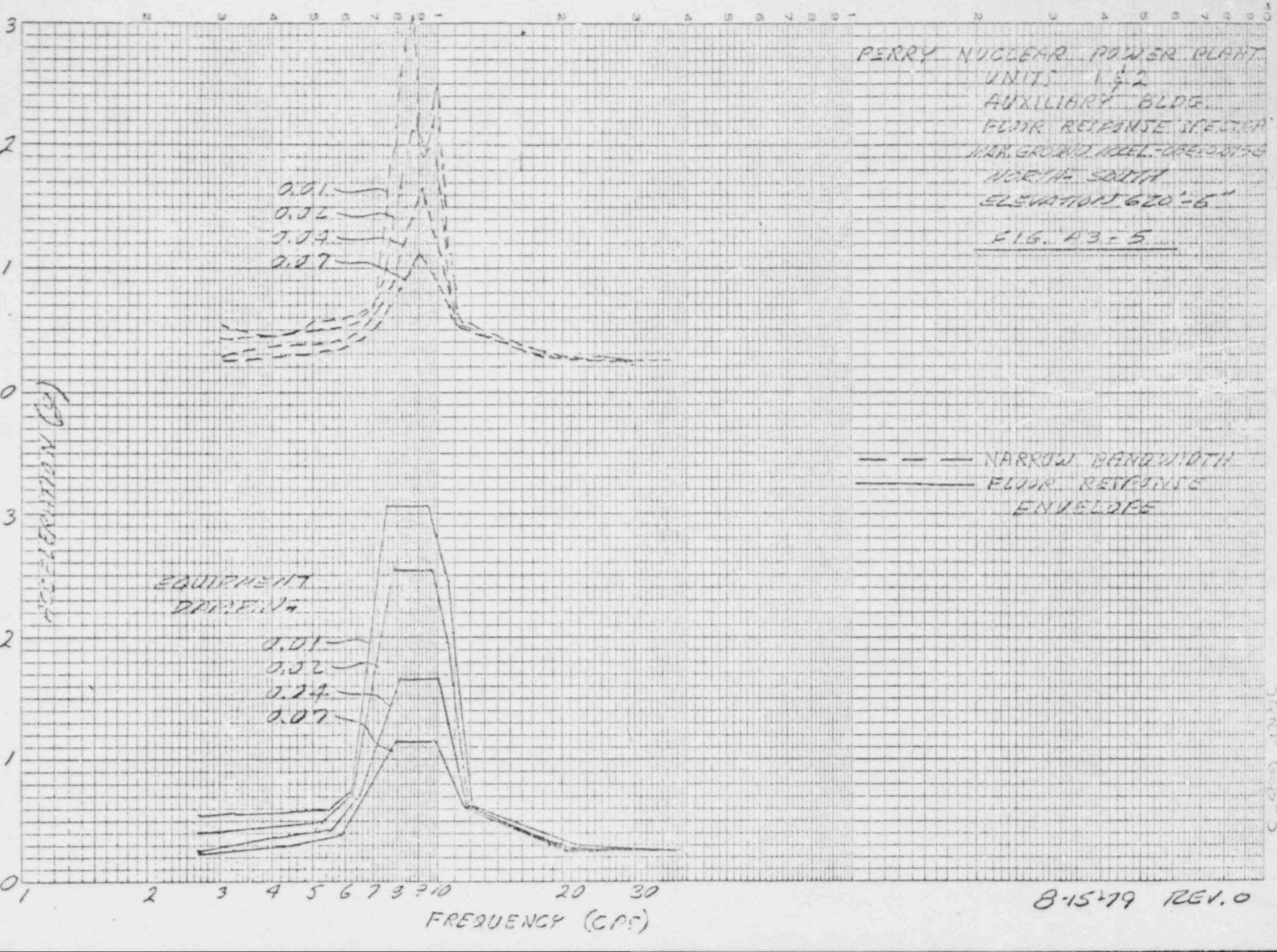
PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL - OBE = 0.015G

EAST-WEST
ELEVATION 620'-6"

FIG A3-4

8-15-79 REV. 0

SQRT 628-3

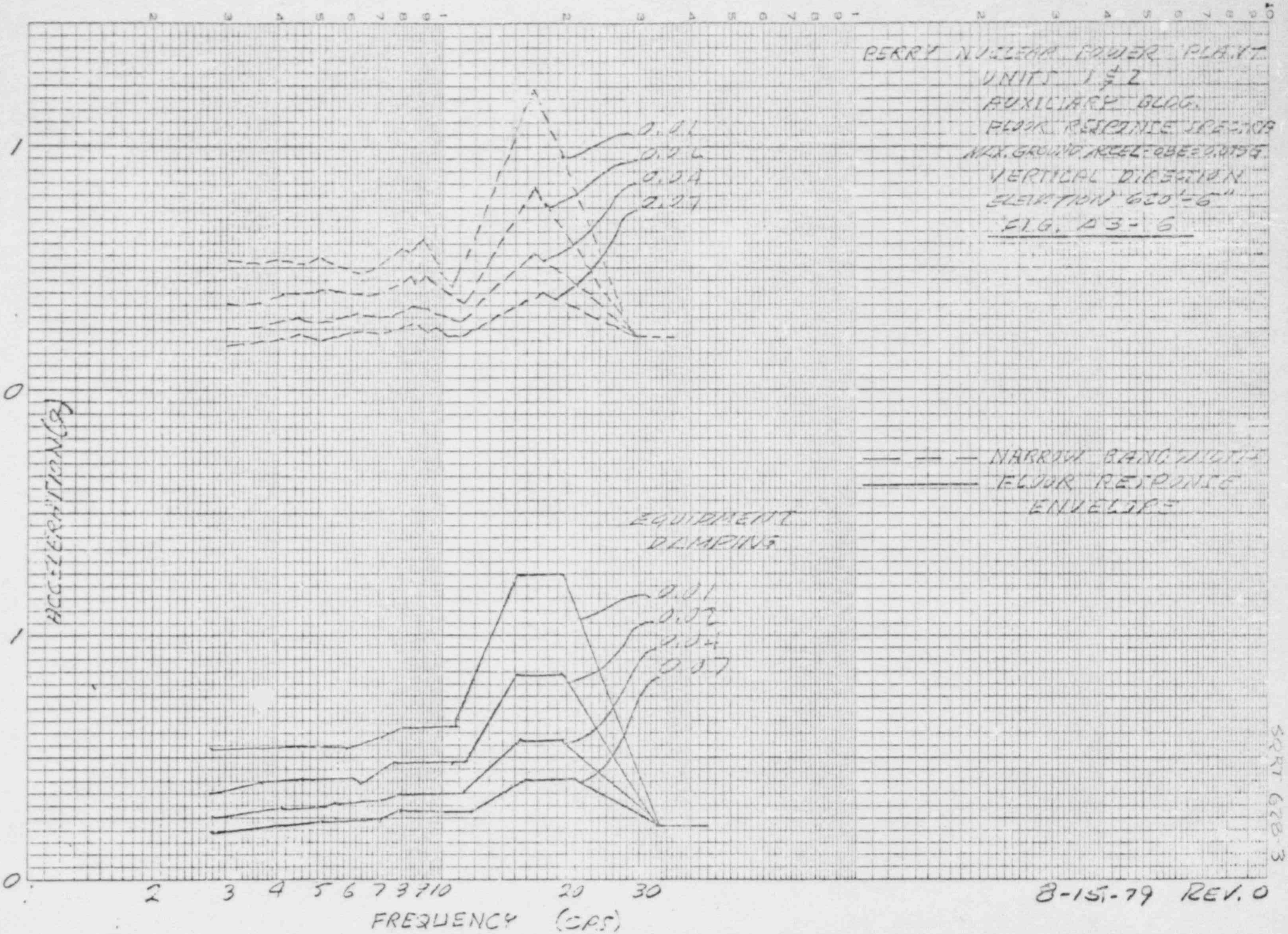


PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL.-OBE=0.075G
NORTH-SOUTH
ELEVATION 620'-6"

FIG. A3-5

8-15-79 REV. 0

SGRT-668-3



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
AUXILIARY BLDG.
FLOOR RESPONSE SPECTRA
MAX. GROUND ACCEL = OBE = 0.075G.
VERTICAL DIRECTION
ELEVATION 620'-6"
FIG. A3-6

8-15-79 REV. 0

SRRT 628-3

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

MPL# 0C41N0415A
0C41N0415B

I. PLANT NAME: PERRY NUCLEAR POWER PLANT — TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING — PWR: ______
2. NSSS: GENERAL ELECTRIC — BWR: X
3. A/E: GILBERT/COMMONWEALTH — Other ______

II. COMPONENT NAME: LEVEL SWITCH

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: 580A-1 — Quantity: 2
3. Size or Range: 0-30" H_2O
4. Vendor: ITT BARTON
5. If the component is a cabinet or panel, name and model Number of the devices included:
   N/A
6. Physical Description:
   a. Appearance: SEE ATTACHMENT
   b. Dimensions: 7"x6"
   c. Weight: 17 lbs
7. Location: Building: INT. BLDG
   Elevation: 620'
8. Field Mounting Conditions
   ☒ Bolt (No. 4, Size 5/16"ϕ)
   ☐ Weld (Length ______)
   ☐ ______
9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   MOUNTED ON POST ATTACHED TO FLOOR
10. a. System in which located: STAND BY LIQUID CONTROL
    b. Functional Description: SURGE TANK PUMP INTERLOCK INDICATING INSTRUMENT
    AUX MIXING TANK LEVEL INDICATOR
    c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
    ☐ Both ☒ Neither ☒ Other POST. LOCA

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP-598

[✓ a] Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

[✓ d.] Service Conditions

e. Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: ITT BARTON QUALIFICATION REPORT No. R3-580A-9 &

(No., Title and Date): VOLS 1,2,3, &4 DATED 12/23/83 99Q-689-2-0 (TAB C) AS SUPPLEMENT

Company that Prepared Report: ITT BARTON

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE 344-1975

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☐ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☒ SRSS ☐ —
(other, specify)

3. Required Response Spectra ** (attach the graphs): IB4 (-1 THRU -C)

NOTE:

**If more than one report complete Items IV thru VII for each report.*

***If other than RRS is used, describe method.*

4. Damping Corresponding to RRS: OBE 2% SSE 2%

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other Peak
(specify)

OBBA or [✓ OBE] S/S = 1.08g F/B = 2.0g V = 2.0g

SSBA or [✓ SSE] S/S = 1.75g F/B = 2.64g V = 3.25g

6. Were fatigue effects considered:

☐ Yes ☒ No

If yes, describe how they were treated in overall qualification program:

VI. IF QUALIFICATION BY TEST, THEN COMPLETE: (DETAILS ON R3-580A-9 p. IV-113 to end of Vol 2)

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

2. ☐ Single Axis ☒ Multi-Axis
☒ Independent Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE 5 SSE 1 Other
(specify)

4. Frequency Range: 1-100 Hz Appx IV Section B, 6

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): NOT MONITORED

S/S = — F/B = — V = —

6. Method of Determining Natural Frequencies N/A

☐ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☒ Yes (Attach TRS and RRS graphs)

☐ No

8. Maximum Input g Level Test: FIG. 10.37 FIG. 10.25 FIG 10.26

OBBA or [✓ OBE] S/S = 9.38 F/B = 9.89 V = 10.88

SSBA or [✓ SSE] S/S = 9.11 F/B = 9.11 V = 11.88

FIG. 10.47 FIG. 10.35 FIG. 10.36

9. Laboratory Mounting:

a. ☒ Bolt (No. 4, Size 5/16) SEC. 4 OF THE PACKAGE

☐ Weld (Length ______) ☐ ____________

b. Orientation and Fixturing: SEE ATTACHED PHOTO

10. Functional operability verified:

☒ Yes ☐ No ☐ Not Applicable P-15 R3-SPOA-9 pag IV-133 RAS 7-18-84

11. Test Results including modifications made: N/A

12. Other tests performed (such as aging or fragility test, including results):

AGING, RADIATION AND LOCA TEST

13. Failure Modes (If appropriate) FAILURE TO FUNCTION

14. Margins Available: ☒ Input Spectrum ☐ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = ____________ F/B = ____________ V = ____________

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ____________

4. ☐ Computer Codes: ________________

Frequency Range and No. of Modes

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☐ Other: ________________ (specify)

6. Damping:

OBE ________ SSE ________ 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 Allowable

b.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ________________

10. Margins Available: ☐ Input Spectrum ☐ Stress or Deflection

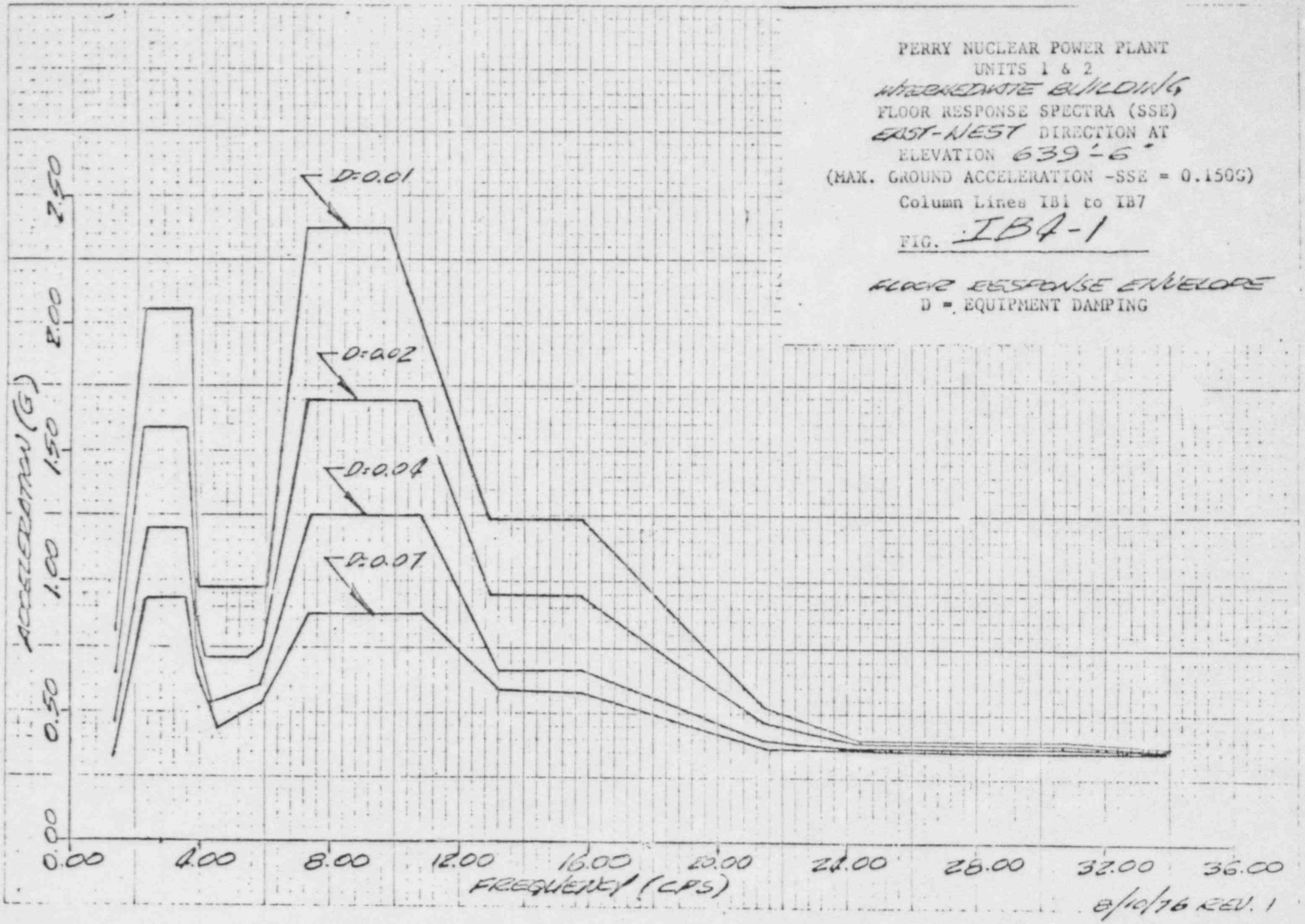
REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED

REVIEWED BY M. GABALLA 4-24-84

CHECKED BY J. D. Caherly 05/07/84

APPROVED BY DA Peter 7-23-84

RAS 7-23-84



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
INTERMEDIATE BUILDING
FLOOR RESPONSE SPECTRA (SSE)
EAST-WEST DIRECTION AT
ELEVATION 639'-6"
(MAX. GROUND ACCELERATION -SSE = 0.150G)
Column Lines IB1 to IB7

FIG. IB4-1

FLOOR RESPONSE ENVELOPE
D = EQUIPMENT DAMPING

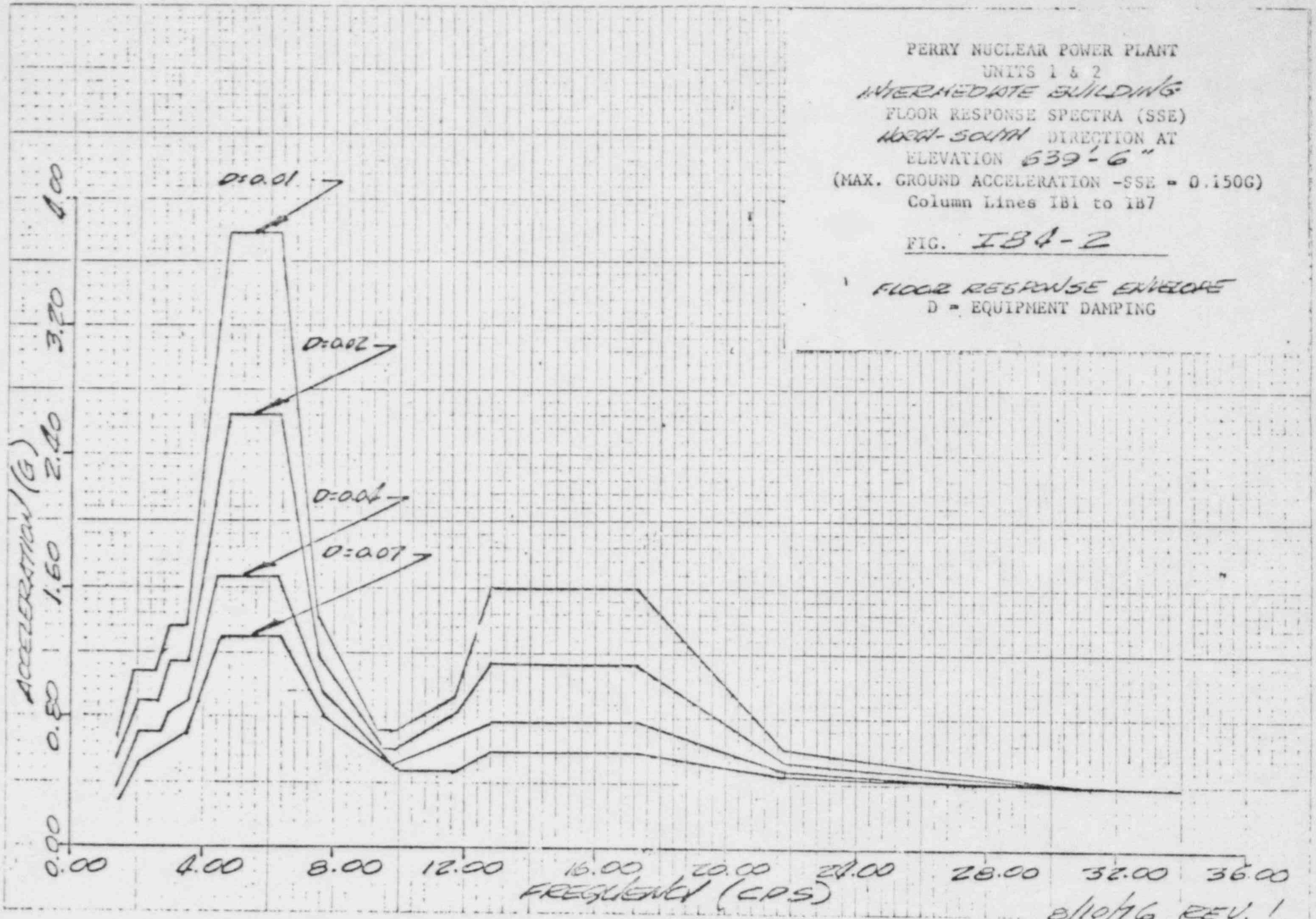
8/10/76 REV. 1

12/1/80 Rev. 2

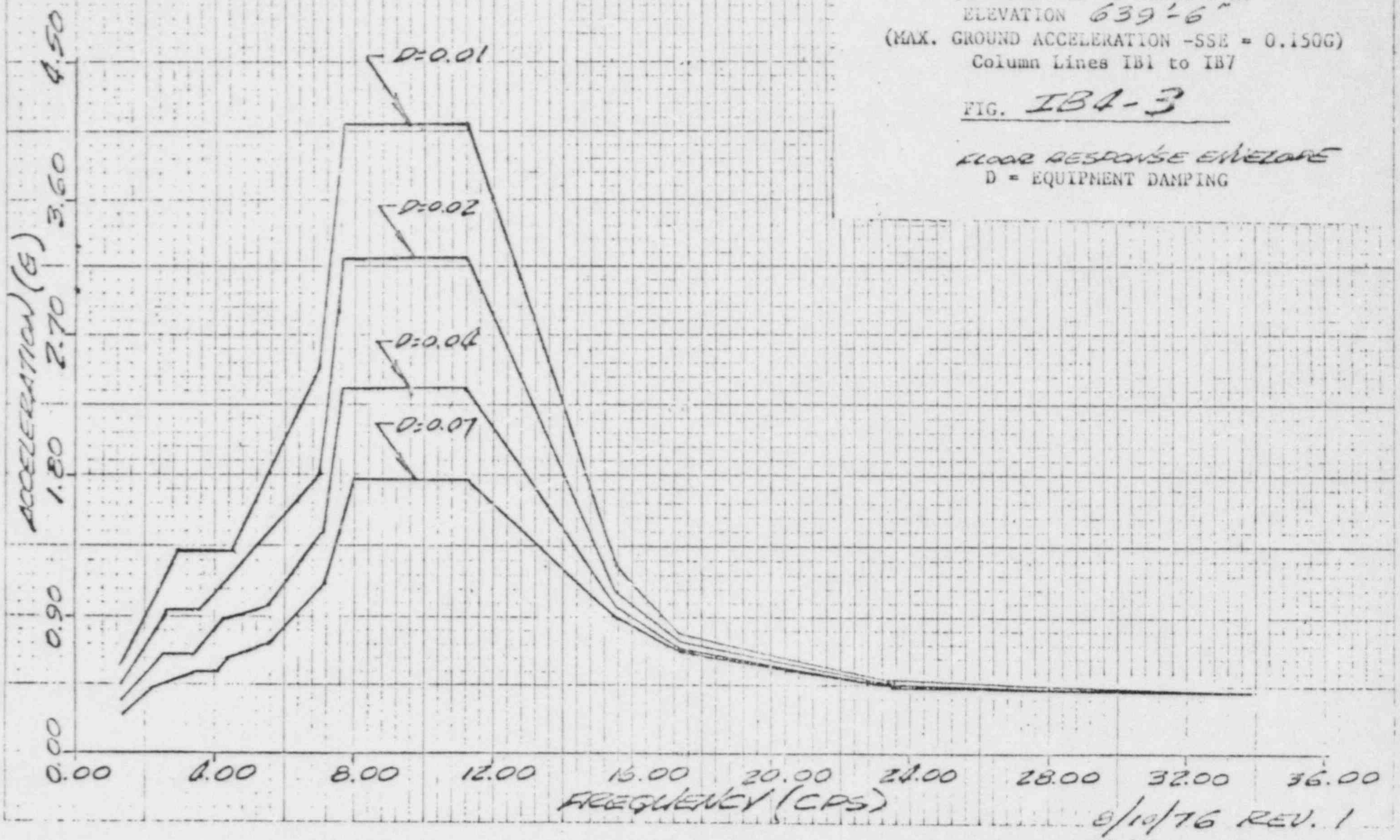
PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
INTERMEDIATE BUILDING
FLOOR RESPONSE SPECTRA (SSE)
NORTH-SOUTH DIRECTION AT
ELEVATION 639'-6"
(MAX. GROUND ACCELERATION -SSE = 0.150G)
Column Lines IB1 to IB7

FIG. IB4-2

FLOOR RESPONSE ENVELOPE
D = EQUIPMENT DAMPING



8/10/76 REV. 1
12/1/80 Rev. 2



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
INTERMEDIATE BUILDING
FLOOR RESPONSE SPECTRA (SSE)
VERTICAL DIRECTION AT
ELEVATION 639'-6"
(MAX. GROUND ACCELERATION -SSE = 0.150G)
Column Lines IB1 to IB7

FIG. IB4-3

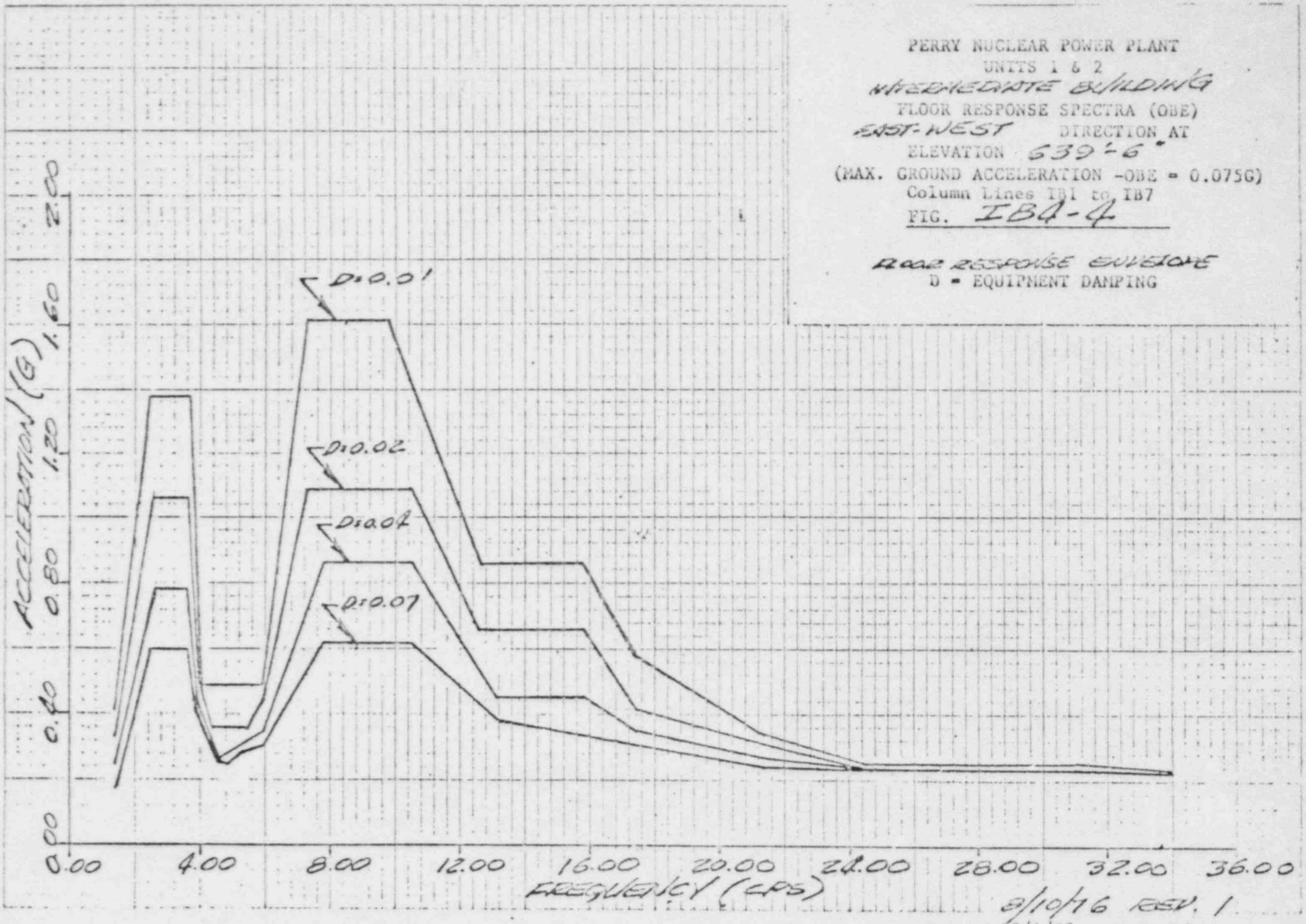
FLOOR RESPONSE ENVELOPE
D = EQUIPMENT DAMPING

8/10/76 REV. 1

12/1/80 Rev. 2

PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
INTERMEDIATE BUILDING
FLOOR RESPONSE SPECTRA (OBE)
EAST-WEST DIRECTION AT
ELEVATION 639'-6"
(MAX. GROUND ACCELERATION -OBE = 0.075G)
Column Lines IB1 to IB7
FIG. IB4-4

FLOOR RESPONSE ENVELOPE
D = EQUIPMENT DAMPING

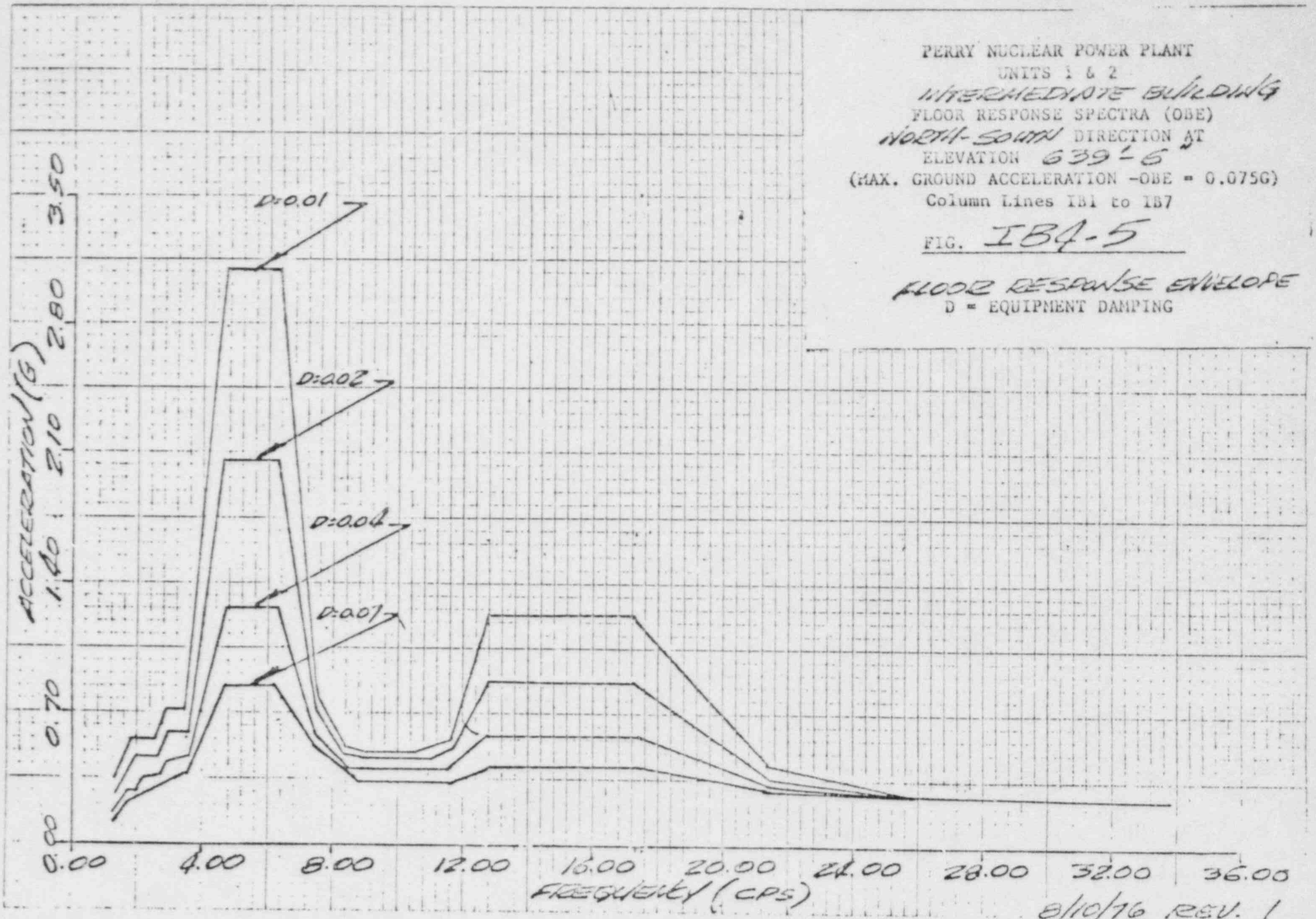


8/10/76 REV. 1
12/1/80 Rev. 2

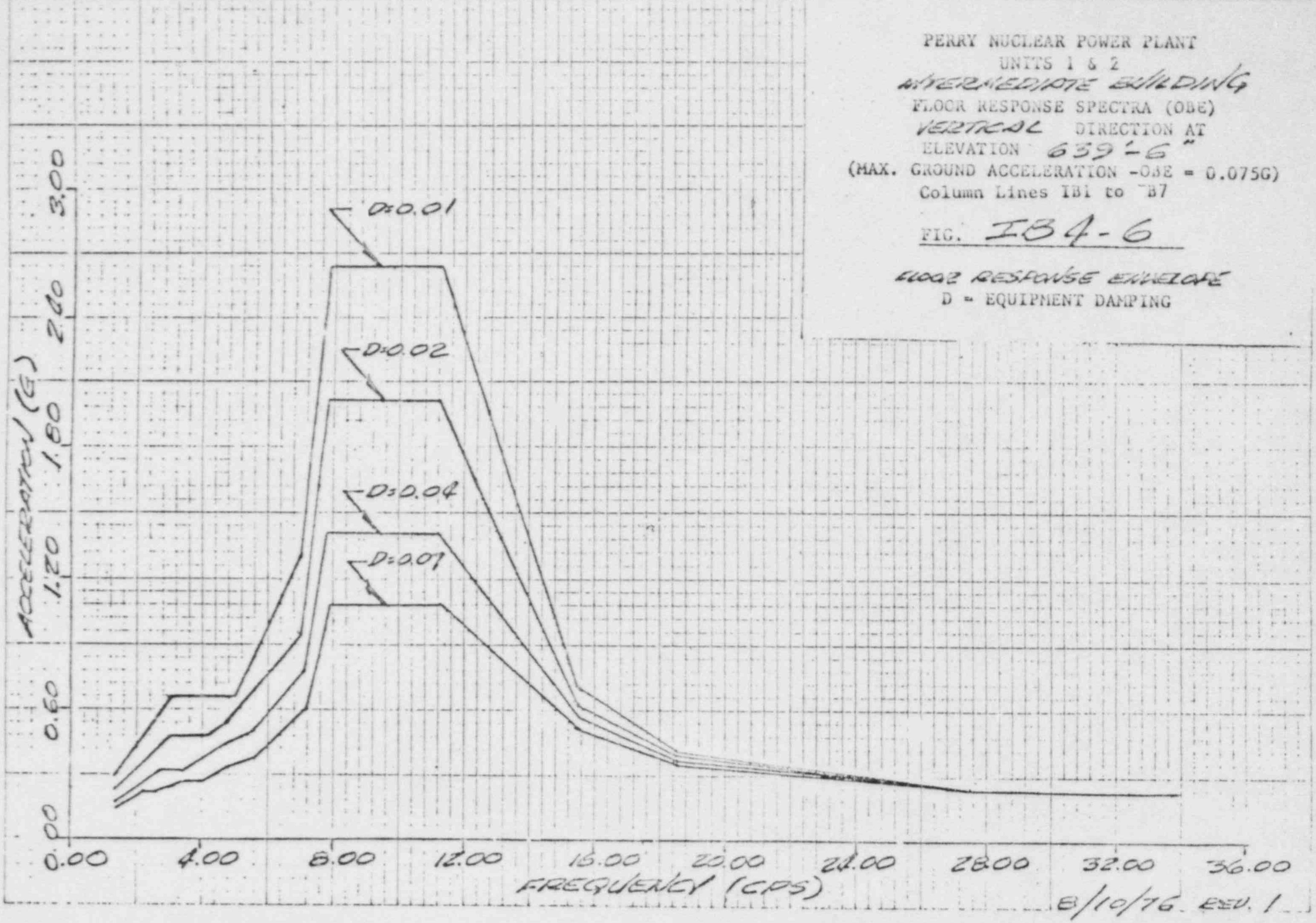
PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
INTERMEDIATE BUILDING
FLOOR RESPONSE SPECTRA (OBE)
NORTH-SOUTH DIRECTION AT
ELEVATION 639'-6"
(MAX. GROUND ACCELERATION -OBE = 0.075G)
Column Lines IB1 to IB7

FIG. IB4-5

FLOOR RESPONSE ENVELOPE
D = EQUIPMENT DAMPING



8/10/76 REV. 1
12/1/80 Rev. 2



PERRY NUCLEAR POWER PLANT
UNITS 1 & 2
INTERMEDIATE BUILDING
FLOOR RESPONSE SPECTRA (OBE)
VERTICAL DIRECTION AT
ELEVATION 639'-6"
(MAX. GROUND ACCELERATION -OBE = 0.075G)
Column Lines IB1 to IB7

FIG. IB4-6

FLOOR RESPONSE ENVELOPE
D = EQUIPMENT DAMPING

8/10/76 REV. 1

12/1/80 Rev. 2

SP-563-00-03

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

MPL#1R72 S002
RH
7.27.87

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ______
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ______

II. COMPONENT NAME: Medium Voltage Modular Electrical Penetrations NON IE r. to PEN-TR-82-51 RH 10.5.83

1. Scope: ☐ NSSS ☒ BOP ☐ Other
2. Model Number: WX 33328 REF. WEST. DESIGN DWGS. Quantity: 2 |R1
3. Size or Range: 600 Ampere REF. WEST. DESIGN DWGS |R1
4. Vendor: Westinghouse
5. If the component is a cabinet or panel, name and model Number of the devices included:
—
—
6. Physical Description:
   - * a. Appearance: Cylinder with cables extending beyond ends |R1
   - * b. Dimensions: 18" in diameter, 128" long ALSO, SEE p A2 of PEN-TR-82-51 RH 10.5.83 |R1
   - * c. Weight: 1,200 lb |R1
7. Location: Building: Shield building and containment vessel
   Elevation: 659'
8. Field Mounting Conditions ☐ Bolt (No. ____, Size ____)
   ☒ Weld (Length 56.55" full circumference
   ☐ ______
9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   between shield building and containment vessel walls
10. a. System in which located: Electrical
    b. Functional Description: Maintain pressure boundary REF. SEC. 2.0 of PEN-TR-82-51 |R1
    c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
    ☒ Both ☐ Neither ☐ Other ______

* REF. WESTING-HOUSE
DESIGN DRAWINGS |R1

II. Pertinent Reference Design Specifications for Qualification Requirements:

SP-563-4549-000

[✓ a. Seismic Input]

[✓ b. Hydrodynamic Load Input]

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☒ Yes ☐ No ☐ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: PEN-TR-82-52 (Sections PEN-TR-78-02, PEN-TR-78-87) REF. TITLE Pg. |R1

(No., Title and Date): Technical Reports and Qualification Data, Med. Volt. Elec. Pen. 12/1/82

Company that Prepared Report: WESTINGHOUSE REF. TITLE Pg. |R1

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT EHB 1/5/8

Applicable Codes And/Or Standards: IEEE 344-1975 REF. SEC. 1.1 of PEN-TR-78-~~87~~ 02 |R1

V. VIBRATION INPUT:

1. Loads considered:

a. ☒ Seismic ~~only~~ EHB 2/15/83

b. ☒ Hydrodynamic ~~only~~ 2/15/83 EHB

c. ☐ Vibration from normal operation

d. ☐ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☒ SRSS ☐ ____________
(other, specify)

3. Required Response Spectra ** (attach the graphs): SP-563 RRS CURVES ATTACHED |R1

NOTE:

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

ST 563-00-03

4. Damping Corresponding to RRS: OBE 2% * SSE 2% *

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other Peak
(specify)

[✓ OBBA] or OBE S/S = 3.23g F/B = 3.23g V = 2.75g ✓

[✓ SSBA] or SSE S/S = 4.5g F/B = 4.5g V = 3.35g ✓

REF. ATTACHD CURVES |R

6. Were fatigue effects considered

☒ Yes ☐ No

If yes, describe how they were treated in overall qualification program: The penetrations were exposed to 20 OBBA and 4 SBBA test accelerations; this is 4 times the number of events anticipated by NRC requirements for an operating power plant

VI. IF QUALIFICATION BY TEST, THEN COMPLETE: REF. SEC. 6.1 of PEN-TR-78-~~27~~ 02 CHB 10/5/83 |R1

1. ☐ Single Frequency ☒ Multi–Frequency ☒ random
☐ sine beat
☐

2. ☐ Single Axis ☒ Multi–Axis REF. FIG. 4 of PEN-TR-78-~~27~~ 02 CHB 10/5/83 |R1
☐ Independent Axis ☒ In–phase motions

3. Number of Qualifications Tests: REF. SEC. 6.1 of PEN-TR-78-~~27~~ 02 CHB 10/5/83 |R1

OBE 20 SSE 4 Other
(specify)

4. Frequency Range: 1 Hz to 100 Hz REF. ATTACHED CURVES CHB 10/5/83 |R1

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): REF. SEC. 5.2 of PEN-TR-78-~~27~~ 02 |R1

S/S = 11 Hz, 1~~6~~5 Hz, 2~~8~~2 Hz F/B = 11 Hz, 1~~6~~5 Hz, 2~~8~~2 Hz V = 11 Hz, 1~~6~~5 Hz, 2~~8~~2 Hz CHB 10/5/83
5.2 CHB 10/5/83

6. Method of Determining Natural Frequencies REF. SEC. 5.0, 5.1 of PEN-TR-78-~~27~~ 02 CHB 10/5/83 |R1

☒ Lab Test ☐ In–Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi–Frequency Test REF. SEC. 6.1 of PEN-TR-78-~~27~~ 02 CHB 10/5/83 |R1

☒ Yes (Attach TRS and RRS graphs)

☐ No

* 2% damping used for RRS, 2.5% for TRS

SP 563 00-03

8. Maximum Input g Level Test: REF. ATTACHED FIG. 5+6 of PEN-TR-78-~~87~~ 02 EHB 10/5/83 |R1

[✓ OBBA] or OBE S/S = 8.2g * F/B = 8.2g * V = 8.2g *

[✓ SSBA] or SSE S/S = 10.5g * F/B = 10.5g * V = 10.5g *

9. Laboratory Mounting: REF. SEC. 3.0 of PEN-TR-78-87 |R1

a. ☐ Bolt (No. ____, Size _____)

☒ Weld (Length 37.7") ☐ full circumference

b. Orientation and Fixturing: Welded to nozzle attached to test table

10. Functional operability verified: REF. SEC. 6.2 of PEN-TR-78-~~87~~ 02 EHB 10/5/83 |R1

☒ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: Penetration leak rate did not exceed maximum allowable per IEEE 317. REF. SEC. 6.2 of PEN-TR-78-~~87~~ 02 EHB 10/5/83 |R1

12. Other tests performed (such as aging or fragility test, including results):

Aging Ref: Sec. 3.4, PEN-TR-82-51 EHB 10/6/83

13. Failure Modes (If appropriate) __________

14. Margins Available: ☒ Input Spectrum ☐ Fragility |R1

REF. SEC. 6.1 of PEN-TR-78-~~87~~ 02 EHB 10/5/83

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = ________ F/B = ________ V = ________

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ________

* Test table oriented 45° to direction of motion, giving equal horizontal and vertical accelerations, REF. FIG. 4 of PEN-TR-78-~~87~~ 02 EHB 10/5/83 |R1

SP-563 00-05

4. ☐ Computer Codes: ______________________

Frequency Range and No. of Modes

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☐ Other: ______________________ (specify)

6. Damping:

OBE ____________ SSE ____________ 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 Allowable

b.	Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ______________________

10. Margins Available: ☐ Input Spectrum ☐ Stress or Deflection

REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
1	7/24/83	ETB /	GSK /	VAM 10/7/83 RAS 10.6.83
	/	/	/	
	/	/	/	

REVIEWED BY Edward T. Burke 12/15/83

CHECKED BY D. J. Lahorski 12-24-83

APPROVED BY V.A. Matheny 10/7/83

RAS 10.6.83

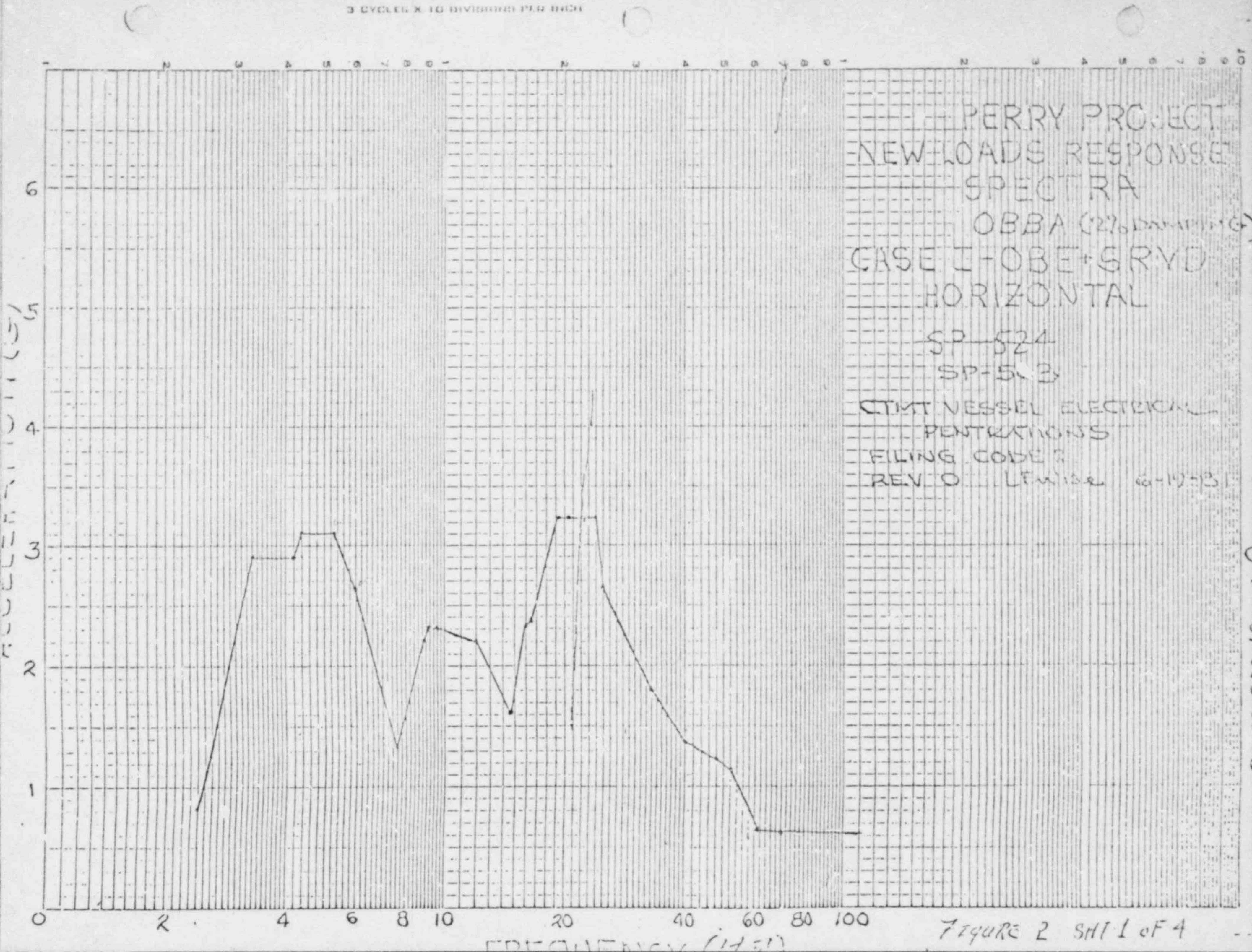


FIGURE 2 SHT 1 OF 4

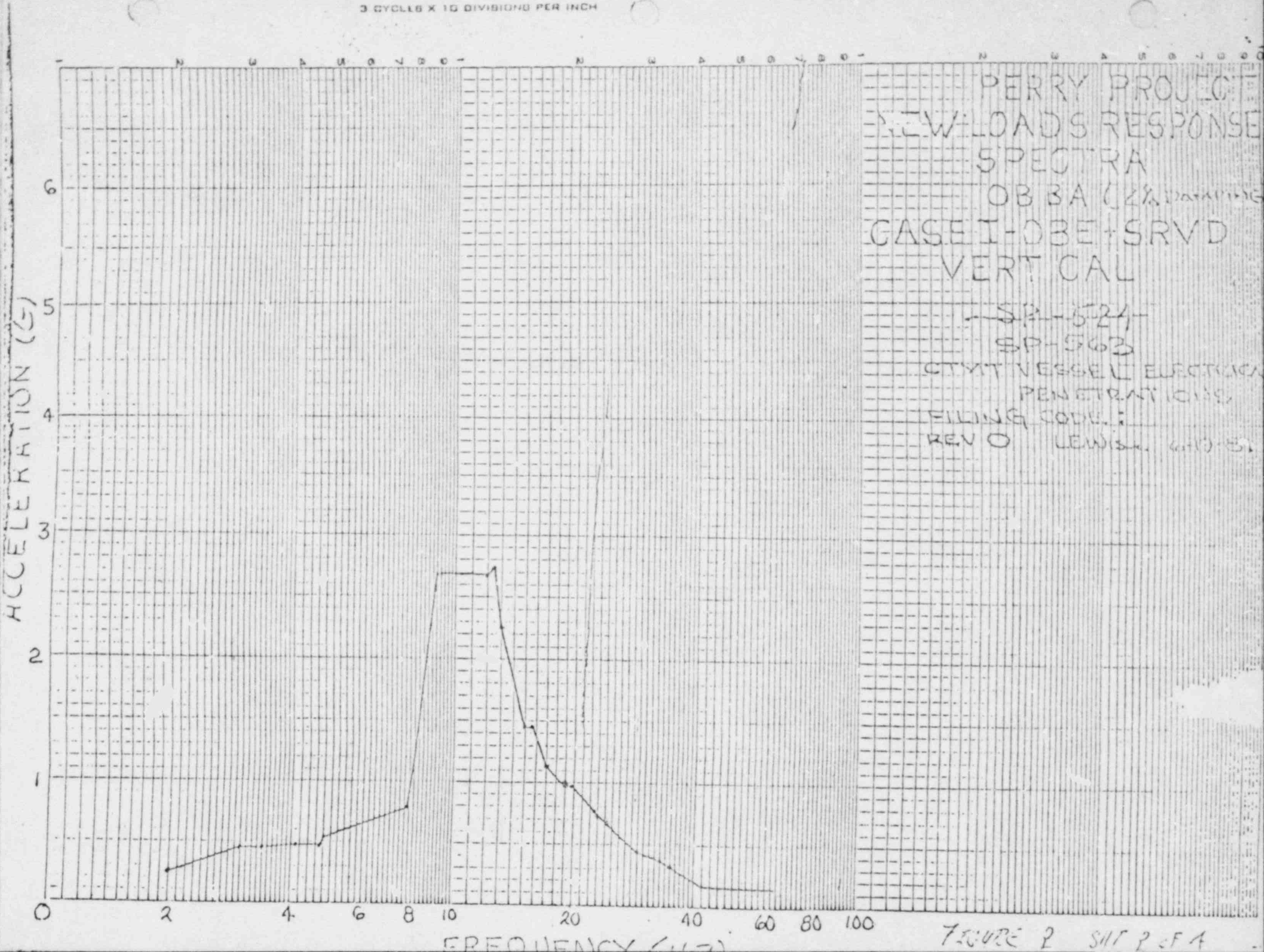


FIGURE 2 SHT 2 OF 4

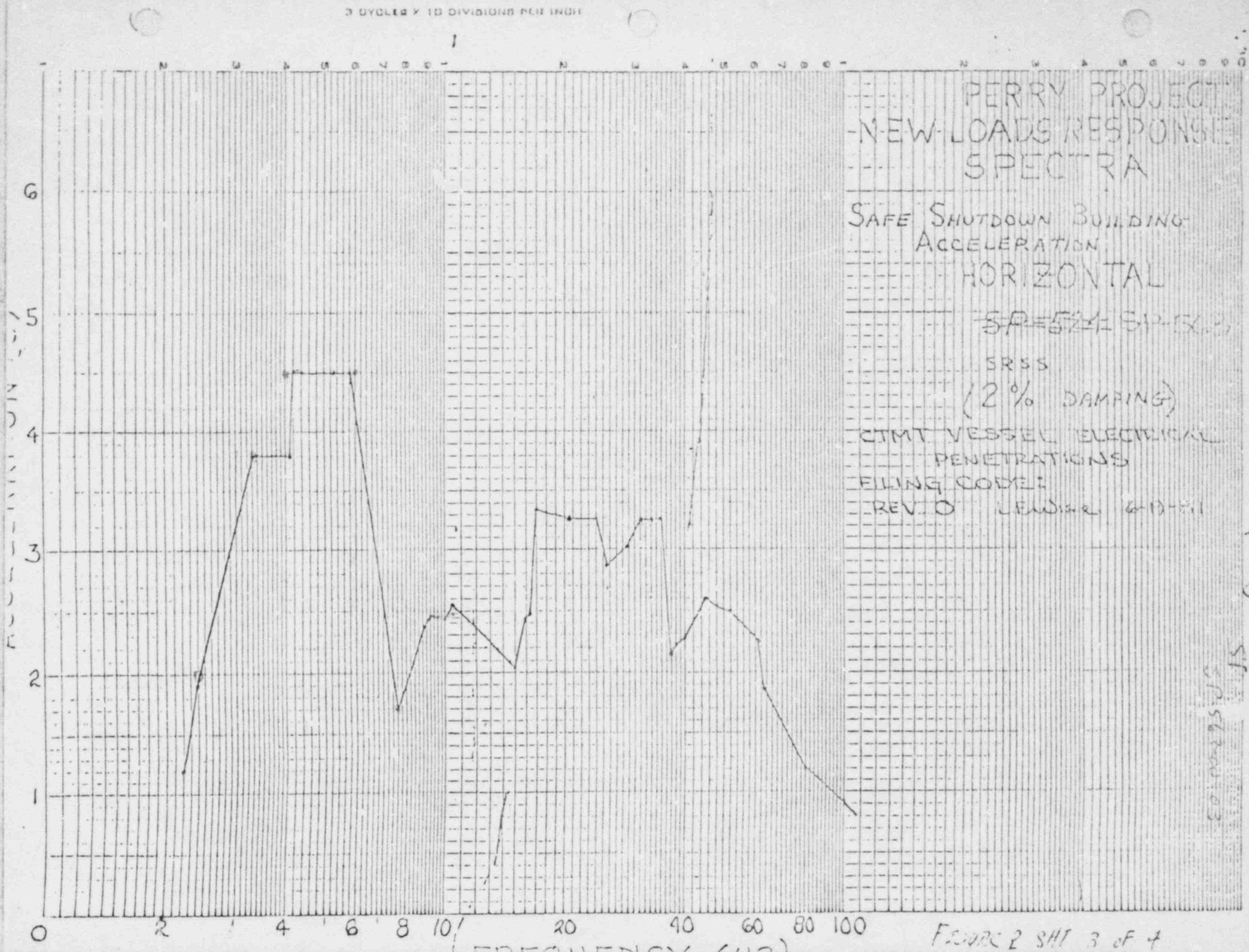
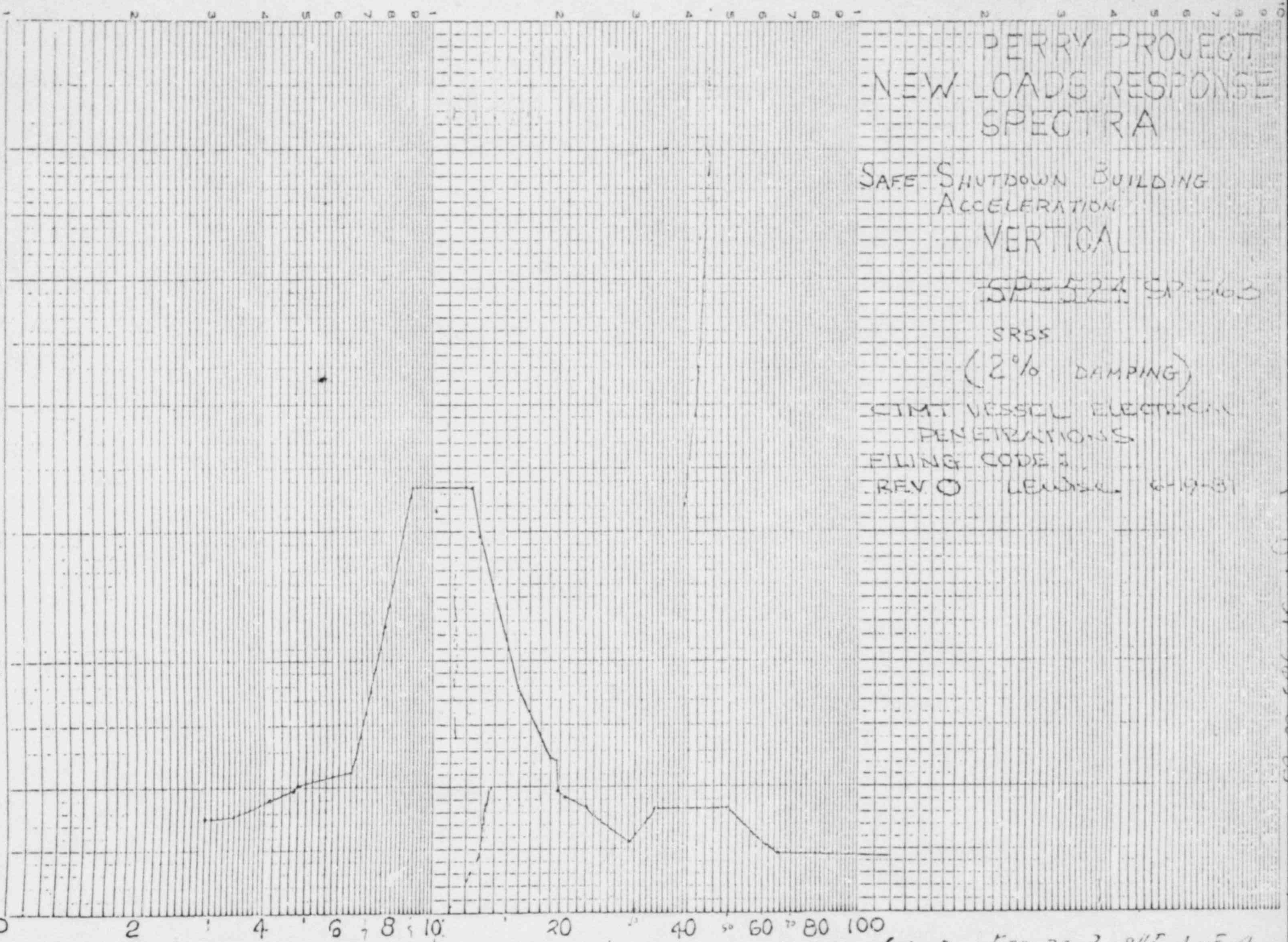


FIGURE 2 SHT 3 of 4



PERRY PROJECT
NEW LOADS RESPONSE
SPECTRA

SAFE SHUTDOWN BUILDING
ACCELERATION
VERTICAL
~~SP-524~~ SP-563

SRSS
(2% DAMPING)
CTMT VESSEL ELECTRICAL
PENETRATIONS
FILING CODE 3
REV 0 [illegible] 6-19-81

FIGURE 2 SHT 4 OF 4

SEISMIC AND DYNAMIC QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: PERRY NUCLEAR POWER PLANT TYPE:

1. Utility: CLEVELAND ELECTRIC ILLUMINATING PWR: ________
2. NSSS: GENERAL ELECTRIC BWR: X
3. A/E: GILBERT/COMMONWEALTH Other ________

II. COMPONENT NAME: LIMITORQUE ACTUATORS

1. Scope: ☒ NSSS ☒ BOP ☐ Other
2. Model Number: SMB, SB, SMB/HBC Quantity: 215
3. Size or Range: SMB-000 TO SMB-4
4. Vendor: LIMITORQUE CORPORATION
5. If the component is a cabinet or panel, name and model Number of the devices included:

   N/A

6. Physical Description:
   - a. Appearance: TOTALLY ENCLOSED MOTOR OPERATED ACTUATOR
   - b. Dimensions: (AVG. SMB-1) L=37" W=10" H=11"
   - c. Weight: 140 LBS TO 3750 LBS. (AVG. 560 LBS SMB-1)
7. Location: Building: REFER TO MECHANICAL MPL SQRT FORM

   Elevation: REFER TO MECHANICAL MPL SQRT FORM

8. Field Mounting Conditions

   ☒ Bolt (No. 8, Size 5/8-11) (AVG. SMB-1)

   ☐ Weld (Length ______)

   ☐ ________

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)

   ON VALVE OR SLUICE GATE

10. a. System in which located: REFER TO MECHANICAL MPL SQRT

    b. Functional Description: REFER TO MECHANICAL MPL SQRT

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

    REFER TO MECHANICAL MPL SQRT

    ☐ Both ☐ Neither ☐ Other ________

II. Pertinent Reference Design Specifications for Qualification Requirements:

GAI SP-568-4549-00 AND PARENT SPECIFICATION TO WHICH IT IS ATTACHED

[✓ a.] Seismic Input [✓ d.] Service Conditions

[✓ b.] Hydrodynamic Load Input [✓ e.] Qualified Life

c. Fatigue Considerations

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT:

☐ Yes ☐ No ☒ Partial or limited availability

IV. EQUIPMENT QUALIFICATION METHOD:

☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: (No., Title and Date): REPORT NO. B0115, HYDRODYNAMIC VIBRATION TESTING (NEW LOADS), DATED 6-24-82

Company that Prepared Report: LIMITORQUE CORPORATION

Company that Reviewed Report: GILBERT/COMMONWEALTH

Where Report is filed or available: PERRY NUCLEAR POWER PLANT

Applicable Codes And/Or Standards: IEEE-344-1975 IEEE-382-1972

V. VIBRATION INPUT:

1. Loads considered:
   - a. ☒ Seismic only
   - b. ☒ Hydrodynamic only
   - c. ☐ Vibration from normal operation
   - d. ☒ Combination of (a), (b), and (c)

2. Method of Combining RRS:

☐ Absolute Sum ☒ SRSS ☐ ____________ (other, specify)

3. Required Response Spectra ** (attach the graphs): SEE "PNPP VALVE QUALIFICATION PROGRAM DESCRIPTION" FOR VALVE MOUNTED ACTUATORS

NOTE: SEE SP-530 FOR SLUICE GATE MOUNTED ACTUATORS.

*If more than one report complete Items IV thru VII for each report.

**If other than RRS is used, describe method.

4. Damping Corresponding to ~~RRS~~: PIPING ANALYSIS OBE 1% 2% SSE 2% 3% VALVES <12" VALVES >12"

5. Required Acceleration in Each Direct:

☐ ZPA ☒ Other PEAK (specify)

OBBA or OBE S/S = ________ F/B = ________ V = ________

SSBA or SSE S/S = REFER TO MECHANICAL MPL SQRT F/B = ________ V = ________

6. Were fatigue effects considered:

☒ Yes ☐ No

If yes, describe how they were treated in overall qualification program: SEE "LIMITORQUE ACTUATOR QUALIFICATION FOR THE PERRY NUCLEAR POWER PLANT" SECTION 6

10-13-83

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

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

2. ☒ Single Axis ☐ Independent Axis ☐ Multi-Axis ☐ In-phase motions

3. Number of Qualifications Tests:

OBE ________ SSE ________ Other 5 BEAT - 15 CYCLE TEST OF 8g AND 10g (specify) @ 1/3 OCTAVE INTERVALS

4. Frequency Range: 2 TO 100 HERTZ

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

S/S = ≥100 HZ 90 HZ HANDWHEEL ONLY 47, 60 HZ (MOTOR) F/B = ≥100 HZ 89 HZ 70-75 HZ, 90-95 HZ (MOTOR) 36, 75 HZ (MOTOR) V = ≥100 HZ SMB-2-60, SMB-1-60 87 HZ SMB-00-15 /HZBC 58 HZ, 74 HZ SMB-4-250 66 HZ (MOTOR) SMB-000 W/MODICA

6. Method of Determining Natural Frequencies

☒ Lab Test ☐ In-Situ Test ☐ Analysis

7. TRS enveloping RRS using Multi-Frequency Test

☐ Yes (Attach TRS and RRS graphs)

☐ No

N/A: MULTI-FREQUENCY TEST NOT USED

8. Maximum Input g Level Test: FOR RIM

10g 10g 10g SMB-000 TE SMB-3

OBBA or OBE S/S = 7g F/B = 7g V = 7g SMB-4

SSBA or SSE S/S = 8g F/B = 8g V = 8g SMB/HBC

9. Laboratory Mounting:

a. ☐ Bolt (No. ____, Size _____)

☐ Weld (Length ______) ☒ BOLTED TO AN ALUMINUM PLATE THEN RIGIDLY CLAMPED TO HYDRAULIC SHAKER

b. Orientation and Fixturing: MOTOR AND LIMIT SWITCH COMPARTMENT IN THE HORIZONTAL PLANE

10. Functional operability verified:

☒ Yes ☐ No ☐ Not Applicable

11. Test Results including modifications made: THE TESTS DEMONSTRATED THAT THE UNITS ARE CAPABLE OF WITHSTANDING THE TESTED LOADS

12. Other tests performed (such as aging or fragility test, including results):

NONE

13. Failure Modes (If appropriate) NONE

14. Margins Available: ☐ Input Spectrum ☒ Fragility

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time–History ☐ Response Spectrum

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

S/S = ________ F/B = ________ V = ________

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

☐ Finite Element ☐ Beam

☐ Closed Form Solution ☐ Other ________

4. ☐ Computer Codes: ______

Frequency Range and No. of Modes

☐ Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads:

☐ Absolute Sum ☐ SRSS ☐ Other: ______ (specify)

6. Damping:

OBE ______ SSE ______ 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 Allowable

b.	Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes: ______

10. Margins Available: ☐ Input Spectrum ☐ Stress or Deflection

REV.NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/	/	/	
	/	/	/	
	/	/	/	

REVIEWED BY Steven R. Mannon | 7-22-83

CHECKED BY James D. Coberly | 7/29/83

APPROVED BY ~~RAS 7.23.84~~ | 7/24/84

CEI
REVIEWED BY
1/24/84
APPROVED BY
DA Patre 1-24-84

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Perry Unit No. 1 2. Docket No.: 50-440, 50-441

3. Utility: Cleveland Electric Illuminating Company

4. NSSS: Reactor Core Isolation Cooling (RCIC) ☐ PWR ☒ BWR

5. A/E: Gilbert Associates Inc.

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☒ NSSS ☐ BOP

2. Location: a. Building/Room Reactor Bldg.

   b. Elevation 578'2" N9°

   c. System RCIC

3. Component number on in-house drawings: E51-C001

4. If component is a ☒ Pump complete II.5.

   If component is a ☐ Valve complete II.6.

5. General Pump Data

a.	Pump	b.	Prime-mover
Name	RCIC	Name	STEAM TURBINE
Mfg.	Bingham-Willamette Co.	Mfg.	TERRY CORP.
Model	6X6X10½B, 4-Stage	Model	GS-2N
S/N	15210030	S/N	T-38176-A
Type	Centrifugal Pump	Type	BASE MOUNTED SOLID WHEEL STEAM TURBINE

---

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

RWH:rf/G0241*-1
2/4/83

a. Pump (continued)

Size 47½"wX62½"LX49"H

Weight 6575 lbs

Mounting Method Pedestal Mounted on Base Plate

Required B.H.P. 825

Parameter	Design	Operating
Press	1525 psig	1450 psig
Temp	40°F-140°F	40°F-140°F
Flow	725 GPM	725 GPM
Head	2980'	2980'

Required NPSH at maximum flow 20'

Available NPSH 21'

Operating Speed 4520 rpm

Critical Speed NC1 2725 RPM
NC2 11578RPM

b. Prime-mover (continued)

Size 7 ft. long, 6 ft. wide, 5 ft. high

Weight 5000 lbs. approximate

Mounting Method BASE MOUNTED TO CONCRETE VIA 6-1INCH diameter BOLTS

H.P. 825 HP

Power requirements: (include normal, maximum and minimum).

Electrical 120 VDC ± 10%

Other REACTOR STEAM

If MOTOR list:

Duty cycle N A

Stall current

Class of insulation

List functional accessories:* Provided by manufacturer.

List control signal inputs: Inputs are to pump driver. SYSTEM flow controller OUTPUT (1.0-5.0 VDC) signal is the speed demand signal To the turbine control signal.

---

*Functional accessories are those subcomponents not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

RWH:rf/G0241*-2
2/4/83

6. General Valve Data

a. Valve

Name ____________________

Mfg. ____________________

Model ____________________

S/N ____________________

Type ____________________

Size ____________________

Weight ____________________

Mounting Method ____________________

Required Torque ____________________

Parameter	Design	Operating
Press	______	______
Temp	______	______
Flow	______	______
Max ΔP across valve		______
Closing time @ max ΔP		______
Opening time @ max ΔP		______

Power requirements for functional accessories, (if any) ____________________

____

b. Actuator (if not an integral unit)

Name ____________________

Mfg. ____________________

Model ____________________

S/N ____________________

Type ____________________

Size ____________________

Weight ____________________

Mounting Method ____________________

Torque ____________________

Power requirements: (include normal, maximum and minimum).

Electrical ____________________

____

____

____

Other: ☐ Pneumatic ☐ Hydraulic

____

____

____

____

List control signal inputs: ____________________

____

____

RWH:rf/G0241*-3
2/4/83

List functional accessories:* ______________________________

III. FUNCTION

1. Briefly describe component's normal and safety functions: Normal function is to transport make-up water from the condensate storage tank to the reactor vessel to assure adequate core cooling takes place. Upon the reactor water level reaching a pre-determined low level, the RCIC system shall be initiated automatically. The turbine driven pump will supply demineralized make-up water from the condensate storage tank to the reactor vessel: An alternate source of water is available from the suppression pool.

2. The component's normal state is: ☐ Operating ☒ Standby

3. Safety function:

   a. ☐ Emergency reactor shutdown
   b. ☐ Containment heat removal
   c. ☐ Containment isolation
   d. ☐ Reactor heat removal
   e. ☒ Reactor core cooling
   f. ☐ Prevent significant release of radioactive material to environment
   g. ☐ Does the component function to mitigate the consequences of one or more of the following events? ☒ Yes ☐ No If "Yes", identify.

      ☐ LOCA ☐ HELB ☐ MSLB

      ☒ Other Vessel isolation accompanied by loss of coolant, control rod drop and ATWS conditions.

4. Safety requirements:

   ☒ Intermittent Operation ☐ During postulated event

   ☐ Continuous Operation ☐ Following postulated event

   If component operation is required following an event, give approximate length of time component must remain operational.

   6 hours - ATWS Event
   12 hours - Isolation Event (e.g., hours, days, etc.)

---

*Functional accessories are those subcomponents not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES: NA

does the component ☐ Fail open ☐ Fail closed ☐ Fail as is

Is this the fail safe position? ☐ Yes ☐ No

Is the valve used for throttling purposes? ☐ Yes ☐ No

Is the valve part of the reactor coolant pressure boundary?
☐ Yes ☐ No

Does the valve have a specific limit for leakage? ☐ Yes ☐ No

If "Yes" give limit: ____________________

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

ASME B&PV Code Sections III & VIII Class II

2. Reference those qualification standards, used as a guide to qualify the component:

Standards of the Hydraulic Institute and ASME Power Test Code, PTC 8.2

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
NONE	NONE

4. Have acceptance criteria been established and documented in the test plan(s) for the component? ☒ Yes ☐ No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

Driver fails to start.

6. Are the margins* identified in the qualification documentation?
☒ Yes ☐ No

---

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

If component is a [✓ PUMP], complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: ☒ Analysis ☐ Test ☐ Combination

Identify PUMP tests performed:

a. ☒ Shell hydrostatic (ASME Section III)
b. ☒ Bearing temperature evaluations
c. ☒ Seismic loading
d. ☒ Vibration levels
e. ☐ Exploratory vibration (Fundamental freq._____)
f. ☒ Seal leakage @ hydro press
g. ☐ Aging: ☐ Thermal ☐ Mechanical
h. ☒ Flow performance
Are curves provided ☐ Yes ☒ No
i. ☒ Pipe reaction end loads (nozzle loads)
j. ☐ Others ______________
k. ☐ Extreme environment:
☐ Humidity
☐ Chemical
☐ Radiation

8. Valve operability has been demonstrated by: ☐ Analysis ☐ Test ☐ Combination

Identify VALVE tests performed:

a. ☐ Shell hydrostatic (ASME Section III)
b. ☐ Cold cyclic List times:
Open __________
Closed __________
c. ☐ Seismic loading
d. ☐ Hot cyclic List times:
Open __________
Closed __________
e. ☐ Exploratory vibration (Fundamental freq._____)
f. ☐ Mean seat leakage

~~g. ☐ Aging: ☐ Thermal~~
~~☐ Mechanical~~
~~h. ☐ Back seat leakage~~

~~i. ☐ Pipe reaction end loading~~
~~j. Disc hydrostatic~~

~~k. ☐ Extreme environment:~~
~~☐ Humidity~~
~~☐ Chemical~~
~~☐ Radiation~~
~~l. ☐ Flow interruption capability~~

~~m. ☐ Flow characteristics~~
~~Are curves provided?~~
~~☐ Yes ☐ No~~
~~n. ☐ Others ______________~~
~~______________~~
~~______________~~

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☐ Yes ☒ No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? ☒ Yes ☐ No. If "No", is installed component ☐ oversized or ☐ undersized?

11. If <u>type</u> test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.? ☐ Yes ☐ No ☒ NOT PERFORMED.

12. Is component orientation sensitive? ☒ Yes ☐ No ☐ Unknown If "Yes", does installed orientation coincide with test orientation? ☒ Yes ☐ No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.) ☒ Yes ☐ No

RWH:rf/G0241*-7
2/4/83

14. Were the qualification tests performed in sequence and on <u>only</u> one component? ☐ Yes ☐ No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): None performed.

15. If "aging"* was performed, identify the significant aging mechanisms: None performed.

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☐ Plants (shutdown loads) b. ☐ Extreme environment

c. ☒ Seismic load d. ☐ Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.)
☐ Yes ☒ No

If "Yes", identify:

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance).
☐ Yes ☒ No

If "Yes", identify:

20. Is the qualified life for the component less than 40 years?
☐ Yes ☒ No If "Yes", what is the qualified life?

---

*As outlined in Section 4.4.1 of IEEE-627 1980.

RWH:rf:csc/G0241*-8
2/4/83

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
AG-534	Q.C. Records Binder, Certificate of Hydrostatic Test:		Bingham Willamette Pump Co.	General Electric Co. NPSED
	1. Outer Case	11/28/77	"	"
	2. Seal Circulation Piping	1/13/78	"	"
T-152100 30-1,	Performance Test Data (VPF 4060-63-1)	12/19/77	Bingham Willamette Pump Co.	General Electric Co. NPSED
3720-652	Pump VENDOR STRESS REPORT	6/17/77	BYRON-JACKSON	GENERAL ELECTRIC Co NPSED

RWH:rf/G0242*-1
2/4/83

CEI
REVIEWED BY
12/24/84
APPROVED BY
12-24-84

PUMP AND VALVE OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Perry Unit No. 1 Docket No.: 50-440, 50-441

3. Utility: Cleveland Electric Illuminating Company

4. NSSS: General Electric Company ☐ PWR ☒ BWR

5. A/E: Gilbert Associates, Inc.

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☒ NSSS ☐ BOP

2. Location:
   - a. Building/Room Auxiliary Building
   - b. Elevation 574 Ft.
   - c. System Low Pressure Core Spray

3. Component number on in-house drawings: E21-C001

4. If component is a ☒ Pump complete II.5.

   If component is a ☐ Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name	Low Pressure Core Spray	Name	Electric Motor
Mfg.	Byron Jackson	Mfg.	General Electric Company
Model	30DX-20CKX-H4	Model	5K6347XC100A
S/N	741-S-1413	S/N	JMJ901002
Type	Vertical Five Stage VMT	Type	Induction

---

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

RWH:rf/G0241*-1
2/4/83

a. Pump (continued)

Size 37" dia. x 367" length

(Wet) Weight 38,500

Mounting Method Bolted Flange

Required B.H.P. 1600

Parameter	Design	Operating
Suction (psi)	115	**
Discharge Press (psi)	600	330
Temp (^oF)	212	40-212
Flow	6250	0-6250
Head (Ft)	760	760
Runout Flow (GPM)	7655	N/A

Required NPSH at maximum flow *1.5 ft.*

Available NPSH *5.0 ft.*

Operating Speed 1780

Critical Speed 2040 CPM

List functional accessories:* None

List control signal inputs: *-LOCA signal from relay E21A-K12*

b. Prime-mover (continued)

Size 42" dia. x 78" length

Weight 13,500

Mounting Method Bolted Flange

H.P. 1750

Power requirements: (include normal, maximum and minimum).

Electrical 4,000 volts

3-phase

60 Cycle

Other 222 Amps

If MOTOR list:

Duty cycle Continuous

Stall current 1443 Amps

Class of insulation F (VPI)

---

*Functional accessories are those subcomponents not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, etc.)

** Depends upon system piping configuration.

RWH:rf/G0241*-2
2/4/83

6. General Valve Data

a. Valve

Name ______________________

Mfg. ______________________

Model ______________________

S/N ______________________

Type ______________________

Size ______________________

Weight ______________________

Mounting Method ______________________

Required Torque ______________________

Parameter	Design	Operating
Press	_____	_____
Temp	_____	_____
Flow	_____	_____

Max ΔP across valve _____

Closing time @ max ΔP _____

Opening time @ max ΔP _____

Power requirements for functional accessories, (if any) _____

____

b. Actuator (if not an integral unit)

Name ______________________

Mfg. ______________________

Model ______________________

S/N ______________________

Type ______________________

Size ______________________

Weight ______________________

Mounting Method ______________________

Torque ______________________

Power requirements: (include normal, maximum and minimum).

Electrical ______________________

____

____

____

Other: [] Pneumatic [] Hydraulic

____

____

____

____

List control signal inputs: ______________________

____

____

List functional accessories:* NA

III. FUNCTION

1. Briefly describe component's normal and safety functions:

   To supply makeup water to the reactor core in the event of an accident. The primary purpose is to provide spray cooling and makeup water during large break accidents which the core could uncover.

2. The component's normal state is: ☐ Operating ☒ Standby

3. Safety function:

   a. ☐ Emergency reactor shutdown

   b. ☐ Containment heat removal

   c. ☐ Containment isolation

   d. ☐ Reactor heat removal

   e. ☒ Reactor core cooling

   f. ☐ Prevent significant release of radioactive material to environment

   g. ☐ Does the component function to mitigate the consequences of one or more of the following events? ☒ Yes ☐ No
   If "Yes", identify.

   ☒ LOCA ☐ HELB ☐ MSLB

   ☐ Other

4. Safety requirements:

   ☐ Intermittent Operation ☐ During postulated event

   ☐ Continuous Operation ☒ Following postulated event

   If component operation is required following an event, give approximate length of time component must remain operational.

   100 days (e.g., hours, days, etc.)

---

*Functional accessories are those subcomponents not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches).

5. For VALVES:

~~does the component ☐ Fail open ☐ Fail closed ☐ Fail as is~~

~~Is this the fail safe position? ☐ Yes ☐ No~~

~~Is the valve used for throttling purposes? ☐ Yes ☐ No~~

~~Is the valve part of the reactor coolant pressure boundary? ☐ Yes ☐ No~~

~~Does the valve have a specific limit for leakage? ☐ Yes ☐ No~~

~~If "Yes" give limit: ______________~~

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

ASME Section VIII & III, AISC Erection Spec, NEMA MG-1,

IEEE TP-85, ANSI B16.5, Hydraulic Institute Standards

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE 98, 99, 101, 275, 323, 334, 344

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
None	None

4. Have acceptance criteria been established and documented in the test plan(s) for the component? ☒ Yes ☐ No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function?

Motor fails to start

6. Are the margins* identified in the qualification documentation? ☒ Yes ☐ No

---

*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

RWH:rf:csc/G0241*-5
2/4/83

If component is [✓ a PUMP], complete IV.7.

If component is a VALVE, complete IV.8. NA

7. Pump operability has been demonstrated by: ☒ Analysis ☐ Test ☐ Combination

Identify PUMP tests performed:

a. ☒ Shell hydrostatic (ASME Section III)

b. ☒ Bearing temperature evaluations

c. ☒ Seismic loading

d. ☒ Vibration levels

e. ☐ Exploratory vibration (Fundamental freq.____)

f. ☒ Seal leakage @ hydro press

g. ☐ Aging: ☐ Thermal
☐ Mechanical

h. ☒ Flow performance
Are curves provided ☒ Yes
☐ No

i. ☒ Pipe reaction end loads (nozzle loads)

j. ☐ Others ____________

k. ☐ Extreme environment:
☐ Humidity
☐ Chemical
☐ Radiation

~~8. Valve operability has been demonstrated by: ☐ Analysis ☐ Test ☐ Combination~~

~~Identify VALVE tests performed:~~

~~a. ☐ Shell hydrostatic (ASME Section III)~~

~~b. ☐ Cold cyclic List times:~~
~~Open ________~~
~~Closed ________~~

~~c. ☐ Seismic loading~~

~~d. ☐ Hot cyclic List times:~~
~~Open ________~~
~~Closed ________~~

~~e. ☐ Exploratory vibration (Fundamental freq.____)~~

~~f. ☐ Mean seat leakage~~

g. ☐ Aging: ☐ Thermal
☐ Mechanical

h. ☐ Back seat leakage

i. ☐ Pipe reaction end loading

j. Disc hydrostatic

k. ☐ Extreme environment:
☐ Humidity
☐ Chemical
☐ Radiation

l. ☐ Flow interruption capability

m. ☐ Flow characteristics
Are curves provided?
☐ Yes ☐ No

n. ☐ Others ______________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☒ Yes ☐ No
If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

Insignificant deviations only; RPT 456HA898.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? ☐ Yes ☒ No. If "No", is installed component ☒ oversized or ☐ undersized?

11. If <u>type</u> test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, Section 5.?
☒ Yes ☐ No

12. Is component orientation sensitive? ☒ Yes ☐ No ☐ Unknown
If "Yes", does installed orientation coincide with test orientation? ☒ Yes ☐ No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)
☒ Yes ☐ No ☐ Unknown

14. Were the qualification tests performed in sequence and on <u>only</u> one component? ☒ Yes ☐ No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.): Thermal aging, operational aging, radiation, seismic, DBE, post accident.

15. If "aging"* was performed, identify the significant aging mechanisms: Thermal aging in accordance with IEEE 275 using derived Arrhenius curves.

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☐ Plants (shutdown loads) b. ☒ Extreme environment

c. ☒ Seismic load d. ☐ Others ____

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.) ☐ Yes ☒ No

If "Yes", identify: ____

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance). ☐ Yes ☒ No

If "Yes", identify: ____

20. Is the qualified life for the component less than 40 years? ☐ Yes ☒ No If "Yes", what is the qualified life? ____

---

*As outlined in Section 4.4.1 of IEEE-627 1980.

21. Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
456HA 898	Qualification Report	9/30/76	General Electric Company San Jose Motor Plant Small AC Motor Department	General Electric Company NEBO

RWH:rf/G0242*-1
2/4/83

SHEET 1 OF 9

B/M RJC-1

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: PERRY NPP Unit No. 1 & 2 2. Docket No.: 50-440 & 50-441

3. Utility: CLEVELAND ELECTRIC ILLUMINATING

4. NSSS: GENERAL ELECTRIC ☐ PWR ☒ BWR

5. A/E: GILBERT/COMMONWEALTH

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☐ NSSS ☒ BOP

2. Location: a. Building/Room AUXILIARY

b. Elevation 574 FT.

c. System E-22 HIGH PRESSURE CORE SPRAY

3. Component number on in-house drawings: 1 E22 F010

4. If component is a ☐ Pump complete II.5.

If component is a ☒ Valve complete II.6.

~~5. General Pump Data~~

~~a. Pump~~		~~b. Prime-mover~~	
~~Name~~		~~Name~~	
~~Mfg.~~		~~Mfg.~~	
~~Model~~		~~Model~~	
~~S/N~~		~~S/N~~	
~~Type~~		~~Type~~	
~~Size~~		~~Size~~	
~~Weight~~		~~Weight~~	
~~Mounting Method~~		~~Mounting Method~~	
~~Required B.H.P.~~		~~H.P.~~	

NOTE:

**The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.*

5. General Pump Data (Continued)

Parameter	Design	Operating
Press		
Temp		
Flow*		
Head		

Power requirements: (include normal, maximum and minimum).

Electrical

Other

Required NPSH at maximum flow

Available NPSH

Operating Speed

Critical Speed

If MOTOR list:

Duty cycle

Stall current

Class of insulation

List functional accessories:*

List control signal inputs:

6. General Valve Data

a. Valve

Name TEST BY-PASS TO CONDENSATE STORAGE

Mfg. ANCHOR DARLING

Model NOT ASSIGNED BY VENDOR

S/N 53070

Type GLOBE

Size 10" ANSI CLASS 900

Weight 1760 LBS

Mounting Method WELD ENDS

Required Torque 3443 FT LBS

b. Actuator (if not an integral unit)

Name TEST BY-PASS TO CONDENSATE STORAGE ACTUATOR

Mfg. LIMITORQUE

Model SMB

S/N 385625-C 288336

Type WP

Size 4-200

Weight 1840 LBS

Mounting Method BOLTED

Torque 8300 FT. LBS

NOTE:

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data (Continued)

Parameter	Design	MAXIMUM Operating
Press	1575 PSIG	1530 PSIG
Temp	212°F	148°F
Flow	*	6110 GPM

Max ΔP across valve 1575 PSI

Closing time @ max ΔP 50 SEC.

Opening time @ max ΔP 50 SEC.

Power requirements for functional accessories, (if any) NONE

Power requirements: (include normal, maximum and minimum).

Electrical 460 v/3 PHASE/60 HZ

Other: ☐ Pneumatic ☐ Hydraulic

NONE

List control signal inputs: NONE

List functional accessories:* NONE

* NOT CRITICAL TO VALVE APPLICATION. VALVE SPECIFIED SAME SIZE AS CONNECTING PIPE

III. FUNCTION

1. Briefly describe components normal and safety functions:

NORMAL - NOT OPERATING (SYSTEM ISOLATION)

SAFETY - NONE; VALVE IS USED ONLY DURING PUMP TEST.

NOTE: IF AN HPCS PUMP TEST WERE BEING PERFORMED AT THE TIME OF AN ACCIDENT, VALVE WOULD BE REQUIRED TO CLOSE

2. The components normal state is: ☐ Operating ☑ Standby

3. Safety function: NONE

a. ☐ Emergency reactor shutdown

b. ☐ Containment heat removal

c. ☐ Containment isolation

d. ☐ Reactor heat removal

e. ☐ Reactor core cooling

f. ☐ Prevent significant release of radioactive material to environment

NOTE:

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational (e.g., limit switches).

3. Safety function: (Continued)

g. ☐ Does the component function to mitigate the consequences of one or more of the following events? ☐ Yes ☒ No If "Yes", identify.

☐ LOCA ☐ HELB ☐ MSLB

☐ Other ____

4. Safety requirements: NONE

☐ Intermittent Operation ☐ During postulated event

☐ Continuous Operation ☐ Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.

N/A (e.g., hours, days, etc.)

5. For VALVES:

does the component ☐ Fail open ☐ Fail closed ☒ Fail as is

Is this the fail safe position? ☐ Yes ☐ No N/A - NOT A SPRING LOADED VALVE

Is the valve used for throttling purposes? ☒ Yes ☐ No

Is the valve part of the reactor coolant pressure boundary?

☐ Yes ☒ No

Does the valve have a specific limit for leakage? ☒ Yes ☐ No

If "Yes" give limit: 100 CC/HR

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: SPEC SP-301-4508-00, REV. I, 10-11-73; ASME B&PV CODE, SECTION III, NB-3200 & NC-3500, 1971 EDITION, ADDENDA TO WINTER 1973.

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE 323-74

NRC STANDARD REVIEW PLAN 3.9.3 (NUREG 0800)

REV. 1 (7-81)

NRC REG. GUIDE 1.48 (3-81)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted: NONE

Modified: NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? ☒ Yes ☐ No (ACTUATOR) (TEST NOT PERFORMED ON VALVE)

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? PERMANENT DEFORMATION OR FAILURE OF YOKE LEGS

6. Are the margins* identified in the qualification documentation?

☒ Yes ☐ No (ACTUATOR) (TEST NOT PERFORMED ON VALVE)

If component is a PUMP, complete IV.7.

If component is [✓ a VALVE,] complete IV.8.

~~7. Pump operability has been demonstrated by: ☐ Analysis~~

~~☐ Test ☐ Combination~~

~~Identify PUMP tests performed:~~

~~a. ☐ Shell hydrostatic (ASME Section III)~~

~~b. ☐ Bearing temperature evaluations~~

~~c. ☐ Seismic loading~~

~~d. ☐ Vibration levels~~

~~e. ☐ Exploratory vibration (Fundamental freq. ________)~~

~~f. ☐ Seal leakage @ hydro press~~

~~g. ☐ Aging: ☐ Thermal ☐ Mechanical~~

~~h. ☐ Flow performance~~

~~Are curves provided ☐ Yes ☐ No~~

~~i. ☐ Pipe reaction end loads (nozzle loads)~~

~~j. ☐ Others ________~~

~~k. ☐ Extreme environment:~~

~~☐ Humidity~~

~~☐ Chemical~~

~~☐ Radiation~~

NOTE:

**Margin is the difference between design basis parameters and the test parameters used for equipment qualification.*

8. Valve operability has been demonstrated by: ☒ Analysis (SEE SHEET 8 of 9)

☒ Test ☐ Combination
(ACTUATOR)

Identify VALVE tests performed:

a. ☒ Shell hydrostatic

(ASME Section III)

b. ☐ Cold cyclic List times:

Open ______

Closed ______

c. ☒ Seismic loading (ACTUATOR)

d. ☐ Hot cyclic List times:

Open ______

Closed ______

e. ☐ Exploratory vibration

(Fundamental freq. ______)

f. ☐ Main seat leakage

g. ☒ Aging: ☒ Thermal ☒ Mechanical } (ACTUATOR)

h. ☐ Back seat leakage

i. ☐ Pipe reaction end loading

j. ☐ Disc hydrostatic

k. ☒ Extreme environment (ACTUATOR)

☒ Humidity

☐ Chemical

☒ Radiation

l. ☐ Flow interruption capability

m. ☐ Flow characteristics are

Are curves provided?

☐ Yes ☐ No

n. ☒ Others STATIC DEFLECTION ANALYSIS (VALVE)

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☐ Yes ☒ No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

______

______

______

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? ☐ Yes ☒ No If "No", is installed component ☒ oversized or ☐ undersized? (ACTUATOR)(TEST NOT PERFORMED ON VALVE)

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, SECTION 5.?

☒ Yes ☐ No (ACTUATOR)

12. Is component orientation sensitive? ☒ Yes ☐ No ☐ Unknown

If "Yes", does installed orientation coincide with test orientation?

☒ Yes ☐ No (ACTUATOR)

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?

☐ Yes ☐ No ☒ Unknown (ACTUATOR)

14. Were the qualification tests performed in sequence and on only one component?

☒ Yes ☐ No (ACTUATOR)

If "Yes" identify sequence, (e.g., radiation, smic, cyclic, thermal, etc.):

ACCORDING TO IEEE 323 (1974) 6.3.2, 1-6

15. If "aging"* was performed, identify the significant aging mechanisms: ACTUATOR

THERMAL

MECHANICAL (CYCLING)

RADIATION (EXPOSURE TO GAMMA RADIATION)

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☐ Plants (shutdown loads)

b. ☒ Extreme environment (ACTUATOR)

c. ☒ Seismic load (ACTUATOR & VALVE)

d. ☒ Others

HYDRODYNAMICS (ACTUATOR ONLY)

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

NOTE:

**As outlined in Section 4.4.1 of IEEE-627 1980.*

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.)

☐ Yes ☒ No

If "Yes", identify: ______________________________

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance).

☐ Yes ☒ No

If "Yes", identify: ______________________________

20. Is the qualified life for the component less than 40 years?

☐ Yes ☒ No If "Yes", what is the qualified life? ______________________________

21. Information Concerning Qualification Documents for the Component

REPORT NUMBER	REPORT TITLE	DATE	COMPANY/ORGANIZATION PREPARING REPORT	COMPANY/ORGANIZATION REVIEWING REPORT
—	DESIGN CALCULATION FOR 10" 900 LB GLOBE VALVE WITH SMB-4-200 MOTOR OPERATOR	2-15-83	ANCHOR DARLING VALVE Co.	GENERAL ELECTRIC
B0058	LIMITORQUE VALVE ACTUATOR QUALIFICATION	1-11-80	LIMITORQUE CORP.	GILBERT/COMMONWEALTH
SP-301-4508-00	SPECIFICATION - NUCLEAR STEAM SUPPLY SYSTEM	REV. 1 10-11-73	GILBERT/ COMMONWEALTH	GILBERT/ COMMONWEALTH
B0115	HYDRODYNAMIC VIBRATION TESTING (NEW LOADS)	6-24-82	LIMITORQUE CORPORATION	GILBERT / COMMONWEALTH

REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/		/	/
	/		/	/
	/		/	/

REVIEWED BY 1/18/84

CHECKED BY Stuart W. Litchfield 1/23/84

APPPOVED BY 1/23/84

G-2
REV. 1-82

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
PERRY NUCLEAR POWER PLANT
MEMORANDUM

☐ I no longer wish to receive this material.

SO/10914

TO SQRT Audit File

FROM H. A. Putre

DATE July 24, 1984

SUBJECT PVORT Item 1B21F0047 (SRV's)

The Equipment Qualification Program for the subject Safety-Relief Valves is still in process. Therefore we are submitting only a partially completed PVORT form for these valves.

At this time Radiation, Aging and Seismic Tests are completed, and Post-LOCA Tests are underway. When completed, these tests will verify environmental, seismic and operability qualification. The Safety-Relief Valve Qualification Program is expected to be completed before Perry I fuel load.

H.A. Putre
Senior Engineer, EQ

SHEET 1 OF 9

1B21F0047B

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: PERRY NPP Unit No. 1 & 2 2. Docket No.: 50-440 & 50-441

3. Utility: CLEVELAND ELECTRIC ILLUMINATING

4. NSSS: GENERAL ELECTRIC ☐ PWR ☒ BWR

5. A/E: GILBERT/COMMONWEALTH

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☒ NSSS ☐ BOP

2. Location: a. Building/Room REACTOR - INSIDE DRYWELL

b. Elevation 630'

c. System MAIN STEAM

3. Component number on in-house drawings: 1B21F0047B

4. If component is a ☐ Pump complete II.5.

If component is a ☒ Valve complete II.6.

5. General Pump Data

a. Pump	b. Prime-mover
Name	Name
Mfg.	Mfg.
Model	Model
S/N	S/N
Type	Type
Size	Size
Weight	Weight
Mounting Method	Mounting Method
Required B.H.P.	H.P.

NOTE:

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

5. General Pump Data (Continued)

Parameter	Design	Operating
Press		
Temp		
Flow		
Head		

Power requirements: (include normal, maximum and minimum).

Electrical

Other

Required NPSH at maximum flow

Available NPSH

Operating Speed

Critical Speed

If MOTOR list:

Duty cycle

Stall current

Class of insulation

List functional accessories:*

List control signal inputs:

6. General Valve Data

a. Valve

Name MAIN STEAM RELIEF/SAFETY

Mfg. DIKKERS

Model G471-6/125.04

S/N *

Type DUAL FUNCTION RELIEF/SAFETY

Size 8" x 10" pipe flange

Weight ~ 3050 lbs

Mounting Method flanged

Bolt Required Torque 1400 ft. lbs (inlet)
300 ft. lbs (outlet)

b. Actuator (if not an integral unit)

Name electro-pneumatic actuator

Mfg. SEMPRESS / SEITZ

Model VB 300/235 EWVS (cylinder)

S/N * SEITZ 1166 (air valve)
SEITZ 6A33 (solenoid)

Type pneumatic

Size 2' x 1' cylinder

Weight 410 lbs.

Mounting Method bolted

Torque N/A

NOTE: * MPL to S/N association not made until equipment is issued. S/RV will not be installed until after system hydro.

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data (Continued)

Parameter	Design	Operating
Press	1375	965 } at 100% PWR
Temp	585	540 }
Flow	871,170 lb/HR	same as design

Max ΔP across valve 1123 *

Closing time @ max ΔP N/A

Opening time @ max ΔP N/A

Power requirements for functional accessories, (if any) 125V DC (+10% -15%); .2Amps

Power requirements: (include normal, maximum and minimum).

Electrical NONE

Other: ☑ Pneumatic ☐ Hydraulic

dry air; 50 micron filtered, 100 psig (90-200 psig prior to operation)

List control signal inputs: Automatic from system pressure, or manual from the actuation of the solenoid/air cylinder

List functional accessories:* Solenoid - Seitz

* 1123 relief set pressure for relief mode of SRV operator via the electro magnetic actuator.

III. FUNCTION

1. Briefly describe components normal and safety functions: the valve limits the peak pressure in the reactor vessel by automatic relieving when system pressure is too high. the valve opens on signal to limit the thermal transient on the nuclear fuel and/or to depressurize the system to desired level. Normally closed for system integrity

2. The components normal state is: ☐ Operating ☑ Standby

3. Safety function:

a. ☐ Emergency reactor shutdown

b. ☐ Containment heat removal

c. ☐ Containment isolation

d. ☑ Reactor heat removal

e. ☐ Reactor core cooling

f. ☑ Prevent significant release of radioactive material to environment

NOTE:

Functional accessories are those sub–components not supplied by the manufacturer that are required to make the valve assembly operational (e.g., limit switches).

3. Safety function: (Continued)

   g. ☑ Does the component function to mitigate the consequences of one or more of the following events? ☑ Yes ☐ No If "Yes", identify.

   ☑ LOCA ☐ HELB ☐ MSLB

   ☑ Other Small line break

4. Safety requirements:

   ☑ Intermittent Operation ☑ During postulated event

   ☐ Continuous Operation ☑ Following postulated event

   If component operation is required following an event, give approximate length of time component must remain operational.

   100 days (e.g., hours, days, etc.)

5. For VALVES:

   does the component ☐ Fail open ☑ Fail closed ☐ Fail as is

   Is this the fail safe position? ☐ Yes ☑ No the valve will still operate in the safety mode. The relief mode will no longer be operable upon failure

   Is the valve used for throttling purposes? ☐ Yes ☑ No

   Is the valve part of the reactor coolant pressure boundary?

   ☑ Yes ☐ No

   Does the valve have a specific limit for leakage? ☑ Yes ☐ No

   If "Yes" give limit: 20 lb/hr. (EQUIVALENT PER INSTALLED VALVE FOR TOTAL PLANT COMPLIMENT.)

IV. QUALIFICATION the remaining portions cannot be completed at present. the equipment is "in test" and qualification is not complete.

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component:

   7/25/84

2. Reference those qualification standards, used as a guide to qualify the component:

SHEET 1 OF 9

PUORT 644-1

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: PERRY NPP Unit No. 1 & 2 2. Docket No.: 50-440 & 50-441

3. Utility: CLEVELAND ELECTRIC ILLUMINATING

4. NSSS: GENERAL ELECTRIC ☐ PWR ☒ BWR

5. A/E: GILBERT/COMMONWEALTH

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☐ NSSS ☒ BOP

2. Location: a. Building/Room CONTROL COMPLEX GAI DWG D-923-002

b. Elevation 574' - 10"

c. System CONTROL COMPLEX CHILLED WATER

3. Component number on in-house drawings: 0P47-C001A, Ⓑ, C

4. If component is a ☒ Pump complete II.5.

If component is a ☐ Valve complete II.6.

5 General Pump Data

a. Pump		b. Prime-mover	
Name	CONTROL COMPLEX CHILLED WATER PUMPS	Name	CONTROL COMPLEX CHILLED WATER PUMP MOTOR
Mfg.	INGERSOLL-RAND COMPANY	Mfg.	WESTINGHOUSE
Model	8X14SD	Model	LIFELINE T
S/N	0378-139, (140), 141	S/N	- 7901-01-001
Type	HORIZONTAL	Type	SQUIRREL CAGE
Size	1600 GPM CAPACITY	Size	FRAME 405 T
Weight	1,060 lbs (BEDPLATE 725 lbs)	Weight	915 lbs
Mounting Method	BOLTED TO BEDPLATE ON FLOOR	Mounting Method	BOLTED TO BEDPLATE ON FLOOR
Required B.H.P.	72	H.P.	100

ABOVE INFORMATION FOUND ON p2 OF I-R INSTRUCTION MANUAL 96-314-0-02

NOTE:

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

5. General Pump Data (Continued)

DESIGN INFORMATION FOUND ON DGP 644-1

OPERATING INFORMATION FOUND ON GAI DWG D-913-001

Parameter	Design	Operating
Press	150 PSIG	150 PSIG
Temp	55°F	55°F
Flow	1600 gpm	1513 GPM
Head	130 ft	130 ft

NOTE: DESIGN TEMP. IS 120°F FOR NON-OPERATING LOOP D-920-001

Required NPSH at maximum flow 10 ft

p2 I-R INSTRUCTION MANUAL

Available NPSH 100 ft

p2 I-R INSTRUCTION MANUAL

Operating Speed 1750 RPM

Critical Speed 6705 rpm pE-1C Report 016-36421

List functional accessories:* –

Power requirements: (include normal, maximum and minimum).

Electrical

RATED VOLTAGE 460 V

RATED FULL LOAD CURRENT 115 AMPS

MOTOR INFORMATION FOUND ON p1 MM-91

Other

If MOTOR list:

Duty cycle CONTINUOUS

Stall current RATED INRUSH CURRENT 710 AMPS

Class of insulation H

Rev II

List control signal inputs: COMBINED LOCA, LOOP

Ref. GAI DWG S-802-001 SH P47-02

III

6. General Valve Data

a. Valve

Name

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Required Torque

b. Actuator (if not an integral unit)

Name

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Torque

NOTE:

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational (e.g., coupling, lubricating oil system, etc.)

6. General Valve Data (Continued)

Parameter	Design	Operating
Press		
Temp		
Flow		
Max ΔP across valve		
Closing time @ max ΔP		
Opening time @ max ΔP		
Power requirements for functional accessories, (if any)		

Power requirements: (include normal, maximum and minimum).

Electrical

Other: ☐ Pneumatic ☐ Hydraulic

List control signal inputs:

List functional accessories:*

III. FUNCTION

1. Briefly describe components normal and safety functions: SUPPLY CHILLED WATER TO CONTROL COMPLEX HVAC SYSTEM COOLING COILS DURING NORMAL AND SAFETY OPERATION.

2. The components normal state is: ☒ Operating ☒ Standby ONE PUMP OPERATES AT ANY SPECIFIC TIME. OPERATING TIME SHARED BETWEEN THE THREE PUMPS.

3. Safety function:

a. ☐ Emergency reactor shutdown
b. ☐ Containment heat removal
c. ☐ Containment isolation
d. ☐ Reactor heat removal
e. ☐ Reactor core cooling
f. ☐ Prevent significant release of radioactive material to environment
G. ☑ OTHER PROVIDES ATMOSPHERIC COOLING TO SAFETY RELATED COMPONENTS.

NOTE:

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational (e.g., limit switches).

PLORT 644-1

3. Safety function: (Continued)

g. ☐ Does the component function to mitigate the consequences of one or more of the following events? ☒ Yes ☐ No If "Yes", identify.

☒ LOCA ☒ HELB ☒ MSLB

☐ Other ______

4. Safety requirements:

☐ Intermittent Operation ☐ During postulated event

☒ Continuous Operation ☐ Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.

180 days post LOCA (e.g., hours, days, etc.)

5. For VALVES: NA

does the component ☐ Fail open ☐ Fail closed ☐ Fail as is

Is this the fail safe position? ☐ Yes ☐ No

Is the valve used for throttling purposes? ☐ Yes ☐ No

Is the valve part of the reactor coolant pressure boundary?

☐ Yes ☐ No

Does the valve have a specific limit for leakage? ☐ Yes ☐ No

If "Yes" give limit: ______

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME SECTION III SUBSECTION ND, ASME SECTION II, SECTION IX AND SECTION XI ANSI B16.5-1973 USNRC REG. GUIDE 1.48

2. Reference those qualification standards, used as a guide to qualify the component:

IEEE 323-1974, IEEE 344-1975, IEEE 334-1974

IEEE 117-1974

PLCRT 644-1

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted: NONE

Modified: NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? ☒ Yes ☐ No

5. What is the expected failure mode that would keep the pump - valve assembly from performing its safety function? FECT SHEAR PINS

6. Are the margins* identified in the qualification documentation?

☒ Yes ☐ No

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: ☒ Analysis

☐ Test ☐ Combination

Identify PUMP tests performed:

Rev I

III

a. ☒ Shell hydrostatic (ASME Section III)

b. ☒ Bearing temperature evaluations

c. ☒ Seismic loading

d. ☒ Vibration levels

e. ☐ Exploratory vibration (Fundamental freq. ________)

f. ☐ Seal leakage @ hydro press

g. ☐ Aging: ☐ Thermal ☐ Mechanical

h. ☒ Flow performance

Are curves provided ☒ Yes ☐ No

i. ☒ Pipe reaction end loads (nozzle loads)

j. ☐ Others ________

k. ☐ Extreme environment:

☐ Humidity

☐ Chemical

☐ Radiation

NOTE:

**Margin is the difference between design basis parameters and the test parameters used for equipment qualification.*

8. Valve operability has been demonstrated by: ☐ Analysis

☐ Test ☐ Combination

Identify VALVE tests performed:

a. ☐ Shell hydrostatic
(ASME Section III)

b. ☐ Cold cyclic List times:
Open __________
Closed __________

c. ☐ Seismic loading

d. ☐ Hot cyclic List times:
Open __________
Closed __________

e. ☐ Exploratory vibration
(Fundamental freq. ______)

f. ☐ Main seat leakage

g. ☐ Aging: ☐ Thermal
☐ Mechanical

h. ☐ Back seat leakage

i. ☐ Pipe reaction end loading

j. ☐ Disc hydrostatic

k. ☐ Extreme environment
☐ Humidity
☐ Chemical
☐ Radiation

l. ☐ Flow interruption capability

m. ☐ Flow characteristics are
Are curves provided?
☐ Yes ☐ No

n. ☐ Others __________

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☐ Yes ☒ No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

10. Was the test component previsely identical (as to model, size, etc.) to the in-plant component? ☒ Yes ☐ No If "No", is installed component ☐ oversized or ☐ undersized? MOTORETTE TEST REPRESENTIVE OF MOTOR
SEISMIC ANALYSIS BASE ON SAME SIZE MOTOR

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, SECTION 5.?

☐ Yes ☐ No (NOT TYPE TESTED)

12. Is component orientation sensitive? ☒ Yes ☐ No ☐ Unknown

If "Yes", does installed orientation coincide with test orientation?

☒ Yes ☐ No (ANALYSIS BASED ON PLANT ORIENTATION)

13. Is the component mounted in the same manner in-plant as it was during ANALYSIS ~~testing~~ (i.e., welded, same number and size bolts, etc.)?

☒ Yes ☐ No ☐ Unknown

14. Were the qualification tests performed in sequence and on only one component?

☒ Yes ☐ No (MOTORETTE TEST)

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.):

THERMAL, VOLTAGE, RADIATION, VIBRATION, HUMIDITY

15. If "aging"* was performed, identify the significant aging mechanisms:

THERMAL

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☐ Plants (shutdown loads)
b. ☒ Extreme environment
c. ☒ Seismic load
d. ☐ Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

NOTE:

*As outlined in Section 4.4.1 of IEEE-627 1980.

PVCRT 644-1

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.)

☐ Yes ☒ No

If "Yes", identify: ______________________________

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance).

☐ Yes ☒ No

If "Yes", identify: ______________________________

20. Is the qualified life for the component less than 40 years?

☐ Yes ☒ No If "Yes", what is the qualified life? ______________________________

21. Information Concerning Qualification Documents for the Component

REPORT NUMBER	REPORT TITLE	DATE	COMPANY/ORGANIZATION PREPARING REPORT	COMPANY/ORGANIZATION REVIEWING REPORT
016-36421	STRUCTURAL INTEGRITY AND OPERABILITY ANALYSIS OF 8X14SD PUMP	11-23-82	INGERSOLL-RAND COMPANY	GILBERT ASSOCIATES INC.
MM-9112	QUALIFICATION DOCUMENT CLASS IE MEDIUM A.C. MOTORS	1-18-80	WESTINGHOUSE	GILBERT ASSOCIATES INC.
~~WCAP-9112~~	~~QUALIFICATION OF WESTINGHOUSE MEDIUM MOTOR AND GEARING DIVISION CLASS IE MOTORS~~	~~5-12-77~~	~~WESTINGHOUSE~~	~~GILBERT ASSOCIATES INC.~~
-	INSTRUCTION FOR INSTALLATION - OPERATION AND MAINTENANCE OF "S" LINE GENERAL SERVICE PUMPS	2-23-79	INGERSOLL-RAND COMPANY	—

III

REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
I	/ 2-23-83	fff	/ JFF	
II	/ 11-29-83	fff	/ JFF	
III	/ 7-20-84	fff	/	/

SP-644

REVIEWED BY ________ / 11-21-83

CHECKED BY J. F. Flemming Jr / 11-25-83

APPROVED BY ________ / 7-20-84

SHEET 9 OF 9

PUORT 644-1

B/M RN I 203

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: PERRY NPP Unit No. 1 & 2 2. Docket No.: 50-440 & 50-441

3. Utility: CLEVELAND ELECTRIC ILLUMINATING

4. NSSS: GENERAL ELECTRIC ☐ PWR ☒ BWR

5. A/E: GILBERT/COMMONWEALTH

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☐ NSSS ☒ BOP

2. Location: a. Building/Room AUXILIARY

b. Elevation 574 FT

c. System P-45 EMERGENCY SERVICE WATER

3. Component number on in-house drawings: 1 P45 F0571 Ⓐ & B

4. If component is a ☐ Pump complete II.5.

If component is a ☒ Valve complete II.6.

5. General Pump Data

a. Pump	b. Prime-mover
Name	Name
Mfg.	Mfg.
Model	Model
S/N	S/N
Type	Type
Size	Size
Weight	Weight
Mounting Method	Mounting Method
Required B.H.P.	H.P.

NOTE:

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

5. General Pump Data (Continued)

Parameter	Design	Operating
Press		
Temp		
Flow		
Head		

Power requirements: (include normal, maximum and minimum).

Electrical

Other

Required NPSH at maximum flow

Available NPSH

Operating Speed

Critical Speed

If MOTOR list:

Duty cycle

Stall current

Class of insulation

List functional accessories:*

List control signal inputs:

6. General Valve Data

a. Valve

Name SERVICE WATER VALVE

Mfg. TARGET ROCK

Model 76H-006

S/N [✓ 1] , 2

Type RELIEF VALVE

Size $1\frac{1}{2}$"-150 x 2"-150

Weight 35 LBS.

Mounting Method BOLTED

Required Torque N/A

b. Actuator (if not an integral unit)

Name NONE

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Torque

NOTE:

**Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational (e.g., coupling, lu' icating oil system, etc.)*

6. General Valve Data (Continued)

Parameter	Design	Operating
Press	150PSI	125 PSIG SET PRESS.
Temp	150°F	150°F
Flow	50.4GPM	*

Max ΔP across valve 125 psid

Closing time @ max ΔP N/A.

Opening time @ max ΔP N/A

Power requirements for functional accessories, (if any) NONE

Power requirements: (include normal, maximum and minimum).

Electrical NONE

Other: ☐ Pneumatic ☐ Hydraulic

NONE

List control signal inputs: NONE

List functional accessories:* NONE

* VARIES WITH PRESSURE AND FLOW AT VALVE INLET

III. FUNCTION

1. Briefly describe components normal and safety functions: VALVE IS LOCATED BETWEEN ISOLATION VALVES OF RHR HEAT EXCHANGER TO PREVENT OVERPRESSURIZATION & POSSIBLE DAMAGE TO EQUIPMENT OR PIPING

2. The components normal state is: ☐ Operating ☒ Standby

3. Safety function:

- a. ☐ Emergency reactor shutdown
- b. ☐ Containment heat removal
- c. ☐ Containment isolation
- d. ☒ Reactor heat removal
- e. ☐ Reactor core cooling
- f. ☐ Prevent significant release of radioactive material to environment

NOTE:

**Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational (e.g., limit switches).*

3. Safety function: (Continued)

g. ☐ Does the component function to mitigate consequences of one or more of the following events? ☐ Yes ☒ No "If Yes", identify.

☐ LOCA ☐ HELB ☐ MSLB

☐ Other ____________________

4. Safety requirements:

☐ Intermittent Operation ☐ During postulated event

☐ Continuous Operation ☐ Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.

N/A (e.g., hours, days, etc.)

5. For VALVES:

does the component N/A ☐ Fail open ☐ Fail closed ☐ Fail as is

Is this the fail safe position? N/A ☐ Yes ☐ No

(NOT APPLICABLE FOR RELIEF VALVE WITHOUT ACTUATOR

Is the valve used for throttling purposes? ☐ Yes ☒ No

Is the valve part of the reactor coolant pressure boundary?

☐ Yes ☒ No

Does the valve have a specific limit for leakage? ☐ Yes ☐ No

If "Yes" give limit: 15 CC/HR SEAT LEAKAGE (@ 90% OF SET PRESSURE FOR 15 MIN. DURATION - COMPLETED WITHIN 1 HR. AFTER ACTUATION PER SPEC. 523)

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME BOILER & PRESSURE VESSEL CODE, SECTION III, DIV. 1, 1974 EDITION TO SUMMER 1975

2. Reference those qualification standards, used as a guide to qualify the component:

GAI SPEC SP-523-4549-00

NRC STD. REVIEW PLAN 3.9.3

NRC REG. GUIDE 1.48 (3/81)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
NONE	NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? ☒ Yes ☐ No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? PERMANENT DEFORMATION OF NECK

6. Are the margins* identified in the qualification documentation?

☒ Yes ☐ No

If component is a PUMP, complete IV.7.

If component is [✓ a VALVE,] complete IV.8.

7. Pump operability has been demonstrated by: ☐ Analysis

☐ Test ☐ Combination

Identify PUMP tests performed:

a. ☐ Shell hydrostatic (ASME Section III)

b. ☐ Bearing temperature evaluations

c. ☐ Seismic loading

d. ☐ Vibration levels

e. ☐ Exploratory vibration (Fundamental freq. ________)

f. ☐ Seal leakage @ hydro press

g. ☐ Aging: ☐ Thermal ☐ Mechanical

h. ☐ Flow performance

Are curves provided ☐ Yes ☐ No

i. ☐ Pipe reaction end loads (nozzle loads)

j. ☐ Others ________

k. ☐ Extreme environment:

☐ Humidity

☐ Chemical

☐ Radiation

NOTE:

**Margin is the difference between design basis parameters and the test parameters used for equipment qualification.*

8. Valve operability has been demonstrated by: ☐ Analysis

☐ Test ☒ Combination

Identify VALVE tests performed:

a. ☒ Shell hydrostatic (ASME Section III)

b. ☐ Cold cyclic List times:

Open ______

Closed ______

c. ☑ Seismic loading

d. ☐ Hot cyclic List times:

Open ______

Closed ______

e. ☐ Exploratory vibration (Fundamental freq. ______)

f. ☒ Main seat leakage

g. ☐ Aging: ☐ Thermal ☐ Mechanical

h. ☐ Back seat leakage

i. ☐ Pipe reaction end loading

j. ☐ Disc hydrostatic

k. ☐ Extreme environment

☐ Humidity

☐ Chemical

☐ Radiation

l. ☐ Flow interruption capability

m. ☐ Flow characteristics are

Are curves provided?

☐ Yes ☐ No

n. ☒ Others SINE BEAT TEST RESONANT FREQUENCY SEARCH

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☐ Yes ☒ No If "Yes", briefly describe any changes made in tests (or analysis or to the component to correct the deviation.

______

______

______

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? ☒ Yes ☐ No If "No", is installed component ☐ oversized or ☐ undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, SECTION 5.?

☐ Yes N/A ☐ No (NO ELECTRICAL COMPONENTS)

12. Is component orientation sensitive? ☐ Yes ☒ No ☐ Unknown

If "Yes", does installed orientation coincide with test orientation?

☐ Yes ☐ No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?

☒ Yes ☐ No ☐ Unknown

14. Were the qualification tests performed in sequence and on only one component?

☒ Yes ☐ No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.):

(a) PRE-TEST INSPECTION & OPERATIONAL TESTS
(b) RESONANT FREQUENCY SEARCH
(c) INPUT MOTION TESTS (SINE BEAT)
(d) POST-TEST INSPECTION & OPERATIONAL TESTS

15. If "aging"* was performed, identify the significant aging mechanisms:

(NOT PERFORMED)

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☐ Plants (shutdown loads)

b. ☐ Extreme environment

c. ☒ Seismic load

d. ☐ Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

NOTE:

**As outlined in Section 4.4.1 of IEEE-627 1980.*

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.)

☐ Yes ☒ No

If "Yes", identify: ______________________________

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance).

☐ Yes ☒ No

If "Yes", identify: ______________________________

20. Is the qualified life for the component less than 40 years?

☐ Yes ☒ No If "Yes", what is the qualified life? ______________________________

21. Information Concerning Qualification Documents for the Component

REPORT NUMBER	REPORT TITLE	DATE	COMPANY/ORGANIZATION PREPARING REPORT	COMPANY/ORGANIZATION REVIEWING REPORT
SP. 523-4549-00	SPECIFICATION - DESIGN, FABRICATION, AND DELIVERY OF SAFETY RELATED RELIEF VALVES	REV. VII 5-12-82	GILBERT / COMMONWEALTH	GILBERT / COMMONWEALTH
3636	SEISMIC QUALIFICATION TEST REPORT FOR PERRY NUCLEAR POWER PLANT.	REV. 0 11-10-82	TARGET ROCK CORP.	GILBERT / COMMONWEALTH
2196	IMPOSED LOADING REPORT FOR 76H VALVES, WITH ADDENDUM #1	REV. B 4-28-83	TARGET ROCK CORP.	GILBERT / COMMONWEALTH
2206	SEISMIC QUALIFICATION AND ASSURANCE OF OPERABILITY REPORT.	REV. E 7-11-83	TARGET ROCK CORP.	GILBERT / COMMONWEALTH
3672	SUMMARY REPORT "NEW LOADS" APPLIED TO PROJECT 76H	REV. 0 6-10-83	TARGET ROCK CORP.	GILBERT / COMMONWEALTH

REV. NO	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
1	8-3-83	JAD	RHN	KAM
2	~~8~~7-20-84			

REVIEWED BY A. HIRSHBERGER /2-8-83

CHECKED BY R. H. NEWMAN /2-9-83

APPROVED BY K. A. MAHONY /11-25-83

B/M RNN 9

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: PERRY NPP Unit No. 1 & 2 2. Docket No.: 50-440 & 50-441

3. Utility: CLEVELAND ELECTRIC ILLUMINATING

4. NSSS: GENERAL ELECTRIC ☐ PWR ☒ BWR

5. A/E: GILBERT/COMMONWEALTH

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☐ NSSS ☒ BOP

2. Location: a. Building/Room REACTOR

b. Elevation 599 FT.

c. System P-50 CONTAINMENT VESSEL CHILLED WATER

3. Component number on in-house drawings: 1 P50 F0140

4. If component is a ☐ Pump complete II.5.

If component is a ☒ Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	
Size		Size	
Weight		Weight	
Mounting Method		Mounting Method	
Required B.H.P.		H.P.	

NOTE:

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

5. General Pump Data (Continued)

Parameter	Design	Operating
Press		
Temp		
Flow		
Head		

Power requirements: (include normal, maximum and minimum).

Electrical

Other

Required NPSH at maximum flow

Available NPSH

Operating Speed

Critical Speed

If MOTOR list:

Duty cycle

Stall current

Class of insulation

List functional accessories:*

List control signal inputs:

6. General Valve Data

a. Valve Name INBOARD CONTAINMENT ISOLATION

Mfg. CONTROMATICS

Model C-W2566-BB

S/N 34772-16-1

Type BUTTERFLY VALVE

Size 6" 150LB CLASS

Weight 290LB w/ ACTUATOR

Mounting Method PIPE MOUNTED BETWEEN FLANGES

Required Torque 83 FT-LBS

b. Actuator (if not an integral unit) Name INBOARD CONTAINMENT ISOLATION VALVE MOTOR OPERATOR

Mfg. LIMITORQUE

Model SMB-000-2 w HOBC

S/N 249096

Type SMB

Size 000-2

Weight 180 LBS

Mounting Method BOLTED

Torque 469 FT LBS

NOTE:

**Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational (e.g., coupling, lubricating oil system, etc.)*

6. General Valve Data (Continued)

Parameter	Design	Operating
Press	150 PSIg	≤150 PSIg
Temp	185°F	45°-55°F
Flow	600 gpm	≤600 gpm

Max ΔP across valve 150 PSI

Closing time @ max ΔP 30 SEC

Opening time @ max ΔP 30 SEC

Power requirements for functional accessories, (if any) NONE

Power requirements: (include normal, maximum and minimum).

Electrical 460V, 3ϕ, 60HZ

.13HP

Other: ☐ Pneumatic ☐ Hydraulic

N/A

List control signal inputs: NONE

List functional accessories:* NONE

III. FUNCTION

1. Briefly describe components normal and safety functions:

NORMAL - OPEN, ALLOWING CHILLED WATER FLOW FOR CONTAINMENT VESSEL COOLING

SAFETY - CLOSED FOR CONTAINMENT ISOLATION

2. The components normal state is: ☒ Operating ☐ Standby

3. Safety function:

a. ☐ Emergency reactor shutdown

b. ☐ Containment heat removal

c. ☒ Containment isolation

d. ☐ Reactor heat removal

e. ☐ Reactor core cooling

f. ☐ Prevent significant release of radioactive material to environment

NOTE:

**Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational (e.g., limit switches).*

3. Safety function: (Continued)

g. ☒ Does the component function to mitigate the consequences of one or more of the following events? ☒ Yes ☐ No If "Yes", identify.

☒ LOCA ☐ HELB ☐ MSLB

☐ Other ______

4. Safety requirements:

☐ Intermittent Operation ☒ During postulated event

☐ Continuous Operation ☐ Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.

N/A (e.g., hours, days, etc.)

5. For VALVES:

does the component ☐ Fail open ☐ Fail closed ☒ Fail as is

Is this the fail safe position? N/A ☐ Yes ☐ No

NOT A SPRING-LOADED VALVE

Is the valve used for throttling purposes? ☐ Yes ☒ No

Is the valve part of the reactor coolant pressure boundary?

☐ Yes ☒ No

Does the valve have a specific limit for leakage? ☒ Yes ☐ No

If "Yes" give limit: 18 cc/HR

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: SPECIFICATION 524, ASME BOILER AND PRESSURE VESSEL CODE SECTION III DIV 1, SUBSECTION NC 3500

2. Reference those qualification standards, used as a guide to qualify the component:

NRC REGULATORY GUIDE 1.48 3/81

NRC STANDARD REVIEW PLAN 3.93 (NUREG-0800) REV. 1 7/81

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
NONE	NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? ☒ Yes ☐ No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? NONE

6. Are the margins* identified in the qualification documentation?

☒ Yes ☐ No

If component is a PUMP, complete IV.7.

If component is a [✓ VALVE,] complete IV.8.

7. Pump operability has been demonstrated by: ☐ Analysis

☐ Test ☐ Combination

Identify PUMP tests performed:

a. ☐ Shell hydrostatic (ASME Section III)

b. ☐ Bearing temperature evaluations

c. ☐ Seismic loading

d. ☐ Vibration levels

e. ☐ Exploratory vibration (Fundamental freq. ________)

f. ☐ Seal leakage @ hydro press

g. ☐ Aging: ☐ Thermal ☐ Mechanical

h. ☐ Flow performance

Are curves provided ☐ Yes ☐ No

i. ☐ Pipe reaction end loads (nozzle loads)

j. ☐ Others ________

k. ☐ Extreme environment:
  - ☐ Humidity
  - ☐ Chemical
  - ☐ Radiation

NOTE:

Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

8. Valve operability has been demonstrated by: ☐ Analysis

☒ Test ☐ Combination

Identify VALVE tests performed:

a. ☒ Shell hydrostatic VALVE (ASME Section III)

b. ☐ Cold cyclic List times:
Open ____________
Closed ____________

SEE LIMIT TORQUE QUALI-FICATION

c. ☒ Seismic loading (VALVE AND ACTUATOR)

d. ☐ Hot cyclic List times:
Open ____________
Closed ____________

e. ☐ Exploratory vibration (Fundamental freq. ______)

f. ☒ Main seat leakage (VALVE)

g. ☒ Aging: ☒ Thermal ☒ Mechanical
ACTUATOR.

h. ☐ Back seat leakage

i. ☐ Pipe reaction end loading

j. ☐ Disc hydrostatic

k. ☒ Extreme environment (ACTUATOR)
☒ Humidity
☐ Chemical
☒ Radiation

l. ☐ Flow interruption capability

m. ☐ Flow characteristics are
Are curves provided?
☐ Yes ☐ No

n. ☒ Others RESONANCE SURVEY TEST
MULTIPLE FREQUENCY TEST } VALVE
____

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☐ Yes ☒ No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

____

____

____

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? ☐ Yes ☒ No If "No", is installed component ☐ oversized or ☒ undersized?

CONTROMATICS QUALIFICATION BY SIMILARITY

SEE LIMITORQUE QUALIFICATION

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, SECTION 5.?

☒ Yes ☐ No

12. Is component orientation sensitive? ☐ Yes ☒ No ☐ Unknown

If "Yes", does installed orientation coincide with test orientation?

☐ Yes ☐ No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?

☒ Yes ☐ No ☐ Unknown

SEE LIMITORQUE QUALI-FICATION

14. Were the qualification tests performed in sequence and on only one component?

☒ Yes ☐ No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.):

ACCORDING TO IEEE 323 (1974) 6.3.2, 1-6 (ACTUATOR)

15. If "aging"* was performed, identify the significant aging mechanisms: (ACTUATOR)

THERMAL

MECHANICAL (CYCLING)

RADIATION (EXPOSURE TO GAMMA RADIATION)

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☒ Plants (shutdown loads)

b. ☒ Extreme environment (ACTUATOR)

c. ☒ Seismic load (ACTUATOR & VALVE)

d. ☒ Others

HYDRODYNAMIC

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

NOTE:

**As outlined in Section 4.4.1 of IEEE-627 1980.*

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.)

☐ Yes ☒ No

If "Yes", identify: ____________________

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance).

☐ Yes ☒ No

If "Yes", identify: ____________________

20. Is the qualified life for the component less than 40 years?

☐ Yes ☒ No If "Yes", what is the qualified life? ____________________

21. Information Concerning Qualification Documents for the Component

REPORT NUMBER	REPORT TITLE	DATE	COMPANY/ORGANIZATION PREPARING REPORT	COMPANY/ORGANIZATION REVIEWING REPORT
SP-524-4549-000 REV XIV	SPECIFICATION - DESIGN FABRICATION, AND DELIVERY OF SAFETY RELATED BUTTERFLY AND BALL VALVES	ORIG. 12/13/74 REV XIV 7/30/81	GILBERT/ COMMONWEALTH	GILBERT/ COMMONWEALTH
#B0058	LIMITORQUE VALVE ACTUATOR QUALIFICATION	1-11-80	LIMITORQUE CORP.	GILBERT/ COMMONWEALTH
16243-1	REPORT OF TEST FOR DYNAMIC TESTING OF 1, 8" CONTROMATICS VALVE ASSEMBLY	7-31-81	ENVIRONMENTAL TESTING CORP.	GILBERT/ COMMONWEALTH
B0115	HYDRODYNAMIC VIBRATION TESTING (NEW LOADS)	6-24-82	LIMITORQUE CORPORATION	GILBERT/ COMMONWEALTH

REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
/			/	/
/			/	/
/			/	/

REVIEWED BY 1 7/20/84

CHECKED BY 1 7/23/84

APPROVED BY 1 7/23/84

B/M RNN 226

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: PERRY NPP Unit No. 1 & 2 2. Docket No.: 50-440 & 50-441

3. Utility: CLEVELAND ELECTRIC ILLUMINATING

4. NSSS: GENERAL ELECTRIC ☐ PWR ☒ BWR

5. A/E: GILBERT/COMMONWEALTH

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☐ NSSS ☒ BOP

2. Location: a. Building/Room AUXILIARY

b. Elevation 574 FT.

c. System E12 RESIDUAL HEAT REMOVAL

3. Component number on in-house drawings: 1/2 E12 F0006 [✓ A], B

4. If component is a ☐ Pump complete II.5.

If component is a ☒ Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	
Size		Size	
Weight		Weight	
Mounting Method		Mounting Method	
Required B.H.P.		H.P.	

NOTE:

**The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.*

5. General Pump Data (Continued)

Parameter	Design	Operating
Press		
Temp		
Flow		
Head		

Power requirements: (include normal, maximum and minimum).

Electrical ______

Other ______

Required NPSH at maximum flow ______

Available NPSH ______

Operating Speed ______

Critical Speed ______

If MOTOR list:

Duty cycle ______

Stall current ______

Class of insulation ______

List functional accessories:* ______

List control signal inputs: ______

6. General Valve Data

a. Valve

Name ISOLATION VALVE

Mfg. BORG WARNER

Model 81150

S/N 1E12F0006A 53070
1E12F0006B 51899

Type GATE VALVE

Size 18". 300 LB.

Weight 4600 REPORT NSR 81150

Mounting Method WELD. END

Required Torque 730 FT LBS

b. Actuator (if not an integral unit)

Name ISOLATION VALVE MOTOR OPERATOR

Mfg. LIMITORQUE

Model SMB

S/N 1E12F0006A 288336
1E12F0006B 288337

Type W.P.

Size 1-40

Weight 450 LBS

Mounting Method BOLTED

Torque 850 FT. LBS

NOTE:

**Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational (e.g., coupling, lubricating oil system, etc.)*

6. General Valve Data (Continued)

Parameter	Design	Operating
Press	500 PSIG	165 PSIG
Temp	480°F	358°F
Flow	7100 GPM	7100 GPM

Max ΔP across valve 330 PSID

Closing time @ max ΔP 87.2 SEC

Opening time @ max ΔP 86.8 SEC

TIMES INDICATED ARE ACTUAL TEST TIMES DURING STATIC DEFLECTION. SPEC. RQMT IS 90 SEC.

Power requirements for functional accessories, (if any) NONE

Power requirements: (include normal, maximum and minimum).

Electrical 460 [illegible] 3 | 60

2.6 HP

Other: ☐ Pneumatic ☐ Hydraulic

NONE

List control signal inputs: NONE

List functional accessories:* NONE

III. FUNCTION

1. Briefly describe components normal and safety functions:

NORMAL - NOT OPERATING

SAFETY - OPEN TO ALLOW CROSS-FLOW BETWEEN RHR A & B LOOPS

2. The components normal state is: ☐ Operating ☒ Standby

3. Safety function:

a. ☒ Emergency reactor shutdown
b. ☐ Containment heat removal
c. ☐ Containment isolation
d. ☑ Reactor heat removal
e. ☐ Reactor core cooling
f. ☐ Prevent significant release of radioactive material to environment

NOTE:

**Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational (e.g., limit switches).*

3. Safety function: (Continued)

   g. ☐ Does the component function to mitigate the consequences of one or more of the following events? ☒ Yes ☐ No If "Yes", identify.

   ☒ LOCA ☐ HELB ☐ MSLB

   ☐ Other

4. Safety requirements:

   ☐ Intermittent Operation ☐ During postulated event

   ☐ Continuous Operation ☒ Following postulated event

   If component operation is required following an event, give approximate length of time component must remain operational.

   FOR LENGTH OF POSTULATED EVENT (180 DAYS MAX) (e.g., hours, days, etc.)

5. For VALVES:

   does the component ☐ Fail open ☐ Fail closed ☒ Fail as is

   Is this the fail safe position? ☐ Yes ☐ No N/A NOT A SPRING LOADED VALVE

   Is the valve used for throttling purposes? ☐ Yes ☒ No

   Is the valve part of the reactor coolant pressure boundary?

   ☐ Yes ☒ No

   Does the valve have a specific limit for leakage? ☒ Yes ☐ No

   If "Yes" give limit: 180 CC/HR HYDROSTATIC LEAK PER SPEC
   17,100 CC/HR PNEUMATIC " 521-02

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME BOILER & PRESSURE VESSEL CODE, SECTION III, NB 3200 & NC 3500, 1971 EDITION TO WINTER 1972

2. Reference those qualification standards, used as a guide to qualify the component:

   GAI SPEC. SP-521-02-4549-00
   IEEE 323-74
   NRC STD REVIEW PLAN 3.9.3
   NRC REG. GUIDE 1.48 (3/81)

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted:	Modified:
NONE	NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? ☒ Yes ☐ No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? PERMANENT DEFORMATION OF BONNET FLANGE

6. Are the margins* identified in the qualification documentation?

☒ Yes ☐ No

If component is a PUMP, complete IV.7.

If component is a VALVE, complete IV.8.

7. Pump operability has been demonstrated by: ☐ Analysis

☐ Test ☐ Combination

Identify PUMP tests performed:

a. ☐ Shell hydrostatic (ASME Section III)

b. ☐ Bearing temperature evaluations

c. ☐ Seismic loading

d. ☐ Vibration levels

e. ☐ Exploratory vibration (Fundamental freq. ________)

f. ☐ Seal leakage @ hydro press

g. ☐ Aging: ☐ Thermal ☐ Mechanical

h. ☐ Flow performance
Are curves provided ☐ Yes ☐ No

i. ☐ Pipe reaction end loads (nozzle loads)

j. ☐ Others ________

k. ☐ Extreme environment:
  ☐ Humidity
  ☐ Chemical
  ☐ Radiation

NOTE:
*Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

8. Valve operability has been demonstrated by: ☐ Analysis

☐ Test ☒ Combination

Identify VALVE tests performed:

a. ☒ Shell hydrostatic (ASME Section III)

b. ☐ Cold cyclic List times:

Open ______________

Closed ______________

c. ☒ Seismic loading

d. ☐ Hot cyclic List times:

Open ______________

Closed ______________

e. ☐ Exploratory vibration (Fundamental freq. _______)

f. ☒ Main seat leakage

SEE LIMITORQUE QUALIFICATION

g. ☒ Aging: ☒ Thermal ☒ Mechanical } ACTUATOR

h. ☐ Back seat leakage

i. ☐ Pipe reaction end loading

j. ☐ Disc hydrostatic

k. ☒ Extreme environment (ACTUATOR)

☒ Humidity

☐ Chemical

☒ Radiation

l. ☐ Flow interruption capability

m. ☐ Flow characteristics are

Are curves provided?

☐ Yes ☐ No

n. ☒ Others STATIC DEFLECTION (ASSEMBLY)

NSR 81150 REPORT

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☐ Yes ☒ No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? ☒ Yes ☐ No If "No", is installed component ☐ oversized or ☐ undersized? ACTUATOR & VALVE

SEE LIMITORQUE QUALIFICATION

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, SECTION 5.?

☒ Yes ☐ No ACTUATOR

12. Is component orientation sensitive? ☐ Yes ☒ No ☐ Unknown

If "Yes", does installed orientation coincide with test orientation?

☐ Yes ☐ No

SEE LIMITORQUE QUALIFICATION

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?

☒ Yes ☐ No ☐ Unknown

14. Were the qualification tests performed in sequence and on only one component?

☒ Yes ☐ No ACTUATOR

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.):

ACCORDING TO IEEE 323(1974) 6.3.2.1-6

15. If "aging"* was performed, identify the significant aging mechanisms:

THERMAL

MECHANICAL (CYCLING)

RADIATION (EXPOSURE TO GAMMA RADIATION)

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☐ Plants (shutdown loads)

b. ☒ Extreme environment (ACTUATOR ONLY)

c. ☒ Seismic load (ACTUATOR & VALVE)

d. ☒ Others

HYDRODYNAMIC (ACTUATOR ONLY)

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

NOTE:

**As outlined in Section 4.4.1 of IEEE-627 1980.*

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.)

☐ Yes ☒ No

If "Yes", identify: ______________________________

____

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance).

☐ Yes ☒ No

If "Yes", identify: ______________________________

____

____

____

20. Is the qualified life for the component less than 40 years?

☐ Yes ☒ No If "Yes", what is the qualified life? ______________

____

21. Information Concerning Qualification Documents for the Component

REPORT NUMBER	REPORT TITLE	DATE	COMPANY/ORGANIZATION PREPARING REPORT	COMPANY/ORGANIZATION REVIEWING REPORT
SP-521-02	SPECIFICATION-DESIGN, FABRICATION AND DELIVERY OF SAFETY RELATED GATE, GLOBE AND CHECK VALVES 2½" & LARGER	6-10-75 (ORIG.) 3-4-82 REV. XIV	GILBERT/ COMMONWEALTH	GILBERT/ COMMONWEALTH
NSR81150	SEISMIC ANALYSIS OF 18" 300LB CARBON STEEL MOTOR OPERATED GATE VALVE	REV. C 4-21-80	BORG WARNER	GILBERT/ COMMONWEALTH
B00 58	LIMITORQUE VALVE ACTUATOR QUALIFICATION	1-11-80	LIMITORQUE CORP.	GILBERT/ COMMONWEALTH
B0115	HYDRODYNAMIC VIBRATION TESTING (NEW LOADS)	6-24-82	LIMITORQUE CORPORATION	GILBERT/ COMMONWEALTH

REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/		/	/
	/		/	/
	/		/	/

REVIEWED BY 7/19/84

CHECKED BY 7/23/84

APPROVED BY 7/23/84

BM No. RNN 279
MPL No. MS1F0110

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: PERRY NPP Unit No. 1 & 2 2. Docket No.: 50-440 & 50-441

3. Utility: CLEVELAND ELECTRIC ILLUMINATING

4. NSSS: GENERAL ELECTRIC ☐ PWR ☒ BWR

5. A/E: GILBERT/COMMONWEALTH

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☐ NSSS ☒ BOP

2. Location: a. Building/Room INTERMEDIATE

b. Elevation 624'

c. System MS1 . COMBUSTIBLE GAS CONTROL

3. Component numuer on in-house drawings: RNN 279 MS1F0110

4. If component is a ☐ Pump complete II.5.

If component is a ☒ Valve complete II.6.

5. General Pump Data

a. Pump	b. Prime-mover
Name	Name
Mfg.	Mfg.
Model	Model
S/N	S/N
Type	Type
Size	Size
Weight	Weight
Mounting Method	Mounting Method
Required B.H.P.	H.P.

NOTE:

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

5. General Pump Data (Continued)

~~Parameter~~	~~Design~~	~~Operating~~
~~Press~~		
~~Temp~~		
~~Flow~~		
~~Head~~		

~~Required NPSH at maximum flow~~

~~Available NPSH~~

~~Operating Speed~~

~~Critical Speed~~

~~List functional accessories*~~

~~List control signal inputs:~~

~~Power requirements: (include normal, maximum and minimum).~~

~~Electrical~~

~~Other~~

~~If MOTOR list:~~

~~Duty cycle~~

~~Stall current~~

~~Class of insulation~~

6. General Valve Data

a. Valve

Name OUTBOARD CONTAINMENT ISOLATION VALVE

Mfg ROCKWELL INTERNATIONAL

Model 150 14 MPT 2

S/N BH940

Type ANGLE- GLOBE

Size 2" 1500 LB CLASS

Weight 70 LB

Mounting Method PIPE MOUNTED

Required Torque 34 FT. POUNDS

b. Actuator (if not an integral unit)

Name OUTBOARD CONTAINMENT ISOLATION VALVE MOTOR ACTUATOR

Mfg. LIMITORQUE

Model SMB-000-2

S/N 347412

Type SMB

Size 000-2

Weight 170 LB.

Mounting Method BOLTED TO VALVE YOKE FLANGE

Torque AVAIL 56 FT. POUNDS

NOTE:

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational (e.g., coupling, lubricating oil system, etc.)

GAI DWG.
302.831
SP
531-06

6. General Valve Data (Continued)

Parameter	Design	Operating
Press (IN. H_2O ABS.)	1238	537
Temp (°F)	330	175
Flow (SCFM)	50	50

Max ΔP across valve 600 PSI

Closing time @ max ΔP MFR. STD.

Opening time @ max ΔP MFR. STD.

Power requirements for functional accessories, (if any) NONE

Power requirements: (include normal, maximum and minimum).

Electrical 460 v, 3 ϕ, 60 HZ
.13 HP

Other: ☐ Pneumatic ☐ Hydraulic
N/A

List control signal inputs: NONE

List functional accessories:* NONE

III. FUNCTION

1. Briefly describe components normal and safety functions:
NORMALLY OPEN
CLOSE FOR CONTAINMENT ISOLATION

2. The components normal state is ☐ Operating ☒ Standby

3. Safety function
   - a. ☐ Emergency reactor shutdown
   - b. ☐ Containment heat removal
   - c. ☒ Containment isolation
   - d. ☐ Reactor heat removal
   - e. ☐ Reactor core cooling
   - f. ☒ Prevent significant release of radioactive material to environment

NOTE:

*Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational (e.g., limit switches).

3. Safety function: (Continued)

   g. ☒ Does the component function to mitigate the consequences of one or more of the following events? ☒ Yes ☐ No If "Yes", identify.

   ☒ LOCA ☐ HELB ☐ MSLB

   ☐ Other __________

4. Safety requirements:

   ☐ Intermittent Operation ☐ During postulated even

   ☐ Continuous Operatior ☒ Following postulated event

   If component operation is required following an event, give approximate length of time component must remain operational.

   100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

   does the component ☐ Fail open ☐ Fail closed ☒ Fail as is NOT A SPRING LOADED ACTUATOR

   Is this the fail safe position? ☐ Yes ☐ No N/A

   Is the valve used for throttling purposes? ☐ Yes ☒ No

   Is the valve part of the reactor coolant pressure boundary?

   ☐ Yes ☒ No

   Does the valve have a specific limit for leakage? ☒ Yes ☐ No

   If "Yes" give limit: HYDROSTATIC SEAT LEAKAGE- 20cc/HR. MAX. PNEUMATIC SEAT LEAKAGE 1900cc/HR. MAX.

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: SPECIFICATION SP 531-06, ASME B&PV CODE, SECTION III, SUBSECTION NCA, NB & SECTION III APPENDICES, 1974 EDITION, WINTER 1972 ADDENDA FOR CLASS 2 OR 3 VALVES

2. Reference those qualification standards, used as a guide to qualify the component:

   NRC REG. GUIDE 1.48 3/81

   NRC STD. REVIEW PLAN 3.93 (NUREG 0800) REV. 1 7/81

   IEEE 382-1980

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted: NONE

Modified: NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? ☒ Yes ☐ No

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? NONE APPARENT FROM REPORT LWR 83-27

6. Are the margins* identified in the qualification documentation?

☒ Yes ☐ No

If component is a PUMP, complete IV.7.

If component is [✓ a VALVE], complete IV.8.

7. Pump operability has been demonstrated by: ☐ Analysis

☐ Test ☐ Combination

Identify PUMP tests performed:

a. ☐ Shell hydrostatic (ASME Section III)

b. ☐ Bearing temperature evaluations

c. ☐ Seismic loading

d. ☐ Vibration levels

e. ☐ Exploratory vibration (Fundamental freq. ________)

f. ☐ Seal leakage @ hydro press

g. ☐ Aging: ☐ Thermal ☐ Mechanical

h. ☐ Flow performance

Are curves provided ☐ Yes ☐ No

i. ☐ Pipe reaction end loads (nozzle loads)

j. ☐ Others ________

k. ☐ Extreme environment:

☐ Humidity

☐ Chemical

☐ Radiation

NOTE:

**Margin is the difference between design basis parameters and the test parameters used for equipment qualification.*

8. Valve operability has been demonstrated by: ☐ Analysis

☐ Test ☒ Combination

Identify VALVE tests performed:

a. ☒ Shell hydrostatic (ASME Section III)

b. ☐ Cold cyclic List times:
Open ______
Closed ______

c. ☒ Seismic loading (VALVE ANALYSIS)

d. ☐ Hot cyclic List times:
Open ______
Closed ______

e. ☐ Exploratory vibration (Fundamental freq. ______)

f. ☒ Main seat leakage

SEE LIMITORQUE QUALIFICATION g. ☒ Aging: ☐ Thermal ☐ Mechanical

h. ☐ Back seat leakage

i. ☒ Pipe reaction end loading (VALVE ANALYSIS)

j. ☒ Disc hydrostatic

k. ☒ Extreme environment (ACTUATOR ONLY)

SEE LIMITORQUE QUALIFICATION
☒ Humidity
☐ Chemical
☒ Radiation

l. ☐ Flow interruption capability

m. ☐ Flow characteristics are
Are curves provided?
☐ Yes ☐ No

n. ☒ Others MODAL TEST (VALVE)
STATIC OPERABILITY TEST (VALVE)

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☐ Yes ☒ No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

10. Was the test component previsely identical (as to model, size, etc.) to the in-plant component? ☒ Yes ☐ No If "No", is installed component ☐ oversized or ☐ undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323–1974, SECTION 5.? ACTUATOR

SEE LIMITORQUE QUALIFICATION ☒ Yes ☐ No

12. Is component orientation sensitive? ☐ Yes ☒ No ☐ Unknown

If "Yes", does installed orientation coincide with test orientation?

☐ Yes ☐ No

13. Is the component mounted in the same manner in–plant as it was during testing (i.e., welded, same number and size bolts, etc.)?

☒ Yes ☐ No ☐ Unknown

SEE
LIMIT-
TORQUE
QUALI-
FICATION

14. Were the qualification tests performed in sequence and on only one component?

☒ Yes ☐ No

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.):

ACCORDING TO IEEE 323 (1974) 6.3.2, 1-6 (ACTUATOR)

15. If "aging"* was performed, identify the significant aging mechanisms:

THERMAL

MECHANICAL CYCLING

RADIATION

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☒ Plants (shutdown loads)

b. ☒ Extreme environment (ACTUATOR) SEE LIMITORQUE QUALIFICATION

c. ☒ Seismic load

d. ☐ Others

17. Have component design specifications been reviewed in–house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

NOTE:

**As outlined in Section 4.4.1 of IEEE–627 1980.*

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.)

☐ Yes ☒ No

If "Yes", identify: ____

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance).

☐ Yes ☒ No

If "Yes", identify: ____

20. Is the qualified life for the component less than 40 years?

☐ Yes ☒ No If "Yes", what is the qualified life? ____________________

21. Information Concerning Qualification Documents for the Component

REPORT NUMBER	REPORT TITLE	DATE	COMPANY/ORGANIZATION PREPARING REPORT	COMPANY/ORGANIZATION REVIEWING REPORT
SP-531-06 4549-000 REV VI	SPECIFICATION - DESIGN, FABRICATION, AND DELIVER OF SAFETY RELATED GATE, GLOBE, AND CHECK VALVES	ORIGINAL 3/2/81 REV. VI 1/27/84	GILBERT/COMMON-WEALTH	GILBERT/COMMON-WEALTH
B0058	LIMITORQUE VALVE ACTUATOR QUALIFICATION	1-11-80	LIMITORQUE CORP.	GILBERT/COMMON WEALTH
WR 83-27 REV. B	QUALIFICATION OF FIVE MOTOR OPERATED VALVE ASSEMBLIES	12-2-83	WYLE LABORATORIES RESEARCH STAFF	GILBERT/COMMON WEALTH
WR84-13 REV. B	QUALIFICATION OF A MOTOR OPERATED VALVE ASSEMBLY	6/84	WYLE LABORATORIES RESEARCH STAFF	GILBERT/COMMON WEALTH
B0115	HYDRODYNAMIC VIBRATION TESTING (NEW LOADS)	6-24-82	LIMITORQUE CORPORATION	GILBERT/COMMONWEALTH

REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/		/	/
	/		/	/
	/		/	/

REVIEWED BY L. H. Newman / 7/16/84

CHECKED BY 7/12/84

APPROVED BY 7/23/84

SHEET 9 OF 9

PUMP AND VALVE
OPERABILITY ASSURANCE REVIEW

BM No. RNQ 12

I. PLANT INFORMATION

1. Name: PERRY NPP Unit No. 1 & 2 2. Docket No.: 50-440 & -441

3. Utility: CLEVELAND ELECTRIC ILLUMINATING

4. NSSS: GENERAL ELECTRIC ☐ PWR ☒ BWR

5. A/E: GILBERT/COMMONWEALTH

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ☐ NSSS ☒ BOP

2. Location: a. Building/Room REACTOR

b. Elevation 664 FT.

c. System DRYWELL VACUUM RELIEF

3. Component number on in-house drawings: M16F020 [✓ A] & B

4. If component is a ☐ Pump complete II.5.

If component is a ☒ Valve complete II.6.

5. General Pump Data

a. Pump	b. Prime-mover
Name	Name
Mfg.	Mfg.
Model	Model
S/N	S/N
Type	Type
Size	Size
Weight	Weight
Mounting Method	Mounting Method
Required B.H.P.	H.P.

NOTE:

*The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

5. General Pump Data (Continued)

Parameter	Design	Operating
Press		
Temp		
Flow		
Head		

Power requirements: (include normal, maximum and minimum).

Electrical

Other

Required NPSH at maximum flow

Available NPSH

Operating Speed

Critical Speed

If MOTOR list:

Duty cycle

Stall current

Class of insulation

List functional accessories:*

List control signal inputs:

6. General Valve Data

a. Valve

Name DRYWELL VACUUM BREAKER

Mfg. GPE CONTROLS

Model LD-240-339

S/N AA109305A

Type VACUUM RELIEF

Size 10" 150LB ANSI CLASS

Weight 164 LB

Mounting Method FLANGED HORIZONTAL PIPE

Required Torque N/A

b. Actuator (if not an integral unit) N/A (SEE SECTION II.6- CONTROL SIGNAL INPUTS)

Name

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Torque

NOTE:

**Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational (e.g., coupling, lubricating oil system, etc.)*

6. General Valve Data (Continued)

Parameter	Design	Operating
Press	25.0 PSIG	-0.5PSIG
Temp	330°F	135°F
Flow	N/A	NOT NORMALLY FLOWING

Max ΔP across valve 21 PSI

Closing time @ max ΔP NORMALLY CLOSED

Opening time @ max ΔP NOT SPECIFIED

Power requirements for functional accessories, (if any) N/A

Power requirements: (include normal, maximum and minimum).

Electrical N/A

Other: ☐ Pneumatic ☐ Hydraulic

N/A

List control signal inputs: VALVE IS EQUIPPED WITH A PNEUMATIC CYLINDER AND REMOTE ELECTRICAL SWITCH TO TEST OPEN/CLOSE CAPABILITY OF VALVE. THIS ARRANGEMENT IS NOT REQUIRED FOR THE VALVE TO PERFORM ITS SAFETY FUNCTION

List functional accessories:* N/A

III. FUNCTION

1. Briefly describe components normal and safety functions:

SAFETY - VALVE REMAINS IN CLOSED POSITION

NORMAL — VALVE OPENS TO RELIEVE VACUUM IN DRYWELL WHEN ABNORMAL CONDITIONS EXIST

2. The components normal state is: ☐ Operating ☒ Standby (CLOSED)

3. Safety function:

a. ☐ Emergency reactor shutdown

b. ☐ Containment heat removal

c. ☐ Containment isolation

d. ☐ Reactor heat removal

e. ☐ Reactor core cooling

f. ☐ Prevent significant release of radioactive material to environment

NOTE:

**Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational (e.g., limit switches).*

3. Safety function: (Continued)

   g. ☒ Does the component function to mitigate the consequences of one or more of the following events? ☐ Yes ☐ No If "Yes", identify.

   ☐ LOCA ☐ HELB ☐ MSLB

   ☒ Other REMAIN CLOSED TO ISOLATE DRYWELL FROM LOCA, HELB AND SMALL LINE BREAK

4. Safety requirements: N/A SAFETY REQUIREMENT STATED ABOVE

NON-SAFETY OR NORMAL REQ'TS

☒ Intermittent Operation ☒ During postulated event

☐ Continuous Operation ☒ Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.

UNTIL VACUUM CONDITION IN DRYWELL NO LONGER EXISTS (180 DAYS MAX.) (e.g., hours, days, etc.)

5. For VALVES:

does the component ☐ Fail open ☐ Fail closed ☐ Fail as is N/A (SEE NOTE BELOW *)

Is this the fail safe position? ☐ Yes ☐ No N/A (SEE NOTE BELOW*)

Is the valve used for throttling purposes? ☐ Yes ☒ No

Is the valve part of the reactor coolant pressure boundary?

☐ Yes ☒ No

Does the valve have a specific limit for leakage? ☐ Yes ☒ No

If "Yes" give limit:

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: SPECIFICATION 635, ANSI B16.5-1973 ASME BOILER & PRESSURE VESSEL CODE, SECTION III DIV. 1, SUBSECTION NC (FOR CLASS 2 COMPONENTS) SEISMIC CLASS 1, 1974 THRU WINTER 1975

2. Reference those qualification standards, used as a guide to qualify the component: NRC REGULATORY GUIDE 1.48 STANDARD REVIEW PLAN 3.93 (NUREG 0800)

* NOTE : CHECK VALVES NOT CONSIDERED TO HAVE ANY PARTICULAR FAILURE MODE.

3. Identify those parts of the above qualification standards deleted or modified in the qualification program.

Deleted: NONE

Modified: NONE

4. Have acceptance criterias been established and documented in the test plan(s) for the component? ☐ Yes ☐ No N/A NO TEST

5. What is the expected failure mode that would keep the pump or valve assembly from performing its safety function? PERMANENT DISTORTION OF THE HINGE PIN

6. Are the margins* identified in the qualification documentation?

☒ Yes ☐ No

If component is a PUMP, complete IV.7.

If component is [✓ a VALVE,] complete IV.8.

7. Pump operability has been demonstrated by: ☐ Analysis

☐ Test ☐ Combination

Identify PUMP tests performed:

a. ☐ Shell hydrostatic (ASME Section III)

b. ☐ Bearing temperature evaluations

c. ☐ Seismic loading

d. ☐ Vibration levels

e. ☐ Exploratory vibration
(Fundamental freq. _________)

f. ☐ Seal leakage @ hydro press

g. ☐ Aging: ☐ Thermal
☐ Mechanical

h. ☐ Flow performance
Are curves provided ☐ Yes ☐ No

i. ☐ Pipe reaction end loads
(nozzle loads)

j. ☐ Others ______________

k. ☐ Extreme environment:
☐ Humidity
☐ Chemical
☐ Radiation

NOTE:

***Margin is the difference between design basis parameters and the test parameters used for equipment qualification.**

8. Valve operability has been demonstrated by: ☒ Analysis

☒ Test ☒ Combination

ONLY a & f BELOW

Identify VALVE tests performed:

a. ☒ Shell hydrostatic

(ASME Section III)

b. ☐ Cold cyclic List times:

Open ______

Closed ______

c. ☐ Seismic loading

d. ☐ Hot cyclic List times:

Open ______

Closed ______

e. ☐ Exploratory vibration

(Fundamental freq. ______)

f. ☒ Main seat leakage

g. ☐ Aging: ☐ Thermal

☐ Mechanical

h. ☐ Back seat leakage

i. ☐ Pipe reaction end loading

j. ☐ Disc hydrostatic

k. ☐ Extreme environment

☐ Humidity

☐ Chemical

☐ Radiation

l. ☐ Flow interruption capability

m. ☐ Flow characteristics are

Are curves provided?

☐ Yes ☐ No

n. ☐ Others ______

9. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ☐ Yes ☒ No If "Yes", briefly describe any changes made in tests (or analysis) or to the component to correct the deviation.

______

______

______

10. Was the test component precisely identical (as to model, size, etc.) to the in-plant component? ☒ Yes ☐ No If "No", is installed component ☐ oversized or ☐ undersized?

11. If type test was used to qualify the component, does the type test meet the requirements of IEEE 323-1974, SECTION 5.?

☐ Yes ☐ No N/A ANALYSIS

12. Is component orientation sensitive? ☒ Yes ☐ No ☐ Unknown

If "Yes", does installed orientation coincide with ~~test~~ ANALYSIS orientation?

☒ Yes ☐ No

13. Is the component mounted in the same manner in-plant as it was during testing (i.e., welded, same number and size bolts, etc.)?

☐ Yes ☐ No ☐ Unknown N/A

14. Were the qualification tests performed in sequence and on only one component?

☐ Yes ☐ No N/A

If "Yes" identify sequence, (e.g., radiation, seismic, cyclic, thermal, etc.):

15. If "aging"* was performed, identify the significant aging mechanisms:

N/A

16. Identify loads imposed (assumed) on the component for the qualification tests (analysis) performed:

a. ☐ Plants (shutdown loads) b. ☐ Extreme environment

c. ☒ Seismic load + HYDRODYNAMIC d. ☐ Others

17. Have component design specifications been reviewed in-house to assure they envelope all expected operating, transient, and accident conditions? ☒ Yes ☐ No

NOTE:

***As outlined in Sectic 1 4.4.1 of IEEE-627 1980.**

18. Does the component utilize any unique or special materials? (Examples are special gaskets or packing, limitations on nonferrous materials, or special coatings or surfaces.)

☒ Yes ☐ No

If "Yes", identify: NORDEL EPT (EPDM) SEATS - ACCEPTABLE FOR RADIATION LEVELS PRESENT. (EPT SEATS GOOD TO 1 x 10^8 RADS)

19. Does component require any special maintenance procedures or practices, (including shorter periods between maintenance).

☒ Yes ☐ No

If "Yes", identify: REMOTE MANUAL TESTING REQUIRED PERIODICALLY. i.e. OPEN / CLOSE VALVE WITH PNEUMATIC CYLINDER OPERATOR,

20. Is the qualified life for the component less than 40 years?

☐ Yes ☒ No If "Yes", what is the qualified life?

21. Information Concerning Qualification Documents for the Component

REPORT NUMBER	REPORT TITLE	DATE	COMPANY/ORGANIZATION PREPARING REPORT	COMPANY/ORGANIZATION REVIEWING REPORT
SP-635 4599-00 REV. VII	CONTAINMENT AND DRYWELL VACUUM RELIEF VALVES SPECIFICATION	APRIL 9 1978 ORIGINAL JAN. 5 1982 REV VII	GILBERT/ COMMONWEALTH	GILBERT/ COMMONWEALTH
LA-241-184-1 REV. 0 ADDENDA 1	STRESS ANALYSIS FOR SEISMIC AND OPERATING CONDITIONS OF MODEL LD 240-339 VACUUM BREAKER	JULY 19 1978	GPE CONTROLS DIV. VAPOR CORP.	GILBERT/ COMMONWEALTH

REV. NO.	DATE	INITIALS		
		REVIEW	CHECKED	APPROVED
	/	/	/	
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	/	/	/	

REVIEWED BY 7/21/84

CHECKED BY 7/23/84

APPROVED BY 7/23/84