SARGENT & LUNDY

INTER-OFFICE MEMORANDUM

From J. Sinnappan - 30 x6773 Date Nov. 3, 1981

Dept./Div. Mechanical/Component Qualification Project No. 4266/4267/6093-00

Spec. No.

File No. CQD-000412

Page No. 1 of 1

Client CECo Stn. LaSalle County Unit 1&2

Subject SQRT - Post Audit Documentation (Vol. 10)

(Safety-Related)

To: D. C. Haan/G. C. Jones - 31
J. B. Gouvas - 31

CC: M. M. Hassaballa - 30
AEM/JS - 30
CQD File - 30

References: 1) Letter from G. R. Crane dated 10-26-81
2) Conference call with NRC dated 10-26-81

Attached is our updated status report on seismic qualification of safety-related equipment.

The following are attached:

TAB-A: Status of modifications on HPCS Values and RCIC Turbine

TAB-B: SQRT forms for six components for which tests were completed but report not received.
SQRT forms completed based on test witness reports.

TAB-C: Justification for Interim Operation for six open items. These six items are scheduled for test in the near future. However, we show with the existing reports that the device has been successfully tested to required 'q' levels. We opted to retest because of lack of proper documentation. We also attach a copy of our test program which would furnish complete documentation.

TAB-D: This contains the test program for fatigue testing of two representative Limitorque operators. These tests were completed on 11-2-81. We also include the test results for one valve as logged by our S&L engineers who witnessed the test.

The above documentation should answer and eliminate all the concerns raised by NRC SQRT.

JS/gk
Attachments.

J Sinnappan

SARGENT & LUNDY
ENGINEERS
CHICAGO

LA SALLE COUNTY NUCLEAR STATION
COMMONWEALTH EDISON COMPANY

SAFETY-RELATED EQUIPMENT QUALIFICATION
POST NRC AUDIT DOCUMENTATION
VOL. 10

BY
COMPONENT QUALIFICATION DIVISION
SARGENT & LUNDY ENGINEERS
11-5-81

CQD FILE # 000412

/

TABLE OF CONTENTS

STATUS OF MODIFICATIONS ON HPCS VALVES AND THE RCIC TURBINE

EQUIPMENT#	MODIFICATIONS	STATUS
E22-F010	10" Globe Valve; add modified yoke legs to existing valve yoke legs. Dwg. #VPF3238-21-6	Completed/ per ECN-M513LS.
E22-F011	10" Globe Valve; add modified yoke legs to existing valve yoke legs. Dwg. #VPF3238-230-3	Completed/ per ECN-M5132S.
E22-F023	12" Globe Valve; add modified yoke legs to existing valve yoke legs. Dwg. #VPF3238-022-9	Completed/ per ECN-M513LS.
E22-F012	4" Valve, add additional support for valve. Support Dwg.#M09-HP09-1037R	Completed/ per ECN-M513LS.
E51-C002	RCIC Turbine *Replace #8 taper pins with #9 pins and pedestal bolt lock plates. *Verify stiffness of trip latch spring used on S&K valve to be 32.5 #/inch. *Replace 2 EGM control boxes with Model #8271-236. *Replace 2 RGSC Modules with Model #8271-083 and #8271-590.	Completed/ per tele-con with field

Device Name: LEVEL INDICATING TRANSFER SWITCH

Model Number: # 760

The seismic qualification testing for this device was done at SOUTH WEST RESEARCH INSTITUTE, SAN ANTONIO, TEXAS, on 10-26-1981.

One of our engineers representing COMMONWEALTH EDISON COMPANY witnessed the testing and he confirms that the device passed the test without any structural or functional failure. Therefore the SQRT forms were completed based on his reporting and the only items not included were:

a) the report number

b) the TRS and RRS envelops.

This will provided when the report becomes available.

Nuclear Safety Related
Project Nos. 4266/67

LA SALLE NUCLEAR STATIONS
UNITS 1 & 2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: Level Indicating Transmitter Switch

EQUIPMENT NO: B21-N026A/D B21-N044A/B

LOCATION: Reactor Bldg. El. 761', 710'

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD:

Biaxial Random Motion Test

QUALIFICATION DOCUMENT REFERENCES:

1. SWRI Test Report #
2. GE Drawing 159C4383
3. Nutech Test Specification: MK2-02-100 Rev. 0 dated 10-7-81
4.
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

Form PI-LS-32.1.1 Rev. 0 (- - -)

Nuclear Safety Related
Project Nos. 4266/67

SEISMIC QUALIFICATION SUMMARY

* Required Response Spectrum curves were generated from the analysis of the local panels. These spectra were used as input to the instrument for seismic qualification.

* Mounting on the test table simulates the actual in-service mounting.

* Monitoring for funtionability and operability was done as per the referenced test specification. No malfunction was noted.

* Proof Testing:

  a) Upset Condition: Biaxial Random Motion test. Excitation is independently controlled in the horizontal and vertical direction. The frequency range is from 1 to 100 Hz. The duration of the test is 30 seconds per event with 5 OBE events per orientations.

  b) Emergency Condition: Same as Upset Condition except that one event of 30 seconds duration in each orientation shall be performed.

* Supporting Testing:

  a) SRV fatigue testing was performed using two independent inputs such taht the TRS envelopes the RRS. Frequency range 1 - 200 Hz.

  b) SRV + LOCA testing was also performed based on the same procedure as above.

  c) Resonance search was also performed in the frequency range of 1. to 100. Hz. in all three separate axis.

Ref: CQD File No. CQD-000251

SARGENT & LUNDY ENGINEERS CHICAGO

Nuclear Safety Related
Project Nos. 4266/67

Qualification Summary of Equipment

I. Plant Name: LaSalle County

Type:

1. Utility: CECo — PWR ____
2. NSSS: GE — BWR X
3. A-E: S&L

II. Component Name: Level Indicating Trans. Switch

1. Model Number 760 — Quantity: 6
2. Vendor ITT Barton
3. If the component is a cabinet or panel, name and model No. of the devices included: ____
4. Physical Description a. Appearance Rectangular Shape
   b. Dimensions 8" x 11" x 5"
   c. Weight 10 lbs.
5. Location: Building: Mounted on Local Panels (See Table 1)
   Elevation: ____
6. Field Mounting Conditions [ ] Bolt (No. ___, Size ___) [ ] Weld (Length ___) [ ] ____
   Mounted on local panel per Mfg. standard mounting bracket.
7. Natural Frequencies in Each Direction: ____
   h1: ____ h2: ____ V: ____
8. a. Functional Description: High and Low water level Indicating Switch
   b. Is the equipment required for [X] Hot Standby [X] Cold Shutdown [ ] Both [X] Post LOCA
9. Pertinent Reference Design Specifications: GE 225A6634 & 225A6635

Reference: CQD File No. CQD-000251

SARGENT & LUNDY ENGINEERS

Form PI-LS-32.1.3 Rev. 0 (- - -)

Nuclear Safety Related
Project Nos. 4266/67

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

Comments: _____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

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

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
SRV + LOCA
4.[X] Other (Specify) _____ 5.[ ] Combination of 1&4

2. Required Response Spectra (attach the graphs):
RRS curves generated from local panel analysis

3. Required Acceleration in Each Direction:

h1 = _____ h2 = _____ V = _____

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 1 - 100 Hz

4. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Attach TRS graphs (later)
[ ] No

5. g-level Test at h1 = _____ h2 = _____ V = _____

6. Laboratory Mounting: Simulating the field mounting

1. [ ] Bolt (No.___, Size____) [ ] Weld (Length____)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ____
SRV Fatigue, SRV + LOCA, Resonance Search

Reference: CQDFile No. CQD-000251

SARGENT LUNDY ENGINEERS CHICAGO

Form PI-LS-32.1.4 Rev. 0 (- - -)

Nuclear Safety Related
Project Nos. 4266/67

VII. If Qualification by Analysis or by the Combination of Test and Analysis, Complete the Following Information: N/A

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification	Location	Governing Response	Combination	Seismic Stress	Total Stress	Allowable

B. Max. Deflection	Location	Effect Upon Functional Operability

Reference: CQD File No. CQD-000251

SARGENT LUNDY ENGINEERS

Form PI-LS-32.1.5 Rev. 0 (- - -)

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.: [redacted]4383

Qualification 'g' levels		
h_1=	h_2=	V=

TABLE-1

Name: Level Indic. Trans. Switch

Manufacturer: Barton

Model No.: 760

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	v		
B21-N026A/D	Region RB-2 El. 761' on panels H22-P004,5,26,27	1.21	.91	.84	A	Hot Standby, Cold Shutdown and Post LOCA
B21-N044A/B	Region RB-8 El. 710' on panels H22-P009,10	1.95	1.46	1.04	A	"
		TRS envelopes		RRS		

A - Active P - Passive 1E - Class 1E

6

REACTOR VESSEL LEVEL & PRESSURE SYSTEM LEVEL INDICATING TRANSMITTER SWITCH B21-N026

ENVIRONMENTAL QUALIFICATION TABLE B21-7

1. DESCRIPTION
The instrument is a Barton Model 760 Level Indicating Transmitter Switch which has four (4) SPDT switches.

2. SAFETY FUNCTION
The level indicating transmitter senses reactor vessel water level and is designed to trip the Nuclear Steam Supply Shutoff System isolation logics (MSIV closure) on low level.

3. SAFETY DESIGN PARAMETERS

A. Switching: Low-2 SPDT snap action switches simultaneous setpoint only for decreasing water level.
High-2 SPDT snap action switches simultaneous setpoint only for decreasing water level.

B. Switch Rating: 5 amps at 120 Vac 0.1 amp at 125 Vdc

C. Working Pressure: 2000 psig

D. Transmitter Output: (A) 10-50 mA into 500 ohms 52.5 Vdc
(B) 4-20 mA into 300 ohms 25 Vdc

4. FSAR ENVIRONMENTAL CONDITIONS
The Instrument is on the Reactor Vessel LeveL and Pressure Panel (H22-P004) in the reactor building. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
0-1 hr.	340°F	7 in. WC	All steam	Operating 0.001 R/hr Accident 6.5×10^2 R/hr Integrated 6.5×10^2 Rad

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
0-1 hr.	340°F	7 in. WC	All steam	Operating 0.001 R/hr Accident 6.5×10^2 R/hr Integrated 6.5×10^2 Rad

REACTOR VESSEL LEVEL & PRESSURE SYSTEM LEVEL INDICATING TRANSMITTER SWITCH B21-N026 (Continued)

ENVIRONMENTAL QUALIFICATION TABLE B21-7

6. QUALIFICATION METHOD

Type Test

The instrument continued to perform all functions (transmitter, indicator and switches) during the ambient conditions of:

Time	Temperature	Humidity	Ambient Pressure
1 hr	40°F	20% RH	Atmospheric - 1 in. H_2O
1 hr	70°F	Atmosphere	Atmospheric
1 hr	100°F	Atmosphere	Atmospheric
1 hr	212°F	100% RH	Atmospheric + 7 in. H_2O

7. RESULTS

The instrument continued to perform all functions throughout the tests. The performance of the test specimen was within the General Electric Specification No. 159C4383.

TABLE I

INSTRUMENT DATA

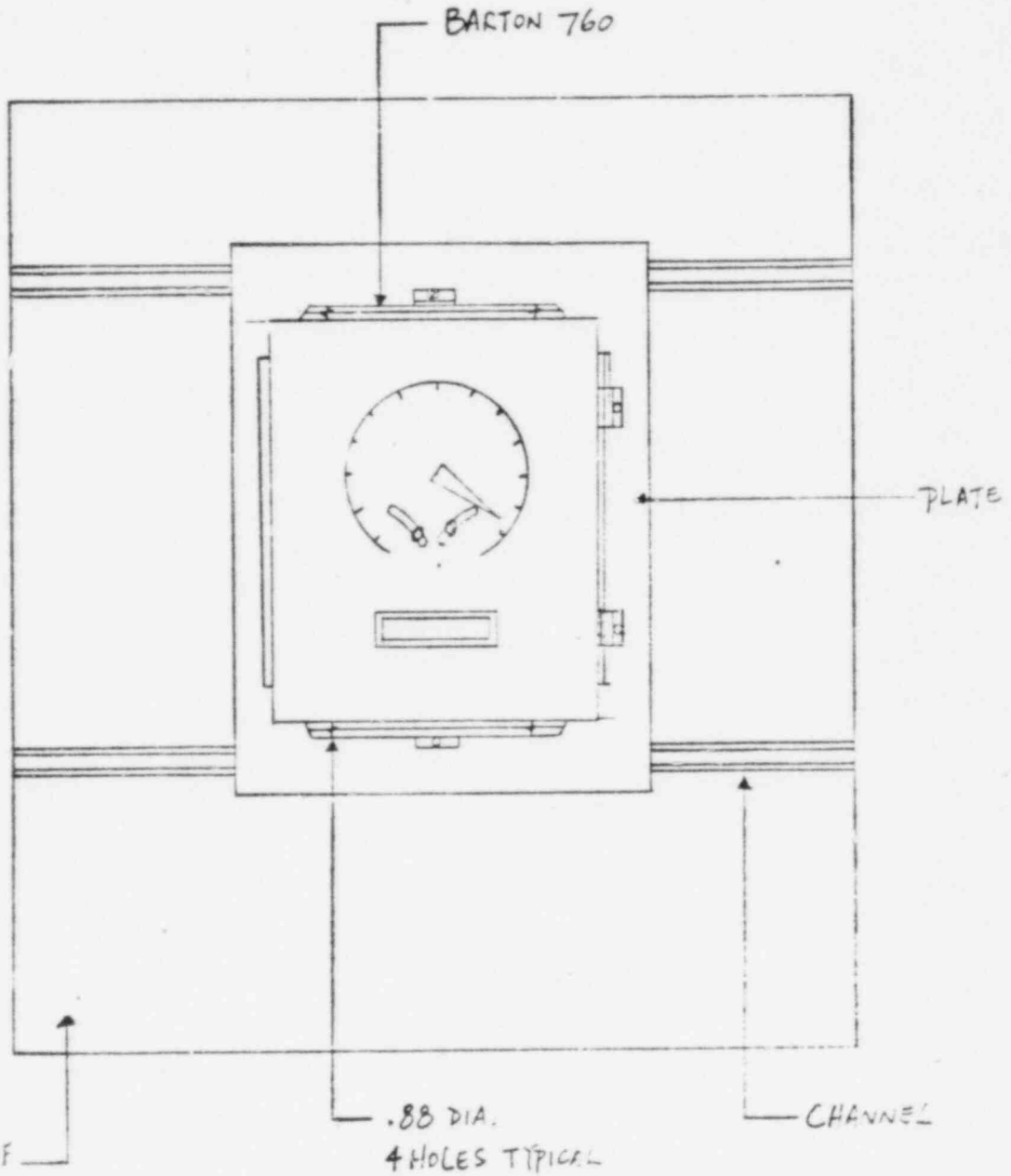
INSTRUMENT NAME:	Level Indication Transmitter Switch
MODEL NO.:	760
*** SERIAL OR ID. NO.:**	295
MANUFACTURER:	Barton
SPECIAL FEATURES IF ANY:	None
FUNCTION:	RPV level 2 trip
DIMENSIONS:	11.5" H x 8.94" W x 6" D
*** WEIGHT:**	
REQUIRED RANGE:	-150 (214.69)/0/+60 (64.40)
REQUIRED ACCURACY:	±7.5"
MONITORING REQUIREMENTS:	Output and differential pressure, contact position and Chatter Detection
MOUNTING DETAILS:	See Figure 1
CHATTER TIME:	20 milliseconds when scale reading is ±1 % of full scale from setpoint

* To be completed by SwRI

Project La Salle County Station Units 1 and 2 File No.

Owner Commonwealth Edison Company

Client Commonwealth Edison Company



MOUNTING FOR BARTON 760
LEVEL INDICATION TRANSMITTER SWITCH

FIGURE 1

Revision	0					Page 1 of
Prepared By/Date	GLC 8-3-81					
Checked By/Date	[illegible] 10-6-81					

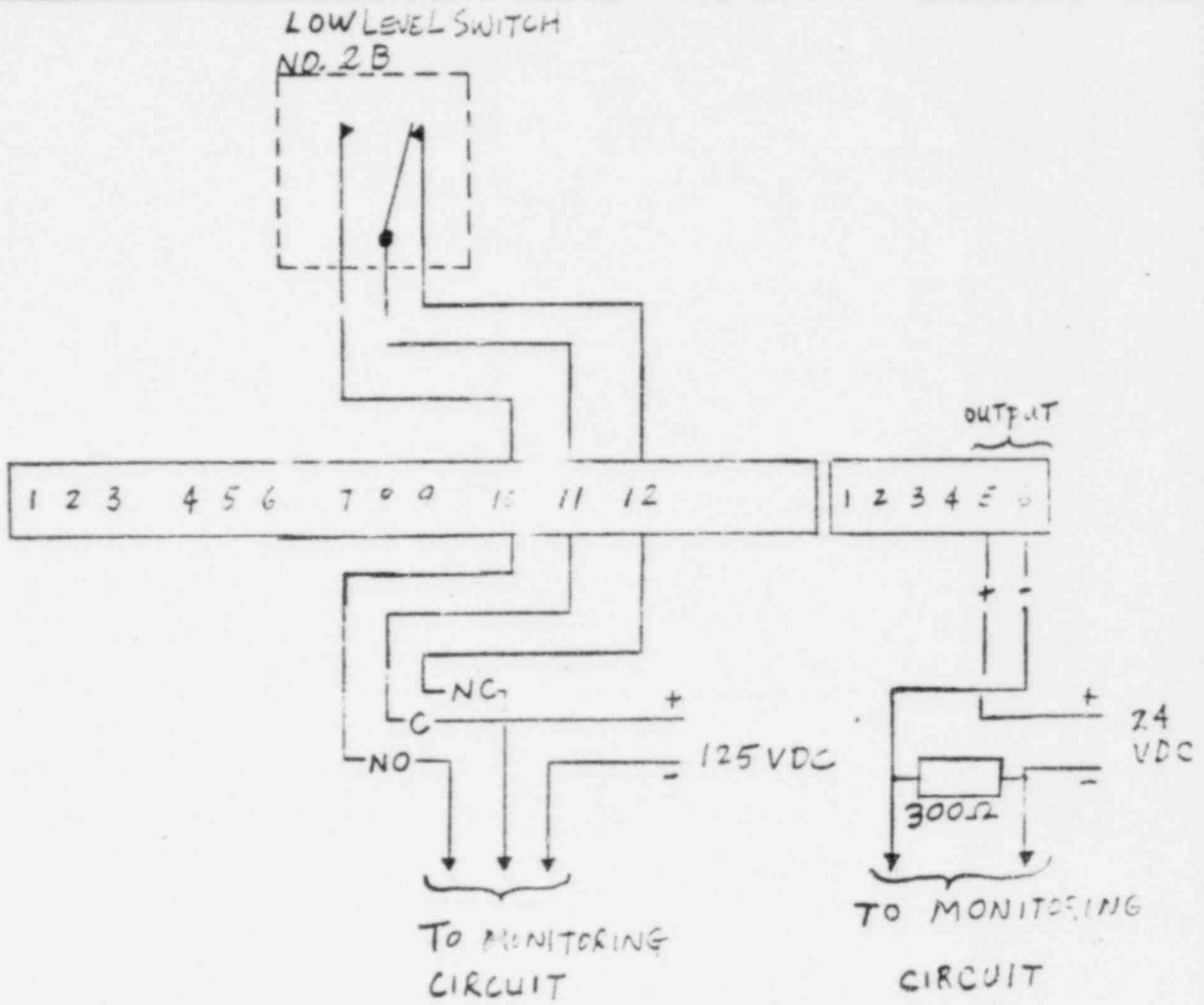
nutech

San Jose, California

Project La Salle County Station Units 1 and 2 File No.

Owner Commonwealth Edison Company

Client Commonwealth Edison Company



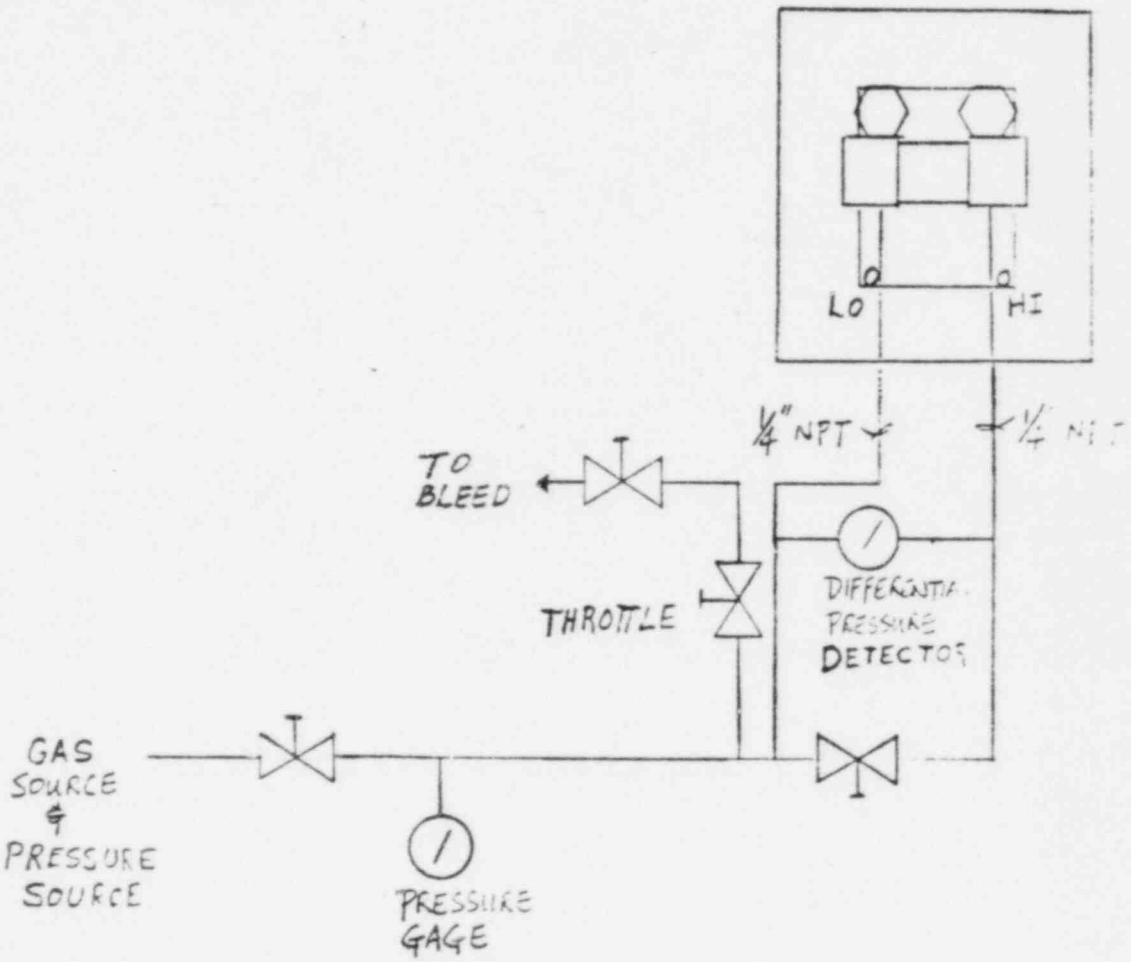
TEST WIRING DIAGRAM FOR BARTON 764

FIGURE 2

Revision	0					Page 15
Prepared By/Date	GM 8-3-81					of
Checked By/Date	PEH 10-6-81					

nutech
San Jose, California

Project La Salle County Station Units 1 and 2 File No.
Owner Commonwealth Edison Company
Client Commonwealth Edison Company



TEST SET-UP FOR BARTON 76

FIGURE 3

Revision	0					Page 16
Prepared By/Date	GLC 8-3-81					of
Checked By/Date	DEZ 10 6 81					

REACTOR VESSEL LEVEL & PRESSURE SYSTEM LEVEL INDICATING TRANSMITTER SWITCH B21-N044

ENVIRONMENTAL QUALIFICATION TABLE B21-7

1. DESCRIPTION
The instrument is a Barton Model 760 Level Indicating Transmitter Switch which has four (4) SPDT switches.

2. SAFETY FUNCTION
The level indicating transmitter senses reactor vessel water level and is designed to trip the Nuclear Steam Supply Shutoff System isolation logics (MSIV closure) on low level.

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A. Switching: Low-2 SPDT snap action switches simultaneous setpoint only for decreasing water level.
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5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
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ENVIRONMENTAL QUALIFICATION TABLE B21-7

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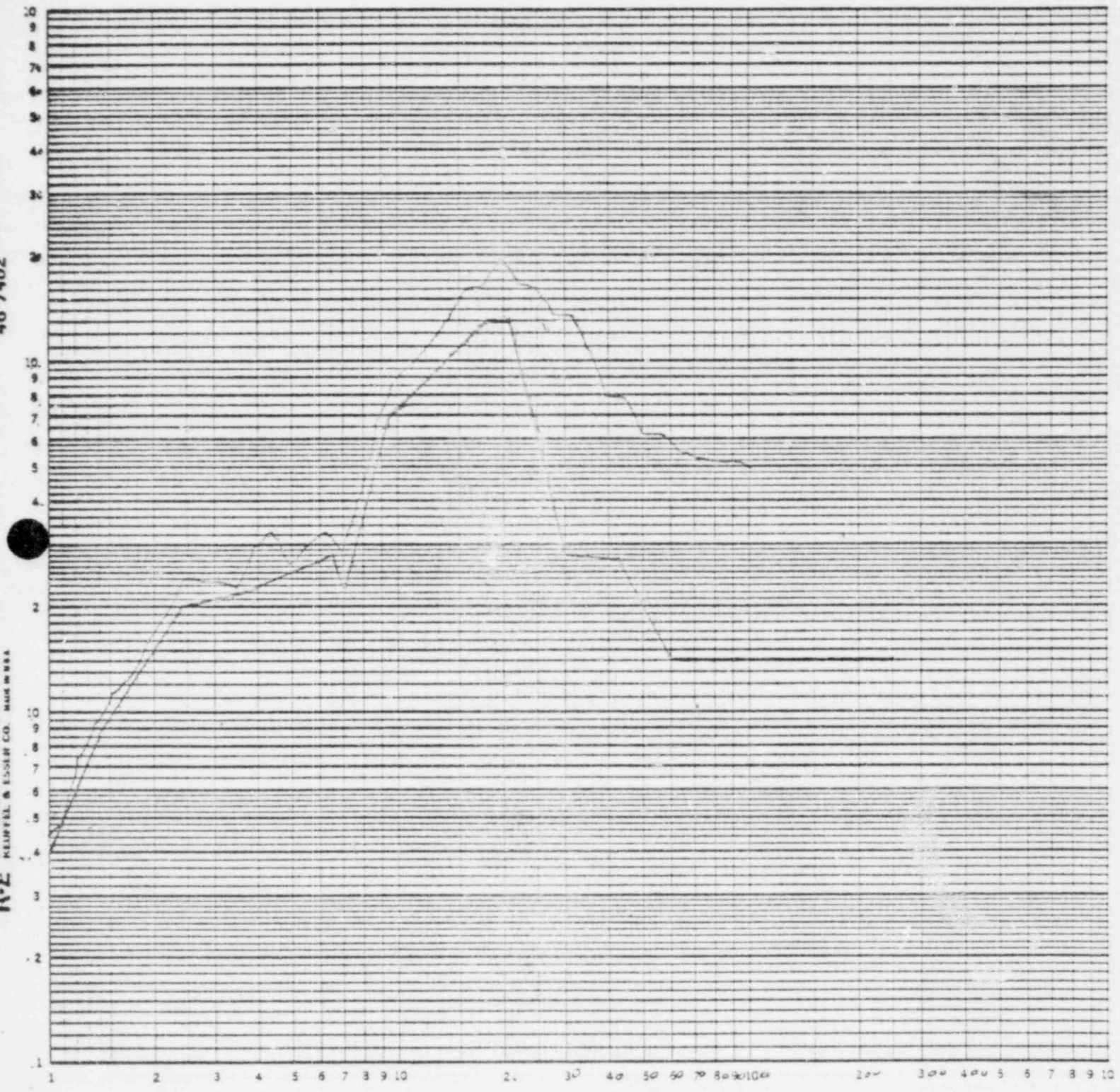
1 hr	70°F	Atmosphere	Atmospheric
1 hr	100°F	Atmosphere	Atmospheric
1 hr	212°F	100% RH	Atmospheric + 7 in. H_2O

7. RESULTS

The instrument continued to perform all functions throughout the tests. The performance of the test specimen was within the General Electric Specification No. 159C4383.

SAMPLE



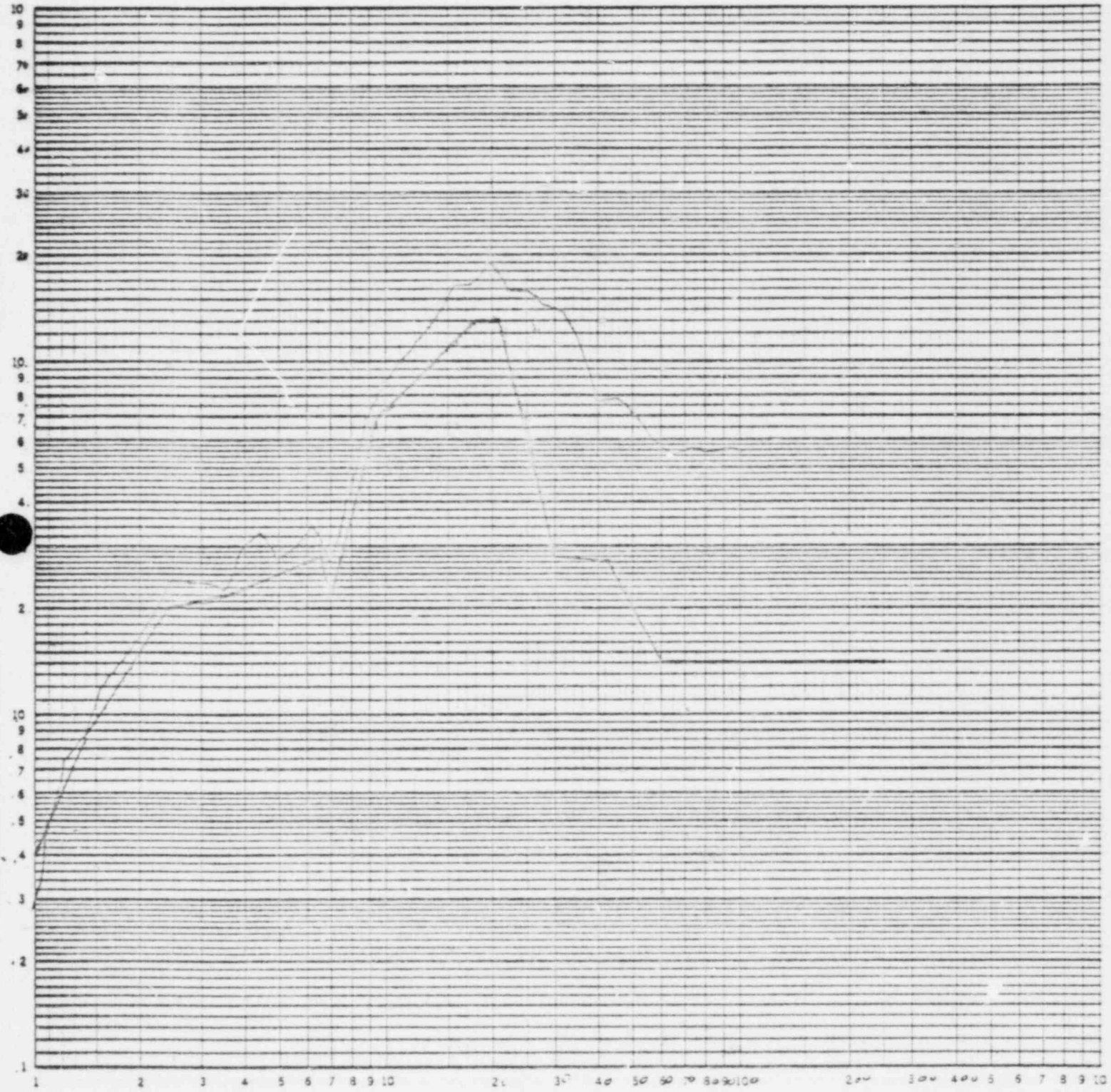
UPSET CONDITION UPSX25

X - Z Axis

Vert. Accel.

UPSE
VERT.

SAMPLE



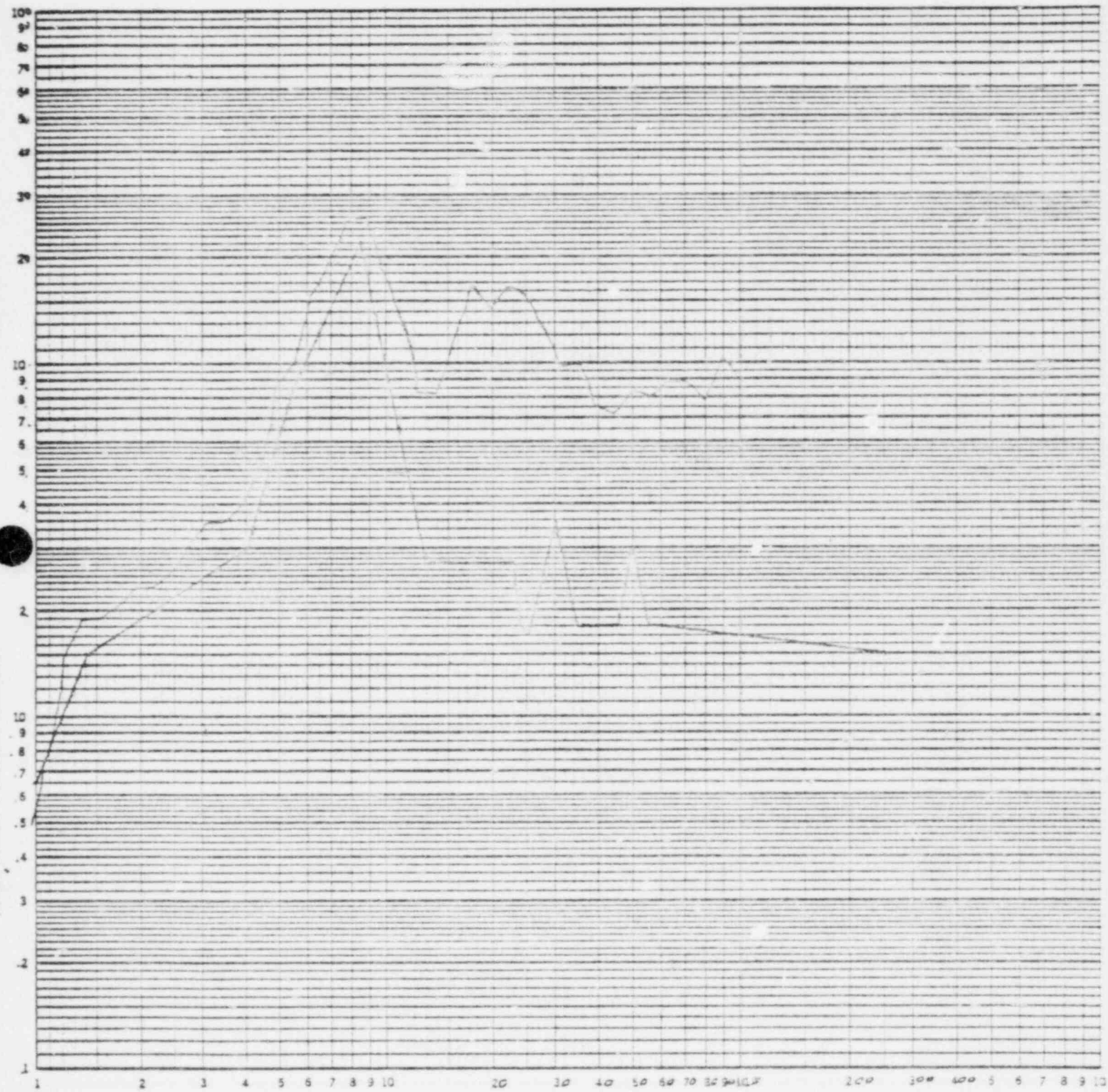
UPSET CONDITION UPSXZT

X-Z AXIS

VERTICAL ACCEL

UPSE
VERT.

SAMPLE

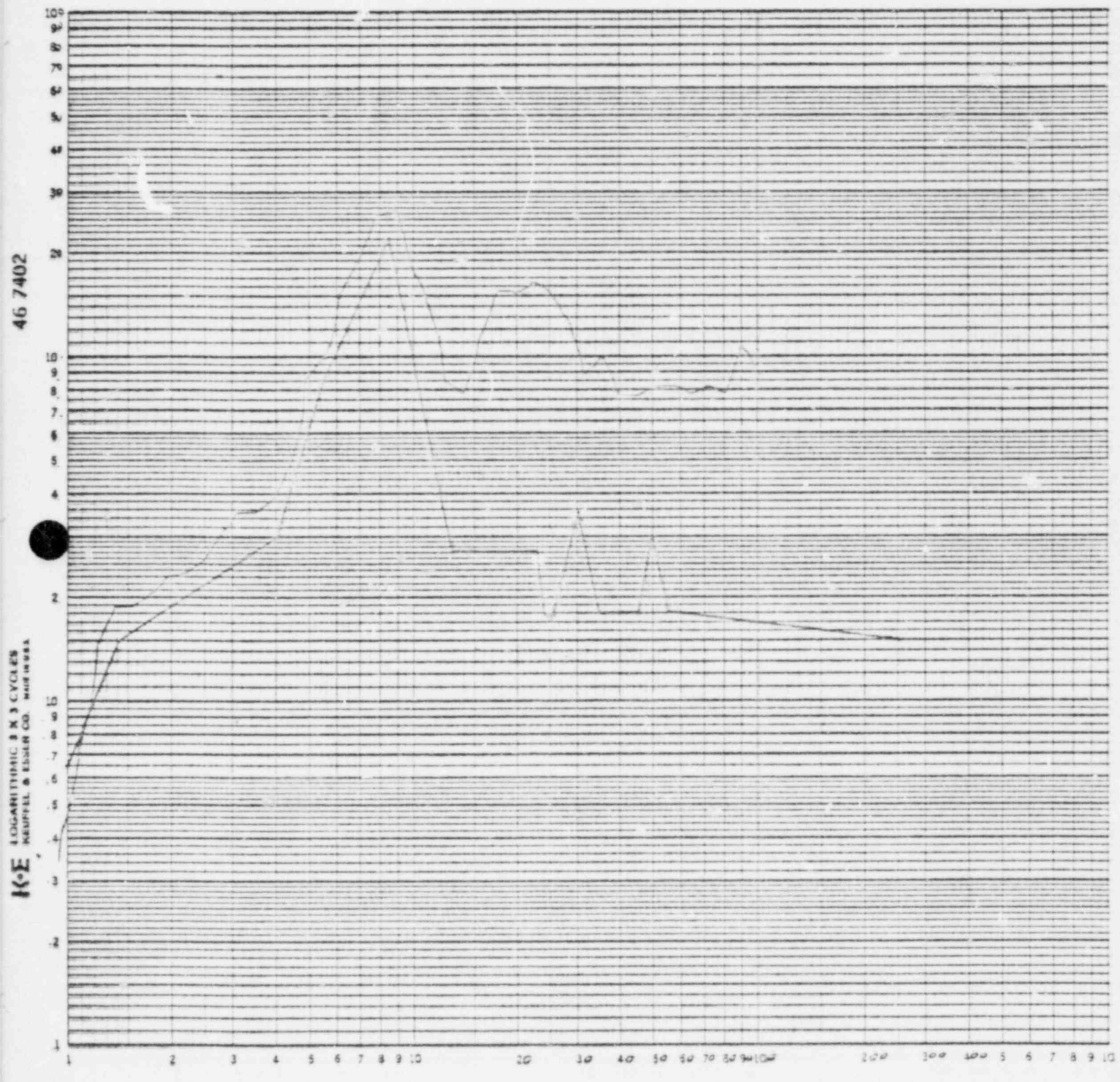


UPSET CONDITION UPSET

UPSET
MOM 2

X - Z AXIS
HORIZONTAL ACCEL.

SAMPLE



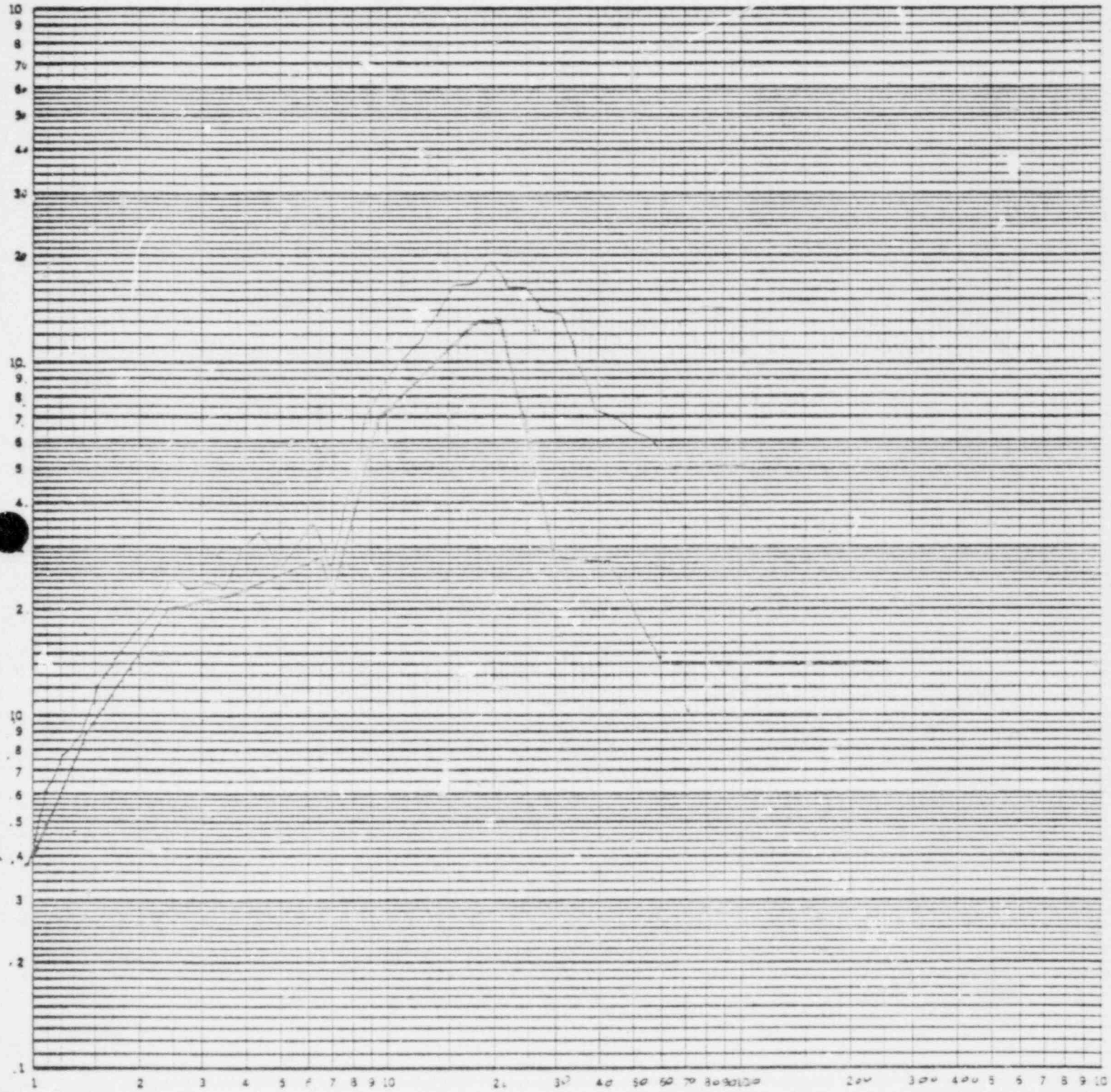
UPSET CONDITION UPSX #2

X - Z AXIS

HORIZONTAL ACCEL.

UPSET
H001 2

SAMPLE



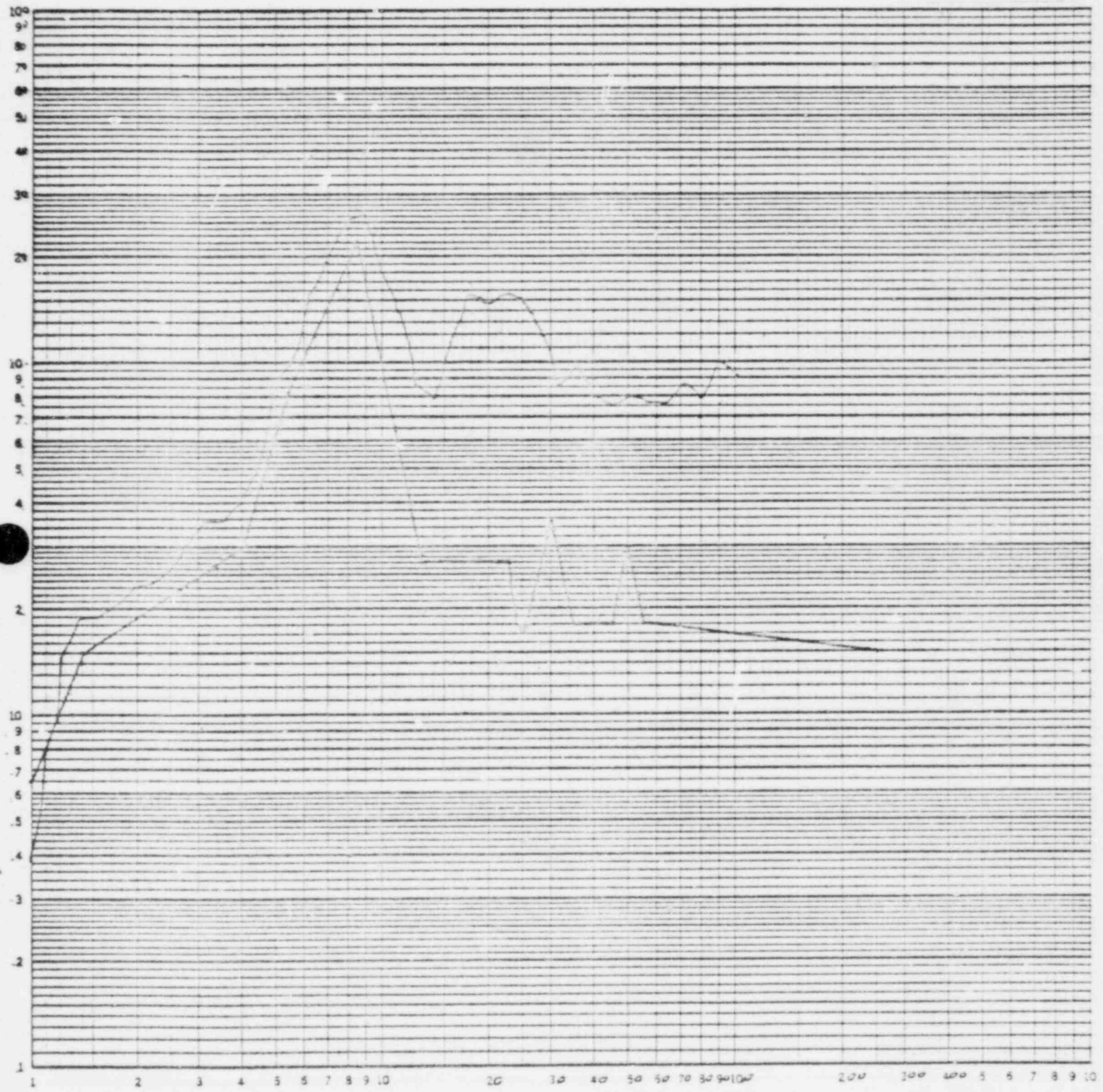
UPSET CONDITION UPSX-Z 2

X-Z Axis

Vert. Accel.

UPSE
VERT.

SAMPLE



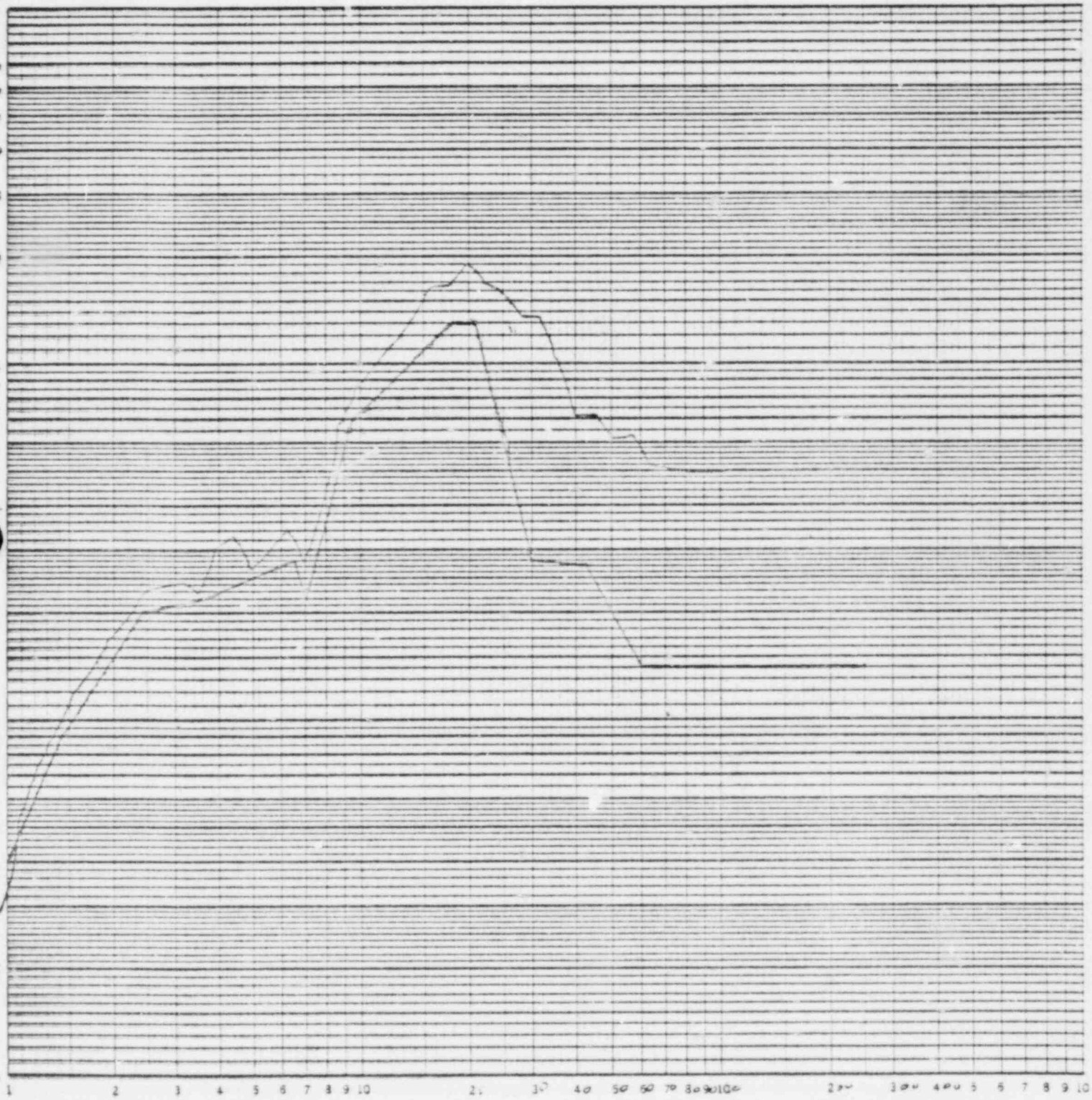
UPSET CONDITION UPS x 23

X-Z AXIS

HORIZ. ACCEL.

UPSET
Horiz

SAMPLE

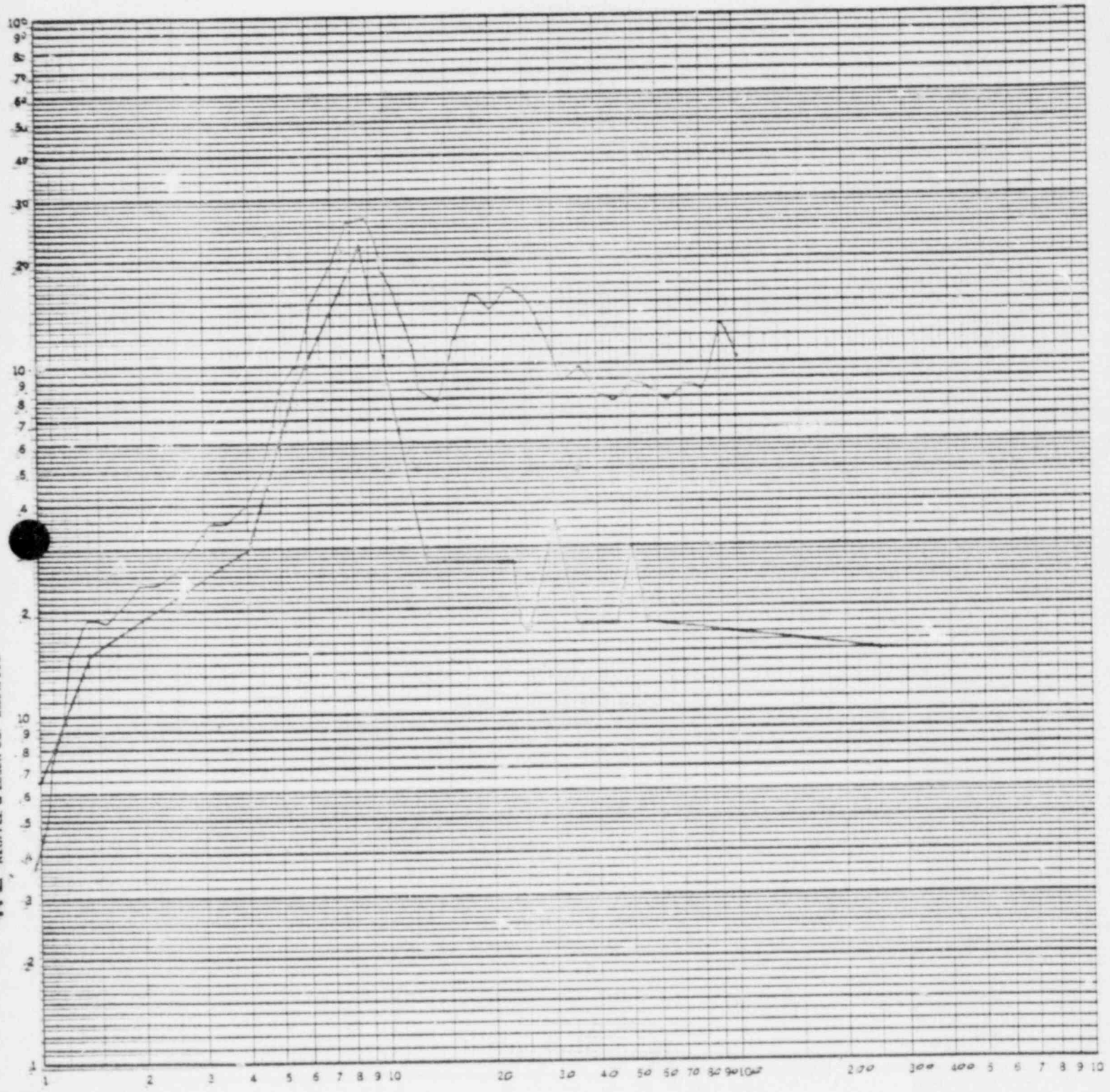


UPSET CONDITION UPSXZ3

X - Z Axis
Vert Accel.

UPSE
VERT.

SAMPLE



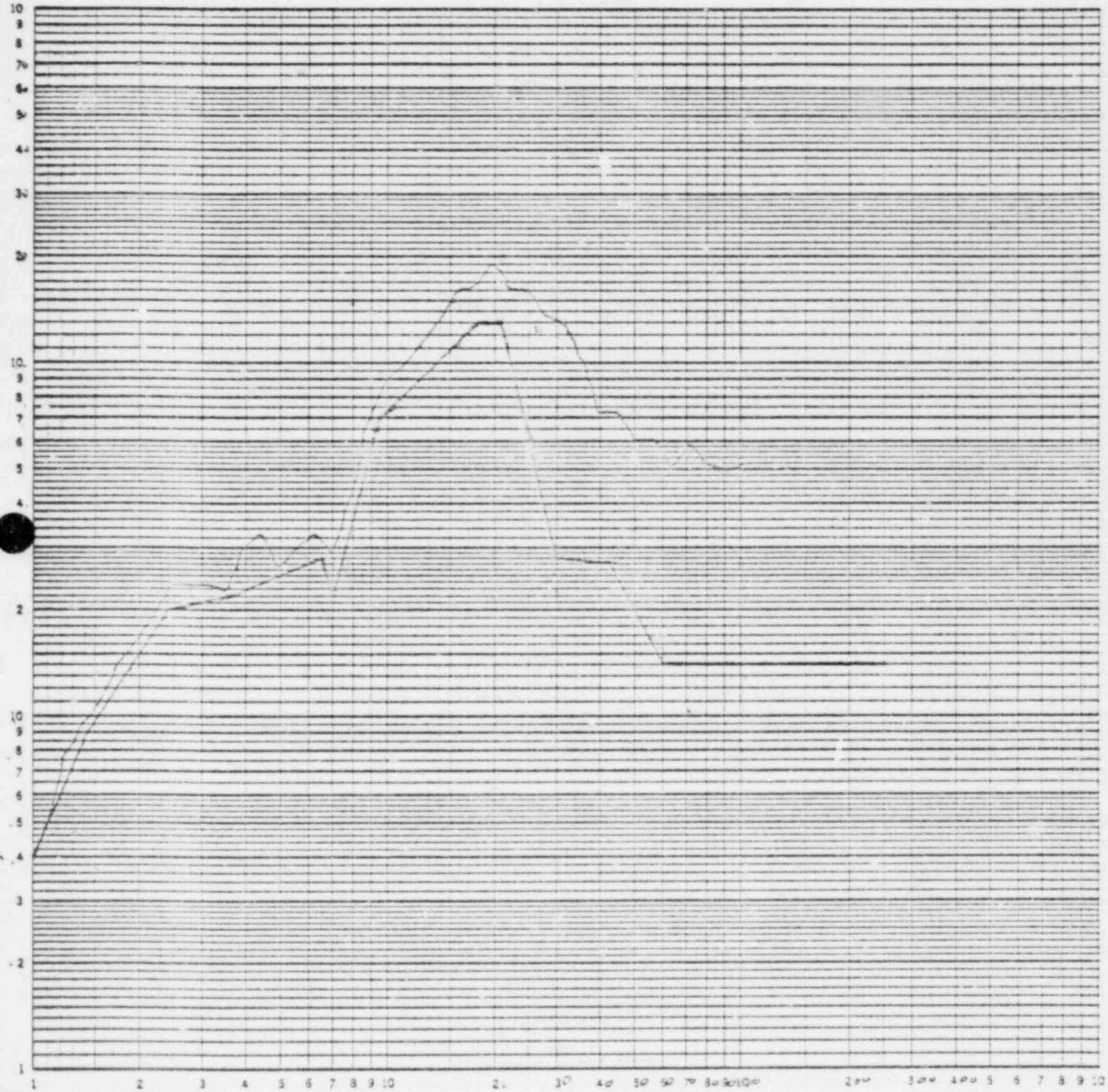
UPSET CONDITION UPS X Z 4

X - Z Axis

HORIZ. ACCEL.

UPSET
HORIZ

SAMPLE



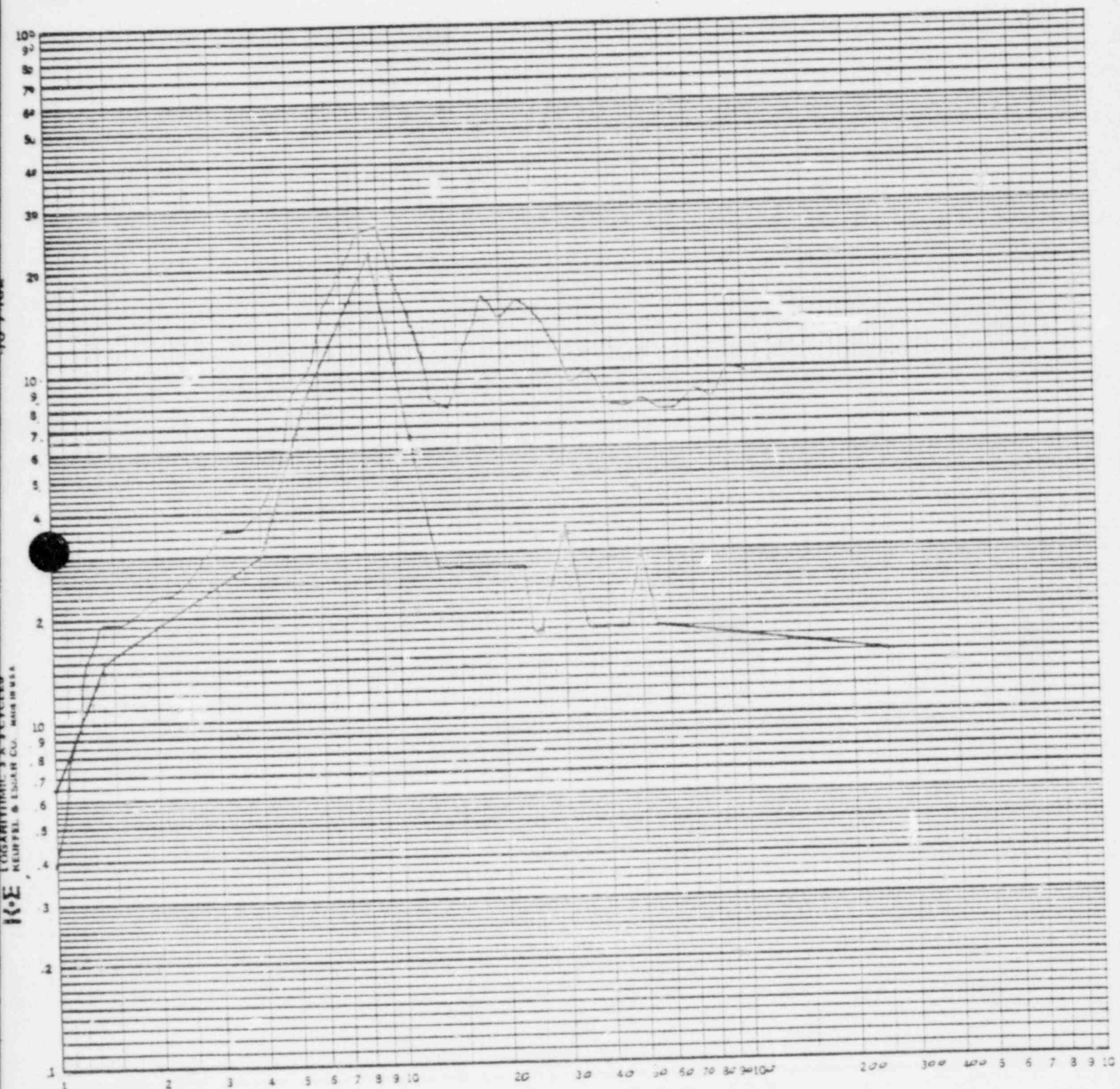
UPSET CONDITION UPS X Z 4

X - Z Axis

Vert. Accel.

UPSE
VERT.

SAMPLE



UPSET CONDITION UPSX = 5

X-Z Axis

HORIZ. ACCEL.

UPSET
HORI 2

Client CECo/CINGRP		Prepared by Chongfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohamad Gold.	Date 4/22/81
Proj. No. 6093-00/4130-15	Equip. No.	Approved by Jkannappan	Date 4/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
Page 4 of 6

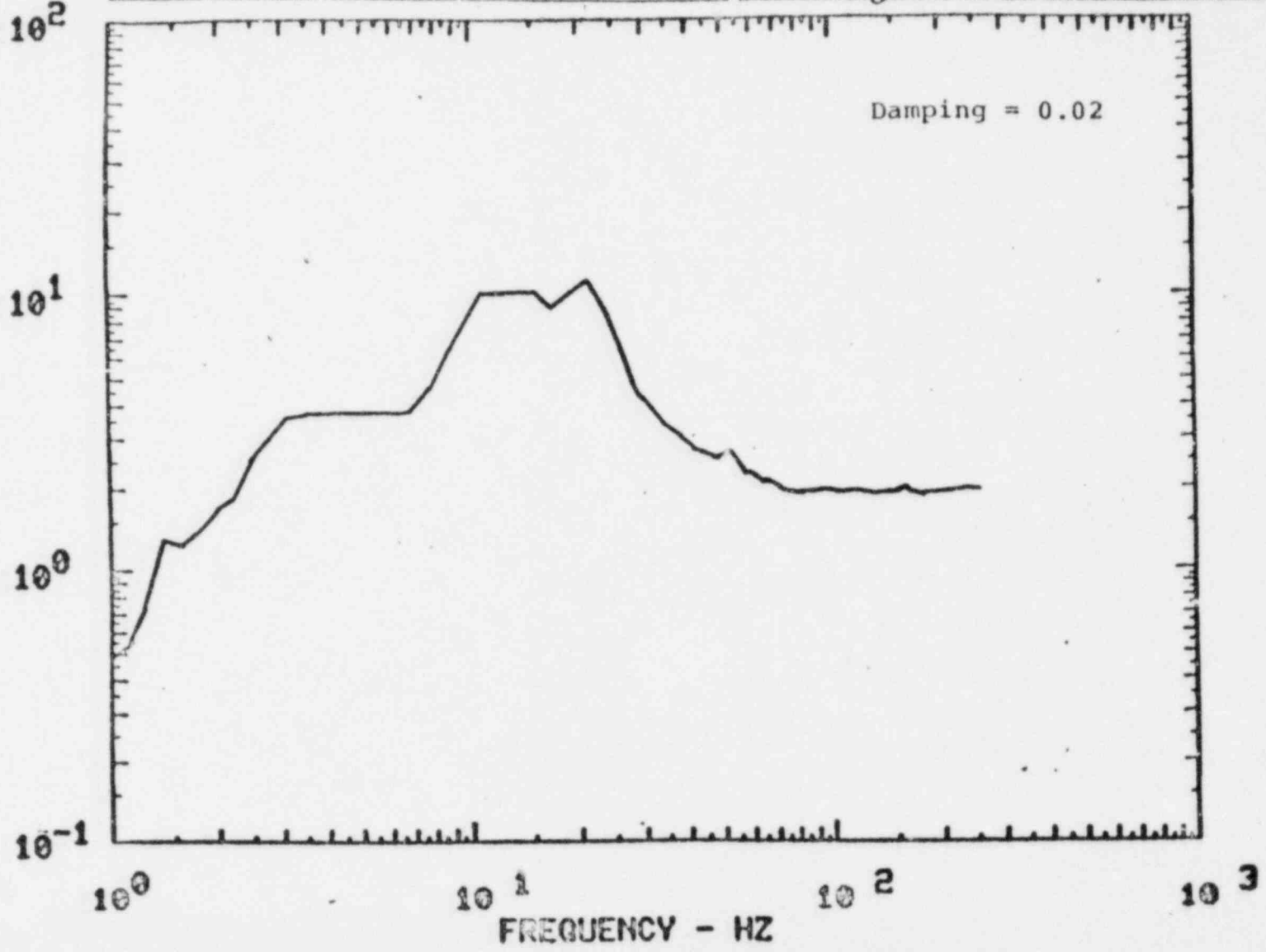


FIGURE 11

Required Response Spectrum for Instruments mounted on Local Panels
~~SRV-LOCA/UPSET~~/EMERGENCY VERTICAL/~~HORIZONTAL~~
UPPERBOUND ENVELOP OF FOLLOWING RSC: - EMSYZ6 6V 72"
EMSXZ1 5V 48"
EMSXZ2 6V 30"

Client CECo/CINGRP		Prepared by Chongfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohamad Gohadj.	Date 4/22/81
Proj. No. 6093-00/4130-15	Equip. No.	Approved by JBinnappam	Date 4/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
Page 3 of 6

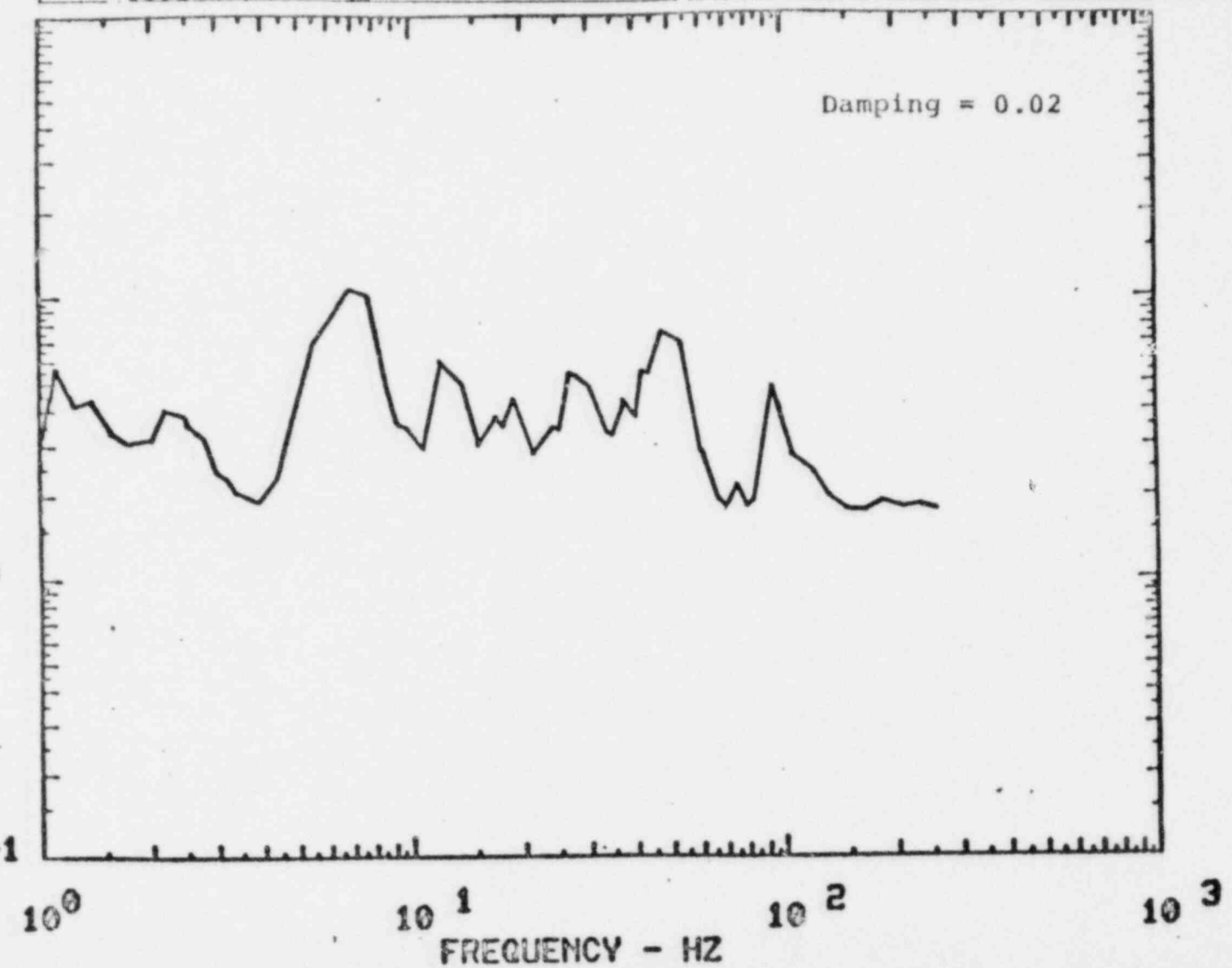


FIGURE 10

Required Response Spectrum for Instruments mounted on Local Panels
~~GRV LOCA/UPSET~~/EMERGENCY ~~VERTICAL~~/HORIZONTAL
UPPERBOUND ENVELOP OF FOLLOWING RSC: - EMSXZ1 A6 72" EMSYZ1 A6 72"
EMSXZ2 A4 48" EMSYZ2 A6 48"
EMSXZ1 A5 30" EMSYZ1 A6 30"

Client CECo/CINGRP		Prepared by Chongfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohammad Gutal.	Date 4/22/81
Proj. No 6093-00/4130-15	Equip. No.	Approved by [illegible]	Date 4/22/81

Calc. No. EMD-030011
Rev. 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
Page 2 of 6

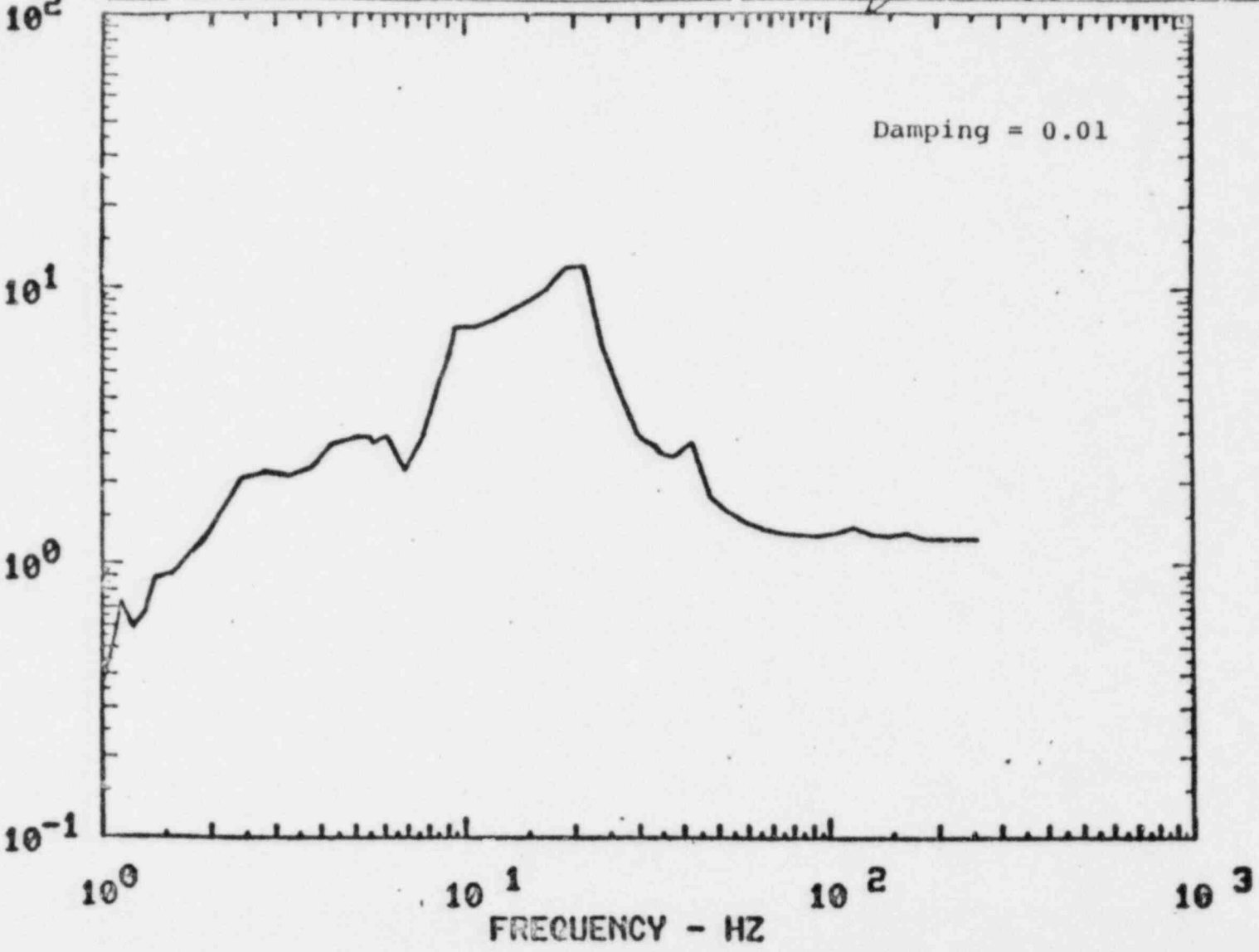


FIGURE 9

Required Response Spectrum for Instruments mounted on Local Panels

~~SRV LOCA~~/UPSET/~~EMERGENCY~~ VERTICAL/~~HORIZONTAL~~

UPPERBOUND ENVELOP OF FOLLOWING RSC: - UPSXZ6 5V 30"
UPSXZ5 5V 48"
UPSXZ6 6V 72"

22

30

Client CECo/CINGRP		Prepared by Chongfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohammad Gobad	Date 4/22/81
Proj. No. 6093-00/4130-15	Equip No.	Approved by J Kennappan	Date 4/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
Page 1 of 6

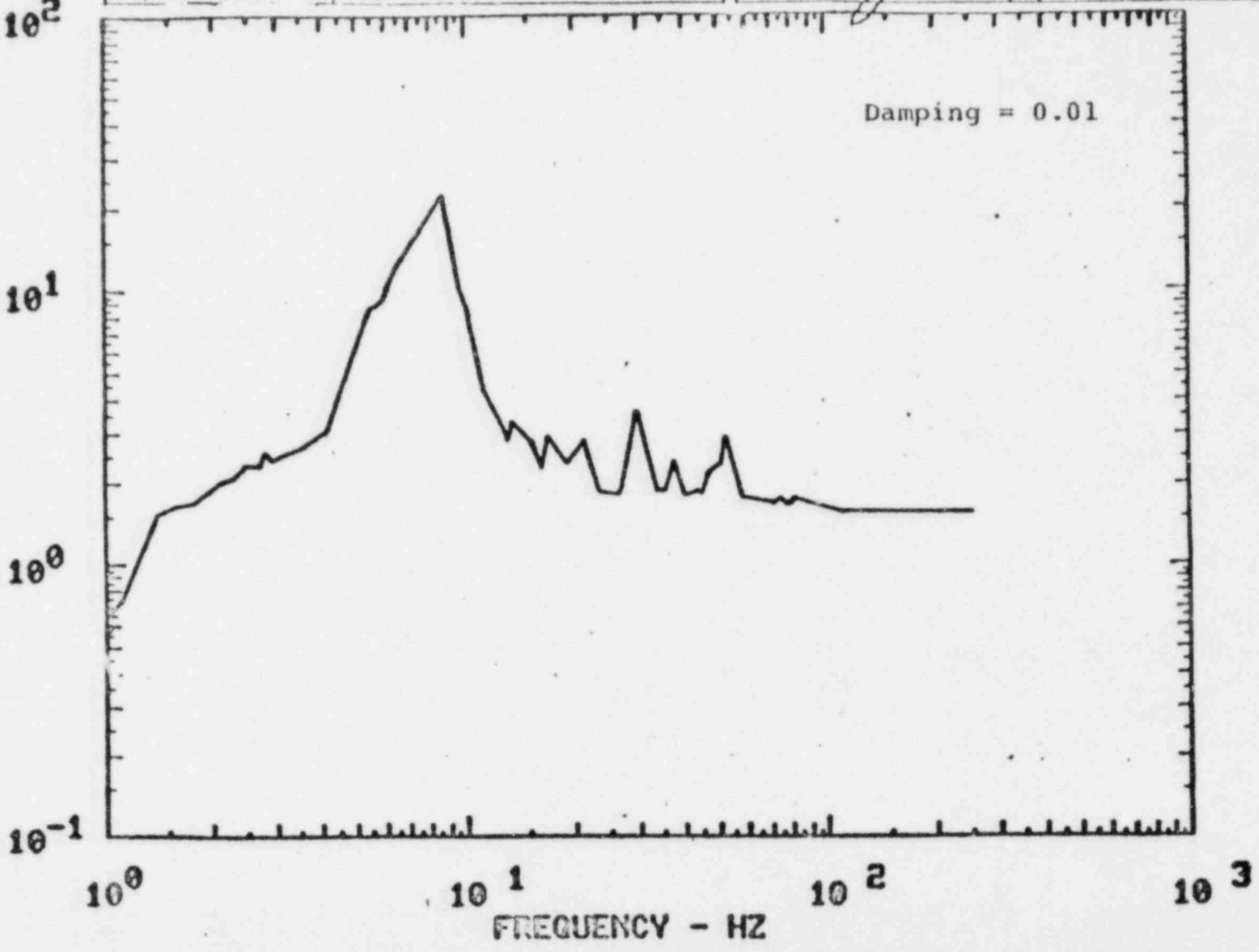


FIGURE 8

Required Response Spectrum for Instruments mounted on Local Panels
~~SRV-LOCA~~/UPSET/~~EMERGENCY~~ ~~VERTICAL~~/HORIZONTAL
UPPERBOUND ENVELOP OF FOLLOWING RSC: - UPSXZ5 A6 72" UPSYZ5 A6 72"
UPSXZ6 A4 48" UPSYZ6 A4 48"
UPSXZ5 A6 30" UPSYZ5 A6 30"

Client CECo/CINGRP		Prepared by Chongfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohammad Gosh.	Date 4/22/81
Proj. No. 6093-00/4130-15	Equip. No.	Approved by JBimmappan	Date 4/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
Page 6 of 6

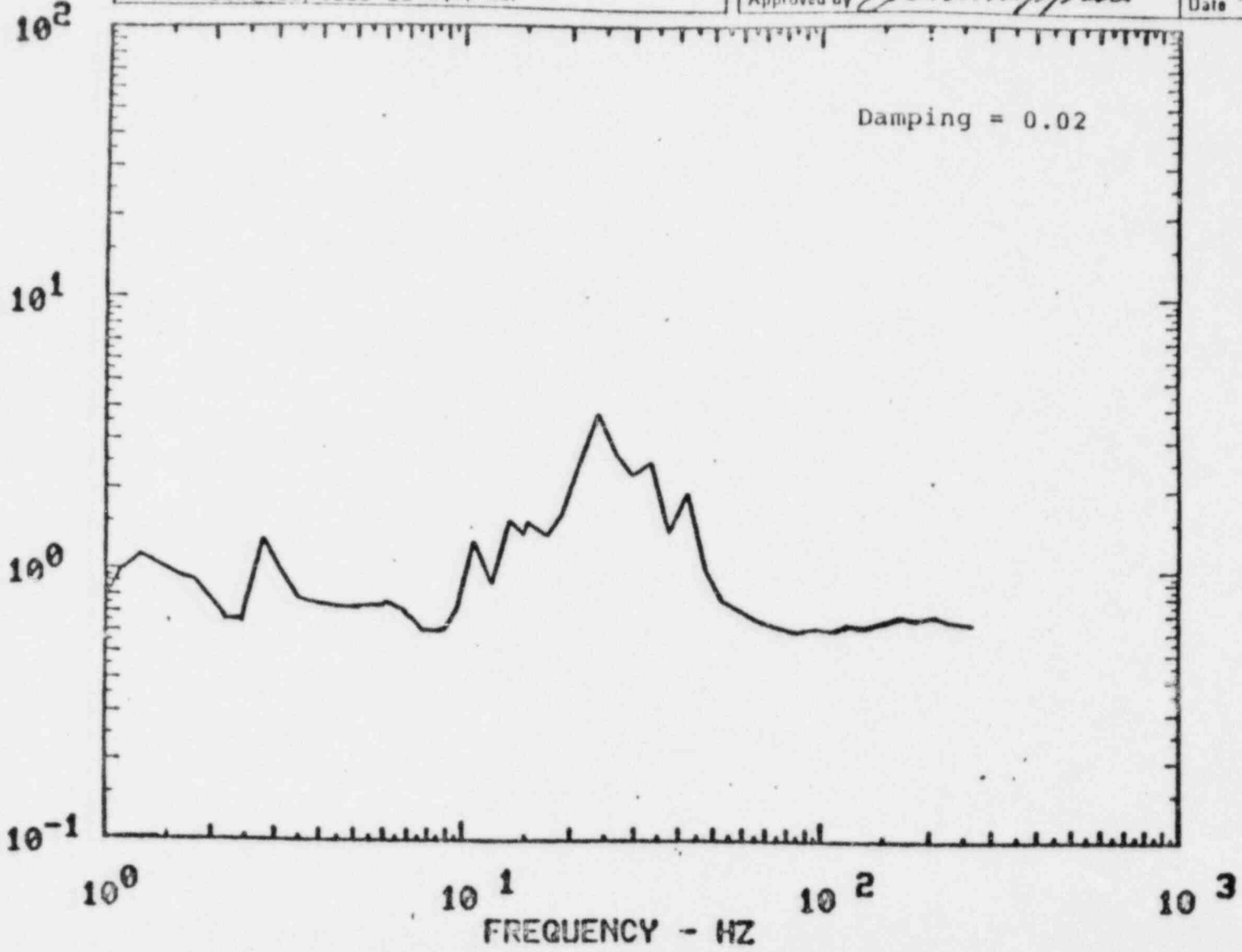


FIGURE 7

Required Response Spectrum for Instruments mounted on Local Panels
SRV-LOCA/~~UPSET/EMERGENCY~~ VERTICAL/~~HORIZONTAL~~
UPPERBOUND ENVELOP OF FOLLOWING RSC: - SVLYZ4 6V 72"
SVLXZ1 5V 48"
SVLXZ2 4V 30"

Client	CECo/CINGRP	Prepared by Chengfang Lee	Date 4/22/81
Project	LaSalle County/Zimmer	Reviewed by Mohammad Gulrez	Date 4/22/81
Proj. No.	6093-00/4130-15 Equip. No.	Approved by Krishnappan	Date 4/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
Page 5 of 6

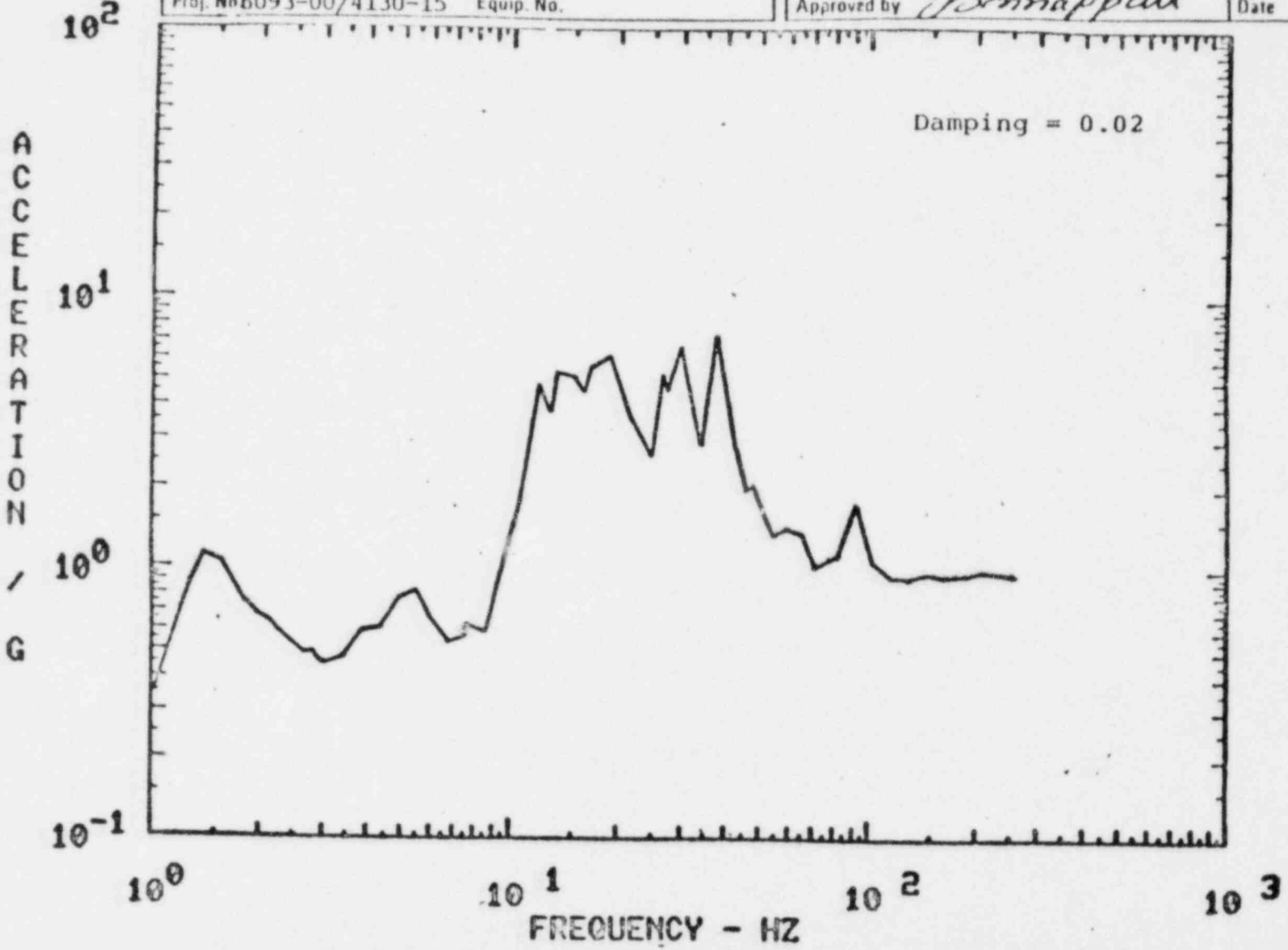


FIGURE 6

Required Response Spectrum for Instruments mounted on Local Panels
SRV-LOCA/~~UPSET/EMERGENCY~~ ~~VERTICAL~~/HORIZONTAL
UPPERBOUND ENVELOP OF FOLLOWING RSC: - SVLXZ2 A5 72" SVLYZ2 A4 72"
SVLXZ2 A4 48" SVLYZ2 A6 48"
SVLXZ1 A6 30" SVLYZ1 A6 30"

Device Name: PUSH BUTTON SWITCH # 145C3230

Model Number: 10250T.

The seismic qualification testing for this device was done at WYLE LABORATORIES, NORCO, CALIFORNIA on 9-5-1981

One of our Engineers representing Commonwealth Edison Company witnessed the testing and he confirms that the device passed the test without any structural failure or functional failure. Therefore the SQRT forms were completed based on his reporting and the only items not included were:

a) the report number

b) The TRS and RRS envelops.

This will be provided when the report becomes available.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: Push Button Switch Model # 145C3230
B21C-S32A/B, B21C-S33A/B, B21C-S25A/D, E12A-S61, E21A-S09, E22A-S02,
EQUIPMENT NO: E51A-S41

LOCATION: Aux. Building El.768' on Panels H13-P601

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Seismic (See page 2)

QUALIFICATION DOCUMENT REFERENCES:

1. WYLE Test Report # dated
2. NUTECH Test Spec. # MK-02-031 Rev.2.
3. Drawings & Misc. Data.
4.
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION METHOD

The test specimen is attached to a fabricated test fixture. The monitoring devices are provided for testing.

1. Operational Testing:

   First, operational tests are performed which establishes a baseline function.

2. Exploratory Testing:

Test Method:	Low Level Sine Sweep
Input Motion:	Single Axis
No. of Tests:	3, One in Each Orthogonal Axis
Frequency Range:	1 - 100Hz
Sweep Rate:	1 Octave Per Minute
Input 'g' Level:	.025g Peak

3. Proof Testing:

	(a) OBE Testing	(b) DBE Testing
Test Method	Random Motion	Random Motion
Input Motion	Biaxial	Biaxial
No. of Tests	10 With 5 in Each Orientation	4-Armed and Dis-Armed in Each Orientation
Frequency Range	1 - 100Hz	1 - 100Hz
Test Duration	30 Secs/Test	30 Secs/Test

4. Required Response Spectrum:-

   Different size control panels were tested to a random multifrequency biaxial testing with the test response spectrum enveloping the floor response spectrum. The response spectrum at different instrument locations were obtained during this test. The envelop of these response spectrum were obtained and this was the required response spectrum for the instrument qualification.

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1&2 Type:

1. Utility: CECO PWR
2. NSSS: GE BWR X
3. A-E: S&L

II. Component Name: Push Button Switches # 145C3230

1. Model Number 10250T Quantity: Several
2. Vendor Cutler Hammer
3. If the component is a cabinet or panel, name and model No. of the devices included:
4. Physical Description a. Appearance Push button type switches
   b. Dimensions 1.38"Ø x 4.38" long (with 3 blocks)
   c. Weight 1 lb.
5. Location: Building: on Panels H13-P601 Aux. Bldg.
   Elevation: El. 768'
6. Field Mounting Conditions Panel mounted. [ ] Bolt (No.___, Size___) [ ] Weld (Length___) [ ] ___
7. Natural Frequencies in Each Direction:
   h1: h2: V:
8. a. Functional Description: used for remote manual control of various reactor and coolant systems
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [ ] Both Other safety function --
9. Pertinent Reference Design Specifications:

Reference: CQD File No. CQD 000271

SARGENT & LUNDY ENGINEERS

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

Comments: _____

_____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by WYL: Project # (Later) dated _____
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify) _____ 5.[ ] Combination of _____

2. Required Response Spectra (attach the graphs): See attached.

_____

3. Required Acceleration in Each Direction:

h1 = _____ h2 = _____ V = _____

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 1 - 100 Hz

4. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Attach TRS graphs (Later)
[ ] No

5. g-level Test at h1 = _____ h2 = _____ V = _____

6. Laboratory Mounting:

1. [X] Bolt (No. ___, Size ____) [ ] Weld (Length ____)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ____
Resonance Search Test

_____

SARGENT & LUNDY ENGINEERS

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

Complete: NA

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis [ ] Dynamic Analysis

[ ] Response Spectrum [ ] Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification Location	Governing Response Combination	Seismic Total Stress Stress	Stress Allowable

B. Max. Deflection	Location	Effect Upon Functional Operability

SARGENT & LUNDY ENGINEERS CHICAGO

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.: [illegible]3230

Qualification 'g' levels		
h_1=	h_2=	V=

Name: Push Button Switch

Manufacturer: Cutler Hammer

Model No.: 10250T

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	V		
B21C-S32A/B	Aux. Bldg El.768' On Panel P601				A	Random multifrequency biaxial testing with TRS enveloping RRS
B21C-S33A/B	-"-				A	
B21C-S25A/D	-"-				A	
E12A-S61	-"-				A	
E12A-S09	-"-				A	
E22A-S02	-"-				A	
E51A-S41	-"-				A	

A - Active P - Passive 1E - Class 1E

PUSHBUTTON SWITCH C71A-S---

ENVIRONMENTAL QUALIFICATION TABLE C71-4

1. DESCRIPTION
The equipment is a pushbutton switch as manufactured by Cutler Hammer.

2. SAFETY FUNCTION
Manual initiation of Safety System. (R. G. 1.62)

3. SAFETY DESIGN PARAMETERS
Type: Armed Pushbutton
Contacts: Momentary
Collar Positions: 2 & 3
Contact Ratings: 10 Amps continuous, 6 amps at 110 VAC, 2.2 Amps at 120 VDC break, 60 Amps at 110 VAC, 2.2 Amps at 120 VDC make & interrupting

4. FSAR ENVIRONMENTAL CONDITIONS
The equipment is located inside the Control Room. The FSAR environment conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
Min	40°F	Range 0.10 in.	10%	Operating 0.0005 R/hr
Normal	60°-90°F	to 1.0 in.	50%	Integrated 1.75×10^2 Rad
Max.	120°F	water gauge static pressure	60%	

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3087, Rev. 0)

Duration	Temperature	Pressure	Humidity	Radiation
Min	40°F	Range 0.10 in.	10%	Operating 0.0005 R/hr
Normal	60°-90°F	to 1.0 in.	50%	Integrated 1.75×10^2 Rad
Max.	120°F	water gauge static pressure	60%	

6. QUALIFICATION METHOD
Type Test
Details of the Test -

First Step - Set temperature at 40°F, relative humidity 90%. Let stabilize for 45 minutes and then operate 5 times. at rated load.

Second Step - Increase temperature to 50°F, relative humidity 90%. Let stabilize for 45 minutes and then operate at 5 times rated load.

Subsequent Steps - Repeat temperature increases at 10°F intervals up to 120°F, everything else remaining the same.

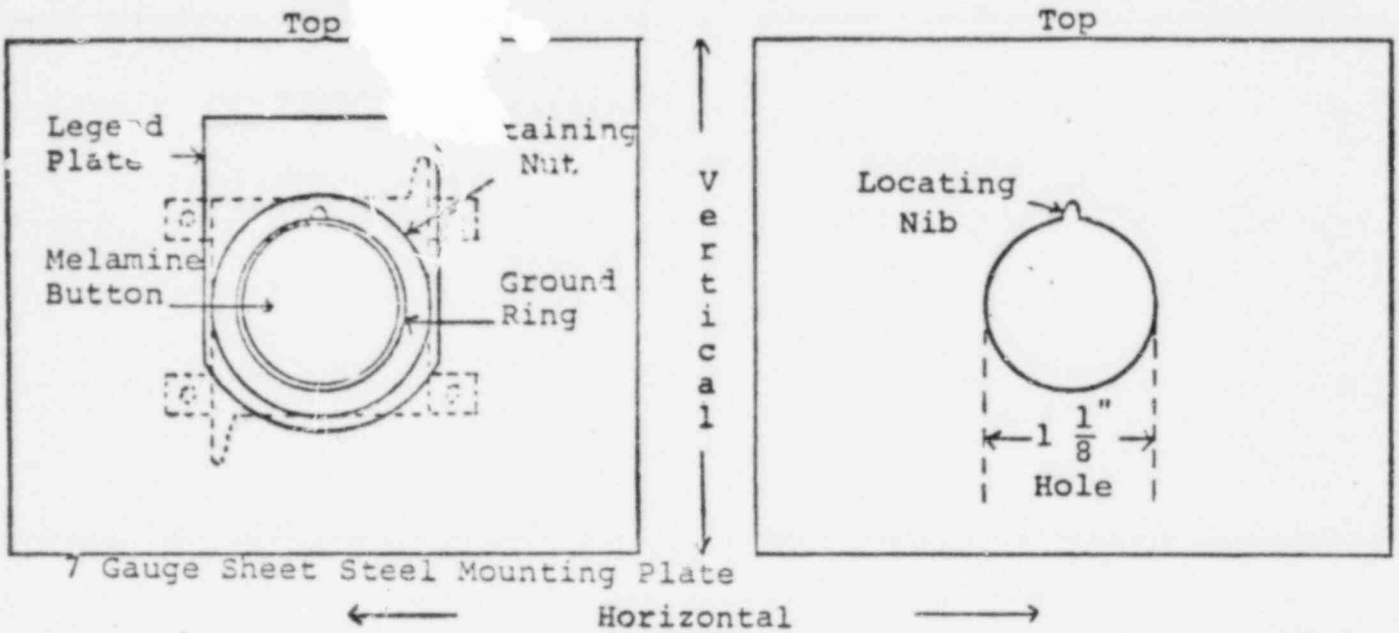
PUSHBUTTON SWITCH C71A-S--- (Continued)

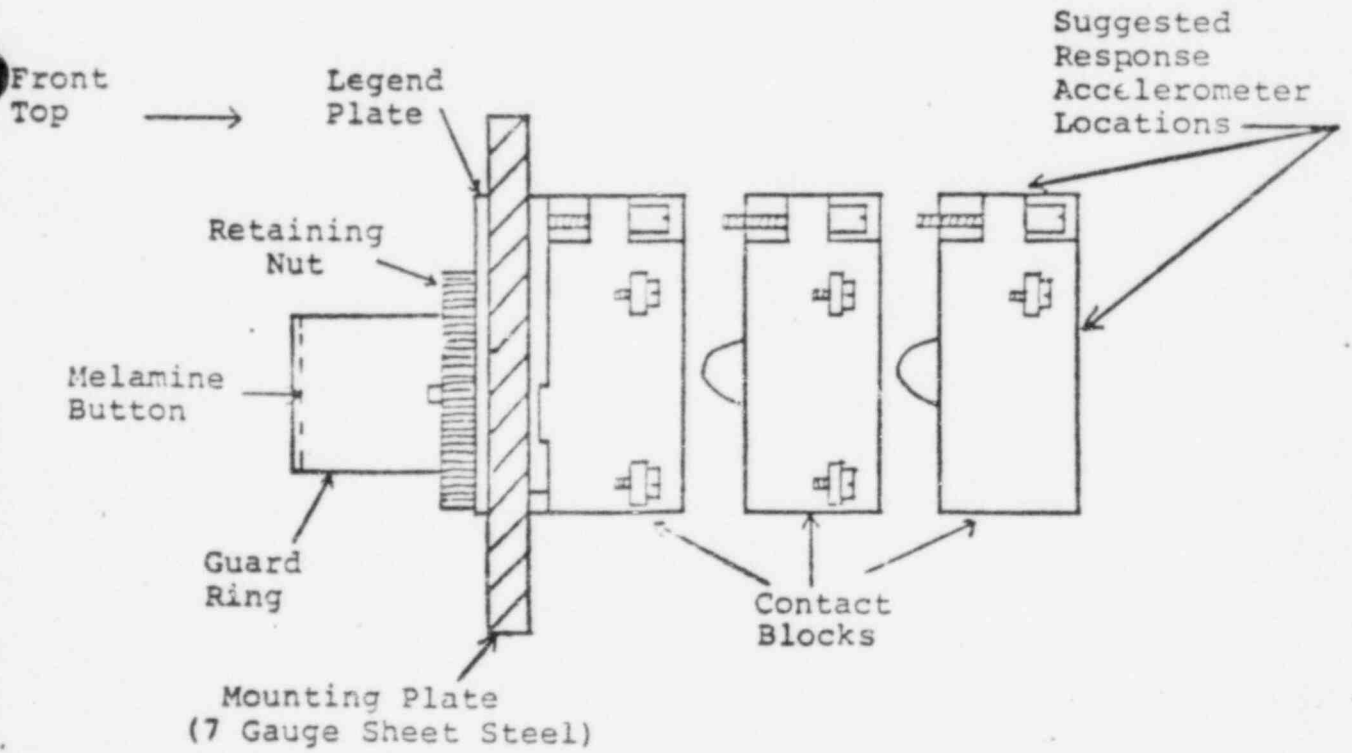
ENVIRONMENTAL QUALIFICATION TABLE C71-4

Final Step - Return to Ambient temperature and humidity. Let stabilize for 15 minutes and then operate at rated load 100 times.

7. RESULTS

The rotopush 10250T switch has passed the environmental test requirements of the General Electric Company.





MOUNTING TECHNIQUE FOR TEST SPECIMEN

FIGURE 1

Revision	0	1				Page 11 of 16
Prepared By/Date	[illegible]	[illegible]				
Checked By/Date	[illegible]	S.B.Hemsl				

nutech
San Jose, California

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.
Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.
Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.

Revision								
Prepared By/Date								
Checked By/Date								

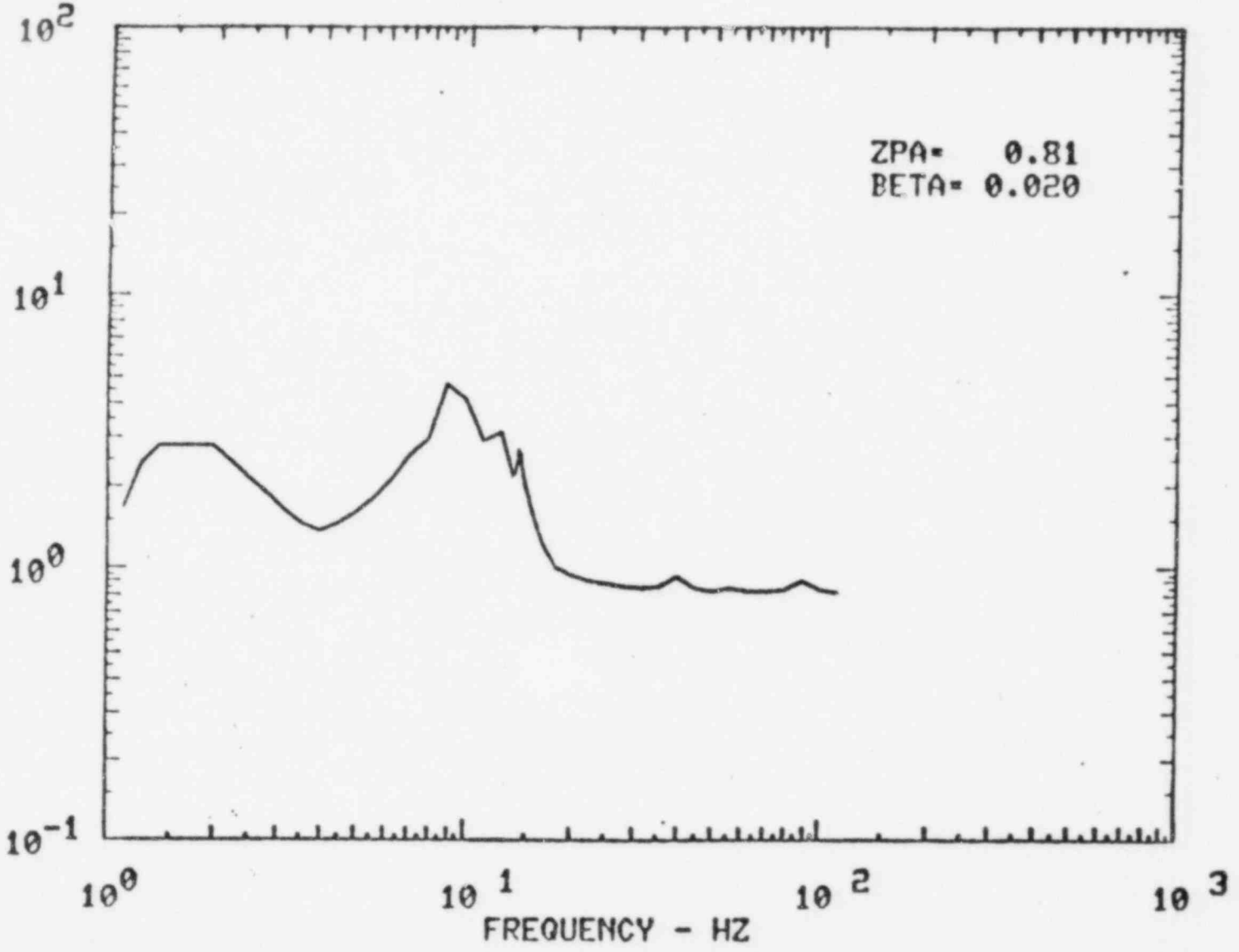


Figure 4

Horizontal DBE Required Response Spectrum

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.

Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.

Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.

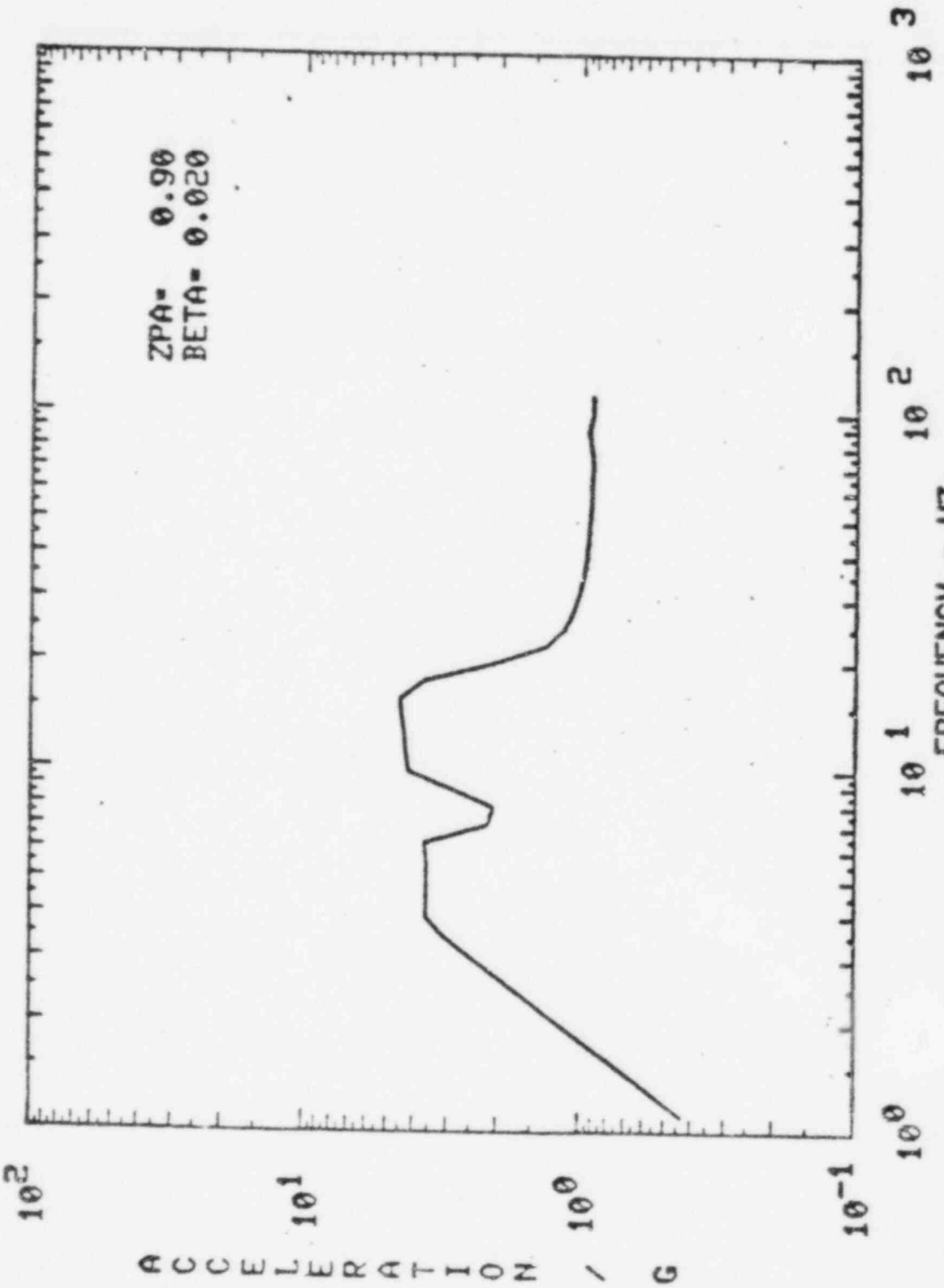


Figure 5

Vertical DBE Required Response Spectrum

Revision	1	2			
Prepared By/Date	[illegible] 7/14/81	[illegible] 9/15/81			
Checked By/Date	[illegible] 7-14-81	[illegible] 9/15/81			

Device Name: LOG RADIATION MONITOR # 238X660

Model Number: 807E228

The seismic qualification testing for this device was done at WYLE LABORATORIES, NORCO, CALIFORNIA on 9-7-1981

One of our Engineers representing Commonwealth Edison Company witnessed the testing and he confirms that the device passed the test without any structural failure or functional failure. Therefore the SQRT forms were completed based on his reporting and the only items not included were:

a) the report number

b) The TRS and RRS envelops.

This will be provided when the report becomes available.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: LOG.RAD. MONITOR # 238X660

EQUIPMENT NO: D18-K610A/D

LOCATION: Reactor Building CR-1, El. 768' on Panels H13-P635, 36

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD:

QUALIFICATION DOCUMENT REFERENCES:

1. WYLE Test Report # dated
2. NUTECH Test Spec. # MK2-02-034 Rev.0
3. Drawings & Misc. Data.
4.
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

Qualification Method

Nutech provides the test laboratory with a drawout shelf assembly upon which the test specimen shall be mounted.

Monitoring devices are provided for testing the specimen by the test laboratory.

1. Explanatory Testing:

Test Method:	Low level sine sweep
Input Motion:	Simple axis
No. of Tests	3-1 in each orthogonal axis
Frequency Range:	1-100 Hz
Sweep Rate:	< 1 octave per minute
Input 'g' Level:	0.25g peak

2.

Proof Testing	OBE Testing	DBE Testing
Test Method	Random Motion	Random Motion
Input Motion	Biaxial	Biaxial
No. of Tests	10 with 5 in each orientation	2 with 1 in each orientation
Frequency Range	1-100Hz	1-100Hz
Test Duration	30 sec./Test	30 sec./Test

3. Required Response Spectrum:-

Different size control panels were tested to a random multifrequency biaxial testing with the test response spectrum enveloping the floor response spectrum. The response spectrum at different instrument locations were obtained during this test. The envelop of these response spectrum were obtained and this was the required response spectrum for the instrument qualification.

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1 &2

Type:

PWR ____

BWR X

1. Utility: CECO
2. NSSS: GE
3. A-E: S&L

II. Component Name: Log Radiation Monitor # 238X660

1. Model Number 807E228 Quantity: 4
2. Vendor G.E.
3. If the component is a cabinet or panel, name and model No. of the devices included: NA
4. Physical Description a. Appearance Instrumentation
   b. Dimensions 7"HX19"W
   c. Weight 35 lbs.
5. Location: Building: Region CR-1
   Elevation: 768'-0" on panels H13-P635, 636
6. Field Mounting Conditions [ ] Bolt (No.___, Size___)
   panel mounted [ ] Weld (Length___)
   (see sketch attached) [ ] ____
7. Natural Frequencies in Each Direction: ____
   h1: ____ h2: ____ V: ____
8. a. Functional Description: ____
   (See attached anv. Qual. Tables)
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
   [ ] Both
9. Pertinent Reference Design Specifications: --

Reference: CQD File No. CQD 000262

SARGENT & LUNDY ENGINEERS

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

Comments: _____

_____

IV. Equipment Qualification Method: Test: ___ X _____

Analysis: -- _____

Combination of Test and Analysis: ____

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

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify) _____ 5.[ ] Combination of _____

2. Required Response Spectra (attach the graphs): FROM PANEL TEST.
~~panel accelerations for panels H13-P635, -636~~

3. Required Acceleration in Each Direction: NA

h1 = _____ h2 = _____ V = _____

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 1-100Hz

4. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Attach TRS graphs (Later)) [ ] No

5. g-level Test at NA h1 = _____ h2 = _____ V = _____

6. Laboratory Mounting: (See attached sketch)

1. [ ] Bolt (No. ___, Size ____) [ ] Weld (Length ____) [ ] _____

7. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ____
Resonance Search Test

SARGENT & LUNDY ENGINEERS CHICAGO

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

Complete: NA

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification	Location	Governing Response	Combination	Seismic Stress	Total Stress	Stress Allowable

B. Max. Deflection	Location	Effect Upon Functional Operability

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.: 25[illegible]660G007

Qualification 'g' levels		
h_1=	h_2=	V=

Name: Log. Rad.Monitor

Manufacturer: C.E.

Model No.: 807E228

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	v		
D18-K610A/D	Region CR-1 El. 768' on Panels H13-P635, 36				A	Random Multifrequency biaxial testing with TRS enveloping RRS.

A - Active P - Passive 1E - Class 1E

DIV I RADIATION MONITORING SYSTEM LOG. RAD. MON. D18-K610

ENVIRONMENTAL QUALIFICATION TABLE D18-3

1. DESCRIPTION
The instrument is a General Electric Logarithmic Radiation Monitor drawing number 238X660. All controls and indicators required for normal operation are mounted on the Front Panel.

2. SAFETY FUNCTION
The Log Radiation Monitor provides monitoring of gross gamma radiation levels in the main steam lines and provides initiation of a reactor scram and closure of the main steam line isolation valves in case of significant increases in the gross gamma radiation levels.

3. SAFETY DESIGN PARAMETERS

A. Input Power: 115 Vac, 53 to 63 Hz

B. Trip Circuits: Two upscale
One downscale
One high voltage - inop

4. FSAR ENVIRONMENTAL CONDITIONS
The instrument is located in the control room. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range 0.1 in.	20%	Operating 0.0005
N/A	60°-90°F	To 0.25 in. water	40-50%	Integrated 1.75×10^2
N/A	120°F	gauge static pressure		

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

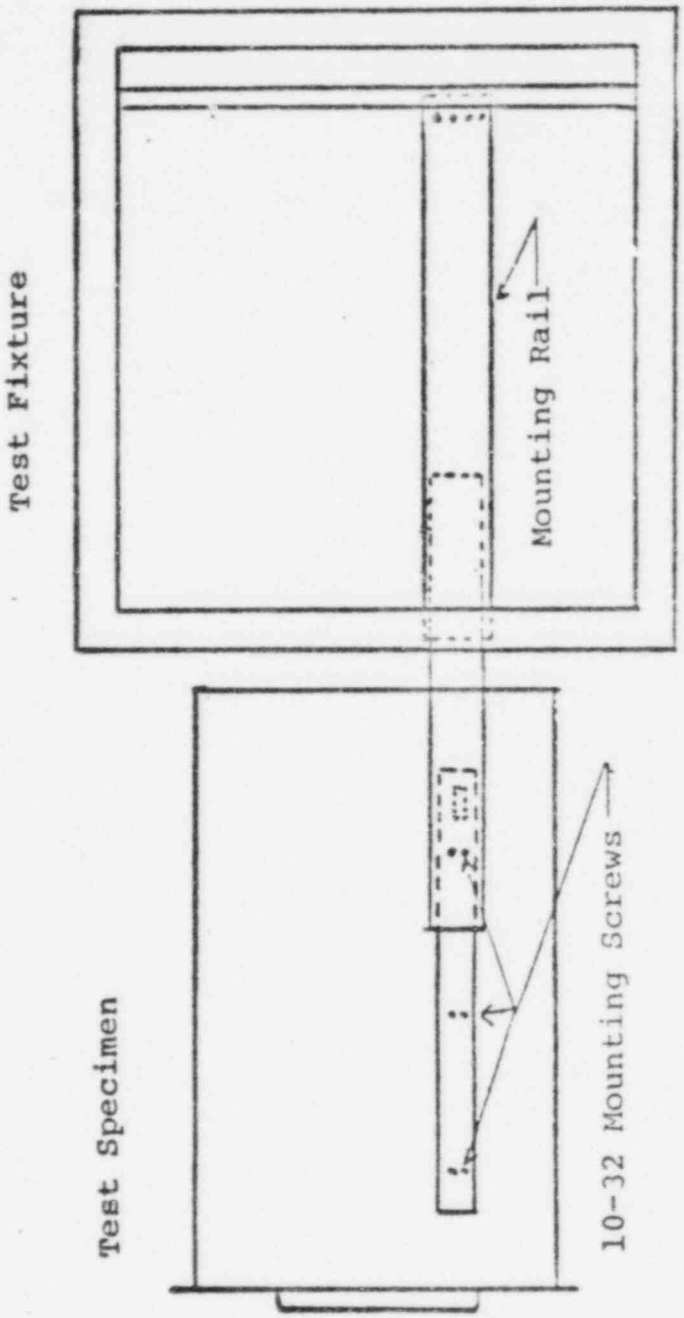
Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range 0.1 in.	20%	Operating 0.0005
N/A	60-90°F	To 0.25 in. water	40-50%	Integrated 1.75×10^2
N/A	120°F	gauge static pressure	60% (1)	

(1) During HVAC equipment failure conditions, relative humidity may approach 100% for 100 hours, but 120°F would not occur concurrently.

6. QUALIFICATION METHOD
Type Test

NO DATA

7. RESULTS

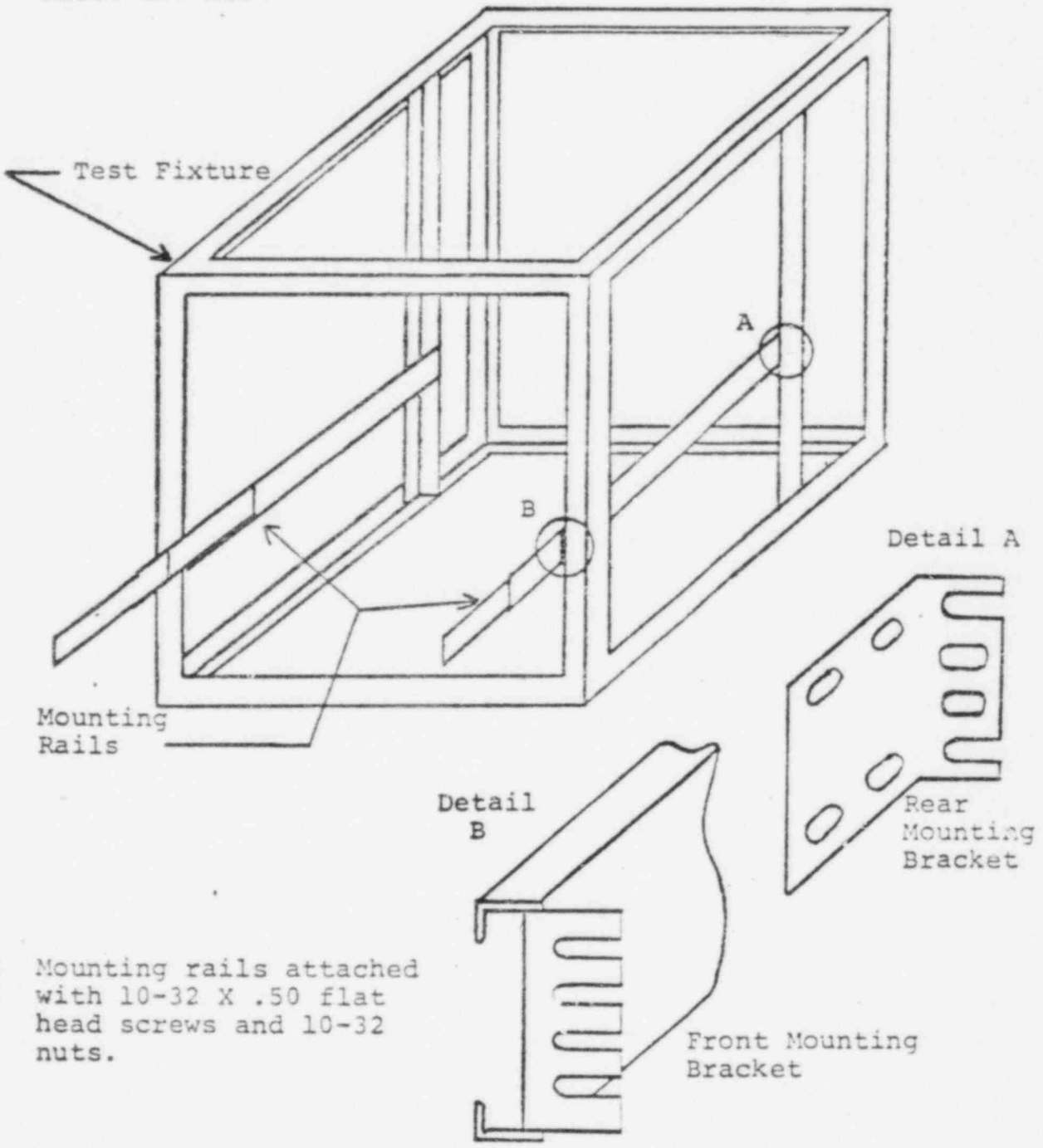


Mounting Technique for Test Specimen

Figure 1

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.
Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.
Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.

NOTE: Test fixture to be supported such that it is rigid below 200 Hz.

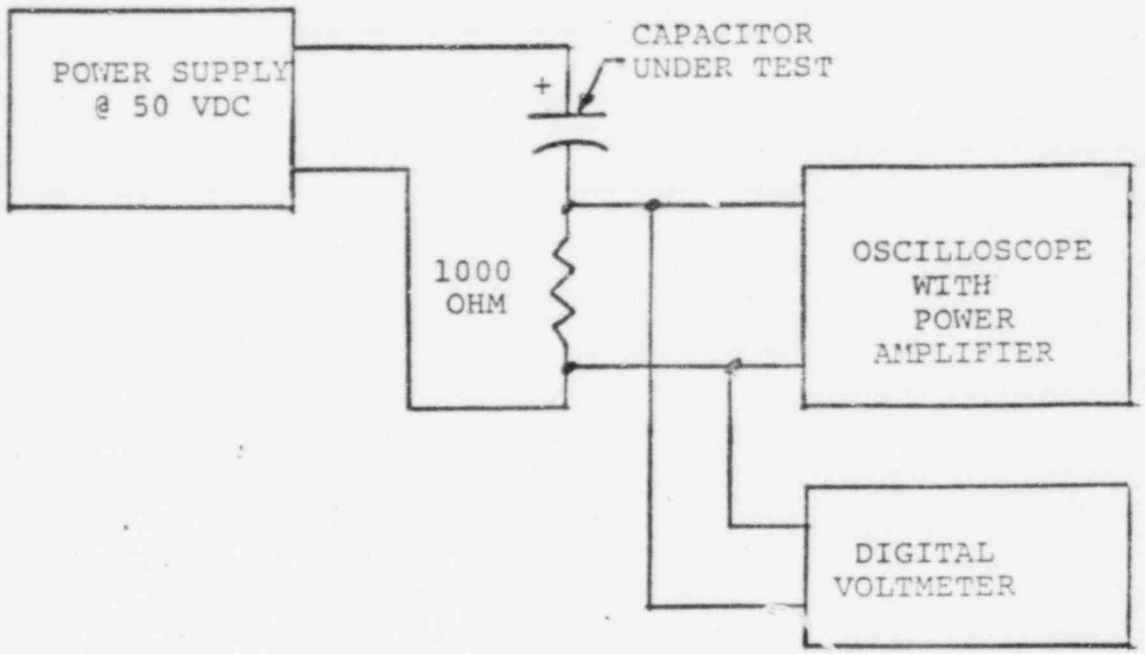


NOTE: Mounting rails attached with 10-32 X .50 flat head screws and 10-32 nuts.

Test Fixture for Test Specimen Mounting

Figure 2

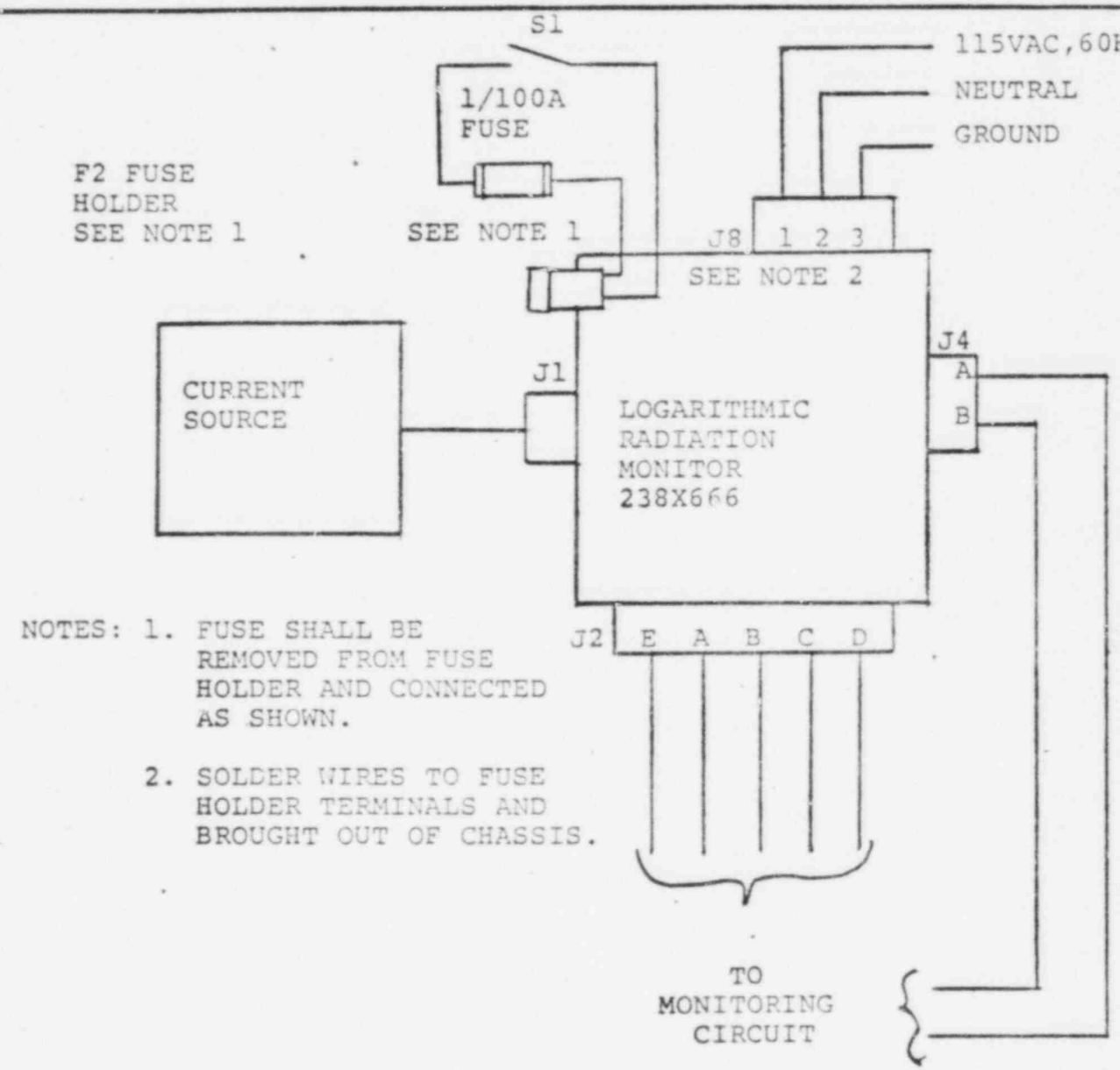
Revision	0					Page 24
Prepared By/Date	[illegible]					of 32
Checked By/Date	[illegible]					



TEST SET-UP FOR CAPACITOR TEST

FIGURE 3

Project Wm. H. Zimmer/La Salle County Nuclear Power Station File No.
Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.
Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.



NOTES: 1. FUSE SHALL BE REMOVED FROM FUSE HOLDER AND CONNECTED AS SHOWN.

2. SOLDER WIRES TO FUSE HOLDER TERMINALS AND BROUGHT OUT OF CHASSIS.

TEST SET-UP FOR LOGARITHMIC RADIATION MONITOR 238X666 OPERATIONAL TEST

FIGURE 4

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.
Owner Cincinnati Gas and Electric Co./Commwealth Edison Co.
Client Cincinnati Gas and Electric Co./Commwealth Edison Co.

TABLE 2

INSTRUMENT DATA

INSTRUMENT NAME:	Logarithmic Radiation Monitor
MODEL NO.:	238X660
* SERIAL OR ID. NO.:	
MANUFACTURER:	General Electric
SPECIAL FEATURES IF ANY:	None
FUNCTION:	Receive current input proportional to radiation and provide RPS trip outputs
DIMENSIONS:	7"H X 19"W
WEIGHT:	35 lbs
REQUIRED RANGE:	$1\text{-}10^6$ mR/hr
REQUIRED ACCURACY:	± 3%
MONITORING REQUIREMENTS:	Input current and output trips and voltage
MOUNTING DETAILS:	See Figures 1 and 2

* To be completed by test laboratory

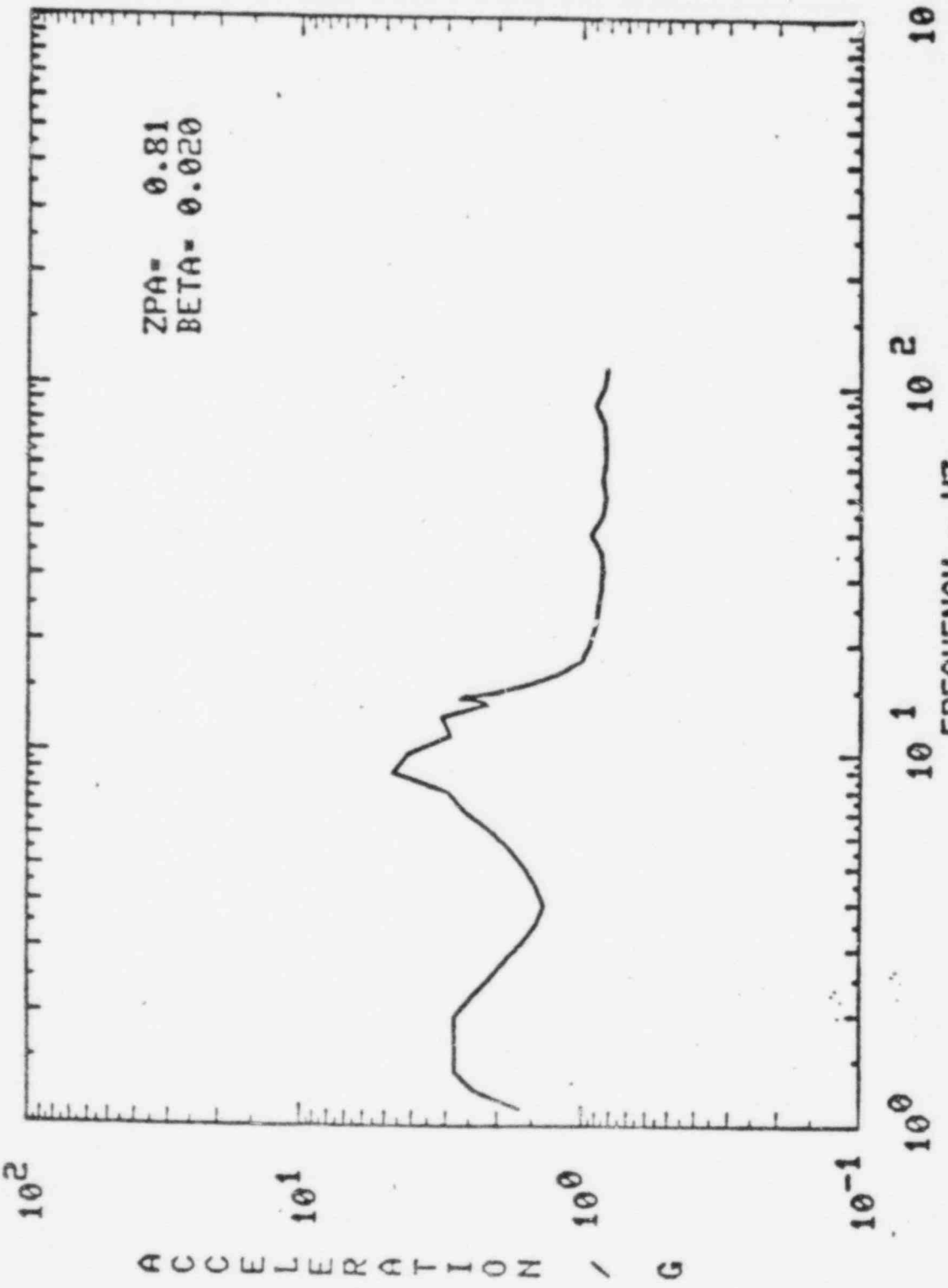


Figure 7
Horizontal DBE Required Response Spectrum

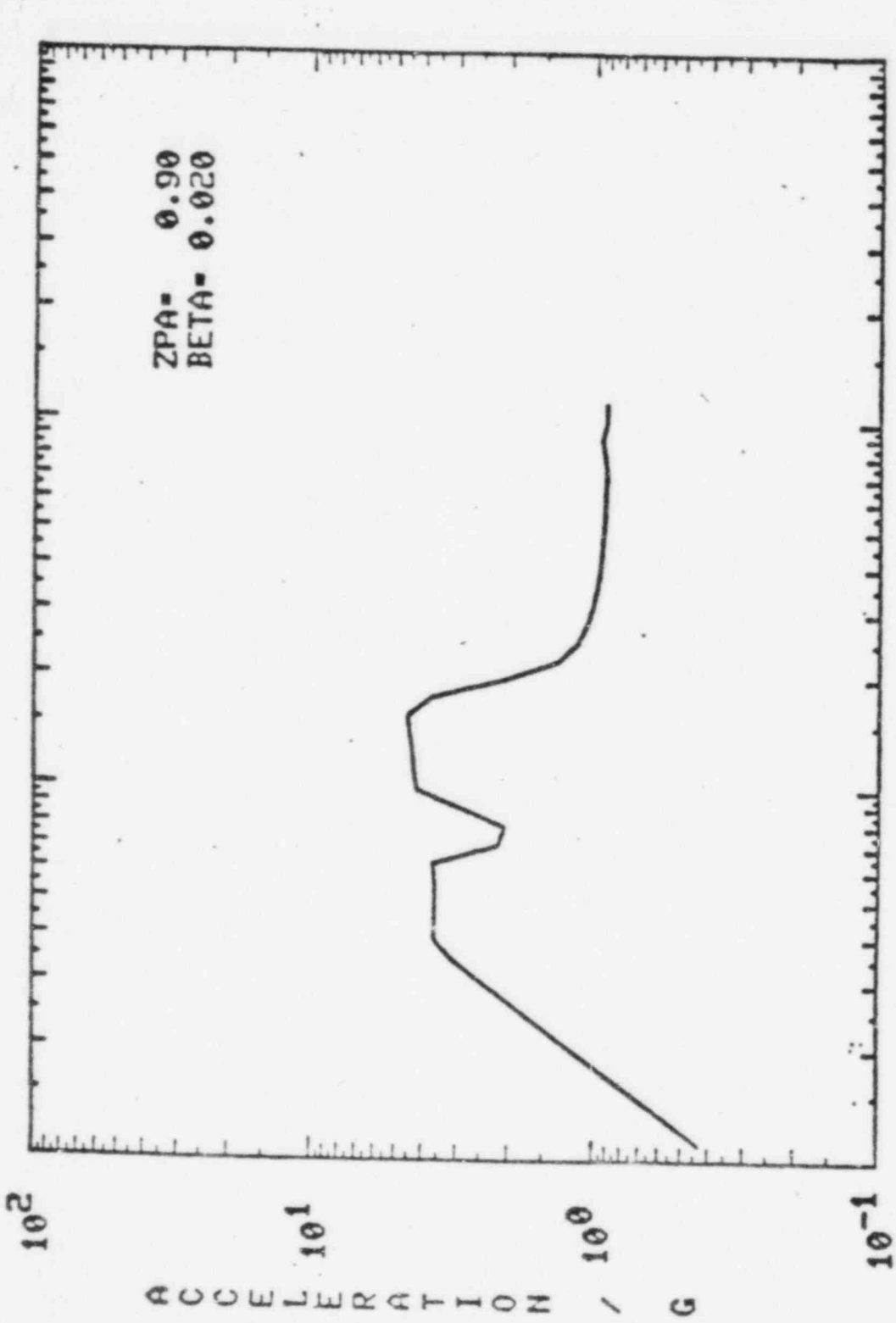


Figure 8

Vertical DBE Required Response Spectrum

Device Name: TIME DELAY RELAY # 145C3035

Model Number: CR2820.

The seismic qualification testing for this device was done at WYLE LABORATORIES, NORCO, CALIFORNIA on 9-4-1981

One of our Engineers representing Commonwealth Edison Company witnessed the testing and he confirms that the device passed the test without any structural failure or functional failure. Therefore the SQRT forms were completed based on his reporting and the only items not included were:

a) the report number

b) The TRS and RRS envelops.

This will be provided when the report becomes available.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: Time Delay Relay # 145C3035

EQUIPMENT NO: See Table -1

LOCATION: on Panel H13-P609 Aux. Bldg. El. 768'

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Seismic Tests (See page 2)

QUALIFICATION DOCUMENT REFERENCES:

1. WYLE Test Report dated
2. NUTECH Test Spec. MK2-02-040 Rev.1.
3. Drawings & Misc. Data.
4.
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION METHOD

The test specimen is attached to a fabricated test fixture. The monitoring devices are provided for testing.

1. Operational Testing:

   First, operational tests are performed which establishes a baseline function.

2. Exploratory Testing:

Test Method:	Low Level Sine Sweep
Input Motion:	Single Axis
No. of Tests:	3, One in Each Orthogonal Axis
Frequency Range:	1 to 100Hz
Sweep Rate:	1 Octave/Minute
Input 'g' Level:	0.25g Peak

3. Proof Testing:

	(a) OBE Testing	(b) DBE Testing
Test Method	Random Motion	Random Motion
Input Motion	Biaxial	Biaxial
No. of Tests	10-4 de-energized and 1 energized, in each orientation	4-1 de-energized and 1 energized in each orientation
Frequency Range	1 - 100Hz	1 - 100Hz
Test Duration	30 Secs/Test	30 Secs/Test

4. Required Response Spectrum:-

   Different Size control panels were tested to a random multifrequency biaxial testing with the test response spectrum enveloping the floor response spectrum. The response spectrum at different instrument locations were obtained during this test. The envelop of these response spectrum were obtained and this was the required response spectrum for the instrument qualification.

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1&2

Type:

PWR ____

BWR X

1. Utility: CECO
2. NSSS: GE
3. A-E: S&L

II. Component Name: Time Delay Relay # 145C3035

1. Model Number CR2820 Quantity: See Table-1 24
2. Vendor GE/general purpose control
3. If the component is a cabinet or panel, name and model No. of the devices included: ____
4. Physical Description a. Appearance Instrumentation
   b. Dimensions 3.75" x 3.75" x 3.5"
   c. Weight 2 lbs.
5. Location: Building: Auxiliary Building
   Elevation: on Panel H13-P609 El. 768'
6. Field Mounting Conditions [ ] Bolt (No. 4, Size 10-24)
   [ ] Weld (Length ___)
   [ ] Mounted on Panels
7. Natural Frequencies in Each Direction: ____
   h1: ____ h2: ____ V: ____
8. a. Functional Description: ____
   (See attached env.Qual. Table)
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
   [ ] Both Other safety function
9. Pertinent Reference Design Specifications: ____

Reference: CQD File No. CQD 000273

SARGENT & LUNDY ENGINEERS

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

Comments: _____

_____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by WYLE LAB. REPORT # (LATER) dated _____
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify) _____ 5.[ ] Combination of _____

2. Required Response Spectra (attach the graphs): See attached.

_____

3. Required Acceleration in Each Direction: NA .

h1 = _____ h2 = _____ V = _____

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 1 - 100Hz

4. TRS enveloping RRS using Multi-Frequency Test[X] Yes (Attach TRS graphs (LATER)
[ ] No

5. g-level Test at h1 = _____ h2 = _____ V = _____

6. Laboratory Mounting:

1. [X] Bolt (No. 4 , Size 10-32) [ ] Weld (Length ____)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ____
Resonance Search Test.

_____

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

Complete: N.A.

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Allowable

B. Max. Deflection Location Effect Upon Functional Operability

SARGENT & LUNDY ENGINEERS CHICAGO

TIME DELAY RELAY B21C-K---

ENVIRONMENTAL QUALIFICATION TABLE B21-12

1. DESCRIPTION
The equipment is a CR2820 time delay relay manufactured by General Electric.

2. SAFETY FUNCTION
Time delay relay energization required to permit initiation of the Automatic Depressurization System function and General Safety System application.

3. SAFETY DESIGN PARAMETERS
The time delay relay mst energize and de-energize with a 10% accuracy when required and supply a 120 volt DC, 130 MA inductive load.

Maximum environmental condition: 120°F - 90% R/H

4. FSAR ENVIRONMENTAL CONDITIONS
The equipment is located inside the Control Room. The FSAR environment conditions are tabulated below.

Duration	Temperature	Pressure	Humdity	Radition
Minimum	40°F	Range	10%	Operating 0.0005 /hr
Normal	60°-90°F	0.10 in. to	50%	Integrated (40 yrs)
Maximum	120°F	1.0 in. water Gauge Static Pressure	60%	1.75×10^2 Rads

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008 Rev. 5)

Duration	Temperature	Pressure	Humdity	Radition
Minimum	40°F	Range	10%	Operating 0.0005 /hr
Normal	60°-90°F	0.10 in. to	50%	Integrated (40 yrs)
Maximum	120°F	1.0 in. water Gauge Static Pressure	60%	1.75×10^2 Rads

6. QUALIFICATION METHOD
Operational Qualification
The devices were placed in the Environmental Chamber and soaked for 16 hours at 60°C and 90-95% relative humidity. At the conclusion of the soak period, without change of environmental conditions, each device was cycled 50 times at rated load. Each cycle consisted of 1 sec. on and 9 sec. off except for the selector switch which had 1 sec. right, 1 sec. left, 8 sec. off.

7. - RESULTS
Contact tests show relay will handle 120 volts DC, 130 MA inductive load. Tests demonstrate that the relay has 10% timing accuracy. Relay will function in environments up to 120°F and 90% R/H.

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.: 14[illegible]035

Qualification 'g' levels		
h_1=	h_2=	V=

Name: Time Delay Relay

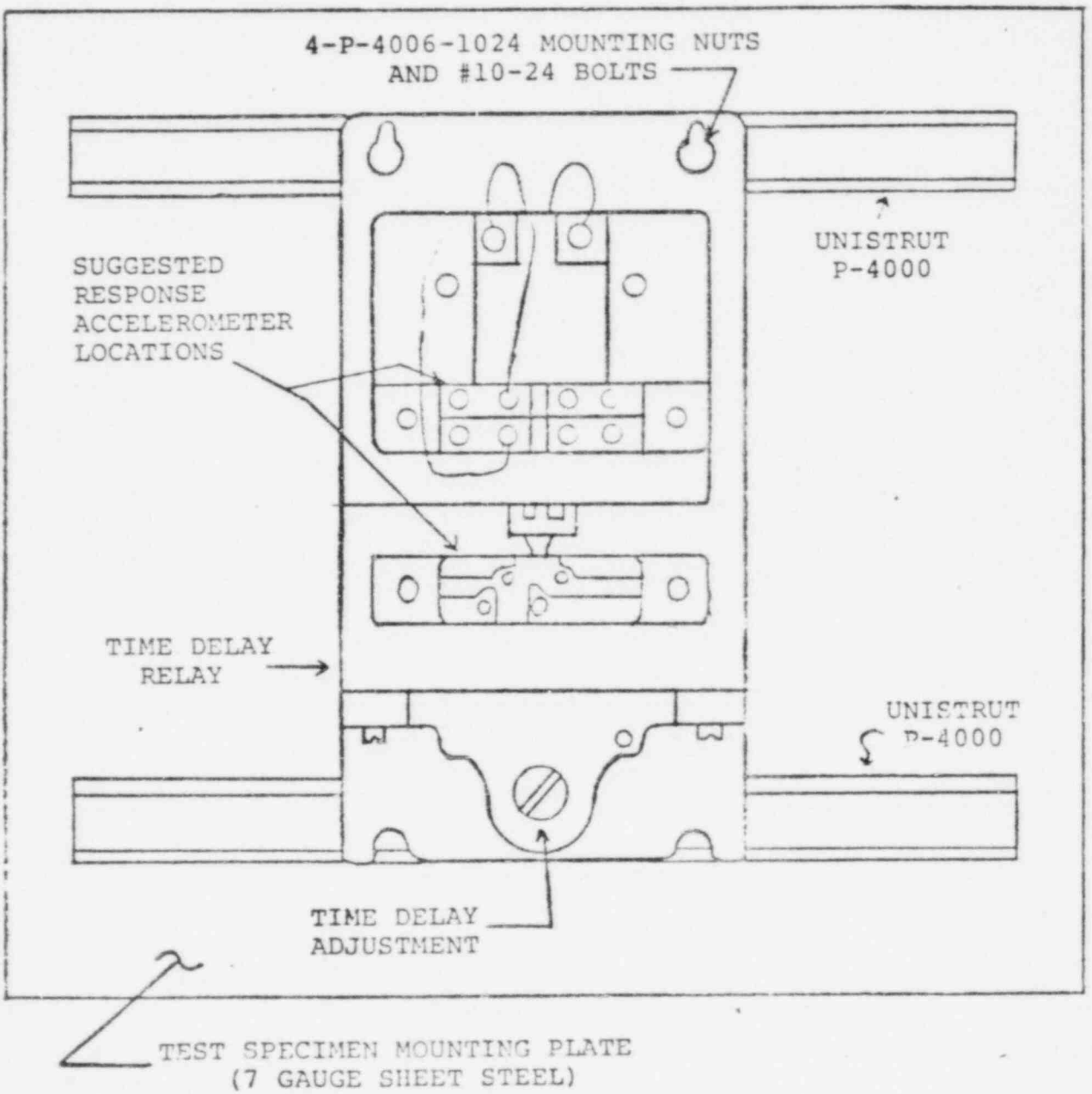
Manufacturer: GE

Model No.: CR2820

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	v		
B21C-K05A/B	Aux. Bldg. El.768' On Panel H13-P628/631				A	Random Multifrequency Biaxial Testing with the TRS enveloping The RRS.
B21L-K01A/D	On Panel H13-P689/690				A	
C11A-K01	On Panel H13-P610				A	
C71A-K16A/D	On Panel H13-.609/611				A	
C71A-K22A/D	On Panel H13-P609				A	
E12A-K054A/B	Reactor Bldg. 673', AB-731' On Panel H13-P618/629				A	
E12A-K055	Reactor Bldg. El.673' On Panel H13-P613				A	
E12A-K070A/B	Aux.Bldg. El.731' On Panel H13-P618/629				A	
E12A-K093A/B	-"-				A	
E22B-K06	D.G.-1 El.710' On Panel H22-P028				A	
E51A-K09	Reactor Bldg. El.731' On Panel H13-P621				A	

A - Active P - Passive 1E - Class 1E

Project Wm. H. Zimmer/ La Salle County Nuclear Power Stations File No.
Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.
Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.



MOUNTING TECHNIQUE FOR TEST SPECIMEN

FIGURE 1

Revision	0					Page 11
Prepared By/Date	[illegible] 9/78					of 16
Checked By/Date	[illegible]					

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.

Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.

Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.

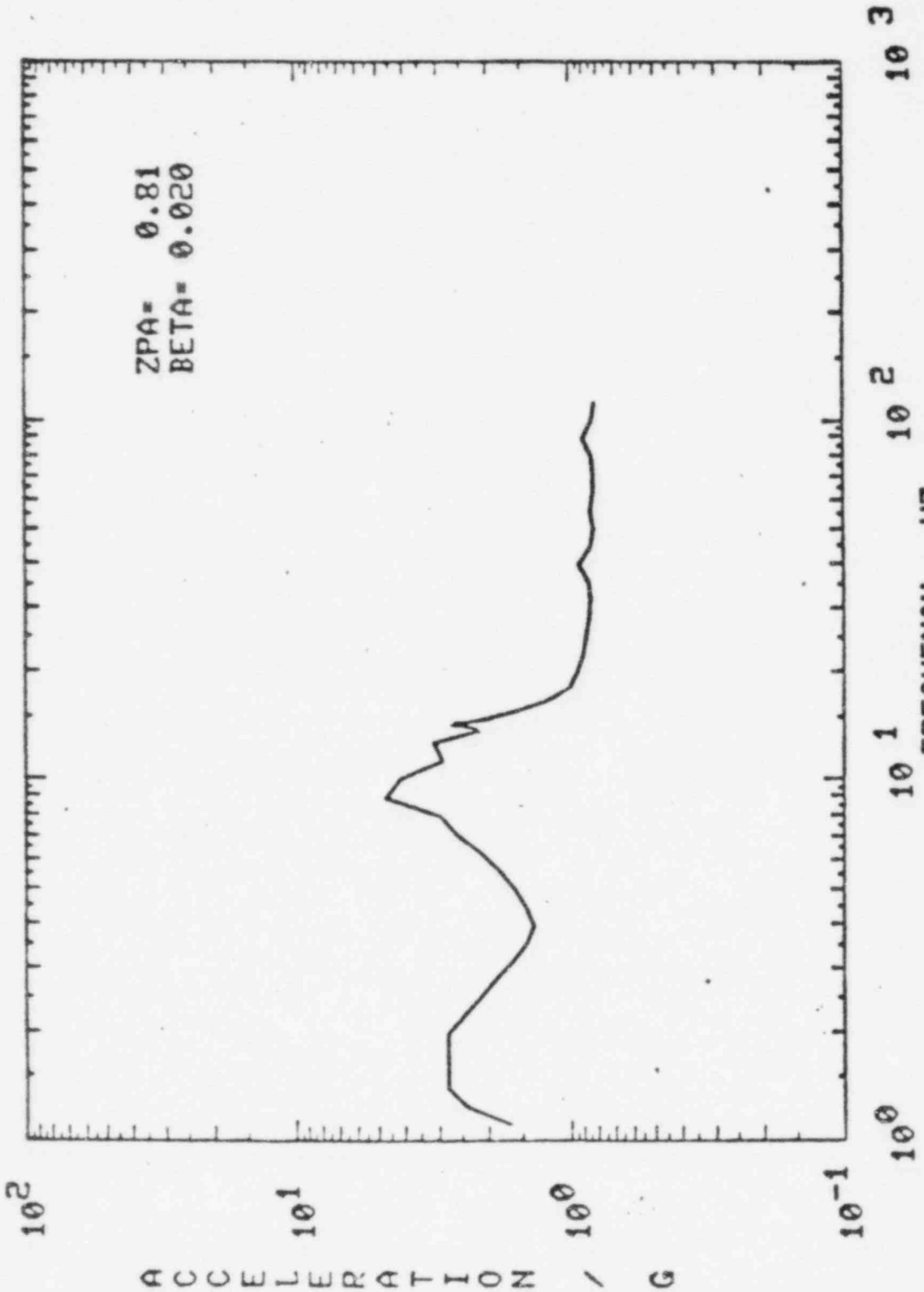


Figure 4

Horizontal DBE Required Response Spectrum

Revision	0	1			
Prepared By / Date	[illegible] 2/6/81	[illegible] 9/15/81			
Checked By / Date	DAH 7-16-81	GAC 9/15/81			

nutech
San Jose, California

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.

Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.

Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.

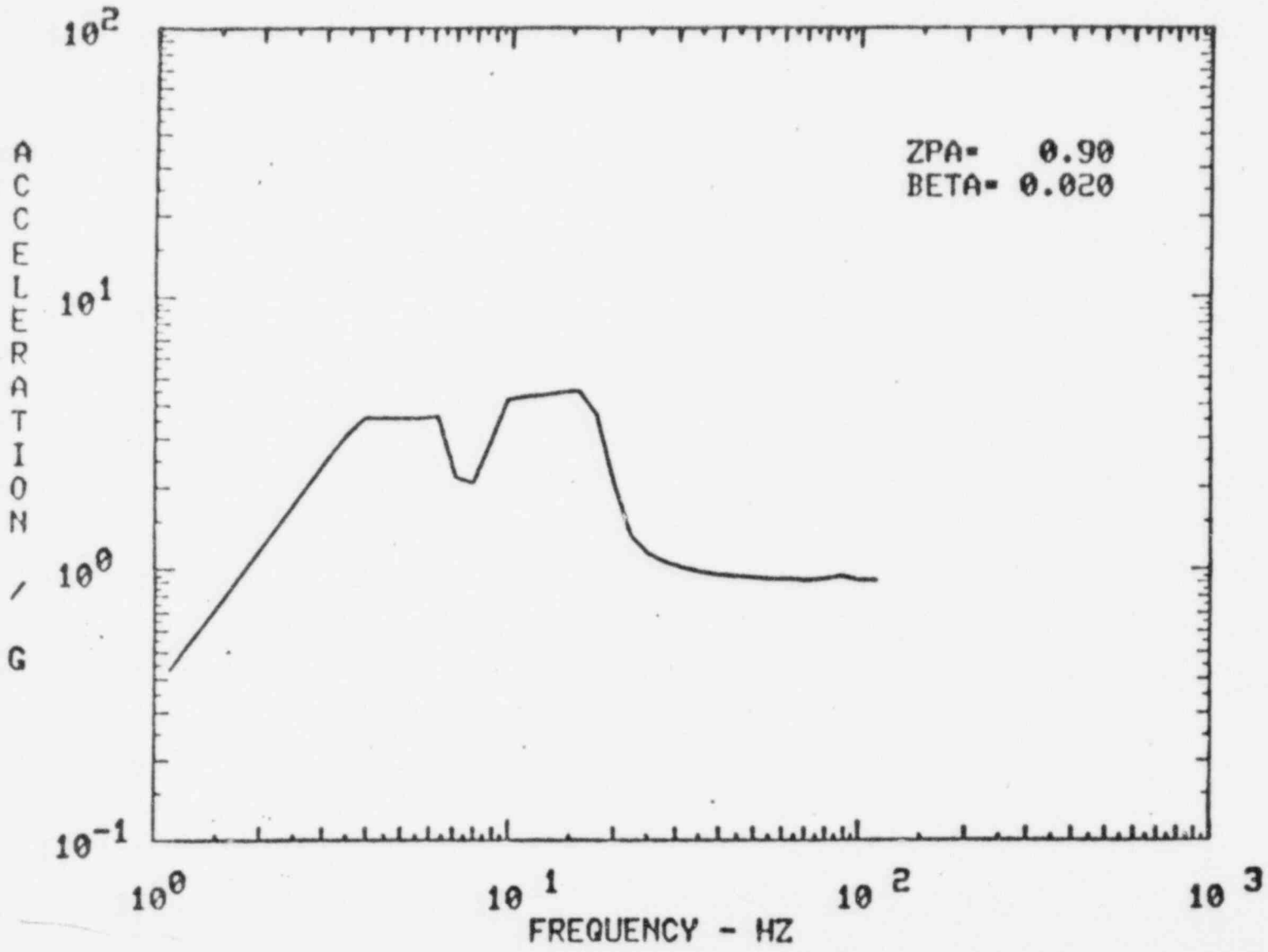


Figure 5

Vertical DBE Required Response Spectrum

Revision					
Prepared By/Date					
Checked By/Date					

Device Name: EAGLE SIGNAL TIMER # 145C3043

Model Number: HP 5

The seismic qualification testing for this device was done at WYLE LABORATORIES, NORCO, CALIFORNIA on 9-5-1981

One of our Engineers representing Commonwealth Edison Company witnessed the testing and he confirms that the device passed the test without any structural failure or functional failure. Therefore the SQRT forms were completed based on his reporting and the only items not included were:

a) the report number

b) The TRS and RRS envelops.

This will be provided when the report becomes available.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: Adjustable Timer # 145C3043

EQUIPMENT NO: E31-R621A/B, E32-N600A,E,J,N, E32-N601A,E,J,N, E32-N602A,E, E32-N604

LOCATION: Reactor Building CR1 El.768' on Panels H13-P632, 642
El.761' on Panels H13-P655, 654

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Seismic Test

QUALIFICATION DOCUMENT REFERENCES:

1. WYLE Test Report # dated
2. NUTECH Test Spec. MK2-02-032 Rev.2.
3. Drawings & Misc. Data.
4.
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

Qualification Methods

The timer case is securely mounted to the mounting plate using four 8-32 mounting screws. The test specimen is mounted on a vertical surface with the case and timer in a horizontal position.

The monitoring devices are provided for testing.

1. Exploratory Testing

Test Method	Low level Sine Sweep
Input motion	Single-axis
No. of Tests	3 in each orthogonal axis
Frequency Range	1 to 100 Hz
Sweep Rate	1 octave 1 minute
Input 'g' level	0.25 'g' peak

2. Proof Testing

	OBE Testing	DBE Testing
Test Method	Random Motion	Random Motion
Input Motion	Biaxial	Biaxial
No. of tests	10-4 with the timer de-energized and 1 with timer operating, in each orientation.	4-1 with timer de-energized and 1 with timer operating, in each orientation
Frequency Range	1-100 Hz	1-100 Hz
Test Duration	30 Secs/Test	30 Secs/Test

3. Required Response Spectrum:-

Different size control panels were tested to a random multifrequency biaxial testing with the test response spectrum enveloping the floor response spectrum. The response spectrum at different instrument locations were obtained during this test. The envelop of these response spectrum were obtained and this was the required response spectrum for the instrument qualification.

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1&2

Type:

1. Utility: CECO — PWR ____
2. NSSS: GE — BWR X
3. A-E: S&L

II. Component Name: Adjustable Timer # 145C3043

1. Model Number: HP5 — Quantity: 13
2. Vendor: Eagle Signal
3. If the component is a cabinet or panel, name and model No. of the devices included: --
4. Physical Description a. Appearance: Instrumentation
   b. Dimensions: $4\frac{1}{2}$" x 3^{13} x $5^{3}/4$" deep
   c. Weight: 2 lbs 11 oz
5. Location: Building: Reactor Bldg. Region CR-1
   Elevation: 768' on Panels H13-P632, 642
   761' " H13-P654, 655
6. Field Mounting Conditions [X] Bolt (No. 4, Size $^{3}/_{16}$)
   [ ] Weld (Length ___)
   [ ] ____
7. Natural Frequencies in Each Direction: ____
   h1: ____ h2: ____ V: ____
8. a. Functional Description: to initiate a timed period by an external signal from a push button, limit switch, photo cell, etc.
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [ ] Both Other safety function.
9. Pertinent Reference Design Specifications: --

Reference: CQD File No. CQD 000268

SARGENT & LUNDY ENGINEERS

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

Comments: _____

_____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

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

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify) _____ 5.[ ] Combination of _____

2. Required Response Spectra (attach the graphs): SEE ATTACHED.
~~Panel acceleration for panels H13-P632, 42, 54, 55~~

3. Required Acceleration in Each Direction: NA

h1 = _____ h2 = _____ V = _____

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 1 - 100 Hz

4. TRS enveloping RRS using Multi-Frequency Test[X] Yes (Attach TRS graphs (LATER)
[ ] No

5. g-level Test at h1 = _____ h2 = _____ V = _____

6. Laboratory Mounting:

1. [X] Bolt (No. 4 , Size 8-32) [ ] Weld (Length _____)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) _____
Resonance Search Test.

_____

SARGENT & LUNDY ENGINEERS CHICAGO

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

Complete: NA

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

	Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Allowable
A.						

	Max. Deflection	Location	Effect Upon Functional Operability
B.			

Reference: C&D File No. 000268

SARGENT & LUNDY ENGINEERS CHICAGO

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.: 1[illegible]3043

Qualification 'g' levels		
h_1=	h_2=	V=

Name: Time Indicator Switch

Manufacturer: Eagle Signal

Model No.: HP-5

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	v		
E31-R621 A/B	Region CR-1 El.768' Panel H13-P632 H13-P-642				A	Random Multifrequency biaxial testing with the TRS enveloping the RRS.
E32-N600A,E,J,N	Region CR-1 El. 761' on Panel H13-P655				A	
E32-N601A,E,J,N	Region CR-1 El.761' on Panel H13-P655				A	
E32-N602A,E	Region CR-1 El.761' on Panel H13-P655				A	
E32-N604	Region CR-1 El.761' on Panel H13-P654				A	

A - Active P - Passive 1E - Class 1E

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E31-R621

ENVIRONMENTAL QUALIFICATION TABLE E31-3

1. DESCRIPTION
The instrument is a Model HP55AG synchronous motor driven timer with a progressive pointer, manufactured by Eagle Company.

2. SAFETY FUNCTION
The Leak Detection System (LDS), including the time indicating switch, senses leaks in closed systems and initates the appropriate isolation signals. The time indicating switch works as a bypass timer, which overrides the isolation signal (from high differential flow) during the Reactor water clean-up system (RWCU) startup. No function important to safety is performed by this device.

3. SAFETY DESIGN PARAMETERS

The Timer must energize with an accuracy of 0.5% a Volt dc, 65 mA inductive load.

Worst case: 120°F - 90% R/H, +1.0 in mC

A. Contact rating: 10 amp at 120 Vac

B. Sequence:

(1) Energized clutch coil starts timing
(2) De-energized coil resets timer
(3) Timer resets on power failure
(4) Instantaneous contacts operate when clutch coil is energized
(5) Delay contacts operate when pointer is at end of timing cycle (reaches 0)

C. Reset time 0.5 sec (Full scale)

4. FSAR ENVIRONMENTAL CONDITIONS
The instrument is on the Division I Leak Detection V.B. panel (H13-P632) located in the control room. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E31-R621 (Continued)

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

ENVIRONMENTAL QUALIFICATION TABLE E31-3

(1) During HVAC equipment failure conditions relative humidity may approach 90% for 100 hours, but 120°F would not occur simultaneously.

6. QUALIFICATION METHOD

Type Test

The HP50A6 was randomly withdrawn from stock and placed in a Tenney Environmental Chamber, Model BTRS-30350. The relative humidity was set for 90% and the chamber was cycled from 120°F to 40°F to 120°F for duration of the test. Base readings were taken at 30% relative humidity and 73°F.

Time	Temperature	Humidity%
1 hr	40°F	92
1.5 hr	120°F	90
1 hr	40°F	90
2 hr	120°F	90
1.5 hr	40°F	90
2 hr	120°F	90
1.5 hr	40°F	90
3/4 hr	70°F	30
17.5 hr	120°F	90

7. RESULTS

The unit functioned normally throughout the tests.

Tests performed show that timer accuracy, contact rating for worst case inductive load, will function in temperatures up to 120°F. The exceedingly small amount of radiation and pressure variations in the control room will have an insignificant effect on the timer.

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E32-N600

ENVIRONMENTAL QUALIFICATION TABLE E31-3

1. DESCRIPTION
The instrument is a Model HP55AG synchronous motor driven timer with a progressive pointer, manufactured by Eagle Company.

2. SAFETY FUNCTION
The Leak Detection System (LDS), including the time indicating switch, senses leaks in closed systems and initates the appropriate isolation signals. The time indicating switch works as a bypass timer, which overrides the isolation signal (from high differential flow) during the Reactor water clean-up system (RWCU) startup. No function important to safety is performed by this device.

3. SAFETY DESIGN PARAMETERS

The Timer must energize with an accuracy of 0.5% a Volt dc, 65 mA inductive load.

Worst case: 120°F - 90% R/H, +1.0 in mC

A. Contact rating: 10 amp at 120 Vac

B. Sequence:

(1) Energized clutch coil starts timing
(2) De-energized coil resets timer
(3) Timer resets on power failure
(4) Instantaneous contacts operate when clutch coil is energized
(5) Delay contacts operate when pointer is at end of timing cycle (reaches 0)

C. Reset time 0.5 sec (Full scale)

4. FSAR ENVIRONMENTAL CONDITIONS
The instrument is on the Division I Leak Detection V.B. panel (H13-P632) located in the control room. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E32-N600 (Continued)

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

ENVIRONMENTAL QUALIFICATION TABLE E31-3

(1) During HVAC equipment failure conditions relative humidity may approach 90% for 100 hours, but 120°F would not occur simultaneously.

6. QUALIFICATION METHOD

Type Test
The HP50A6 was randomly withdrawn from stock and placed in a Tenney Environmental Chamber, Model BTRS-30350. The relative humidity was set for 90% and the chamber was cycled from 120°F to 40°F to 120°F for duration of the test. Base readings were taken at 30% relative humidity and 73°F.

Time	Temperature	Humidity%
1 hr	40°F	92
1.5 hr	120°F	90
1 hr	40°F	90
2 hr	120°F	90
1.5 hr	40°F	90
2 hr	120°F	90
1.5 hr	40°F	90
3/4 hr	70°F	30
17.5 hr	120°F	90

7. RESULTS
The unit functioned normally throughout the tests.

Tests performed show that timer accuracy, contact rating for worst case inductive load, will function in temperatures up to 120°F. The exceedingly small amount of radiation and pressure variations in the control room will have an insignificant effect on the timer.

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E32-N601

ENVIRONMENTAL QUALIFICATION TABLE E31-3

1. DESCRIPTION
The instrument is a Model HP55AG synchronous motor driven timer with a progressive pointer, manufactured by Eagle Company.

2. SAFETY FUNCTION
The Leak Detection System (LDS), including the time indicating switch, senses leaks in closed systems and initates the appropriate isolation signals. The time indicating switch works as a bypass timer, which overrides the isolation signal (from high differential flow) during the Reactor water clean-up system (RWCU) startup. No function important to safety is performed by this device.

3. SAFETY DESIGN PARAMETERS

The Timer must energize with an accuracy of 0.5% a Volt dc, 65 mA inductive load.

Worst case: 120°F - 90% R/H, +1.0 in mC

A. Contact rating: 10 amp at 120 Vac

B. Sequence:

(1) Energized clutch coil starts timing
(2) De-energized coil resets timer
(3) Timer resets on power failure
(4) Instantaneous contacts operate when clutch coil is energized
(5) Delay contacts operate when pointer is at end of timing cycle (reaches 0)

C. Reset time 0.5 sec (Full scale)

4. FSAR ENVIRONMENTAL CONDITIONS
The instrument is on the Division I Leak Detection V.B. panel (H13-P632) located in the control room. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E32-N601 (Continued)

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

ENVIRONMENTAL QUALIFICATION TABLE E31-3

(1) During HVAC equipment failure conditions relative humidity may approach 90% for 100 hours, but 120°F would not occur simultaneously.

6. QUALIFICATION METHOD

Type Test
The HP50A6 was randomly withdrawn from stock and placed in a Tenney Environmental Chamber, Model BTRS-30350. The relative humidity was set for 90% and the chamber was cycled from 120°F to 40°F to 120°F for duration of the test. Base readings were taken at 30% relative humidity and 73°F.

Time	Temperature	Humidity%
1 hr	40°F	92
1.5 hr	120°F	90
1 hr	40°F	90
2 hr	120°F	90
1.5 hr	40°F	90
2 hr	120°F	90
1.5 hr	40°F	90
3/4 hr	70°F	30
17.5 hr	120°F	90

7. RESULTS
The unit functioned normally throughout the tests.

Tests performed show that timer accuracy, contact rating for worst case inductive load, will function in temperatures up to 120°F. The exceedingly small amount of radiation and pressure variations in the control room will have an insignificant effect on the timer.

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E32-N602

ENVIRONMENTAL QUALIFICATION TABLE E31-3

1. DESCRIPTION
The instrument is a Model HP55AG synchronous motor driven timer with a progressive pointer, manufactured by Eagle Company.

2. SAFETY FUNCTION
The Leak Detection System (LDS), including the time indicating switch, senses leaks in closed systems and initates the appropriate isolation signals. The time indicating switch works as a bypass timer, which overrides the isolation signal (from high differential flow) during the Reactor water clean-up system (RWCU) startup. No function important to safety is performed by this device.

3. SAFETY DESIGN PARAMETERS

The Timer must energize with an accuracy of 0.5% a Volt dc, 65 mA inductive load.

Worst case: 120°F - 90% R/H, +1.0 in mC

A. Contact rating: 10 amp at 120 Vac

B. Sequence:

(1) Energized clutch coil starts timing
(2) De-energized coil resets timer
(3) Timer resets on power failure
(4) Instantaneous contacts operate when clutch coil is energized
(5) Delay contacts operate when pointer is at end of timing cycle (reaches 0)

C. Reset time 0.5 sec (Full scale)

4. FSAR ENVIRONMENTAL CONDITIONS
The instrument is on the Division I Leak Detection V.B. panel (H13-P632) located in the control room. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E32-N604

ENVIRONMENTAL QUALIFICATION TABLE E31-3

1. DESCRIPTION
The instrument is a Model HP55AG synchronous motor driven timer with a progressive pointer, manufactured by Eagle Company.

2. SAFETY FUNCTION
The Leak Detection System (LDS), including the time indicating switch, senses leaks in closed systems and initates the appropriate isolation signals. The time indicating switch works as a bypass timer, which overrides the isolation signal (from high differential flow) during the Reactor water clean-up system (RWCU) startup. No function important to safety is performed by this device.

3. SAFETY DESIGN PARAMETERS

The Timer must energize with an accuracy of 0.5% a Volt dc, 65 mA inductive load.

Worst case: 120°F - 90% R/H, +1.0 in mC

A. Contact rating: 10 amp at 120 Vac

B. Sequence:

(1) Energized clutch coil starts timing
(2) De-energized coil resets timer
(3) Timer resets on power failure
(4) Instantaneous contacts operate when clutch coil is energized
(5) Delay contacts operate when pointer is at end of timing cycle (reaches 0)

C. Reset time 0.5 sec (Full scale)

4. FSAR ENVIRONMENTAL CONDITIONS
The instrument is on the Division I Leak Detection V.B. panel (H13-P632) located in the control room. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

DIVISION I LEAK DETECTION SYSTEM TIMER INDICATING SWITCH E32-N604 (Continued)

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range	10%	Operating 0.0005 R/hr
N/A	60-90°F	0.1 in.	40-50%	
N/A	120°F	To 1.0 in. Water gauge Static Pressure	60% (1)	Integrated (40 yrs) 1.75×10^2 Rad

ENVIRONMENTAL QUALIFICATION TABLE E31-3

(1) During HVAC equipment failure conditions relative humidity may approach 90% for 100 hours, but 120°F would not occur simultaneously.

6. QUALIFICATION METHOD

Type Test

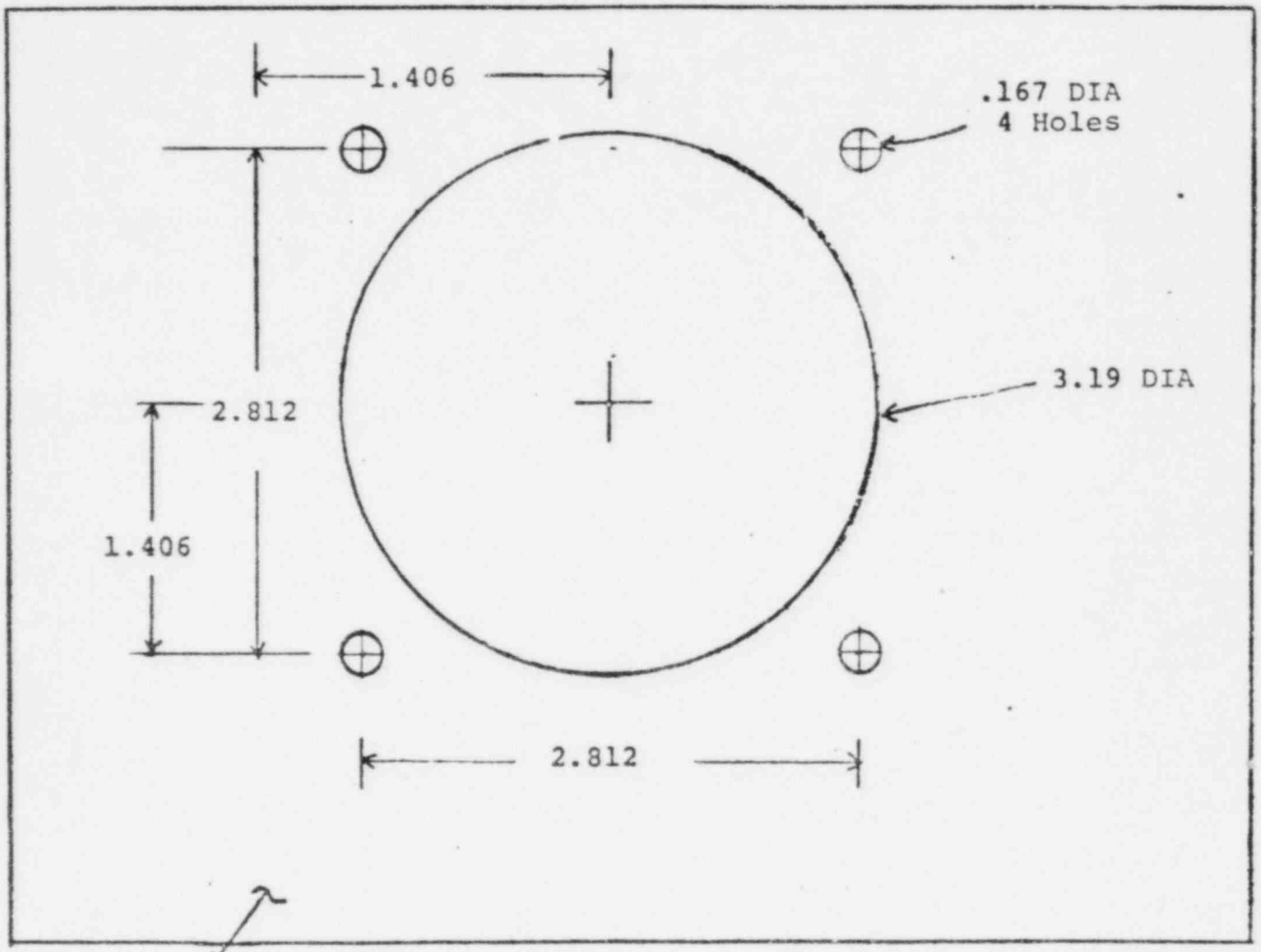
The HP50A6 was randomly withdrawn from stock and placed in a Tenney Environmental Chamber, Model BTRS-30350. The relative humidity was set for 90% and the chamber was cycled from 120°F to 40°F to 120°F for duration of the test. Base readings were taken at 30% relative humidity and 73°F.

Time	Temperature	Humidity%
1 hr	40°F	92
1.5 hr	120°F	90
1 hr	40°F	90
2 hr	120°F	90
1.5 hr	40°F	90
2 hr	120°F	90
1.5 hr	40°F	90
3/4 hr	70°F	30
17.5 hr	120°F	90

7. RESULTS

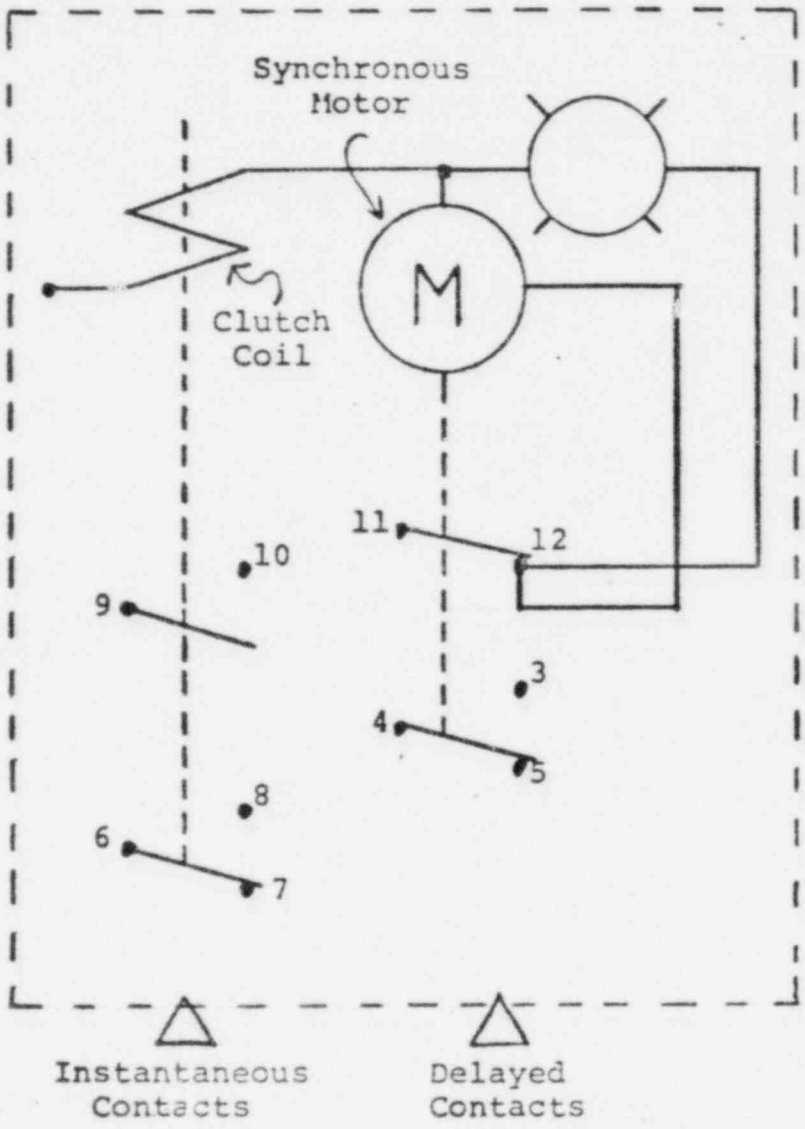
The unit functioned normally throughout the tests.

Tests performed show that timer accuracy, contact rating for worst case inductive load, will function in temperatures up to 120°F. The exceedingly small amount of radiation and pressure variations in the control room will have an insignificant effect on the timer.



MOUNTING TECHNIQUE FOR TEST SPECIMEN

FIGURE 1



SCHEMATIC DIAGRAM
CYCLE FLEX TIMER CIRCUIT

FIGURE 2

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.

Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.

Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.

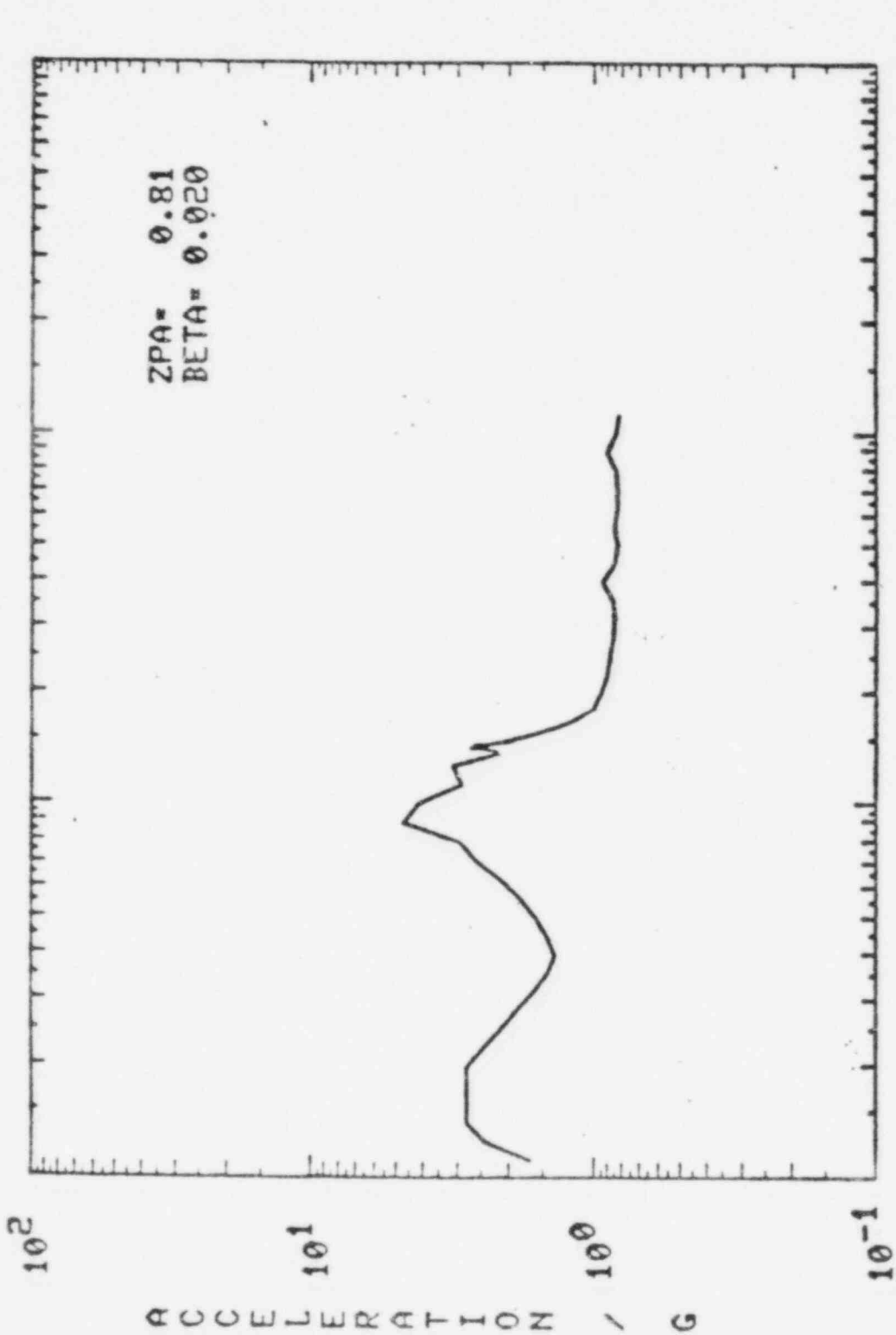


Figure 5

Horizontal DBE Required Response Spectrum

Revision	1	2			
Prepared By / Date	[illegible] 9/15/81	[illegible] 9/15/81			
Checked By / Date	BBH 9/16/81	[illegible] 9/15/81			

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.

Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.

Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.

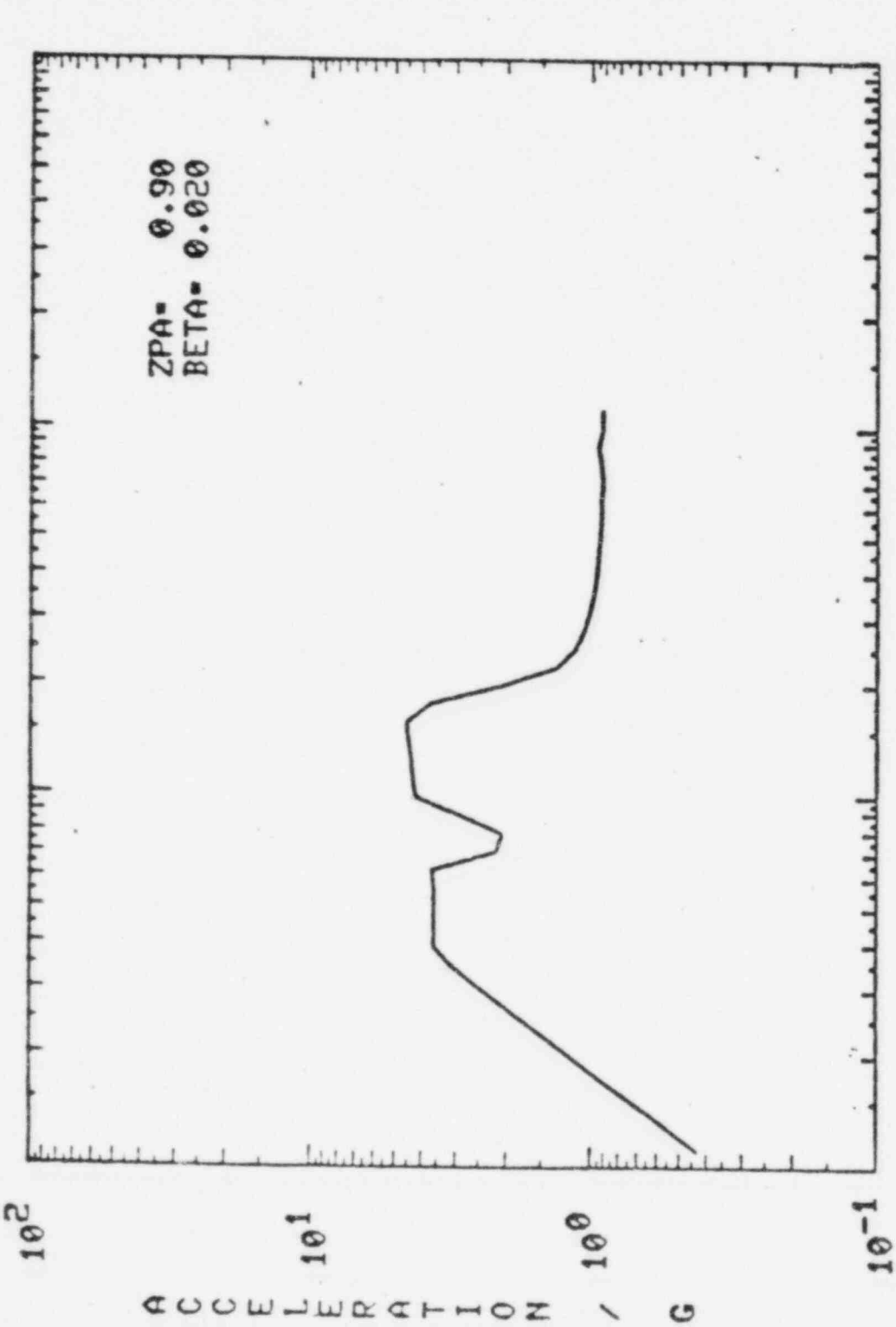


Figure 6

Vertical DBE Required Response Spectrum

Revision	1	2			
Prepared By / Date	[illegible] 7/16/81	[illegible] 9/15/81			
Checked By / Date	DSH 7-16-81	GLC 9/15/81			

Device Name: CRD SYSTEM SOLENOID VALVE # C11-F099

Model Number: # 21A9317SC

The seismic qualification testing for this device was done at SOUTH WEST RESEARCH INSTITUTE, SAN ANTONIO, TEXAS on 9-25-81.

One of our Engineers representing COMMONWEALTH EDISON COMPANY witnessed the testing and he confirms that the device passed the test without any structural or functional failure. Therefore the SQRT forms were completed based on his reporting and the only items not included were:

a) The report number

b) The TRS and RRS envelops.

This will provided when the report becomes available.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: CRD SYSTEM SOLENOID VALVE # 21A9317AC

EQUIPMENT NO: C11-F009

LOCATION: Reactor Building El. 740' on piping subsystem

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Test

QUALIFICATION DOCUMENT REFERENCES:

1. SWRI Test Report # dated
2. NUTECH Test Spec. # MK2-02-112 Rev.0
3. Drawings & Misc.Data.
4.
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION METHOD

A new test is done to meet the requirements of IEEE-344-1975; Recommended Practices for Seismic Qualification of Class 1E equipment for Nuclear Power Generating Stations.

The Test Specimen is mounted on a fixture, which inturn mounted on a vibrational table.

The monitoring devices and accessories are provided for vibration test.

1. Exploratory Testing:

Test Method:	Low Level Sine Sweep
Input Motion:	Single Axis
No. of Tests:	3 With One in Each Orthogonal Axis
Frequency Range:	1 to 100Hz
Sweep Rate:	< 2 Octaves/Minute
Input 'g' Value:	0.1g Peak

2. Proof Testing:

a) Upset Condition: Test Method: Random Motion
Input Motion: Biaxial

No. of Tests: 3 in each of the test specimen orientation, and Time 30 sec/test.

Frequency Range: 1 - 50Hz

b) Emergency Condition: Test Method: Random Motion
Input Motion: Biaxial

No. of Tests: 1 in each orientation, 30 sec/test and Time

Frequency Range: 1 - 50Hz

3. Fragility Testial: A fragility test is performed in each orthogonal axis, at each resonance frequency 1 - 100Hz.

4. Input Test Levels:
The RMS value of input test 'g' levels shall be:

OBE	3.0g	in each of the three directions
SSE	4.0g	-"- -"-

The 'g' level from the piping system are kept within these limits.

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1&2

Type:

1. Utility: CECO — PWR ____
2. NSSS: GE — BWR X
3. A-E: S&L

II. Component Name: CRD System Solenoid Valve # 21A9317 AC

1. Model Number: HT832322 — Quantity: 1
2. Vendor: ASCO HVA-166-265
3. If the component is a cabinet or panel, name and model No. of the devices included: --
4. Physical Description a. Appearance ____
   b. Dimensions: $7\frac{1}{16}$"H x $3\frac{7}{16}$"W x $2\frac{3}{4}$"D
   c. Weight: 3.1 lbs
5. Location: Building: Reactor Building
   Elevation: 740' on Piping Subsystem
6. Field Mounting Conditions
   Pipe mounted
   (see attached sketch)
   [ ] Bolt (No. ___, Size ___)
   [ ] Weld (Length ___)
   [ ] ____
7. Natural Frequencies in Each Direction: ____
   h1: ____ h2: ____ V: ____
8. a. Functional Description: Supply Instrument Air
   For Actuation of Air operated Valve
   b. Is the equipment required for [x] Hot Standby [ ] Cold Shutdown
   [ ] Both
   X POST LOCA
9. Pertinent Reference Design Specifications: ____

Reference: CQD File No. CQD 000255

SARGENT & LUNDY ENGINEERS

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

Comments: _____

_____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

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

V. Vibration Input:

1. Loads considered 1.[ ] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify) _____ 5.[ ] Combination of _____

2. Required Response Spectra (attach the graphs):

_____

3. Required Acceleration in Each Direction:

h1 = < 3.0 g h2 = < 3.0 g V = < 3.0 g

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: _____

4. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Attach TRS graphs (LATER)) [ ] No

5. g-level Test at OBE: 3.0g SSE: 4.0g h1 = _____ h2 = 3.0g 4.0g V = 3.0g 4.0g

6. Laboratory Mounting: Pipe mounted (See attached sheet)

1. [ ] Bolt (No. ___, Size ___) [ ] Weld (Length ___)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ___

Exploratory Testing, Proof Testing, and Fragility Testing

SARGENT LUNDY ENGINEERS

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

Complete: NA

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification Location	Governing Response Combination	Seismic Stress	Total Stress	Allowable

B. Max. Deflection	Location	Effect Upon Functional Operability

Reference: COD File No. 000255

SARGENT LUNDY ENGINEERS CHICAGO

SOLENOID VALVES FOR INSTRUMENT AIR C11-F009

ENVIRONMENTAL QUALIFICATION TABLE C11-4

1. DESCRIPTION
The instruments are ASCO, model HT832322 solenoid valves used for instrument air service.

2. SAFETY FUNCTION
The control rod drive hydraulic system (including the solenoid valve) runs the control rod drives (CRD) and is designed to cause rapid insertion of the control rods (scram) upon receiving signals from the reactor protection system. The solenoid valve controls the instrument air supply to the HCUs providing a backup to the individual scram pilot valves. It also closes valves on the scram discharge volume vent and drain, closing them during scram.

3. SAFETY DESIGN PARAMETERS

A. Capable of continuous operation at voltage and ambient conditions.

B. Operate at pressure differentials and minimum voltages.

4. FSAR ENVIRONMENTAL CONDITIONS
The equipment is located in the CRD hydraulic system. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
Normal Operation	70°F - 90°F normal 104°F maximum 40°F minimum	-0.10 to -1.0 inch wc	40% normal 90% maximum 20% minimum	3.5×10^2 rad 1 mr/hr
Accident 0-1 hour	212°F	7 in. WC	All steam	6.5×10^2 rad

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
Normal Operation	70°F - 90°F normal 104°F maximum 40°F minimum	-0.10 to -1.0 inch wc	40% normal 90% maximum 20% minimum	3.5×10^2 rad 1 mr/hr
Accident 0-1 hour	212°F	7 in. WC	All steam	6.5×10^2 rad

6. QUALIFICATION METHOD

Duration	Temperature	Pressure	Humidity	Radiation
0-1 hour	212°F	7 in. WC	All steam	10^3 rad total

SOLENOID VALVES FOR INSTRUMENT AIR C11-F009 (Continued)

ENVIRONMENTAL QUALIFICATION TABLE C11-4

6. QUALIFICATION METHOD

Type Test
This is a fail-safe device in that it deenergizes when performing its safety function. No qualification testing is therefore required.

7. RESULTS
No qualification testing has been performed.

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.: 21A9317AC

Qualification 'g' levels		
h_1=	h_2=	V=

Name: CRD System Solenoid Valve
Manufacturer: ASCo
Model No.: HT832322

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	v		
C11-F009	Reactor Building El. 740'-0" on Piping Subsystem					

A - Active P - Passive 1E - Class 1E

021

Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company

Client Cincinnati Gas and Electric Company/Commonwealth Edison Company

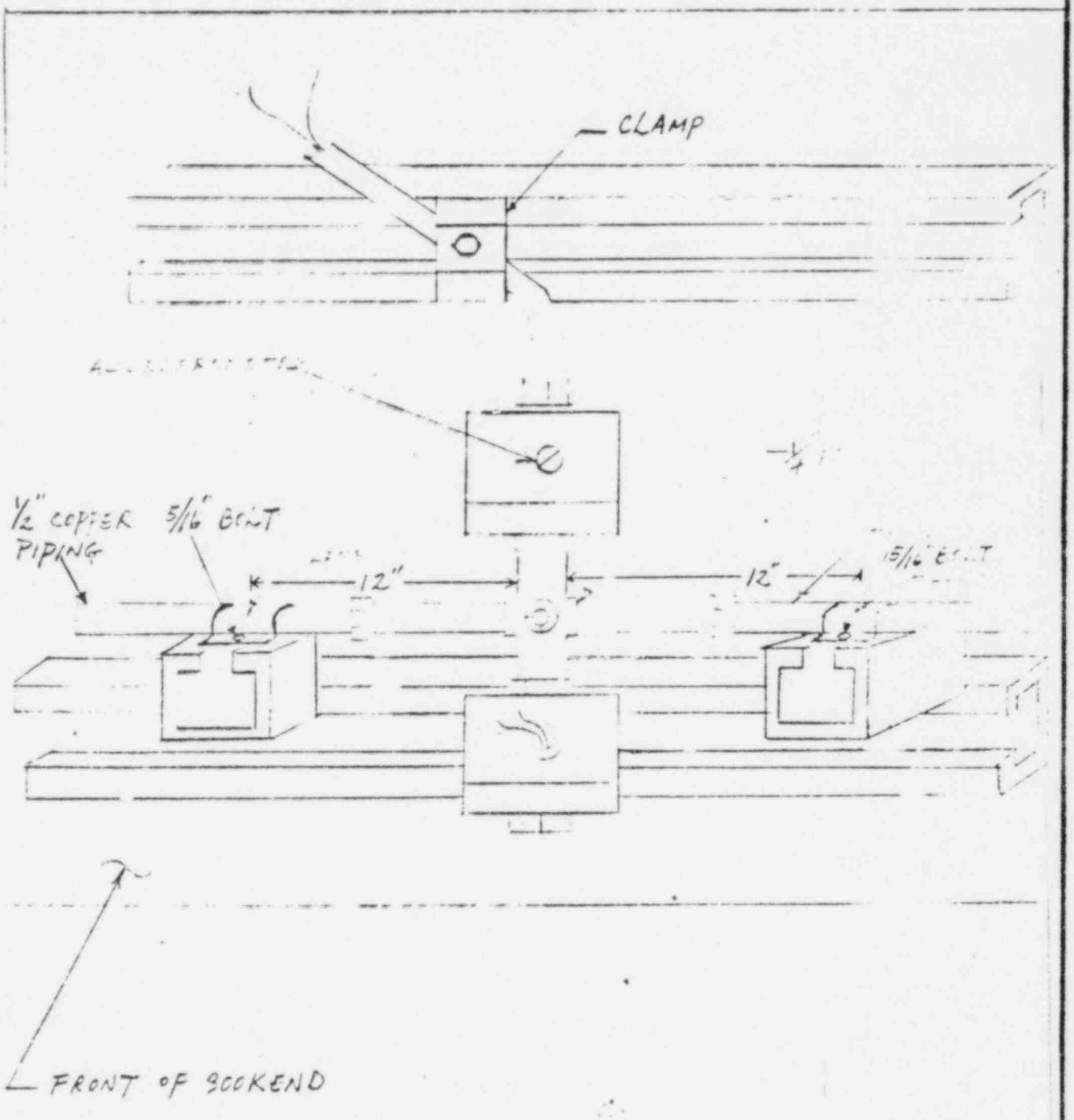


FIGURE 1. TEST SPECIMEN MOUNTING AND ACCELEROMETER LOCATION

Revision	0					Page 9
Prepared By/Date	for S.B. 9/14/81					of 11
Checked By/Date	SLC 9/10/81					

Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company

Client Cincinnati Gas and Electric Company/Commonwealth Edison Company

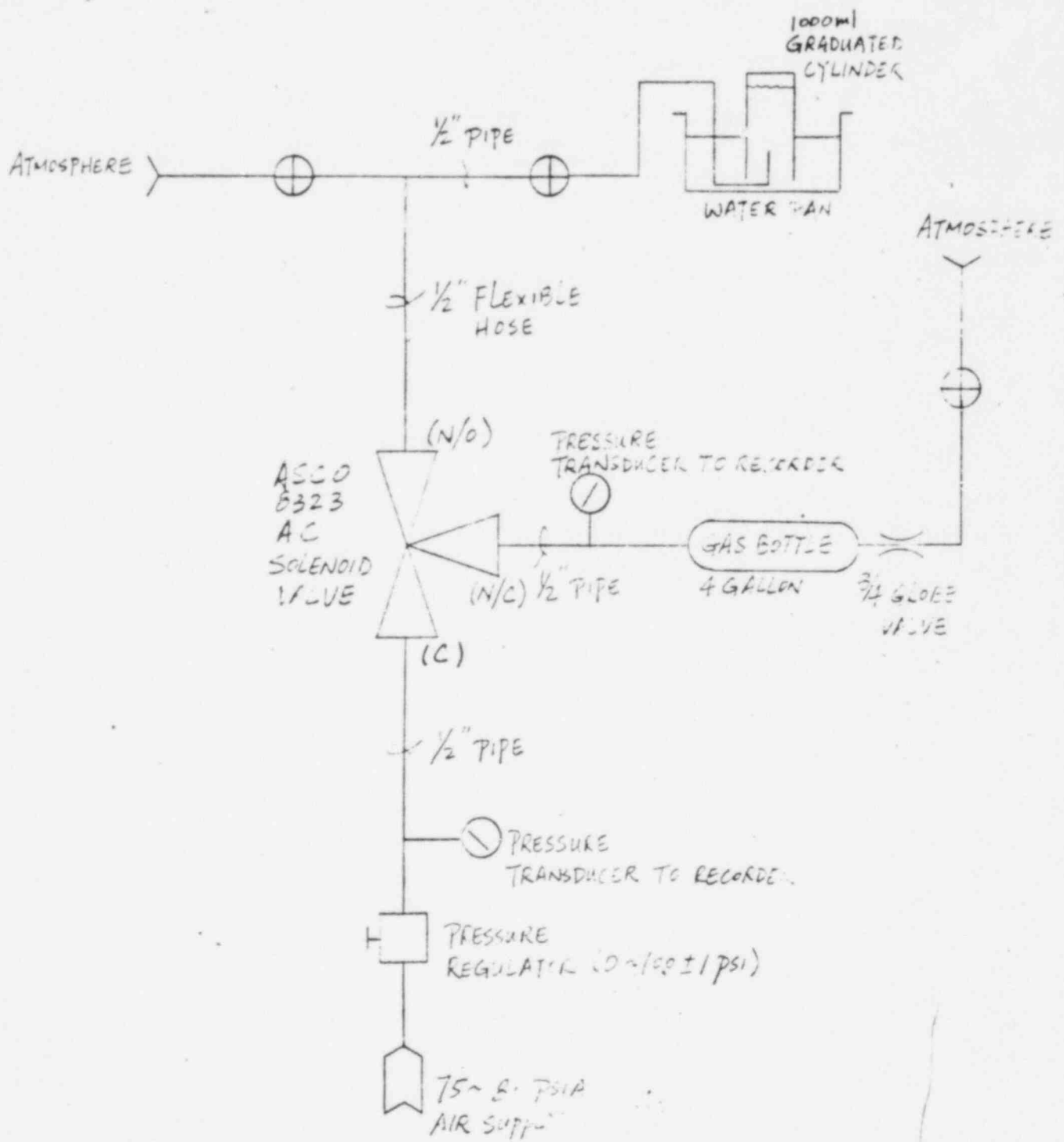


FIGURE 2. TEST SETUP

Revision	0					Page 10 of 11
Prepared By/Date	[illegible] 4/81 for SD					
Checked By/Date	[illegible] 4/81					

TABLE I

TEST SPECIMEN DATA

INSTRUMENT NAME:	SOLENOID AIR PILOT VALVE
MODEL NO.:	ASCO 8323A22
SERIAL OR ID. NO.:*	
MANUFACTURER:	AUTOMATIC SWITCH CO.
SPECIAL FEATURES IF ANY:	NONE
FUNCTION:	SUPPLY INSTRUMENT AIR FOR ACTUATION OF AIR OPERATED VALVE
DIMENSIONS:	7 1/16"H X 3 7/16"W X 2 3/4"D
WEIGHT:	3.1 LB
REQUIRED RANGE:	14.7 ∿ 100 PSIG
MAXIMUM PERMISSIBLE LEAKAGE RATE:	0.1 SCFH/INCH OF NOMINAL VALVE SIZE
MONITORING REQUIREMENTS:	CHANGE OF STATE AND VALVE SEAT LEAKAGE
MOUNTING DETAILS:	SEE FIGURE 1
CHATTER TIME:	N/A
NOMINAL VALVE SIZE:	1/2"

*TO BE COMPLETED BY SwRI

QUALIFICATION OF VOLTAGE PREAMPLIFIER # 163C1263

JUSTIFICATION FOR INTERIM OPERATION

The test report submitted by GE meets the specified g levels.

Acceleration level comparisons are shown below.

Required g level from Panel Analysis $h_1 = 1.1g$ $h_2 = .76g$ $V = .9g$

g level from Test Report $h_1 = 1.8g$ $h_2 = 1.8g$ $V = 1.8g$

Therefore the equipment is qualified as for as test g levels are considered.

However we opted to perform new tests for the following reasons:

a) Documentation of test log was insufficient.

b) Funcional testing of Instruments not adequately explained.

c) Single axis single frequency testing was done.

The new tests will be done to the test requirements as attached as soon as the test specimen is procured.

For the above reasons we strongly feel that the device is qualified for the interim operation.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: Voltage Preamplifier # 163C1263AA

EQUIPMENT NO: C51-K002A/H

LOCATION: Reactor Building El.740'0" on Panels H22-P030, H22-P031, H22-P032 H22-P033

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Test

QUALIFICATION DOCUMENT REFERENCES:

1. GE Document 22A4232, Rev.0
2. GE Dwg. # 163C1263AA Rev. 6 7-27-73
3. GE Document PL 163C1263AA, Rev.7 5-11-74
4. NUTECH Test Spec. MK2-02-099 Rev.0
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION SUMMARY

Single axis single frequency testing was done.

Input 'g' levels	h_1= 1.8 g
	h_2= 1.8 g
Natural frequency	h_1= 29 Hz
	h_2= 16 Hz
	V = none.

Qualification Summary of Equipment

I. Plant Name: LASALLE 1 & 2

Type: PWR ____ BWR X

1. Utility: CECO
2. NSSS: GE
3. A-E: S&L

II. Component Name: Voltage Preamplifier # 163C1263AA

1. Model Number 828E309AA Quantity: 1
2. Vendor GE
3. If the component is a cabinet or panel, name and model No. of the devices included: ____
4. Physical Description a. Appearance ____
   b. Dimensions 10.5" H x 6.5"W x 5.2"D
   c. Weight ____
5. Location: Building: Reactor Building
   Elevation: 740'0" on Panels H22-P030, H22-P031 H22-P032, H22-P033
6. Field Mounting Conditions [X] Bolt (No. 4, Size ¼)
   [ ] Weld (Length ___)
   [X] Mounted on Panels
7. Natural Frequencies in Each Direction: ____
   h1: 29 h2: 16 V: none
8. a. Functional Description: Part of the intermediate range monitoring subsystem
   (See attached anv.Qual. Table)
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both
9. Pertinent Reference Design Specifications: ____

Reference: CQD File No. CQD 000258

SARGENT & LUNDY ENGINEERS CHICAGO

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

Comments: _____

_____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by GE Test Report 22A4232 dated 14-8-76
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[X] Other (Specify) _____ 5.[ ] Combination of 1&4

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

_____

3. Required Acceleration in Each Direction:

h1 = 1.19 h2 = 0.769 V = 0.99

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 1 - 33 Hz

4. TRS enveloping RRS using Multi-Frequency Test[ ] Yes (Attach TRS graphs [ ] No

5. g-level Test at h1 = 1.8g h2 = 1.8g V = 1.8g

6. Laboratory Mounting:

1. [X] Bolt (No. 4, Size ½) [ ] Weld (Length ____)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ____

Exploratory Testing, Fatigue Testing, Proof Testing

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

Complete: N/A

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Allowable

B. Max. Deflection	Location	Effect Upon Functional Operability

TABLE I

INSTRUMENT DATA

INSTRUMENT NAME: Voltage Preamplifier

MODEL NO.: 163C1263AA

* SERIAL OR ID. NO.:

MANUFACTURER: General Electric

SPECIAL FEATURES IF ANY: None

FUNCTION: Monitor reactor core neutron level and provide input to Mean Square Voltage Wide Range Monitor.

DIMENSIONS: 10.5"H X 6.5"W X 5.2"D

* WEIGHT:

REQUIRED RANGE: 8 to 16 KHz and 300 to 600 KHz

REQUIRED ACCURACY: ± 3%

MONITORING REQUIREMENTS: Input voltage and frequency and output voltage

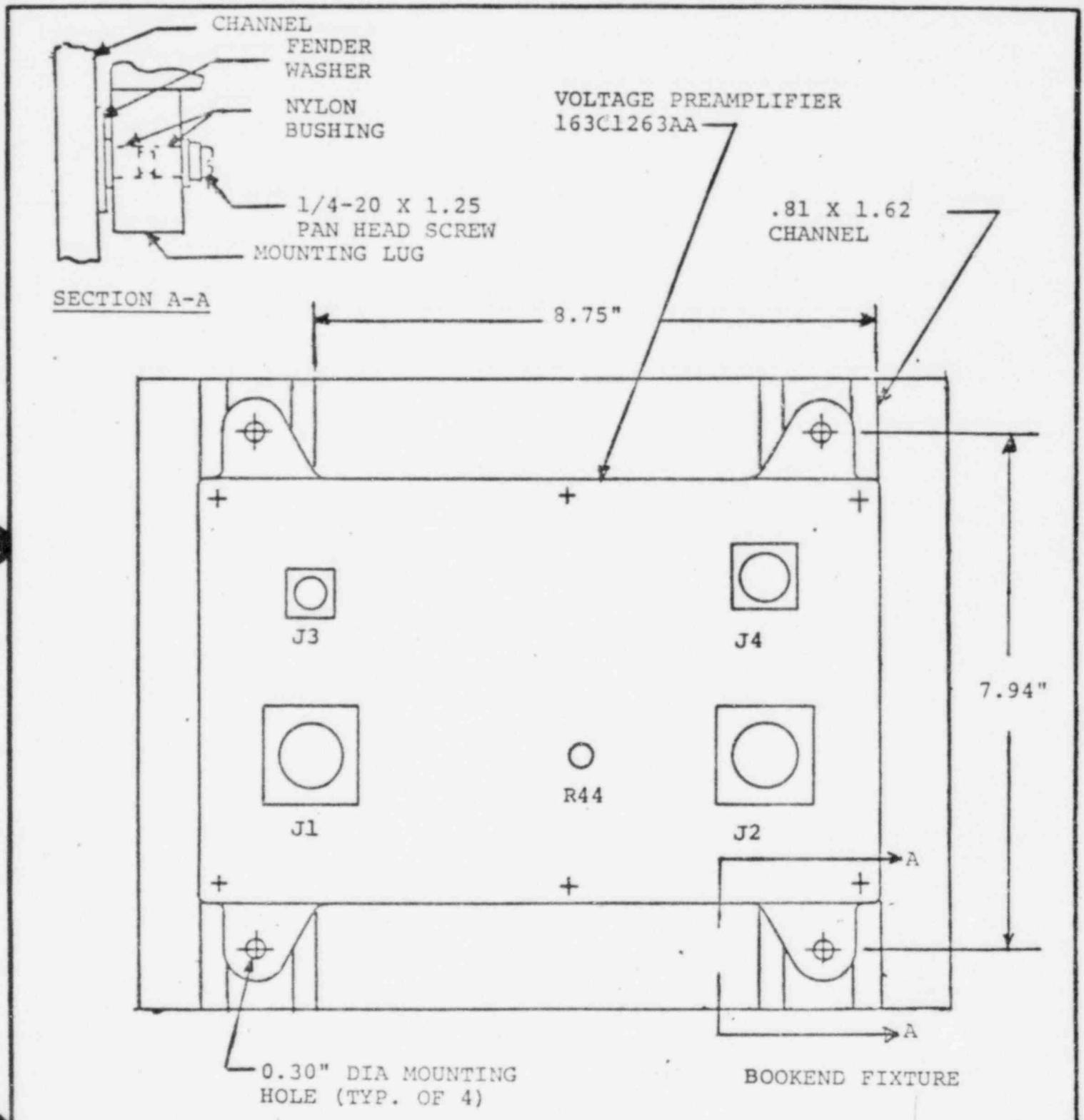
MOUNTING DETAILS: See Figure 1

* To be completed by test laboratory

Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company

Client Cincinnati Gas and Electric Company/Commonwealth Edison Company



MOUNTING FOR GENERAL ELECTRIC VOLTAGE PREAMPLIFIER 163C1263AA

FIGURE 1

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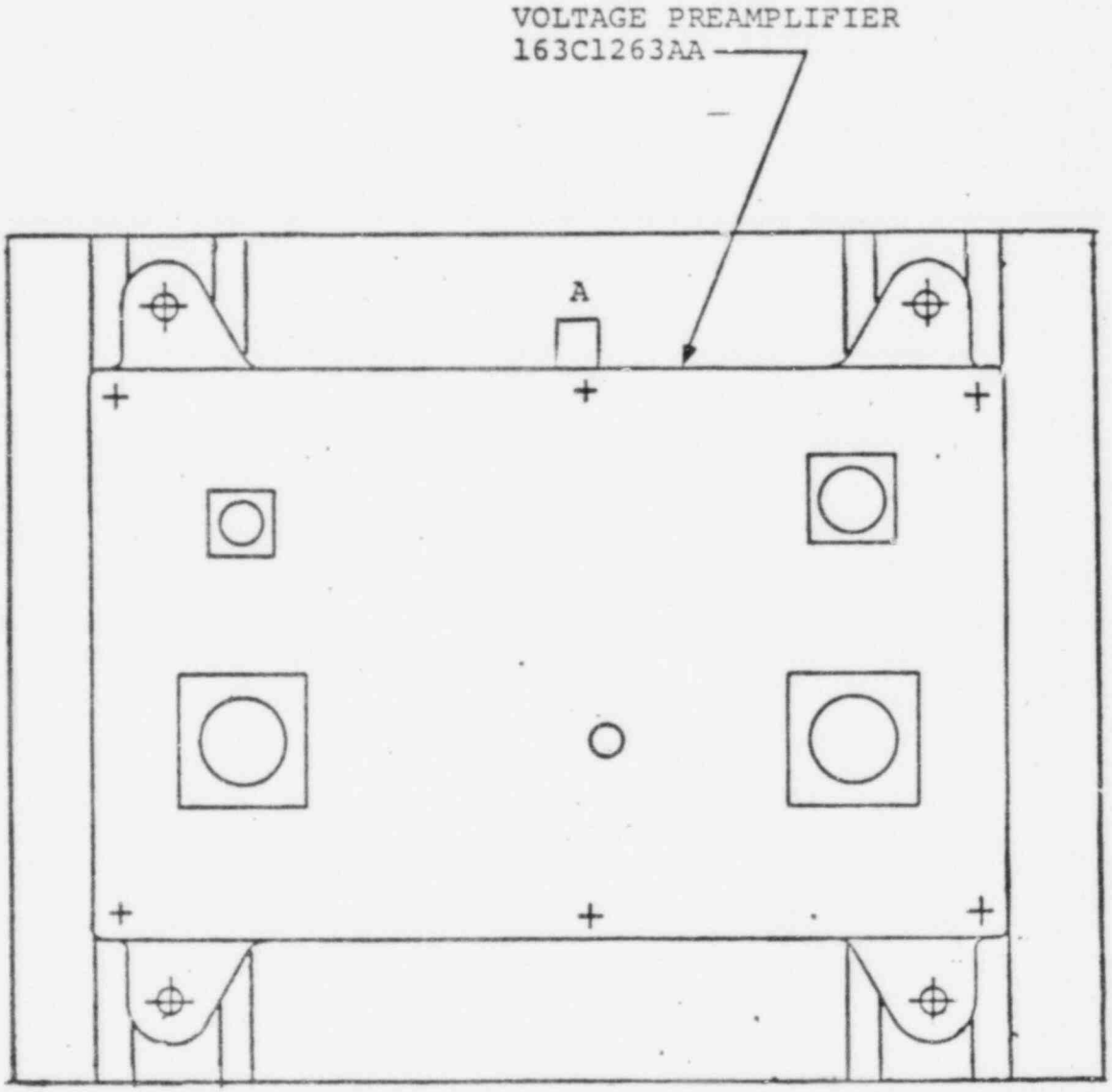
Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company

Client Cincinnati Gas and Electric Company/Commonwealth Edison Company



ACCELEROMETER LOCATION FOR GENERAL ELECTRIC VOLTAGE PREAMPLIFIER 163C1263AA

FIGURE 2

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Checked By/Date	GB 5/25/81					

VOLTAGE PREAMPLIFIER C51-K002

ENVIRONMENTAL QUALIFICATION TABLE C51-1

1. DESCRIPTION
The Instrument is a Voltage Preamplifier Manufactured by General Electric Company.

2. SAFETY FUNCTION
Voltage preamplifiers condition the output signals from the IRM detectors to the IRM's, which are capable of generating a trip signal to the RPS to prevent fuel damage from single operating errors or equipment malfunction in the intermediate power range.

3. SAFETY DESIGN PARAMETERS

A. Gain: Low Frequency - 4500
High Frequency - Adjustable 200 to 1000

B. Output: Must drive 75 ohm load with 4.0 volt peak to peak signal

4. FSAR ENVIRONMENTAL CONDITIONS
The instrument is located in the reactor building. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
Normal	135°F	-0.5 to 2.0 psig	40-55% Normal	1.4×10^6 Rad
Maximum	150°F		90% Max.	2.5×10^{12} NVT

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008 Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
Normal	135°F	-0.5 to 2.0 psig	40-55% Normal	1.4×10^6 Rad
Maximum	150°F		90% Max.	2.5×10^{12} NVT

6. QUALIFICATION METHOD

Type Test
The high and low frequency output, peak frequency response, and high voltage were monitored in environmental conditions ranging from 40°F to 140°F and 90% RH. No test times.

7. RESULTS
The preamplifier operated per its design and performance specification during the test environment.

not be considered a malfunction, but shall be noted in the test report. Failure is indicated if the test specimen does not maintain output voltage ±5% while undergoing vibration in accordance with paragraph 5.3. Failure is indicated if the test specimen does not meet the operational requirements after vibration in accordance with paragraph 4.2.2.2. All failures shall be rated on the test report.

5.0 TEST REQUIREMENTS

5.1 Exploratory Testing

Exploratory testing shall be performed to determine the test specimens' resonant frequencies, if any, within a specified frequency range. A recommended procedure for this testing is provided below. Fast Fourier Transform (FFT) or other testing methods will be acceptable provided they yield the same information about the dynamic characteristics of the test specimens.

5.1.1 Sine Sweep Recommended Test Parameters

Test Method: Low Level Sine Sweep
Input Motion: Single axis
Number of Tests: 3 with one in each Orthogonal Axis
Frequency Range: 1 to 100 Hz
Sweep Rate: Less than 2 Octaves per minute
Input g Level: 0.1 g Peak

5.1.2 Exploratory Testing Results

The acceleration response in g's and the transfer function for the accelerometer location shall be plotted as a function of frequency.

5.2 Fatigue Testing

Fatigue testing shall be performed in order to account for any possible long term effects the SRV and LOCA event may have upon the test specimen. This test phase shall be conducted in two parts, first, SRV fatigue testing and second SRV + LOCA fatigue testing. The RRS to be used are those generated during previous vibration testing.

5.2.1 SRV Fatigue Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Number of Tests: 1 in each test specimen orientation
Test Specimen Orientations: 2 orientations

(1) Front to back/vertical

(2) Side to side/vertical

Frequency Range: 1 to 200 Hz
Duration of Individual Time History: Less than 20 sec
Total Test Duration: 400 sec each orientation
RRS Damping: 2%
Required Response Spectra: Figures 5 and 6

5.2.2 SRV Fatigue Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% at 1/6 octave intervals. For comparison the table TRS and RRS shall be plotted on the same sheet. Power Spectral Density (PSD) plots shall be developed from the table accelerometer time histories for each test specimen orientation.

All accelerometer signals shall be recorded on analog magnetic tape.

5.2.3 SRV + LOCA Fatigue Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Number of Tests: 1 in each test specimen orientation
Test Specimen Orientations: 2 orientations

(1) Front to back/vertical

(2) Side to side/vertical

Frequency Range: 1 to 200 Hz

Duration of Individual Time History: Less than 20 sec
Total Test Duration: 200 sec each orientation
RRS Damping: 2%
Response Spectra: Figures 7 and 8

5.2.4 SRV + LOCA Fatigue Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% at 1/6 octave intervals. For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed from the table accelerometer time histories for each test specimen orientation. All accelerometer signals shall be recorded on analog magnetic tape.

5.3 Proof Testing

The adequacy of the test specimens for upset and emergency plant conditions will be demonstrated by the proof testing phase. This phase will be divided into two parts, testing for upset plant condition and testing for emergency plant condition, and shall consider the maximum combined dynamic loads the test specimens may experience under each condition. The RRS to be used are those generated during previous vibration testing and data reduction.

5.3.1 Upset Condition Testing

Test Method: Random Motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Test Specimen Operation: As specified below
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Number of Tests: 5 in each test specimen orientation

(1) Before performing the low and high frequency tests repeat paragraph 4.2.2.1.
(2) Low Frequency Test
a) Pre-Vibration
1) Turn OFF all power to the voltage preamplifier.

2) Connect the equipment in accordance with Figure 4.
3) Turn ON the power to the voltage preamplifier and place switch S2 in the OPEN position and switch S1 in the CLOSED Position.
4) Turn ON the test oscillator and RMS voltmeter.
5) Set test attenuation to position 3.
6) Set the test oscillator output frequency to 10 Hz and adjust the test oscillator output signal amplitude to obtain a reading of 1.0 VAC on the RMS voltmeter.

b) During Vibration

Maintain the above conditions for 2 tests in each test specimen orientation.

(3) High Frequency Test

a) Pre-Vibration

1) If testing has been stopped repeat Steps (2) a) 1) and (2) a) 2).
2) Turn ON the power to the voltage preamplifier and place switch S1 in the OPEN position and switch S2 in the CLOSED position.
3) Set test attenuator to position 4.
4) Set the test oscillator output frequency to 350 Hz and adjust the test oscillator output signal amplitude to obtain a reading of 0.5 VAC on the RMS voltmeter, then sweep the test oscillator output frequency between 350 KHz and 450 KHz to locate the frequency that provides the peak output from the voltage preamplifier as indicated on the RMS voltmeter. Record RMS voltmeter reading.

b) During Vibration
Maintain the above conditions for 3 tests in each test specimen orientation.

Monitoring Requirements: Input voltage and frequency and output voltage.
Frequency Range: 1-200 Hz
Test Duration: 30 sec per test
RRS Damping: 2%
Required Response Spectra: Figures 9 and 10

5.3.2 Upset Condition Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% at 1/6 octave intervals. For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed for the first test in each orientation. All accelerometer signals shall be recorded on analog magnetic tape.

5.3.3 Emergency Condition Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Test Specimen Operation: As specified below
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Number of Tests: 1 in each orientation perform test in accordance with paragraph 5.3.1 (2) in one orientation and in accordance with paragraph 5.3.1(3) in the other orientation.

Monitoring Requirements: Input voltage and frequency and output voltage.
Frequency Range: 1 to 200 Hz
Test Duration: 30 sec. per test
RRS Damping: 2%
Required Response Spectra: Figures 11 and 12
Operational Test: Checkout test specimen after emergency condition tests in accordance with paragraph 4.2.2

5.3.4 Emergency Condition Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% at 1/6 octave intervals. For comparison, the Table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed from the table accelerometer time histories for each test specimen's orientation and voltage relay operation. All accelerometer signals shall be recorded on analog magnetic tape. Results of operational test checkout after exitation shall be reported and any significant deviation from the baseline shall be noted in the final report.

6.0 WITNESSING OF TESTS

6.1 All tests shall be subject to observation by NUTECH or their authorized representatives.

6.2 All tests shall also be subject to observation by Cincinnati Gas and Electric and Commonwealth Edison Companies or their authorized representatives.

7.0 TEST REPORT REQUIREMENTS

The test laboratory shall supply ten certified copies of a test report which satisfies the requirements of IEEE 344 - 1975. This report wil describe the equipment, calibration, and test procedures, including photographs of the test set up, and provide all results and conclusions from the test. Operational checkout and inspections shall be described and all results summarized and any deficiencies and/or repairs noted. Critical data to be included in this report are as follows:

7.1 Inspection and operational test results reports, verifying adjustments and recording values, also noting any significant deficiencies and repairs to device. A description of test equipment and calibration information shall be included.

7.2 Test Specimen resonance search data

7.3 The test response spectra plots obtained in 5.2.2, 5.2.4, 5.3.2 and 5.3.4. These TRS are to be computed for all accelerations recorded. For each of the two orientations for the test specimen, the TRS shall be computed for both horizontal and vertical table motions to verify that they envelop the corresponding RRS.

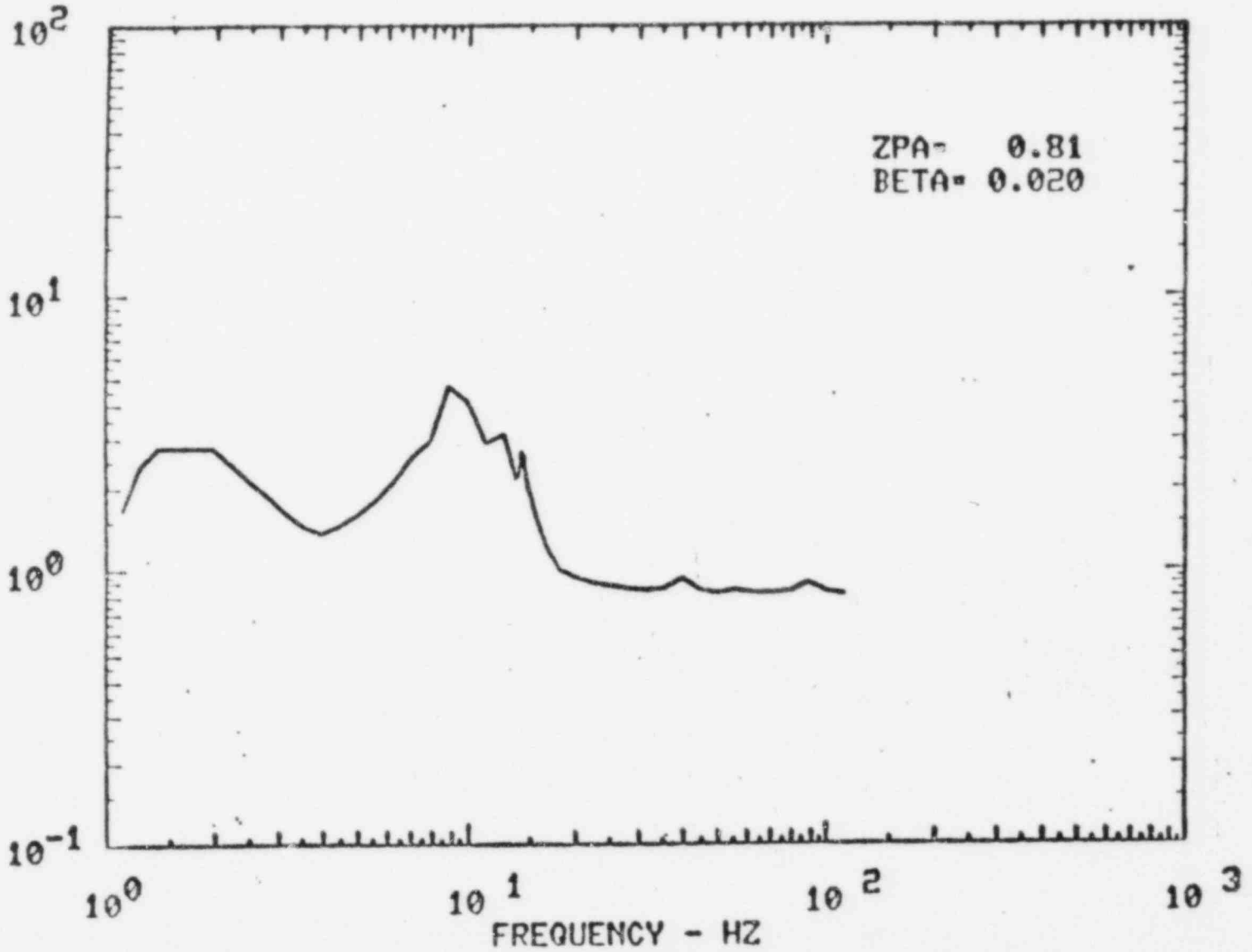

Figure 4

Horizontal DBE Required Response Spectrum

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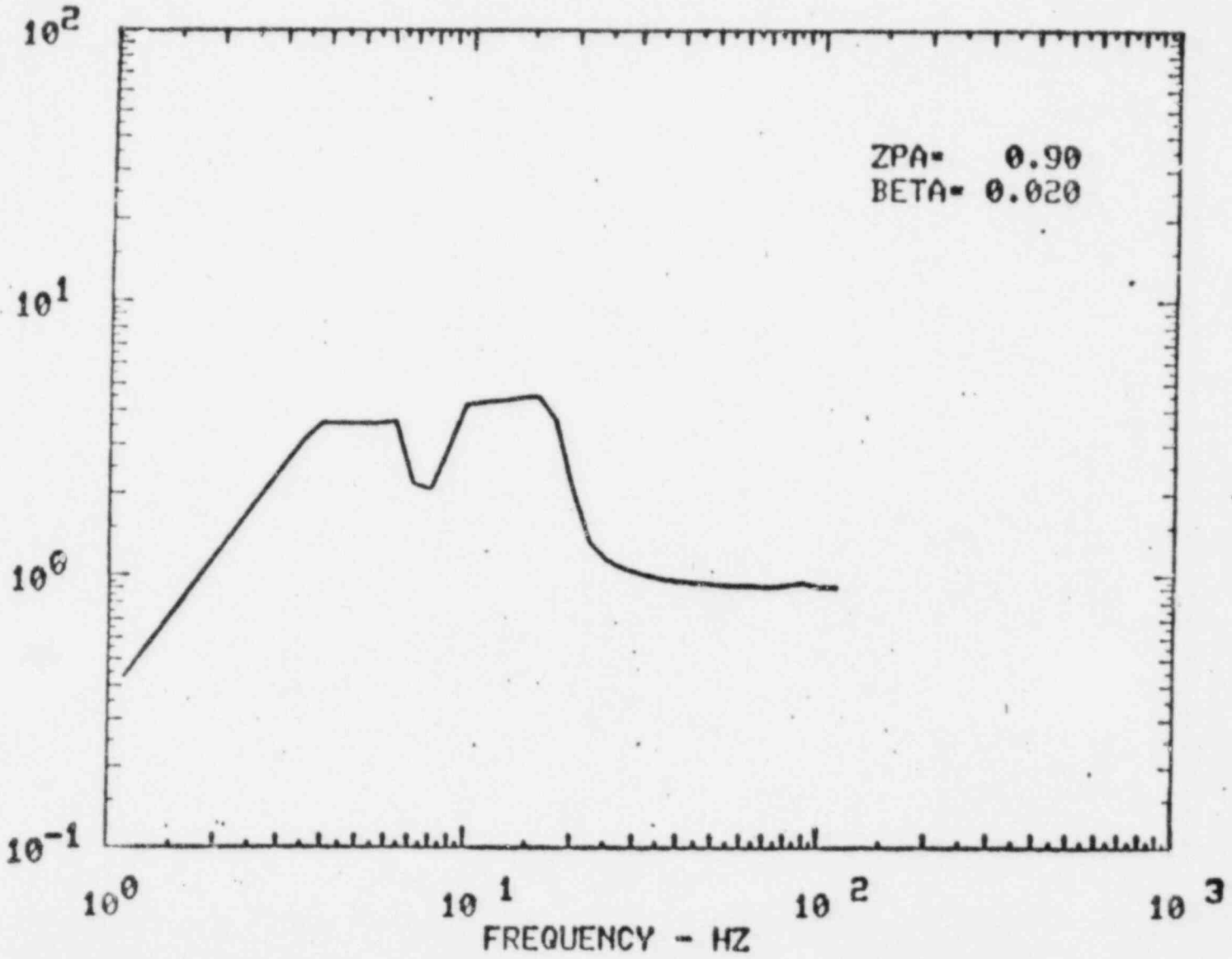

Figure 5

Vertical DBE Required Response Spectrum

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QUALIFICATION OF WRM-MSV Intermediate Range Monitor
#368X102AA

JUSTIFICATION FOR INTERIM OPERATION

The test report submitted by GE meets the specified g levels.

Acceleration level comparisons are shown below.

Required g level from Panel Analysis	$h_1 = 1.02g$	$h_2 = .4g$	$V = .46g$
g level from Test Report	$h_1 = 5.9g$	$h_2 = 4.5g$	$V = 2.5g$

Therefore the equipment is qualified as for as test g levels are considered.

However we opted to perform new tests for the following reasons:

a) Documentation of test log was insufficient.

b) Funcional testing of Instruments not adequately explained.

c) Single axis single frequency testing was done.

The new tests will be done to the test requirements as attached as soon as the test specimen is procured.

For the above reasons we strongly feel that the device is qualified for the interim operation.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME. WRM-MSV Intermediate Range Monitor # 368X102AA

EQUIPMENT NO: C51-K601A/H

LOCATION: Reactor Building El. 768'0" on Panel H13-P635, H13-P636

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Test

QUALIFICATION DOCUMENT REFERENCES:

1. GE # 175A7267 Rev.3.
2. GE letter dated 11-19-74 on Hanford - 2 Radiator Monitor
3. GE # 262A7244 dated 12-16 75 Rev.0
4. GE # 262A7445 dated 2-13-74 Rev.0
5. GE # 225A6956 dated 11-30-70 Rev 0
6. GE # 225A5766 dated 1-05-78 Rev.7
7. GE PPD for # 368X102AA by GE
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SRV + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION SUMMARY

1. Test for Hanford - 2 GE Doc. 262A7244 Rev.O and GE letter dated 11-19-74.

GE WRM was tested along with the Hanford Radiation Monitoring Cabinet H13-P606. The cabinet is similar to LASALLE Cabinet.

a) Low level resonance search test from 1 - 33 Hz in each axis

b) High level sweep tests at resonant frequencies in each axis.

Max Test 'g' levels to Cabinet $h_1 = h_2 = V = 1.75g$

Max 'g' level for WRM $h_1 = 5.9$ g

$h_2 = 4.5$ g $V = 2.5$ g

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1&2

Type:

1. Utility: CECO — PWR ____
2. NSSS: GE — BWR X
3. A-E: S&L

II. Component Name: WRM-MSV Intermediate Range Monitor # 368X102AA

1. Model Number None — Quantity: 8
2. Vendor GE
3. If the component is a cabinet or panel, name and model No. of the devices included: ____
4. Physical Description a. Appearance Instrumentation
   b. Dimensions 7"H x 19"W x 16"D
   c. Weight ____
5. Location: Building: Reactor Building
   Elevation: 768'0" on Panels H13-P635/636
6. Field Mounting Conditions (See attached figures)
   [ ] Bolt (No.___, Size___)
   [ ] Weld (Length___)
   [ ] ____
7. Natural Frequencies in Each Direction: None
   h1: ____ h2: ____ V: ____
8. a. Functional Description: Used in the neutron monitoring system (See attached Env.Qual. Table)
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both
9. Pertinent Reference Design Specifications: ____

Reference: CQD File No. CQD 000259

SARGENT & LUNDY ENGINEERS CHICAGO

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

Comments: _____

_____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by GE Report # 262A7244 Rev.0
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of _____

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

_____

3. Required Acceleration in Each Direction:

h1 = 1.02g h2 = .4g V = .46g

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 1-33Hz

4. TRS enveloping RRS using Multi-Frequency Test[ ] Yes (Attach TRS graphs NA

5. g-level Test at h1 = 5.9g h2 = 4.5g [ ] No V = 2.5g

6. Laboratory Mounting: (See sketch attached)

1. [ ] Bolt (No.___, Size____) [ ] Weld (Length____)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ____

Exploratory Testing

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

Complete: NA

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Allowable

B. Max. Deflection	Location	Effect Upon Functional Operability

SARGENT & LUNDY ENGINEERS CHICAGO

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.:

Qualification 'g' levels		
h_1 = 5.9	h_2 = 4.5	V = 2.5

Name: WRM-MSV Intermediate Range Monitor

Manufacturer: GE

Model No.: 368X102AA

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	v		
C51-K601A/H	Reactor Building El. 768'0" on Panel H13-P635/636	1.02	.4	.46	1E	

A - Active P - Passive 1E - Class 1E

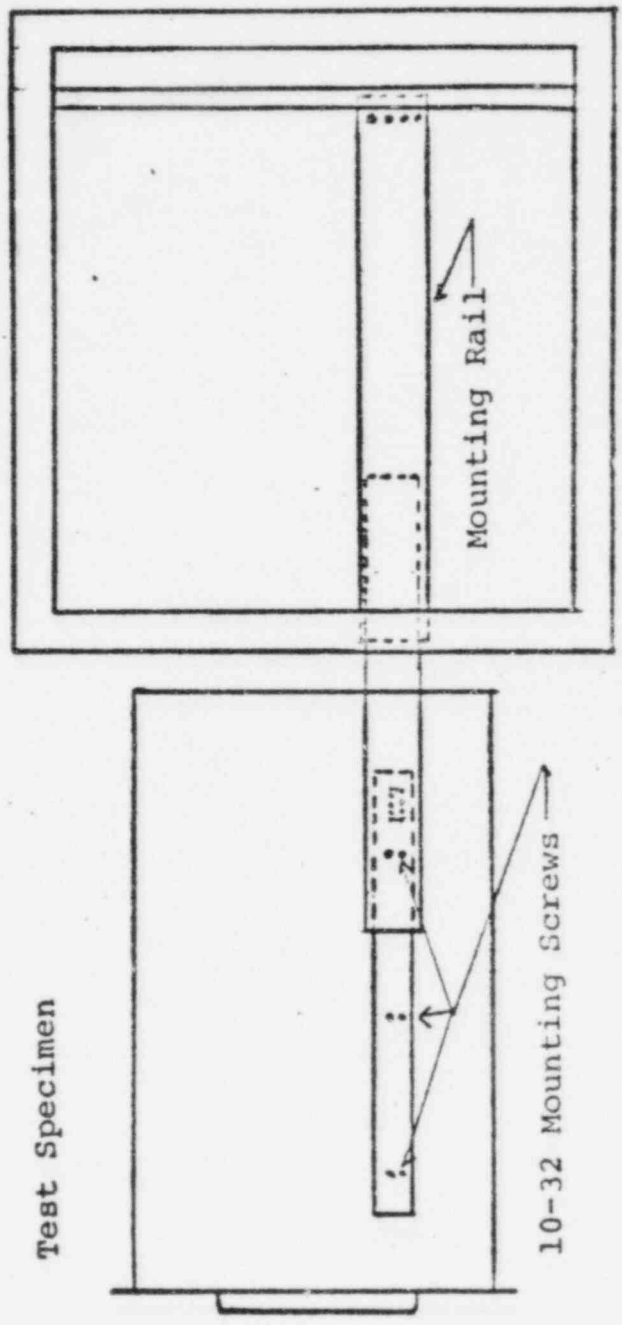
TABLE 5

INSTRUMENT DATA

INSTRUMENT NAME:	Mean Square Voltage-Wide Range Monitor
MODEL NO.:	368 X 102AA
* **SERIAL OR ID. NO.:**	
MANUFACTURER:	General Electric
SPECIAL FEATURES IF ANY:	None
FUNCTION:	Receive input current proportional to neutron flux from voltage preamplifier and provide RPS trip outputs
DIMENSIONS:	7"H X 19"W X 16"D
* **WEIGHT:**	
REQUIRED RANGE:	8 to 16 KHz and 300 to 600 KHz
REQUIRED ACCURACY:	± 3%
MONITORING REQUIREMENTS:	Input voltage and frequency and output trips and voltage
MOUNTING DETAILS:	See Figures 1 and 10

* To be completed by test laboratory

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.
Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.
Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.



Mounting Technique for Test Specimen

Figure 1

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STARTUP SYSTEM IRM/MSV C51-K601

ENVIRONMENTAL QUALIFICATION TABLE C51-3

1. DESCRIPTION
The instrument is a General Electric Company Intermediate Range Monitor Dwg Number 368X102AA., which measures the mean square value of variations in the average value of the detector signal in one of two discrete band widths.

2. SAFETY FUNCTION
The I.R.M. provides annuciation outputs, triplight outputs, computer outputs, and rod block outputs. It also initiates one RPS trip during reactor anomalies.

3. SAFETY DESIGN PARAMETERS

A. Power requirements: $\pm$ 20 Vdc at 0.7A

B. Signal level: 0.-10 volts

C. Output: isolation protected

4. FSAR ENVIRONMENTAL CONDITIONS
The instrument is located in the control room panel H13-P635. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
Min	40°F	Range	10%	Operating 0.0005 R/hr
Normal	60-90°F	0.10 in. to	40-50%	Accident (6 mos) $3x10^{0}$ Rad
Max.	120°F	1.0 in. water	60%(1)	Integrated (40 yrs)
		Gauge static		$1.75x10^{2}$ Rad
		Pressure		

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
Min	40°F	Range	10%	Operating 0.0005 R/hr
Normal	60-90°F	0.10 in. to	40-50%	Accident (6 mos) $3x10^{0}$ Rad
Max.	120°F	1.0 in. water	60%(1)	Integrated (40 yrs)
		Gauge static		$1.75x10^{2}$ Rad
		Pressure		

(1) During HVAC Equipment failure conditions relative humidity may approach 90% for 100 hours, but 120°F would not occur simultaneously.

6. QUALIFICATION METHOD

Type Test
No data

7. RESULTS
None

NEW TEST PROCEDURE

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6.2.12.7 Adjust the input amplitude to the MSV-WRM until there is 1.000 ± .030v at the recorder output.

6.2.12.8 Lower the frequency until the recorder output is 0.500 + .030v. Keep the input constant. Verify ± that the frequency is less than 8.5 kHz.

6.2.12.9 Adjust the frequency of the test oscillator for 100 kHz sinewave and the amplitude for 1.00 volts at the recorder output of the MSV-WRM.

6.2.12.10 It may be necessary to readjust R19 on AR11 to obtain the correct recorder indication for range 7 only. (If R19 is readjusted the calibration signal must be readjusted by adjusting R9 on Z10). Measure the rms input voltage at J1 on the MSV-WRM chassis.

6.2.12.11 Complete the data required in Table 3. The test frequency for the high and low gain amplifiers will be the same for the test (100 kHz). Verify that the output is given in 6.2.12.3.

6.2.13 Check of Relay K10 (ten) in the Mean Square Analog Unit Module 194X669G1 (GEK-855).

6.2.13.1 Check relay K10 in the mean square analog unit to ensure that relay K10 contacts are closed on ranges one through six, and are open on ranges seven through ten (use a multimeter - on voltage range - across the relay contacts).

7.0 VIBRATIONAL TEST REQUIREMENTS

7.1 Test Specimen Operation During Testing

During vibrational testing the test specimen shall be setup as depicted in Figure 2. During exploratory testing the operation shall be in accordance with

paragraph 7.2.1. During OBE and DBE tests the operation shall be as indicated in paragraphs 7.3.1. and 7.3.3 respectively.

7.2 Exploratory Testing

Following the Baseline Operational Testing and Calibration (if required), exploratory testing shall be performed to determine the test specimen's resonant frequencies over the frequency range of 1-100 Hz. A recommended procedure for this testing is provided below. Other testing methods will be acceptable provided they yield the same information about the dynamic characteristics of the test specimen.

7.2.1 Sine Sweep Recommended Test Parameters

Test Method:	Low Level Sine Sweep
Input Motion:	Single Axis
Number of tests:	Three with one in each Orthogonal Axis
Frequency Range:	1 to 100 Hz
Sweep Rate:	Less than 1 octave per minute
Input g level:	0.25 g Peak
Test Specimen Operation:	As specified below

7.2.1.1 Pre-Vibration

(1) Turn OFF the ± 26.5 VDC power to the MSV-WRM.

(2) Connect equipment in accordance with Figure 2. Place switch S2 in the CLOSED position.

(3) Turn ON the ± 26.5 VDC power to the MSV-WRM.

(4) Turn ON the test oscillator, digital voltmeter and RMS voltmeter. Verify or set the test oscillator output signal amplitude to 0 volts.

(5) Place the MSV-WRM selector switch to the OPERATE position and momentarily place the MSV-WRM RESET switch to the TRIP position.

(6) Verify that all MSV-WRM indicating lights, except for the DOWNSCALE LEVEL indicating light (DS16B), are extinguished.

(7) Verify that there is 0 $\pm$ 0.1 VDC across resistor R3 and 12 $\pm$ 2 VDC across resistors R1, R2, and R4.

(8) Verify that there is 0 VDC across MSV-WRM receptacle J4, pins H and K.

(9) Place the range switch to position 1.

(10) Set the test oscillator frequency to 100 KHz.

(11) Increase the test oscillator output signal amplitude until there is 12 $\pm$ 2 VDC across resistor R3 and the DOWNSCALE LEVEL indicating light (D16B) extinguishes.

7.2.1.2 During Vibration

Maintain the above conditions during the exploratory testing.

Test Specimen Monitoring: Monitor trips and recorder outputs in accordance with paragraph 5.2

Operational Test: In accordance with paragraph 6.1

7.3 Proof Testing

The adequacy of the test specimen for Operating Basis Earthquake and Design Basis Earthquake will be demon-

strated by the proof testing phase. This phase shall be divided into two parts, 1) testing for OBE plant condition, and 2) testing for DBE plant condition. The tests shall consider the maximum seismic loads the test specimen may experience under each condition. The defined input response spectra to be used are included in Figures 5 thru 8.

7.3.1 OBE Testing

Test Method:	Random Motion
Input Motion:	Biaxial
Excitation:	2 independent random signals
Level:	Table TRS to envelope RRS
Test Specimen Operation:	As specified below

7.3.1.1 Normal Condition

(1) Pre-Vibration

a) If testing has been stopped repeat paragraph 7.2.1.1 (1) through (8) as required to achieve normal condition.

b) Place the range switch to position 2.

c) Set the test oscillator output frequency to 100 KHz.

d) Increase the test oscillator output signal amplitude until there is 12 $\pm$ 2 VDC across Resistor R3 and the DOWNSCALE LEVEL indicating light (DS16B) extinguishes.

(2) During Vibration

Maintain the above conditions for 1 vibration test in each MSV-WRM orientation.

7.3.1.2 Downscale Trip

a) If testing has been stopped repeat steps 7.2.1.1(1) through (8) as required to achieve normal condition.

b) Place the range switch to position 5.

c) Set the test oscillator output frequency to 100 KHz.

(2) During Vibration

a) Decrease the test oscillator output signal amplitude to the recorded value (±3%) in paragraph 6.1.14 and verify that there is 0 ± 0.1 VDC across Resistor R3 and that the DOWNSCALE LEVEL indicating light (DS16B) illuminates.

b) Perform this test once in each MSV-WRM orientation.

7.3.1.3 Upscale (H1) Trip

(1) Pre-Vibration

a) Repeat steps 7.2.1.1(1) through (8) as required to achieve normal conditions.

b) Place the range switch to position 8.

c) Set the test oscillator output frequency to 100 KHz.

(2) During Vibration

a) Increase the test oscillator output signal

amplitude to the recorded value (±3%) in paragraph 6.1.12 and verify that there is 0 ± 0.1 VDC across Resistor R? and that UPSCALE LEVEL indicating light (DS17A) illuminates.

b) Perform this test once n each MSV-WRM orientation.

7.3.1.4 Upscale (HI-HI) Trip)

(1) Pre-Vibration

a) If testing has been stopped repeat steps 7.2.1.1(1) through (8) as required to achieve normal condition.

b) Place the range switch to position 11.

c) Set the test oscilator output frequency to 100 KHz.

(2) During Vibration

a) Increase the test oscillator output amplitude to the recorded value (± 3%) in paragraph 6.1.13 and verify that there is 0 ± VDC across Resistor R1 and that UPSCALE LEVEL indicating light (DS17B) illuminates.

b) Perform this test once in each MSV-WRM orientation.

7.3.1.5 Inoperative Trip

(1) Pre-Vibration

a) Verify the following:

1) ± 26.5 VDC MSV-WRM power is ON.

2) MSV-WRM selector switch is in the OPERATE position.

3) Switch S2 is in the CLOSED position.

4) MSV-WRM RESET switch has been momentarily placed in the TRIP position.

5) The monitoring circuit is connected across Resistor R4 and the voltage reading is 12 ± 2 VDC.

6) INOPERATIVE indicating light (DS16A) is extinguished.

(2) During Vibration

a) Place switch S2 in the OPEN position. Verify that there is 0 ± 0.1 VDC across Resistor R4 and that INOPERATIVE indicating light (DS16A) illuminates.

b) Perform this test once in each MSV-WRM orientation.

Test Specimen Orientation: 2 orientations
(1) Front to back/ vertical
(2) Side to side/ vertical

Number of Tests: 10 with 5 in each orientation

Test Specimen Monitoring:	Monitor MSV-WRM trips, test oscillator output signal amplitude (signal input) and recorder outputs in accordance with paragraph 5.2
Frequency Range:	1-100 Hz
Test Duration:	30 sec per test
Damping:	2%
Required Response Spectra:	Figures 6 and 7
Operational Tests:	If the operational tests performed during the DBE are satisfactory, then operational test in accordance with paragraph 6.1 may be waived.

7.3.2 OBE Testing Results

TRS shall be plotted for each accelerometer location at a damping value of 2% at 1/6 octave intervals (2.5 damping is acceptable). For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed for the last test in each orientation. The test laboratory shall provide an analog tape of time history response for each accelerometer recorded on standard 14 channel IRIG tape with a voice channel. Response shall be unfiltered from 1 to 200 Hz. Test specimen operability shall be noted. Plot downscale trip with recorder output, upscale (hi) trip with recorder output and upscale (hi-hi) trip with recorder output. NUTECH shall be notified of lo, hi, and hi-hi trip points before proceeding with DBE testing.

7.3.3 DBE Testing

Test Method:	Random motion
Input Motion:	Biaxial
Excitation:	2 independent random signals

Level: Table TRS to envelope RRS

Test Specimen Operation: As specified below

7.3.3.1 Upscale (Hi-Hi) and Inoperative Trip

(1) Pre-Vibration

a) Repeat paragraph 7.2.1.1 as required to achieve normal condition.

(2) During Vibration

a) Increase the test oscillator output signal amplitude to the recorded value (± 3%) in paragraph 6.1.13 and verify that there is 0 ± 0.1 VDC across Resistor R1 and that UPSCALE LEVEL indicating light (DS17B) illuminates.

b) Place switch S2 in the OPEN position. Verify that there is 0 ± 0.1 VDC across Resistor R4 and that INOPERATIVE indicating light (DS16A) illuminates.

Test Specimen Orientation: 2 orientations
(1) Front to back/ vertical
(2) Side to side/ vertical

Number of Tests: 2 with 1 in each orientation

Test Specimen Monitoring: Monitor MSV-WRM trips, test oscillator output signal amplitude (signal output) and recorder

	outputs in accordance with paragraph 5.2
Frequency Range:	1 to 100 Hz
Test Duration:	30 sec. per test
Damping:	2%
Required Response Spectra:	Figures 8 and 9.
Operational Tests:	After the final DBE test in accordance with paragraph 6.1

7.3.4 DBE Testing Results

TRS shall be plotted for each accelerometer location at a damping value of 2% at 1/6 octave intervals (2.5% damping is acceptable). For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed from the table accelerometer time histories for each test specimen orientation. The test laboratory shall provide an analog tape of time history response for each accelerometer recorded on standard 14 channel IRIG tape with a voice channel. Response shall be unfiltered from 1 to 200 Hz. Test specimen operability shall be noted. For the last DBE, plot lo trip with recorder output, hi trip with recorder output, and hi-hi trip with recorder output.

8.0 WITNESSING OF TESTS

8.1 All tests shall be subject to observation by NUTECH or their authorized representative.

8.2 All tests shall be subject to observation by Cincinnati Gas and Electric Company, Commonwealth Edison Company, or their authorized representatives.

9.0 TEST REPORT REQUIREMENTS

The test laboratory shall supply ten certified copies of a test report which satisfies the requirements of IEEE 344-1975. This report will describe the equipment, calibration, and test procedures, including photographs of the test set up, and provide all results and conclusions from the test.

Operational tests and inspections shall be described and all results summarized and any deficiencies and/or repairs noted. Critical data to be included in this report are as follows:

9.1 Inspection and operational test results, verifying adjustments and recording values, also noting any significant deficiencies and repairs to the device. Include a description of test equipment and calibration.

9.2 Test Specimen resonance data

9.3 For each of the two orientations for the test specimen and for each test specimen state and operation, the TRS shall be computed for both horizontal and vertical table motions to verify that they envelop the corresponding RRS.

9.4 Time history recordings from OBE and DBE tests, recorded on standard 14 channel IRIG tape with a voice channel. Response shall be unfiltered from 1 to 200 Hz. Time histories shall also be plotted and included in the test report.

9.5 Power Spectral Density Plots from the selected OBE and DBE tests.

9.6 A record of the number of test runs, including testing level and duration, signal input levels and test specimen operation shall be maintained for test runs in the test log.

9.7 Any direct records from instrument operational monitoring (i.e. recorder plots).

9.8 A copy of the test log.

10.0 REFERENCES

10.1 IEEE 344-1975: Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.

10.2 GEK-45844A G.E. Operation and Maintenance Instructions (MSV-WRM with Range Switch).

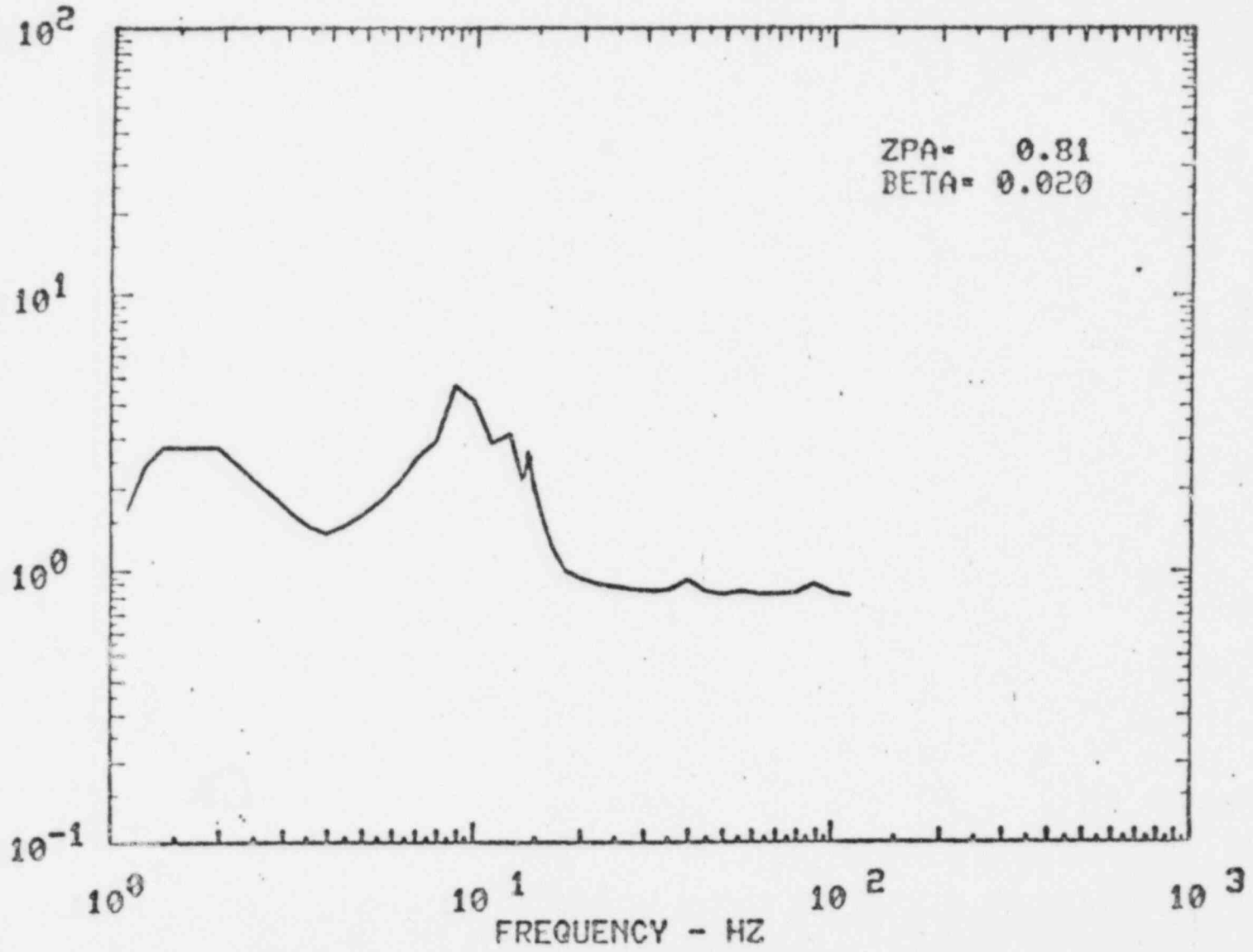

Figure 4

Horizontal DBE Required Response Spectrum

nutech
San Jose, California

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.
Owner Cincinnati Gas and Electric Co./Commonwealth Edison Co.
Client Cincinnati Gas and Electric Co./Commonwealth Edison Co.

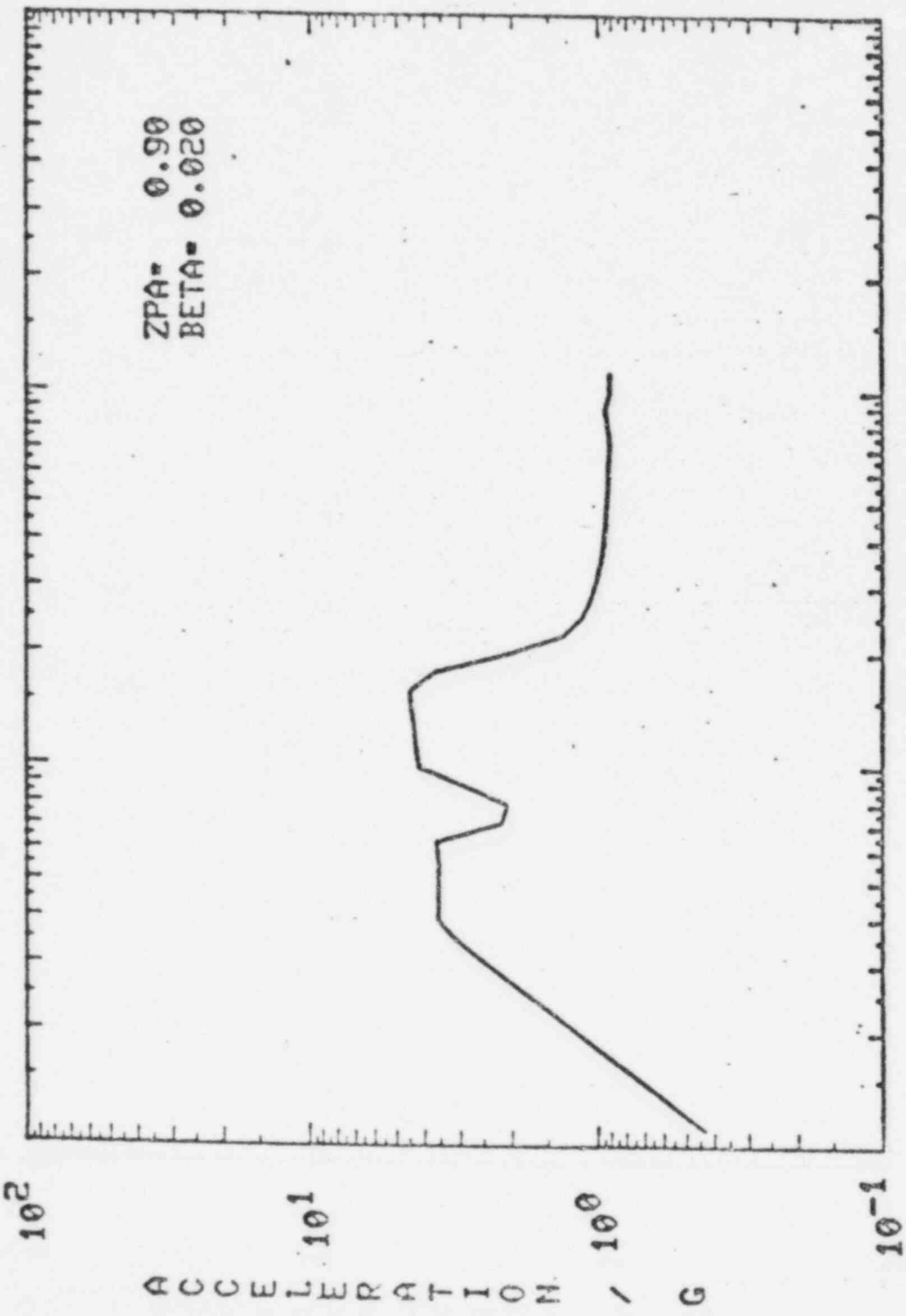

Figure 5
Vertical DBE Required Response Spectrum

Revision	1	2			
Prepared By/Date					
Checked By/Date	DHA 7-14-81				

QUALIFICATION OF Indicator & Trip Unit #129B2802

JUSTIFICATION FOR INTERIM OPERATION

The test report submitted by GE meets the specified g levels. Acceleration level comparisons are shown below.

Required g level from Panel Analysis	$h_1 = 1.02g$	$h_2 = .49$	$V = .469$
g level from Test Report	$h_1 = 4.2g$	$h_2 = 4.2g$	$V = 5.4g$

Therefore the equipment is qualified as for as test g levels are considered.

However we opted to perform new tests for the following reasons:

a) Documentation of test log was insufficient.

b) Funcional testing of Instruments not adequately explained.

c) Single axis single frequency testing was done.

The new tests will be done to the test requirements as attached as soon as the test specimen is procured.

For the above reasons we strongly feel that the device is qualified for the interim operation.

LA SALLE NUCLEAR STATIONS
UNIT 1 & 2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: Indicator & Trip Unit # 129B2802

EQUIPMENT NO: D18-K609A/D, D18-K611A/B, D18-K615A/D

LOCATION: Reactor Building El. 768' on Panels H13-P635 & H13-P636

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Seismic Test (See page 2)

QUALIFICATION DOCUMENT REFERENCES:

1. GE # 175A7267 Rev.3.
2. GE # 262A7244 dated 12-16-75 Rev.0
3. GE letter dated 11-19-74 on Hanford-2 Radiation Monitor
4. GE # 262A7445 dated 12-13-74 Rev.0
5. GE # 225A6970 dated 11-30-70 Rev.0
6. ATR - 510 -EAD05-01 dated Aug.77
7. GE # 225A5766 dated 1-05-78 Rev.7
8. GE # 235A1678 dated 9-14-72 Rev.0
9. PPD for 129B2802 by GE
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION SUMMARY

Several Tests were done by GE to qualify this device.
(2 are given below)

1. Test for Hanford-2 GE Doc. 262A7244 Rev.O and GE letter dated 11-19-74.

   Indicator Trip Unit was tested along with the Hanford Radiation Monitoring Cabinet H13-P606. The cabinet is similar to LASALLE cabinet.

   a) Low level resonance search test from 1-33 Hz in each axis.

   b) High level sweep tests at resonant frequencies in each axis.

   Max Test 'g' levels to Cabinet $h_1 = h_2 = V = 1.75g$

   Max 'g' level for Indicator Trip Unit $h_1 = 4.2g$

   $h_2 = 4.2g$ $V = 5.4g$

2. GE Doc. 225A6970. Test of Indicator & Trip Unit.

   a) 7 minute sine sweep test - Freq. range 5-33Hz

   Input .02" DA.

   Resonant Frequencies $h_1 = h_2 = 31$ Hz

   V = none

   b) 2 minute Resonance Dwell test at 31 Hz at 'g' level of

   $h_1 = 1.0g$

   $h_2 = 2.1$ g

   c) Vibration Endurance Test 5-33Hz at $x = y = z = 1.5g$

   d) Max. acceleration reached at 33Hz = 15 g's.

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1&2 Type:

1. Utility: CECO PWR
2. NSSS: GE BWR X
3. A-E: S&L

II. Component Name: Indicator & Trip Unit # 129B2802

1. Model Number: None Quantity: 10
2. Vendor: GE/NID
3. If the component is a cabinet or panel, name and model No. of the devices included:
4. Physical Description a. Appearance: Instrumentation
   b. Dimensions: 6"H x 2 3/4"W x 12 1/2"D
   c. Weight: 4 lbs.
5. Location: Building: Reactor Building - Control Room
   Elevation: 768'0" On Panels H13-P635, 636
6. Field Mounting Conditions [ ] Bolt (No.___, Size___)
   [ ] Weld (Length___)
   [ ] Mounted on Panels
   See attached sheet
7. Natural Frequencies in Each Direction:
   h1: 31 Hz h2: 31 Hz V: none from 5-33 Hz
8. a. Functional Description: used in connection with the Sensor Converter (See Env.Qual. Table)
   b. Is the equipment required for [ ]Hot Standby [ ]Cold Shutdown [ ]Both
9. Pertinent Reference Design Specifications:

Reference: CQD File No. CQD 000261

SARGENT & LUNDY ENGINEERS

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

Comments: _____

_____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by GE Report # 262A7244 Rev.0
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify) _____ 5.[ ] Combination of _____

2. Required Response Spectra (attach the graphs):

Panel accelerations for panels H13-P635, 636

3. Required Acceleration in Each Direction:

h1 = 1.02 h2 = 0.40 V = 0.46

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 1-33 Hz

4. TRS enveloping RRS using Multi-Frequency Test[ ] Yes (Attach TRS graphs [ ] No

5. g-level Test at h1 = 4.2g h2 = 4.2 V = 5.4

6. Laboratory Mounting:

1. [ ] Bolt (No.___, Size____) [ ] Weld (Length____)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ____
Resonance Search Test from 1-33Hz

_____

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

Complete: N.A.

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Allowable

B. Max. Deflection	Location	Effect Upon Functional Operability

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.:

Qualification 'g' levels		
h_1=4.2g	h_2=4.2g	V=5.4g

Specimen vibrated at resonant frequencies(31 Hz) in horizontal axes at 2 g's for 2 minutes. Malfunction limit test up to 15 g's.

Name: Indicator & Trip Unit

Manufacturer: GE

Model No.: None

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	V		
D18-K609A/D	Region CR-1 El.768' on Panels H13-P635, 36	1 02	.4	.46	A	
D18-K611A/B	Region CR-1 El.768' on Panels H13-P635	1.02	.4	.46	A	
D18-K615A/D	Region CR-1 El.768' on Panels H13-P635, 36	1.02	.4	.46	A	

A - Active P - Passive 1E - Class 1E

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Project Zimmer/La Salle SQRT Requalification Program File No.
Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company
Client Cincinnati Gas and Electric Company/Commonwealth Edison Company

TABLE 2

INSTRUMENT DATA

INSTRUMENT NAME: Indicator and Trip Unit

MODEL NO.: 129B2802

* SERIAL OR ID. NO.:

MANUFACTURER: General Electric

SPECIAL FEATURES IF ANY: None

FUNCTION: Receive output of sensor and converter and provide containment ventilation isolation and SGTS initiation.

DIMENSIONS: 6"H X 2 3/4"W X 12 1/2"D

WEIGHT: 4 lbs.

REQUIRED RANGE: 0.01 mR/hr to 100 mR/hr

REQUIRED ACCURACY: 9.5%

** MONITORING REQUIREMENTS: Output trip

MOUNTING DETAILS: See Figure 2

CHATTER TIME: 20 milliseconds

* To be completed by test laboratory
** Input monitoring at sensor and converter

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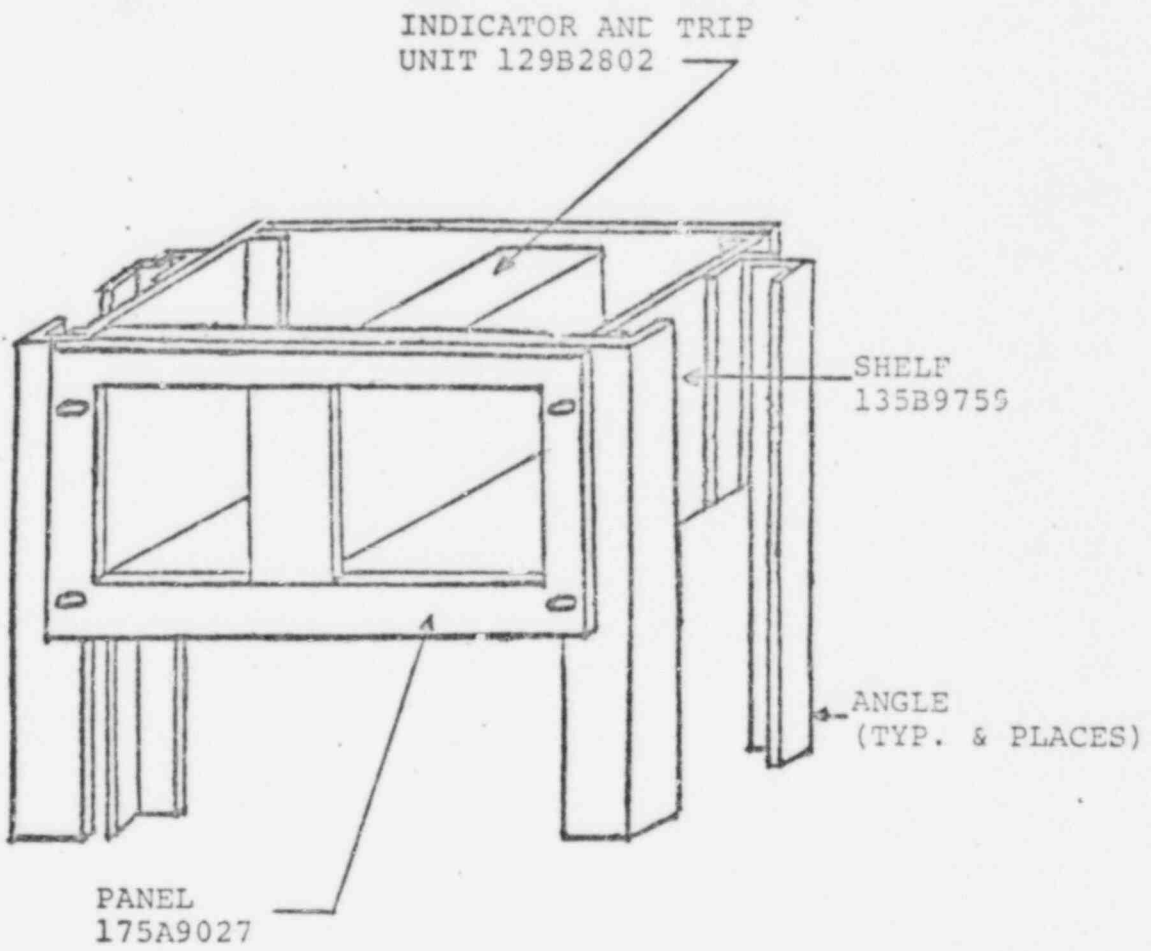
Prepared By/Date	SCW/8/28/81					
Checked By/Date	SB 8/28/81					of ___

Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company

Client Cincinnati Gas and Electric Company/Commonwealth Edison Company



MOUNTING FOR GENERAL ELECTRIC
INDICATOR AND TRIP UNIT 129B2802

FIGURE 1

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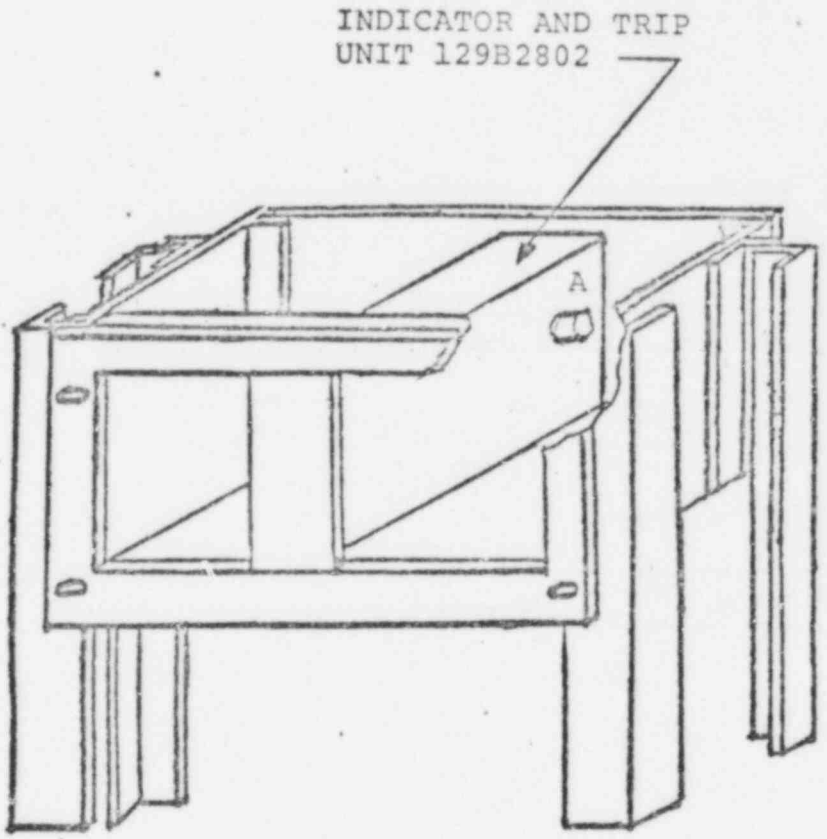
Prepared By/Date	SHE 5/26/81					of ___
Checked By/Date	SJB 5/26/81					

Project Zimmer/La Salle SQRT Requalification Program File No.
Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company
Client Cincinnati Gas and Electric Company/Commonwealth Edison Company



ACCELEROMETER LOCATION FOR GENERAL ELECTRIC
INDICATOR AND TRIP UNIT 129B2802

FIGURE 3

Revision	0					Page ___
Prepared By/Date	[illegible] 5/1/81					of ___
Checked By/Date	SB 5/25/81					

DIV II RADIATION MONITORING SYSTEM INDICATOR TRIP UNIT D18-K611

ENVIRONMENTAL QUALIFICATION TABLE D18-4

1. DESCRIPTION
The indicator trip unit is in a module designed for mounting in an equipment rack that holds as many as six similar units. Electronic components are mounted on two vertical printed circuit boards. Connections to power supply and sensor convertor unit are made via connections mounted on the rear panel of the module.

2. SAFETY FUNCTION
The building ventilation indicator/trip unit monitors the gross gamma radiation levels on the refueling room, drywell and torus, and standby gas treatment ventilation exhaust. Alarm and control actions signal excessive radiation levels and automatically isolate the reactor building ventilation system.

3. SAFETY DESIGN PARAMETERS

A. Range: 0.01 mr/hr to 100 mr/hr (4 decades)

B. Relay Response Time: 10 milliseconds to an input step of 100 microamps.

C. Power: +24 Vdc, 26mA
-24 Vdc, 21mA
+30 Vdc unregulated, 80mA

4. FSAR ENVIRONMENTAL CONDITIONS
The equipment is located in the control room panel H13-P636. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range 0.1 in.	20%	Operating 0.0005
N/A	60-90°F	to 0.25 in. water	40-50%	Integrated 1.75×10^2
N/A	120°F	gauge static pressure	60% (1)	

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range 0.1 in.	20%	Operating 0.0005
N/A	60-90°F	To 0.25 in. water	40-50%	Integrated 1.75×10^2
N/A	120°F	gauge static pressure	60%(1)	

(1) During HVAC equipment failure conditions, relative humidity may approach 100% for 100 hours, but 120°F would not occur concurrently.

6. QUALIFICATION METHOD
Not Available

7. RESULTS

DIV II RADIATION MONITORING SYSTEM INDICATOR TRIP UNIT D18-K615

ENVIRONMENTAL QUALIFICATION TABLE D18-4

1. DESCRIPTION
The indicator trip unit is in a module designed for mounting in an equipment rack that holds as many as six similar units. Electronic components are mounted on two vertical printed circuit boards. Connections to power supply and sensor convertor unit are made via connections mounted on the rear panel of the module.

2. SAFETY FUNCTION
The building ventilation indicator/trip unit monitors the gross gamma radiation levels on the refueling room, drywell and torus, and standby gas treatment ventilation exhaust. Alarm and control actions signal excessive radiation levels and automatically isolate the reactor building ventilation system.

3. SAFETY DESIGN PARAMETERS

A. Range: 0.01 mr/hr to 100 mr/hr (4 decades)

B. Relay Response Time: 10 milliseconds to an input step of 100 microamps.

C. Power: +24 Vdc, 26mA
-24 Vdc, 21mA
+30 Vdc unregulated, 80mA

4. FSAR ENVIRONMENTAL CONDITIONS
The equipment is located in the control room panel H13-P636. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range 0.1 in.	20%	Operating 0.0005
N/A	60-90°F	to 0.25 in. water	40-50%	Integrated 1.75×10^2
N/A	120°F	gauge static pressure	60% (1)	

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
N/A	40°F	Range 0.1 in.	20%	Operating 0.0005
N/A	60-90°F	To 0.25 in. water	40-50%	Integrated 1.75×10^2
N/A	120°F	gauge static pressure	60%(1)	

(1) During HVAC equipment failure conditions, relative humidity may approach 100% for 100 hours, but 120°F would not occur concurrently.

6. QUALIFICATION METHOD
Not Available

7. RESULTS

accordance with paragraphs 5.3.1 and 5.3.3. Failure is indicated if the test specimen does not meet the operational requirements after vibration in accordance with paragraph 4.2. More than 20 milliseconds chatter shall be considered a failure. Any indication of chatter shall be brought to the attention of NUTECH for further analysis. All failures shall be noted in the test report.

5.0 TEST REQUIREMENTS

5.1 Exploratory Testing

Exploratory testing shall be performed to determine the test specimens' resonant frequencies, if any, within a specified frequency range. A recommended procedure for this testing is provided below. Fast Fourier Transform (FFT) or other testing methods will be acceptable provided they yield the same information about the dynamic characteristics of the test specimens.

5.1.1 Sine Sweep Recommended Test Parameters

Test Method: Low Level Sine Sweep
Input Motion: Single axis
Number of Tests: 3 with one in each Orthogonal Axis
Frequency Range: 1 to 100 Hz
Sweep Rate: Less than 2 Octaves per minute
Input g Level: 0.1 g Peak

5.1.2 Exploratory Testing Results

The acceleration response in g's and transfer function for each of the accelerometer location shall be plotted as a function of frequency.

5.2 Fatigue Testing (Sensor and Converter Only)

Fatigue testing shall be performed in order to account for any possible long term effects the SRV and LOCA event may have upon the test specimen. This test phase shall be conducted in two parts, first, SRV fatigue testing and second SRV + LOCA fatigue testing. The RRS to be used are those generated during previous vibration testing.

5.2.1 SRV Fatigue Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Number of Tests: 1 in each test specimen orientation
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Frequency Range: 1 to 200 Hz
Duration of Individual Time History: Less than 20 sec
Total Test Duration: 400 sec each orientation
RRS Damping: 2%
Required Response Spectra: Figures 10 and 11

5.2.2 SRV Fatigue Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% at 1/6 octave intervals. For comparison the table TRS and RRS shall be plotted on the same sheet. Power Spectral Density (PSD) plots shall be developed from the table accelerometer time histories for each test specimen orientation.

All accelerometer signals shall be recorded on analog magnetic tape.

5.2.3 SRV + LOCA Fatigue Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Number of Tests: 1 in each test specimen orientation
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Frequency Range: 1 to 200 Hz
Duration of Individual Time History: Less than 20 sec
Total Test Duration: 200 sec each orientation

RRS Damping: 2%
Response Spectra: Figures 12 and 13

5.2.4 SRV + LOCA Fatigue Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% at 1/6 octave intervals. For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed from the table accelerometer time histories for each test specimen orientation. All accelerometer signals shall be recorded on analog magnetic tape.

5.3 Proof Testing

The adequacy of the test specimens for upset/OBE and emergency/DBE plant conditions will be demonstrated by the proof testing phase. This phase will be divided into two parts, testing for upset/OBE plant condition and testing for emergency/DBE plant condition, and shall consider the maximum combined dynamic loads the test specimens may experience under each condition. The RRS to be used are those generated during previous vibration testing and data reduction. The indicator and trip unit will be tested to OBE and DBE as a control room item. The sensor and converter will be tested to earthquake plus hydrodynamic loads in upset and emergency as a local item.

5.3.1 Upset/OBE Condition Testing

Test Method: Random Motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelop RRS
Test Specimen Operation: As specified below
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Number of Tests: 10, 5 in each test specimen orientation

5.3.1.1 Sensor and Converter-Upset

(1) Pre-Vibration

a) Place the power supply POWER SUPPLY OFF-ON switch to the OFF position.

b) Connect the sensor and converter, power supply, indicator and trip unit and monitoring circuit in accordance with Figure 8.

c) Place the TRIP TEST-ZERO-OPERATE switch on the indicator and trip unit to the OPERATE position.

d) Place switch S1 to the CLOSED position.

e) Place the power supply POWER SUPPLY OFF-ON switch to the ON position.

f) Verify that the reading on the indicator and trip unit meter is approximately 20 percent of the first decade.

g) Depress the RESET push-button on the indicator and trip unit and verify that the LOW and HIGH indicating lights extinguish.

h) Verify that there is voltage across Resistor R1 (Relay K2 contacts 6 and 10 closed) and no voltage across Resistor R2 (Relay K1 contacts 3 and 11 opened).

(2) During Vibration

Maintain the above conditions throughout the 5 tests in each test specimen orientation.

(3) Post Vibration

a) Place the power supply, POWER SUPPLY OFF-ON switch to the OFF position.

b) Disconnect the monitoring circuit connected in step (1) b).

5.3.1.2 Indicator and Trip Unit - OBE (Normal Condition)

(1) Pre-Vibration

a) Place the power supply, POWER SUPPLY OFF-ON switch to the OFF position.

b) Remove the sensor and converter from its case.

c) Connect the sensor and converter, power supply, indicator and trip unit and test equipment in accordance with Figure 9.

d) Connect indicator and trip unit receptacle J1 pins 8 and 19 to individual monitoring circuits in accordance with Figure 9.

e) Place the TRIP TEST-ZERO-OPERATE switch on the indicator and trip unit to the OPERATE position.

f) Place switch S1 to the OPEN position.

g) Place the power supply POWER SUPPLY OFF-ON switch to the ON position.

h) Turn on the electronic counter and pulse generator and adjust the pulse generator output for

negative pulses of 15 volts peak amplitude.

i) Set the pulse generator pulse duration so that the pulse length provides a 50 percent duty cycle.

j) Adjust the pulse generator output frequency control for a reading of approximately 20 percent of the first decade on the indicator and trip unit meter.

k) Depress the RESET push-button on the indicator and trip unit and verify that the LOW and HIGH indicating lights extinguish.

l) Verify that there is voltage across Resistor R1 (Relay K2 contacts 6 and 10 closed) and no voltage across Resistor R2 (Relay K1 contacts 3 and 11 opened).

(2) During Vibration

Maintain the above conditions for 1 vibration test in each test specimen orientation.

5.3.1.3 Indicator and Trip Unit-OBE (Downscale Trip)

(1) Pre-Vibration

a) If testing has been stopped repeat steps 5.3.1.2 (1) a) through l) as required to achieve normal condition.

(2) During Vibration

a) Decrease the pulse generator output frequency to the recorded value (+ 10%) in paragraph 4.2.2.3 step 13 and verify that there is voltage across Resistor R2 (Relay K1 contacts 3 and 11 closed) and the LOW indicating light illuminates.

b) Perform this test once in each test specimen orientation.

5.3.1.4 Indicator and Trip Unit-OBE (Downscale Steady State Condition)

(1) Pre-Vibration

a) If testing has been stopped repeat steps 5.3.1.2 (1) a) through l) as required to achieve normal condition.

b) Maintain the conditions in step 5.3.1.3(2) a) or perform if required.

(2) During Vibration

Maintain the above conditions for 1 vibration test in each test specimen orientation.

5.3.1.5 Indicator and Trip Unit-OBE (Upscale Trip)

(1) Pre-Vibration

a) Repeat steps 5.3.1.2 (1) a) through l) as required to achieve normal condition

(2) During Vibration

a) Increase the pulse generator output frequency to

the recorded value (± 10%) in paragraph 4.2.2.3 step 13 and verify that there is no voltage across Resistor R1 (Relay K2 contacts 6 and 10 opened) and the HIGH indicating light illuminates.

b) Perform this test once in each test specimen orientation.

5.3.1.6 Indicator and Trip Unit-OBE (Upscale Steady State Condition)

(1) Pre-Vibration

a) If testing has been stopped repeat steps 5.3.1.2 (1) a) through 1) as required to achieve normal condition.

b) Maintain the conditions in step 5.3.1.5(2) a) or perform if required.

(2) During Vibration

Maintain the above conditions for 1 vibration test in each test specimen orientation.

Monitoring Requirements: Indicator and trip unit output voltage for the sensor and converter test and indicator and trip unit contact position, chatter detection and output voltage for the indicator and trip unit test.
Frequency Range: 1-200 Hz
Test Duration: 30 sec per test
RRS Damping: 2%
Required Response Spectra: Figures 14 and 15 (OBE plus SRV plus chugging or LOCA) for the sensor and converter and Figures 16 and 17 (OBE) for the indicator and trip unit.

5.3.2 Upset/OBE Condition Testing Results

TRS for the indicator and trip unit shall be plotted for table accelerometer locations at a damping value of 2% (2 1/2% is acceptable) at 1/6 octave intervals. The TRS for the sensor and converter shall be plotted at a damping value of 1% at 1/6 octave intervals. For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed for the first test in each orientation. All accelerometer signals shall be recorded on analog magnetic tape.

5.3.3 Emergency/DBE Condition Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Test Specimen Operation: As Specified below
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Number of Tests: 1 in each test specimen orientation

5.3.3.1 Sensor and Converter

Perform test in accordance with paragraph 5.3.1.1.

5.3.3.2 Indicator and Trip Unit

Perform test in accordance with paragraph 5.3.1.5.

Monitoring Requirements: Indicator and trip unit output voltage for the sensor and converter test and indicator and trip unit contact position and chatter detection and output voltage for the indicator and trip unit test
Frequency Range: 1 to 200 Hz
Test Duration: 30 sec. per test
RRS Damping: 2%
Required Response Spectra: Figures 18 and 19 (DBE plus SRV plus chugging or LOCA) for the sensor and converter

and Figures 20 and 21 (DBE) for the indicator and trip unit

Operational Test: Checkout Test Specimen after emergency condition tests in accordance with paragraph 4.2.2.1

5.3.4 Emergency/DBE Condition Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% (2 1/2% is acceptable) at 1/6 octave intervals. For comparison, the Table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed from the table accelerometer time histories for each test specimens orientation and voltage relay operation. All accelerometer signals shall be recorded on analog magnetic tape. Results of operational test checkout after excitation shall be reported and any significant deviation from the baseline shall be noted in the final report.

6.0 WITNESSING OF TESTS

6.1 All tests shall be subject to observation by NUTECH or their authorized representatives.

6.2 All tests shall also be subject to observation by Cincinnati Gas and Electric and Commonwealth Edison Companies or their authorized representatives.

7.0 TEST REPORT REQUIREMENTS

The test laboratory shall supply ten certified copies of a test report which satisfies the requirements of IEEE 344 - 1975. This report wil describe the equipment, calibration, and test procedures, including photographs of the test set up, and provide all results and conclusions from the test. Operational checkout and inspections shall be described and all results summarized and any deficiencies and/or repairs noted. Critical data to be included in this report are as follows:

7.1 Inspection and operational test results reports, verifying adjustments and recording values, also noting any significant deficiencies and repairs to device. A description of test equipment and calibration information shall be included.

7.2 Test Specimens resonance search data

7.3 The test response spectra (TRS) plots obtained in 5.2.2, 5.2.4, 5.3.2 and 5.3.4. These TRS are to be computed for all accelerations recorded. For each of the two orientations for the test specimen, the TRS shall be computed for both horizontal and vertical table motions to verify that they envelop the corresponding RRS.

7.4 PSD plots obtained in 5.2.2, 5.2.4, 5.3.2 and 5.3.4.

7.5 A record of voltage and frequency readings, contact position, test specimen operation, and chatter shall be maintained in the test log.

7.6 A record of the number of test runs including level and duration shall be maintained in the test log.

7.7 A copy of the test log.

7.8 Completed Instrument Data Forms (a partially completed form have been provided as Tables 1 and 2 of this specification).

8.0 REFERENCES

8.1 IEEE 344- 1975: Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.

8.2 GEK32374D G.E. Operation and Maintenance Instructions (Area Radiation Monitor Sensor and Converter)

8.3 GEK27828G, G.E. Operation and Maintenance Instructions (Area Radiation Monitor Indicator and Trip Unit)

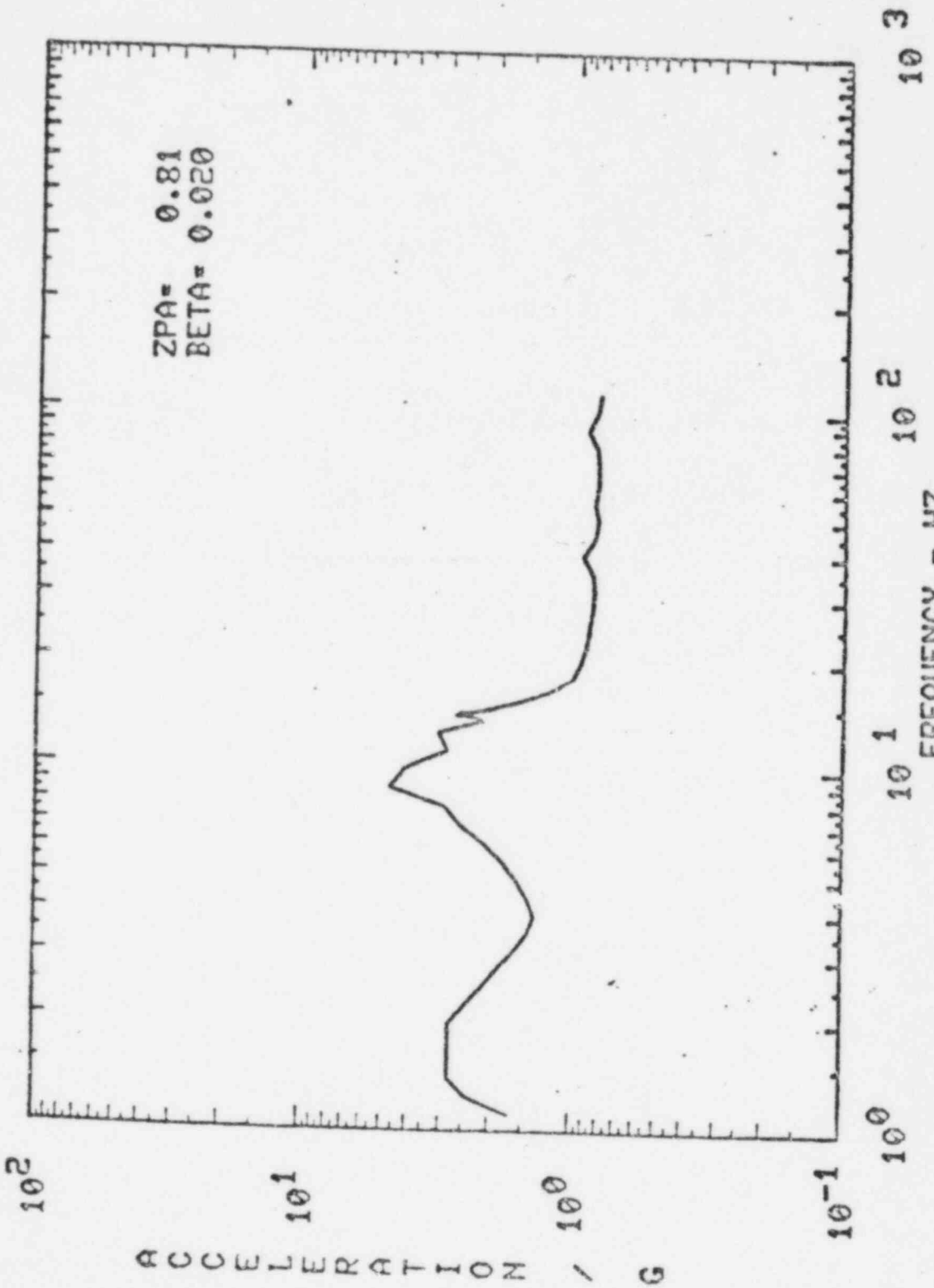


Figure 4
Horizontal DBE Required Response Spectrum

Revision	1	2			
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Checked By / Date	[illegible] 7-16-81	[illegible] 7/15/81			

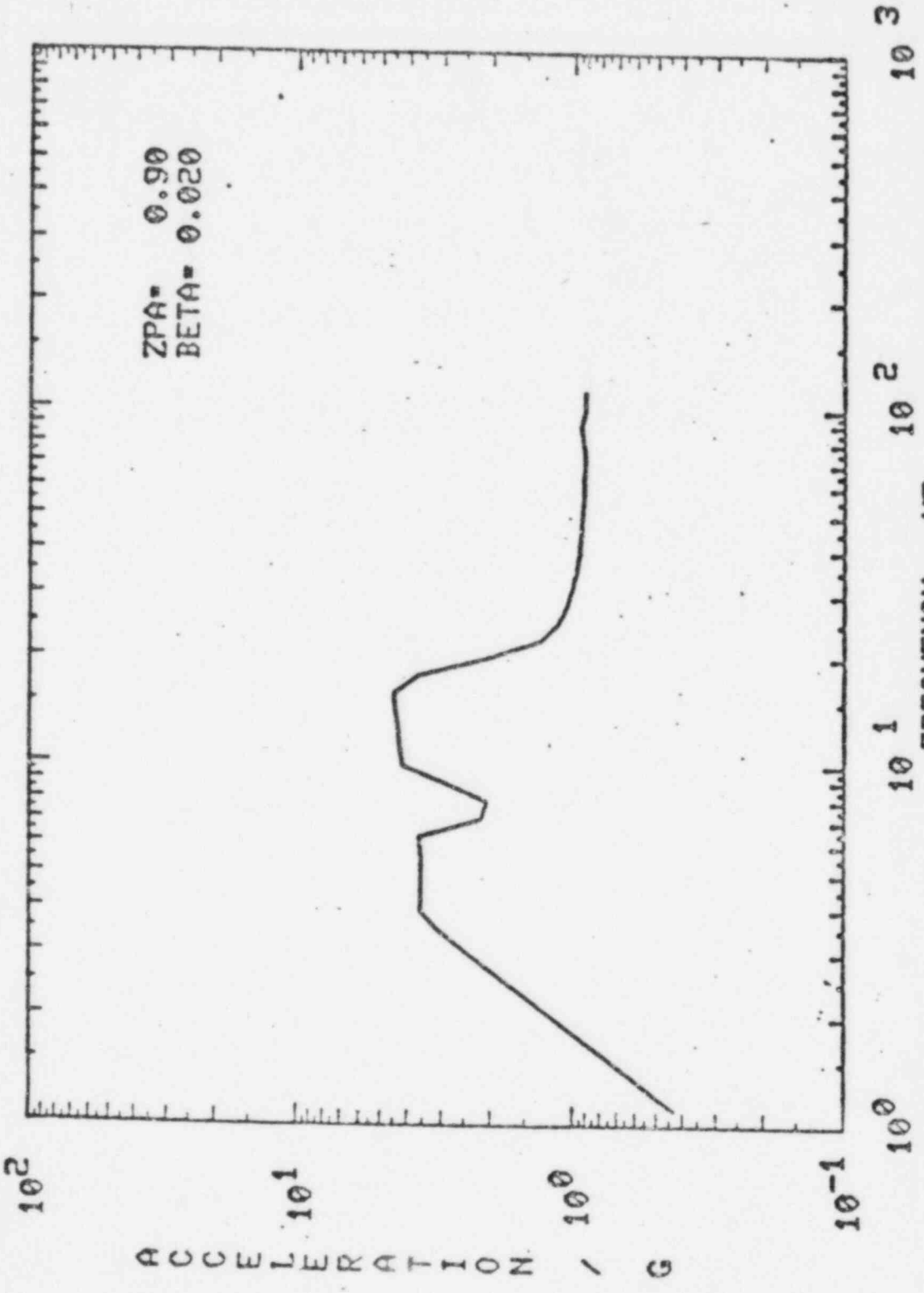


Figure 5

Vertical DBE Required Response Spectrum

QUALIFICATION OF CONTACTOR #145C3029

JUSTIFICATION FOR INTERIM OPERATION

The test report submitted by GE meets the specified g levels. Acceleration level comparisons are shown below.

Required g level from Panel Analysis	$h_1 = .8g$	$h_2 = 1.1g$	$V = .46g$
g level from Test Report	$h_1 = 1.5g$	$h_2 = 1.5g$	$V = .5g$

Therefore the equipment is qualified as for as test g levels are considered.

However we opted to perform new tests for the following reasons:

a) Documentation of test log was insufficient.

b) Funcional testing of Instruments not adequately explained.

c) Single axis single frequency testing was done.

The new tests will be done to the test requirements as attached as soon as the test specimen is procured.

For the above reasons we strongly feel that the device is qualified for the interim operation.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: Contactor # 145C3029

EQUIPMENT NO: C71A-K14A/H

LOCATION: On Panel H13-P609

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Seismic Tests (See page 2)

QUALIFICATION DOCUMENT REFERENCES:

1. GE Document # 225A6966 (Seismic Test Summary)
2. GE " # 225A6279 (Seismic Test Results)
3. GE " # 225A5766 dated 1-5-78 Rev. 7
4. DVI4563209
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION SUMMARY

EXISTING TEST REPORT

a) Resonance Search Test - in all the three axes.

Frequency range 5-33 Hz Input = .02"DA

Duration 7 minutes sweep

Resonant frequency h_2= 27Hz

h_1& V = None

b) 2 minute dwell test in h_2 direction at 27 Hz.

g level = 2 'g'

c) Endurance Sweep Test h_1= h_2= 1.5 g

V = .5g

d) Malfunction Test up to 12 g's at 27 Hz in h_2 direction.

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1&2

Type:

1. Utility: CECO — PWR ____
2. NSSS: GE — BWR X
3. A-E: S&L

II. Component Name: Contactor # 145C3209

1. Model Number CR105/102 — Quantity: 8
2. Vendor GE/GPCD
3. If the component is a cabinet or panel, name and model No. of the devices included: ____
4. Physical Description a. Appearance Instrumentation
   b. Dimensions 6.62" x 4.94" x 5.38"
   c. Weight 7 lbs. (approx.)
5. Location: Building: Auxiliary Bldg.
   Elevation; on Panel H13-P609
6. Field Mounting Conditions [X] Bolt (No. 3, Size 3/8")
   [ ] Weld (Length ___)
   [ ] Mounted on Panels
7. Natural Frequencies in Each Direction: ____

From old test

h1 None from 5-33 h2: 27Hz V: None from 5-33

8. a. Functional Description: used as scram trip actuator relay in the Reactor Protection System
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [ ] Both Other Safety Function
9. Pertinent Reference Design Specifications: ____

Reference: CQD File No. CQD 000272

SARGENT & LUNDY ENGINEERS

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

Comments: _____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: & 225A6279

Test and/or Analysis by Philco Ford GE Document No 225A6966
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of _____

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

3. Required Acceleration in Each Direction:

h1 = .8 g h2 = 1.1 g V = .46 g

VI. If Qualification by Test, then Complete:

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

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

3. Frequency Range: 5-33 Hz

4. TRS enveloping RRS using Multi-Frequency Test[ ] Yes (Attach TRS graphs
NA
[ ] No

5. g-level Test at h1 = 1.5g h2 = 1.5g V = 0.5g

6. Laboratory Mounting:

1. [X] Bolt (No. 3x20 Size ¼") [ ] Weld (Length____)[ ] _____

7. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results)
Resonance frequency test from 5-33 Hz. Resonant frequencyof 27 Hz in Hz direction. Malfunction limit test reached to a maximum of 12 g's at 33 Hz.

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

Complete: N.A.

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A. Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Stress Allowable

B. Max. Deflection	Location	Effect Upon Functional Operability

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.:

Qualification 'g' levels		
h_1= 1.5	h_2= 1.5	V= 1.5

Name: Contactor

Manufacturer: GE

Model No.: CR105/205

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	v		
C71-K14A/H	On Panel H13-P609 Aux. Bldg. El. 768'	.8	1.1	.46	A	

A - Active P - Passive 1E - Class 1E

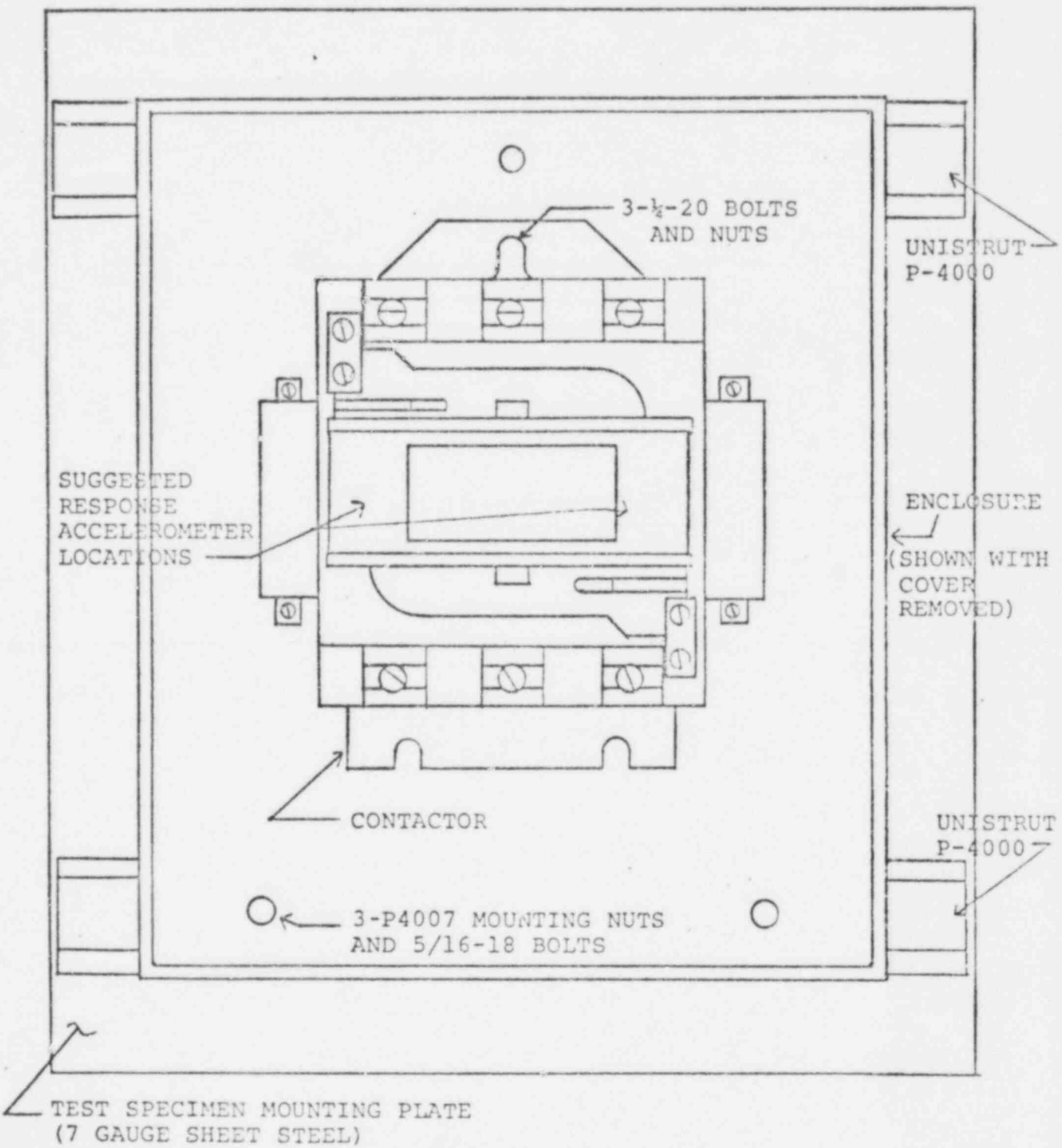
nutech

San Jose, California

Project Wm. H. Zimmer/La Salle County Nuclear Power Stations File No.

Owner Cincinnati Gas and Electric Company/Commonwealth Edison Co.

Client Cincinnati Gas and Electric Company/Commonwealth Edison Co.



MOUNTING TECHNIQUE FOR TEST SPECIMEN

FIGURE 1

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CONTACTOR C71A-K---

ENVIRONMENTAL QUALIFICATION TABLE C71-2

1. DESCRIPTION
The equipment is a type CR105/CR205 contactor as manufactured by G.E.

2. SAFETY FUNCTION
Relay de-energization required to trip the Reactor Protection System i.e., initiate rapid insertion of all control rods simultaneously (SCRAM).

3. SAFETY DESIGN PARAMETERS
The contactor must de-energize as required within a minimum of 20 milliseconds with a 120 volt AC, 1250 VA sealing inductive load.

Worst Case: 120°F - 90 % R/H

Contact Rating

NEMA Size	Continuous A.C. Current Ratings (Amperes)	
	Enclosed	Open
00	9	10
0	18	20
1	27	30
2	45	50
3	90	100
4	135	150
5	270	300

Maximum Contact Voltage: 600 Volts

4. FSAR ENVIRONMENTAL CONDITIONS
The equipment is located inside the Control Room. The FSAR environment conditions are tabulated below.

Duration	Temperature	Pressure	Humidity	Radiation
Min	40°F	Range	10%	Operating 0.0005
Normal	60-90°F	0.10 in. to	50%	Integrated (40 yrs)
Max.	120°F	1.0 in. water gauge static pressure	60%	1.75×10^2

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008 Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
Min	40°F	Range	10%	Operating 0.0005
Normal	60-90°F	0.10 in. to	50%	Integrated (40 yrs)
Max.	120°F	1.0 in. water gauge static pressure	60%	1.75×10^2

CONTACTOR C71A-K--- (Continued)

ENVIRONMENTAL QUALIFICATION TABLE C71-2

6. QUALIFICATION METHOD

Type Test

The devices were placed in the Environmental Chamber and soaked for 16 hours at 60°C and 90-95% relative humidity. At the conclusion of the soak period, without change of environmental conditions, each device was cycled 50 times at rated load. Each cycle consisted of 1 sec on and 9 sec off except for the selector switch which had 1 sec right, 1 sec left, 8 sec off.

7. RESULTS

All devices passed the 50 cycle test while under specified ambient conditions without (by visual inspection) undue heating or pitting of contacts.

NEW TEST PROCEDURE

180

6.0 TEST REQUIREMENTS

6.1 Operational Testing

An operational test shall establish a baseline function in accordance with paragraph 5.2.2. During exploratory testing the test specimen shall be energized for the duration of the test. During proof testing the test specimen shall be operationally cycled, from energized to de-energized. The relay shall be maintained in each state for fifteen seconds to indicate contact chatter. Subsequent operational tests shall follow each phase of vibrational testing in accordance with paragraph 5.2.2. Relay coil voltage shall be 105V during all phases of testing. 105V is the low nominal voltage for all Zimmer and LaSalle Control Room 120V power busses.

6.2 Exploratory Testing

After the baseline operational checkout, exploratory testing shall be performed to determine the test specimen's resonant frequencies over the frequency range of 1-100 Hz. A recommended procedure for this testing is provided below. Other testing methods will be acceptable provided they yield the same information about the dynamic characteristics of the test specimen.

6.2.1 Sine Sweep Recommended Test Parameters

Test Method:	Low Level Sine Sweep
Input Motion:	Single Axis
Number of Tests:	3, 1 in each Orthogonal Axis
Frequency Range:	1 to 100 Hz
Sweep Rate:	less than 1 octave per minute
Input g Level:	0.25 g Peak
Test Specimen State:	Energized
Test Specimen Monitoring:	In accordance with Paragraph 5.2.3

Operational Test:	In accordance with Paragraph 5.2.2

6.2.2 Results

The acceleration response in g's from each accelerometer location shall be plotted as a function of frequency. Any detected chatter shall be noted in the final report.

6.3 Proof Testing

The adequacy of the test specimen for Operating Basis Earthquake and Design Basis Earthquake will be demonstrated by the proof testing phase. This phase shall be divided into two parts, 1) testing for OBE plant condition, and 2) testing for DBE plant condition. The tests shall consider the maximum seismic loads the test specimen may experience under each condition. The defined input response spectra to be used are included in Figures 2 through 5.

6.3.1 OBE Testing

Test Method:	Random Motion
Input Motion:	Biaxial
Excitation:	2 independent random signals
Level:	Table TRS to envelope RRS
Test Specimen State:	Energized for first fifteen seconds, then de-energized for the remainder of the test
Test Specimen Orientation:	2 orientations (1) Front to back/vertical (2) Side to side/vertical
Number of Tests:	10 with 5 in each orientation
Test Specimen Monitoring:	In accordance with paragraph 5.2.3

Frequency Range:	1-100 Hz
Test Duration:	30 sec per test
Damping:	2%
Required Response Spectra:	Figures 2 and 3
Operational Tests:	After each group of OBE tests in each orientation, in accordance with paragraph 5.2.2.

6.3.2 OBE Testing Results

TRS shall be plotted for each accelerometer location at a damping value of 2% at 1/6 octave intervals (2.5% damping is acceptable). For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed for the last test in each orientation. The test laboratory shall provide an analog tape of time history response for each accelerometer recorded on standard 14 channel IRIG tape with a voice channel. Response shall be unfiltered from 1 to 200 Hz. Times of operation and chatter shall be noted. Results of the operational tests shall be documented and any deviation from baseline shall be noted in the final report.

6.3.3 DBE Testing

Test Method:	Random motion
Input Motion:	Biaxial
Excitation:	2 independent random signals
Level:	Table TRS to envelope RRS
Test Specimen State:	Energized for first fifteen seconds, then de-energized for the remainder of the test

Test Specimen Orientation:	2 orientations (1) Front to back/vertical (2) Side to side/vertical
Number of Tests:	2 with 1 in each orientation
Test Specimen Monitoring:	In accordance with paragraph 5.2.3
Frequency Range:	1 to 100 Hz
Test Duration:	30 sec. per test
Damping:	2%
Required Response Spectra:	Figures 4 and 5.
Operational Tests:	After each DBE test in accordance with paragraph 5.2.2.

6.3.4 DBE Testing Results

TRS shall be plotted for each accelerometer location at a damping value of 2% at 1/6 octave intervals (2.5% damping is acceptable). For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed from the table accelerometer time histories for each test specimen orientation. The test laboratory shall provide an analog tape of time history response for each accelerometer recorded on standard 14 channel IRIG tape with a voice channel. Response shall be unfiltered from 1 to 200 Hz. Times of operation and chatter shall be noted on these plots. Results of the operational tests shall be documented and any deviation from baseline shall be noted in the final report.

7.0 WITNESSING OF TESTS

7.1 All tests shall be subject to observation by NUTECH or their authorized representative.

7.2 All tests shall be subject to observation by Cincinnati Gas and Electric Company, Commonwealth Edison Company, or their authorized representatives.

8.0 TEST REPORT REQUIREMENTS

The test laboratory shall supply ten certified copies of a test report which satisfies the requirements of IEEE 344-1975. This report will describe the equipment, calibration, and test procedures, including photographs of the test set up, and provide all results and conclusions from the test.

Operational tests and inspections shall be described and all results summarized and any deficiencies and/or repairs noted. Critical data to be included in this report are as follows:

8.1 Inspection and operational test results, verifying adjustments and recording values, also noting any significant deficiencies and repairs to the device. Include a description of test equipment and calibration.

8.2 Test Specimen resonance data

8.3 For each of the two orientations for the test specimen and for each test specimen state and operation, the TRS shall be computed for both horizontal and vertical table motions to verify that they envelop the corresponding RRS.

8.4 Time history recordings from OBE and DBE tests, recorded on standard 14 channel IRIG tape with a voice channel. Response shall be unfiltered from 1 to 200 Hz. Time histories shall also be plotted and included in the test report.

8.5 Power Spectral Density Plots from the selected OBE and DBE tests.

8.6 A record of the number of test runs, including testing level and duration, contact position, test specimen operation, and chatter shall be maintained for test runs in the test log.

8.7 Any direct records from instrument operational monitoring (i.e. oscillograph recordings).

8.8 A copy of the test log.

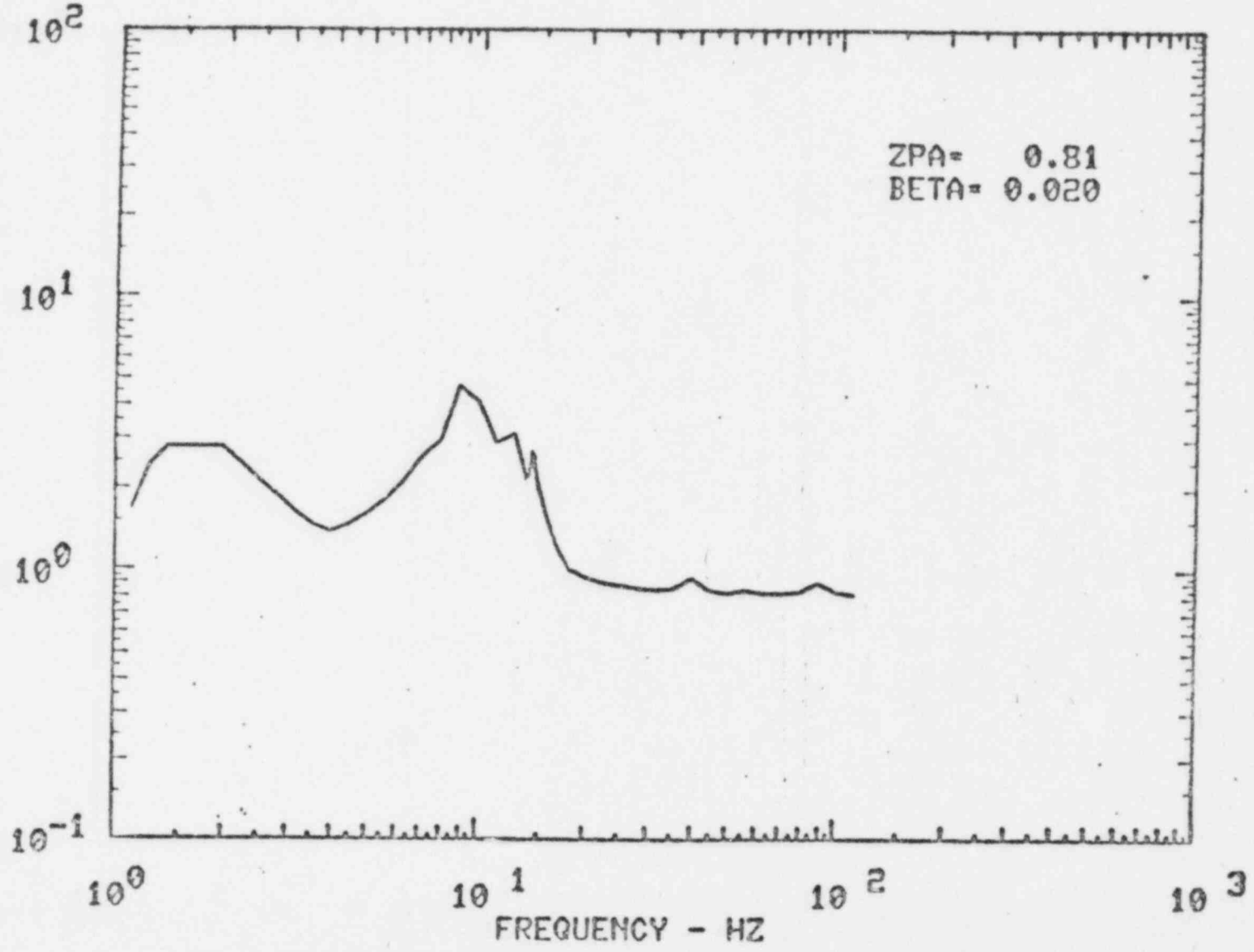

Figure 4

Horizontal DBE Required Response Spectrum

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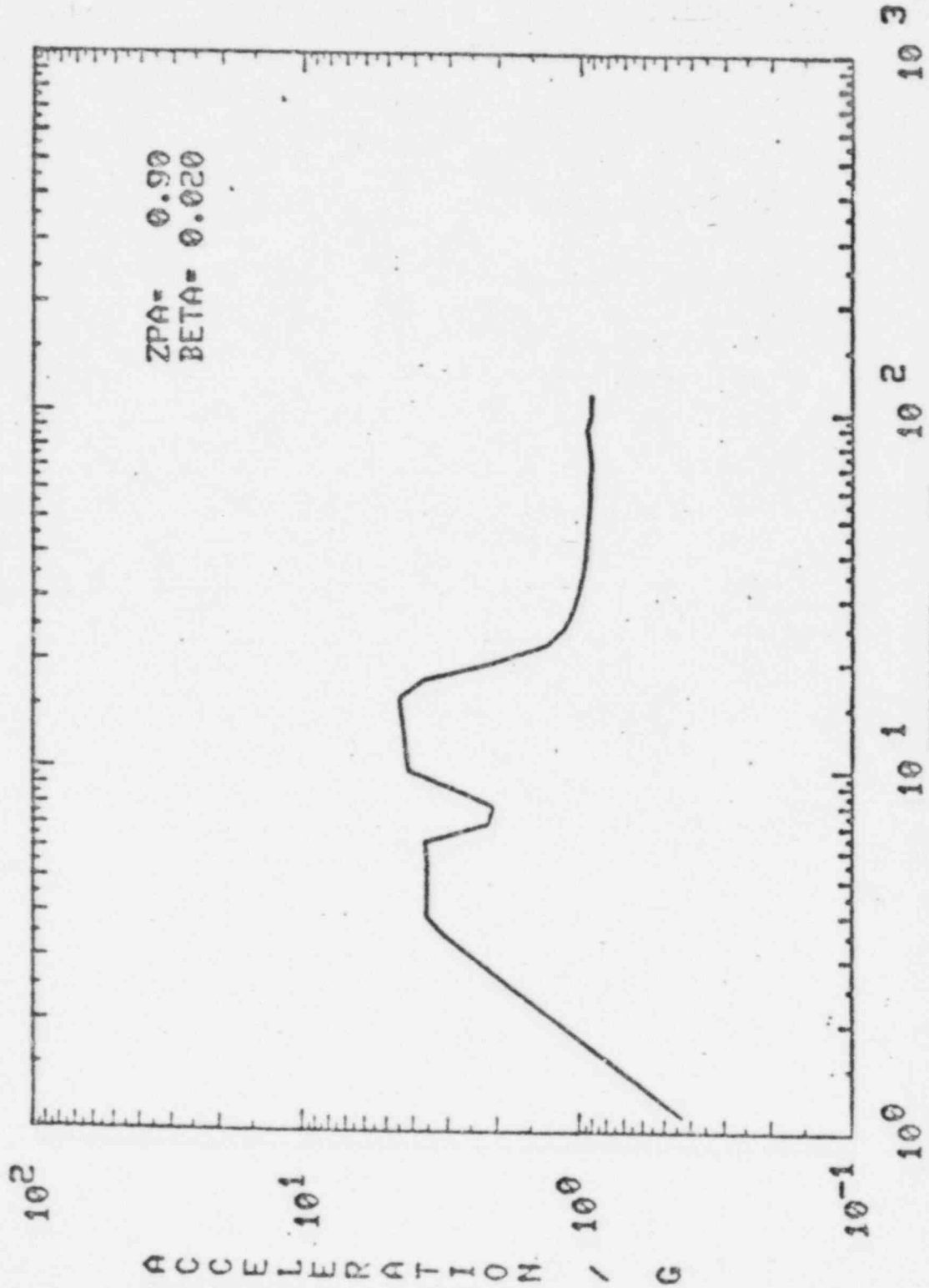

Figure 5

Vertical DBE Required Response Spectrum

QUALIFICATION OF Sensor & Convertor # 194C927

JUSTIFICATION FOR INTERIM OPERATION

The test report submitted by GE meets the specified g levels. Acceleration level comparisons are shown below.

Required g level from Panel Analysis	$h_1 = 1.2g$	$h_2 = 1.2g$	$V = 1.2g$
g level from Test Report	$h_1 = 1.5g$	$h_2 = 1.5g$	$V = 1.5g$

Therefore the equipment is qualified as for as test g levels are considered.

However we opted to perform new tests for the following reasons:

a) Documentation of test log was insufficient.

b) Funcional testing of Instruments not adequately explained.

c) Single axis single frequency testing was done.

The new tests will be done to the test requirements as attached as soon as the test specimen is procured.

For the above reasons we strongly feel that the device is qualified for the interim operation.

LA SALLE NUCLEAR STATIONS
UNIT 1 & 2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: Sensor & Converter # 194C927

EQUIPMENT NO: D18-N009A/D, D18-N015A/D

LOCATION: Reactor Building RB-2 El. 790' Locally Mounted
RB-2 El.790' Locally Mounted on Duct

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Seismic Test (See page 2)

QUALIFICATION DOCUMENT REFERENCES:

1. GE # 225A6967 dated 11-30-70 Rev.0
2. GE # 225A6607 dated 7-21-70 Rev.0
3. GE # 225A5766 dated 1-05-78 Rev.7
4.
5.
6.
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION SUMMARY

SEISMIC QUALIFICATION METHOD:

a) Resonance Search Test

Single axis

Freq. range 5-33 Hz

Duration - 7 minute sweep

Resonant freq. - none.

b) High Level Sweep Test

Input 'g' = h_1= h_2= V = 1.5g

c) Max. endurance 'g' level at 33 Hz = 15 g.

Qualification Summary of Equipment

I. Plant Name: LASALLE COUNTY 1&2 Type:

1. Utility: CECO PWR ____
2. NSSS: GE BWR X
3. A-E: S&L

II. Component Name: Sensor & Converter # 194C927

1. Model Number: None Quantity: 8
2. Vendor: GE
3. If the component is a cabinet or panel, name and model No. of the devices included: ____
4. Physical Description a. Appearance: Instrumentation
   b. Dimensions: 10½H x 2¾W x 3⅛"D
   c. Weight: ____
5. Location: Building: Reactor Building RB-2
   Elevation: El.760'
6. Field Mounting Conditions [ ] Bolt (No.___, Size___)
   [ ] Weld (Length___)
   [ ] ____
   See attached sketch
7. Natural Frequencies in Each Direction: ____
   h1: ____ h2: ____ V: ____
8. a. Functional Description: Used in connection with Indicating Trip Unit (See attached Env.Qual.Table)
   b. Is the equipment required for [ ]Hot Standby [ ]Cold Shutdown [ ]Both
9. Pertinent Reference Design Specifications: ____

Reference: CQD File No. CQD 000263

SARGENT & LUNDY ENGINEERS

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

Comments: _____

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by GE Report # 225A6607 Rev.0
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of _____

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

3. Required Acceleration in Each Direction:

h1 = > 1.2g h2 = > 1.2g V = > 1.2g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [ ] Multi-Frequency

2. [ ] Single Axis [ ] Multi-Axis

3. Frequency Range: 5-33 Hz

4. TRS enveloping RRS using Multi-Frequency Test[ ] Yes (Attach TRS graphs) [ ] No NA

5. g-level Test at h1 = 1.5g's h2 = 1.5 g's V = 1.5 g's

6. Laboratory Mounting: (See attached sketch)

1. [ ] Bolt (No.___, Size____) [ ] Weld (Length____)[ ] _____

7. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results)
Resonance Search Test from 5-33 Hz. Resonant frequency is none.
Malfunction limit test up to 15 g's without any malfunction.

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

Complete: N.A.

1. Description of Test including Results: _____

2. Method of Analysis:

[ ] Static Analysis [ ]Equivalent Static Analysis [ ]Dynamic Analysis

[ ] Response Spectrum [ ]Time-History

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. Damping: _____

6. Support Considerations in the model: _____

7. Critical Structural Elements:

A.

Identification	Location	Governing Response Combination	Seismic Stress	Total Stress	Allowable

B.

Max. Deflection	Location	Effect Upon Functional Operability

INSTRUMENT IDENTIFICATION & QUALIFICATION REQUIREMENTS

ID No.: 194X927

Qualification 'g' levels		
h_1 = 1.5	h_2 = 1.5	V = 1.5

Name: Sensor and Converter

Manufacturer: GE/NID

Model No.: None

Instrument Numbers	Location	Required 'g' levels			Equipment Class.	Remarks
		h_1	h_2	v		
D18-N009A/D	Region RB-2 El.790' Locally mounted	> 1.2	> 1.2	> 1.2	A	
D18-N015A/D	Region RB-2 El.790' Locally mounted on duct	> 1.2	> 1.2	> 1.2	A	

A - Active P - Passive 1E - Class 1E

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Project Zimmer/La Salle SQRT Requalification Program File No.
Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company
Client Cincinnati Gas and Electric Company/Commonwealth Edison Company

TABLE I

INSTRUMENT DATA

INSTRUMENT NAME: Sensor and Converter

MODEL NO.: 194X927

* SERIAL OR ID. NO.:

MANUFACTURER: General Electric

SPECIAL FEATURES IF ANY: None

FUNCTION: Monitor reactor building vent and fuel pool area radiation and provide input signal to indicator and trip units.

DIMENSIONS: 10½"H X 2 3/4"W X 3 1/8"D

* WEIGHT:

REQUIRED RANGE: 0.01 mR/hr. to 100 mR/hr.

REQUIRED ACCURACY: ± 9.5%

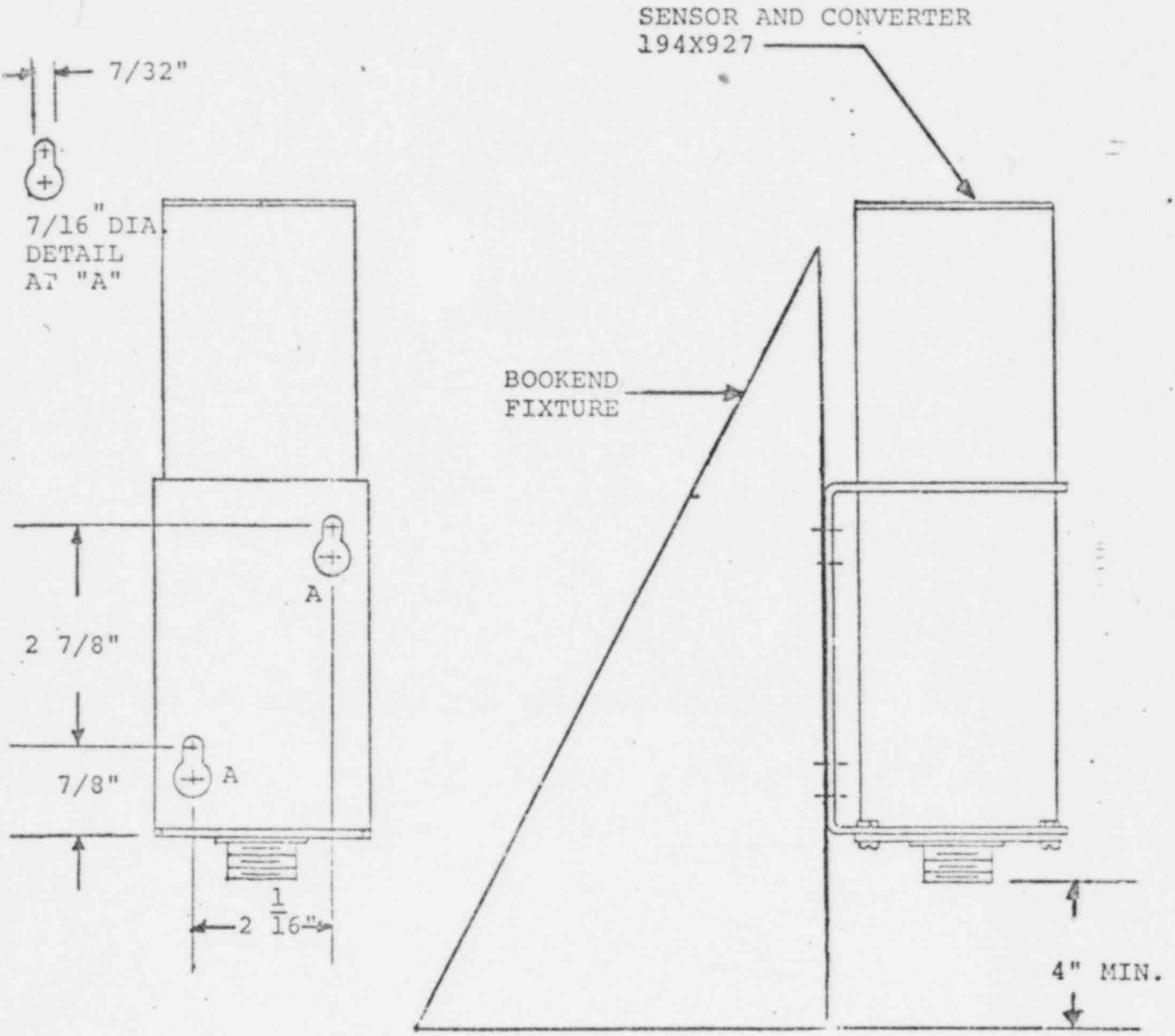
** MONITORING REQUIREMENTS: Input frequency

MOUNTING DETAILS: See Figure 2

* To be completed by test laboratory
** Output monitoring at indicator and trip unit

Revision	0					Page ___
Prepared By/Date	[illegible]					of ___
Checked By/Date	SA 8/28/81					

Project Zimmer/La Salle SQRT Requalification Program File No.
Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company
Client Cincinnati Gas and Electric Company/Commonwealth Edison Company



MOUNTING FOR GENERAL ELECTRIC SENSOR
AND CONVERTER 194X927

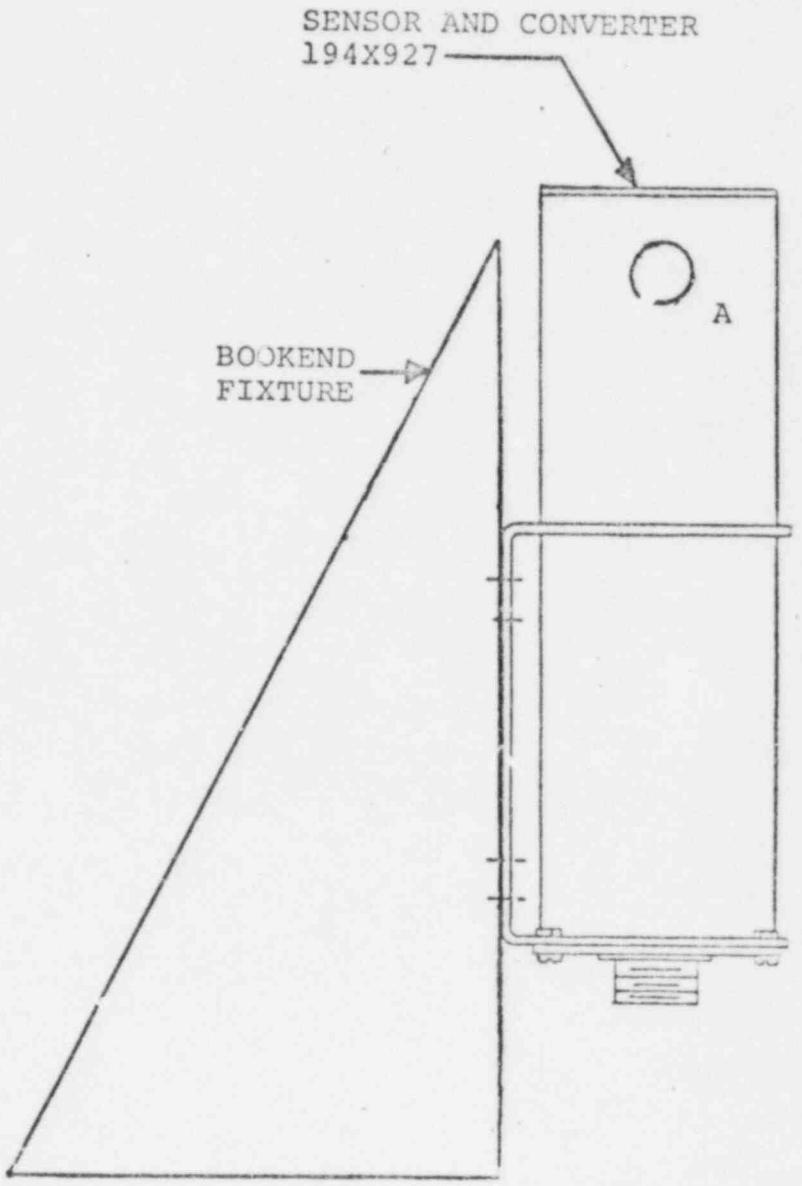
FIGURE 2

Revision	0					Page
Prepared By/Date	[illegible] 3/27/87					of

Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas and Electric Company/Commonwealth Edison Company

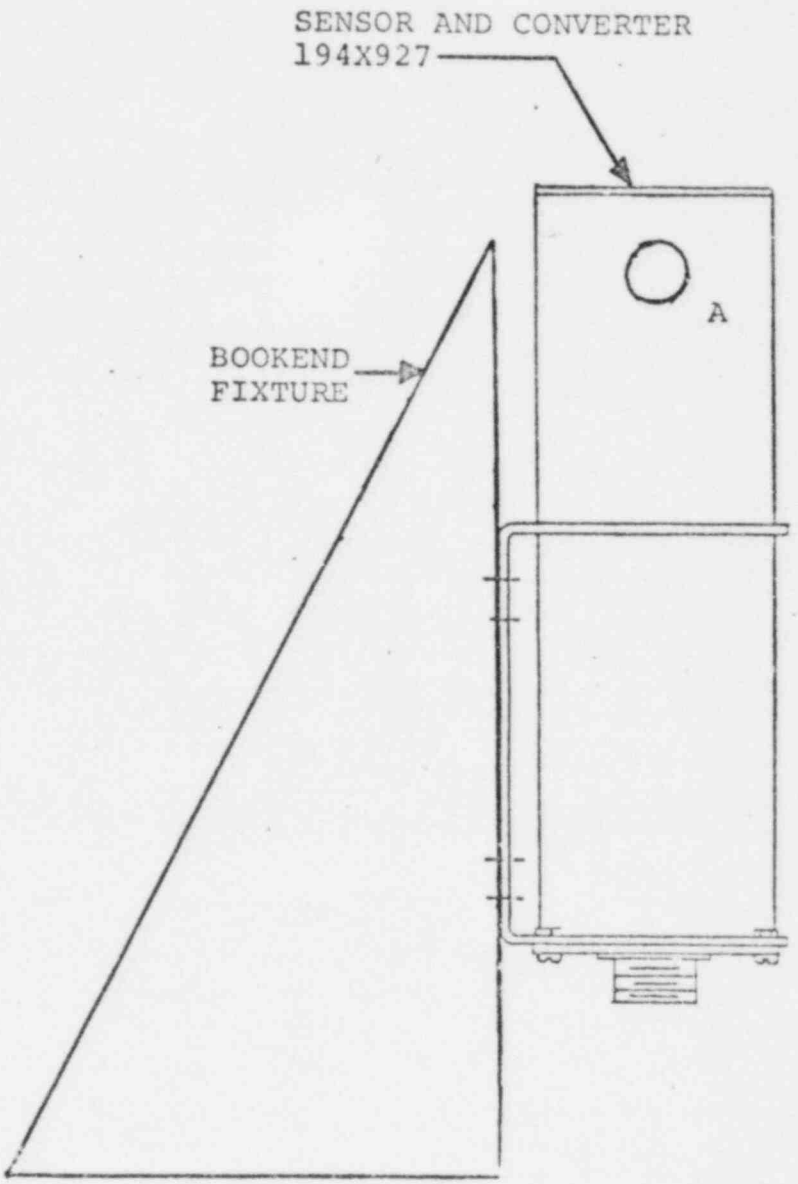
Client Cincinnati Gas and Electric Company/Commonwealth Edison Company



ACCELEROMETER LOCATION FOR GENERAL ELECTRIC
SENSOR AND CONVERTER 194X927

FIGURE 4

Revision	0					Page ___
Prepared By/Date	[illegible] 5/25/81					of ___
Checked By/Date	SB 5/25/81					



ACCELEROMETER LOCATION FOR GENERAL ELECTRIC
SENSOR AND CONVERTER 194X927

FIGURE 4

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Checked By/Date	EB 8/25/81					

SENSOR AND CONVERTER D18-N009

ENVIRONMENTAL QUALIFICATION TABLE D18-1

1. DESCRIPTION
The instrument is a General Electric Sensor and Converter, Dwg. No. 194X927. The detector provides an output signal to monitor the reactor core during the heating operation.

2. SAFETY FUNCTION
The sensor and converter units sense gamma radiation and transmit radiation level signals to the indicator and trip units in the control room, which provide monitoring of the reactor building ventilation exhaust and automatically isolate the reactor building ventilation system on high level trips.

3. SAFETY DESIGN PARAMETERS

The sensor and converter must have a sensitivity of .01-100 MR/HR (G11) or $1\text{-}10^3$ R/N (G17) with an accuracy of $\pm$ 7.5%.

Worst Case: 212°F - 100% R/H

A. Maximum Pressure: 760 Torr

B. Maximum Temperature: 320°F

C. Operating Voltage: 100 Vdc

4. FSAR ENVIRONMENTAL CONDITIONS
The equipment is located in the Reactor Building. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
0-6 hr	212°F	7.0 in. WC	All steam	Operating 1×10^{-3} R/hr
6-12 hr	150°F	7.0 in. WC	100%	Integrated 1.7×10^5 rad
12 hr to 100 days	150°F	0 in. WC	90%	

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
0-6 hr	212°F	7.0 in. WC	All steam	Operating 1×10^{-3} R/hr
6-12 hr	150°F	7.0 in. WC	100%	Integrated 1.7×10^5 rad
12 hr to 100 days	150°F	0 in. WC	90%	

6. QUALIFICATION METHOD
Type Test
The temperature of the tenny chamber was elevated and maintained at 100°C. The sensor converter was 1) placed in the elevated temperature environment of the chanber for six continuous hours and 2) subjected to a cesium 137 radio nuclide source placed near the end of the aluminum housing containing the sensor converter GM tube to provide approximately a 50% upgrade reading.

ENVIRONMENTAL QUALIFICATION TABLE D18-1

The sensor converter output readings were recorded before, during, and after the elevated temperature test with a ruskrak recorder.

7. RESULTS

Tests demonstrate that the sensor and converter has the required accuracy, sensitivity, and will perform under the worst environmental conditions and is therefore qualified for its Class 1 application. The radiation and pressure variations in the reactor building will have an insignificant effect on the sensor converter.

SENSOR AND CONVERTER D18-N015

ENVIRONMENTAL QUALIFICATION TABLE D18-1

1. DESCRIPTION
The instrument is a General Electric Sensor and Converter, Dwg. No. 194X927. The detector provides an output signal to monitor the reactor core during the heating operation.

2. SAFETY FUNCTION
The sensor and converter units sense gamma radiation and transmit radiation level signals to the indicator and trip units in the control room, which provide monitoring of the reactor building ventilation exhaust and automatically isolate the reactor building ventilation system on high level trips.

3. SAFETY DESIGN PARAMETERS

The sensor and converter must have a sensitivity of .01-100 MR/HR (G11) or 1-10^3 R/N (G17) with an accuracy of $\pm$ 7.5%.

Worst Case: 212°F - 100% R/H

A. Maximum Pressure: 760 Torr

B. Maximum Temperature: 320°F

C. Operating Voltage: 100 Vdc

4. FSAR ENVIRONMENTAL CONDITIONS
The equipment is located in the Reactor Building. The FSAR environmental conditions are tabulated below:

Duration	Temperature	Pressure	Humidity	Radiation
0-6 hr	212°F	7.0 in. WC	All steam	Operating $1x10^{-3}$ R/hr
6-12 hr	150°F	7.0 in. WC	100%	Integrated $1.7x10^5$ rad
12 hr to 100 days	150°F	0 in. WC	90%	

5. ENVIRONMENTAL QUALIFICATION ENVELOPE (Spec. 22A3008, Rev. 5)

Duration	Temperature	Pressure	Humidity	Radiation
0-6 hr	212°F	7.0 in. WC	All steam	Operating $1x10^{-3}$ R/hr
6-12 hr	150°F	7.0 in. WC	100%	Integrated $1.7x10^5$ rad
12 hr to 100 days	150°F	0 in. WC	90%	

6. QUALIFICATION METHOD
Type Test
The temperature of the tenny chamber was elevated and maintained at 100°C. The sensor converter was 1) placed in the elevated temperature environment of the chanber for six continuous hours and 2) subjected to a cesium 137 radio nuclide source placed near the end of the aluminum housing containing the sensor converter GM tube to provide approximately a 50% upgrade reading.

ENVIRONMENTAL QUALIFICATION TABLE D18-1

The sensor converter output readings were recorded before, during, and after the elevated temperature test with a ruskrak recorder.

7. RESULTS

Tests demonstrate that the sensor and converter has the required accuracy, sensitivity, and will perform under the worst environmental conditions and is therefore qualified for its Class 1 application. The radiation and pressure variations in the reactor building will have an insignificant effect on the sensor converter.

accordance with paragraphs 5.3.1 and 5.3.3. Failure is indicated if the test specimen does not meet the operational requirements after vibration in accordance with paragraph 4.2. More than 20 milliseconds chatter shall be considered a failure. Any indication of chatter shall be brought to the attention of NUTECH for further analysis. All failures shall be noted in the test report.

5.0 TEST REQUIREMENTS

5.1 Exploratory Testing

Exploratory testing shall be performed to determine the test specimens' resonant frequencies, if any, within a specified frequency range. A recommended procedure for this testing is provided below. Fast Fourier Transform (FFT) or other testing methods will be acceptable provided they yield the same information about the dynamic characteristics of the test specimens.

5.1.1 Sine Sweep Recommended Test Parameters

Test Method: Low Level Sine Sweep
Input Motion: Single axis
Number of Tests: 3 with one in each Orthogonal Axis
Frequency Range: 1 to 100 Hz
Sweep Rate: Less than 2 Octaves per minute
Input g Level: 0.1 g Peak

5.1.2 Exploratory Testing Results

The acceleration response in g's and transfer function for each of the accelerometer location shall be plotted as a function of frequency.

5.2 Fatigue Testing (Sensor and Converter Only)

Fatigue testing shall be performed in order to account for any possible long term effects the SRV and LOCA event may have upon the test specimen. This test phase shall be conducted in two parts, first, SRV fatigue testing and second SRV + LOCA fatigue testing. The RRS to be used are those generated during previous vibration testing.

5.2.1 SRV Fatigue Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Number of Tests: 1 in each test specimen orientation
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Frequency Range: 1 to 200 Hz
Duration of Individual Time History: Less than 20 sec
Total Test Duration: 400 sec each orientation
RRS Damping: 2%
Required Response Spectra: Figures 10 and 11

5.2.2 SRV Fatigue Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% at 1/6 octave intervals. For comparison the table TRS and RRS shall be plotted on the same sheet. Power Spectral Density (PSD) plots shall be developed from the table accelerometer time histories for each test specimen orientation.

All accelerometer signals shall be recorded on analog magnetic tape.

5.2.3 SRV + LOCA Fatigue Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Number of Tests: 1 in each test specimen orientation
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Frequency Range: 1 to 200 Hz
Duration of Individual Time History: Less than 20 sec
Total Test Duration: 200 sec each orientation

RRS Damping: 2%
Response Spectra: Figures 12 and 13

5.2.4 SRV + LOCA Fatigue Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% at 1/6 octave intervals. For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed from the table accelerometer time histories for each test specimen orientation. All accelerometer signals shall be recorded on analog magnetic tape.

5.3 Proof Testing

The adequacy of the test specimens for upset/OBE and emergency/DBE plant conditions will be demonstrated by the proof testing phase. This phase will be divided into two parts, testing for upset/OBE plant condition and testing for emergency/DBE plant condition, and shall consider the maximum combined dynamic loads the test specimens may experience under each condition. The RRS to be used are those generated during previous vibration testing and data reduction. The indicator and trip unit will be tested to OBE and DBE as a control room item. The sensor and converter will be tested to earthquake plus hydrodynamic loads in upset and emergency as a local item.

5.3.1 Upset/OBE Condition Testing

Test Method: Random Motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelop RRS
Test Specimen Operation: As specified below
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Number of Tests: 10, 5 in each test specimer orientation

5.3.1.1 Sensor and Converter-Upset

(1) Pre-Vibration

a) Place the power supply POWER SUPPLY OFF-ON switch to the OFF position.

b) Connect the sensor and converter, power supply, indicator and trip unit and monitoring circuit in accordance with Figure 8.

c) Place the TRIP TEST-ZERO-OPERATE switch on the indicator and trip unit to the OPERATE position.

d) Place switch S1 to the CLOSED position.

e) Place the power supply POWER SUPPLY OFF-ON switch to the ON position.

f) Verify that the reading on the indicator and trip unit meter is approximately 20 percent of the first decade.

g) Depress the RESET push-button on the indicator and trip unit and verify that the LOW and HIGH indicating lights extinguish.

h) Verify that there is voltage across Resistor R1 (Relay K2 contacts 6 and 10 closed) and no voltage across Resistor R2 (Relay K1 contacts 3 and 11 opened).

(2) During Vibration

Maintain the above conditions throughout the 5 tests in each test specimen orientation.

(3) Post Vibration

a) Place the power supply, POWER SUPPLY OFF-ON switch to the OFF position.

b) Disconnect the monitoring circuit connected in step (1) b).

5.3.1.2 Indicator and Trip Unit - OBE (Normal Condition)

(1) Pre-Vibration

a) Place the power supply, POWER SUPPLY OFF-ON switch to the OFF position.

b) Remove the sensor and converter from its case.

c) Connect the sensor and converter, power supply, indicator and trip unit and test equipment in accordance with Figure 9.

d) Connect indicator and trip unit receptacle J1 pins 8 and 19 to individual monitoring circuits in accordance with Figure 9.

e) Place the TRIP TEST-ZERO-OPERATE switch on the indicator and trip unit to the OPERATE position.

f) Place switch S1 to the OPEN position.

g) Place the power supply POWER SUPPLY OFF-ON switch to the ON position.

h) Turn on the electronic counter and pulse generator and adjust the pulse generator output for

negative pulses of 15 volts peak amplitude.

i) Set the pulse generator pulse duration so that the pulse length provides a 50 percent duty cycle.

j) Adjust the pulse generator output frequency control for a reading of approximately 20 percent of the first decade on the indicator and trip unit meter.

k) Depress the RESET pushbutton on the indicator and trip unit and verify that the LOW and HIGH indicating lights extinguish.

l) Verify that there is voltage across Resistor R1 (Relay K2 contacts 6 and 10 closed) and no voltage across Resistor R2 (Relay K1 contacts 3 and 11 opened).

(2) During Vibration

Maintain the above conditions for 1 vibration test in each test specimen orientation.

5.3.1.3 Indicator and Trip Unit-OBE (Downscale Trip)

(1) Pre-Vibration

a) If testing has been stopped repeat steps 5.3.1.2 (1) a) through l) as required to achieve normal condition.

(2) During Vibration

a) Decrease the pulse generator output frequency to the recorded value (± 10%) in paragraph 4.2.2.3 step 13 and verify that there is voltage across Resistor R2 (Relay K1 contacts 3 and 11 closed) and the LOW indicating light illuminates.

b) Perform this test once in each test specimen orientation.

5.3.1.4 Indicator and Trip Unit-OBE (Downscale Steady State Condition)

(1) Pre-Vibration

a) If testing has been stopped repeat steps 5.3.1.2 (1) a) through 1) as required to achieve normal condition.

b) Maintain the conditions in step 5.3.1.3(2) a) or perform if required.

(2) During Vibration

Maintain the above conditions for 1 vibration test in each test specimen orientation.

5.3.1.5 Indicator and Trip Unit-OBE (Upscale Trip)

(1) Pre-Vibration

a) Repeat steps 5.3.1.2 (1) a) through 1) as required to achieve normal condition

(2) During Vibration

a) Increase the pulse generator output frequency to

the recorded value (± 10%) in paragraph 4.2.2.3 step 13 and verify that there is no voltage across Resistor R1 (Relay K2 contacts 6 and 10 opened) and the HIGH indicating light illuminates.

b) Perform this test once in each test specimen orientation.

5.3.1.6 Indicator and Trip Unit-OBE (Upscale Steady State Condition)

(1) Pre-Vibration

a) If testing has been stopped repeat steps 5.3.1.2 (1) a) through 1) as required to achieve normal condition.

b) Maintain the conditions in step 5.3.1.5(2) a) or perform if required.

(2) During Vibration

Maintain the above conditions for 1 vibration test in each test specimen orientation.

Monitoring Requirements: Indicator and trip unit output voltage for the sensor and converter test and indicator and trip unit contact position, chatter detection and output voltage for the indicator and trip unit test.
Frequency Range: 1-200 Hz
Test Duration: 30 sec per test
RRS Damping: 2%
Required Response Spectra: Figures 14 and 15 (OBE plus SRV plus chugging or LOCA) for the sensor and converter and Figures 16 and 17 (OBE) for the indicator and trip unit.

5.3.2 Upset/OBE Condition Testing Results

TRS for the indicator and trip unit shall be plotted for table accelerometer locations at a damping value of 2% (2 1/2% is acceptable) at 1/6 octave intervals. The TRS for the sensor and converter shall be plotted at a damping value of 1% at 1/6 octave intervals. For comparison, the table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed for the first test in each orientation. All accelerometer signals shall be recorded on analog magnetic tape.

5.3.3 Emergency/LBE Condition Testing

Test Method: Random motion
Input Motion: Biaxial
Excitation: 2 independent random signals
Level: Table TRS to envelope RRS
Test Specimen Operation: As Specified below
Test Specimen Orientations: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Number of Tests: 1 in each test specimen orientation

5.3.3.1 Sensor and Converter

Perform test in accordance with paragraph 5.3.1.1.

5.3.3.2 Indicator and Trip Unit

Perform test in accordance with paragraph 5.3.1.5.

Monitoring Requirements: Indicator and trip unit output voltage for the sensor and converter test and indicator and trip unit contact position and chatter detection and output voltage for the indicator and trip unit test
Frequency Range: 1 to 200 Hz
Test Duration: 30 sec. per test
RRS Damping: 2%
Required Response Spectra: Figures 18 and 19 (DBE plus SRV plus chugging or LOCA) for the sensor and converter

and Figures 20 and 21 (DBE) for the indicator and trip unit

Operational Test: Checkout Test Specimen after emergency condition tests in accordance with paragraph 4.2.2.1

5.3.4 Emergency/DBE Condition Testing Results

TRS shall be plotted for table accelerometer locations at a damping value of 2% (2 1/2% is acceptable) at 1/6 octave intervals. For comparison, the Table TRS and RRS shall be plotted on the same sheet. PSD plots shall be developed from the table accelerometer time histories for each test specimens orientation and voltage relay operation. All accelerometer signals shall be recorded on analog magnetic tape. Results of operational test checkout after excitation shall be reported and any significant deviation from the baseline shall be noted in the final report.

6.0 WITNESSING OF TESTS

6.1 All tests shall be subject to observation by NUTECH or their authorized representatives.

6.2 All tests shall also be subject to observation by Cincinnati Gas and Electric and Commonwealth Edison Companies or their authorized representatives.

7.0 TEST REPORT REQUIREMENTS

The test laboratory shall supply ten certified copies of a test report which satisfies the requirements of IEEE 344 - 1975. This report wil describe the equipment, calibration, and test procedures, including photographs of the test set up, and provide all results and conclusions from the test. Operational checkout and inspections shall be described and all results summarized and any deficiencies and/or repairs noted. Critical data to be included in this report are as follows:

7.1 Inspection and operational test results reports, verifying adjustments and recording values, also noting any significant deficiencies and repairs to device. A description of test equipment and calibration information shall be included.

7.2 Test Specimens resonance search data

7.3 The test response spectra (TRS) plots obtained in 5.2.2, 5.2.4, 5.3.2 and 5.3.4. These TRS are to be computed for all accelerations recorded. For each of the two orientations for the test specimen, the TRS shall be computed for both horizontal and vertical table motions to verify that they envelop the corresponding RRS.

7.4 PSD plots obtained in 5.2.2, 5.2.4, 5.3.2 and 5.3.4.

7.5 A record of voltage and frequency readings, contact position, test specimen operation, and chatter shall be maintained in the test log.

7.6 A record of the number of test runs including level and duration shall be maintained in the test log.

7.7 A copy of the test log.

7.8 Completed Instrument Data Forms (a partially completed form have been provided as Tables 1 and 2 of this specification).

8.0 REFERENCES

8.1 IEEE 344- 1975: Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.

8.2 GEK32374D G.E. Operation and Maintenance Instructions (Area Radiation Monitor Sensor and Converter)

8.3 GEK27828G, G.E. Operation and Maintenance Instructions (Area Radiation Monitor Indicator and Trip Unit)

Client CECo/CINGRP		Prepared by Chongfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by [illegible]	Date 4/22/81
Proj. No. 6093-00/4130-15	Equip. No.	Approved by [illegible]	Date 4/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
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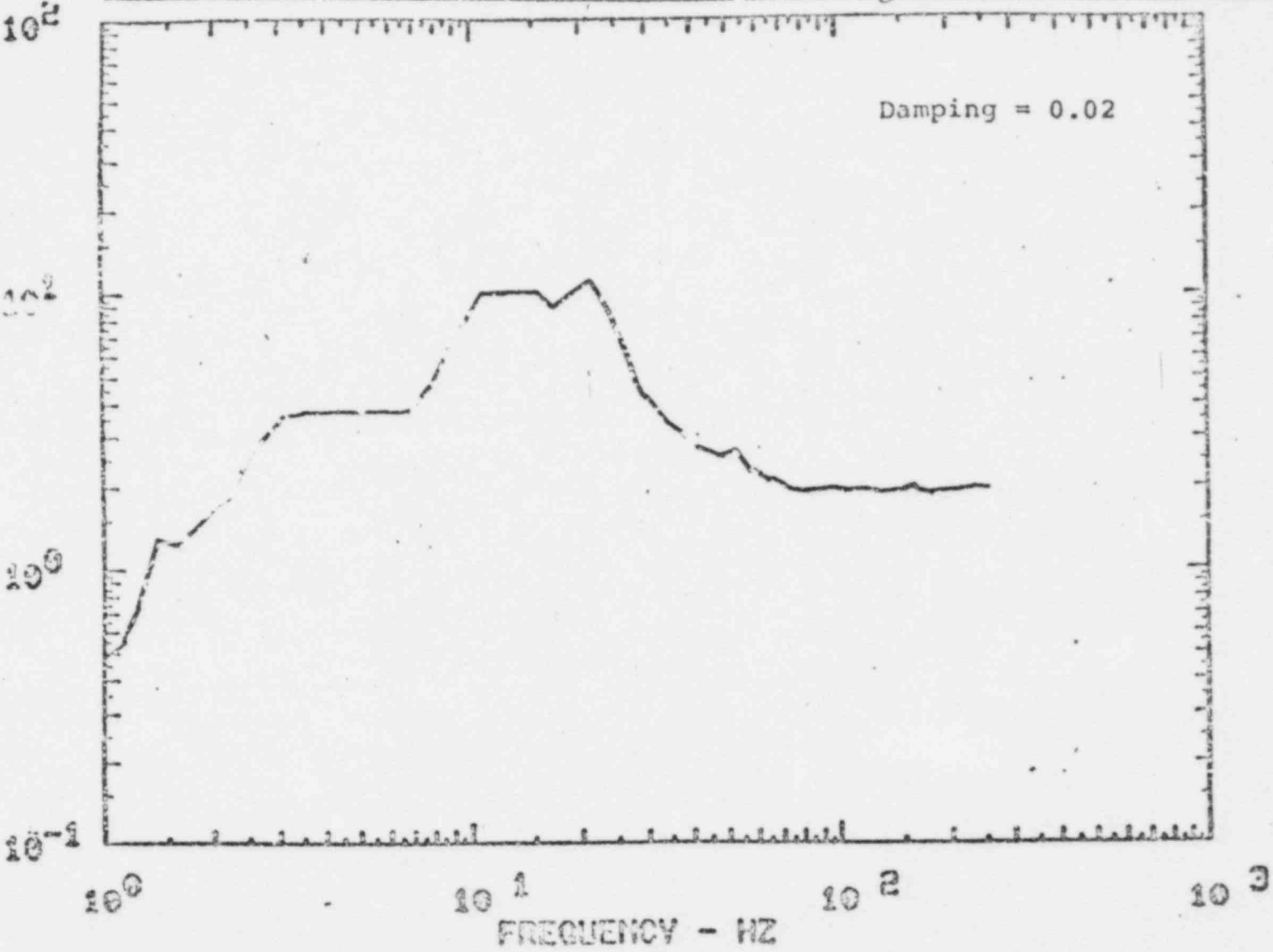

FIGURE 1.1

Required Response Spectrum for Instruments mounted on Local Panels
~~SRV-LOCA/UPSET~~/EMERGENCY VERTICAL/~~HORIZONTAL~~
UPPERBOUND ENVELOP OF FOLLOWING RSC: - EMSYZ6 6V 72"
EMSXZ1 5V 48"
EMSXZ2 6V 30"

Client CECo/CINGRP		Prepared by Chongfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohammad Ishaq	Date 4/22/81
Proj. No. 6093-00/4130-1	Equip. No.	Approved by Shanmugam	Date 4/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
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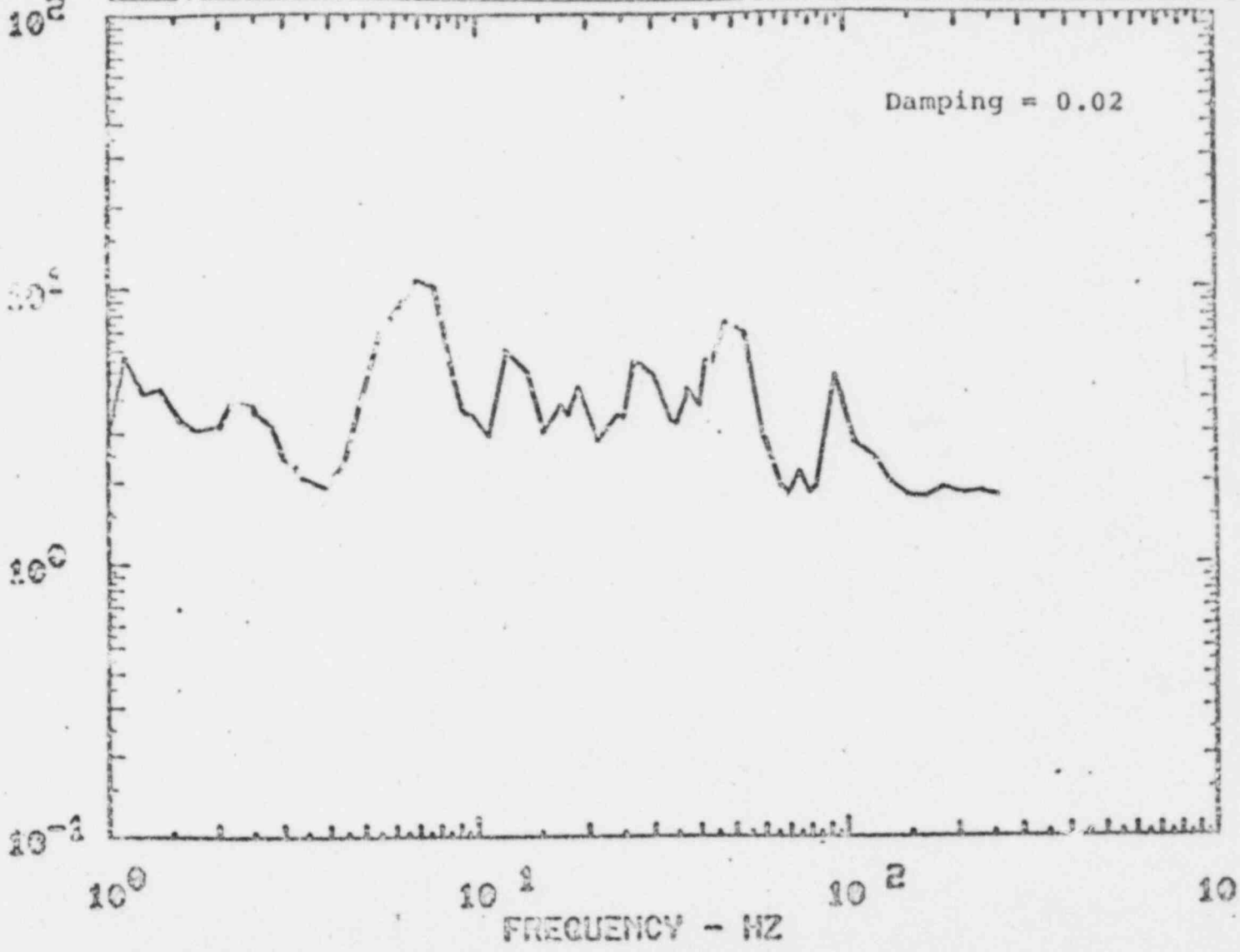

Required Response Spectrum for Instruments mounted on Local Panels
~~GRV LOC~~/~~URGBT~~/EMERGENCY ~~VERTICAL~~/HORIZONTAL
UPPERBOUND ENVELOP OF FOLLOWING RSC: - EMSXZ1 A6 72" EMSYZ1 A6 72"
EMSXZ2 A4 48" EMSYZ2 A6 48"
EMSXZ1 A5 30" EMSYZ1 A6 30"

FIGURE 10

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Client CECo/CINGRP		Prepared by Chongfang Lee	Date 5/22/81
Project LaSalle County/Zimmer		Reviewed by Mohammad Intal.	Date 5/22/81
Proj. No. 6093-00/4130-15	Equip. No.	Approved by [signature]	Date 11/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
Page 2 of 6

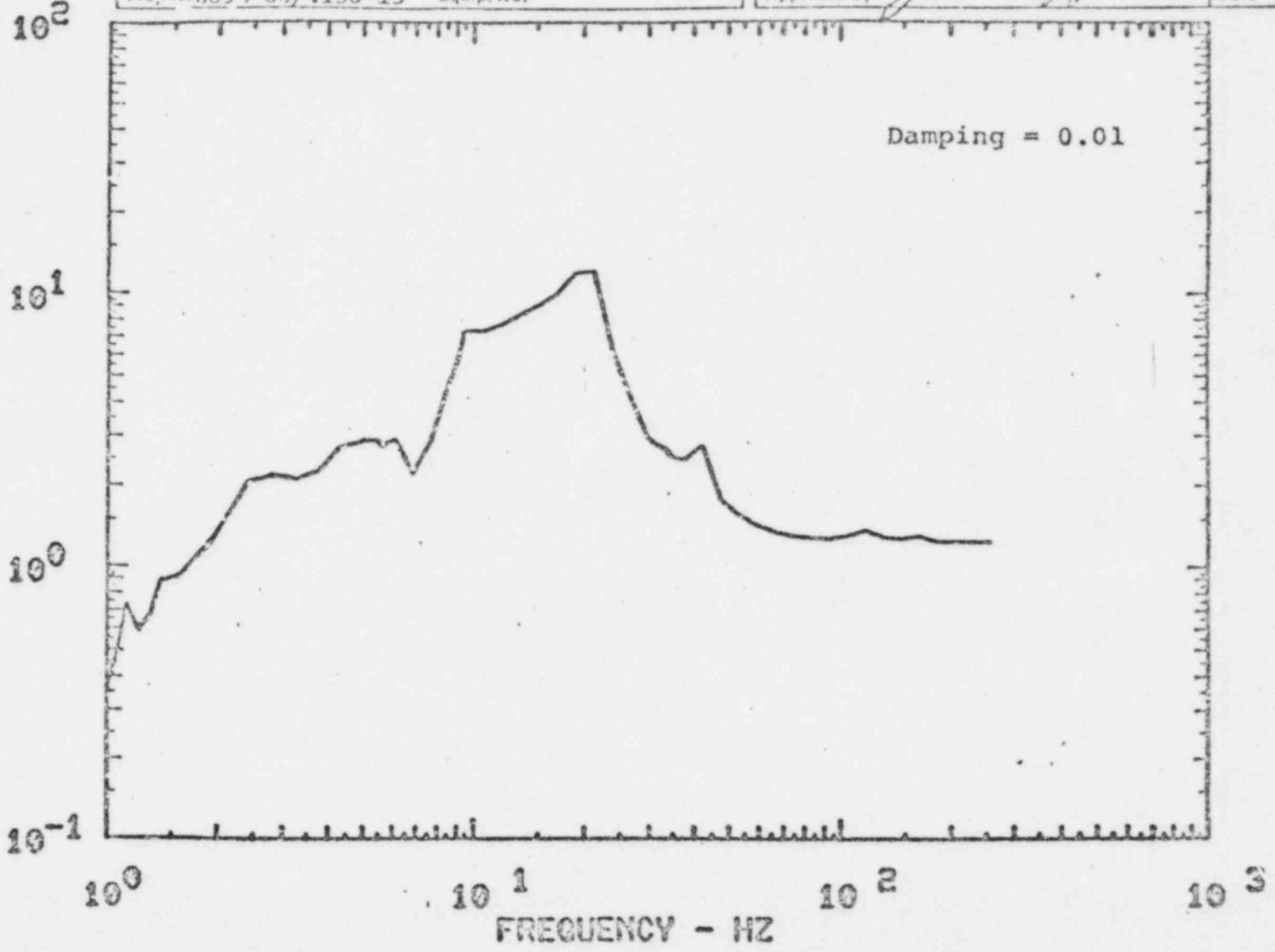

FIGURE 9

Required Response Spectrum for Instruments mounted on Local Panels

~~GRV-LOCN~~/UPSET/~~EMERGENCY~~ VERTICAL/~~HORIZONTAL~~

UPPERBOUND ENVELOP OF FOLLOWING RSC: - UPSXZ6 5V 30"
UPSXZ5 5V 48"

2X

2/5

Client CECo/CINGRP		Prepared by Chengfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohammad Gobad	Date 4/22/81
Proj. No. 6093-00/4130-15	Equip No.	Approved by J Kennappan	Date 4/22/81

Calc. No. EMD-030011
Rev: 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
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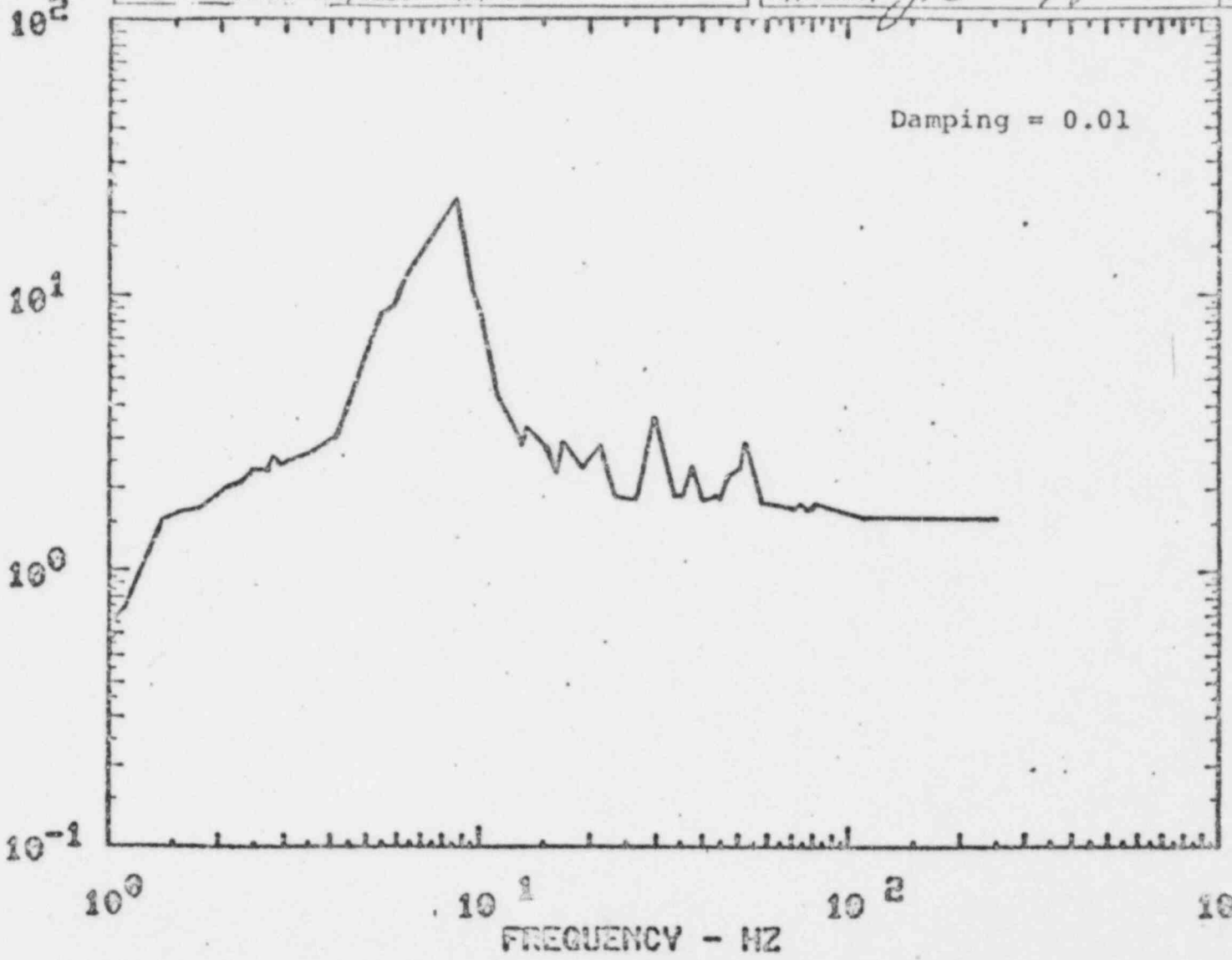

FIGURE 8

Required Response Spectrum for Instruments mounted on Local Panels
~~SRV-LOCAL~~/UPSET/~~EMERGENCY~~ ~~VERTICAL~~/HORIZONTAL
UPPERBOUND ENVELOP OF FOLLOWING RSC: - UPSXZ5 A6 72" UPSYZ5 A6 72"
UPSXZ6 A4 48" UPSYZ6 A4 48"
UPSXZ5 A6 30" UPSYZ5 A6 30"

Client CECo/CINGRP		Prepared by Chongfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohammad Gosal	Date 4/22/81
Proj. No. 6093-00/4130-15	Equip. No.	Approved by G Sivaraman	Date 4/22/81

Calc. No. EMD-030011
Rev. 00 Date: 4-22-81
Proj. No: 6093-00/4130-15
File No: EMD-030011
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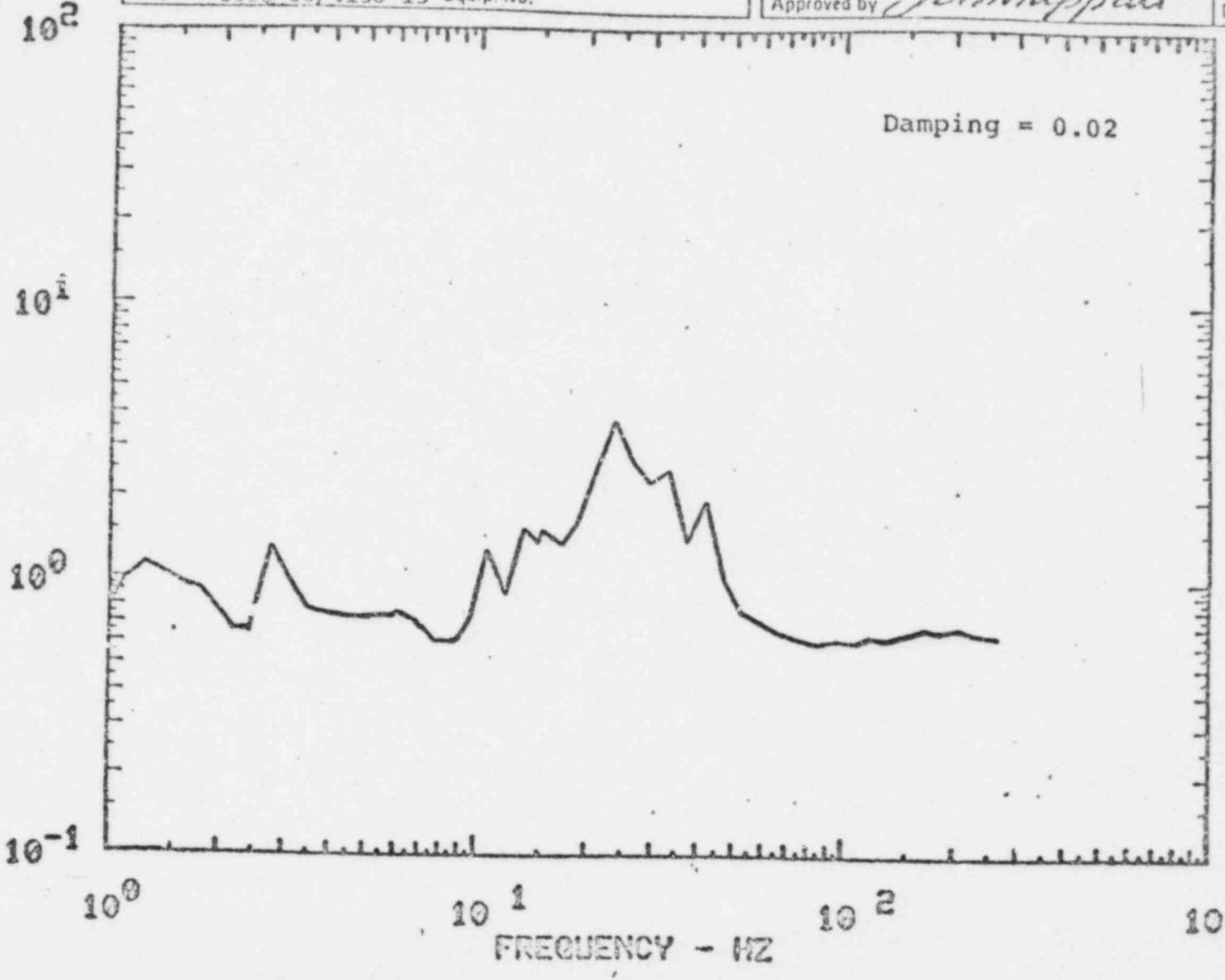

FIGURE 7

Required Response Spectrum for Instruments mounted on Local Panels
SRV-LOCA/~~UPSET/EMERGENCY~~ VERTICAL/~~HORIZONTAL~~
UPPERBOUND ENVELOP OF FOLLOWING RSC: - SVLYZ4 6V 72"
SVLXZ1 5V 48"
SVLXZ2 4V 30"

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Client CECo/CINGRP		Prepared by Chengfang Lee	Date 4/22/81
Project LaSalle County/Zimmer		Reviewed by Mohammad Ijaz	Date 4/22/81
Proj. No. 6093-00/4130-15	Equip. No.	Approved by Kimmappan	Date 4/22/81

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Proj. No. 6093-00/4130-15
File No: EMD-030011
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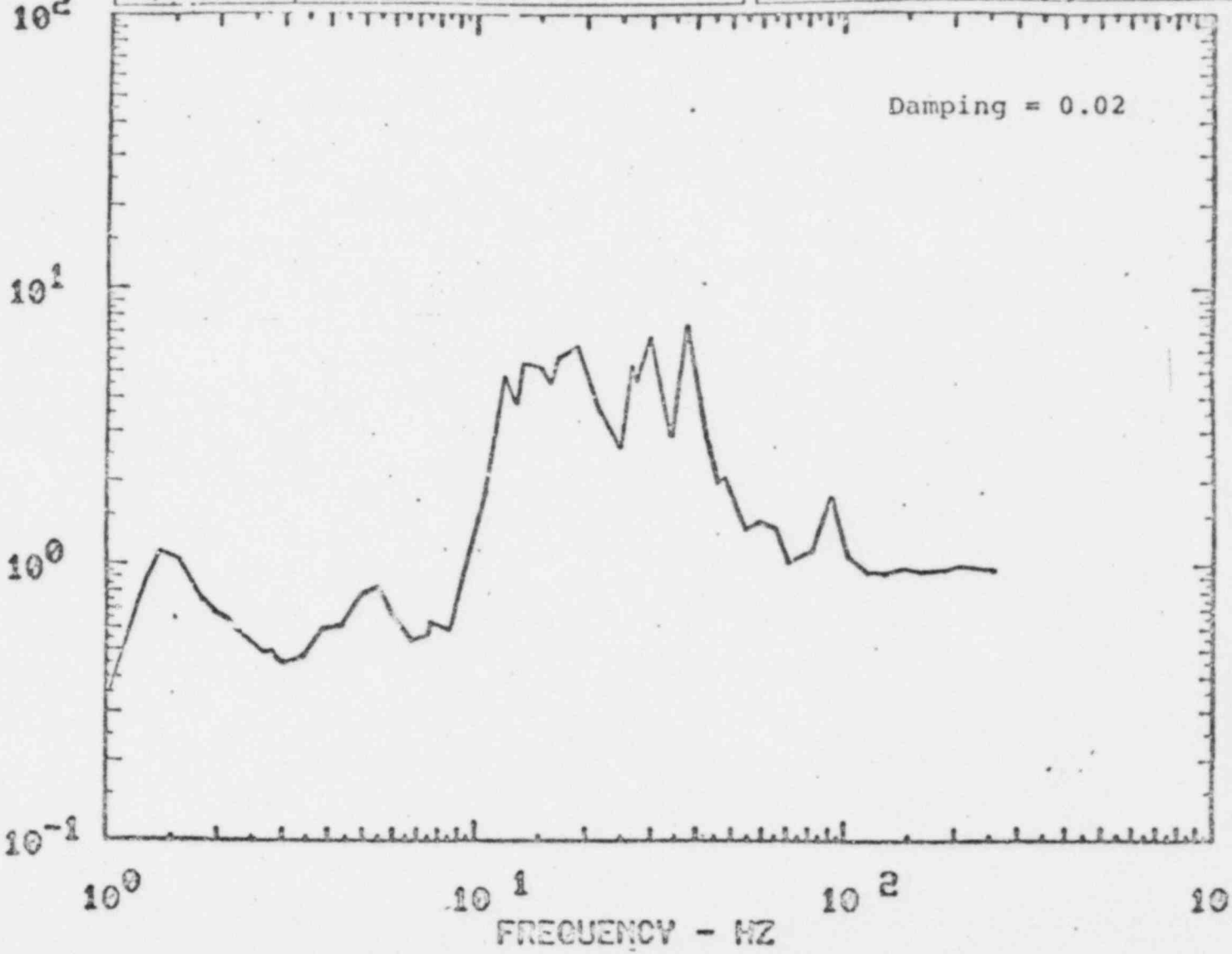

FIGURE 6

Required Response Spectrum for Instruments mounted on Local Panels
SRV-LOCA/~~UPSET/EMERGENCY~~ ~~VERTICAL~~/HORIZONTAL
UPPERBOUND ENVELOP OF FOLLOWING RSC: - SVLXZ2 A5 72" SVLYZ2 A4 72"
SVLXZ2 A4 48" SVLYZ2 A6 48"
SVLXZ1 A6 30" SVLYZ1 A6 30"

QUALIFICATION OF 2" AIR OPERATED GLOBE VALVE 'HAMMEL DAHL' # C11-F011

JUSTIFICATION FOR INTERIM OPERATION

An analysis was performed on this valve. Accel[illegible]n levels of 6 g's in each of the three directions were applied. Pressure load was also taken into account. Stresses at all critical sections were calculated and shown to be within allowable limits. The piping loads were also applied at inlet and outlet ends and stresses checked against allowable limits.

The following critical sections were checked:

Yoke Legs

Body / Bonnet Bolting

Body Flange

Crotch Region Area at Nozzles

Inlet and Outlet Region.

LA SALLE NUCLEAR STATIONS
UNIT 1&2

NSSS EQUIPMENT QUALIFICATION SUMMARY

EQUIPMENT NAME: 2" Air Operated Globe Valve #21A1750P002

EQUIPMENT NO: C11-F011

LOCATION: Reactor Building Elev. 740'

EQUIPMENT CLASSIFICATION: [X] ACTIVE [ ] PASSIVE

QUALIFICATION METHOD: Analysis

QUALIFICATION DOCUMENT REFERENCES:

1. Calculation by S&L
2. G.E. document #VPF 3234-2-5
3. G.E. document #VPF 3234-7-7
4. G.E. document #VPF 3162-112-1
5. G.E. document #VPF 3234-148-2
6. G.E. document #VPF 3234-13-6
7.
8.
9.
10.

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. Normal Operating Loads + OBE + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
2. Normal Operating Loads + SSE + CO_{LEVY-2} + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
3. Normal Operating Loads + SSE+Chugging + $[SRV_{ASY-TQ} + SRV_{ALL-TQ}]$ ENVELOP
4. Normal Operating Loads + SSE + AP
5. Normal Operating Loads + SSE + CO_{LEVY-1}

QUALIFICATION:

PREPARED BY: Date

REVIEWED BY: Date

APPROVED BY: Date

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION SUMMARY

Seismic Qualification Method:

Analysis has been done for these following elements:

1. yoke legs
2. yoke/Body bolting
3. Flange
4. Stem
5. Crotch area at nozzles

All elements were qualified to 6 g's seismic loading in all directions. A test is scheduled for the limit switch 'Hammel-Dahl' and the actuator along with the 2" Globe Valve, C11-F011

SRV Requalification Method:

Qualified to new loads, have taken hydrodynamic effect into account.

Nuclear Safety-Related
Project Nos. 4266/67

Qualification Summary of Equipment

I. Plant Name: LaSalle County 1&2

Type:

1. Utility: CECo — PWR ____
2. NSSS: G.E. — BWR X
3. A-E: S&L

II. Component Name: 2" Air Operated Globe Valve #21A1750P002

1. Model Number 502-JFC62EA29 — Quantity: 1
2. Vendor ITT Hammel Dahl
3. If the component is a cabinet or panel, name and model No. of the devices included: N/A
4. Physical Description a. Appearance 2" Globe Valve
   b. Dimensions 11-1/4" x 11-5/8" x 35-1/8"
   c. Weight 140 lbs.
5. Location: Building: Reactor
   Elevation: 740'
6. Field Mounting Conditions [ ] Bolt (No. ___, Size ___)
   [ ] Weld (Length ___)
   [X] Pipe mounted
7. Natural Frequencies in Each Direction: 76 Hz - min.
   h1: ____ h2: ____ V: ____
8. a. Functional Description: Close on scram because of loss of pilot air, thus isolating the water discharged from the CRD's during scram.
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
   [X] Both
9. Pertinent Reference Design Specifications: GE #21A1750

Reference: File No. ____

SARGENT & LUNDY ENGINEERS

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

Comments: _____

IV. Equipment Qualification Method: Test: _____

Analysis: X

Combination of Test and Analysis: _____

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

V. Vibration Input:

1. Loads considered 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[] Explosive only
4.[X] Other (Specify) Pressure 5.[ ] Combination of _____

2. Required Response Spectra (attach the graphs):

NA

3. Required Acceleration in Each Direction:

	h1 =	h2 =	V =
Qual. 'g' level	< 2 g / 6 g	< 2 g / 6 g	< 2 g / 6 g

VI. If Qualification by Test, then Complete: NA

1. [ ] Single Frequency [ ] Multi-Frequency

2. [ ] Single Axis [ ] Multi-Axis

3. Frequency Range: _____

4. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Attach TRS graphs) [ ] No

5. g-level Test at h1 = _____ h2 = _____ V = _____

6. Laboratory Mounting:

1. [ ] Bolt (No. ___, Size ____) [ ] Weld (Length ____) [ ] _____

7. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

8. Other tests performed (such as fragility test, including results) ____

_____

Reference: File No. _____

SARGENT & LUNDY ENGINEERS
CHICAGO

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

1. Description of Test including Results: _____

2. Method of Analysis:

[X] Static Analysis [ ] Equivalent Static Analysis [ ] Dynamic Analysis

[ ] Response Spectrum [ ] Time-History

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

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

4. [ ] Computer Codes: NA

Frequency Range and No. of modes considered: _____

[X] Hand Calculations

5. Damping: _____

6. Support Considerations in the model: flexible

7. Critical Structural Elements:

A.

Identification Location	Governing Response Combination	Seismic Total Stress	Stress Allowable
	Upset & Emergency		
Yoke legs	"	9955	17500
Body/Bonnet Bolting	"	1.282 in^2	1.322 in^2
Flange Longitudinal	"	32240	34950
" Radial	"	14993	"
" Tangential	"	11778	"
Nozzle Stress	"	24960	26250

B.

Max. Deflection	Location	Effect Upon Functional Operability
NA		

Reference;

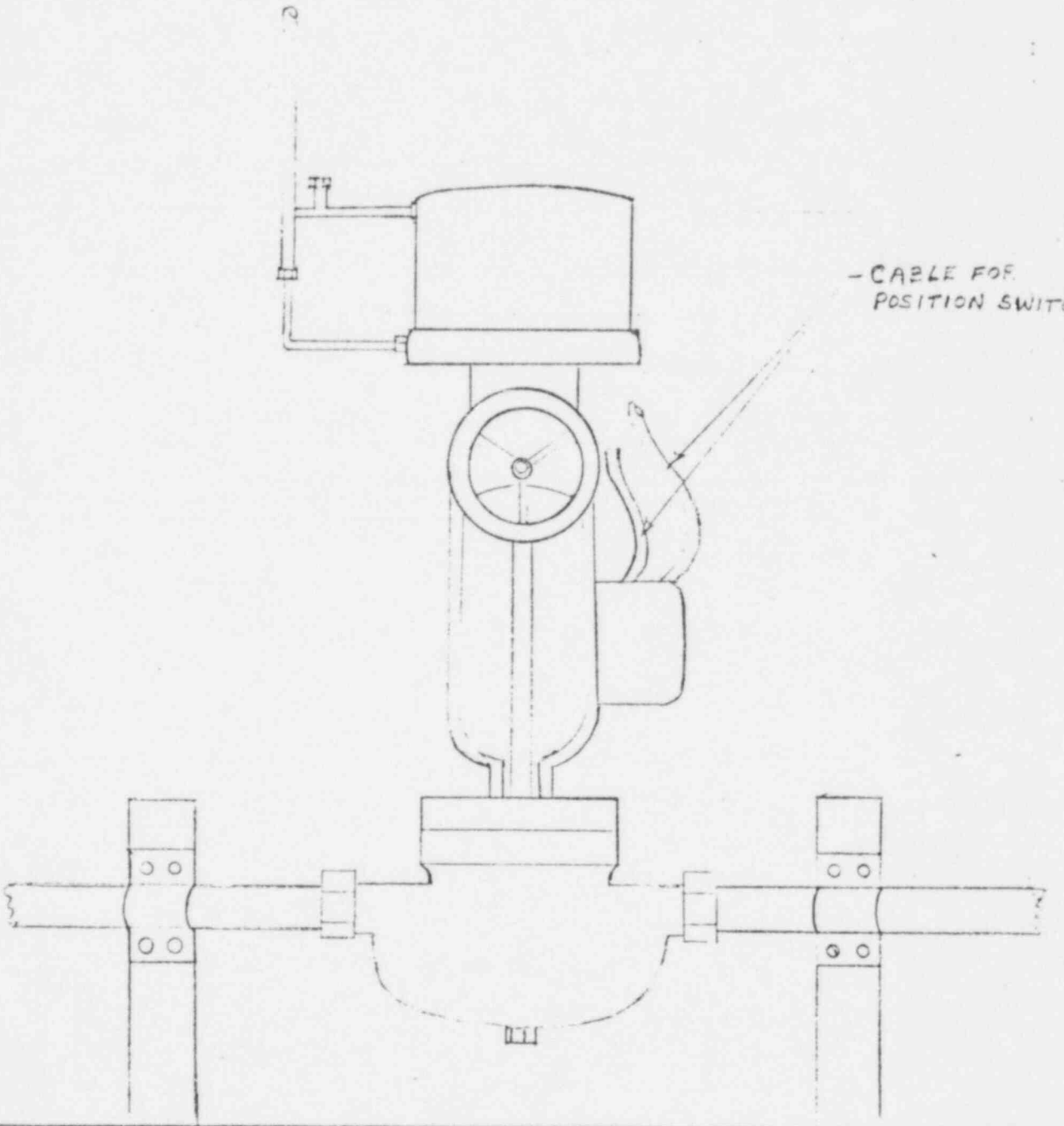
nutech

San Jose, California

Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas & Electric Company/Commonwealth Edison Company

Client Cincinnati Gas & Electric Company/Commonwealth Edison Company



TEST SPECIMEN MOUNTING
FIGURE 1

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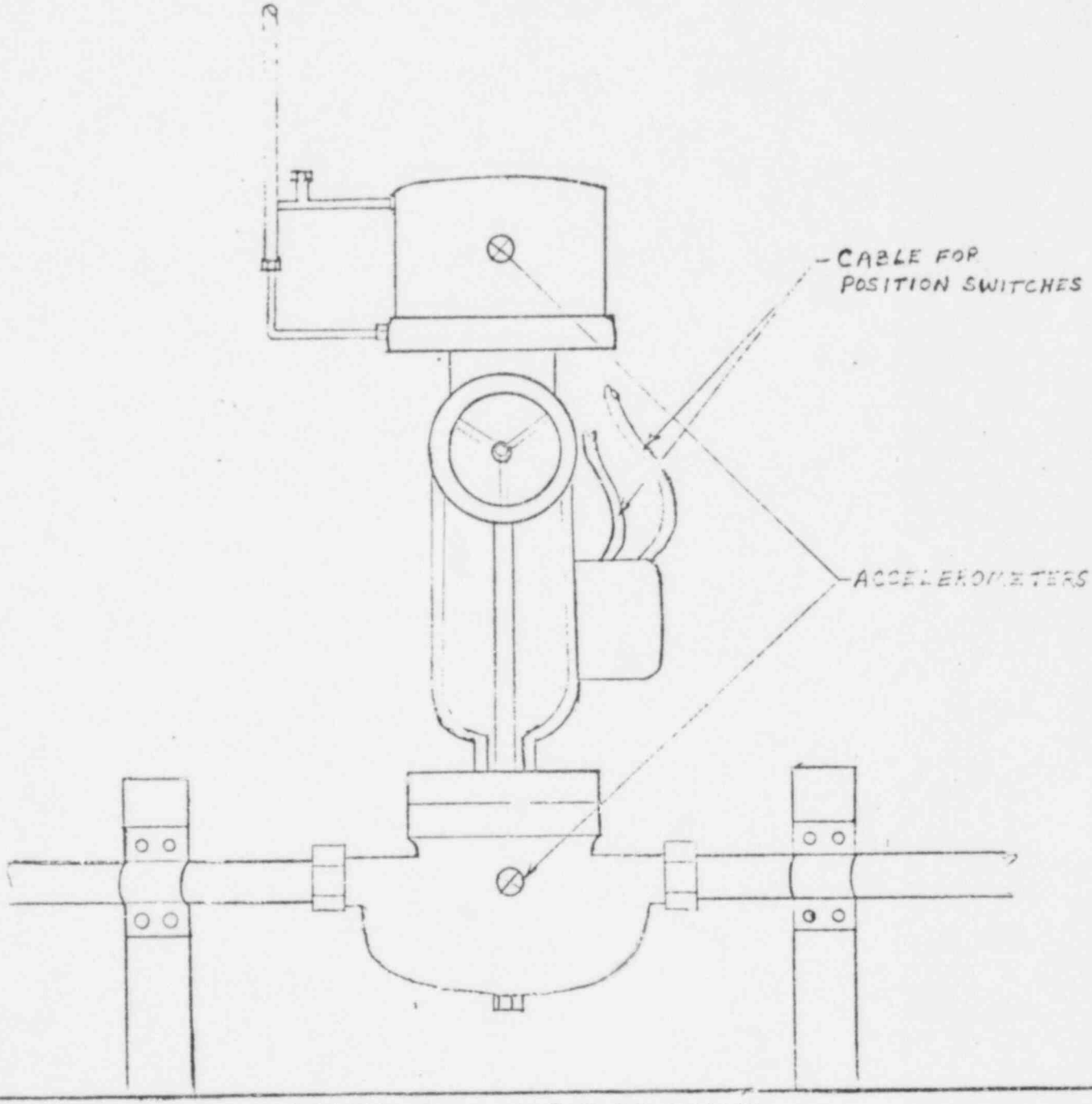
Prepared By/Date	DGH for S.B. 9-14-81					
Checked by/Date	SLL 9/14/81					

Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas & Electric Company/Commonwealth Edison Company

Client Cincinnati Gas & Electric Company/Commonwealth Edison Company



ACCELEROMETER LOCATIONS

FIGURE 2.

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Project Zimmer/La Salle SQRT Requalification Program File No.

Owner Cincinnati Gas & Electric Company/Commonwealth Edison Company

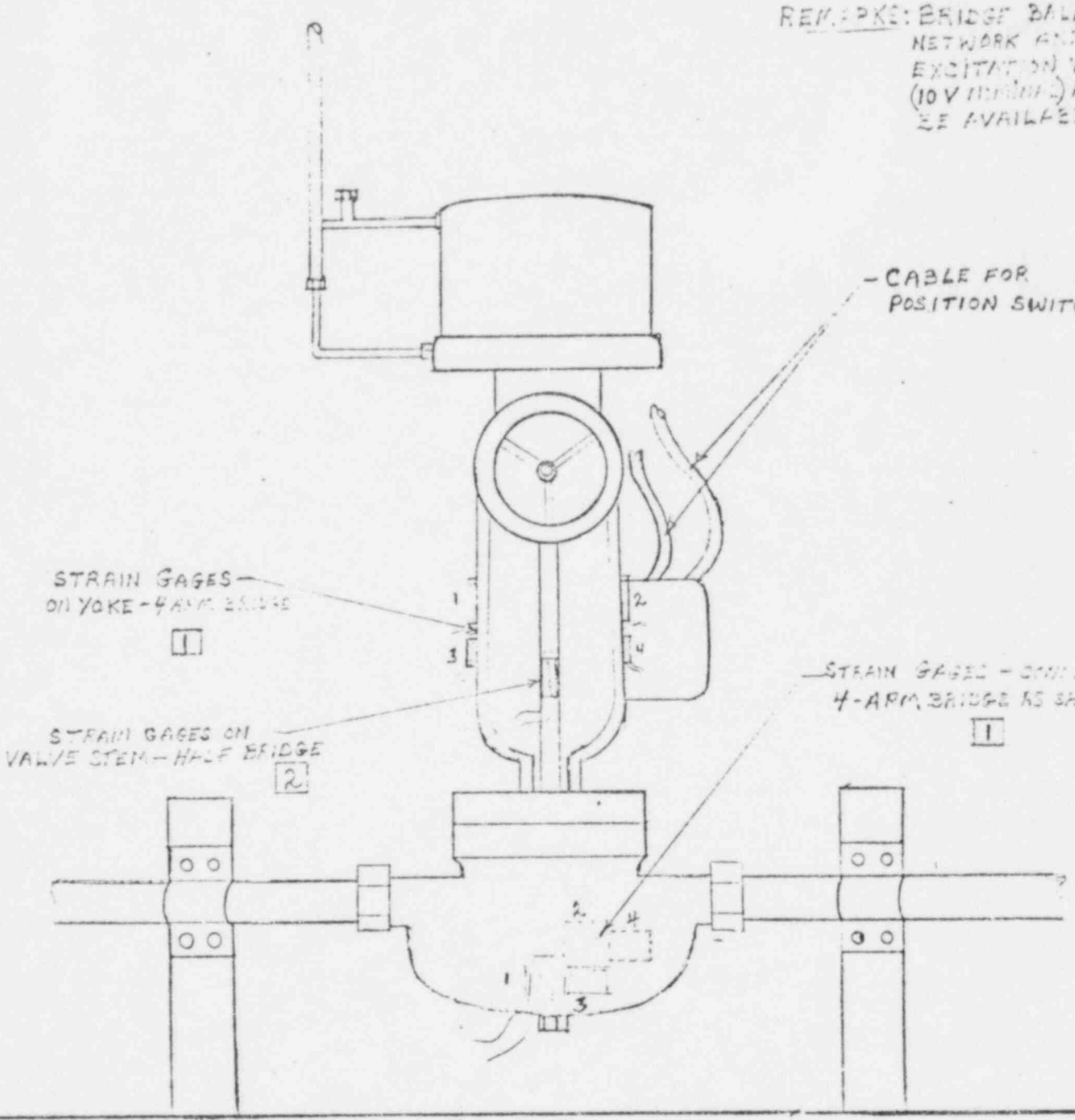
Client Cincinnati Gas & Electric Company/Commonwealth Edison Company

MATERIAL NOTES

1 MICRO-MEASUREMENTS CORP. WK-250-350 (OR EQUIV.)

2 WK-125-350 (OR EQUIV.)

REMARKS: BRIDGE BALANCE NETWORK AND EXCITATION VOLTAGE (10 V minimum) MUST BE AVAILABLE



STRAIN GAGES LOCATIONS

FIGURE 3

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Project Zimmer/La Salle SQRT Requalification Program File No.
Owner Cincinnati Gas & Electric Company/Commonwealth Edison Company
Client Cincinnati Gas & Electric Company/Commonwealth Edison Company

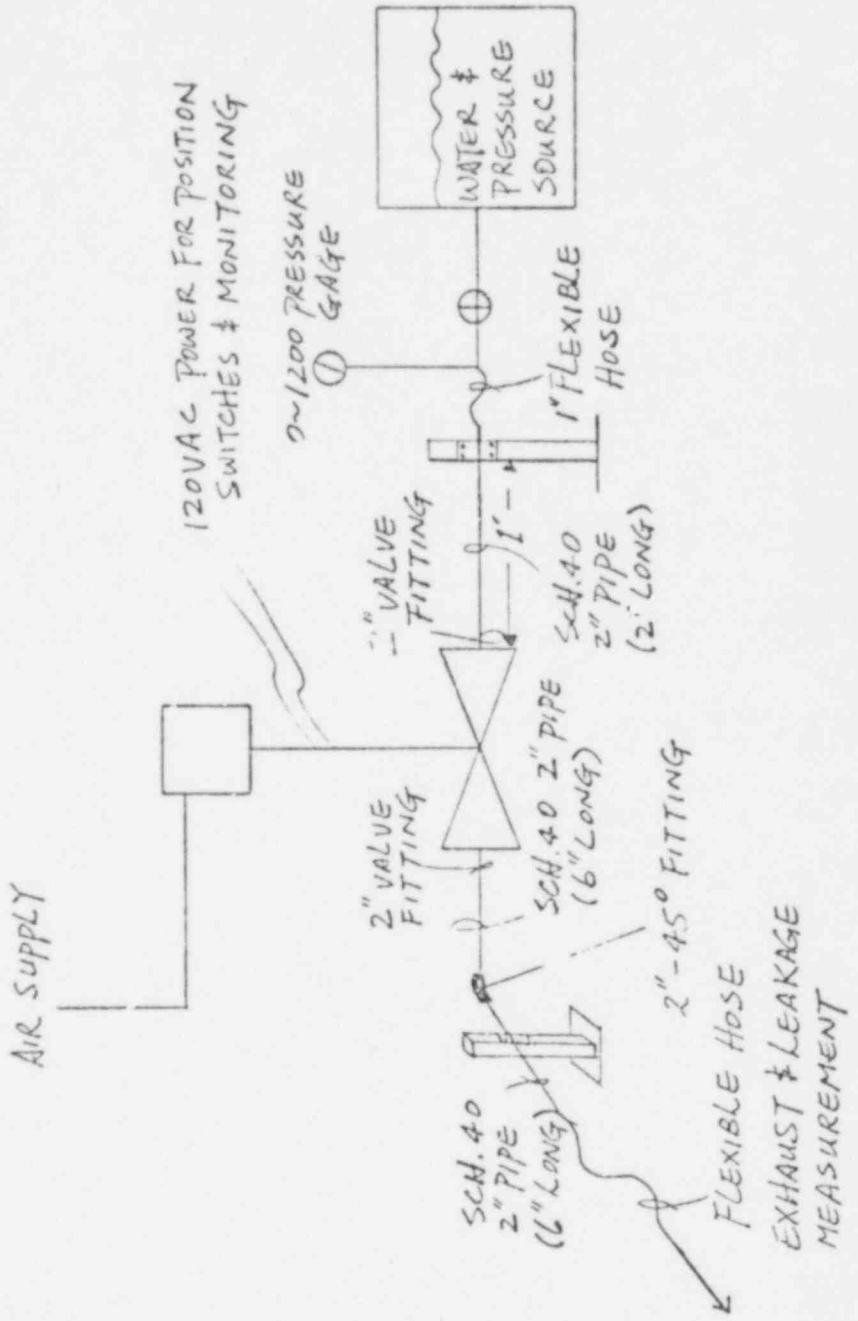

FIGURE 4. TEST SETUP

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TABLE I

TEST SPECIMEN DATA

Device Name: Air operated globe valve

Description: 2" schedule 160 flow control valve
side mounted handwheel piston actuator and
(2) Nat. ACME switches

Primary Service Rating: 600 lb

Fluid: Demineralized water

Valve Operator: Single acting pneumatic cylinder

Air Supply Pressure: 70 ~ 75 psig

Operator Action: Air to open, spring to close

Maximum Operating ΔP: 1055 psid

valve body, bonnet, yoke and actuator. Strain gage locations are shown in Figure 3.

4.3 Malfunction and Failure Criteria

During excitation, the test specimen shall be visually monitored for any evidence of structural failure. The failure or loosening of a part that does not affect the operation of the test specimen would not be considered as malfunction, but shall be noted in the test report. Any inappropriate operation or failure of the test specimen to operate in accordance with paragraph 4.2.3, or if the total leakage is in excess of 1400 cc during proof test, or if leakage rate after proof testing exceeds 40 cc/hr, shall be considered a failure.

5.0 TEST REQUIREMENTS

5.1 Exploratory Testing

Exploratory testing shall be performed to determine the test specimen's resonant frequencies, if any, within a specified frequency range. The procedure for this testing is provided in paragraph 5.1.1. A sine sweep test or other testing methods will be acceptable provided they yield the same information about the dynamic characteristics of the test specimen.

5.1.1 Sine Sweep Recommended Test Parameters

Test Method: Low Level, Sine Sweep

Input Motion: Single Axis

Number of Tests: 3, with one in each Orthogonal Axis

Frequency Range: 1 to 100 Hz

Sweep Rate: Less than 2 Octaves per minute

Input g Level: 0.25 g peak

5.1.2 Exploratory Testing Results

The acceleration response in g's from each accelerometer location shall be plotted as a function of frequency.

5.2 Proof Testing

The adequacy of the test specimen for upset and emergency plant conditions will be demonstrated by proof testing. This test phase will consist of biaxial random vibrational excitation input to the equivalent of the maximum combined dynamic loads the test specimen may experience under the upset or emergency plant condition. The testing will be divided into two parts: (1) testing for upset plant condition and (2) testing for emergency plant condition; the tests consider the maximum combined dynamic loads the test specimen may experience under each condition. The maximum g-level used is the analyzed maximum g-level for the piping on which the test specimen is mounted and will experience during either the upset or emergency plant condition.

5.2.1 Upset Condition Testing

Test Method: Random Motion

Input Motion: Biaxial

Excitation: 2 independent random signals

Level: Flat random input with RMS adjusted to envelop a 6g peak horizontal and 4g peak vertical.

Test Specimen Operation: Operability demonstration in accordance with paragraph 4.2.2

Test Specimen Orientation: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Number of Tests: Five in each test specimen orientation.
(1) Test specimen at open position.
(2) Test specimen at close position with inlet pressure maintained at 1055 psig.
(3) Test specimen change of state in accordance with paragraph 4.2.3.
(4) & (5) Repeat (3).

Monitoring Requirements: test specimen inlet pressure, valve leakage detection in accordance with paragraph 4.2.3 and deflections or strains at the strain gage locations.

Frequency Range: 1-50 Hz

Test Duration: 30 secs. per test

5.2.2 Upset Condition Testing Results

Input peak value shall be shown on the time history plots to ensure that it envelops the specified peak g level. Power Spectrum Density (PSD) plots shall be developed from each accelerometer time history for the first test of each orientation. All accelerometer signals shall be recorded on analog magnetic tape.

5.2.3 Emergency Condition Testing

Test Method: Random Motion

Input Motion: Biaxial

Excitation: 2 independent random signals

Level: Flat random input with RMS adjusted to envelop 7g horizontal and 5g vertical.

Test Specimen Operations: Operability demonstration in accordance with paragraph 4.2.2

Test Specimen Orientation: 2 orientations
(1) Front to back/vertical
(2) Side to side/vertical

Number of Tests: 1 in each orientation

Test specimen change of state in accordance with paragraph 4.2.2.

Monitoring Requirements: Test specimen inlet pressure, valve leakage detection in accordance with paragraph 4.2.2, and deflections or strains at the strain gage locations.

Frequency Range: 1 to 50 Hz

Test Duration: 30 sec. per test

Operational Test: Check Test Specimen after emergency condition tests in accordance with paragraph 4.2.2.

5.2.4 Emergency Condition Testing Results

Input peak value shall be shown on the time history plots to ensure that it envelops the specified peak g level. PSD plots shall be developed from each accelerometer time history for each test specimen orientation. All accelerometer signals shall be recorded on analog magnetic tape. Results of operational test checkout after excitation shall be reported and any significant deviation from the baseline shall be noted in the final report.

5.3 Fragility Testing

Upon completion of the seismic qualification testing, a fragility test shall be performed on the test specimen in each orthogonal axis. Test operation shall be in accordance with paragraph 5.1. The fragility test will consist of increasing the input g level until a non-destructive fragility level is reached. The test sequence shall be: vertical, side to side and front to back. The fragility test shall be performed at each resonance frequency determined from paragraph 5.1 or at 50 Hz if no resonance frequencies are detected. Data obtained as a result of fragility testing shall be recorded and included in the final report. Following fragility testing an operational test shall be performed in accordance with paragraph 4.2.2 The results shall be documented and any deviation from baseline shall be noted in the final report.

6.0 WITNESSING OF TESTS

6.1 All tests shall be subject to observation by NUTECH or their authorized representatives.

6.2 All tests shall also be subject to observation by Cincinnati Gas and Electric Company or their authorized representative.

7.0 TEST REPORT REQUIREMENTS

SwRI shall supply ten certified copies of a test report which satisfies the requirements of IEEE 344 - 1975. This report will describe the equipment, calibration, and test procedures, including photographs of the test setup, and provide all results and conclusions from the test.

Operational checkout and inspections shall be described and all results summarized and any deficiencies and/or repairs noted. Critical data to be included in this report are as follows:

7.1 Inspection and operational test results reports, verifying adjustments and recording values, also noting any significant deficiencies and repairs to device. A description of test equipment and calibration information shall be included.

7.2 Test specimen resonance search data.

7.3 PSD and time history plots obtained in 5.2.2 and 5.2.4.

7.4 A record of pressure supplied and test specimen inlet port pressure during operation, valve leakage and strain or deflection of each strain gage shall be monitored for test runs in the test log.

7.5 A record of the number of test runs including level and duration shall be maintained in the test log.

7.6 A copy of the test log.

7.7 A completed Test Specimen Data Form (a partially completed form has been provided as Table 1 of this specification.

8.0 REFERENCES

8.1 SwRI QA Procedure XI - E-101: Seismic Test of Electrical and Mechanical Components.

8.2 SwRI QA Procedure XII - E-101: Calibration of Mechanical Science Dynamics Test Equipment.

8.3 IEEE 344 - 1975: Recommended Practices for Seismic Qualification of class 1E Equipment for Nuclear Power Generating Stations.

Specification For Dynamic Test of Two Motor-Operated Valve Assemblies

LaSalle County Station Units 1&2
Commonwealth Edison Company

Wm. H. Zimmer Nuclear Power Station Unit 1
Cincinnati Gas & Electric Company

Nuclear Safety-Related

Prepared By

Component Qualification Division
Sargent & Lundy Engineers

Status Summary

Dynamic Qualification Program for

Motor Operated Valve Assemblies

	Task	Status
1)	Select Actuators	Complete
2)	Select Representative Valves & Subsystems	Complete
3)	Procure Valves & Actuators	Complete
4)	Mfg. Inspection of Valves & Actuators	Complete
5)	Analysis of 4TCO and SRV traces to determine traces to be used	Complete
6)	Time-History Analysis of Subsystems	Complete
7)	Response Spectra Generation	Complete
8)	Fatigue Damage Potential Evaluation of Time-Histories	Complete
9)	Preparation and Issue of Test Spec	Complete
10)	Design of Test Fixture	Complete
11)	Fabrication of Test Fixture	10-27-81
12)	Generation of Equivalent White Noise Input	10-28-81
13)	Baseline Testing	10-28-81
14)	Aging & Qualification Testing	Start 10-28-81
15)	Test Report by AE	11-11-81
16)	Test Report by SDRC	

Project Nos.
4130-15
4266-10
4267-10

Approval Page

Specification For Dynamic Testing of Two Motor-Operated Valve Assemblies

LaSalle County Station - Units 1&2
Commonwealth Edison Company

Wm. H. Zimmer Nuclear Power Station - Unit 1
Cincinnati Gas & Electric Company

Rev.	Date	Reason For Issue	Prepared By	Reviewed By	Approved By
00	10-09-81	Initial Issue	[signature] S. Yassin	Ismail Kisisel	[signature]
01	10-23-81	Incorporate client Comments	[signature]	Ismail Kisisel	[signature]

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Table of Contents

1.0 Purpose

The purpose of this specification is to define the technical requirements, documentation requirements, quality assurance requirements, and outline the responsibilities for the dynamic testing of two motor operated valve assemblies.

2.0 Introduction

A great amount of work has been done in demonstrating the adequacy of motor operated valves to function during postulated seismic events. This previous work has been limited to investigating the effects of the relatively short duration dynamic seismic loads having a frequency content of 1-33 Hz. The objective of this program is to demonstrate the adequacy of motor operated valves to function during postulated SRV actuation and LOCA events in addition to the previously investigated seismic events. This will be accomplished by testing two representative valves using a dynamic input which simulates the amplitude, frequency content, and duration for the most severe combination of seismic, SRV actuation, and LOCA loads.

3.0 Identification of Test Specimens

3.1 16 inch 150# Anchor Darling gate valve with Limitorque SMB-2-40 actuator

3.2 4 inch 300# Powell gate valve with Limitorque SMB-000 actuator

4.0 Responsibilities

4.1 The Consulting Engineers shall be responsible for providing the Test Lab:

- test specimens
- design of the test fixture
- valve drawings and
- wiring diagrams as required
- defining the test input

4.2 The Test Lab shall be responsible for

- fabrication of test fixture
- providing the electrical hardware (motor control center) required for operating the valves
- providing the hardware (expansion tank and piping) required for leakage tests
- conducting the test in accordance with the requirements of this specification.

5.0 Instrumentation

The following instrumentation shall be used.

5.1 Control Accelerometers

Three control accelerometers shall be used to determine the actual input to the test specimens.

5.2 Response Accelerometers

Nine response accelerometers per specimen shall be used. Their locations shall be as defined below as shown in Figure 1.

Accelerometer	Orientation	Location
1	Horiz-a	base of yoke
2	Horiz-c	
3	Horiz-a	top of yoke
4	Horiz-c	
5	Vert	as close as practical to the limit switch mounting screws
6	Horiz	
7	Vert	end of actuator motor
8	Horiz-a	
9	Horiz-c	

5.3 Contact Chatter Monitors

The test specimens utilize a four train, rotor type, geared limit switch which consists of four rotary type drum switches each having four contacts (a total of 16 contacts per specimen). The requirements for the contact chatter monitors are:

a) four contact chatter monitors per specimen shall be used

b) they shall be wired one contact per monitor and the following guidelines shall be followed in selecting contacts to be monitored:

- each rotary drum switch shall be monitored (i.e. one monitor per rotary drum switch)
- each contact location (i.e. distance between contact and gear frame) shall be monitored.

c) the contact chatter monitoring system shall be set up in such a manner that should contact chatter occur exceeding 2 msec it shall be detected and the duration of such chatter shall be recorded. This may be accomplished by use of a chatter box along with a recording oscilloscope (triggered automatically or manually) or any other acceptable technique.

5.4 Operability Monitors

The opening and closing time of each specimen shall be recorded. This may be accomplished by using a brush recorder to monitor the voltage across the limit switch, or any other acceptable means to the Consulting Engineers.

5.5 Strain Gages

Each test specimen shall be instrumented with strain gages to determine the stress state versus time at the following locations

- lower portion of one yoke leg
- upper portion of same yoke leg
- one of the yoke-actuator bolts

Any changes required to be made in the test specimens in order to instrument them shall be approved by the Consulting Engineers.

6.0 Test Sequence

a) Baseline Testing

b) SRV Fatigue Aging Test

c) Inspection

d) SRV & CHG Fatigue Aging Test

e) Inspection

f) Upset Condition Qualification Tests

g) Inspection (following each of the five upset condition tests)

h) Emergency Condition Tests

i) Baseline Test

j) Resonance Search

7.0 Test Requirements

7.1 Baseline Testing

The purpose of the baseline test is to provide a data base for evaluating the valve performance during the remainder of the test program. The requirements for the baseline test are specified below:

7.1.1 Baseline Inspection

Verify that all external bolts are tightened to the manufacturer's specifications. The bolts to be checked are:

body to bonnet bolts

bonnet to yoke bolts

yoke to actuator bolts

limit switch screws

actuator motor screws

valve flange bolts

7.1.2 Stroking Time

Determine the opening and closing time for the valve:

a) in its normal service condition (valve pressure and voltage according to valve data sheet).

b) in its normal service condition plus and minus 10% testing margin specified in paragraph 6.3.1.5 of IEEE-323-1974.

In other words the valve stroking time shall be determined for three different conditions:

a) pressure and voltage at normal service condition

b) pressure and voltage at normal service condition minus 10%

c) pressure and voltage at normal service condition plus 10%

7.1.3 Leakage Test

Perform hydrostatic leakage tests according to the procedure outlined in MJS-SP-61-1977.

7.2 Resonance Search

The purpose of the resonance search test is to determine the dynamic characteristics (natural frequencies, cross-coupling effects) of the test specimens. The requirements are defined below.

a) test method: uniaxial sine sweep

b) frequency range: 1 to 100 Hz

c) input acceleration: 0.2 g minimum

d) sweep rate: 1/2 octave per minute maximum

e) documentation: transmissibility plots (one per direction of excitation per response accelerometer)

7.3 SRV Fatigue Aging

The purpose of this test and the following test is to subject the test specimens to the design life mechanical vibration the specimens would experience from the postulated SRV actuation and LOCA events. The requirements for this test are defined below:

a) test method: triaxial random motion

b) test input: white noise generated by the Test Lab to the following requirements:

- fatigue damage potential demonstrated to be equivalent to Consulting Engineers supplied time history

- test response spectra envelopes required response spectra. Care shall be taken to avoid excessive conservatism between the amplitude of the TRS and RRS (i.e. the enveloping must be close)

The equivalent white noise input shall be approved by the Consulting Engineers prior to testing.

c) the Consulting Engineers time history will consist of an approximate 2 second trace which is to be repeated for a total of 9000 times. There shall be no delay between subsequent applications of the trace.

d) demonstration of operability: the test specimens shall be stroked once every 30 minutes

e) required response spectra: identified in Table 1

f) required time histories: identified in Table 2

g) documentation:

- digitized trace of shake table motion in all three directions
- sample TRS from each control and response accelerometer
- log of valve stroking durations

7.4 SRV + CHG Fatigue Aging

The requirements for this test are:

a) test method: triaxial random motion

b) test input: white noise generated by the Test Lab to the following requirements:

- fatigue damage potential demonstrated to be equivalent to the fatigue damage potential of Consulting Engineers supplied time history
- test response spectra envelopes required response spectra. Care shall be taken to avoid excessive conservatism between the amplitude of the TRS and RRS (i.e. the enveloping must be close).

The equivalent white noise input shall be approved by the Consulting Engineers prior to testing.

c) the Consulting Engineer's time history will consist of an approximate 2 second trace which is to be repeated for a total of 1500 times. There shall be no delay between subsequent applications of the trace.

d) demonstration of operability: the test specimens shall be stroked once every 10 minutes

e) required response spectra: identified in table 1

f) required time histories: identified in Table 2

g) documentation:

- digitized trace of shake table motion in all three directions
- sample TRS from each control and response accelerometer
- log of valve stroking durations

7.5 Upset Condition Qualification Test

The purpose of this test and the following test is to demonstrate the ability of the test specimens to function during the most severe loads associated with the upset and emergency plant conditions respectively. The requirements for this test are:

a) test method: triaxial random motion

b) number of tests: 5

c) test input: white noise generated by the Test Lab to the following requirements:

- fatigue damage potential demonstrated to be equivalent to fatigue damage potential of Consulting Engineers supplied time history

- test response spectra envelopes required response spectra. Care shall be taken to avoid excessive conservatism between the amplitude of the TRS and RRS (i.e. the enveloping must be close)

The equivelent white noise input shall be approved by the Consulting Engineers prior to testing.

d) The Consulting Engineers time history will consist of a 15 second trace which is to be used once for each of the five upset condition tests.

e) demonstration of operability: the test specimens shall be stroked once per test. Should the stroking time exceed the test duration the test duration SHALL NOT be extended, as the purpose of this test is to demonstrate functionality during the simultaneous application of normal operating plus postulated dynamic loads.

f) required response spectra: identified in Table 1

g) required time histories: identified in Table 2

h) documentation:

- digitized trace of shake table motion in each of the three directions
- sample TRS from each control and response accelerometer (from one test only)
- log of valve stroking durations

7.6 Emergency Condition Qualification Test

The requirements for this test are:

a) test method: triaxial random motion

b) number of tests: one

c) test input: white noise generated by the Test Lab to the following requirements:

- fatigue damage potential demonstrated to be equivalent to the fatigue damage potential of Consulting Engineers supplied time history.
- test response spectra envelopes required response spectra. Care shall be taken to avoid excessive conservatism between the amplitude of the TRS and RRS (i.e. the enveloping must be close).

The equivalent white noise input shall be approved by the Consulting Engineers prior to testing.

d) the Consulting Engineers time history will consist of a 15 second trace which is to be applied once.

e) demonstration of operability: the test specimens shall be stroked once per test. Should the stroking time exceed the test duration, the test duration SHALL NOT be extended as the purpose of this test is to demonstrate functionality during the simultaneous application of normal operating plus postulated dynamic loads.

f) required response spectra: identified in Table 1

g) required time histories: identified in Table 2

h) documentation:

- digitized trace of shake table motion in all three directions
- sample TRS from each control and response accelerometer
- log of valve stroking durations

7.7 Inspection

An inspection of the test specimens shall be made at the intervals in section 6.0 "Test Sequence". The inspection procedure is:

1) visually examine specimens for broken or loose parts.
2) verify that all external bolts are tight (torqued to manufacturers specifications). The bolts to be checked are: body to bonnet bolts
   bonnet to yoke bolts
   yoke to actuator bolts
   Bolts may be tightened as required
3) remove limit switch cover
4) verify that limit switch is secure (i.e. that limit switch mounting screws are tight). NO TIGHTENING OF ANY INTERNAL SCREWS IS PERMITTED without approval of the Consulting Engineers.
5) replace limit switch cover

7.8 Specimen Mounting

The test specimens shall be mounted using fixture designed by Consulting Engineers in a manner which simulates the

actual in-service mounting condition as closely as practical. The mounting of the valve and test fixture to the shake table shall be such that the vibratory input is transmitted without amplification or attenuation.

8.0 Acceptance Criteria

a) A test failure shall be defined as any occurrence which results in

- failure of the test specimens to stroke; or
- breach of the pressure boundary other than leakage at gaskets or packing
- severance of any external portion of the device

b) A test anomaly shall be defined as any abnormal occurrence other than a failure.

c) Should a test failure occur the testing shall be stopped. Any further course of action shall be determined by the Consulting Engineers test representative.

d) The Consulting Engineer's are responsible for determining the acceptability of any test anomaly.

e) The Consulting Engineers reserve the right to modify the test procedure

9.0 Documentation

A test report shall be prepared by the Test Lab. This report shall include:

a) details of the test procedure

b) transmissibility plots

c) test response spectra plots

d) documentation demonstrating how the fatigue damage potential of the white noise inputs was shown to be equivalent to the fatigue damage potential of Consulting Engineers supplied time histories

e) digitized trace of white noise input

f) photographs of test set-up

g) description of monitoring techniques

h) test log

i) all pertinent measurements and observations

j) results with a description of any abnormalities or malfunctions

k) identification of all test equipment and instrumentation including last calibration date.

Ten copies of this test report shall be submitted to the Consulting Engineers.

10.0 References

a) IEEE-323-1974 "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations."

b) IEEE-344-1975 "IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations."

c) IEEE-382-1980 "IEEE Standard for Qualification of Safety-Related Valve Actuators."

d) MSS-SP61-1977 "Pressure Testing of Steel Valves"

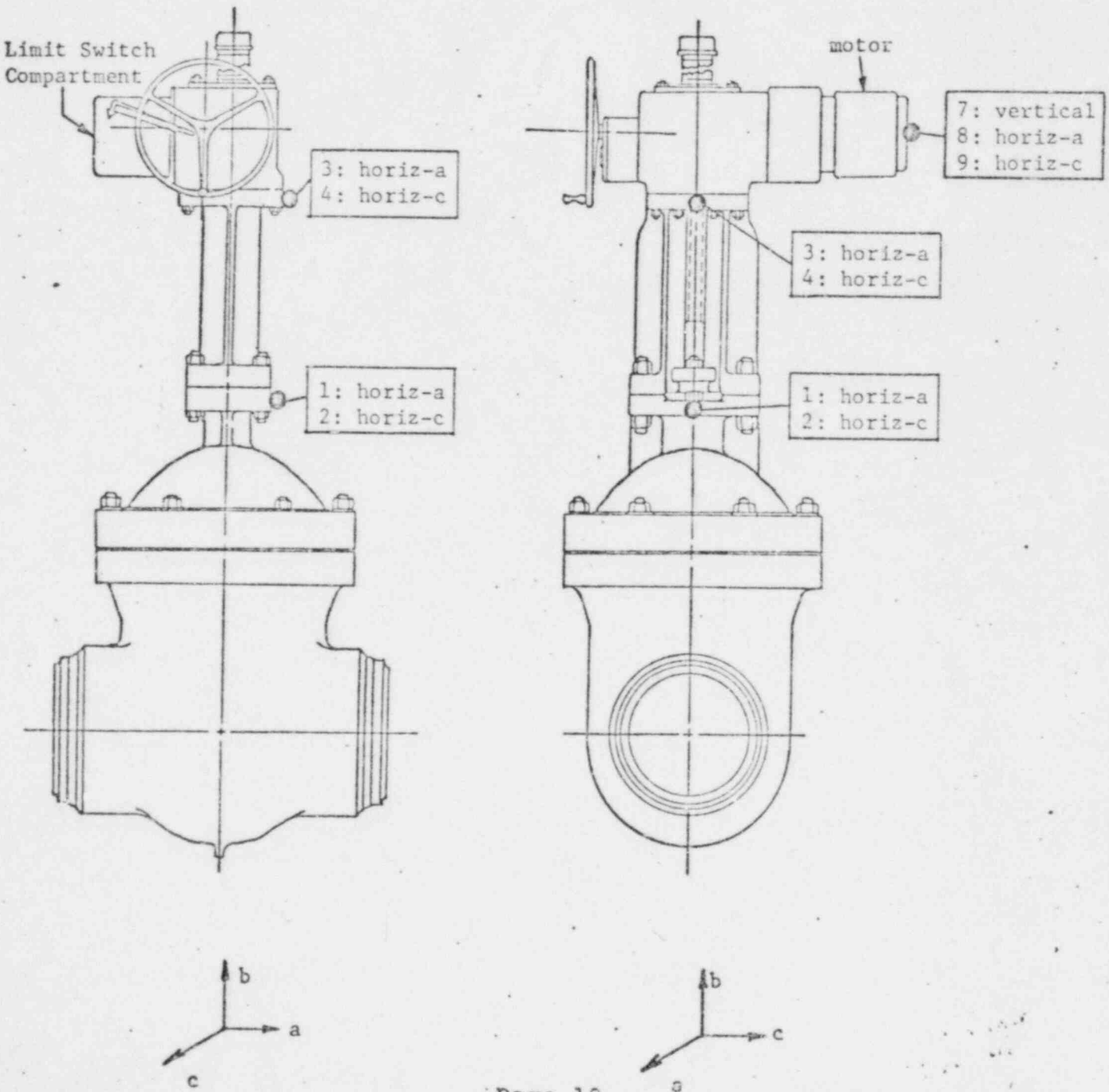
e) Sargent & Lundy Form MSS-6.2B "Standard Specification for Seismic Qualification Criteria for Category I (Essential) Equipment Installed in Nuclear Power Plants."

f) Sargent & Lundy Calculation CQD-000233 "Time History Dynamic Analysis of Piping Systems for Test Motion Input Generation"

g) Sargent & Lundy Calculation CQD-000234 "Fatigue Damage Evaluation For Test Input Time Histories"

FIGURE 1

Accelerometer Location



Specimen Data Sheet

16 inch 150# Motor Operated Gate Valve

Actuator:

Manufacturer - Limitorque
Model - SMB-2-40
Serial No. - Tag #W-18176
Power - 3 phase 60 cycles 460 volts
Horse Power - 5.3, RPM - 3600
Full load Amps - 7.55 Locked Rotor Amps - 62.5
Approx. Weight - 660 lbs.

Valve:

Manufacturer - Darling Valve & Manufacturing Co.
Model - O.S &Y carbon steel gate valve with weld ends
Serial No. - E-5811-031, Tag #E22-F015
Normal Pressure -
Seat Test Pressure - 300 psi

Bolting Data:

	Quantity	Description	Torque (Ft-Lbs) Nominal	Max.
Body/Bonnet	24	5/8-11UNC-2Ax3-½	35	50
Yoke legs	4	7/8-9UNC-2Ax5-½	100	120
Packing Gland Foll	2	3/4-10UNC-2AX5-½	-	100
Limotorque Oper.	8	3/4-10UNC-2Ax3-½	90	100

Total Assembly Weight - 1250 lbs. (Approx.)

Max. Opening or Closing Time - 16 secs.

TABLE I

REQUIRED RESPONSE SPECTRA

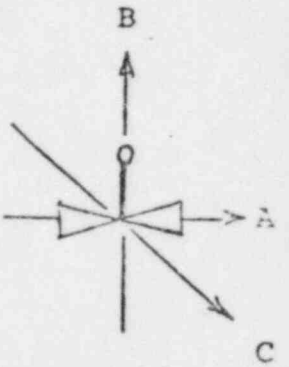
Test Phase	Table or Figure No.					
	4" Powell Valve			16"Anchor Darling Valve		
	Vert.	Horizontal		Vert.	Horizontal	
	b-b	a-a	c-c	b-b	a-a	c-c
SRV Aging	1	2	3	4	5	6
SRV + CHG. Aging	7	8	9	10	11	12
Upset Condition Qualification	13	14	15	16	17	18
Emergency Condition Qualification	19	20	21	22	23	24

Note: Direction a-a Horizontal-Along Pipe Axis
b-b Vertical
c-c Horizontal-Perpendicular to Pipe Axis

TABLE 2

List of Information in Tape in Sequence:Read 4(6x, F12.0)

FILE #	VALVE SIZE	CASE	DIRECTION
1	16"	SRV	A
2	150#		B
3	Anchor Darling		C
4	4"	SRV	A
5	300#		B
6	Powell		C
7	16"	SRV + CHUG	A
8	150#		B
9	Anchor Darling		C
10	4"	SRV + CHUG	A
11	300#		B
12	Powell		C
13	16"	UPSET	A
14	150#		B
15	Anchor Darling		C
16	4"	UPSET	A
17	300#		B
18	Powell		C
19	16"	EMERGENCY	A
20	150#		B
21	Anchor Darling		C
22	4"	EMERGENCY	A
23	300#		B
24	Powell		C



A=Along Pipe Axi (Horiz)
B=Vertical (up-down)

C=L er to Pipe Axis (Horiz)

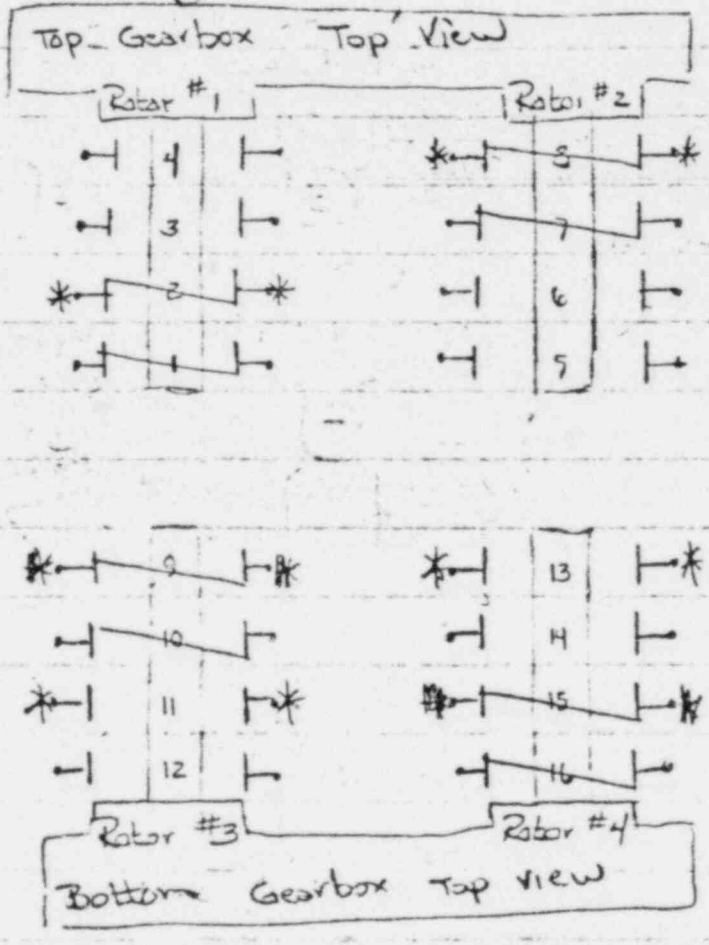
Tape No.2303

4" Powell 300# Gate

1) Valve recieved at SDRC did not have limit switches adjusted, SDRC (Tony Wolfe) did adjusting

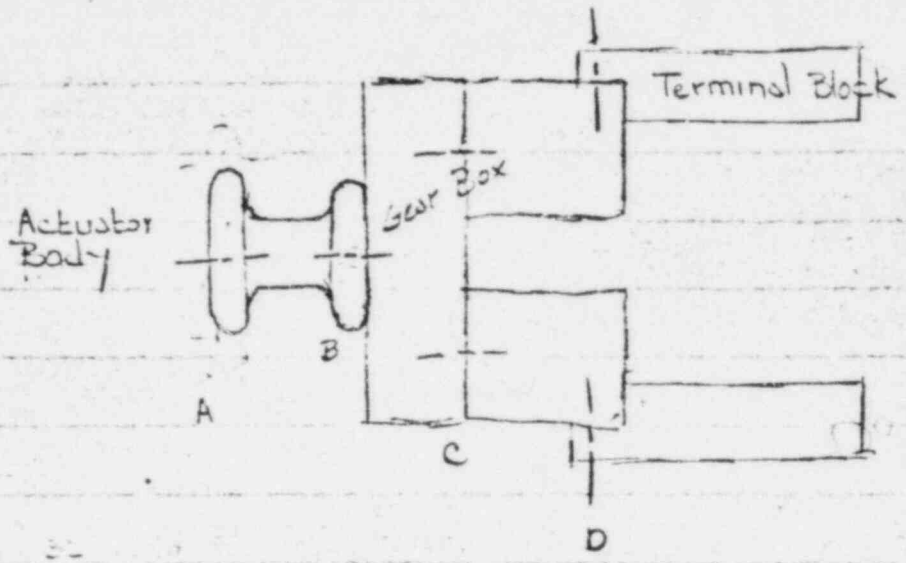
2) Postion gauge on limit switch read
   0 - Valve closed
   approx 130 - Valve backseated (scale only went to 100)
   SDRC asked how we wanted limit switch adjusted (i.e. to stop at 100 or 130)
   R. Ternlund told them 100

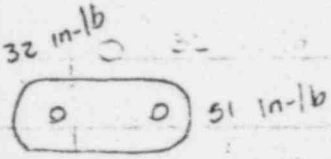
3) Position of chatter monitars (contacts 2, 8, 11, 13



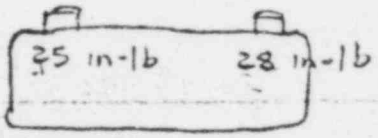
above sketch shows position when valve open

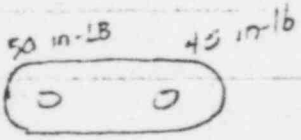
4" Powell Valve initial limit switch torque



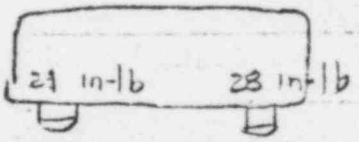


Section A

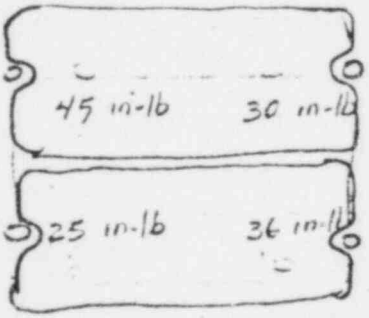




Section B



Section D



Section C

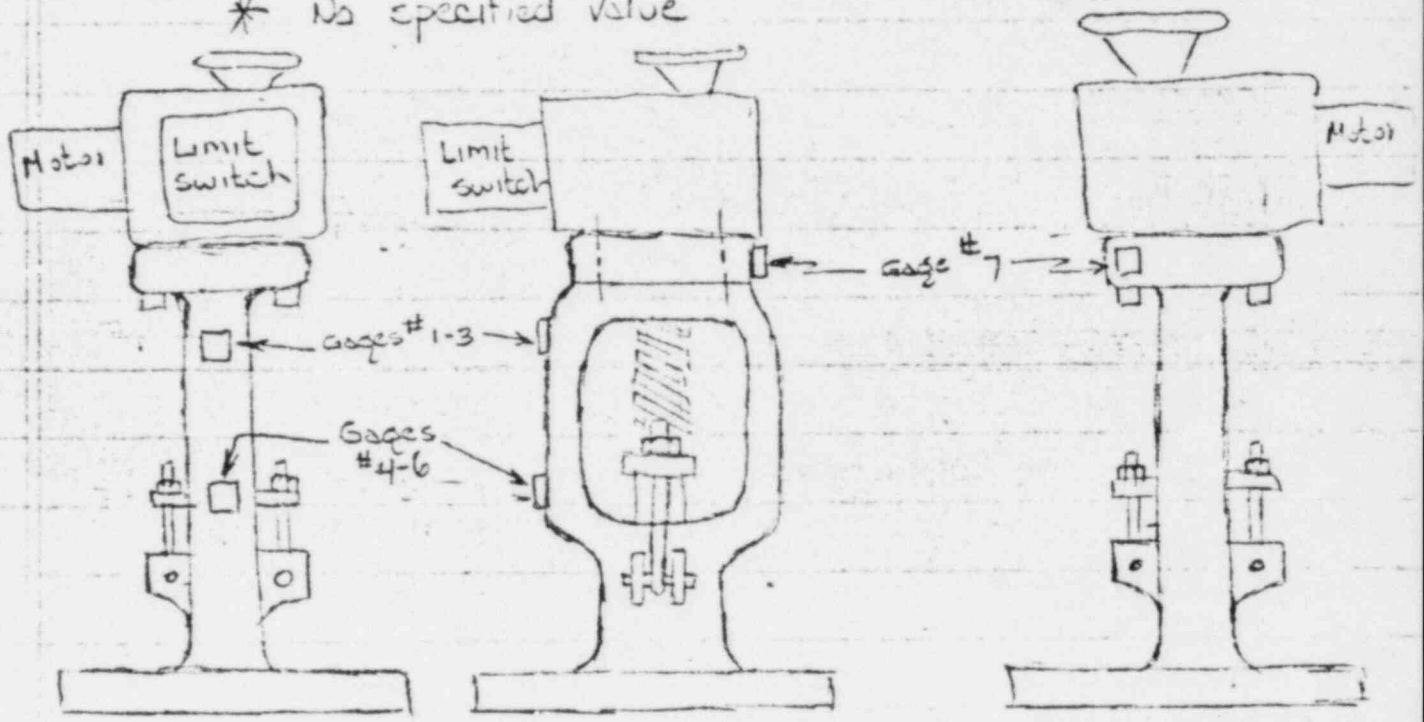
limit switch torque settings for test

Section	# screws	Torque in-lbs
A	2	50
B	2	50
C	4	50
D	4	30

4" Powell

	# Bolts	size	torque (ft-lbs)	Reference
Operator - Yoke	4	1/4" ?	15. ft-lb	} Jay Nachod Wm Powell Co
Yoke - Body	10	5/8"	150 ft-lb	} Jay Nachod Wm Powell Co
Flange	8/flange	3/4"	120 ft-lb	T Miller S&L
Packing	2	1/2"	*	Jay Nachod

* No specified value

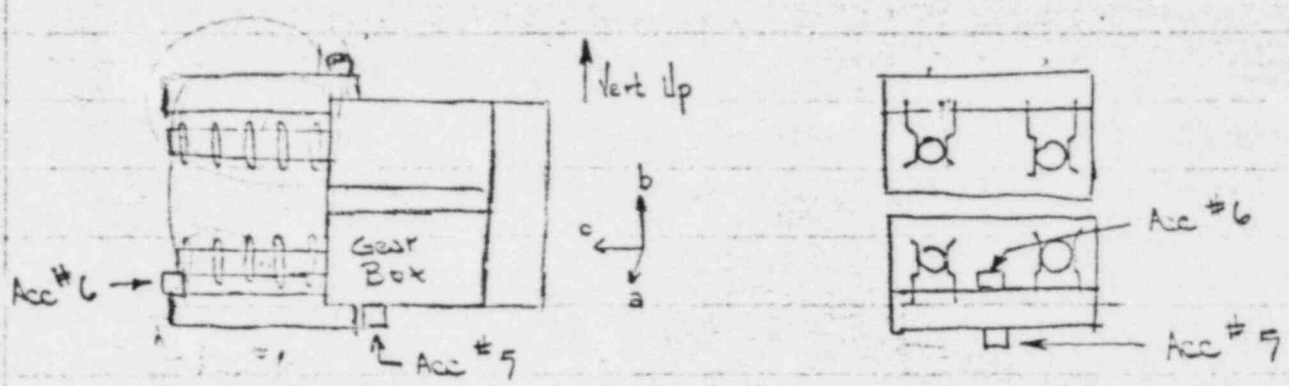


Strain Gages

Strain Gage	Location	Direction
1	Top of Yoke	Vert 0°
2	"	skew 45°
3	"	horiz 90°
4	bottom of Yoke	Vert 0°
5	"	skew 45°
6	"	horiz 90°
7	next to Yoke-actuator screw	Vert 0°

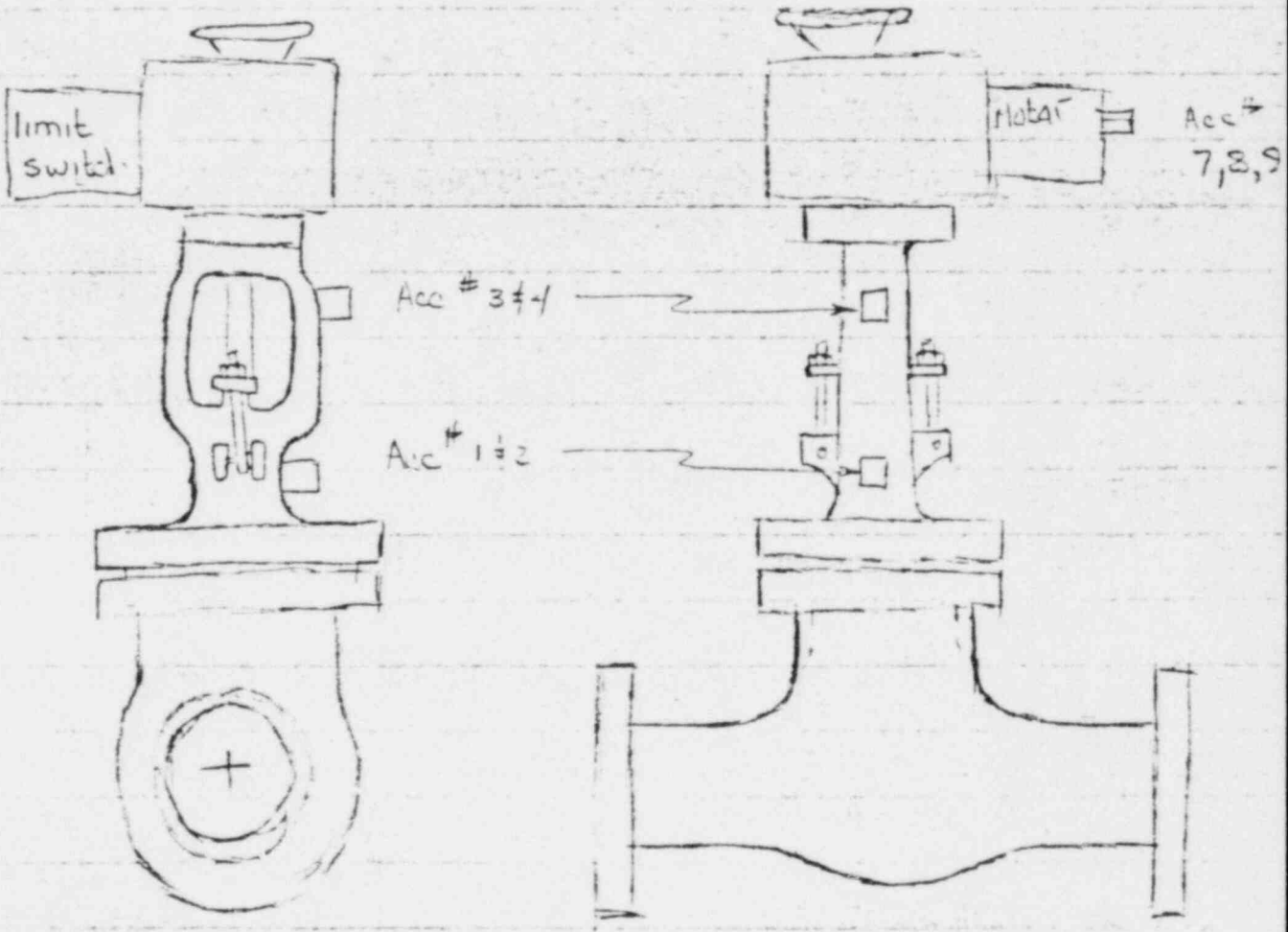
4" Powell

Accelerometer location

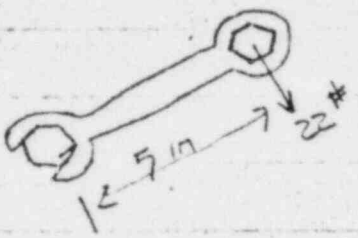


Side View

end View



Torque on actuator motor screws 110 in-lbs



couldn't use torque wrench because of space - so used combination wrench and scale

Baseline Test

A) Stroking Time

Test #	Valve Position	Voltage	Pressure	Stroking Time ± .1	Notes
1	O-C	460	300	76/5 = 15.2	
2	C-O	460	300	74.5/5 = 14.9	
3	O-C	414	330	76.5/5 = 15.3	
4	O	414	330	75.5/5 = 15.1	1
5	O-C	460	330	76.5/5 = 15.3	
6	C-O	460	330	75./5 = 15.0	
7	O-C	506	330	76./5 = 15.2	
8	C-O	506	330	74.5/5 = 14.9	

Notes:

1) Very slight leakage at packing, packing nuts tightened

B) Leakage Tests Valve pressurized to 300 PSI

1) on one side of gate (actuator motor side)

time: in excess of 1 hr

leakage: to small to measure << 1 cc (maybe 2 drops)

2) on opposite side of gate

time: 1 hr

leakage: to small to measure << lcc (maybe 2-3 drops)

Saturday October 31

SRV Fatigue Aging Test

Test began 9:18 AM Valve pressurized to 300 PSI

Operability Verification

Number	Time ± 5 min	Stroking Time (secs ± 0.1 sec) C-O	O-C	Notes
1	9:50	$^{75}/_{5} = 15.0$	$^{74}/_{5} = 15.2$	
2	10:19	$^{74.5}/_{5} = 14.9$	$^{76}/_{5} = 15.2$	
3	10:50	$^{74.5}/_{5} = 14.9$	$^{76}/_{5} = 15.2$	
4	11:20	$^{74.5}/_{5} = 14.9$	$^{74}/_{5} = 15.2$	a
5	11:51	$^{75}/_{5} = 15.0$	$^{76.5}/_{5} = 15.3$	b

Restart Test @ 12:15

12:48 stop test to change tape on instr recorder

12:54 restart test

6	12:54	$^{75}/_{5} = 15.0$	$^{76.5}/_{5} = 15.3$	

continued on page 7

Notes:

a) heard small bang when valve closed (seating), no chatter no problems

b) when valve closed, the table shut down, SDRC felt there were two possible causes of this:

- electrical feedback of breaker (controlling actuator) since table controls & breaker were on same circuit

- Valve drives table when it seats (i.e. creates a small force transient - spike) which could shut the table down if one force feedback circuit picked up spike while others did not.

No contact chatter, no problems with valve

Action: put actuator breaker on different circuit (i.e. plug into a different outlet) & continue testing

Operability Verification Continued From Page 6

Number	Time	Stroking Time (sec ± 0.1 sec) C-O	C-O	Notes
7	1:24	75.1/5 = 15.0	76.5/5 = 15.3	
8	1:54	75.1/5 = 15.0	76.5/5 = 15.3	
9	2:24	75/5 = 15.0	76.0/5 = 15.2	
10	2:54	75/5 = 15.0	76./5 = 15.2	
Test Complete		3:22	No Chatter	All A-OK

Inspection

Item	Torque	#Bolts	Results
Flange	120 ft-lbs	16	3 loose, tightened
Body - Bonnet	150 ft-lbs	10	OK
Yoke - Actuator	15 ft-lbs	4	OK
Actuator Motor	110 in-lbs	4	OK
Limit Switch A	50 in-lbs	2	OK
" " B	50 in-lbs	2	OK
" " C	50 in-lbs	4	1 @ 50, 2 @ 45, 1 @ 48 (Note 1)
" " D	30 in-lbs	4	OK

Note 1: bolts not tightned

SRV + CHG Fatigue Aging Test

Test began 4:23 PM Valve Pressurized to 300. PSI

Operability Verification

Number	Time	Stroking c-o	Time o-c	Notes
1	4:33	75/5 = 15.0	76/5 = 15.2	
2.	4:43	75/5 = 15.0	76.5/5 = 15.3	
3	4:53	Not Measured	76/5 = 15.2	
4	5:03	75/5 = 15.0	76.5/5 = 15.3	
5	5:14	75/5 = 15.0	76/5 = 15.2	

Test Complete 5:18 No Chatter, All A-OK

Inspection

Item	Torque	# Bolts	Results
Flange	120 ft-lbs	16	OK
Body-Bonnet	150 ft-lbs	10	OK
Yoke-Actuator	15 ft-lbs	4	OK
Actuator Motor	110 in-lbs	4	OK
Limit Switch A	50 in-lbs	2	OK
" " B	50 in-lbs	2	OK
" " C	50 in-lbs	4	3 @ 50 1 @ 48 (Note 1)
" " D	30 in-lbs	4	OK

Note 1) Bolt not tightned

Upset Condition Qualification #1

Test Began: 5:58 Valve Pressurized to 300. PSI

Operability Verification

Stroking Time C-O : 75/5 = 15.0
O-C : 74/5 = 15.2

Note: since test duration is so short (15 sec) in comparison to stroking time (>> 30 sec for C-O & O-C) for the upset & emergency qual tests contacts chatter will be monitored by a recording oscilloscope rather than the chatter box used for aging tests

Inspection

Item	Torque	# Bolts	Results
Flange	120 ft-lbs	16	OK
Body-Bonnet	150 ft-lbs	10	OK
Yoke-Actuator	15 ft-lbs	4	OK
Actuator Motor	110 in-lbs	4	OK
Limit Switch A	50 in-lbs	2	OK
" " B	50 in-lbs	2	OK
" " C	50 in-lbs	4	OK
" " D	30 in-lbs	4	OK

Contact Chatter - contact #2 had contact bounce, chatter duration, chatter not continous, does not affect stroking. chatter occurs when contact changes state

Upset Condition Qualification Test #2

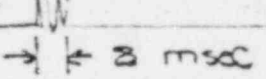
Test Began: 6:22 Valve Pressurized to 300 PSI

Operability Verification

Stroking Time C-O: $^{75}/_{5}$ = 15.0

O-C: $^{76}/_{5}$ = 15.2

Contact chatter - contact bounce when changing state from closed to open, one contact only approx 8 msec duration, chatter not continuous, does not affect stroking occurs when contact changes state



Inspection

Item	Torque	#Bolts	Results
Flange	120 ft-lbs	16	Inspection Waived
Body-Bonnet	150 ft-lbs	10	
Yoke-Actuator	15 ft-lbs	4	OK
Actuator Motor	110 in-lbs	4	slight movement on all four (note 1)
Limit Switch A	50 in-lbs	2	OK
" " B	50 in-lbs	2	OK
" " C	50 in-lbs	4	OK
" " D	30 in-lbs	4	OK

note 1) end of wrench moved max of 0 ½", estimated, wrench length 5"

Upset Condition Qualification Test #3
Test Began: 6:35 Valve Pressurized to 300 PSI

Operability Verification
stroking Time C-O: 75/5 = 15.0
O-C: 76/5 = 15.2

Contact Chatter - contact bounce, same contact as tests 1 & 2, total duration 3 msec - chatter not continous, does not affect stroking: Occurs when contact changes state

Inspection

Item	Torque	# Bolts	Results
Flange	120 ft-lbs	16	Inspection waived
Body-Bonnet	150 ft-lbs	10	
Yoke-Actuator	15 ft-lbs	4	OK
Actuator Motor	110 in-lbs	4	3 OK 1 @ 100 in-lbs
Limit Switch A	50 in-lbs	2	OK
" " B	50 in-lbs	2	OK
" " C	50 in-lbs	4	OK
" " D	30 in-lbs	4	OK

Upset condition Qualification Test #4

Test Began: 6:50 Valve Pressurized to 300. PSI

Operability Verification

Stroking Time C-O : $^{75}/_{5} = 15.0$

O-C : $^{76}/_{5} = 15.2$

Contact Chatter - contact bounce, same contact as in tests 1-3, total duration 3 msec; chatter not continous, does not effect stroking. Occurs when contact changes state

Inspection

Item	Torque	# Bolts	Results
Flange	120 ft-lbs	16	} inspection
Body-Bonnet	150 ft-lbs	10	
Yoke-Actuator	15 ft-lbs	4	OK
Actuator Motor	110 in-lbs	4	3-OK 1-moved slightly (Note
Limit Switch A	50 in-lbs	2	OK
" " B	50 in-lbs	2	OK
" " C	50 in-lbs	4	OK
" " D	30 in-lbs	4	OK

note 1: end of 5" wrench moved approx 3/4"

Upset Condition Qualification Test #5
Test Begin: 7:00 Valve Pressurized to 300 PSI

Operability Verification
Stroking Time C-O: 75/5 = 15.0
O-C: 76/5 = 15.2

Contact Chatter - contact bounce, same contact as in tests 1-4, total duration 4 msec, chatter not continous, does not effect stroking. Occurs when contact changes state

Inspection

Item	Torque	#Bolts	Results
Flange	120 ft-lbs	16	OK
Body-Bonnet	150 ft-lbs	10	OK
Yoke-Actuator	15 ft-lbs	4	OK
Actuator Motor	110 in-lbs	4	OK
Limit Switch A	50 in-lbs	2	OK
" " B	50 in-lbs	2	OK
" " C	50 in-lbs	4	OK
" " D	30 in-lbs	4	OK

Emergency condition Qualification Test
Test Began: 7:13 Valve Pressurized to 300 PSI

Operability Verification
Stroking Time C-O: 74.5/5 = 14.9
O-C: 76./5 = 15.0

Contact Chatter - contact bounce when changing state same contact as in upset condition qual tests contact duration 3 msec, chatter not continous, does not affect stroking. Occurs only when contact changes state.

All A-OK

IT'S A VALVE !