Wayne H. Jens
Vice President
Nuclear Operations

Detroit Edison

Fermi-2
6400 North Dixie Highway
Newport, Michigan 48166
(313) 586-4150

November 20, 1984
EF2-71997

Director of Nuclear Reactor Regulation
Attention: Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Reference: 1) Fermi 2
NRC Docket No. 50-341

2) Detroit Edison Letter to NRC,"Submittal of SQRT List Update and Responses to Open Items", EF2-68287, dated June 22, 1984.

3) NUREG-0798, Safety Evaluation Report - Supplement No. 4, dated September, 1984.

Subject: Seismic Qualification of Equipment

Dear Mr. Youngblood:

Section 3.10 of Reference 3 indicated that as a result of the NRC's review of Reference 2, only Item (2) (c) [as identified in Section 3.10 of Supplement 3 to the SER] remained open. Edison has reviewed the status of valve V11-2006 and confirms the required modification has been completed, and the valve now meets the applicable seismic qualification criteria. This should resolve this remaining issue identified in SSER 4.

In addition, in accordance with SSER 3, item 3.10 (2) (d), and SSER 4, item 3.10.2 (b), attached are additional SQRT forms for equipment installed and qualified after the SQRT audit. These forms constitute the last set of SQRT forms to be submitted prior to fuel load. Edison, therefore, confirms that all safety-related equipment currently identified to be installed at time of fuel load is seismically qualified. As you are aware, Detroit Edison has a seismic qualification program to address future design changes with related Seismic Category I equipment. Edison will notify you of design changes identified subsequent to this letter and before fuel load, which require the qualification of additional equipment or structures not currently encompassed in Fermi 2 seismic qualification submittals to date.

A048
1/1

If you have any further questions on this matter, please contact Mr. O. K. Earle (313) 586-4211.

Sincerely,

Wayne H Jens

cc: Mr. P. M. Byron
Mr. M. D. Lynch
Mr. A. Lee
USNRC, Document Control Desk
Washington, DC 20555

bcc: F. E. Agosti
Y. A. Anand*
L. P. Bregni
R. A. Bryer
W. F. Colbert
O. K. Earle*
W. R. Holland
W. H. Jens (2)
R. S. Lenart
E. Lusis
P. A. Marquardt
T. D. Phillips
M. S. Rager
G. M. Trahey
R. A. Vance
A. E. Wegele
NOC Approval Control - ARMS Coding*
O. K. Earle (Bethesda Office)
Secretary's Office (2412 WCB)
NRR Chron File

* With attachment

SQRT FORM # 53 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Annubar Flow Element

1. Scope: ( ) NSSS (X) BOP
2. Model Number: ANR 76
3. Vendor: Dieterich Standard Corp.
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions 21.37" long, probe 0.813" x 0.813" square (approx.)
   c. Weight 10.5 lbs. (approx.)
6. Location: Building: Auxiliary
   Elevation: 691'-3"
7. Field Mounting Condition ( ) Bolt (No. ____, Size ____)
   (x) Weld (Length 5.7")
   ( ) ____
8. a. System in which located: T-46
   b. Functional Description Measures flow
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown (X) Both ( ) Neither
9. Pertinent Referenced Design Specifications IEEE 344-1975

III. **Is Equipment Available for Inspection in the Plant?** (X) **Yes** ( ) **No**
However it is inaccessible.

IV. **Equipment Qualification Method:**

( ) **Test** (X) **Analysis** ( ) **Combination of Test and Analysis**

Qualification Report*: ER-5109, Rev. A, "Seismic Analysis Qualification Annubar Flow Element Model ANR 76, Jan. 25, 1984 DECo File No. R3-865

Company that Prepared Report: Dieterich Standard Corp.

Company that Reviewed Report: DECo

V. **Vibration Input**

1. **Loads considered:** a.(X) **Seismic only**

b.( ) **Hydrodynamic only**

c.( ) **Combination of (a) and (b)**

2. **Method of Combining RRS:** ( ) **Absolute Sum** ( ) **SRSS**
(X) N/A
other, specify

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

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

5. **Required Acceleration in Each Direction:** ( ) **ZPA**
(X) 5g horizontal
3g vertical
other, specify

6. **Were fatigue effects or other vibration loads considered?**

(X) **Yes** ( ) **No**

If yes, describe loads considered and how they were treated in overall qualification program: The strouhal frequency of the fluid probe system was calculated and was compared with the natural frequency of the probe to ensure that the fluid forcing function would not cause the probe to resonate.

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

VI. If Qualification by Test then Complete*: N/A

1.( )Single Frequency ( )Multi-Frequency ( )random
( )sine beat ( )_____
other, specify

2.( )Single Axis ( )Multi-Axis

3. No. of Qualification Tests: OBE____SSE_____
Other_____

4. Frequency Range:_____

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

S/S =_____F/B =_____V =_____

6. Method of Determining Natural Frequencies_____

( )Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test( )Yes (Attach TRS & RRS Graphs)
( )No

8. Input g-level Test: OBE S/S =_____F/B =_____V =_____

SSE S/S =_____F/B =_____V =_____

9. Laboratory Mounting:

1.( )Bolt (No.___,Size_____) ( ) Weld (Length_____) ( )_____

10. Functional operability verified:( )Yes ( )No ( )Not Applicable

11. Test Results including modifications made:_____

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

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

VII. If Qualification by Analysis, then Complete:

1. Method of Analysis:

( )Static Analysis (X)Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

S/S = Not determined F/B = 299 HZ V = 299 HZ

3. Model Type:( )3D ( )2D (X)1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered: _____

(X)Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other: N/A (specify)

6. Damping: OBE - SSE - Basis for the damping used: N/A

7. Support Considerations in the model: Fixed

8. Critical Structural Elements: Exterior probe and internal tubes

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
Probe	Static Port		1795	2282	18,800 psig
Inner Tubes	Welds		3208	4210	18,800 psig

B.

Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
1.02×10^{-3} in	Static port of probe	5° or 0.715 in.

VIII. List of Subcomponents N/A

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

* If Available
** Yes = Yes, N = No, U = Unknown

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed

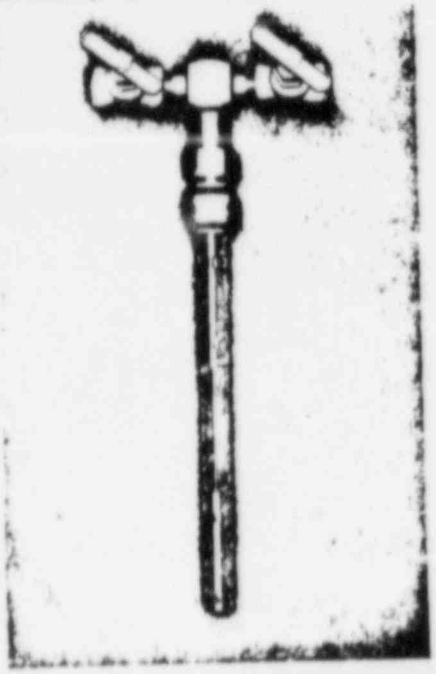
ANNUBAR
Flow Measurement

Industrial Line

Dieterich Standard Corporation

DS-1000 (5/79)
Section B

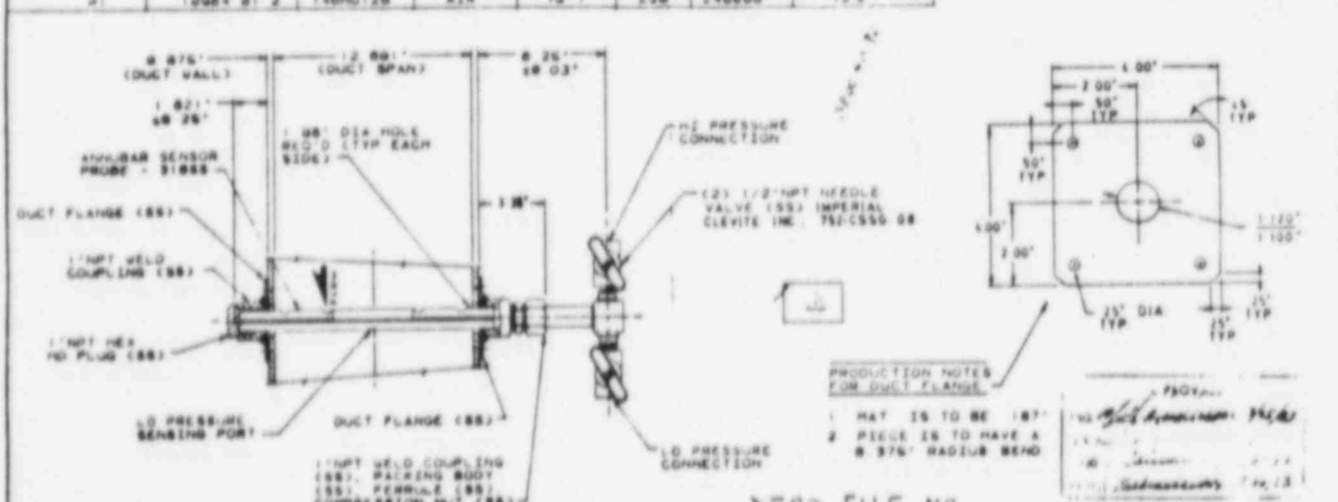
Regular models
General purpose flow applications



ITEM NO	SERIAL NO	TAG NO	FLUID	DESIGN PRESS (PSIA)	TEMP (°F)	FLOW (CFM)	APPROX WEIGHT (LBS)
01	10984 01 1	T48NO12A	AIR	14.7	250	240000	10.5
02	10984 01 2	T48NO12B	AIR	14.7	250	240000	10.5

REVISIONS	DESCRIPTION
A	ISSUE
B	ECR R1394

SU-2735



PRODUCTION NOTES FOR DUCT FLANGE

1. MAT IS TO BE .187"
2. PIECE IS TO HAVE A 0.375" RADIUS BEND

DECO FILE NO.
R3-870

NOTES

1. PERMANENT RUSTPROOF METAL TAG SHOWING MODEL NUMBER, LINE SIZE, SERIAL NUMBER AND INFORMATION AS SUPPLIED BY CUSTOMER (i.e. TAG NUMBER, DESIGN FLOWS/METER READINGS)
2) ANNUBAR TO BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH ASME B&PV CODE SECTION III, CLASS 3 LESS ANI AND STAMP
3) WELDING OF ALL PRESSURE RETAINING AND WETTED PARTS TO BE PER EP-4005, PARAGRAPH 3.0
4) VISUAL WELD EXAMINATION PER ES-1010
5) ASSEMBLY TO BE HYDROSTATICALLY TESTED PER EP-4017
6) DYE PENETRANT INSPECTION TO BE PER ES-1012
7) ASSEMBLY TO BE CLEANED PER ES-1000
8) SPECIAL HANDLING PER EP-4023
9) PACKING, SHIPPING AND STORAGE OF ASSEMBLY TO BE PER EP-4027

DETROIT EDISON CO
P O NO 1A58785
DUC CONTROL NO P-0984

ANR 78 DUCT ANNUBAR

SU-2735 B

SQRT FORM #54

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Presure Transmitter

1. Scope: ( ) NSSS (X) BOP
2. Model Number: 1153GB7
3. Vendor: Rosemount
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions 4-1/2" x 4-1/2" x 9" H
   c. Weight 13 lbs.
6. Location: Building: Reactor
   Elevation: Varies
7. Field Mounting Condition ( ) Bolt (No. 4, Size 5/16")
   ( ) Weld (Length ____)
   ( ) ____
8. a. System in which located: T-49
   b. Functional Description Measurement of Gage Pressure
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown
   (X) Both ( ) Neither
9. Pertinent Referenced Design Specifications IEEE-344-1975

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

IV. Equipment Qualification Method:

(X) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: Rosemount Report 108025, Rev. B, 2/22/83:
Qualification report for pressure transmitters
(No., Title and Date) Rosemount Model 1153 Series B (DECo #C1-1689)

Company that Prepared Report: Rosemount

Company that Reviewed Report: DECo

V. Vibration Input

1. Loads considered: a. (X) Seismic only

b. ( ) Hydrodynamic only

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

2. Method of Combining RRS: ( ) Absolute Sum ( ) SRSS
( ) N/A other, specify

3. Required Response Spectra (attach the graphs): See Attachment "A"
(Generic Requirement by the vendor)

4. Damping Corresponding to RRS: OBE 5% SSE 5%

5. Required Acceleration in Each Direction: ( ) ZPA
( ) other, specify

6. Were fatigue effects or other vibration loads considered?

(X) Yes ( ) No

If yes, describe loads considered and how they were treated in overall qualification program: Sine vibration sweep in a limited frequency range to simulate semi-rigid mounting at field.

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

VI. If Qualification by Test then Complete*:

1.( )Single Frequency (X)Multi-Frequency ( )random
( )sine beat ( )_____
other, specify

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

3. No. of Qualification Tests: OBE 5 SSE 1
Other_____

4. Frequency Range: 1-33

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

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

6. Method of Determining Natural Frequencies See note 1 below

( )Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test (X)Yes (Attach TRS & RRS Graphs)
( )No See Attachment "A"

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

9. Laboratory Mounting:

1.(X)Bolt (No. 4 ,Size 5/16) ( ) Weld (Length_____) ( )_____

10. Functional operability verified:(X)Yes ( )No ( )Not Applicable

11. Test Results including modifications made: Satisfactory

12. Other tests performed (such as aging or fragility test, including results): Aging: Thermal, Functional, Radiation, Seismic.
Results: Satisfactory

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

Item VII. Note 1. Resonance search was conducted by a low level (approx. 0.2g single axis sine sweep from 1 to 60 HZ, in each of three orthogonal axes. The sweep rate was one octave per minute. The test results are given in Table 16, Page 44 of the O.T.R. (Type Test Report, Vol. 1, Test Results).

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

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

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

3. Model Type:( )3D ( )2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered:_____

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other:_____
(specify)

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

7. Support Considerations in the model:_____

8. Critical Structural Elements:_____

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

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

VIII. List of Subcomponents

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

* If Available
** Yes = Yes, N = No, U = Unknown

SORT FORM

IX. Sketch or drawing installed

How it has been installed

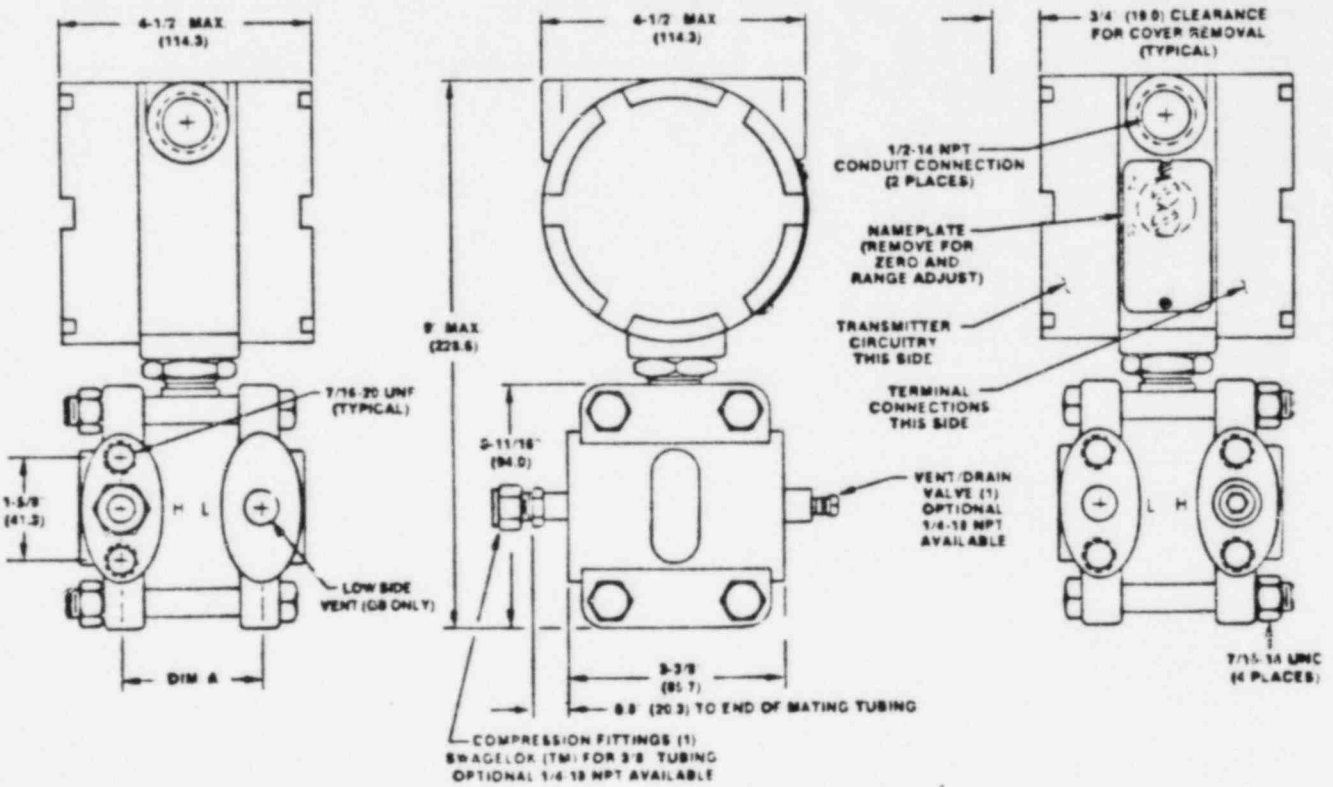
or

How it will be installed

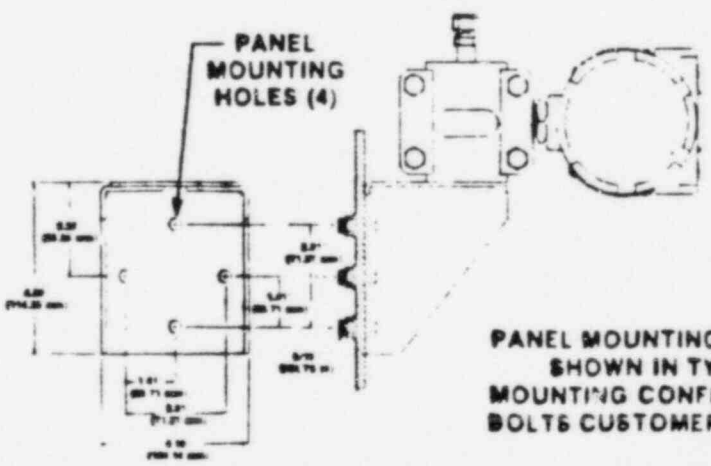
From
Rosemount Inc. 1978
Product Data Sheet
2302

Rosemount
PRESSURE TRANSMITTERS

DIMENSIONAL DRAWINGS
MODEL 1153AB AND 1153GB



TYPICAL MOUNTING CONFIGURATION



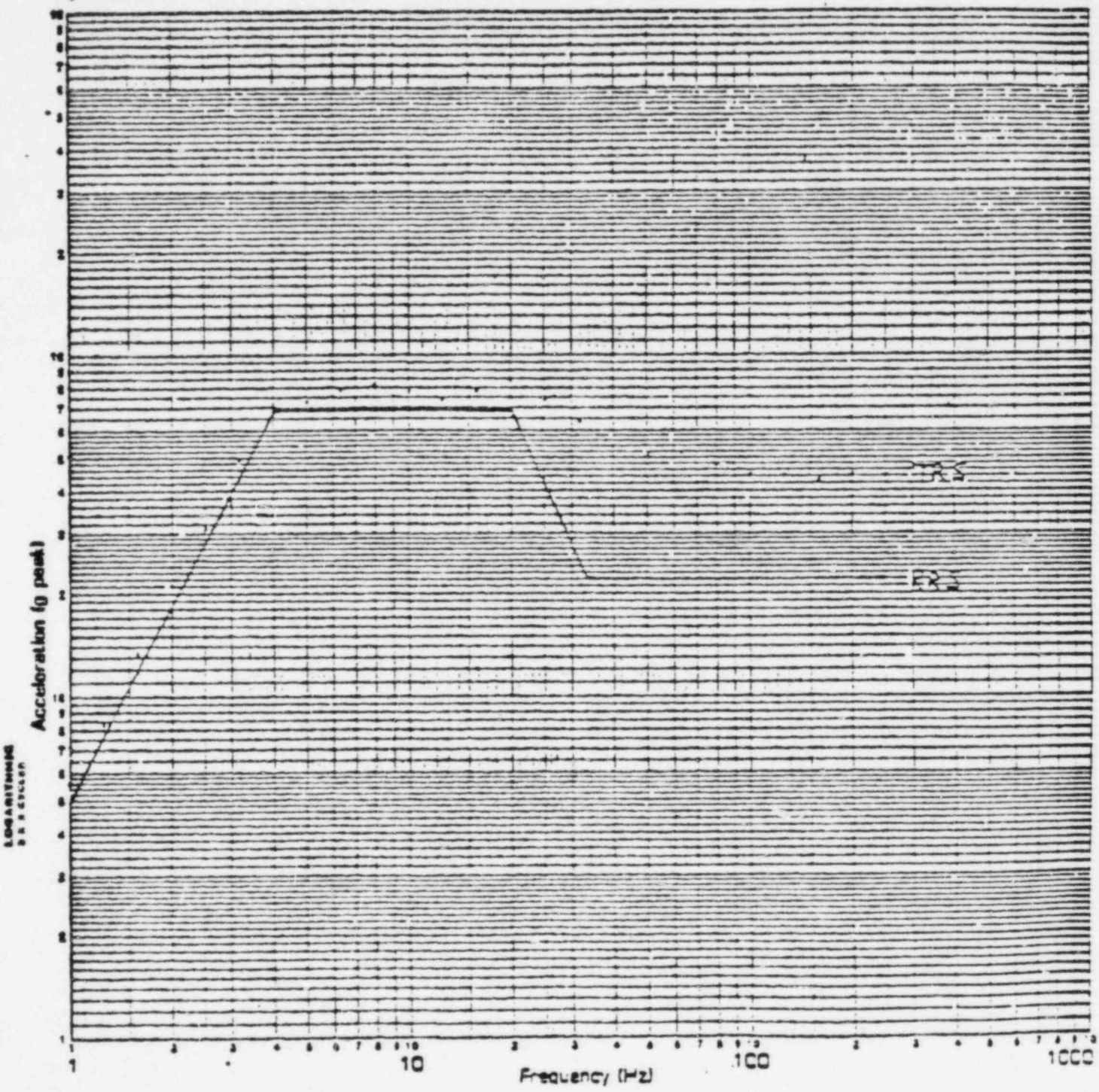
PANEL MOUNTING BRACKET SHOWN IN TYPICAL MOUNTING CONFIGURATION BOLTS CUSTOMER SUPPLIED

Page No. 60
Report No. 45353-1

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING 5 %



SPECIMEN 345 LOCATION NO. HEA

AXIS Long/V TEST RUN NO. 22

SQRT FORM # 55 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Differential Pressure Transmitter

1. Scope: ( ) NSSS (X) BOP
2. Model Number: Veltron/4 - BEJPV
3. Vendor: Air Monitor Corporation
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions
   c. Weight 55 lbs (approximately)
6. Location: Building: Auxiliary
   Elevation: 3rd Floor
7. Field Mounting Condition (X) Bolt (No. 2, Size 0.281)
   ( ) Weld (Length)
   (X) Additional silicon adhesive GE RTV-108
8. a. System in which located: T-41
   b. Functional Description Monitor differential pressure for room pressurization (Ref. NUREG 75/087)
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown (X) Both ( ) Neither
9. Pertinent Referenced Design Specifications IEEE 344-1975

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

IV. Equipment Qualification Method:

(X) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: 1A-57815, IEEE-323 & IEEE-344 Qualification Summary. 1/25/84. DECo File No. C1-2529. This report is to be used in conjunction with C1-2530 and C1-2531.
(No., Title and Date)

Company that Prepared Report: Wyle Laboratories for Air Monitor Corp. Test Report No. 58800 and 58619

Company that Reviewed Report: DECo

V. Vibration Input

1. Loads considered: a. (X) Seismic only

b. ( ) Hydrodynamic only

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

2. Method of Combining RRS: ( ) Absolute Sum ( ) SRSS
( ) other, specify

3. Required Response Spectra (attach the graphs): See Attachments "A" and "B"

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

5. Required Acceleration in Each Direction: ( ) ZPA
(X) See Attachment "C"
other, specify

6. Were fatigue effects or other vibration loads considered?

(X) Yes ( ) No

If yes, describe loads considered and how they were treated in overall qualification program: See page 22, Wyle Lab Qualification Plan 57612-1, DECo File C1-2531. Operational Cycling Effects. Aging effects of mechanical cycling were found to be insignificant.

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

VI. If Qualification by Test then Complete*:

1.( )Single Frequency (X)Multi-Frequency (X)random
( )sine beat ( )_____
other, specify

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

3. No. of Qualification Tests: OBE 5 SSE 1
Other_____

4. Frequency Range: 1¼ to 40 HZ

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): 30 HZ combined. See Attachment "D", Transmissibility curve.

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

6. Method of Determining Natural Frequencies Resonance search

(X)Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test(X)Yes (Attach TRS & RRS Graphs)
( )No

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

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

9. Laboratory Mounting: See Page 23, Wyle Qualification Plan 57612-1, Rev. A, DECo C1-2531. Mounting hole pattern of equipment is simulated in the test fixture.

1.(X)Bolt (No.___,Size_____) ( ) Weld (Length_____) ( )_____

10. Functional operability verified:(X)Yes ( )No ( )Not Applicable

11. Test Results including modifications made: Satisfactory

12. Other tests performed (such as aging or fragility test, including results): Baseline functional, radiation, aging, time-temperature effect, operational cycling effect.

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

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

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

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

3. Model Type:( )3D ( )2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered:_____

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other:_____
(specify)

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

7. Support Considerations in the model:_____

8. Critical Structural Elements:_____

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

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

VIII. List of Subcomponents

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

2.0 IEEE-323 QUALIFICATION (WYLE Report No. 58800)

2.1 DESCRIPTION OF COMPONENTS

a) Electronic Differential Pressure Transducer
Manufacturer / Model: Air Monitor Corp., Veltron Series 2000

b) Electronic Signal Conditioner/Scaling Multiplier
Manufacturer / Model: Air Monitor Corp., Factron Series 1500
Note: Two different models of the Factron Series (1000 & 1750) were qualified in the following test. Together these models contain all of the components and systems incorporated in any other single model in the Factron line. Therefore, their qualification will qualify all Factron models, due to their similarity of construction and components. The Factron 1000 contains all of the components and systems in the Factron 1500, plus the most sensitive system tested, a square rooting circuit, which is not incorporated in the 1500. Since the Factron 1000 is qualified, the Factron 1500 is considered to be also.

c) Fuse
Manufacturer / Model: Bussman/Fusetron FRN-R-1

d) Fuse Block
Manufacturer / Model: Allen Bradley, 1491-N122

e) Terminal Strip
Manufacturer / Model: General Electric, CR151A2

f) Pneumatic Tubing, Polyeurethane
Manufacturer / Model: J.P. Stevens, MP1880

g) Electrical Wiring
Manufacturer / Model: Carol, 18 ga. MTW

h) Wire Connectors
Manufacturer / Model: Molex, series 22

i) Bulkhead Connectors
Manufacturer / Model: Parker, 01600-7002

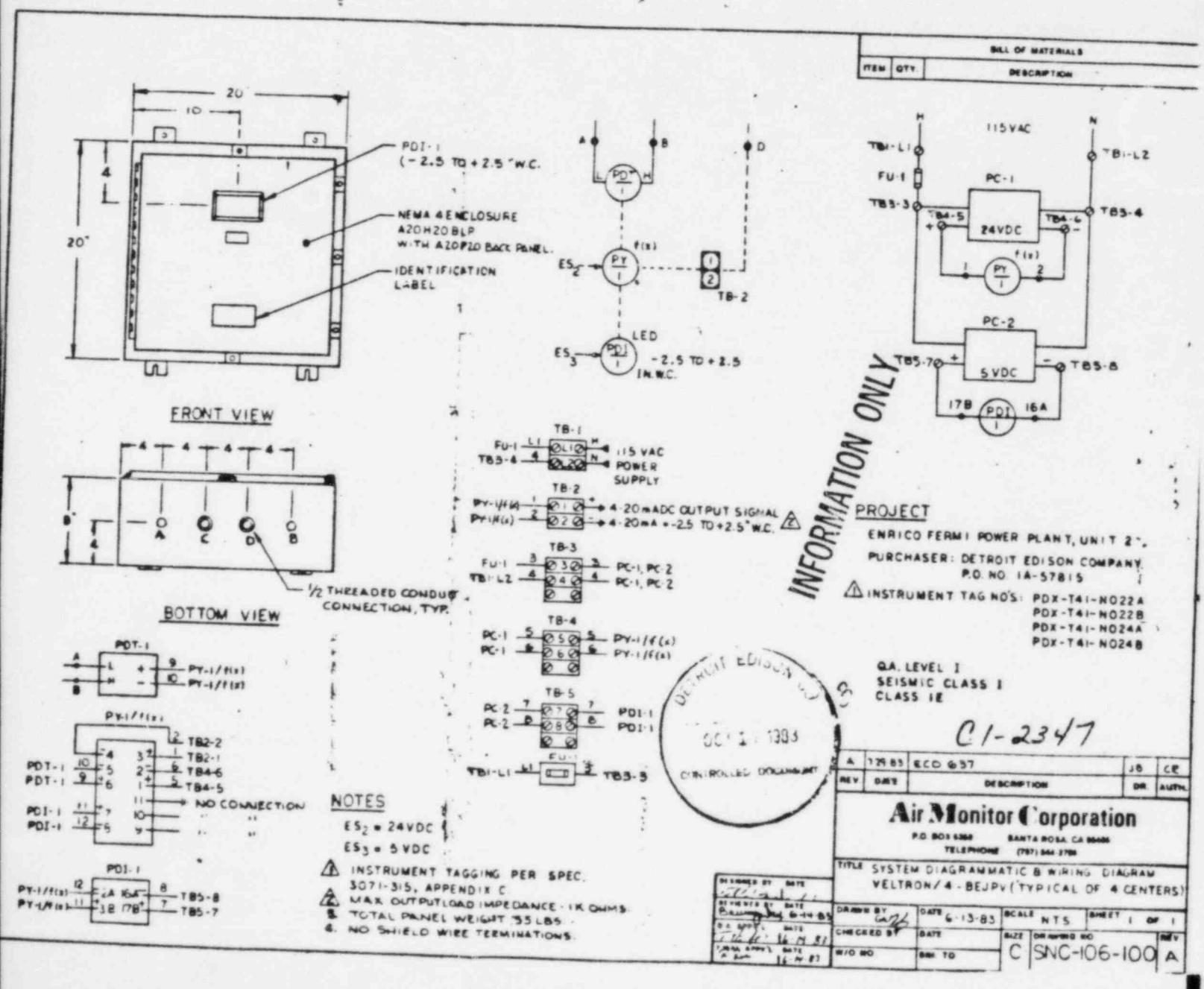
j) 20" x 20" NEMA Type 4 Enclosure
Manufacturer / Model: Hoffman, A20H20BLP

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed



ATTACHMENT "A"

FIG. 1 - HORIZONTAL ACCELERATIONS

WYLE LABORATORIES SCIENTIFIC SERVICES & SYSTEMS GROUP

IEEE-323 & 344 QUALIFICATION SUMMARY
Document No. 1A-57815

1-25-1984

CUSTOMER AIR MONITOR Job No. 58800 Date 3-1-83

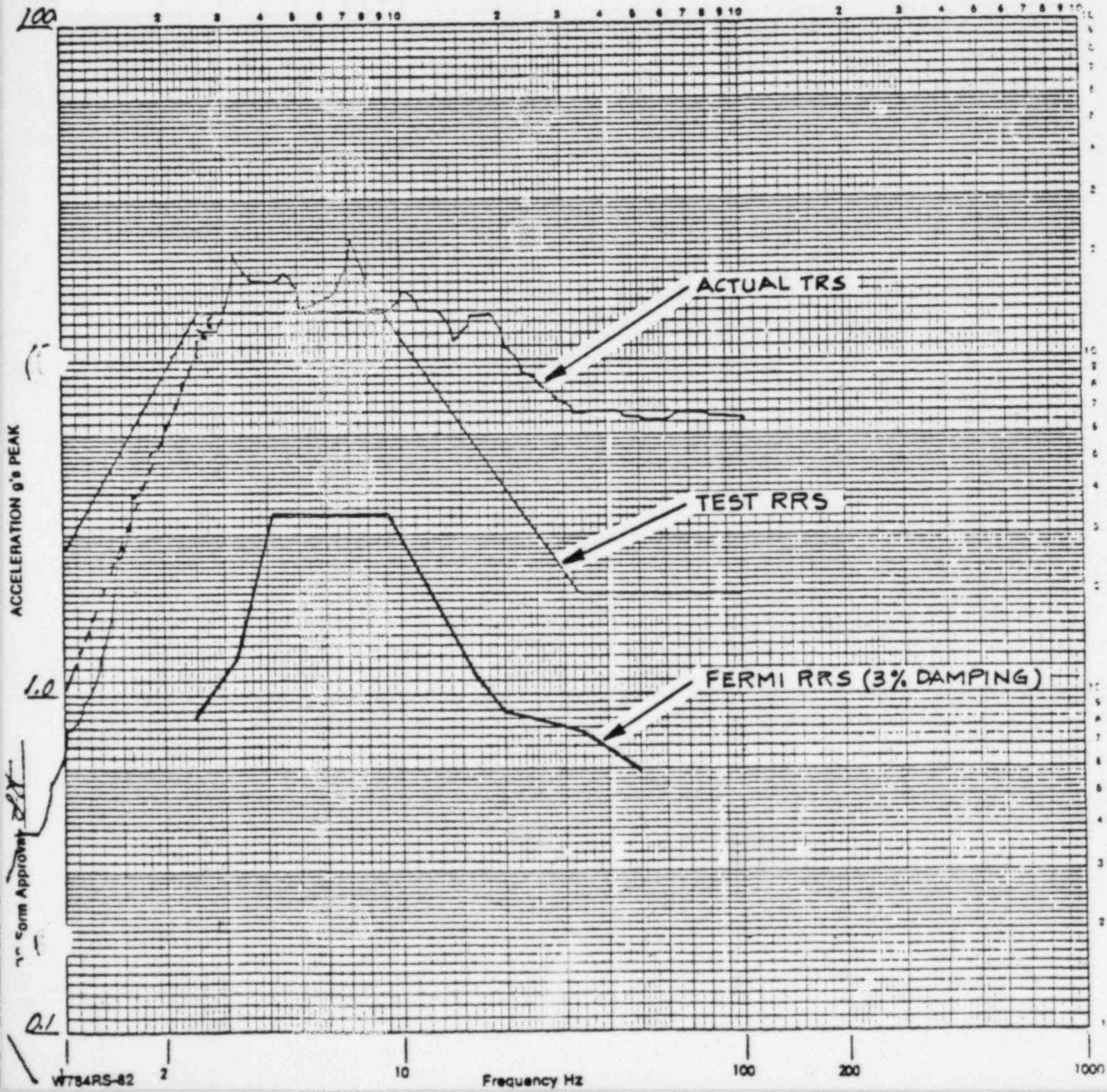
Specimen Diff. Pressure Transducer Center Axis of Test X-Y

Accel. No. 1 Axis Horiz Control (✓) Response ( ) OBE ( ) SSE (✓) DBE ( )

Full Scale 100 g Damping 3 % Run No. 6

Operator GREENMAN Engineer Ross

RESPONSE SPECTRUM



W784RS-82

FIG. 2 - VERTICAL ACCELERATIONS

WYLE LABORATORIES SCIENTIFIC SERVICES & SYSTEMS GROUP

IEEE-323 & 344 QUALIFICATION SUMMARY
Document No. 1A-57815

1-25-1984

CUSTOMER AIR MONITOR Job No. 58800 Date 3-1-83

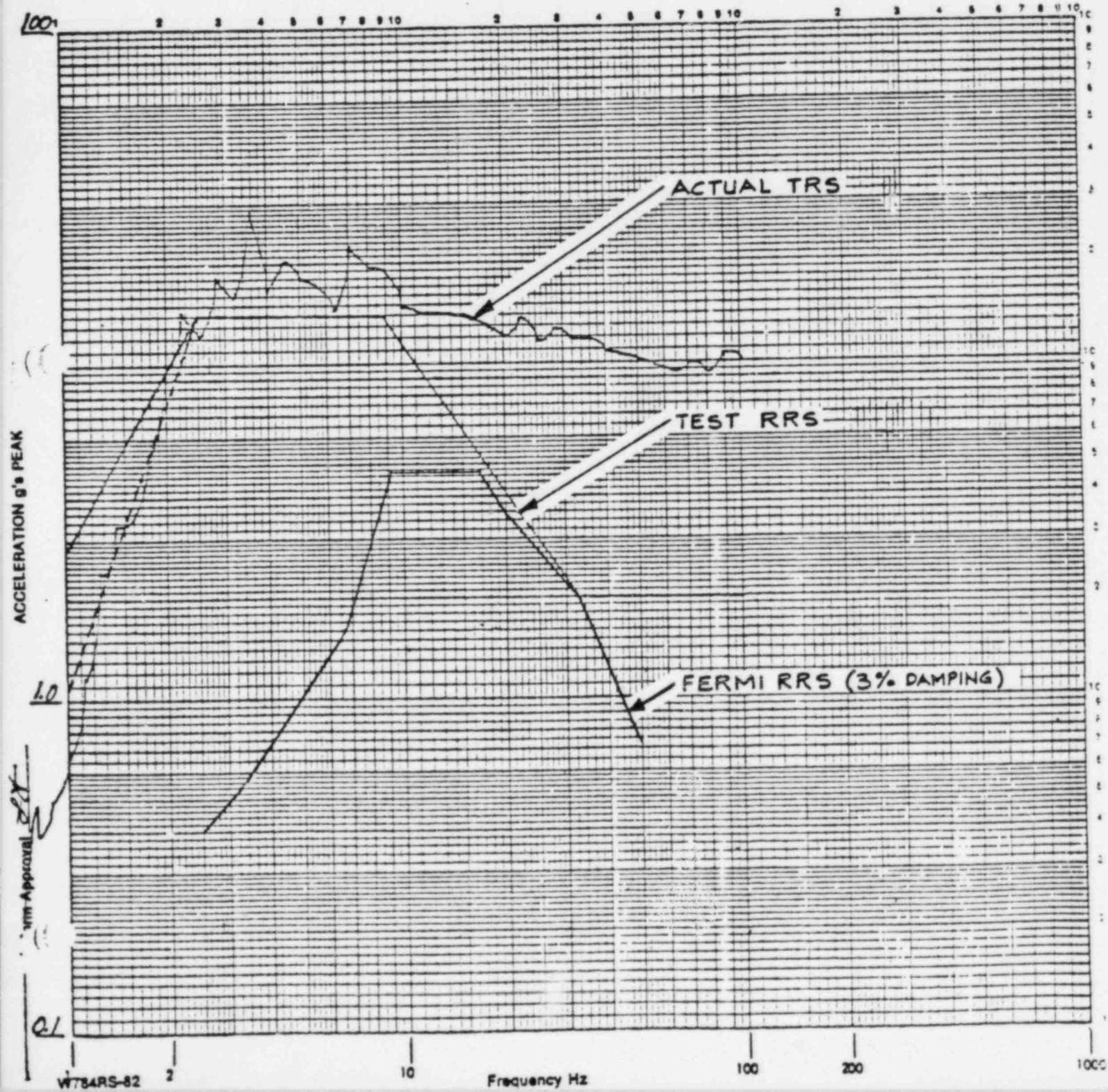
Specimen DIFF. PRESSURE TRANSDUCER CENTER Axis of Test X-Y

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

Full Scale 100 g Damping 3 % Run No. 6

Operator GREENMAN Engineer RMM

RESPONSE SPECTRUM



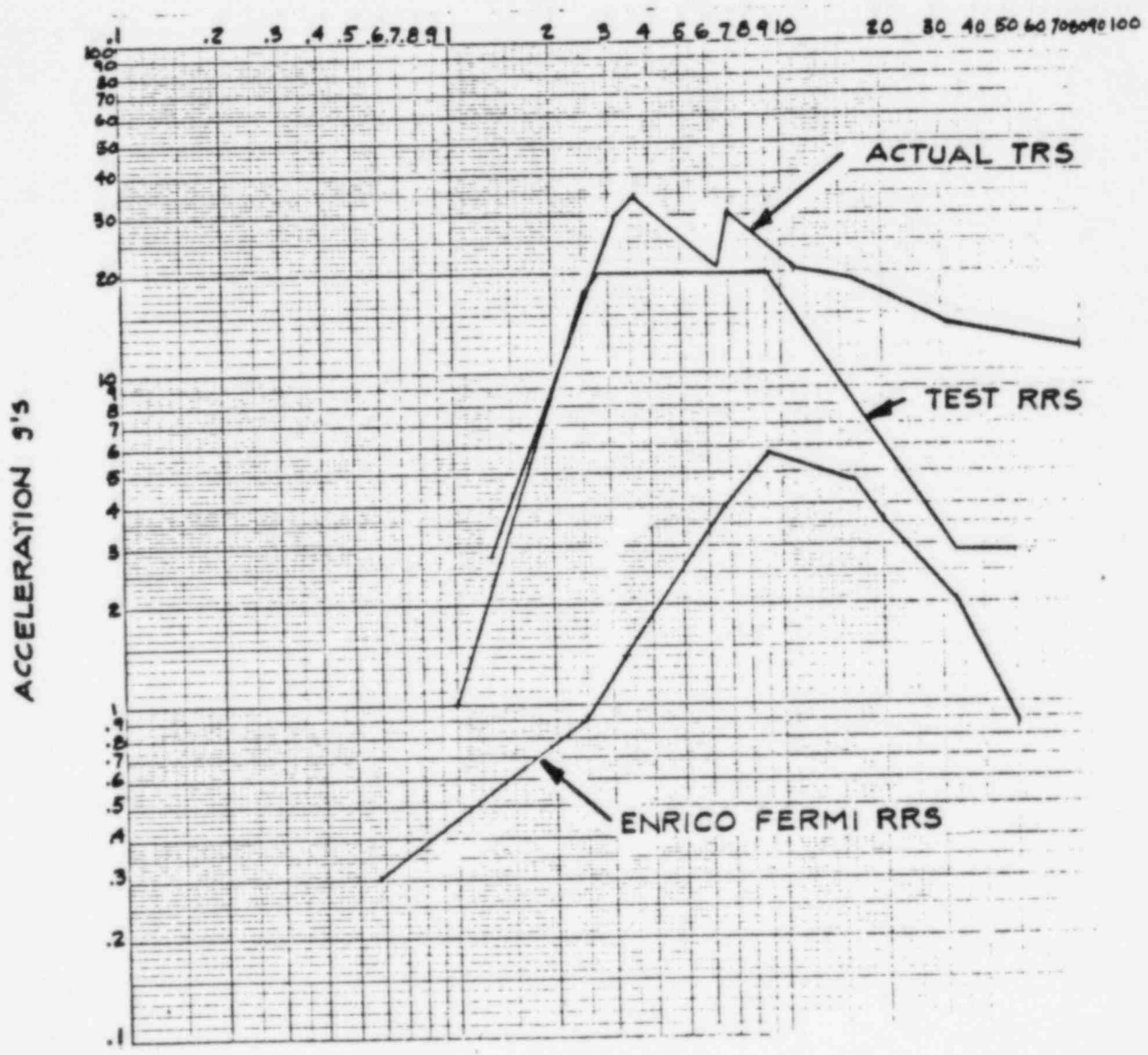
W784RS-82

Air Monitor Corporation
SANTA ROSA • CALIFORNIA

IEEE-323 & 344 QUALIFICATION SUMMARY
Document No. 1A-57815

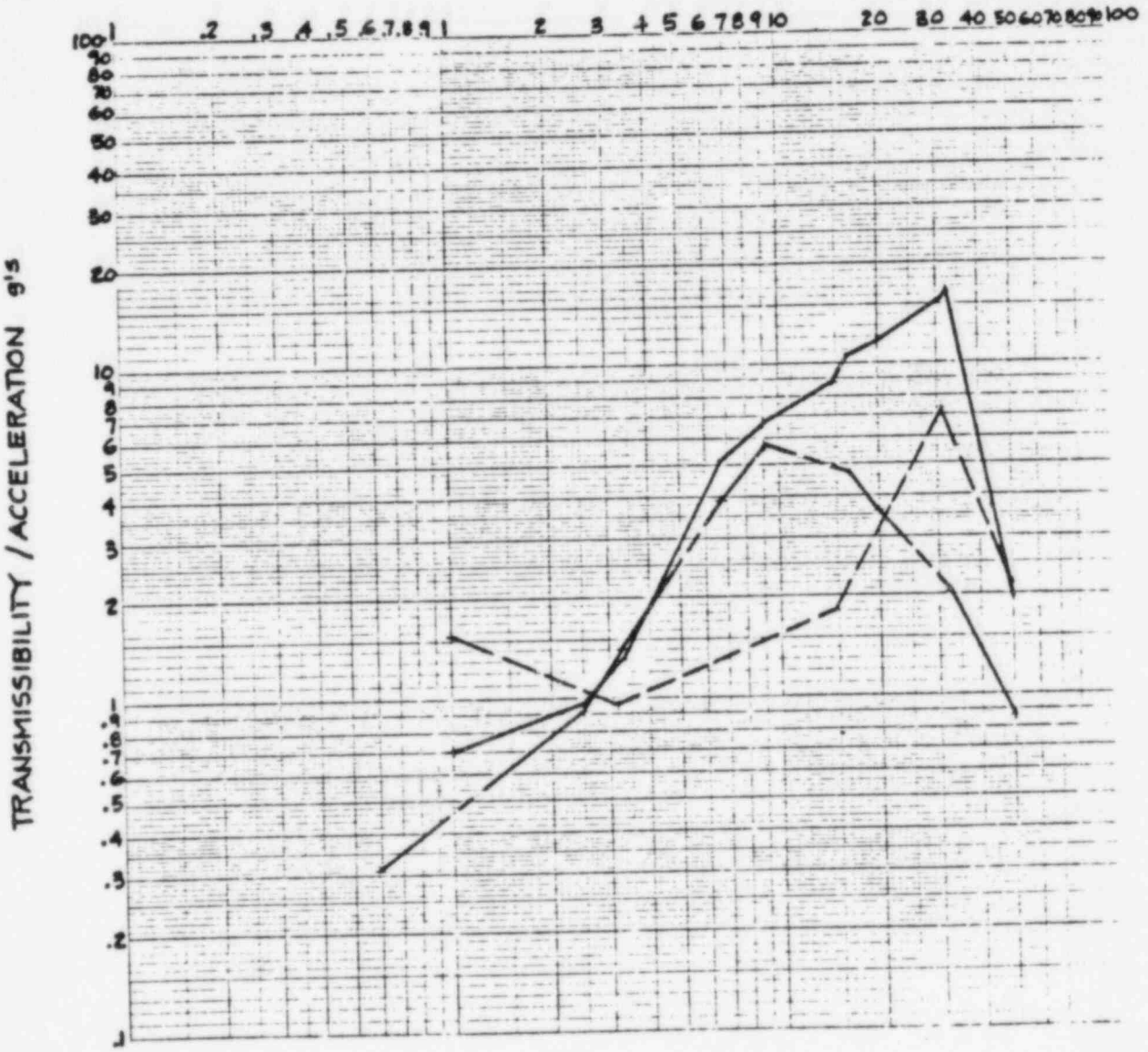
1-25-1984 page 17 of 19

FIG. 3 - COMBINED ACCELERATIONS



Air Monitor Corporation
SANTA ROSA • CALIFORNIA

FIG. 4 - TRANSMISSIBILITY (DOOR-MOUNTED EQUIPMENT)



——— PEAK AMPLIFIED ACCELERATION
—·—·— FERMI RRS
– – – – – TRANSMISSIBILITY (COMBINED SPECTRA, FROM PGS. 5-64 & 5-72 OF WYLE REPORT Nº 58800)

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Pressure Regulator

1. Scope: ( ) NSSS (X) BOP
2. Model Number: Circle Seal NP20-2
3. Vendor: Circle Seal Controls
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions See page 6
   c. Weight 5 lbs. approximately
6. Location: Building: Reactor
   Elevation: 2nd and 3rd Floor
7. Field Mounting Condition ( ) Bolt (No. ____, Size ____)
   ( ) Weld (Length ____)
   (X) Male/Female Connector
8. a. System in which located: T50
   b. Functional Description Pressure Regulator for Primary Containment H_2-O_2 Monitoring System
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown
   (X) Both ( ) Neither
9. Pertinent Referenced Design Specifications IEEE-344-1975

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

IV. Equipment Qualification Method:

(X) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: Seismic Test Report of Circle Seal Controls Part No. NP20-2 including Test Report #16262 of
(No., Title and Date) Environmental Action Testing Corp. DECo File No. C1-2585

Company that Prepared Report: Circle Seal Controls

Company that Reviewed Report: DECo

V. Vibration Input

1. Loads considered: a. (X) Seismic only

b. ( ) Hydrodynamic only

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

2. Method of Combining RRS: ( ) Absolute Sum ( ) SRSS
( ) _____ other, specify

3. Required Response Spectra (attach the graphs): Attachment "A" Generic by Vendor

4. Damping Corresponding to RRS: OBE 1% SSE 1%

5. Required Acceleration in Each Direction: ( ) ZPA
( ) N/A other, specify

6. Were fatigue effects or other vibration loads considered?

( ) Yes ( ) No NOT MENTIONED IN TEST REPORT

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

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

VI. If Qualification by Test then Complete*:

1.( )Single Frequency (X)Multi-Frequency (X)random
( )sine beat ( )_____
other, specify

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

3. No. of Qualification Tests: OBE 5 SSE 1
Other_____

4. Frequency Range: 1 - 35 HZ

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): None below 35 HZ, Reference Page 8 of Report

S/S =_____F/B =_____V =_____

6. Method of Determining Natural Frequencies Resonance Search

( )Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test(X)Yes (Attach TRS & RRS Graphs)
Attachment "A"
( )No

8. Input g-level Test: OBE S/S =_____F/B =_____V =_____ N/A

SSE S/S =_____F/B =_____V =_____

9. Laboratory Mounting:

1.( )Bolt (No.___,Size____) ( ) Weld (Length____) (X) Bulkhead type fixture

10. Functional operability verified:(X)Yes ( )No ( )Not Applicable

11. Test Results including modifications made: Satisfactory

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

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

VII. If Qualification by Analysis, then Complete:

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

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

3. Model Type:( )3D ( )2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered:_____

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other:_____
(specify)

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

7. Support Considerations in the model:_____

8. Critical Structural Elements:_____

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

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

VIII. List of Subcomponents

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

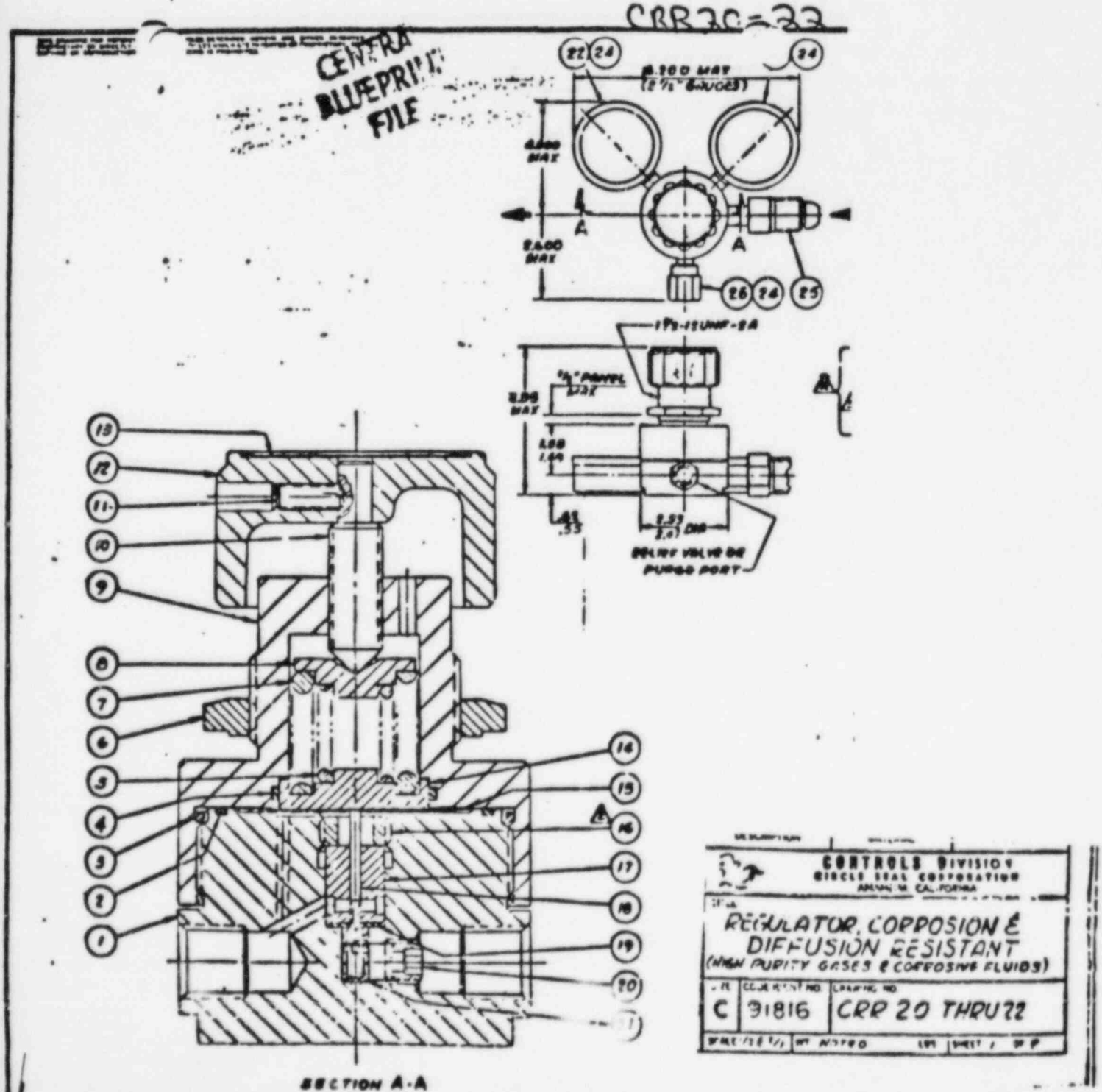
* If Available
** Yes = Yes, N = No, U = Unknown

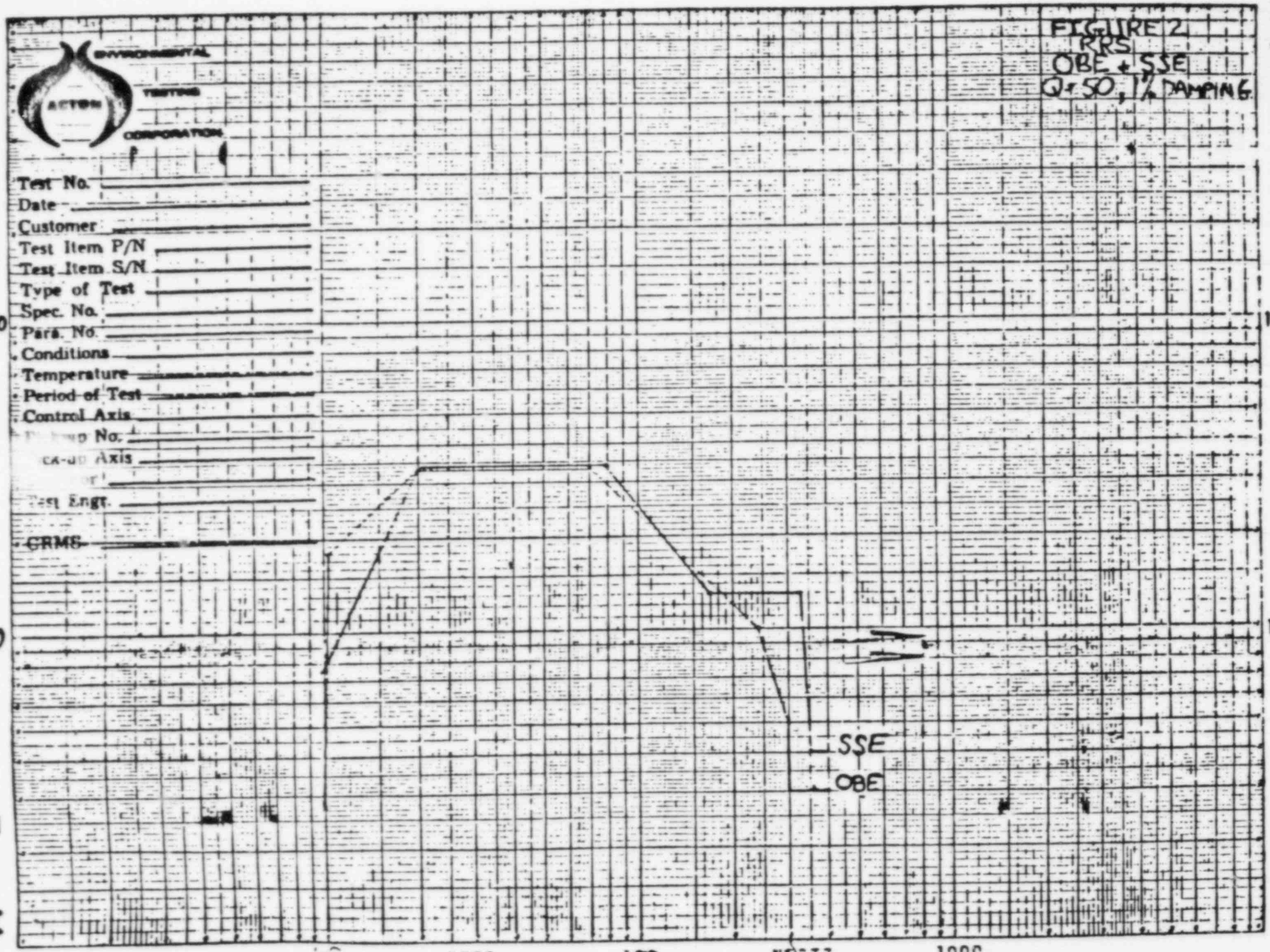
IX. Sketch or drawing installed

How it has been installed

or

How it will be installed





ATTACHMENT "A"

SQRT FORM #57 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Differential Pressure Switch

1. Scope: (X) NSSS ( ) BOP
2. Model Number: 580A-0
3. Vendor: ITT Barton
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions See page 6
   c. Weight 15 lbs. approximately
6. Location: Building: Reactor Building sub-basement
   Elevation: 548'-0"
7. Field Mounting Condition (X) Bolt (No. 4, Size 3/8)
   ( ) Weld (Length ____)
   ( ) ____
8. a. System in which located: T-23
   b. Functional Description Differential Pressure Switch for Primary Containment Vent System
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown ( ) Both (X) Neither
9. Pertinent Referenced Design Specifications IEEE - 344 -1975

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

IV. Equipment Qualification Method:

(X) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: R3-580A-9, ITT Barton Qualification Test Report; 580A Series Differential Pressure Switch; 12/83;
(No., Title and Date) DECo File No. C1-2586 (4 Volumes)

Company that Prepared Report: ITT Barton

Company that Reviewed Report: Seismic Review by DECo

V. Vibration Input

1. Loads considered: a. (X) Seismic only

b. ( ) Hydrodynamic only

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

2. Method of Combining RRS: ( ) Absolute Sum ( ) SRSS
( ) N/A other, specify

3. Required Response Spectra (attach the graphs): See Attachments "A" and "B"

4. Damping Corresponding to RRS: OBE 5% SSE 5%

5. Required Acceleration in Each Direction: ( ) ZPA
( ) N/A other, specify

6. Were fatigue effects or other vibration loads considered?

(X) Yes ( ) No

If yes, describe loads considered and how they were treated in overall qualification program: Accelerated aging.
Result: Satisfactory

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

VI. If Qualification by Test then Complete*:

1.( )Single Frequency (X)Multi-Frequency ( )random
( )sine beat ( )_____
other, specify

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

3. No. of Qualification Tests: OBE 5 SSE 1
Other_____

4. Frequency Range: 1 to 100 HZ _____

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): Resonance search indicated resonance above 40HZ in all directions (Page IV-17, Volume 2 of Report)

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

6. Method of Determining Natural Frequencies Resonance Search

(X)Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test( )Yes (Attach TRS & RRS Graphs)
( )No

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

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

9. Laboratory Mounting:

1.( )Bolt (No.___,Size____) ( ) Weld (Length____) (X)Simulation of Actual Mounting

10. Functional operability verified:(X)Yes ( )No ( )Not Applicable

11. Test Results including modifications made: Satisfactory

12. Other tests performed (such as aging or fragility test, including results): Aging, Radiation, LOCA. Results satisfactory. Section 4.13, pages 29 and 30. Volume 1 of Report.

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

VII. If Qualification by Analysis, then Complete:

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

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

3. Model Type:( )3D ( )2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered:_____

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other:_____
(specify)

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

7. Support Considerations in the model:_____

8. Critical Structural Elements:_____

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

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

VIII. List of Subcomponents

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

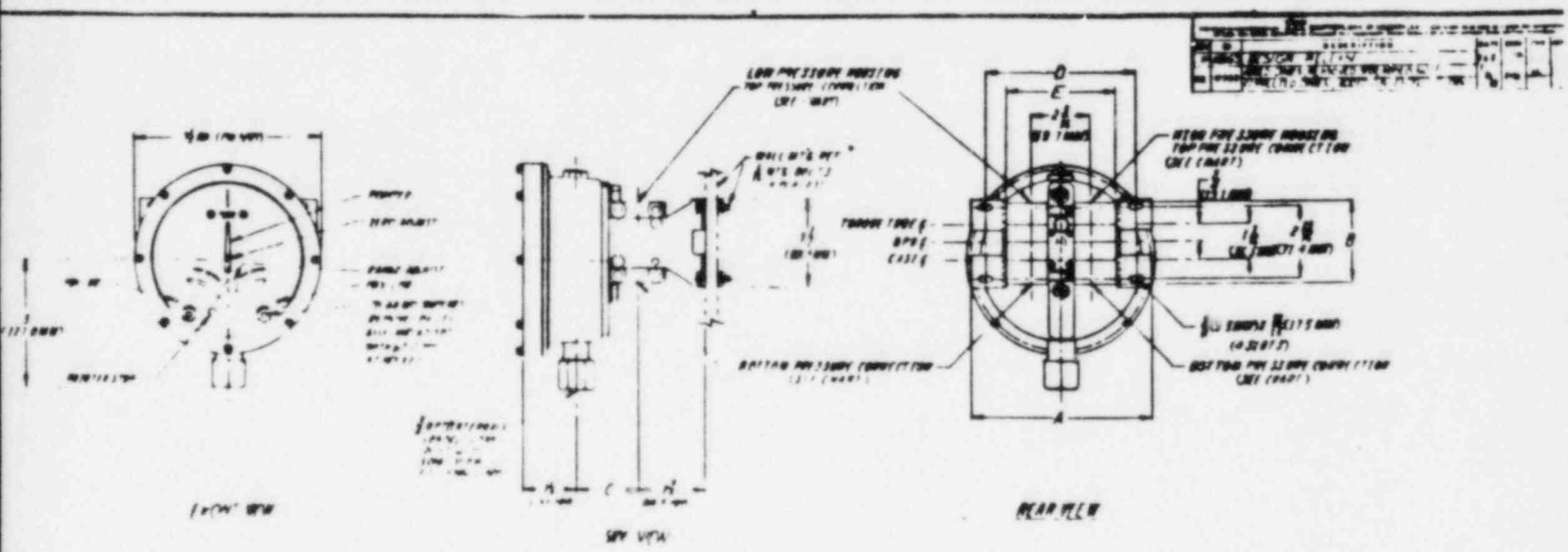
* If Available
** Yes = Yes, N = No, U = Unknown

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed



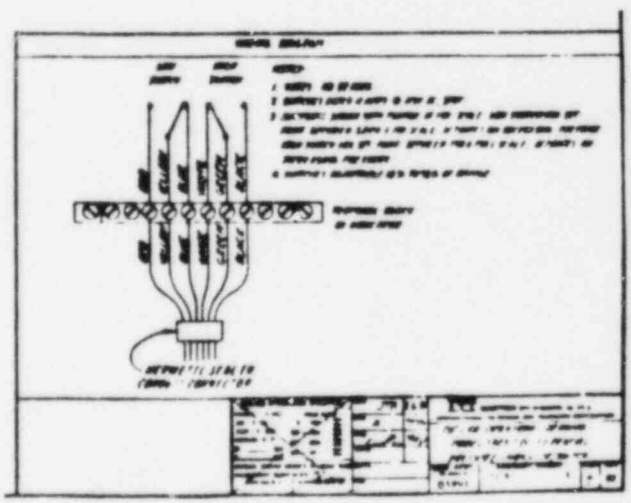


Figure 5-3. Outline Dimension Drawing Model 580A-C

REF: Qualification Report
Volume

Figure 11.1 RUN OBEYZ1 AH

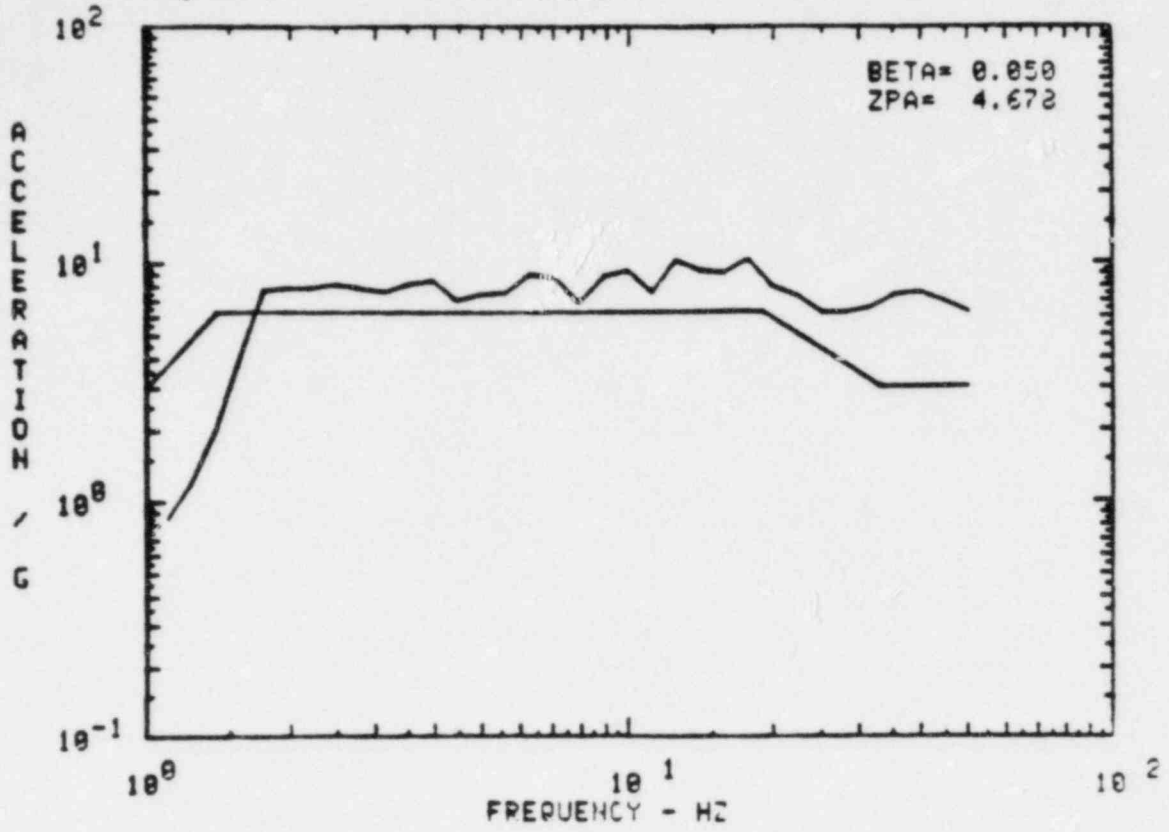


Figure 11.2 RUN OBEYZ1 AV

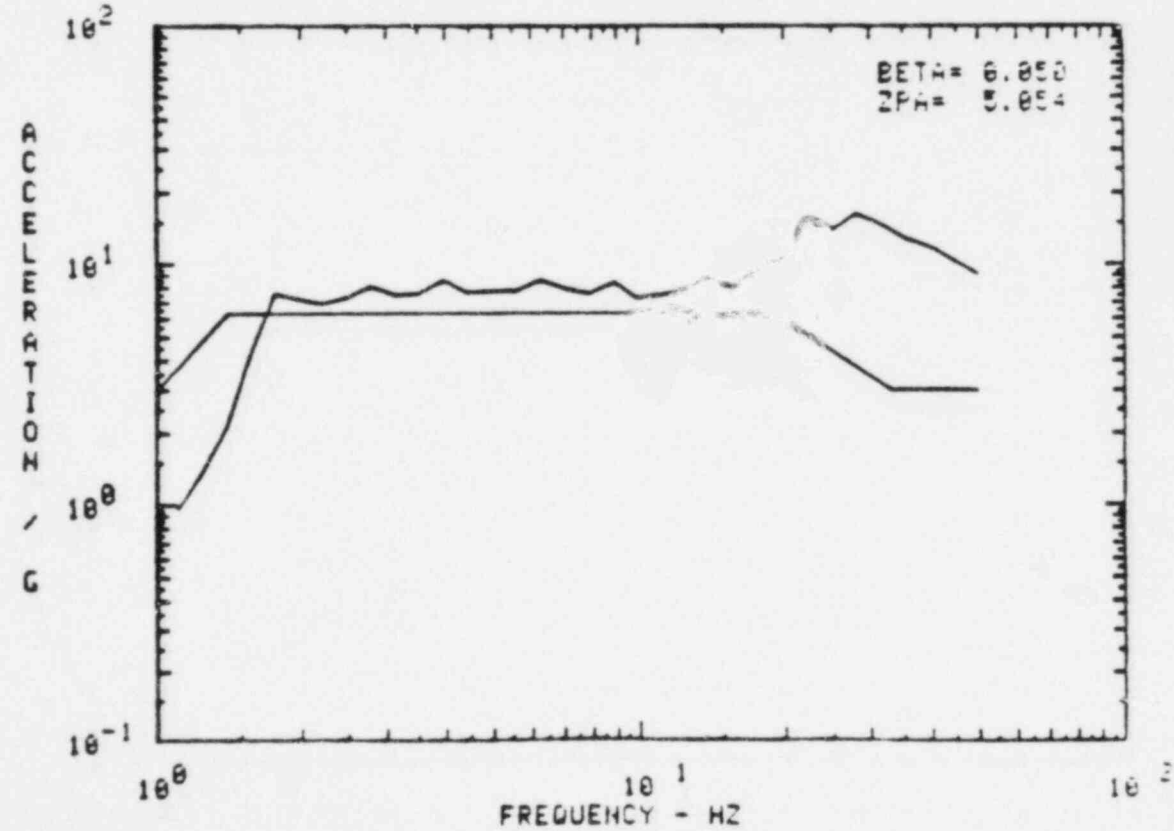


Figure 11.11 RUN SSEYZ1 AH

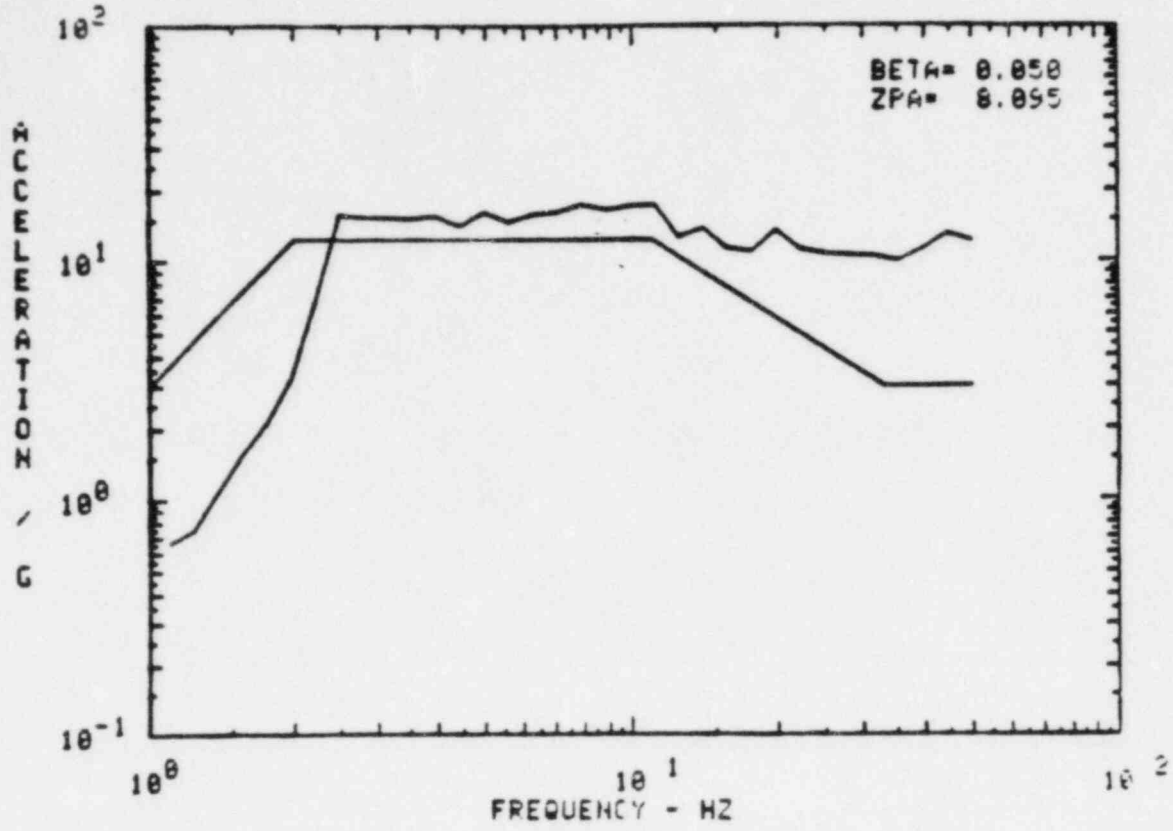
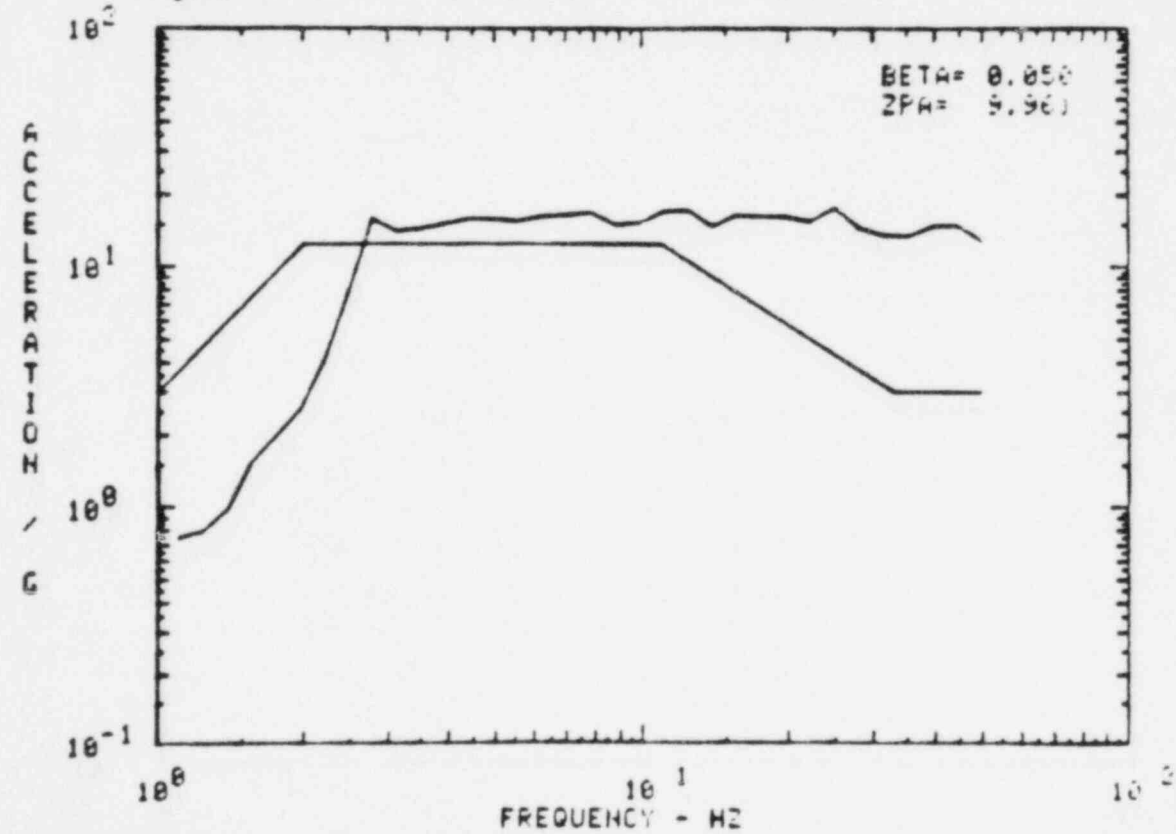


Figure 11.12 RUN SSEYZ1 AV



SQRT FORM # 58 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name See attached table A-C

1. Scope: ( ) NSSS (X) BOP
2. Model Number: See attached table A-C
3. Vendor: See attached table A-C
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions Largest component is 8" x 6" x 4". All other instruments are smaller.
   c. Weight All each less than 15 lbs.
6. Location: Building: Auxiliary, Reactor, RHR
   Elevation: All elevations
7. Field Mounting Condition ( ) Bolt (No. ____, Size ____)
   ( ) Weld (Length ____)
   ( ) ____ See Attchment D & E
8. a. System in which located: T41-00, T41-02, X41-03, T47
   b. Functional Description Various
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown
      (X) Both ( ) Neither
9. Pertinent Referenced Design Specifications 3071-150

IEEE-344-1975

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

IV. Equipment Qualification Method:

(X) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: Nuclear Environmental Qualification Report of Safety Related HVAC Equipment for Enrico Fermi Atomic Power Plant, Unit 2

(No., Title and Date) CCL Report #A-610-83, November 15, 1983

Company that Prepared Report: Corporate Consulting and Development Company, LTD.

Company that Reviewed Report: DECo

V. Vibration Input

1. Loads considered: a. (X) Seismic only

b. ( ) Hydrodynamic only

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

2. Method of Combining RRS: ( ) Absolute Sum ( ) SRSS
(X) N.A.
other, specify

3. Required Response Spectra (attach the graphs): Figures 3.3 - 3.6 from Report - Attachment F-I

4. Damping Corresponding to RRS: OBE 2% SSE 5%

5. Required Acceleration in Each Direction: ( ) ZPA
(X) N.A.
other, specify

6. Were fatigue effects or other vibration loads considered?

( ) Yes (X) No

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

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

VI. If Qualification by Test then Complete*:

1.( )Single Frequency (X)Multi-Frequency (X)random
( )sine beat ( )_____
other, specify

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

3. No. of Qualification Tests: OBE 5 SSE 1
Other_____

4. Frequency Range: 1 to 50 HZ

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): (See Attached Sheets J-L)

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

6. Method of Determining Natural Frequencies Low level sine sweep

(X)Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test(X)Yes (Attach TRS & RRS Graphs)
( )No**ROA 001 (See #11 below)

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

N.A. SSE S/S =_____ F/B =_____ V =_____

9. Laboratory Mounting: See attachment D & E

1.( )Bolt (No.___,Size____) ( ) Weld (Length___) ( )_____

10. Functional operability verified:(X)Yes ( )No ( )Not Applicable

11. Test Results including modifications made: Test levels did not meet required levels due to limitations of the shake table. Refer to ROA 001. The RRS peak is 33.6 compared to shake table maximum 33.4.

12. Other tests performed (such as aging or fragility test, including results): NUREG 0588 analysis for potential aging. A recommended schedule for periodic maintenance is to be supplied by MCC panels.

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

VII. If Qualification by Analysis, then Complete: N.A.

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

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

3. Model Type:( )3D ( )2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered:_____

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other:_____
(specify)

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

7. Support Considerations in the model:_____

8. Critical Structural Elements:_____

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

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

VIII. List of Subcomponents N.A.

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

* If Available
** Yes = Yes, N = No, U = Unknown

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed

Table 2.1 Safety-Related Instruments, Seismic I, QA Level I, Class IE

CCL SAMPLE NO. 1794-	DESCRIPTION AND RANGE/RATING	MANUFACTURER	MANUFACTURER PART NUMBER	ENVIRONMENTAL CRITERIA
001	Terminal Block, 600 V	Allen Bradley	1492-CA1	Table 3.1
002	Dual Element Fuse/Fuseblock	Fusetron Fuse Buchanan Fuseblock	FNM 358	Table 3.1
003	Control Relay, 120 VAC, 10 A, 8 Pole	General Electric	CR120A08022AA	Table 3.1
004	Control Relay, 125 VDC, 10 A, 8 Pole	General Electric	CR120AD08041AA	Table 3.1
005	Control Relay, Latched, 120 VAC, 10 A, 8 Pole	General Electric	CR120C08022AA	Table 3.1
006	Control Relay, 120 VAC, 10 A, 8 Pole	General Electric	CR120B08022	Table 3.1
007	Control Relay, 125 VDC, 10 A, 9 Pole	General Electric	CR120BD09041	Table 3.1
008	DC Milliammeter, 4-20 maDC	General Electric	D8-40 50-103191HE	Table 3.2
009	E/P Transducer, 4-20 maDC	Moore Products	GC 77-16	Table 3.2
010	Alarm Module, 4-20 maDC	Rochester Instruments	ET-1215	Table 3.2
011	Isolated Signal Transmitter, 4-20 maDC	Rochester Instruments	SC-1302	Table 3.2
024 *	Pushbuttom Switch, 120 VAC	General Electric	CR2940UW221A2	Table 3.2
025 *	Current Transformer, 10 VA, 40 A	Osborne	12207	Table 3.1

* SUPPLIED BY ACTUAL MANUFACTURER, ALL OTHERS SUPPLIED BY NCC POWERS.

ATTACH. - A

Table 2.2 Safety-Related Instruments, Seismic I, QA Level I

CCL SAMPLE NO. 1794-	DESCRIPTION AND RANGE/RATING	MANUFACTURER	MANUFACTURER PART NUMBER	ENVIRONMENTAL CRITERIA
012	Pilot Valve, 3-30 psig	ASCO	F316D44K	Table 3.2
013	Receiver Controller, 3-15 psig	MCC Powers	RC185-0125	Table 3.2
014	Multi-Purpose Relay, 20 psi Input	MCC Powers	243-0009	Table 3.2
015	Room Thermostat, 20 psig Input	MCC Powers	TH-180D	Table 3.3
016	Pressure Gauge, 3-15 psig Input	Ashcroft	35-1009-AXPR-02B-XUC	Table 3.2
017	Receiver-Controller, 3-15 psig Input	MCC Powers	RC 195-0001	Table 3.2
018	Temperature Transmitter, 3-15 psig	MCC Powers	163-3110	Table 3.2

Attach. 13

Table 2.3 Safety-Related Instruments, Seismic II/I, QA Level II

CCL SAMPLE NO. 1794-	DESCRIPTION AND RANGE/RATING	MANUFACTURER	MANUFACTURER PART NUMBER	ENVIRONMENTAL CRITERIA
019	Light, 120 VAC	Dialight	51-091-0231- 303 Lens 656-125V Lamp	N/A
020	Enclosure, 8" x 6" x 4"	Hoffman	Type SC	N/A
021	Transformer, 120 VAC/24 VAC	Jefferson Electric	216-1121	N/A
022	Switching Relay, 3-20 psig	MCC Powers	243-0001	N/A
023	Current Alarm, 115 VAC, 0-5 A	Rochester Instruments	ET-1200 L/U	N/A

ATTACH. - C

ATTACH -D

Table 4.1 Mounting Details

The mounting of the specimen simulated the actual in-service mounting as closely as practical.

CCL SAMPLE NO. 1794-	DESCRIPTION	MOUNTED IN	MOUNTING HARDWARE	SOURCE OF HARDWARE	
				MFR	COMM'L
001	Terminal Block	12 ga	8-32 screws every 18". Drill and tap subpanel.		X
002	Fuse/Fuseblock	12 ga	(1) 8-32 screw each end. Drill and tap subpanel.		X
003	AC Relay	12 ga	(2) 8-32 self tapping screws, top left and bottom right.	X	
004	DC Relay	12 ga	(2) 8-32 self tapping screws, top left and bottom right.	X	
005	Latched AC Relay	12 ga	(2) 8-32 self tapping screws, top left and bottom right.	X	
006	AC Relay	12 ga	(2) 8-32 self tapping screws, top left and bottom right.	X	
007	DC Relay	12 ga	(2) 8-32 self tapping screws, top left and bottom right.	X	
008	DC Milliammeter	12 ga	(4) 1/4-28 studs & nut.	X	
009	E/P Transducer	12 ga	(4) 1/4-20 bolts. Drill and tap subpanel.		X
010	Alarm Module	12 ga	(2) 8-32 screws. Drill and tap subpanel.		X
011	Isolated Signal Transmitter	12 ga	(2) 8-32 screws. Drill and tap subpanel.		X
012	Solenoid Valve	3/8"	(2) 3/8" bulkhead fittings.		X
013	Receiver Controller	12 ga	(4) 8-32 screws. Drill and tap subpanel.		X

(Continued)

Table 4.1 Mounting Details

SCL SAMPLE NO. 1794-	DESCRIPTION	MOUNTED IN	MOUNTING HARDWARE	SOURCE OF HARDWARE	
				MFR	COMM'L
014	Multi-Purpose Relay	12 ga	(2) 8-32 screws. Drill and tap subpanel.		X
015	Room Thermostat	1/8"	(2) 8-32 screws. Drill and tap subpanel.		X
016	Temperature Gauge	12 ga	Vendor clamps over 10-32 case studs.	X	
017	Receiver Controller	12 ga	Mount to sample 1794-020 using (4) 6-32 screws, 2 nuts.		X
018	Temperature Transmitter	1/4"	(4) 8-32 screws. Drill and tap subpanel.		X
019	Light	12 ga	Furnished lockwasher and nut.	X	
020	Enclosure	12 ga	(4) 8-32 screws. Drill and tap subpanel.		X
021	Transformer	12 ga	(4) 1/4-20 bolts. Drill and tap subpanel.		X
022	Switching Relay	12 ga	(1) 8-32 screw through vendor bracket. Drill and tap subpanel.	X	X
023	Current Alarm	12 ga	(2) 8-32 screws. Drill and tap subpanel.		X
024	Switch	1/4"	Furnished lockwasher, (1) gasket and nut. 20° from vertical.	X	X
025	Transformer	12 ga	(4) 1/4-20 screws, flat and lockwasher. Install screws from bottom, mount horizontal.		X

(Concluded)

SSE ☐	PERCENT DAMPING	DIRECTION	CCL No.: 83-1794
1/2SSE ☐		HORIZONTAL N-S ☐	DWG. BY: SF Griffin
DBE ☐	2 %	HORIZONTAL E-W ☐	CHK. BY: ANM
OBE ☒		VERTICAL ☒	DATE: 8-18-83

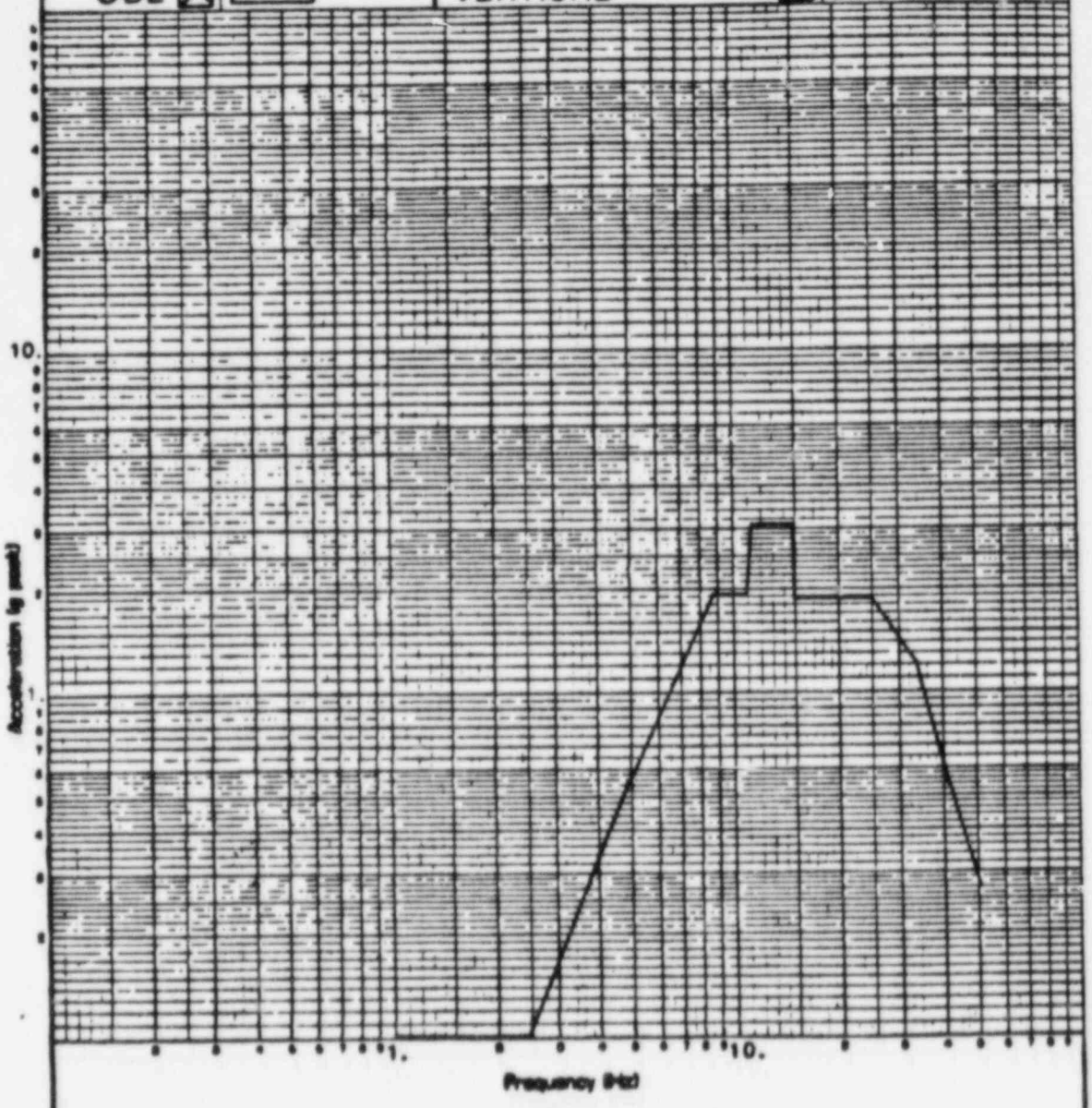


Figure 3.3 Vertical OBE RRS

Corporate Consulting & Development Company, Ltd.
consultants constructors
P.O. Box 12728, Research Triangle Park, North Carolina, 27709-9998

ATTACH - 9

SSE ☐	PERCENT	DIRECTION	CCL No.: 83-1794
1/2SSE ☐	DAMPING	HORIZONTAL N-S ☒	DWG. BY: SF Grissom
DBE ☐	2 %	HORIZONTAL E-W ☒	CHK. BY: ANM
OBE ☒		VERTICAL ☐	DATE: 8-18-83

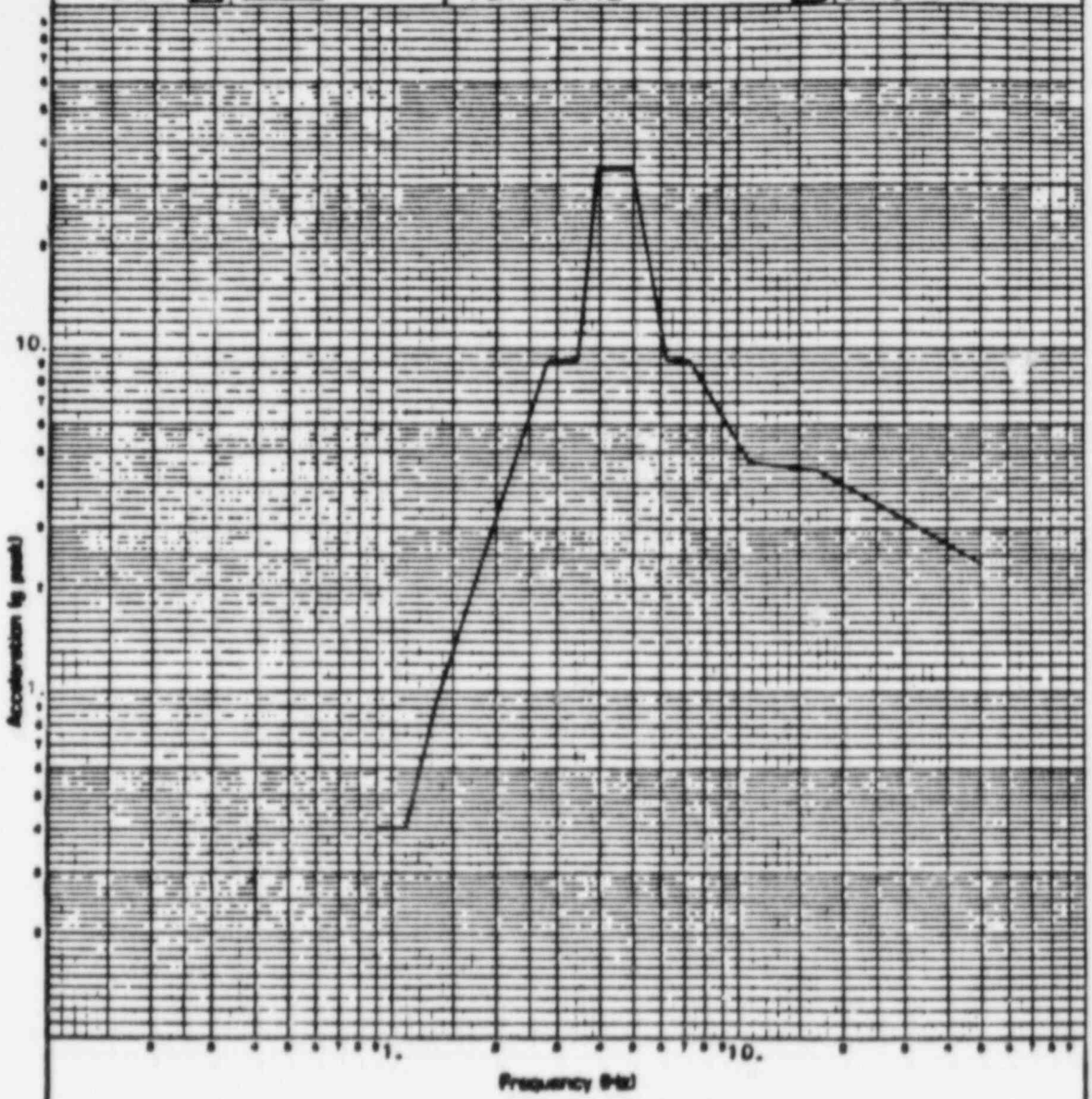


Figure 3.4 Horizontal OBE RRS

Corporate Consulting & Development Company, Ltd.
consultants constructors
P.O. Box 12728, Research Triangle Park, North Carolina, 27709-9998

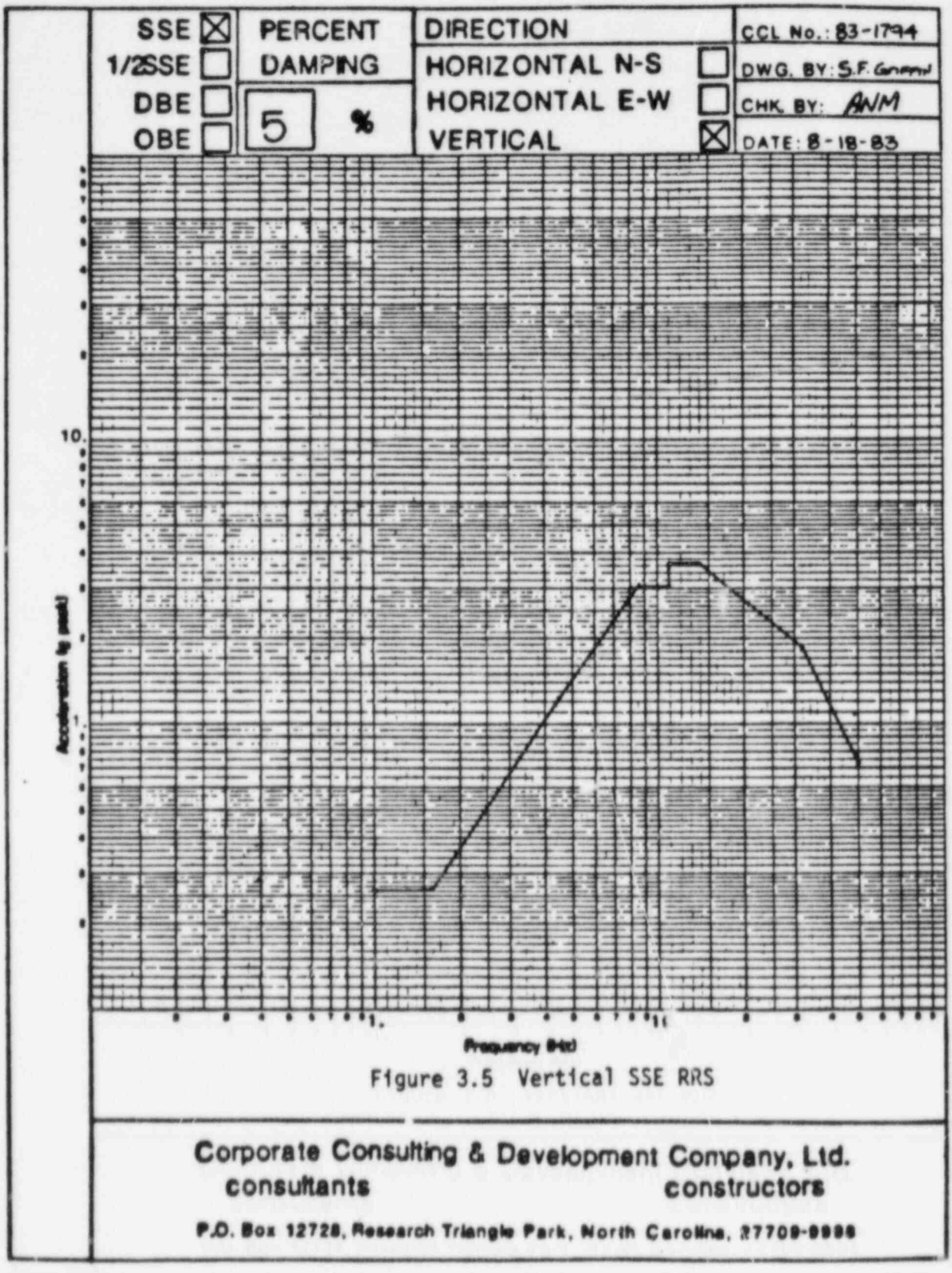


Figure 3.5 Vertical SSE RRS

Corporate Consulting & Development Company, Ltd.
consultants constructors

P.O. Box 12728, Research Triangle Park, North Carolina, 27709-9998

TF-004-I

ATTACH - I

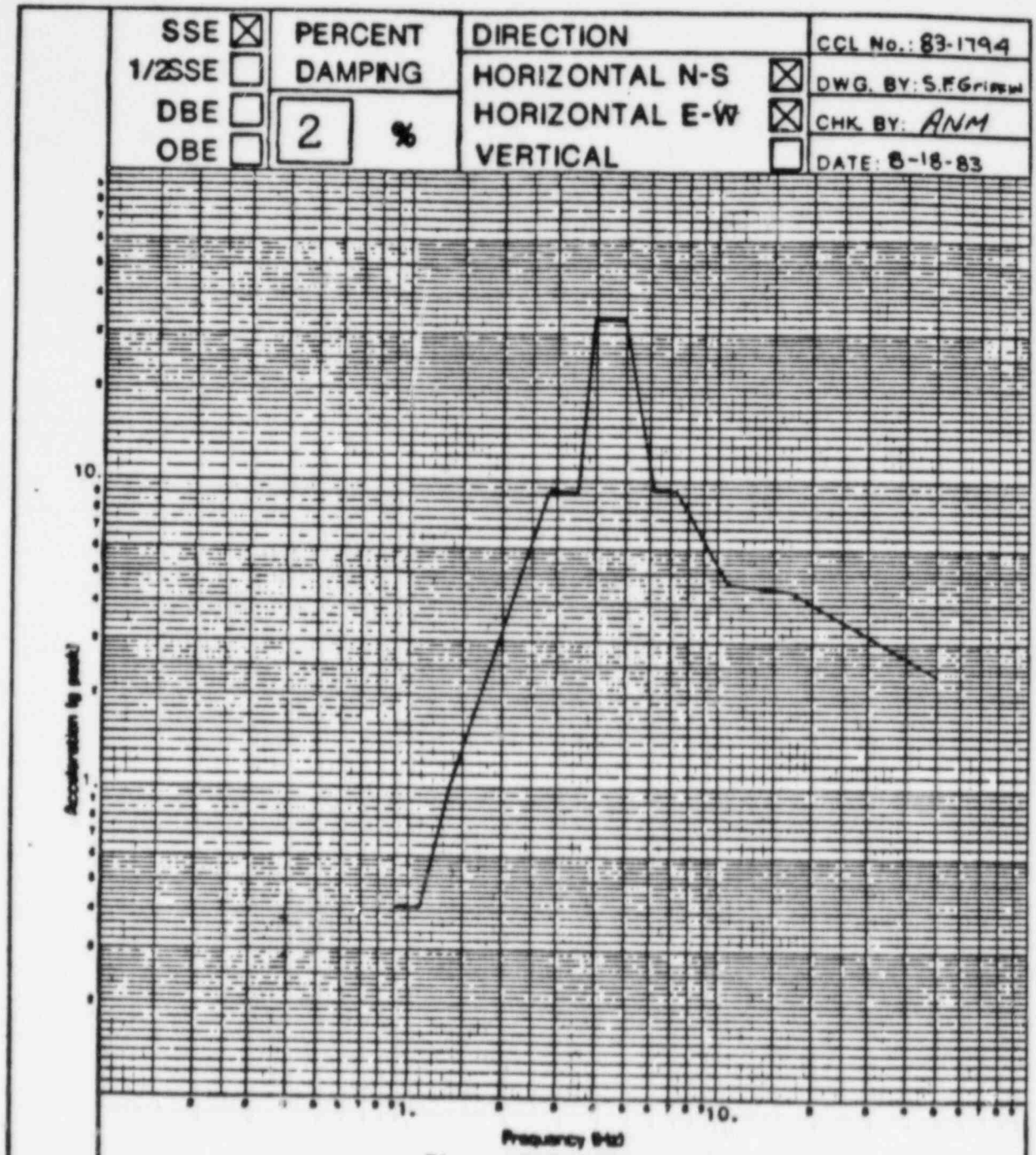


Figure 3.6 Horizontal SSE RRS

Corporate Consulting & Development Company, Ltd.
consultants
constructors
P.O. Box 12728, Research Triangle Park, North Carolina, 27709-2998

TABLE 8.1

Report No. 10139, Rev. 0
34

ATTACH - I

Accelerometer Location	Accelerometer Number	Direction	Photo Fig. No.	Plot Fig. No.	SWRE No. 1974- Description	Summary of Major Resonances (Hz)*
1	X	N-S	I.1	E.1	-002	None Below 50 Hz
1	Y	E-W		E.2	FUEL / FUEL BULK	None Below 50 Hz
1	Z	Vertical		E.3		None Below 50 Hz
2	X	N-S	I.1	E.4	-004	36.9, 41.1
2	Y	E-W		E.5		None Below 50 Hz
2	Z	Vertical		E.6	DC RELAY	None Below 50 Hz
3	X	N-S	I.2	E.7		**23.1, 39.2
3	Y	E-W		E.8	-018	None Below 50 Hz
3	Z	Vertical		E.9	TEMPERATURE TRANSMITTER	None Below 50 Hz
4	X	N-S	I.3	E.10		37.3, 41.1, 49.0
4	Y	E-W		E.11	-005	None Below 50 Hz
4	Z	Vertical		E.12	AC RELAY	None Below 50 Hz
5	X	N-S	I.3	E.13		**23.3, 37.3, 39.5 41.9, 49.0
5	Y	E-W		E.14	-007	39.5, 42.3
5	Z	Vertical		E.15	DC RELAY	43.6, 48.6
6	X	N-S	I.4	E.16		**23.1, 36.6, 41.1 43.2
6	Y	E-W		E.17	-006	39.2, 44.0, 48.6
6	Z	Vertical		E.18	AC RELAY	44.5
7	X	N-S	I.3	E.19		36.9
7	Y	E-W		E.20	-013	None Below 50 Hz
7	Z	Vertical		E.21	RECEIVER CONTROLLER	None Below 50 Hz
8	X	N-S	I.3	E.22		37.3, 39.5, 41.9
8	Y	E-W		E.23	-009	40.3, 41.9, 48.1
8	Z	Vertical		E.24	E/P TRANSDUCER	41.5, 44.0

* Note: These frequencies are cursored approximations at the equipment's resonant frequencies.

**Note: This frequency represents a system resonance and is not a resonance of the fixture.

TABLE 8.1 (CONTINUED)

Accelerometer Location	Accelerometer Number	Direction	Photo Fig. No.	Plot Fig. No.	SAMPLE NO 1974- Description	Summary of Major Resonances (Hz)*
9	X	N-S	I.5	E.25	-010	35.9, 37.7, 48.6
9	Y	E-W		E.26	ALARM MODULE	30.1, 34.5, 39.5, 44.5
9	Z	Vertical		E.27		40.7, 49.0
10	X	N-S	I.3	E.28	—	**23.3, 36.9, 41.9
10	Y	E-W		E.29	TEST FIXTURE	None Below 50 Hz
10	Z	Vertical		E.30		None Below 50 Hz
11	X	N-S	I.3	E.31	-022	37.7, 42.3, 49.0
11	Y	E-W		E.32	SOLID STATE RELAY	None Below 50 Hz
11	Z	Vertical		E.33		41.5
12	X	N-S	I.6	E.34	-020	None Below 50 Hz
12	Y	E-W		E.35	ENCLOSURE	None Below 50 Hz
12	Z	Vertical		E.36		Bad Cable
						None Below 50 Hz
13	X	N-S	I.6	E.37	-021	20.5
13	Y	E-W		E.38	TRANSFORMER	None Below 50 Hz
13	Z	Vertical		E.39		None Below 50 Hz
14	X	N-S	I.6	E.40	-015	20.7
14	Y	E-W		E.41	ROOM THERMOSTAT	None Below 50 Hz
14	Z	Vertical		E.42		None Below 50 Hz
15	X	N-S	I.7	E.43	-012	20.7
15	Y	E-W		E.44	PILOT VALVE	None Below 50 Hz
15	Z	Vertical		E.45		None Below 50 Hz
16	X	N-S	I.7	E.46	-001	20.7, 42.3
16	Y	E-W		E.47	TERMINAL BLOCK	30.1, 33.8
16	Z	Vertical		E.48		None Below 50 Hz

* Note: These frequencies are cursored approximations at the equipment's resonant frequencies.

**Note: This frequency represents a system resonance and is not a resonance of the fixture.

TABLE 8.1 (CONTINUED)

ATTACH-L

Accelerometer		Direction	Photo Fig. No.	Plot Fig. No.	SAMPLE NO 1974- Description	Summary of Major Resonances (Hz)*
Location	Number					
17	X	N-S	I.8	E.49	-024	20.7
17	Y	E-W			SWITCH	Accel not mounted due to space limitations
17	Z	Vertical		E.50		None Below 50 Hz

* Note: These frequencies are cursored approximations at the equipment's resonant frequencies.

SQRT FORM #59 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Bellows assemblies

1. Scope: (X) NSSS ( ) BOP
2. Model Number: 1-1/2" bellows assemblies
3. Vendor: Johnson Controls, Engineered Piping Systems Division
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions ____
   c. Weight ____
6. Location: Building: Reactor Building, 1st Floor
   Elevation: 583'-6"
7. Field Mounting Condition ( ) Bolt (No. 4, Size 1/2)
   ( ) Weld (Length ____)
   ( ) ____
8. a. System in which located: C51 (Traversing In-Core Probe System)
   b. Functional Description Expansion Joint
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown (X) Both ( ) Neither
9. Pertinent Referenced Design Specifications IEEE-344-1975

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

IV. Equipment Qualification Method:

( ) Test (X) Analysis ( ) Combination of Test and Analysis

Qualification Report*: SR-10276, Stress Report, 9-20/84

(No., Title and Date) _____

Company that Prepared Report: Johnson Controls

Company that Reviewed Report: DECo

V. Vibration Input

1. Loads considered: a. ( ) Seismic only

b. ( ) Hydrodynamic only

c. (X) Combination of (a) and (b)

2. Method of Combining RRS: (X) Absolute Sum ( ) SRSS
( ) _____ other, specify

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

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

5. Required Acceleration in Each Direction: ( ) ZPA
( ) N/A other, specify

6. Were fatigue effects or other vibration loads considered?

(X) Yes ( ) No

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

_____

_____

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

VI. If Qualification by Test then Complete*: N/A

1.( )Single Frequency ( )Multi-Frequency ( )random
( )sine beat ( )_____
other, specify

2.( )Single Axis ( )Multi-Axis

3. No. of Qualification Tests: OBE_____SSE_____
Other_____

4. Frequency Range:_____

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

S/S =_____F/B =_____V =_____

6. Method of Determining Natural Frequencies_____

( )Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test( )Yes (Attach TRS & RRS Graphs)
( )No

8. Input g-level Test: OBE S/S =_____F/B =_____V =_____

SSE S/S =_____F/B =_____V =_____

9. Laboratory Mounting:

1.( )Bolt (No.___,Size_____) ( ) Weld (Length_____) ( )_____

10. Functional operability verified:( )Yes ( )No ( )Not Applicable

11. Test Results including modifications made:_____
_____
_____

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

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

VII. If Qualification by Analysis, then Complete:

1. Method of Analysis:

( )Static Analysis (X)Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

S/S = 560 HZ F/B = 279 HZ V = 560 HZ

3. Model Type:(X)3D ( )2D ( )1D
( )Finite Element( )Beam (X)Closed Form Solution

4.( )Computer Codes: DESCAL-8

Frequency Range and No. of modes considered: N/A

( )Hand Calculations

5. Method of Combining Dynamic Responses:(X)Absolute Sum ( )SRSS

( )Other: _____
(specify)

6. Damping: OBE - SSE - Basis for the damping used: N/A

7. Support Considerations in the model: Both ends rigid

8. Critical Structural Elements: Bellows

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress Range	Stress Range Allowable
Bellows	On the Bellows	Normal +(OBE/SSE)	-	153,680 PSI	375,000 PSI
		Faulted (LOCA)	-	457,761 PSI	550,000 PSI

B.

Max. Critical Deflection		Location	Maximum Allowable Deflection to Assure Functional Operability	
0.375" Axial 0.125" Lateral	NORMAL + (OBE/SSE)	On the Bellows	0.875" 0.375"	(FSAR 3.8.2.3.2.2)
1.25" Axial 0.125" Lateral	FAULTED (LOCA)	"	----- -----	

VIII. List of Subcomponents N/A

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

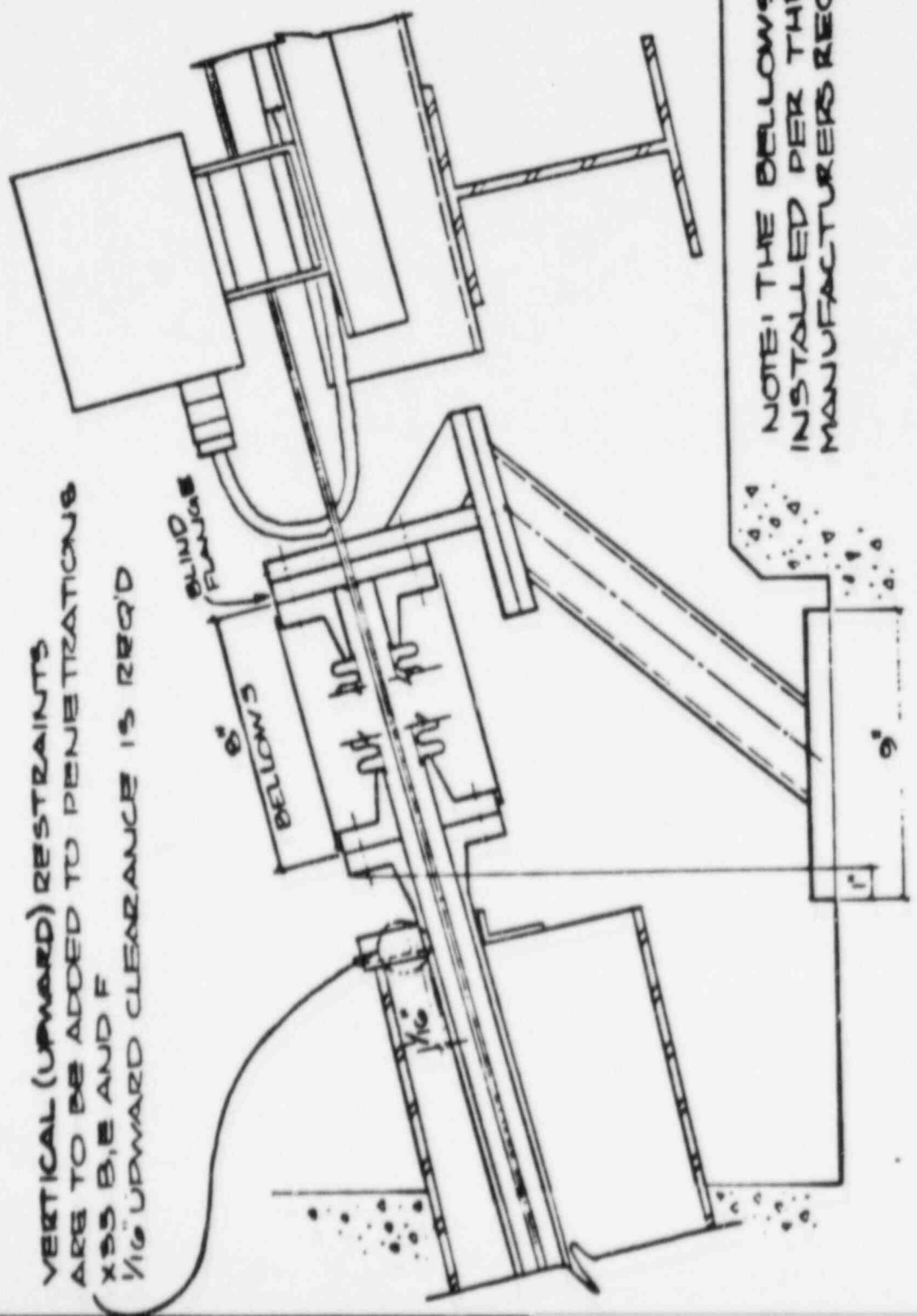
* If Available
** Yes = Yes, N = No, U = Unknown

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed



SQRT FORM #60 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Solenoid Operated Globe Valves

1. Scope:(X)NSSS ( )BOP
2. Model Number: 81M-002, 82M-003, 81M-004 and 84U-001
3. Vendor: Target Rock Corporation
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions
   c. Weight
6. Location: Building: Reactor Building
   Elevation: 613'-6" T2-B12
7. Field Mounting Condition ( )Bolt (No. ____, Size ____)
   (X)Weld (3/4" Socket)
   (X) On line
8. a. System in which located: Radiation Monitoring System T50-01
   b. Functional Description o Full Open or Full Closed
   o Not used for throttling
   c. Is the equipment required for( )Hot Standby ( )Cold Shutdown
   (X)Both ( )Neither
9. Pertinent Referenced Design Specifications

DECo Spec. 3071-501, 3071-12-PUR-116, IEEE-344-1975

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

IV. Equipment Qualification Method:

( )Test (X)Analysis ( )Combination of Test and Analysis

Qualification Report*: TRC Report No. 3477A (DECo File #C1-2134)

(No., Title and Date) Design Report for Solenoid Operated Globe Valves, 2/17/83

Company that Prepared Report: Target Rock Corporation

Company that Reviewed Report: DECo

V. Vibration Input

1. Loads considered: a.( )Seismic only

b.( )Hydrodynamic only

c.(X)Combination of (a) and (b)

2. Method of Combining RRS: ( )Absolute Sum (X)SRSS
( ) _____
other, specify

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

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

5. Required Acceleration in Each Direction: ( )ZPA
(X) 5.0g Horiz. Accel., 3.0g Vert. Accel.
other, specify

6. Were fatigue effects or other vibration loads considered?

(X)Yes ( )No

If yes, describe loads considered and how they were treated in overall qualification program:
Fatigue Requirements per NB-3545.3 satisfied.

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

VI. If Qualification by Test then Complete*: N/A

1.( )Single Frequency ( )Multi-Frequency ( )random
( )sine beat ( )_____
other, specify

2.( )Single Axis ( )Multi-Axis

3. No. of Qualification Tests: OBE_____SSE_____
Other_____

4. Frequency Range:_____

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

S/S =_____F/B =_____V =_____

6. Method of Determining Natural Frequencies_____

( )Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test( )Yes (Attach TRS & RRS Graphs)
( )No

8. Input g-level Test: OBE S/S =_____F/B =_____V =_____

SSE S/S =_____F/B =_____V =_____

9. Laboratory Mounting:

1.( )Bolt (No.___,Size_____) ( ) Weld (Length_____) ( )_____

10. Functional operability verified:( )Yes ( )No ( )Not Applicable

11. Test Results including modifications made:_____

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

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

VII. If Qualification by Analysis, then Complete:

1. Method of Analysis:

( )Static Analysis (X)Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

S/S = 162 HZ F/B = -- V = 162 HZ

3. Model Type:(X)3D ( )2D ( )1D
( )Finite Element(X)Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered: _____

(X)Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum (X)SRSS

( )Other: _____ (specify)

6. Damping: OBE - SSE - Basis for the damping used: N/A

7. Support Considerations in the model: Assumed simply supported by the pipes

8. Critical Structural Elements: Wall Thickness (see Table C below)

A.

Identification	Location		Total Stress	Stress Allowable
81M-003	Body	(Fatigue Factor = 0.50797)	1,927 PSI	32,700 PSI
	Bonnet		10,902 PSI	20,000 PSI
81M-004	Body	(Fatigue Factor = 0.43172)	<1,927 PSI	42,100 PSI
	Bonnet		11,880 PSI	20,000 PSI

B.

Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.0038	81M-003	0.005
0.0038	81M-004	0.005

	Wall Thickness (inches)					
	Body		Neck			
Model No.	Actual	Req'd.	Actual	Req'd.	Actual	Required
81M-003	0.617	0.2454	0.5975	0.3924	0.0825	0.0441
81M-004	0.758	0.307	0.5975	0.510	0.0825	0.0441

VIII. List of Subcomponents N/A

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

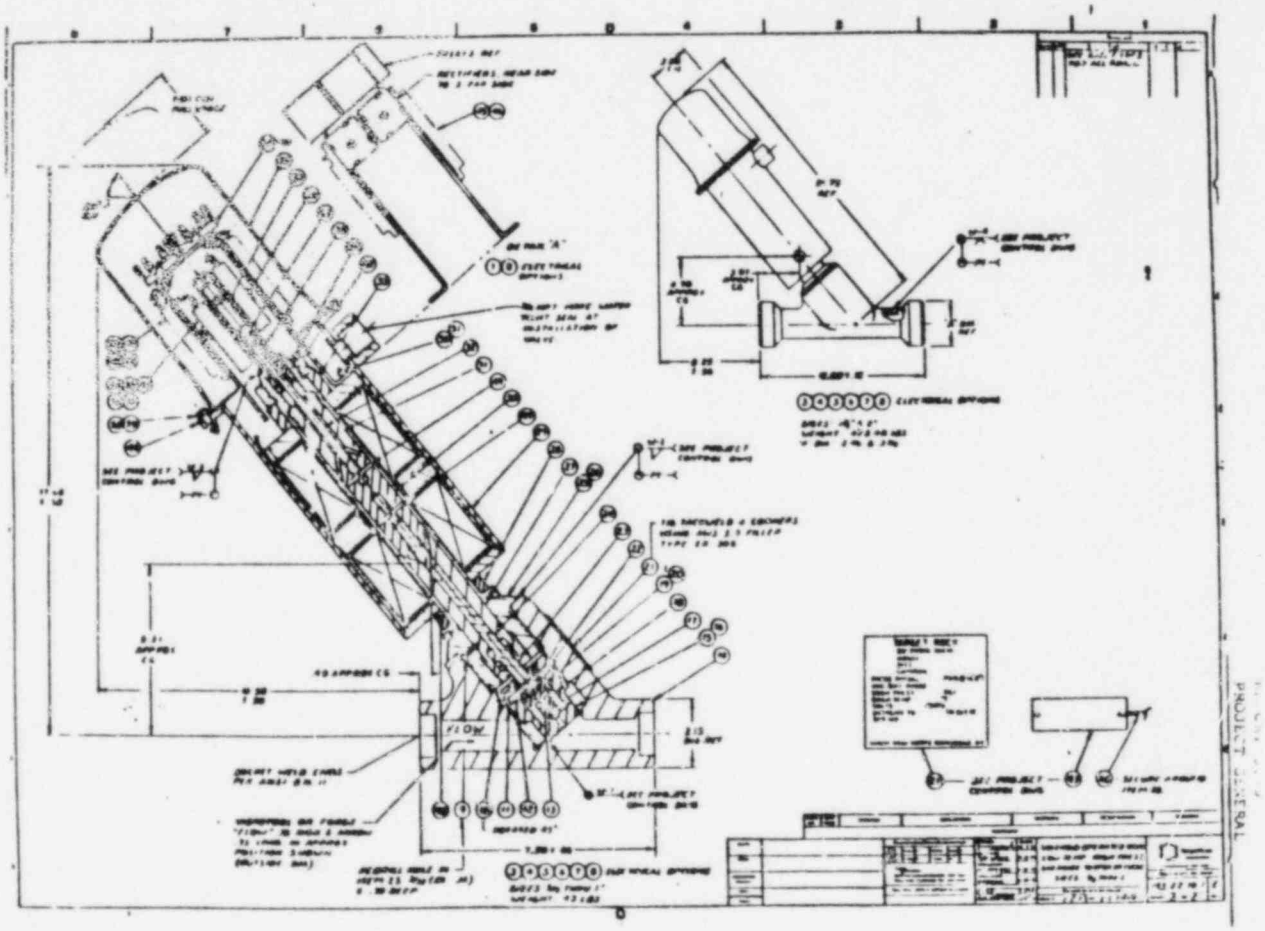
* If Available
** Yes = Yes, N = No, U = Unknown

IX. Sketch or drawing installed **N/A**

How it has been installed

or

How it will be installed



SQRT FORM # 61

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name PYCO Thermocouple

1. Scope: ( ) NSSS (X) BOP
2. Model Number: 102-9039-08-6/102-3171-20
3. Vendor: PYCO
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions 6" long x 1/4" O.D.
   c. Weight less than 1 lb. each
6. Location: Building: Reactor
   Elevation: Various
7. Field Mounting Condition ( ) Bolt (No. ____, Size ____)
   ( ) Weld (Length ____)
   (X) Pipe mounted or local
8. a. System in which located: P44 and G33
   b. Functional Description Measure Area Temperature
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown
   (X) Both ( ) Neither
9. Pertinent Referenced Design Specifications IEEE-344-1975

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

IV. **Equipment Qualification Method:**

(X) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: Nuclear Qualification Testing of Temperature Measurement Devices per IEEE Std. 323-1974 and IEEE Std. 344-1975

(No., Title and Date) 16436-82N Rev. 3 1/31/84

Company that Prepared Report: Acton Environmental Testing Corp.

Company that Reviewed Report: DECo

V. **Vibration Input**

1. **Loads considered:** a. (X) Seismic only

   b. ( ) Hydrodynamic only

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

2. **Method of Combining RRS:** ( ) Absolute Sum ( ) SRSS
   (X) N.A. other, specify

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

4. **Damping Corresponding to RRS:** OBE 5% SSE 5%

5. **Required Acceleration in Each Direction:** ( ) ZPA
   (X) N.A. other, specify

6. **Were fatigue effects or other vibration loads considered?**

   ( ) Yes (X) No

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

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

VI. If Qualification by Test then Complete*:

1.( )Single Frequency (X)Multi-Frequency ( )random
( )sine beat ( )_____
other, specify

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

3. No. of Qualification Tests: OBE 5 SSE 1
Other_____

4. Frequency Range: 1 to 50 HZ

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): No Resonance found from 1 to 50 to 1 HZ

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

6. Method of Determining Natural Frequencies Low level sine sweep

(X)Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test (X)Yes (Attach TRS & RRS SAMPLE Graphs)
( )No

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

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

9. Laboratory Mounting:

1.( )Bolt (No.___,Size____) ( ) Weld (Length____) (X)To simulate actual field mtg.

10. Functional operability verified:(X)Yes ( )No ( )Not Applicable

11. Test Results including modifications made: No anomalies to report during multi-frequency testing

12. Other tests performed (such as aging or fragility test, including results): Thermal aging performed with no anomalies

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

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

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

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

3. Model Type:( )3D ( )2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered:_____

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other:_____
(specify)

6. Damping: OBE___ - SSE___ Basis for the damping used:_____

7. Support Considerations in the model:_____

8. Critical Structural Elements:_____

A.

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

B.

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

VIII. List of Subcomponents N.A.

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

* If Available

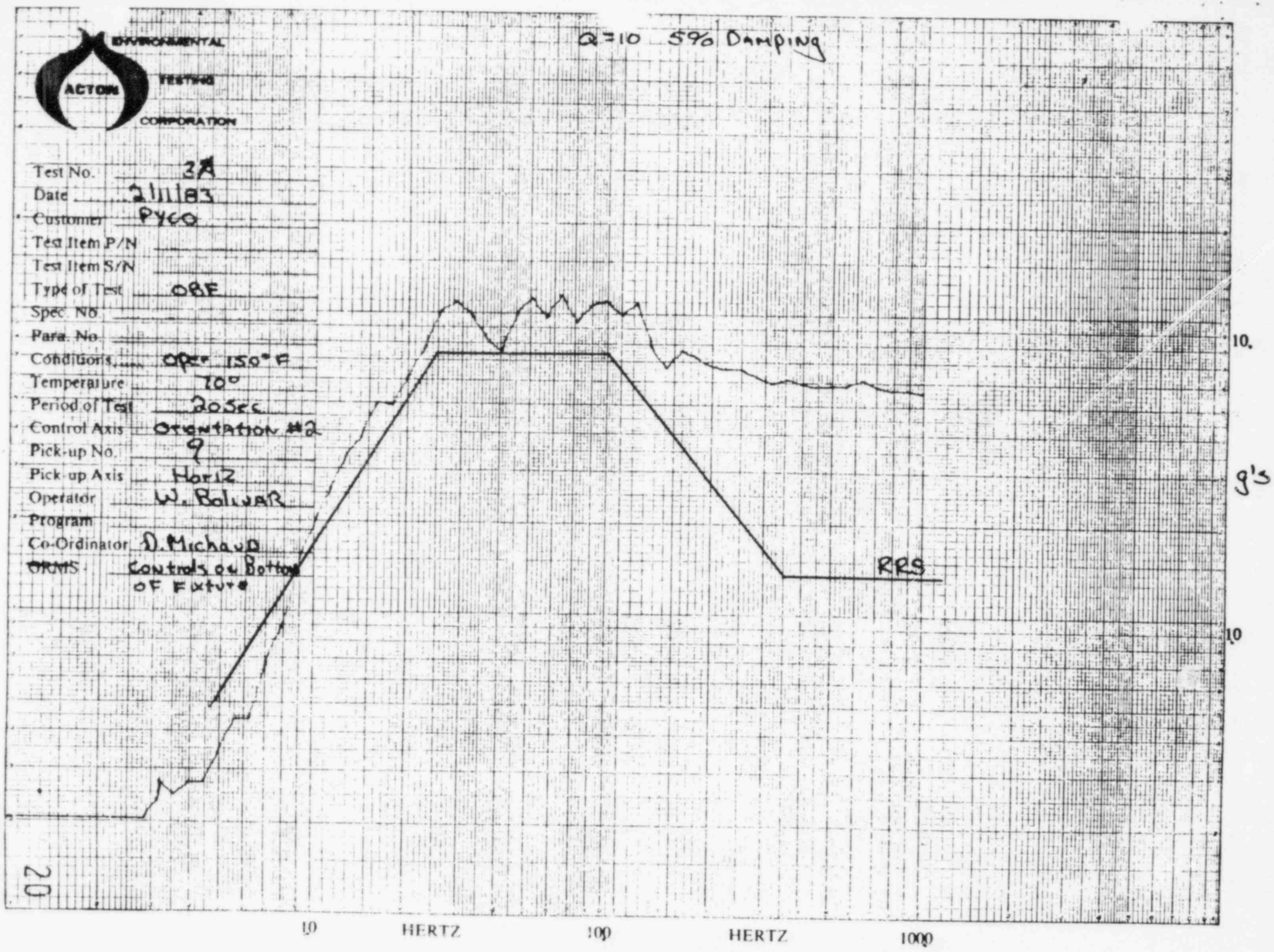
** Yes = Yes, N = No, U = Unknown

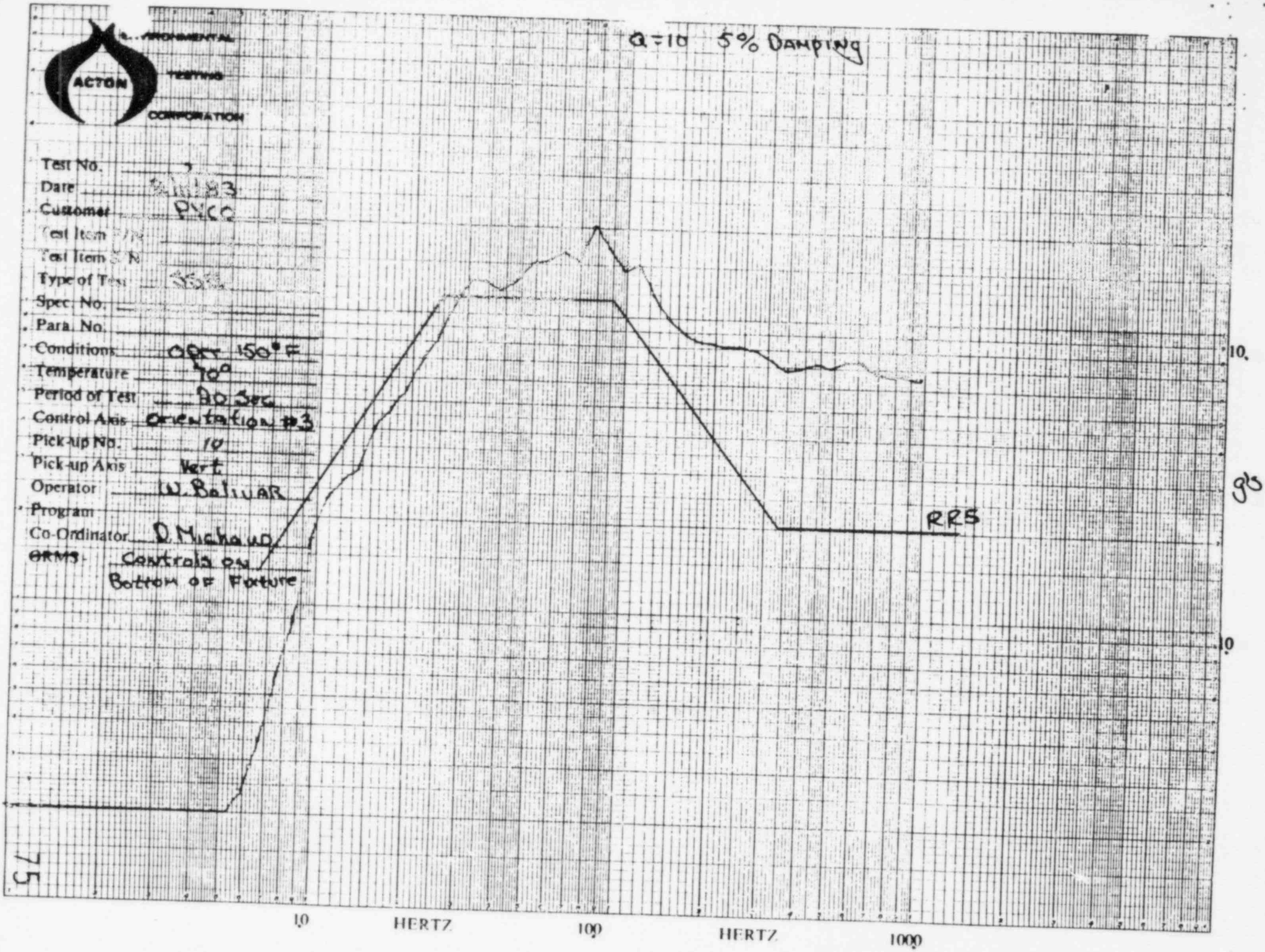
IX. Sketch or drawing installed

How it has been installed

or

How it will be installed


ACTON ENVIRONMENTAL TESTING CORPORATION
Q=10 5% DAMPING
Test No. 3A
Date 2/11/83
Customer PYCO
Test Item P/N
Test Item S/N
Type of Test OBE
Spec. No.
Para. No.
Conditions OPR 150°F
Temperature 70°
Period of Test 20 SEC
Control Axis ORIENTATION #2
Pick-up No. 9
Pick-up Axis HORIZ
Operator W. BOLIVAR
Program
Co-Ordinator D. MICHAUD
GRMS CONTROLS ON BOTTOM OF FIXTURE
RRS
10.
g's
1.0
20
1.0
HERTZ
100
HERTZ
1000


ACTON ENVIRONMENTAL TESTING CORPORATION
Q=10 5% DAMPING
Test No. 7
Date 9/1/83
Customer PNCO
Test Item P/N
Test Item S/N
Type of Test Sine
Spec. No.
Para. No.
Conditions ambt 150°F
Temperature 70°
Period of Test 30 Sec.
Control Axis Orientation #3
Pick-up No. 10
Pick-up Axis Vert.
Operator W. Bolivar
Program
Co-Ordinator D. Michaud
GRMS Controls on Bottom of Fixture
RRS
10.
g's
1.0
HERTZ
100
HERTZ
1000
75

SQRT FORM #62 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Liquid filled pressure gauges

1. Scope: (X) NSSS ( ) BOP
2. Model Number: Ashcroft Model #1279, 316 SS Bourdon Tube
3. Vendor: Dresser Instrument Division
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions Dial Size 4-1/2" dia. See page 6
   c. Weight 3-1/2 lbs. (approximately)
6. Location: Building: RX Building. Sub-basement
   Elevation: 545'-0"
7. Field Mounting Condition ( ) Bolt (No. ____, Size ____)
   ( ) Weld (Length ____)
   (X) Threaded mounting
8. a. System in which located: E11 and E21
   b. Functional Description To measure suction pressure for RHR pumps and core spray pumps
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown
   ( ) Both (X) Neither
9. Pertinent Referenced Design Specifications None -

Pur. Specification 3071-ROO-PUR-113

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

IV. Equipment Qualification Method:

(X) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: DTB04R74-0892, Dayton T. Brown, Inc. Job No. 400524-00.000 Instrument Seismic Vibration Test Program, 7/23/74

(No., Title and Date) DECo File No. C1-2795

Company that Prepared Report: Dayton T. Brown, Inc. for Dresser Industrial Valve and Instrument Division

Company that Reviewed Report: _____

V. Vibration Input

1. Loads considered: a. (X) Seismic only

b. ( ) Hydrodynamic only

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

2. Method of Combining RRS: ( ) Absolute Sum ( ) SRSS
( ) N/A other, specify

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

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

5. Required Acceleration in Each Direction: ( ) ZPA
(X) 3G. - Vendor Specified other, specify

6. Were fatigue effects or other vibration loads considered?

( ) Yes (X) No

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

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

VI. If Qualification by Test then Complete*:

1.(X)Single Frequency ( )Multi-Frequency ( )random
( )sine beat (X) Dwell Test
other, specify

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

3. No. of Qualification Tests: OBE____ SSE_____ N/A
Other_____

4. Frequency Range: 1 to 35 HZ

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): Resonance at 7, 11 and 16 HZ. Page 15 of Report.

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

6. Method of Determining Natural Frequencies Resonance Search

(X)Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test( )Yes (Attach TRS & RRS Graphs)
( )No N/A

8. Input g-level Test: OBE S/S =_____ F/B =_____ V =_____
Up to 7.5g
Combined SSE S/S =_____ F/B =_____ V =_____

9. Laboratory Mounting: Standard mounting simulating field mounting condition

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

10. Functional operability verified:(X)Yes ( )No ( )Not Applicable

11. Test Results including modifications made: Satisfactory

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

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

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

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

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

3. Model Type:( )3D ( )2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered:_____

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other:_____
(specify)

6. Damping: OBE__ - SSE__ Basis for the damping used:_____

7. Support Considerations in the model:_____

8. Critical Structural Elements:_____

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

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

VIII. List of Subcomponents

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

* If Available
** Yes = Yes, N = No, U = Unknown

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed

ASHCROFT

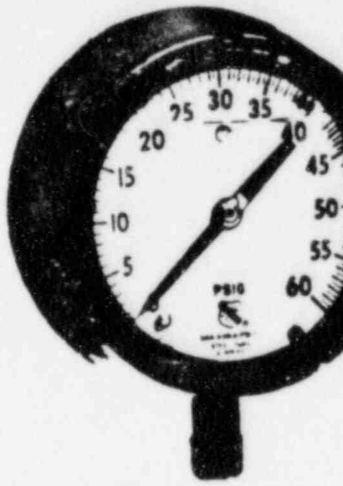
DRESSER INDUSTRIES DRESSER

Bulletin LF-1

4/80

Liquid Filled Pressure Gauges

Specifications 1279

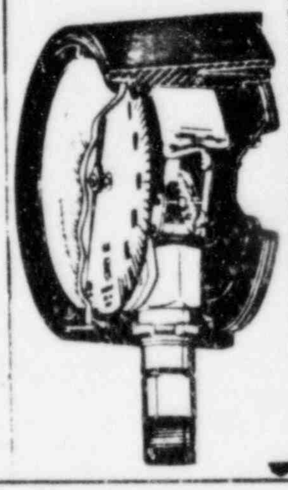


Type 1279
Dial Size .... 4½"
Case .... Phenol Turret, Black, Solid Front
Ring .... Glass Filled Polypropylene, Threaded
Connection .... ½" NPT Lower
Mounting .... Stem, Surface, or Flush
Window .... Acrylic Plastic
Dial .... White Aluminum
Pointer .. Micrometer Adjustable, Black Aluminum
Bourdon Tube .... Bronze, Steel, Stainless Steel, Monel
Movement .... Stainless Steel
Accuracy .... ±0.5% of Full Scale*
"O" Ring (Window and Socket) .... Buna-N
Rear Elastomeric Diaphragm .... EPDM
Ranges .... Vacuum to 20,000 psi
*ANSI B40.1 Grade 2A

NOTE: Throttle screws are supplied as standard on all liquid filled gauges.

All gauges are temperature compensated. The Type 1279 utilizes a flexible, elastomeric back and the Type 1320 a thin, flexible, plastic window. The action of each is to minimize the error created by changes in ambient temperature.

ASHCROFT® 1279
Liquid Filled Gauges

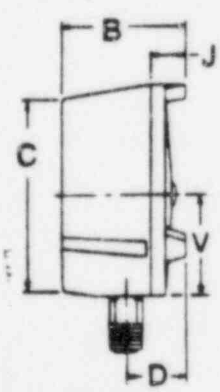


Three-way convertible. Type 1279 is a 4½" solid front phenolic case gauge which may be ordered in any one of these versions: liquid filled, hermetically sealed, or weatherproof. Should the gauge be ordered in the weatherproof version, for example, and service conditions warrant either hermetically sealing for ambient corrosion protection or liquid filling for applications where severe vibration or pulsation are encountered, a kit is available for field conversion.

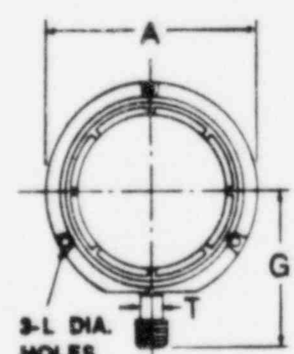
A unique feature of this Ashcroft gauge is the absence of a case vent or fill hole normally required on a conventional liquid filled gauge. A specially designed rear elastomeric diaphragm seal compensates for internal case pressure changes due to changes in ambient temperatures. Protection for the diaphragm is provided by a stainless steel rear cover. If a Bourdon tube leak occurs, the resultant case pressure will push the diaphragm out of its seal and release the rear cover allowing the pressure to be dissipated towards the rear.

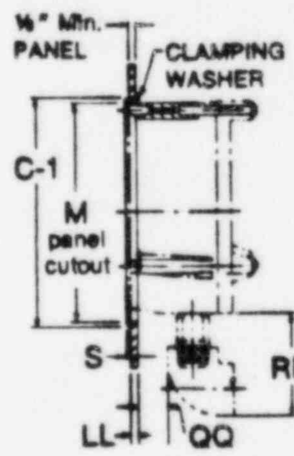
All case holes and threads are molded into this rugged phenolic solid front case. No further machining is required, thus eliminating the possibility of cracking or leaking caused by machining the phenolic material. The integrally molded threads at the front and rear of the case provide six seals, with the use of threaded rings. Identical rings are used in both locations. Only three seals are required ... front, rear, and socket. Available with bronze, steel, stainless steel and Monel Bourdon tubes for stem, surface, or flush mounting. Ranges: Vacuum to 20,000 p

12 Dimensions 1279



Lower Connection





Flush Mounting Ring

Dial Size Inches	A	B	C	D	I	F	G		J	L	T	V	Wgt. (lbs.)	C-1	LL		M	S	QQ	RR
							Bronze ½ NPT	½ NPT							Min.	Max.				
4½	5 13/16	[illegible]	5 1/16	1 5/8	5 3/8	1 5/8	[illegible]	[illegible]	1	7/32	[illegible]	[illegible]	3½	6	1/8	5/16	5 9/16	3/16	13/16	2 13/16
	(148)	(88)	(128)	(41)	(137)	(41)	(97)	(153)	(27)	(5.5)	(15)	(61)		(152)	(3)	(8)	(141)	(5)	(21)	(71)

Note: Dimensions in Brackets ( ) are Millimeters

SQRT FORM # 63 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name 20" 900# Gate Valves with Limitorque SMB-3-150 Operator

1. Scope: (X) NSSS ( ) BOP
2. Model Number: DECo Valve No. V8-4613 and V8-4614
3. Vendor: TVA (Anchor Darling)
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions 13-1/2" dia x 50" long x 79" ht (Approx) See page 6
   c. Weight 7349 lbs (Approx)
6. Location: Building: Reactor - Torus Room
   Elevation: 567', 570'
7. Field Mounting Condition ( ) Bolt (No. ____, Size ____)
   (X) Weld (Length ____)
   ( ) ____
8. a. System in which located: RHR (E11)
   b. Functional Description Isolate bypasses around F017A/B
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown
   ( ) Both (X) Neither
9. Pertinent Referenced Design Specifications

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

IV. **Equipment Qualification Method:**

( ) Test (X) Analysis ( ) Combination of Test and Analysis

Qualification Report*: 1077.524, Seismic Category I Analysis of 20 inch-900 lb. Carbon Steel Flex Wedge Gate Valves, 3/28/78

(No., Title and Date) (DECo File No. P1-11045)

Company that Prepared Report: Ananmet Lab. Inc. for Anchor/Darling Valve Co.

Company that Reviewed Report: Hopper and Associates (HA-4/84-283)

V. **Vibration Input**

1. **Loads considered:** a. (X) **Seismic only**

   b. ( ) **Hydrodynamic only**

   c. ( ) **Combination of (a) and (b)**

2. **Method of Combining RRS:** ( ) **Absolute Sum** ( ) **SRSS**
   ( ) N/A
   other, specify

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

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

5. **Required Acceleration in Each Direction:** ( ) **ZPA**
   (X) _____
   other, specify

   S_{H1} = 4.5g, S_{H2} = 4.5g, S_V = 3.0g
   S_{MAX} = 7.52g. Reference Page 8 of Report

6. **Were fatigue effects or other vibration loads considered?**

   (X) **Yes** ( ) **No**

   If yes, describe loads considered and how they were treated in overall qualification program: Valve Body is analyzed for the maximum combination of seismic, operating and pipe reaction loads. Reference page 34 of report.

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

VI. If Qualification by Test then Complete*: N/A

1.( )Single Frequency ( )Multi-Frequency ( )random
( )sine beat ( )_____
other, specify

2.( )Single Axis ( )Multi-Axis

3. No. of Qualification Tests: OBE_____SSE_____
Other_____

4. Frequency Range:_____

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

S/S =_____F/B =_____V =_____

6. Method of Determining Natural Frequencies_____

( )Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test( )Yes (Attach TRS & RRS Graphs)
( )No

8. Input g-level Test: OBE S/S =_____F/B =_____V =_____

SSE S/S =_____F/B =_____V =_____

9. Laboratory Mounting:

1.( )Bolt (No.___,Size_____) ( ) Weld (Length_____) ( )_____

10. Functional operability verified:( )Yes ( )No ( )Not Applicable

11. Test Results including modifications made:_____
_____
_____

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

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

VII. If Qualification by Analysis, then Complete:

1. Method of Analysis:

( )Static Analysis (X)Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

2. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): 79.52 HZ. Minimum. Reference page 59 of Report.

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

3. Model Type:( )3D (X)2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered: _____

(X)Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other: N/A
(specify)

6. Damping: OBE__ - SSE__ Basis for the damping used: N/A

7. Support Considerations in the model: Hinged on both ends of valve body (Page 58 of Report)

8. Critical Structural Elements: Valve Body and Bonnet

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
			KSI	KSI	KSI
Valve Body (Material SA216 WCB)				14.62	17.5
Bonnet (Material SA105)				6.23	17.5

B.

Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.008"	Maximum Lateral Deflection of Operator	>0.008"

VIII. List of Subcomponents

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

* If Available

** Yes = Yes, N = No, U = Unknown

IX. Sketch or drawing

How it has been installed

or

How it will be installed

ANAMET LABORATORIES, INC.
BERKELEY, CALIF. • SAN CARLOS, CALIF.

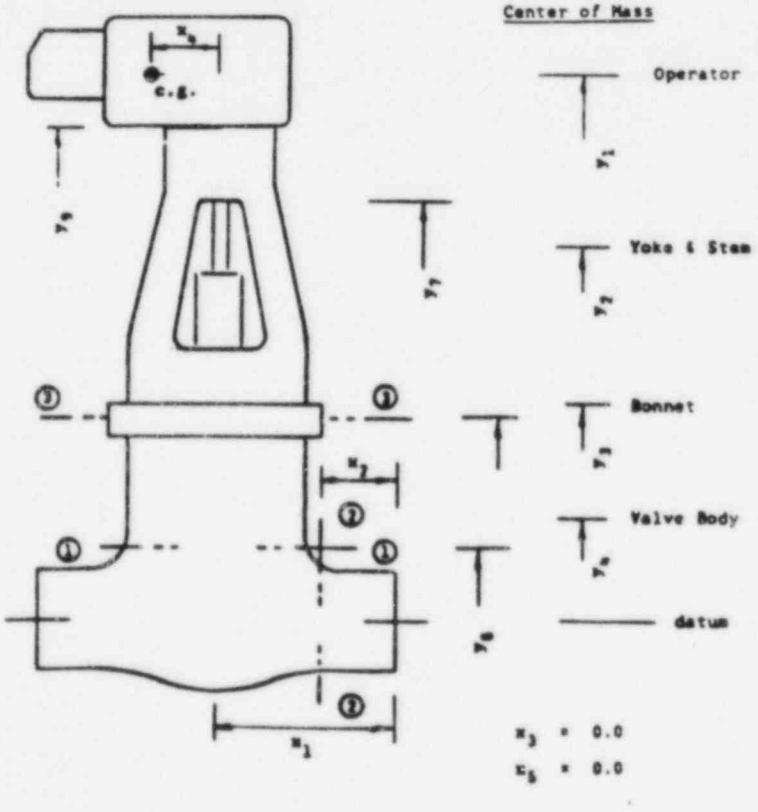


Figure III-1 Schematic of Valve Assembly

TABLE III-1
COMPONENT WEIGHTS AND DIMENSIONS

Component Weights			
Operator	(w_1, lbs.)	=	1200.0
Yoke & Stem	(w_2, lbs.)	=	600.0
Bonnet	(w_3, lbs.)	=	587.0
Valve Body	(w_4, lbs.)	=	4250.0
Disc	(w_5, lbs.)	=	512.0
Total Wts.	(W_T, lbs.)	=	7149.0
Dimensions			
y_1 (in.)		=	79.00
y_2 (in.)		=	58.00
y_3 (in.)		=	36.00
y_4 (in.)		=	8.85
y_5 (in.)		=	36.00
y_6 (in.)		=	13.50
y_7 (in.)		=	62.70
y_8 (in.)		=	36.00
y_9 (in.)		=	72.00
x_1 (in.)		=	65.00
x_2 (in.)		=	12.00
x_3 (in.)		=	0.00
x_4 (in.)		=	7.50
x_5 (in.)		=	0.00

SQRT FORM # 64 Page 1

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Battery Charger Area Cooling Units

1. Scope: ( ) NSSS (X) BOP

2. Model Number: ____

3. Vendor: CVI Inc.

4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)

5. Preliminary Physical Description:

   a. Appearance (See Section IX)

   b. Dimensions T4100B043: 66" x 48" x 36" High; T4100B044: 57" x 39" x 33" High

   c. Weight 1050 lb. 850 lb.

6. Location: Building: Auxiliary

   Elevation: T4100B043 - 651'-0"±
   T4100B044 - 652'-0"±

7. Field Mounting Condition (X) Bolt (No. ____, Size ____)
   Mounting bolts are used to anchor the platform to the ceiling.
   ( ) Weld (Length ____)
   ( ) ____

8. a. System in which located: Battery Charger Area Ventilation

   b. Functional Description ____

   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown (X) Both ( ) Neither

9. Pertinent Referenced Design Specifications 3071-533 Rev. A
   3071-337 Rev. A

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

IV. Equipment Qualification Method:

( )Test (X)Analysis ( )Combination of Test and Analysis

Qualification Report*: B9-2463, B9-2477, B9-2479, B9-2478 & B9-2476

(No., Title and Date) Response Spectrum Analysis of Fan/Coil Units No. T4100B043 and T4100B044

Company that Prepared Report: CVI Incorporated

Company that Reviewed Report: DECo

V. Vibration Input

1. Loads considered: a.(X)Seismic only

b.( )Hydrodynamic only

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

2. Method of Combining RRS: ( )Absolute Sum (X)SRSS
( ) _____
other, specify

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

4. Damping Corresponding to RRS: OBE .5% SSE 2%

5. Required Acceleration in Each Direction: ( )ZPA
( ) _____
other, specify

6. Were fatigue effects or other vibration loads considered?

( )Yes (X)No

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

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

VI. If Qualification by Test then Complete*:

1.( )Single Frequency ( )Multi-Frequency ( )random
( )sine beat ( )_____
other, specify

2.( )Single Axis ( )Multi-Axis

3. No. of Qualification Tests: OBE_____SSE_____
Other_____

4. Frequency Range:_____

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

S/S =_____F/B =_____V =_____

6. Method of Determining Natural Frequencies_____

( )Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test( )Yes (Attach TRS & RRS Graphs)
( )No

8. Input g-level Test: OBE S/S =_____F/B =_____V =_____

SSE S/S =_____F/B =_____V =_____

9. Laboratory Mounting:

1.( )Bolt (No.___,Size_____) ( ) Weld (Length_____) ( )_____

10. Functional operability verified:( )Yes ( )No ( )Not Applicable

11. Test Results including modifications made:_____

_____

_____

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

_____

_____

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

VII. If Qualification by Analysis, then Complete:

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

(X)Dynamic Analysis ( )Time-History (X)Response Spectrum

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

S/S = 13.3 HZ F/B = 17.4 HZ V = 23.7 HZ

3. Model Type:(X)3D ( )2D ( )1D
(X)Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: Stardyne

Frequency Range and No. of modes considered: 1-50 HZ No. of modes = 13

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum (X)SRSS

( )Other: _____
(specify)

6. Damping: OBE .5 SSE 2 Basis for the damping used: % of Critical Damping (REG. GUIDE 1.61 & FSAR)

7. Support Considerations in the model: (HINGED)

8. Critical Structural Elements: Tombstone and Fan Housing

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable	
Element 970 (Fan/Coil Unit No. T4100B043)	Tombstone	SRSS		6045 psi	13500	OBE
Element 970 (Fan/Coil Unit No. T4100B043)	Tombstone	SRSS		15033	18900	SSE

B.

Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.187 in.(Global X1 Direction) OBE	Bottom of Backplate Near outlet	
0.203 in.(Global X1 Direction) SSE	Bottom of Backplate Near outlet	

VIII. List of Subcomponents

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

* If Available

** Yes = Yes, N = No, U = Unknown

SQRT FORM

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed (SEE ATTACHED SKETCH)

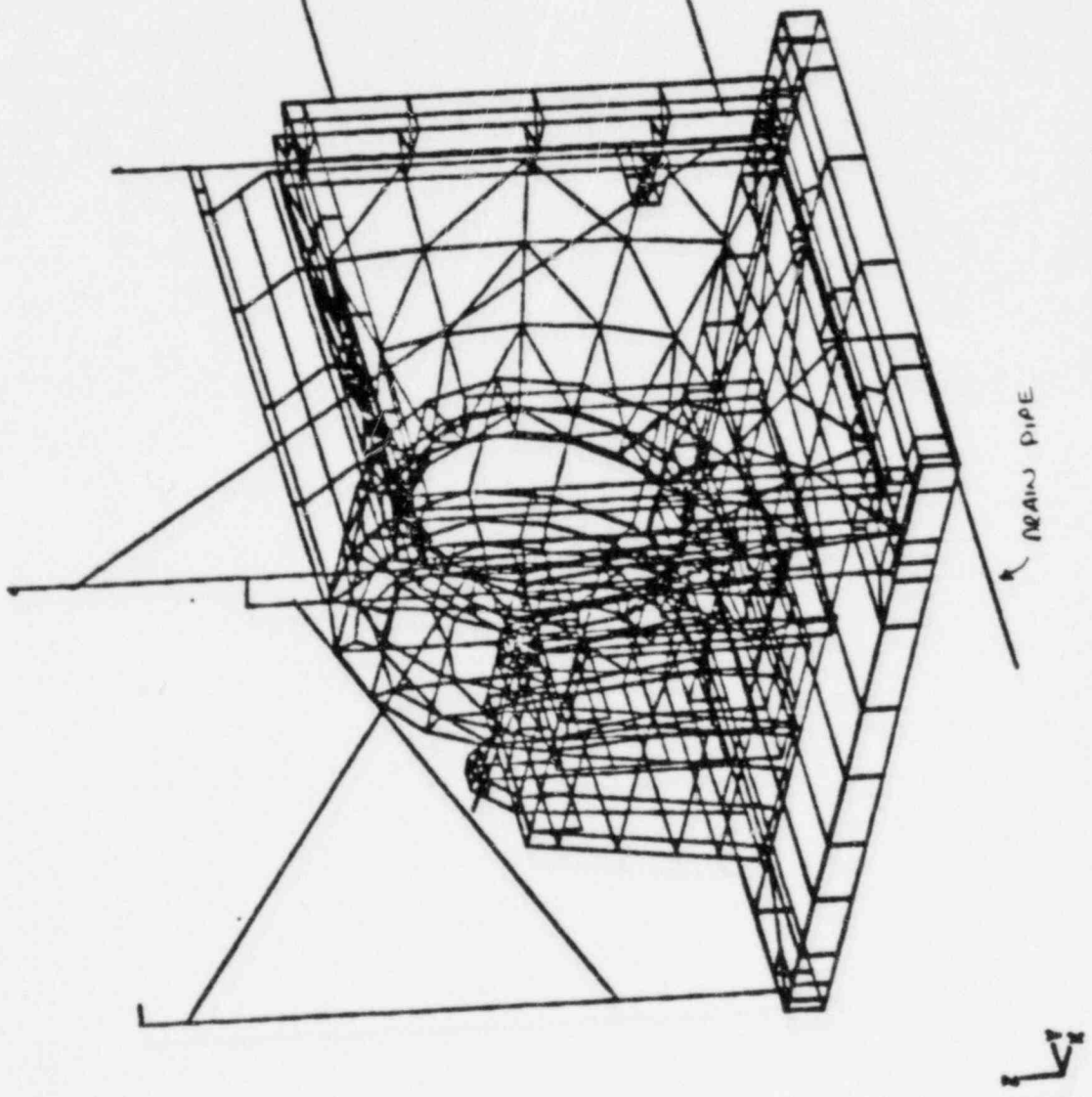
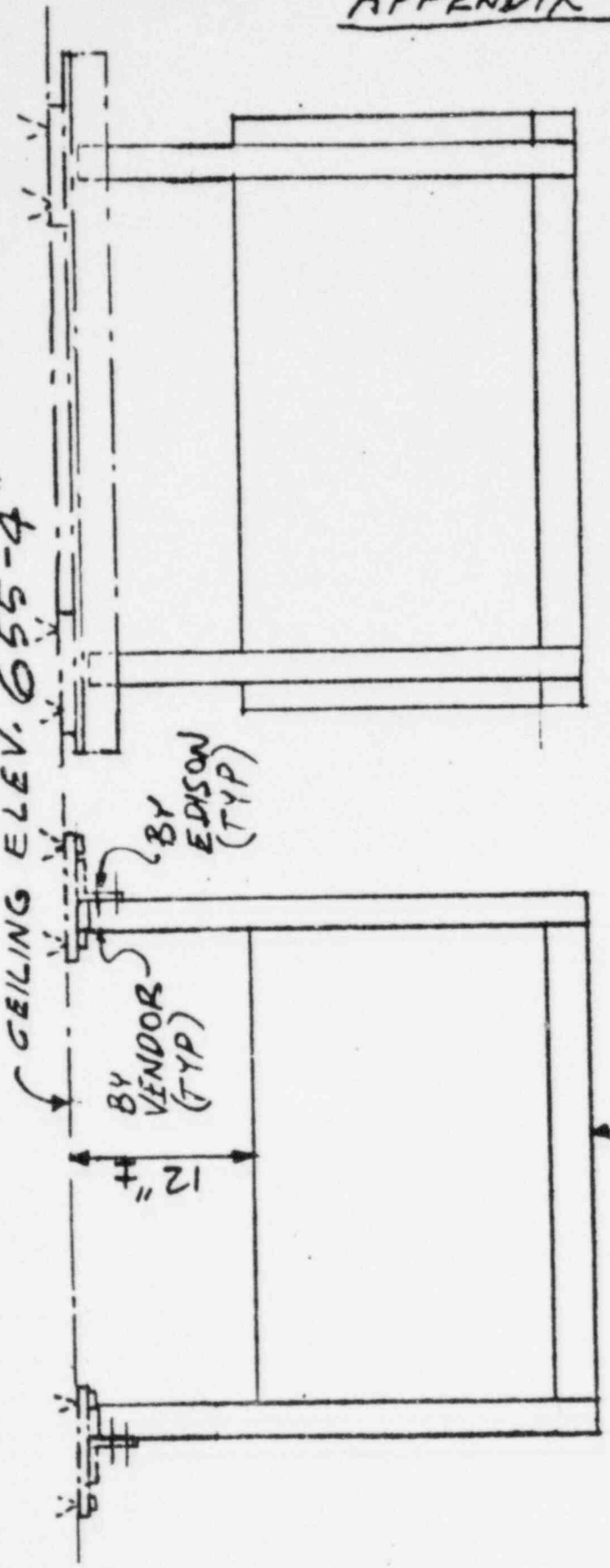


FIGURE 4: Full Model w/Connection I/O And Drain Pipes

ENRICO FERMI UNIT 2
ATTACHMENT TO SPECIFICATION 3071-337
Revision A
Revision Date: May 1983

APPENDIX "C"



ARRANGEMENT OF CEILING SUSPENDED FAN COIL UNITS

Dynamic Seismic Re-evaluation of Fan/coil Unit

computed by: Rahim Falsafi

PROJECT ENGR: A. KOCLIKOWSKI DATE 11/15/84

SYSTEM ENGR: T. GHAID DATE 11/16/84

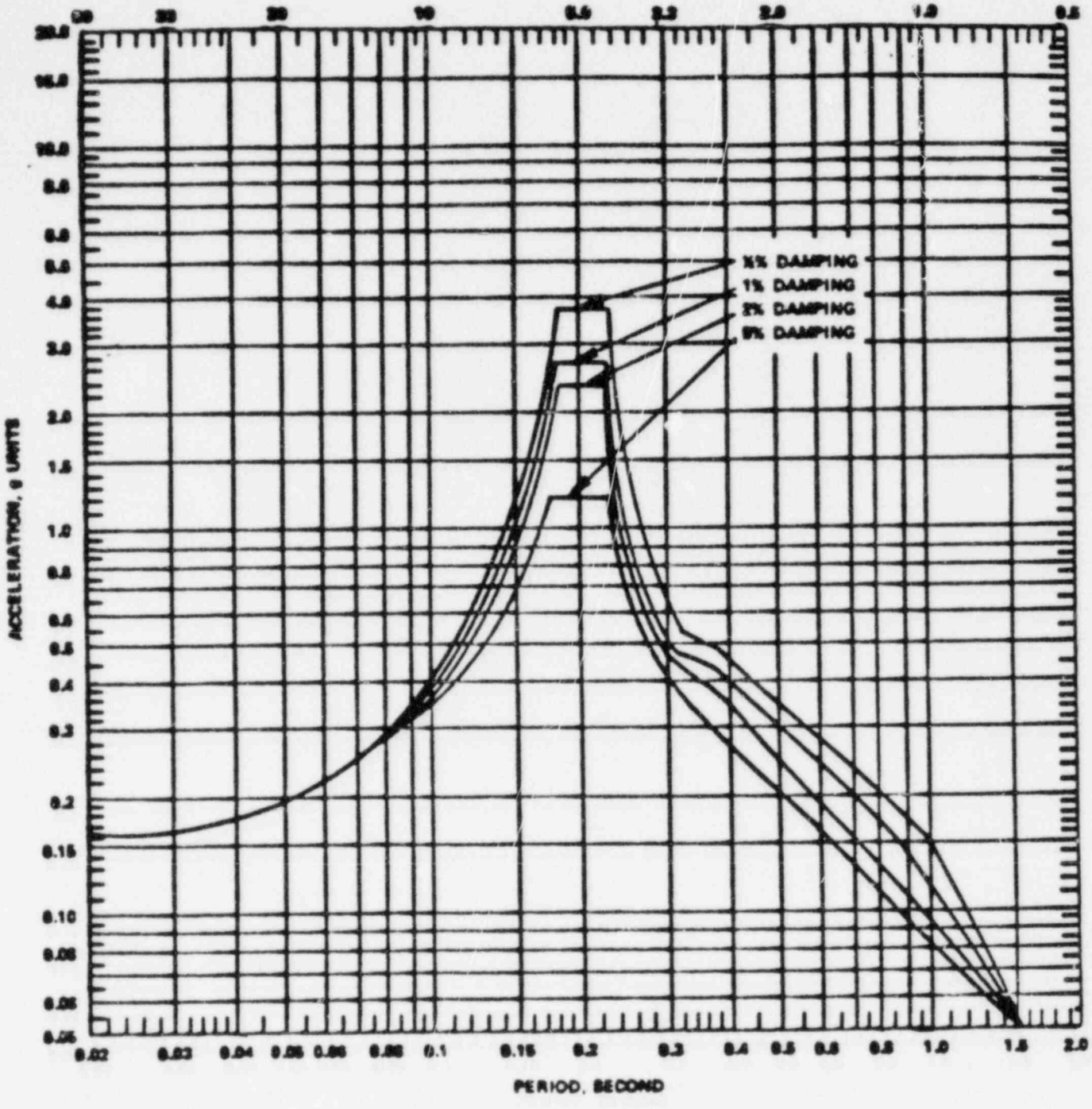


FIGURE NO B-11

ACTUAL LOCATION SPECTRA

T4100B043 UNIT IS HUNG FROM 4TH FLOOR AUX. BLDG. SLAB

ENRICO FERMI ATOMIC POWER PLANT
UNIT 2

HORIZONTAL FLOOR RESPONSE SPECTRA OPERATING BASIS EARTHQUAKE ELEVATION – 650'-0" (SLAB NO. 4) REACTOR/AUXILIARY BUILDING NORTH – SOUTH COMPONENT

BARGENT & LUNDY REPORT NO. SL-2882

Dynamic Seismic Re-evaluation of Fan/Coil Unit
Computed by: Rahim Falsafi

PREPARED BY: A. KROLIKOWSKI 11/3/83 DATE

SYSTEM ENGR: V. ANAND 11/4/83 DATE

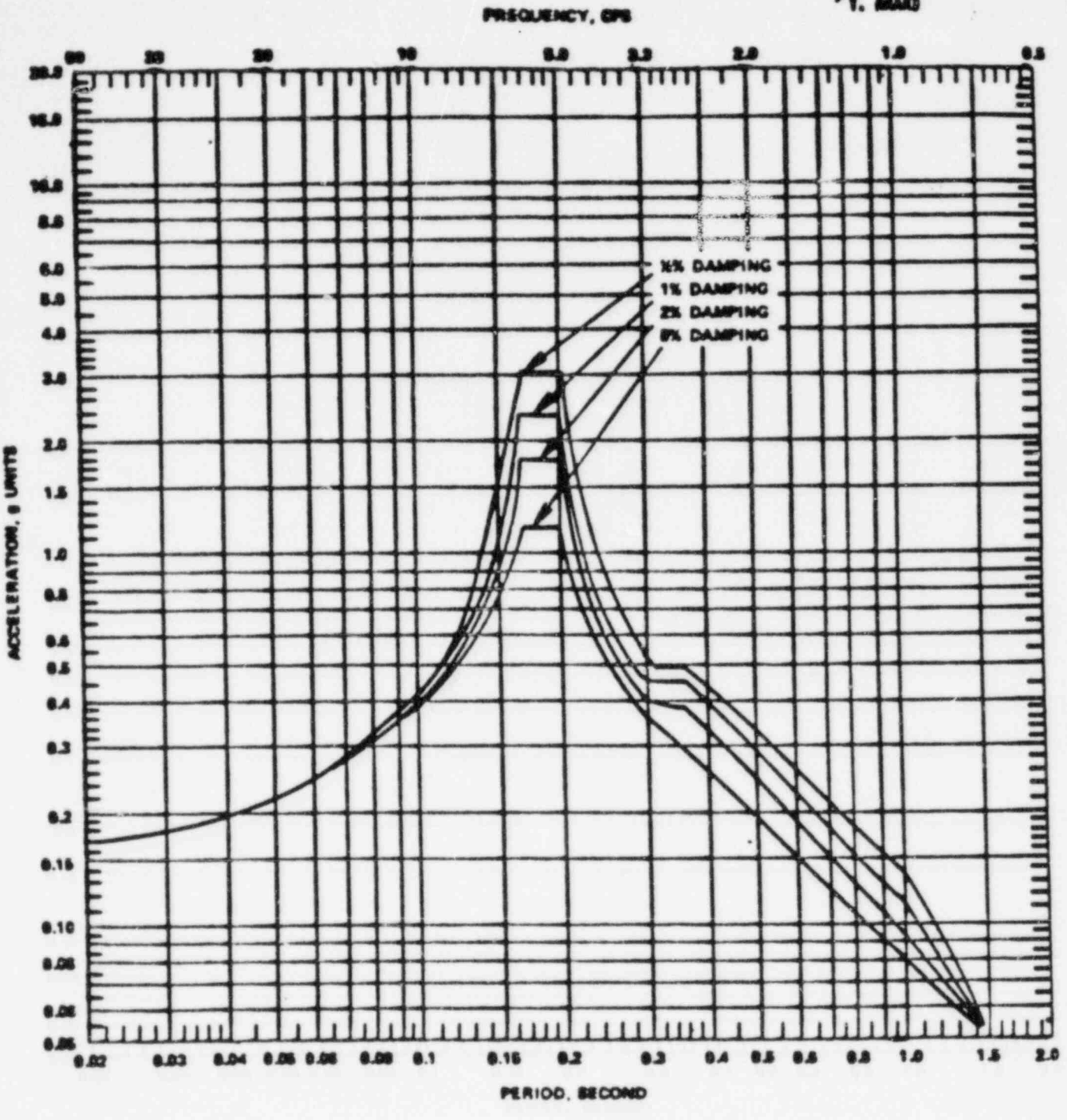


FIGURE NO B-12

ACTUAL LOCATION SPECTRA FOR T4100B043 UNIT

ENRICO FERMI ATOMIC POWER PLANT
UNIT 2

HORIZONTAL FLOOR RESPONSE SPECTRA
OPERATING BASIS EARTHQUAKE
ELEVATION – 659'–0" (SLAB NO. 4) REACTOR/
AUXILIARY BUILDING EAST–WEST COMPONENT

Dynamic Seismic Re-evaluation of Fan/coil Unit

Computed by: Rahim Falsafi

PREPARED BY: A.E.K. 11/5/84
A. KROLIKOWSKI DATE

SYSTEM ENGR: [illegible] 4/4/85
A. [illegible] DATE

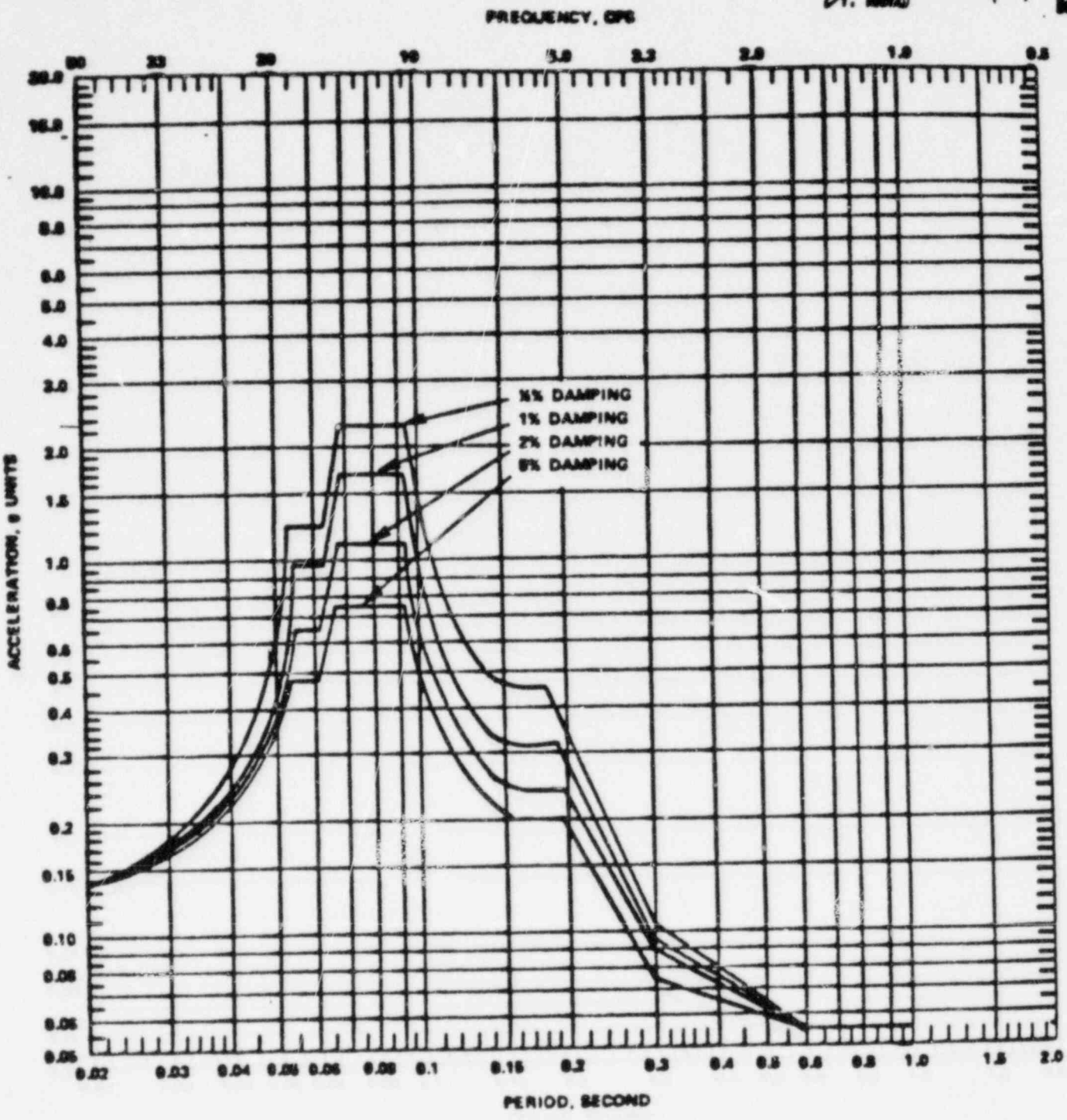


FIGURE NO C-8

ACTUAL LOCATION SPECTRA FOR T4100B043 UNIT

ENRICO FERMI ATOMIC POWER PLANT
UNIT 2.

VERTICAL RESPONSE SPECTRA OPERATING BASIS EARTHQUAKE AUXILIARY BUILDING SLAB EL. 583'-6", 613'-6" & 659'-6"

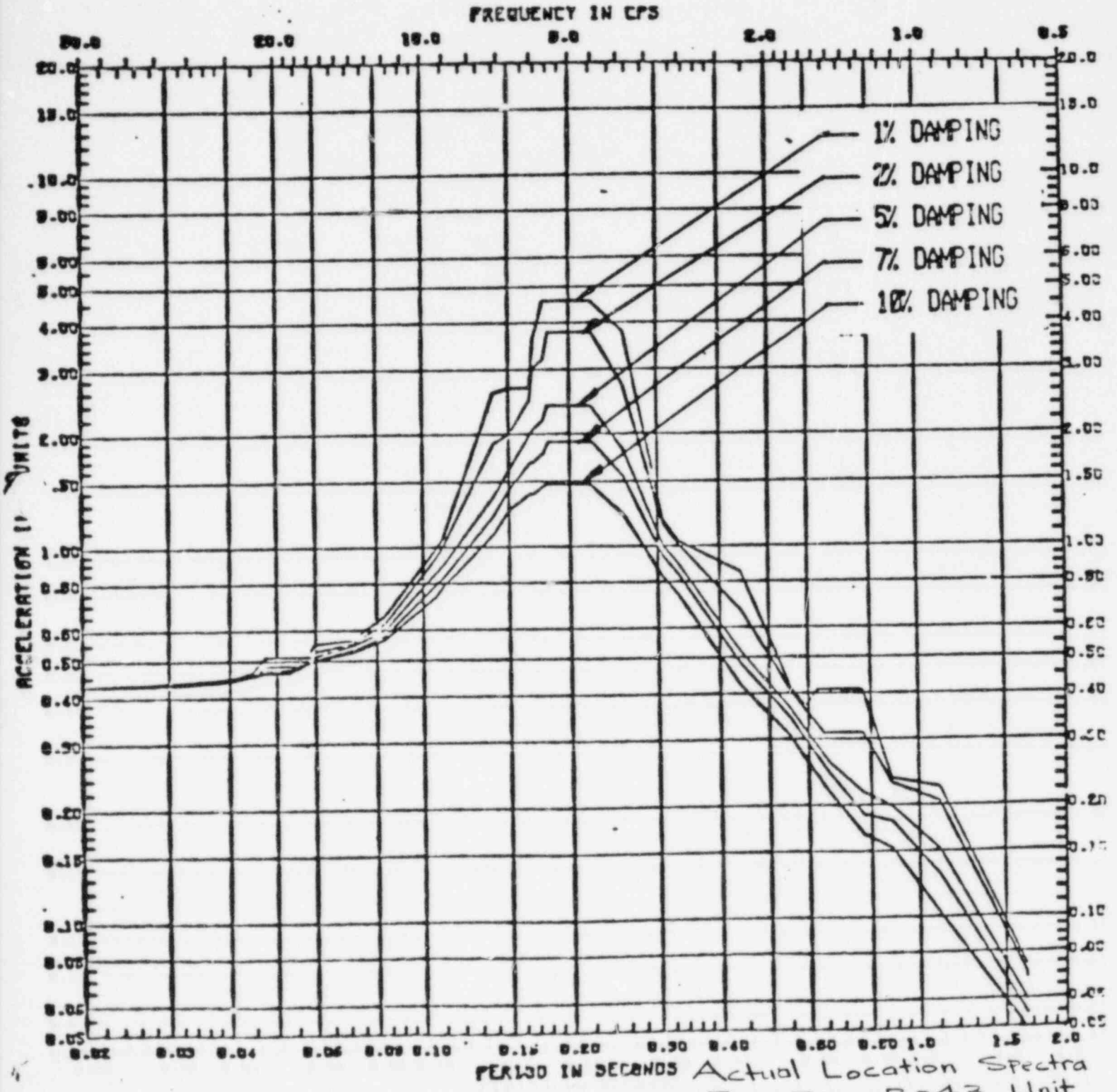
SARGENT & LUNDY REPORT NO. SL-3882

UNIT 2

SYSTEM ENGR: G. ANAND ..... 9/4/84 DATE

SITE SPECIFIC EARTHQUAKE 5% SITE DAMPING

Computed by: Rahim Falsafi



Actual Location Spectra For T4100B043 Unit

REACTOR AUXILLARY BUILDING: RESPONSE SPECTRUM

FIGURE NO. SE5-B-35

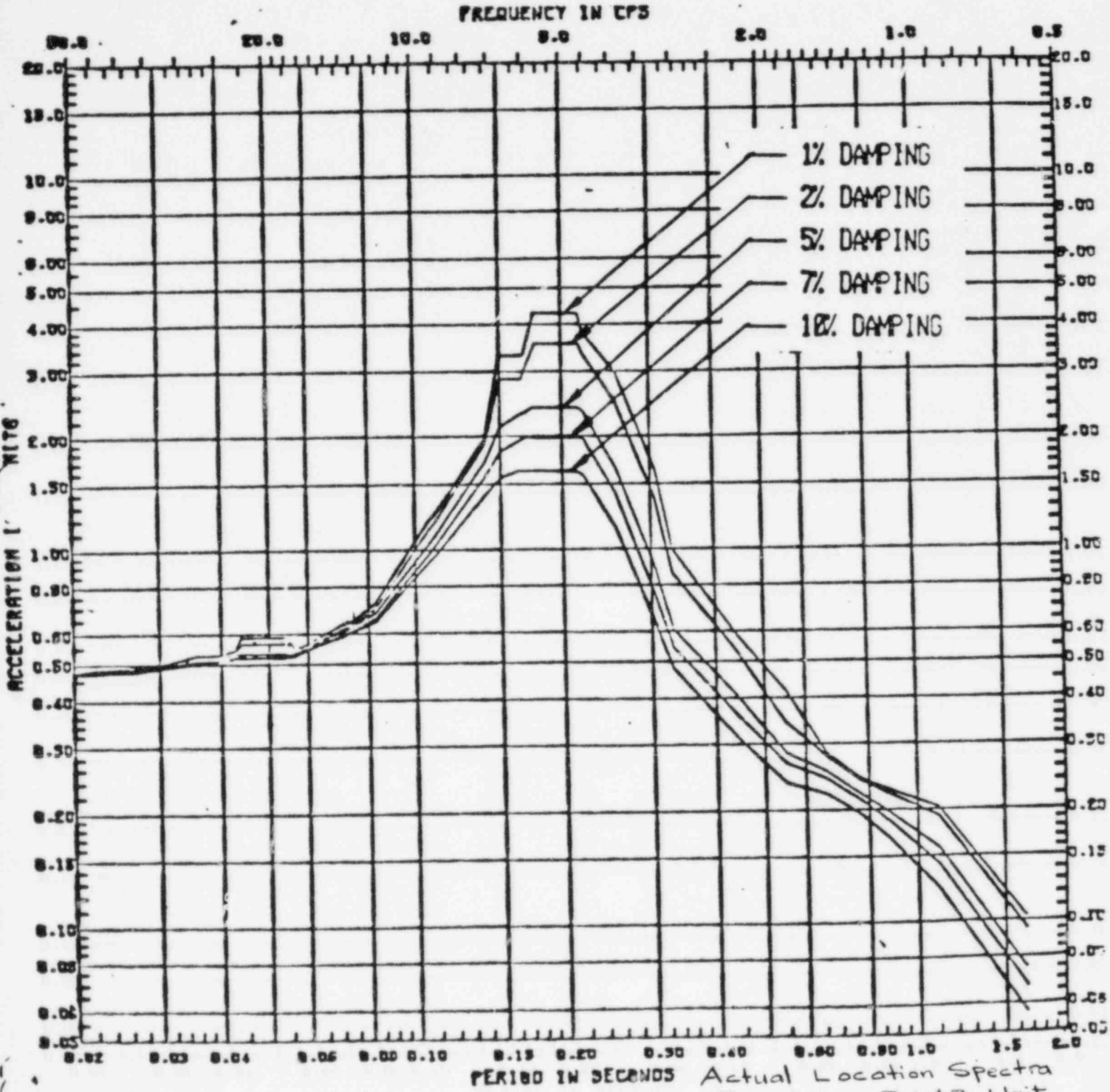
SPECTRUM	NODE	ELEV	DIRECT	LOCATION	
SE5-B-35	4	659-0	NS	REA-AUX BLDG	SLAB 4

UNIT 2

SYSTEM ENGR: J. ANAND 4/11/84 DATE

SITE SPECIFIC EARTHQUAKE 5% SITE DAMPING

Computed by: Rahim Falsafi



Actual Location Spectra For T4100B043 Unit

REACTOR AUXILLARY BUILDING: RESPONSE SPECTRUM

FIGURE NO. SE5-B-36

SPECTRUM	NODE	ELEV	DIRECT	LOCATION	
SE5-B-36	4	659-0	EW	REA-AUX BLDG	SLAB 4

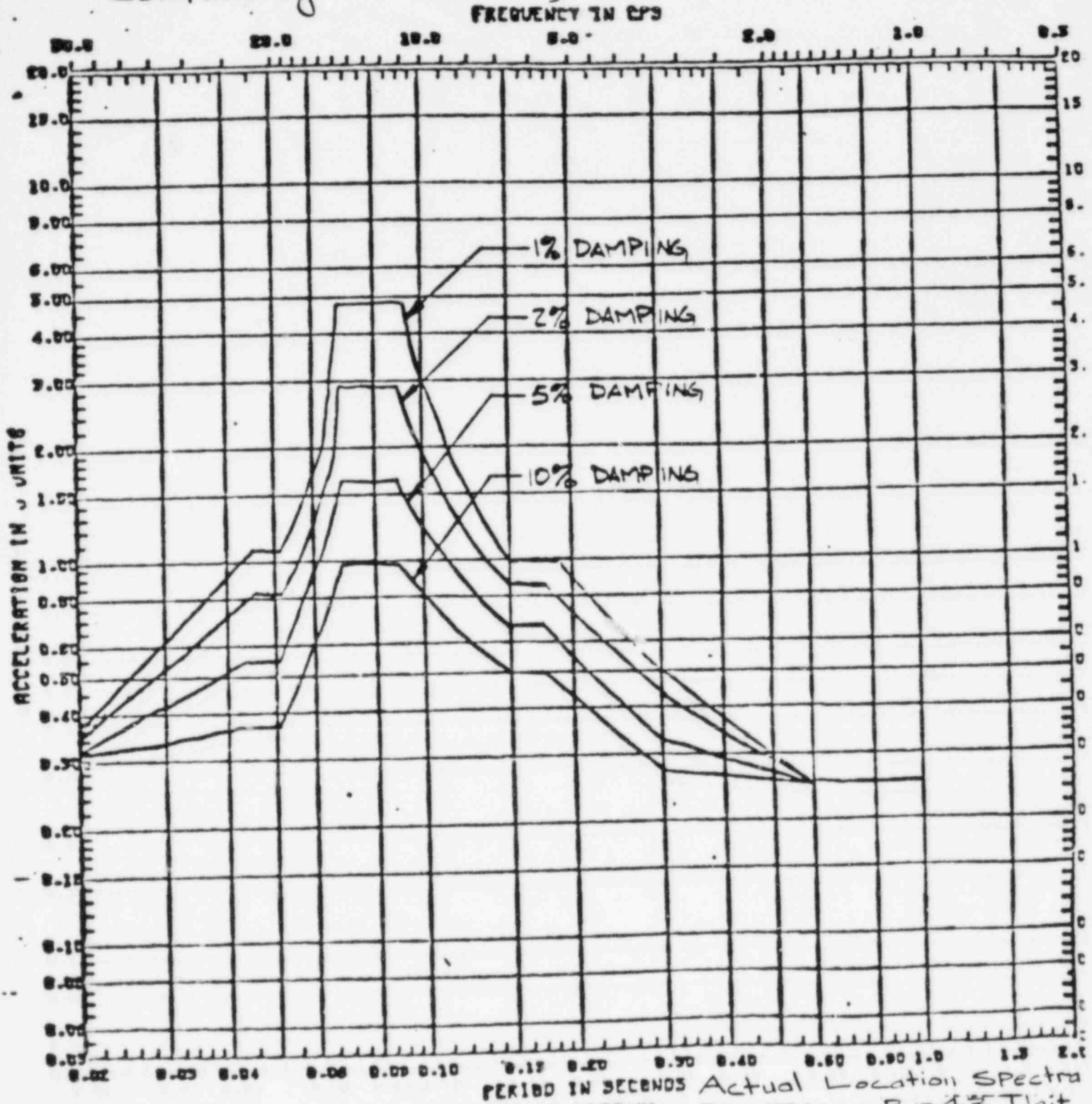
ENRICO FERMI
UNIT 2

A. KROLIKOWSKI DATE

SYSTEM ENGR: [signature] 4/4/81
Y. ANAND DATE

SITE SPECIFIC EARTHQUAKE 5% SITE DAMPING

Computed by: Rahim Falsafi



Actual Location Spectra
For T4100B043 Unit

REACTOR-AUXILLIARY BUILDING: RESPONSE SPECTRUM

FIGURE NO.

SPECTRUM	NODE	ELEV	DIRECT	LOCATION	
SE5-C-18		583-6 613-6 659-6	VERT	AUXILLIARY BUILDING SLAB	SE5-C-18

Qualification Summary of Equipment

I. Plant Name: Enrico Fermi Atomic Power Plant - Unit 2 Type:

1. Utility: Detroit Edison Company PWR ____
2. NSSS: GE 3. A/E: DECo BWR X

II. Component Name Various pneumatic control devices. See Attachment 'A'

1. Scope: ( ) NSSS (X) BOP
2. Model Number: See Attachment 'A'
3. Vendor: See Attachment 'A'
4. If the component is a cabinet or panel, name and model No. of the devices included: (See Section VIII)
5. Physical Description
   a. Appearance (See Section IX)
   b. Dimensions See Attachment 'A'
   c. Weight See Attachment 'A'
6. Location: Building: Auxiliary Building
   Elevation: 577'-6"
7. Field Mounting Condition ( ) Bolt (No. ____, Size ____)
   ( ) Weld (Length ____)
   ( ) ____ See Attachment 'A'
8. a. System in which located: T41-02
   b. Functional Description Pneumatic controls for operation of damper and its air seal
   c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown (X) Both ( ) Neither
9. Pertinent Referenced Design Specifications IEEE 344-1975 and DECo 3071-296

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

IV. Equipment Qualification Method:

(X) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: 10258, Rev. Ø, Seismic Qualification Report on Twelve pneumatic control devices, November 5, 1984
(No., Title and Date)

Company that Prepared Report: Farwell and Hendricks, Inc.

Company that Reviewed Report: DECo

V. Vibration Input

1. Loads considered: a. (X) Seismic only

b. ( ) Hydrodynamic only

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

2. Method of Combining RRS: ( ) Absolute Sum ( ) SRSS
( ) N/A other, specify

3. Required Response Spectra (attach the graphs): Attachment C and D

4. Damping Corresponding to RRS: OBE 5% SSE 5%

5. Required Acceleration in Each Direction: ( ) ZPA
(X) 5.0 G for SSE ZPA other, specify

6. Were fatigue effects or other vibration loads considered?

(X) Yes ( ) No

If yes, describe loads considered and how they were treated in overall qualification program: Operational cycling (1500 cycles) with monitoring.

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

VI. If Qualification by Test then Complete*:

1. ( )Single Frequency (X)Multi-Frequency (X)random
   ( )sine beat ( )_____
   other, specify

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

3. No. of Qualification Tests: OBE 5 SSE 1
   Other_____

4. Frequency Range: 1 to 50 HZ

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): Not required for the test program

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

6. Method of Determining Natural Frequencies N/A

   ( )Lab Test ( )In-Situ Test ( )Analysis

7. TRS enveloping RRS using Multi-Frequency Test (X)Yes (Attach TRS & RRS Graphs)
   Attachment 'C' and 'D'
   ( )No

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

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

9. Laboratory Mounting: See Attachment 'B'

   1. ( )Bolt (No.___,Size_____) ( ) Weld (Length_____) ( )_____

10. Functional operability verified: (X)Yes ( )No ( )Not Applicable

11. Test Results including modifications made: Satisfactory.

12. Other tests performed (such as aging or fragility test, including results): Baseline functional, operational cycling prior to seismic test, operational cycling after seismic test, post seismic functional.

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

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

1. Method of Analysis:

( )Static Analysis ( )Equivalent Static Analysis

( )Dynamic Analysis ( )Time-History ( )Response Spectrum

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

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

3. Model Type:( )3D ( )2D ( )1D
( )Finite Element( )Beam ( )Closed Form Solution

4.( )Computer Codes: _____

Frequency Range and No. of modes considered:_____

( )Hand Calculations

5. Method of Combining Dynamic Responses:( )Absolute Sum ( )SRSS

( )Other:_____
(specify)

6. Damping: OBE__ - SSE__ Basis for the damping used:_____

7. Support Considerations in the model:_____

8. Critical Structural Elements:_____

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

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

VIII. List of Subcomponents

Name	Model No. - *Weight - *Location - If subcomponent was actually present	Was Component present or mass simulated?	Was subcomponent operability verified (Y or N or U **)

* If Available
** Yes = Yes, N = No, U = Unknown

ATTACHMENT 'A"
to SQRT Form #65

COMPONENT	VENDOR MODEL	DIMENSION INCH (APPROXIMATE)	WT LBS. (APPROX)	FIELD MOUNTING
1. Check Valve	Parker Hannifin C-400-B-10	0.81 x 0.81 x 2.62 long.	0.4	In line, Brass Fittings to 1/4" Soft Copper
2. Filter Regulator	Fisher Controls Co. 67F-203 (installed) 67AF-237 (tested)	3.19 x 3.19 x 9.0 Ht. 3.19 x 3.19 x 7.94 Ht.	1.5	(2) 5/16" dia. bolts;
3. 3-Way Switching Valve (3-15PSIG) & (40-100PSIG)	Fisher Controls Co. 164A	4.12 dia. x 9.19 ht.	4.0	L shaped bracket
4. Pressure Gauge (0-60PSIG) 1-1/2" dia.	Fisher Controls Co. J512	2.0 dia.		Brass tee to 1/4" soft copper
5. Actuator	G.H. Bettis CB-525-SR CB-725-SR	8-3/4 dia. x 27-11/16 lg. 8-3/4 dia. x 27-3/4 lg.	60.0 92.0	(4) 7/16"-14THD bolts
6. 3-Way Valve Manual without lugs	WABCO 2MA-1A and 2CA-1A (without roller)	2-1/2 w x 2-7/16 ht x 1-1/2 th.	0.5	(2) 1/4" thru bolts

TABLE 1.1

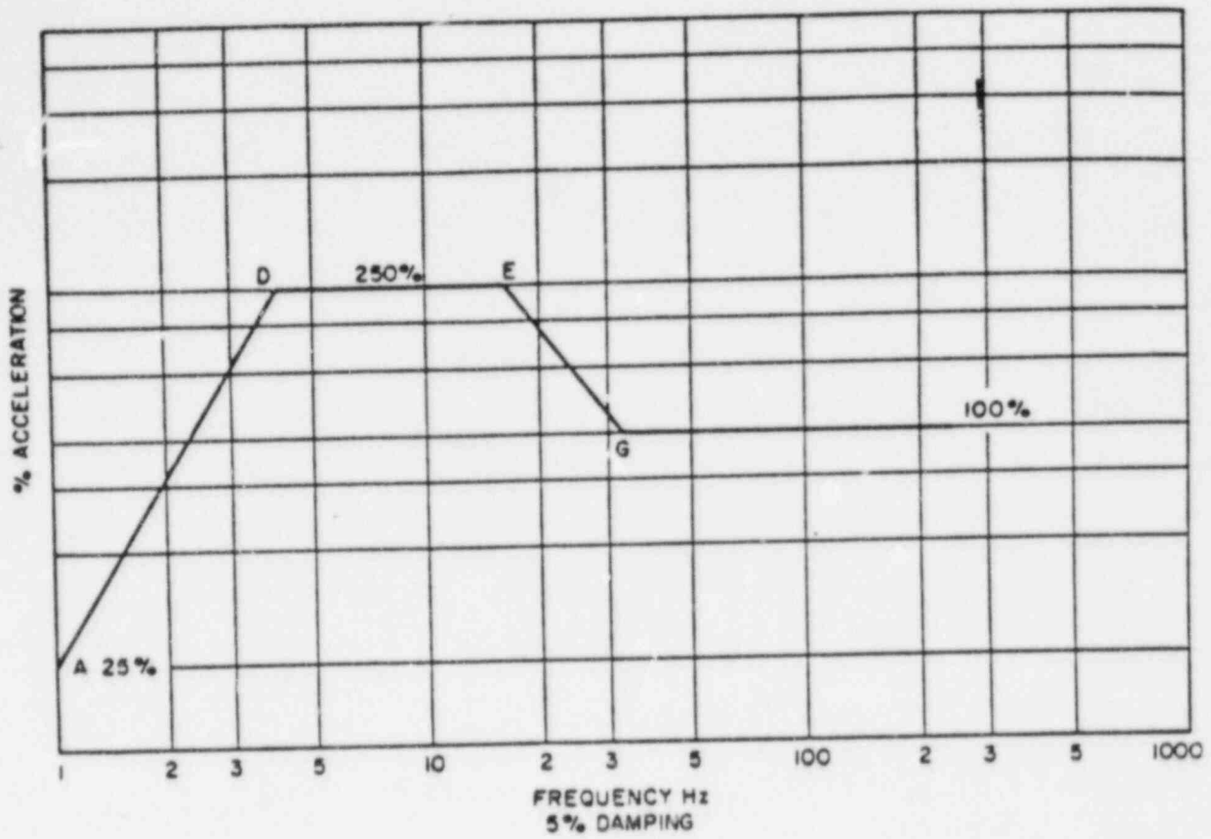
DESCRIPTION OF TEST SPECIMEN(S) AND MOUNTING

Test Specimen I.D.	Device	Mounting	Orientation
CV-1	Parker Hannifin Check Valve C-400-8-10	In Line Connection - Brass Fittings to 1/4" Soft Copper	Horizontal
CV-2	Same as CV-1	In Line Connection - Brass Fittings to 1/4" Soft Copper	Vertical
PVC-1	Fisher 67AF-237 Filter Regulator	2-5/16" Diameter Bolts - Side of Regulator to Fixture	Horizontal
PCV-2	Same as PCV-1	2-5/16" Diameter Bolts - Side of Regulator to Fixture	Vertical
SWV-1	Fisher 164A-47(40-100 psig Spring Range) 3 Way Switching Valve	L-Shaped Bracket (Supplied with Unit) to Fixture	Horizontal
SWV-2	Fisher 164A-17 (3-15 psig Spring) 3 Way Switching Valve	L-Shaped Bracket (Supplied with Unit) to Fixture	Vertical
PI-2	Fisher J512 Pressure Gauge 0-60 psig 1 1/2" Dia. Back Mounted	Connect to Stainless Steel Tee Stainless Steel Tee 1/4" Sof Copper	Horizontal
PI-4	Fisher J512 Pressure Gauge 0-60 psig 1 1/2" Dia. Back Mounted	Connect to Stainless Steel Tee Stainless Steel Tee to 1/4" Soft Cooper	Vertical
ACT-1	Bettis CB-725-SR-80 Actuator	Bolt to Fixture with 4-1/2"-13 THD. SAE Grade 5 Bolts	Vertical
ACT-2	Bettis CB-525-SR-80 Actuator	Bolt to Fixture with 4-7/16" 14 THD SAE Grade 5 Bolts	Horizontal
*SWV-3	WABCO 2 CA-1A(P58721) Manual 3 Way Valve with CAM Roller Removed	2-1/4" Thru Bolts to Fixture	Vertical
*SWV-4	WABCO 2 MA-1A(P58719)	2-1/4" Thru Bolts to Fixture	Horizontal

* Functionally the same: Refer to Appendix D, the P58719 is functionally the same as the P58718 but is supplied with lugs for various operating kits. The P58721 is a P58719 supplied with a two-director cam roller operator kit.

Test items were purchased by Farwell & Hendricks, Inc. as commerical grade components.

Model numbers are corrected from list provided by Detroit Edison and verified with Larry Raisanen on 10-15-84.



	A	D	E	G
OBE #1	.63 g's 1 Hz	6.25 g's 4 Hz	6.25 g's 16 Hz	2.5 g's 33 Hz

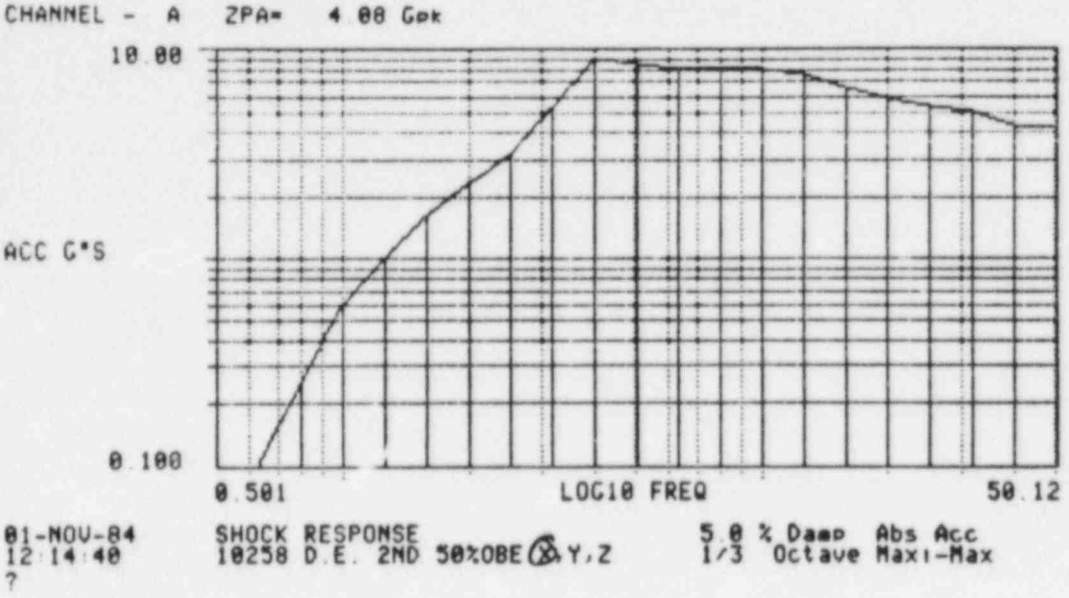
OBE #2 - #5 will be increased to the following approximate flat.

Portion (D-E) Levels

OBE #2	7.50 g's
OBE #3	8.75 g's
OBE #4	10.00 g's
OBE #5	11.25 g's

SSE	1.25 g's 1 Hz	12.5 g's 4 Hz	12.5 g's 16 Hz	5.0 g's 33 Hz

REQUIRED RESPONSE SPECTRA



Freq	Ampl	Freq	Ampl	Freq	Ampl
0.63	0.11	3.16	5.23	15.85	6.53
0.79	0.25	3.98	8.94	19.95	5.69
1.00	0.60	5.01	8.32	25.12	5.27
1.26	1.01	6.31	7.87	31.62	5.00
1.58	1.62	7.94	8.04	39.81	4.27
2.00	2.27	10.00	7.86	50.12	4.18
2.51	3.19	12.59	7.50		

FIGURE 6.2

TEST RESPONSE SPECTRA

IX. Sketch or drawing installed

a. How it has been installed

or

How it will be installed

Parker Hannifin Corporation
Hydraulic Valve Division
520 Ternes Avenue
Elyria, Ohio 44035
Phone: (216) 322-4631

Manatrol Control Valves

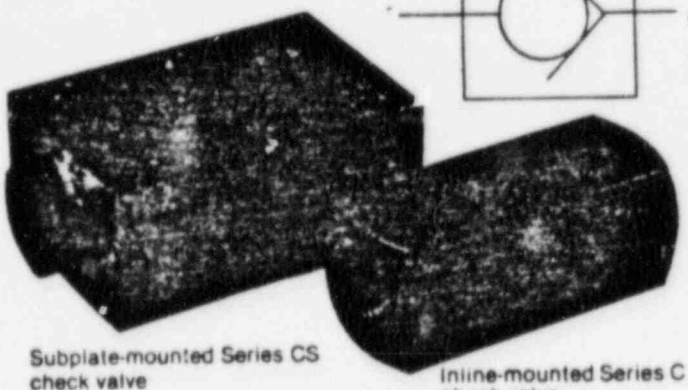
Catalog 3000-2 8/84 10M AP

Check Valves
Series C and CS

Dimensions

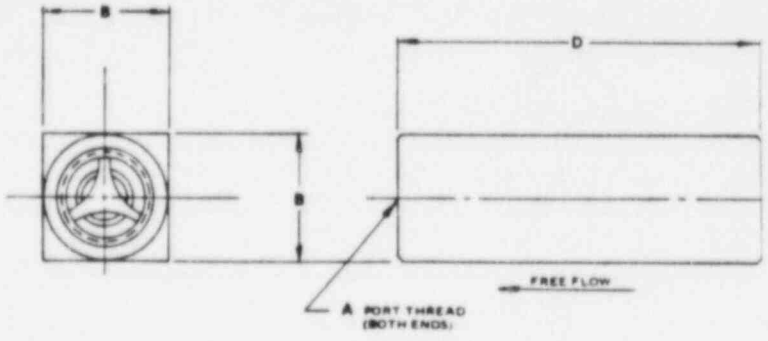
Check Valve, Inline-mounted

Models C200 through C3220



Subplate-mounted Series CS check valve

Inline-mounted Series C check valve



Model Number	Port Size, Inches A	Dimensions, Inch (mm) B	D	Weight Lb. (Kg)
C200	1/8-27 NPTF	0.62 (15.7)	2.00 (50.8)	0.1 (0.05)
C400	1/4-18 NPTF	0.81 (20.6)	2.62 (66.5)	0.4 (0.2)
C620	9/16-18 UNF 2B (SAE 6)	0.88 (22.3)	3.12 (79.2)	0.5 (0.2)
C600	3/8-18 NPTF	1.00 (25.4)	2.75 (69.9)	0.5 (0.2)
C820	3/4-16 UNF 2B (SAE 8)	1.12 (28.4)	3.50 (88.9)	1.3 (0.6)
C800	1/2-14 NPTF	1.25 (31.8)	3.44 (87.4)	1.3 (0.6)
C1020	7/8-14 UNF 2B (SAE 10)	1.25 (31.8)	4.00 (101.6)	2.0 (0.9)
C1200	3/4-14 NPTF	1.50 (38.1)	3.88 (98.6)	2.0 (0.9)
C1220	1-1/16-12 UNF 2B (SAE 12)	1.50 (38.1)	4.62 (117.3)	2.0 (0.9)
C1420	1-3/16-12 UN (SAE 14)	2.00 (50.8)	5.00 (127.0)	3.3 (1.5)
C1600	1-11-1/2 NPTF	1.75 (44.5)	5.00 (127.0)	3.3 (1.5)
C1620	1-5/16-12 UN (SAE 16)	2.25 (57.2)	5.62 (142.7)	3.3 (1.5)
C2000	1-1/4-11-1/2 NPTF	2.25 (57.2)	5.62 (142.7)	6.2 (2.9)
C2020	1-5/8-12 UN (SAE 20)	2.75 (69.9)	6.50 (165.1)	6.2 (2.9)
C2400	1-1/2-11-1/2 NPTF	2.75 (69.9)	5.62 (142.7)	8.4 (3.9)
C2420	1-7/8-12 UN (SAE 24)	3.00 (76.2)	7.25 (184.2)	8.4 (3.9)
C3200	2-11-1/2 NPTF	3.50 (88.7)	6.50 (165.1)	15.4 (7.1)
C3220	2-1/2-12 UN (SAE 32)	4.00 (101.6)	9.00 (228.6)	15.4 (7.1)

IX. Sketch or drawing installed

How it has been installed

FISHER Controls

67 Series Small-Volume Pressure Regulators

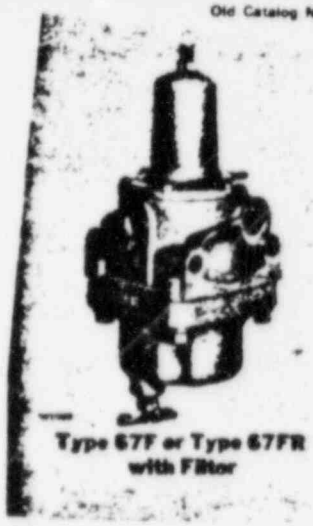
November 1973 | Bulletin 71.1.6

Old Catalog Number C-67

Specifications

AVAILABLE CONFIGURATIONS	See table 1 for type number variations and construction features available with each type
BODY SIZE AND END CONNECTION STYLE	1/4" 18 Dryseal NPTF screwed pipe threads
MAXIMUM INLET PRESSURE	Types 67H, 67HR, 67S, 67U, and 67UR: 400 psig All Other Types: 250 psig
MAXIMUM OUTLET PRESSURE	Types 67FY, 67FYR, 67Y, and 67YR: 20 psig All Other Types: 100 psig
OUTLET SET POINTS OR PRESSURE RANGES	See table 2
PRESSURE REGISTRATION	Internal
CONSTRUCTION MATERIALS	Only materials common to most or all types are shown below; see table 3 for additional materials for individual types Body Plug Gasket (Nonfilter Types Only): Asbestos Regulator Spring Seat: Zinc-plated steel Regulator Spring: See table 2 Valve Stem: Brass or stainless steel Valve Plug *One-Piece Construction:* Same material as valve stem *Bonded Construction:* Standard composition material or Viton* bonded to valve stem Valve Plug Return Spring: Stainless steel Diaphragm Plate: Cadmium-plated steel Filter: Brass, stainless steel, or cellulose Inlet Screen and Holder (Optional) *Types 67H and 67HR Only:* Brass and Monel* *All Other Types:* Aluminum and Monel* or brass and Monel*
TEMPERATURE CAPABILITIES	−20°F to +150°F
FLOW CAPACITIES	See table 4 and figure 6
FLOW COEFFICIENTS	Regulating C_g: 6.2 Wide-Open C_g (for Relief Valve Sizing): 8.5 Representative C_v: 30.4 Maximum C_v: 0.28
ORIFICE DIAMETER	0.123"
FILTER CAPABILITIES	Free Area: 12 times pipe area Micron Rating *Brass and Stainless Steel:* 50µ *Cellulose:* 40µ
OPTIONAL PRESSURE GAUGES	See table 5
SPRING CASE VENT	Standard: 1/8" drilled hole Optional: 1/4" 18 Dryseal NPTF tapped connection

*Trademark of DuPont Company
*Trademark of International Nickel Company



Type 67F or Type 67FR with Filter

NOTE:

Model 67F-203 has been installed. However, this model is now discontinued by the manufacturer. Model 67AF has been tested for similarity. Besides Model 67FR-224 was previously qualified per MCC Powers Report No. 44870-1, December 17, 1979, DECo File No. B9-2455 as part of a Control Relay panel with components.

See Page 6 B.

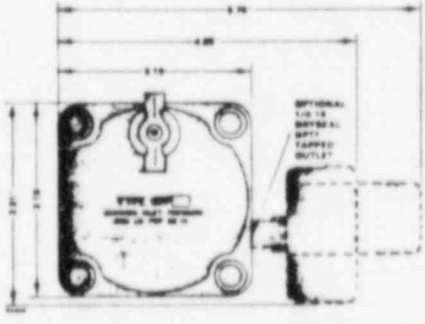


Figure 8. Bottom Dimensions Common Only to Those 67 Series Regulators with Filters

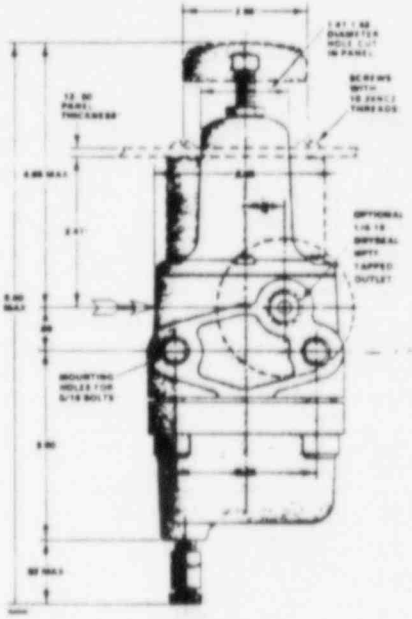


Figure 10. Dimensions for Types 67F and 67FR

IX. Sketch or drawing installed

How it has been installed

Fisher Controls

67 Series Small-Volume Pressure Regulators

September 1980 *Bulletin 71.1:6*

Specifications

AVAILABLE CONFIGURATIONS	See table 1 for type numbers and available configurations. Also, see "Construction Features."
BODY SIZE AND END CONNECTION STYLE	1/4 in. NPT screwed
MAXIMUM ALLOWABLE INLET PRESSURE	Types 67H, 67HR, 67S, 67U, and 67UR: 400 psig (27.2 bar) All Other Types: 250 psig (17.2 bar)
OUTLET PRESSURE RANGES	See table 2
MAXIMUM OPERATING OUTLET PRESSURE	Types 67AFY, 67AFYR, 67Y, and 67YR: 30 psig (1.4 bar) All Other Types: 100 psig (6.9 bar)
MAXIMUM EMERGENCY OUTLET PRESSURE	50 psi (3.4 bar) over outlet pressure setting, or 110 psig (7.6 bar), whichever is greater
PORT DIAMETER	1/8 in. (3.2 mm)
FLOW CAPACITIES	See table 4
RELIEF SIZING COEFFICIENTS	Wide-Open C_g: 8.5 Representative C_1: 30.4 Maximum C_1: 0.28
CONSTRUCTION MATERIALS	See table 3
MATERIAL TEMPERATURE CAPABILITIES	With Nitrile Diaphragm: −20 to 150°F (−29 to 66°C) With Viton Diaphragm: 0 to 300°F (−18 to 149°C)
PRESSURE SETTING ADJUSTMENT	Type 67AFY, 67AFYR, 67Y, and 67YR Regulators: Not adjustable. All Other Types: Adjustable throughout each spring range by turning setscrew, tee handle, handwheel, or cap on calibrated spring case
PRESSURE REGISTRATION	Internal
SPRING CASE VENT	1/8 in. (3.2 mm) drilled hole
FILTER CAPABILITIES	Free Area: 12 times pipe area Micron Rating: 40 µ
APPROXIMATE WEIGHT	Up to 1-1/2 lb (0.7 kg) depending on configuration
OPTIONS	■ See table 1 ■ Pressure gauges are available for regulators with second tapped outlet. Information on the gauges is provided in a separate bulletin.

TYPE 67AF OR TYPE 67AFR WITH FILTER AND OUTLET PRESSURE GAUGE

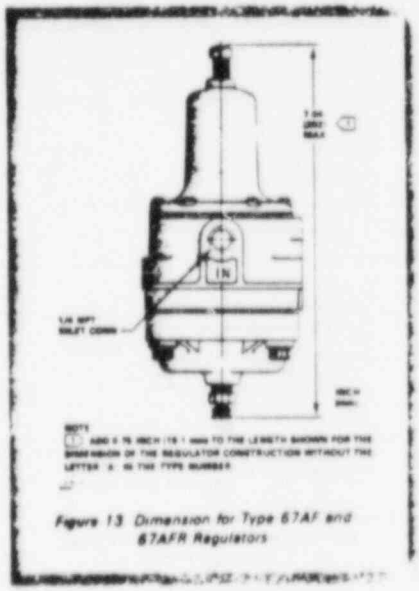


Figure 13. Dimension for Type 67AF and 67AFR Regulators

Construction Features

All standard and optional constructions available in the 67 Series regulators are shown in table 1, which cross-references type numbers and construction features.

The 67 Series regulators with filtering action employ two ways of retaining the filter. A regulator type number that includes the letters "AF" indicates that the filter cap retains the filter. A regulator type number that includes the letter "F" and not the letter "A" indicates that the filter post retains the filter. The performance and specifications are the same regardless of how the filter is retained. The same amount of moisture, or other impurities from the process fluid, can be contained in the filter cap regardless of the way the filter is retained. In addition, the recommended spare parts are interchangeable from a regulator with one filter retention method to a regulator with the other. For a regulator with filtering action, the filter retention method supplied depends on the location at which that regulator was manufactured.

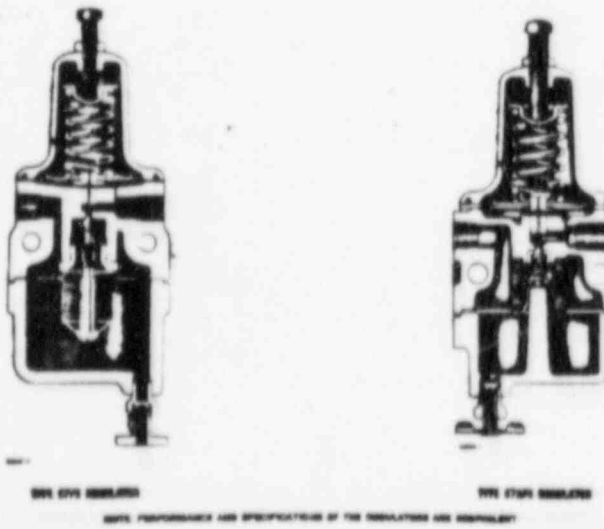
Some standard construction features designated by a letter suffix in the type number are described in the following paragraphs.

Internal Relief

An internal relief valve (indicated by "R" in the type number as shown in table 1) increases controllability in low-flow situations. Although not designed to provide full over-pressure protection, the 67 Series internal relief valve (figures 2, 3, 4, and 5) will allow partial reduction of downstream pressure without the necessity of an external relief valve being opened.

Filtering Action

A filter (indicated by "F" in the type number as shown in table 1) of either stainless steel or resin-impregnated cellulose is available with the 67 Series regulators. The filter has a free area of 12 times the pipe area.



Figs. 2 3. Sectional Views of Filter Regulators Showing Details of Filter Retention and Internal Relief

NOTE:

Model 67AF-237 has been tested to qualify the installed Model 67F-203 by similarity. 67F series has been discontinued by the manufacturer.

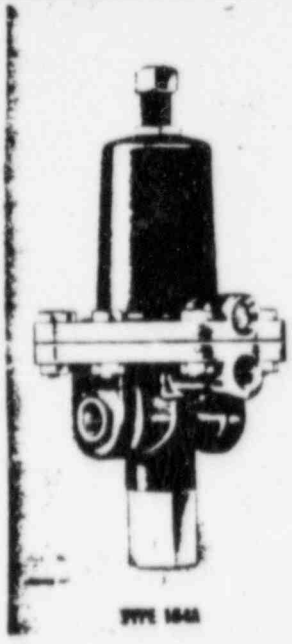
IX. Sketch or drawing installed

How it has been installed

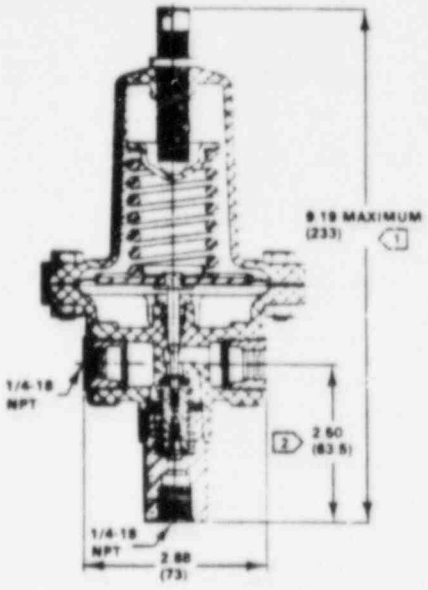
FISHER Controls

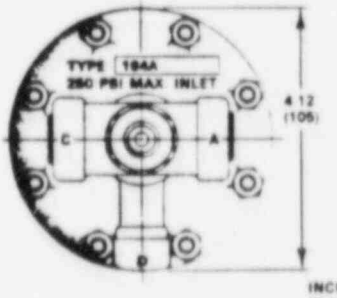
Types 164 and 164A Switching Valves

March 1979 | Bulletin 71.7:164



TYPE 164A





1 DIMENSION SHOWN IS FOR TYPE 164A SWITCHING VALVE. FOR TYPE 164 SWITCHING VALVE THIS DIMENSION IS 8.28 INCHES (210 mm)

2 1.59 INCHES (40 mm) FOR TYPE 164 SWITCHING VALVE

INCH (mm)

Figure 4. Dimensions

Specifications

AVAILABLE CONFIGURATIONS	Type 164: Two-way switching valve Type 164A: Three-way switching valve
MAXIMUM VALVE INLET PRESSURE	250 psig (17.2 barg)
OUTLET PRESSURE RANGES	See table 1
MAXIMUM DIAPHRAGM PRESSURE	100 psig (6.9 barg)
OPERATIVE TEMPERATURE LIMITS*	−20 to 150°F (−29 to 66°C)
FLOW COEFFICIENTS (C_v)	Depends on construction and flow path (see figure 2) as follows: Type 164: 28.8 (Port A to Port C) Type 164A: 15.0 (Port A to Port B) or 28.8 (Port A to Port C)
CONNECTIONS	Type 164: Ports A and C—⊞ 1/4-inch NPT or ⊞ 3/2-inch NPT. Vent and control pressure connection (Port D)—1/4-inch NPT. Type 164A: Ports A, B, and C—⊞ 1/4-inch NPT or ⊞ 1/2-inch NPT. Vent and control pressure connection (Port D)—1/4-inch NPT
CONSTRUCTION MATERIALS	

Part	Material
Spring Case	⊞ Aluminum or ⊞ Cast iron (Accepts optional closing cap)
Valve Body	Aluminum
Valve Disc	Brass and synthetic rubber
Diaphragm and O-rings	Nitrile
Spring	Steel
Closing Cap (Optional)	Brass

APPROXIMATE WEIGHT	4 lbs (1.8 kg)
OPTIONS	Closing cap

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed

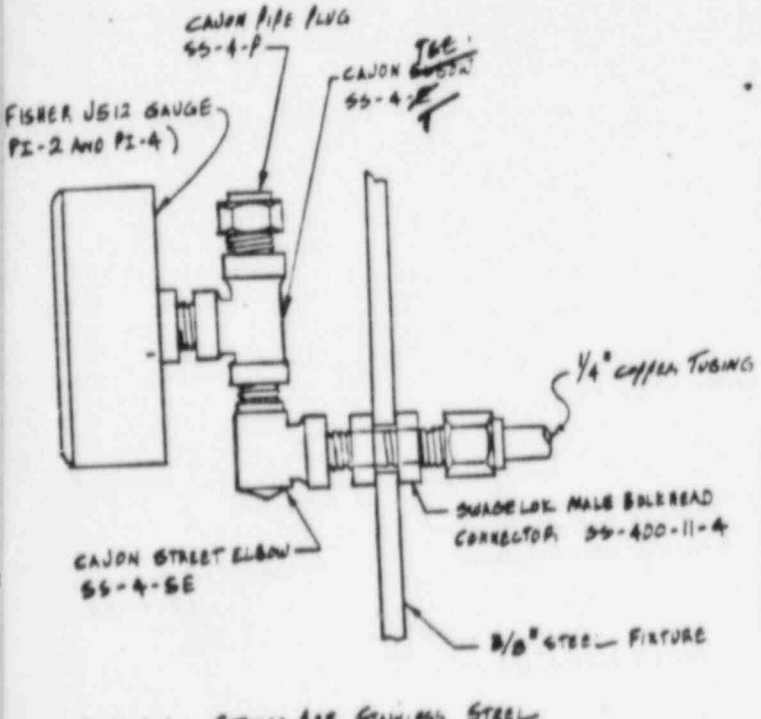
PURCHASE SPECIFICATION
3071-376-PUR-105 SHEET 12 OF 15

FISHER Controls

Fisher Gauges

December 1972 | Bulletin 71.8:50

Old Catalog Number PI-50



NOTE : ALL FITTINGS ARE STAINLESS STEEL

FIGURE 5 - FISHER J512 MOUNT

Series J500 Gauges

Series J500 to J508 and J510 to J519 gauges are furnished in 2" diameter, black steel case. The Type J509 gauge is supplied in 2 1/2" diameter, black steel case. All types are furnished with 1/4" NPT connections and with black letters on a white background. The following tables give the connection locations and the pressure ranges available.

Bottom Connection

Type	Part Number	Calibration—Psig
J500	1J9760 99012	0 to 15
J501	1J9761 99012	0 to 30
J502	1J9762 99012	0 to 60
J503	1J9763 99012	0 to 100
J504	1J9764 99012	0 to 160
J505	1J9765 99012	0 to 200
J506	1J9766 99012	0 to 300
J507	1J9767 99012	0 to 600
J508	1J9768 99012	0 to 1000
J509	1J9769 99012	0 to 2000

Back Connection

Type	Part Number	Calibration—Psig
J510	1J9757 99012	0 to 15
J511	1J9460 99012	0 to 30
J512	1J9752 99012	0 to 60
J513	1J9753 99012	0 to 100
J514	1J9754 99012	0 to 160
J515	1J9756 99012	0 to 200
J516	1J9755 99012	0 to 300
Type	**Part Number**	**Special Calibrations—Kg/Sq. Cm**
J518	1J9758 99012	0 to 2
J519	1J9759 99012	0 to 4

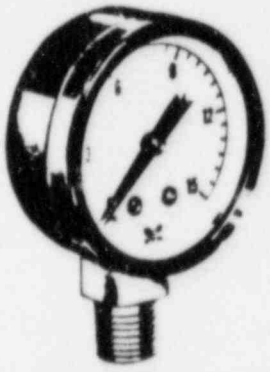


Figure 3. Type J500 Gauge Calibrated 0 to 15 Ps With Bottom Connection

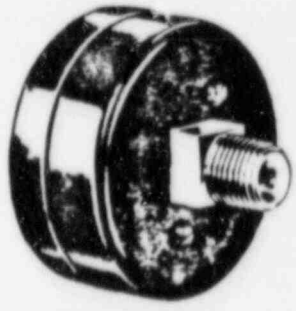


Figure 4. Type J510 Gauge With Back Connection

IX. **Sketch or drawing installed**

How it has been installed

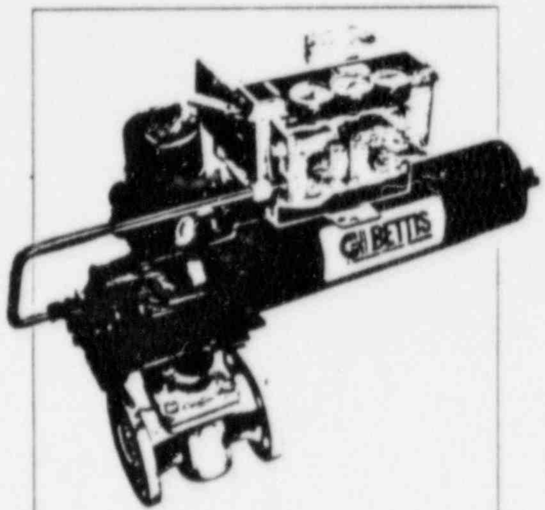
or

How it will be installed

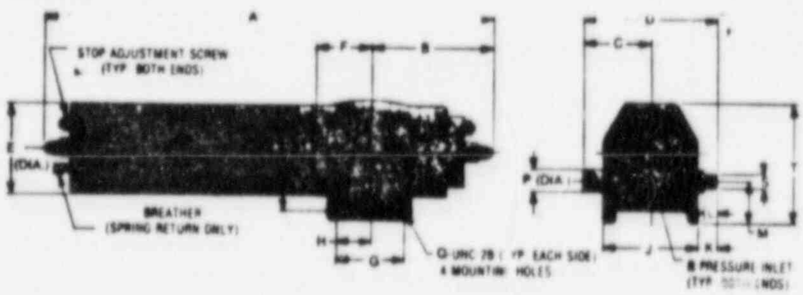
GH BETTIS
A Cameron-Houston Company

CB-Series: Pneumatic Actuators

Catalog #20.00-1A



Dimensions



Actuator Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P (dia.)	Q	R	S	T	U
CB-315	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] NPT	[illegible]	[illegible]	[illegible]
CB-315-SR	[illegible]	[illegible]																	
CB-415	[illegible]	[illegible]			[illegible]														
CB-415-SR	[illegible]	[illegible]																	
CB-420	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible] NPT	[illegible]	[illegible]	[illegible]
CB-420-SR	[illegible]	[illegible]																	
CB-520	[illegible]	[illegible]			[illegible]														
CB-520-SR	[illegible]	[illegible]																	
CB-625	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]-13	[illegible] NPT	[illegible]	[illegible]	[illegible]
CB-625-SR	[illegible]	[illegible]																	
CB-725	[illegible]	[illegible]			[illegible]														
CB-725-SR	[illegible]	[illegible]																	

All dimensions are in inches.
Certified dimensional drawings are available on request. Contact factory with correct model designation and serial number.

Spring-Return Actuators

Actuator Model	Displacement per Stroke		Actuator Spring Size				Max. Allowable Operating Pressure** (psig)	Aproximate Weight (lbs)
			40	60	80	100		
	in³	ft³	Max. Operating Pressure* (psig)					
[illegible]	[illegible]	[illegible]	[illegible]	160	170	[illegible]	240	[illegible]
CB-415-SR	41	024	90	100	115	130	160	25
[illegible]	[illegible]	[illegible]	140	155	[illegible]	[illegible]	[illegible]	[illegible]
CB-520-SR	76	044	100	110	125	135	160	42
[illegible]	[illegible]	[illegible]	[illegible]	175	180	200	240	[illegible]
CB-725-SR	190	110	95	105	120	135	160	92

IX. Sketch or drawing installed

How it has been installed

or

How it will be installed

WABCO BLOCK-TYPE VALVES

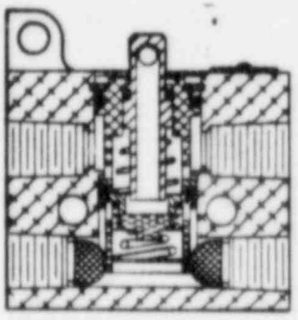
OPERATION

In release position, as shown, the valve disc seats on the inlet valve seat and seals the passage from the inlet to the outlet port. The outlet port is vented to atmosphere through the center of the plunger. As the plunger is forced downward by an external force, it seats on the valve disc. This seals the passage between the outlet port and atmosphere.

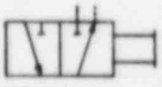
Further downward travel of the plunger unseats the valve disc from the inlet valve seat and allows inlet air pressure to flow to the outlet port.

Release of the external force releases the plunger and valve and plunger return to the original position.

Install the valve to ensure operation within the travel limits shown on the outline drawings. Travel beyond these limits can cause damage to the valve.

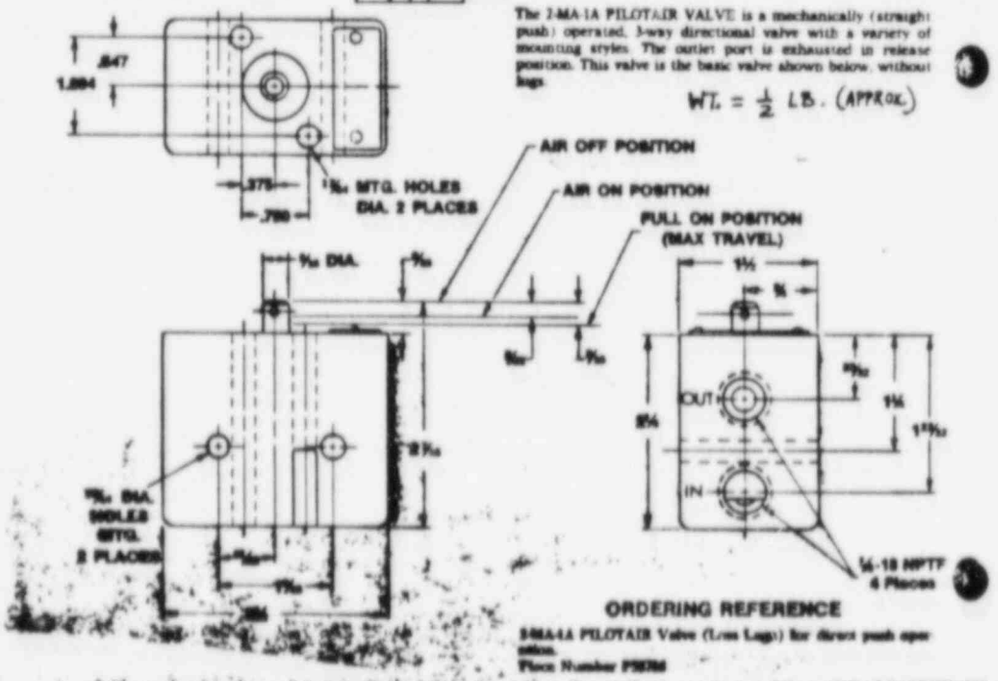


2-MA-1A PILOTAIR VALVE, NORMALLY CLOSED



The 2-MA-1A PILOTAIR VALVE is a mechanically (straight push) operated, 3-way directional valve with a variety of mounting styles. The outlet port is exhausted in release position. This valve is the basic valve shown below, without legs.

WT. = ½ LB. (APPROX.)



ORDERING REFERENCE

2-MA-1A PILOTAIR Valve (Less Legs) for direct push operation.
Place Number P38286

WABCO fluid power

A4-76.89

1555 MERCER ROAD, LEXINGTON, KENTUCKY 40505 (606) 254-6031 – TWX 810-479-6654

Printed in U.S.A.
Rev. Mar. 1982

IX. Sketch or drawing installed

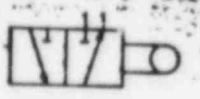
How it has been installed

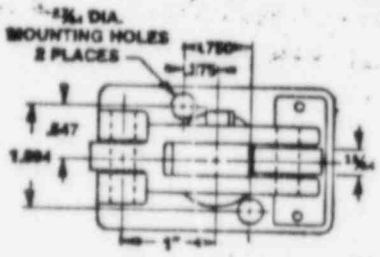
or

WABCO BLOCK-TYPE VALVES

SWV-3

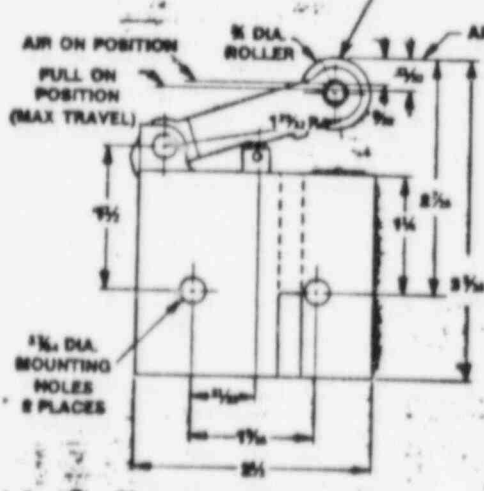
2-CA-1A PILOTAIR VALVE WITH TWO-DIRECTION CAM ROLLER, NORMALLY CLOSED

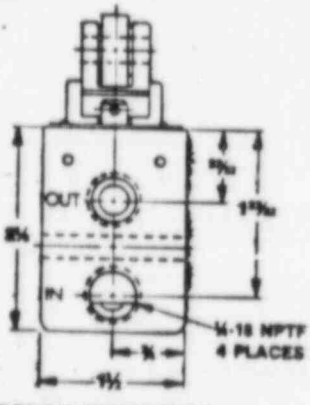




The Two-Direction Cam Roller Operator Kit assembled to the 2-MA-1A PILOTAIR Valve is designated the 2-CA-1A PILOTAIR Valve with Two-Direction Cam Roller.

CAM ROLLER REMOVED FOR TEST





Model 2-CA-1A is same as Model 2-MA-1A except for the additional cam roller, which was removed for the test.

ORDERING REFERENCE

3-CA-1A PILOTAIR Valve, with Two-Direction Cam Roller complete.
Piece Number P56721

CAM ROLLER OPERATOR KIT

Contains a cam lever, a roller, two roll pins and 2 washers.
Piece Number P52974

WABCO fluid power