NINE MILE POINT NUCLEAR STATION UNIT 2

DYNAMIC QUALIFICATION

COMPONENT NAME: HYDRAULIC CONTROL UNIT

MPL OR EDL ITEM NO.: C12D001

MPL REFERENCE: 239X239AF, REV. 23

EQUIPMENT CLASSIFICATION: ☒ ACTIVE ☐ PASSIVE

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

PREPARED BY: L. Y. CHANG *L. Y. Chang* DATE *6/26/85*

ORGANIZATION GENERAL ELECTRIC CO. — NEBO

REVIEWED BY: R. W. HARDY *RW Hardy* DATE *6/26/85*
SQRT PROGRAM MANAGER

VERIFIED BY: *SM Schafer S. Schafer* DATE *6/26/85*

APPROVED BY: G. A. DEAVER *GA Deaver* DATE *6/26/85*
RESPONSIBLE DESIGN ENGINEER

GENERAL ELECTRIC

30628-1

8507170148

QUALIFICATION SUMMARY

1. COMPONENT NAME: Hydraulic Control Unit

2. MPL OR EDL ITEM NO.: C12-D001

3. QUALIFICATION DOCUMENTATION (ENCLOSED WITH THIS REPORT)

A. QUALIFICATION SUMMARY OF EQUIPMENT (SQRT FORM), INCLUDING REQUIRED RESPONSE SPECTRA WITH TRS PLOTTED ON RRS GRAPH, AS APPROPRIATE.

Enclosed

B. SQRT EVALUATION FLOW CHARTS (MARKED TO SHOW DECISION PATH).

Enclosed

C. REFERENCE DOCUMENTS

REFERENCE NUMBER	DOCUMENT IDENTIFICATION	REVISION OR DATE	TITLE/SUBJECT
(1)	GE-761E500	Rev. 10	Hydraulic Control Unit Assembly Drawing
(2)	GE-384HA183	Rev. 0 (7/21/75)	Hydraulic Control Unit, Test Report
(3)	DRF C11-00089	Feb. 1985	Design Record File, HCU Model Analysis
(4)	NEDC-30927	Feb. 1985	Environmental Qualification Report for the Hydraulic Control Unit with 3-way ASCO SSPV
(5)	NEDE-24788	May 1980	Seismic Qualification Review Team (SQRT) Technical Approach for Re-evaluation of BWR4/5 Equipment
(6)	GE-383HA853	Rev. 0	Hydraulic Control Unit, Seismic Analysis

D. ADDITIONAL SUPPORTING DOCUMENTS

DOCUMENT IDENTIFICATION	REVISION OR DATE	TITLE/SUBJECT
GE-22A1342	Rev. 0	CRD System Design Specification

QUALIFICATION SUMMARY (CONTINUED)

MPL ITEM NO.: C12-D001

4. REQUIREMENTS

The Hydraulic Control Unit (HCU) is required to withstand the dynamic loads imposed at the HCU/structural interface locations. The HCU must maintain operability to the extent that a scram function can successfully be completed. The HCU must perform its required safety-related function (scram) during an emergency plant shutdown.

5. DEMONSTRATED CAPABILITY

The dynamic qualification of the installed HCU (761E500G004) is demonstrated by a test performed on a similar HCU (767E800G001) during the Phase III E.Q. Program (Ref. 4). Figure 1 and Figure 2 show the assembly of the installed HCU and the tested HCU. The TRSs obtained from the test are compared with the RRSs at the HCU mounting locations. These comparisons are shown in Figure 3 thru Figure 12. In all the cases, the TRS envelops the RRS by a significant margin. Also, the operability of the HCU scram function was demonstrated before, during and after test.

6. RATIONALE FOR QUALIFICATION CERTIFICATION
(INCLUDE DECISION ANALYSIS WITH COMPARISON TO ACCEPTANCE CRITERIA, APPROACH FOR DEMONSTRATING OPERABILITY, AND CONSIDERATION OF HIGH-FREQUENCY RESPONSE.)

The installed HCU and test HCU are similar, but not identical. However, the loading condition of the tested HCU envelops the installed HCU for the operability and structural integrity for the following reasons:

1) All the active components such as Scram Valves, Accumulator, etc. are completely identical. The main differences are in the N_2 bottle size and holddown hardware. Additionally, the low beam attachment hardware is also slightly different (bolts vs. clamps). Since all the differences are in the passive components, the operability of the HCU is considered to be fully demonstrated during the test due to the significant margins between the TRSs and RRSs.

QUALIFICATION SUMMARY (CONTINUED)

6. RATIONALE FOR QUALIFICATION CERTIFICATION (CONTINUED)

2) Four test anomalies were recorded during the test (See Ref. 4, Pages 40 thru 43). However, the only safety-related item is the NOD No. 2, which is the fracture of the N_2 bottle hanger during the SRV aging test.

   The fractured hanger was submitted to a metallographic examination, which showed that SRV fatigue was responsible for the fracture (See Ref. 4, Page A5-1). However, the SRV loads are negligible (<0.2 g) for the installed HCU due to its location. Note that the SRV TRSs are the limiting loads obtained from several BWR plants which are significantly higher than the SRV RRSs for the NMP2 HCUs.

3) An identical HCU in free-standing configuration has been tested in Wyle Laboratory in 1975 (Ref. 2). This HCU successfully passed all the tests without any failure. As a result of a finite elements model study (Ref. 2), the seismic capability of this HCU is further improved by attaching the HCU to the beam structures of the HCU upper and lower beam attachment locations. Therefore, the structural integrity of the beam mounted HCUs are demonstrated by the more severe free-standing test.

4) A similar analysis has been performed to further assure the acceptance of the HCU structural integrity considering the NMP2-unique mounting configuration. The RRS and TRS (1983 test) at the HCU internal key locations were generated from this task. A comparison of those response spectra was made which demonstrated that the TRS obtained from Reference 4 indeed bounded the NMP2 HCU for the faulted condition. The results are shown in the Reference 4, Figure 9 thru Figure 23.

In summary, the adequacy of the NMP2 HCUs are demonstrated by the tests performed on the comparable HCUs.

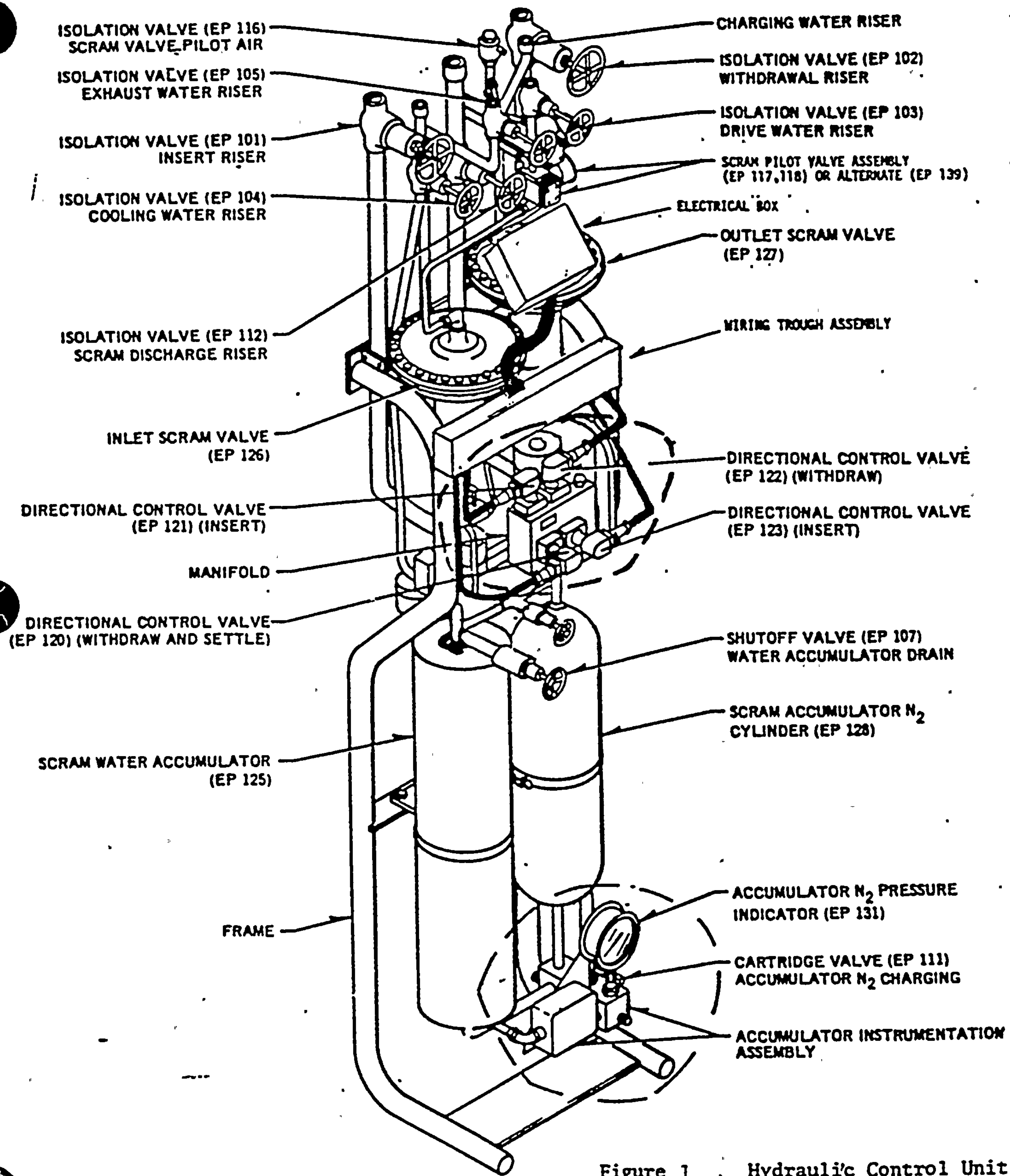


Figure 1 . Hydraulic Control Unit, Part No. 761E500

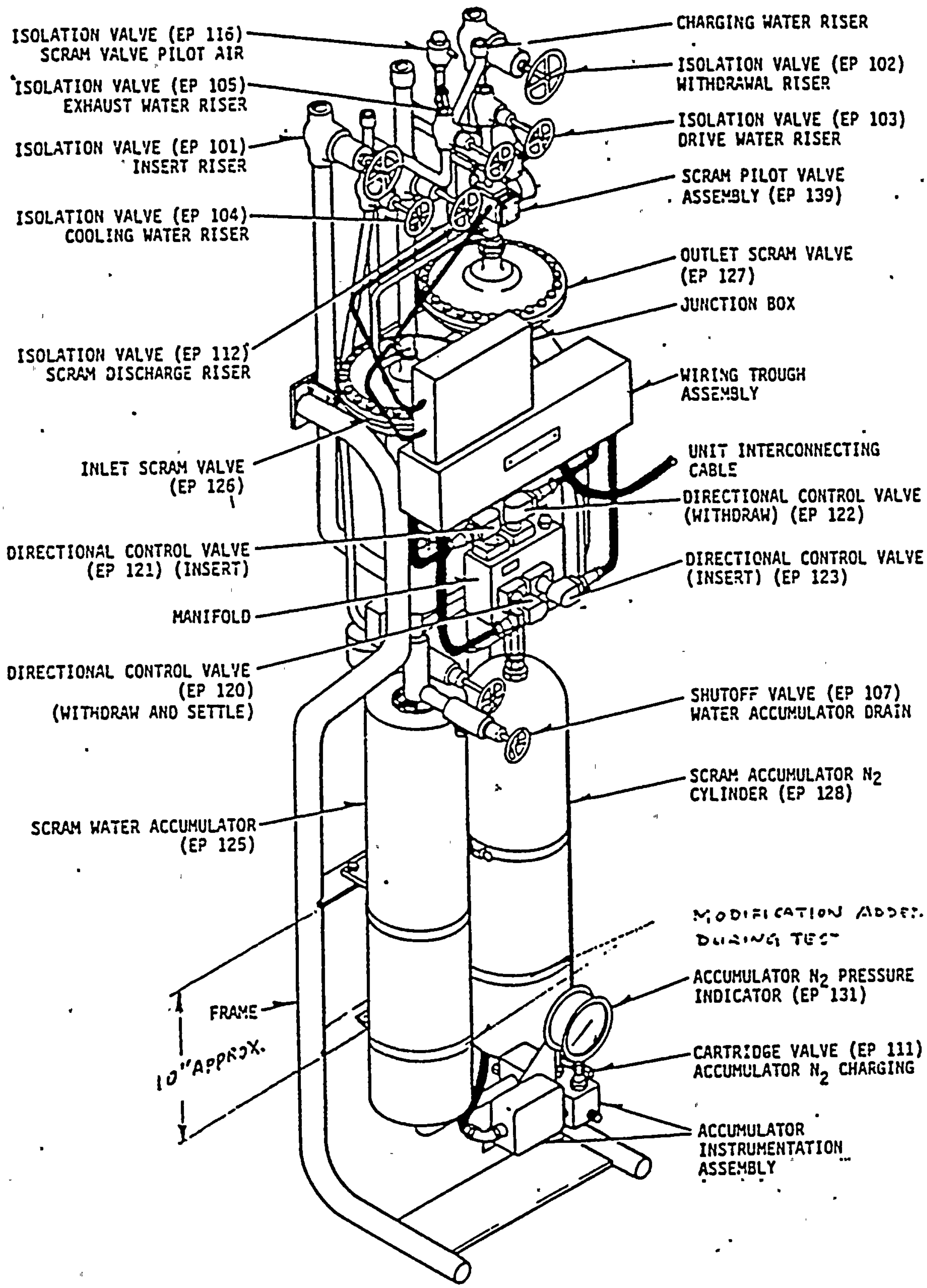


Figure 2. Hydraulic Control Unit, Part No. 767E800

RESPONSE SPECTRUM

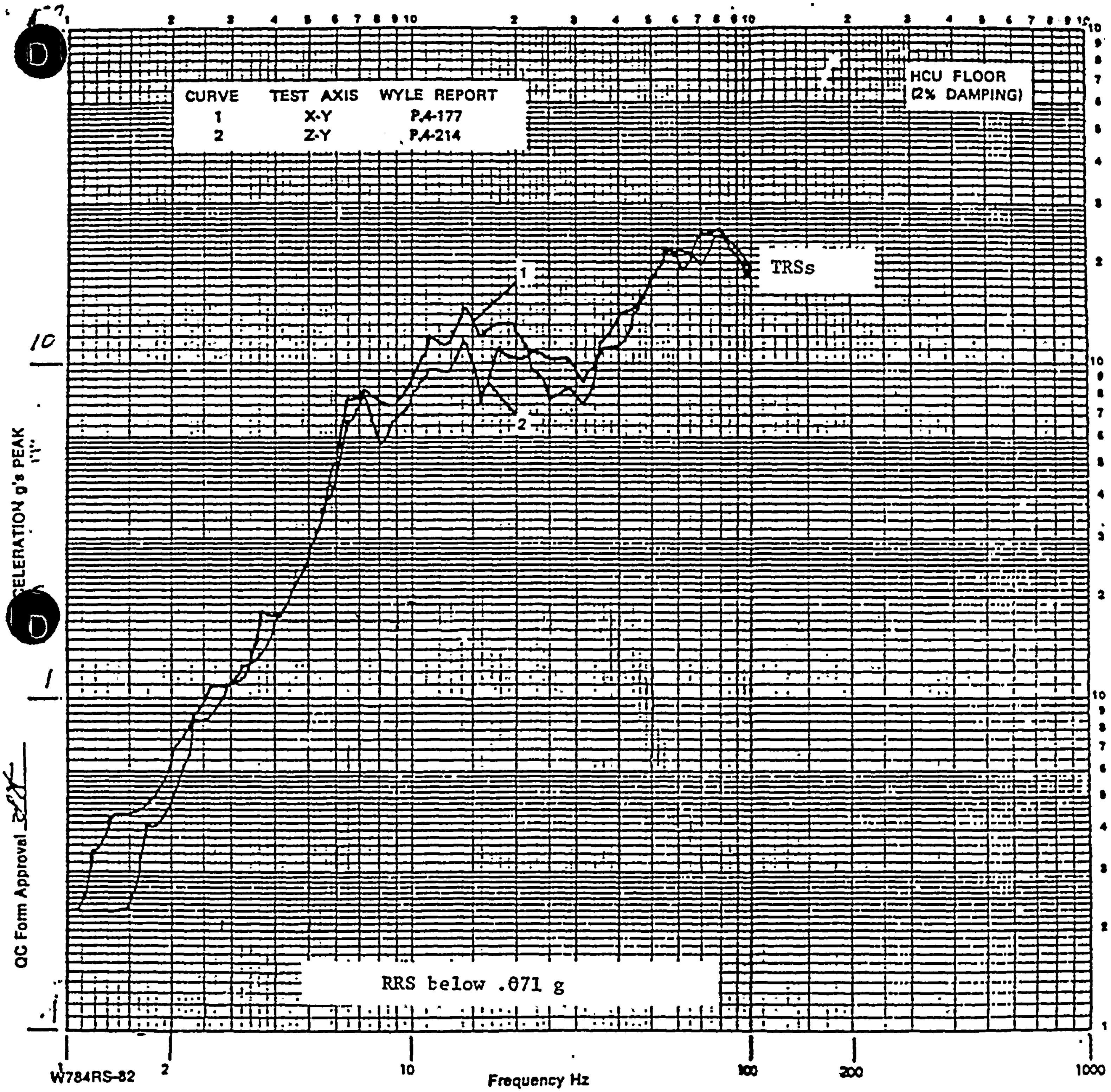


Figure 3 RRS and TRS, Horizontal Direction, SRV Aging

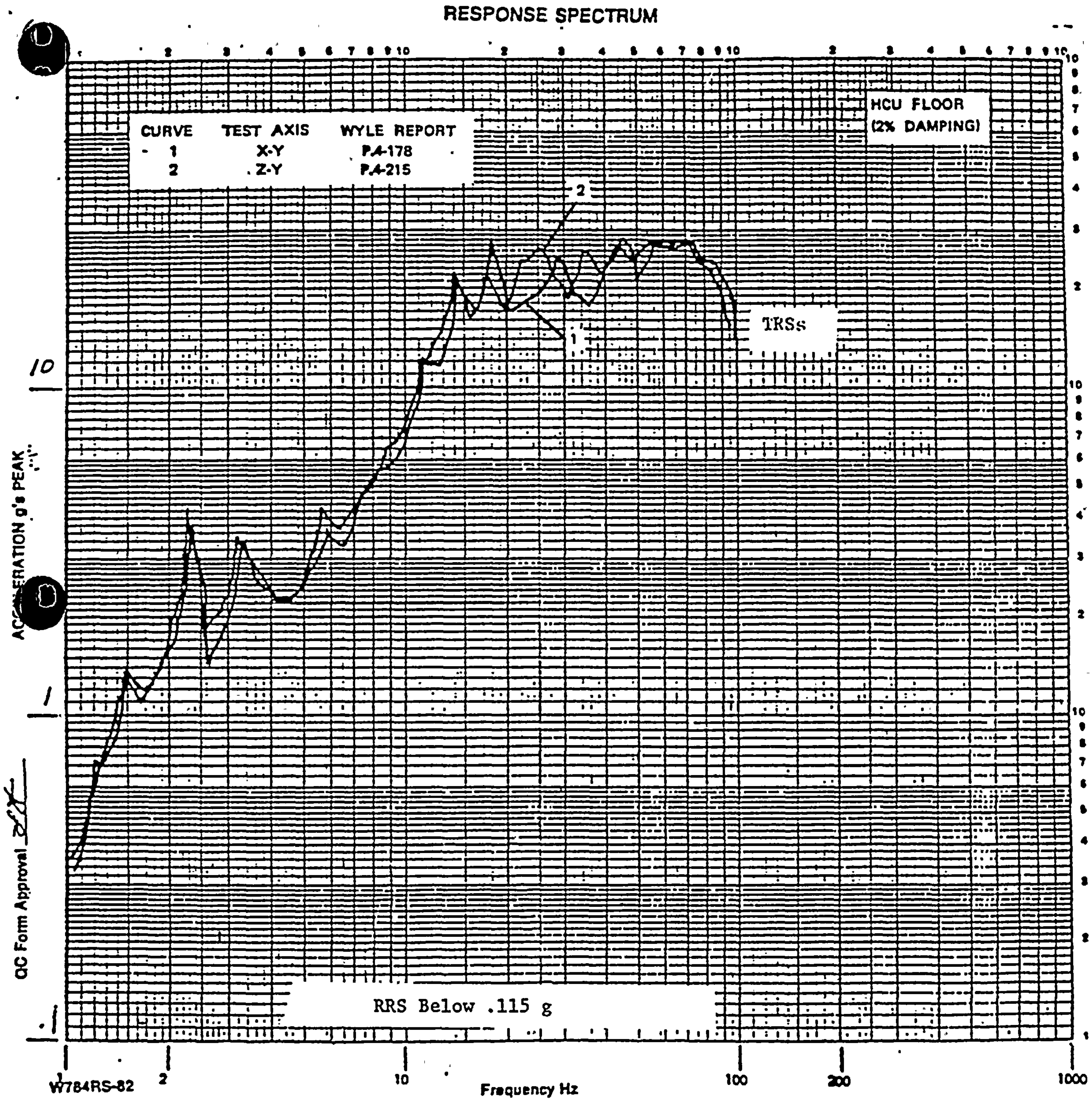


Figure 4 . RRS and TRS, Vertical Direction, SRV Aging

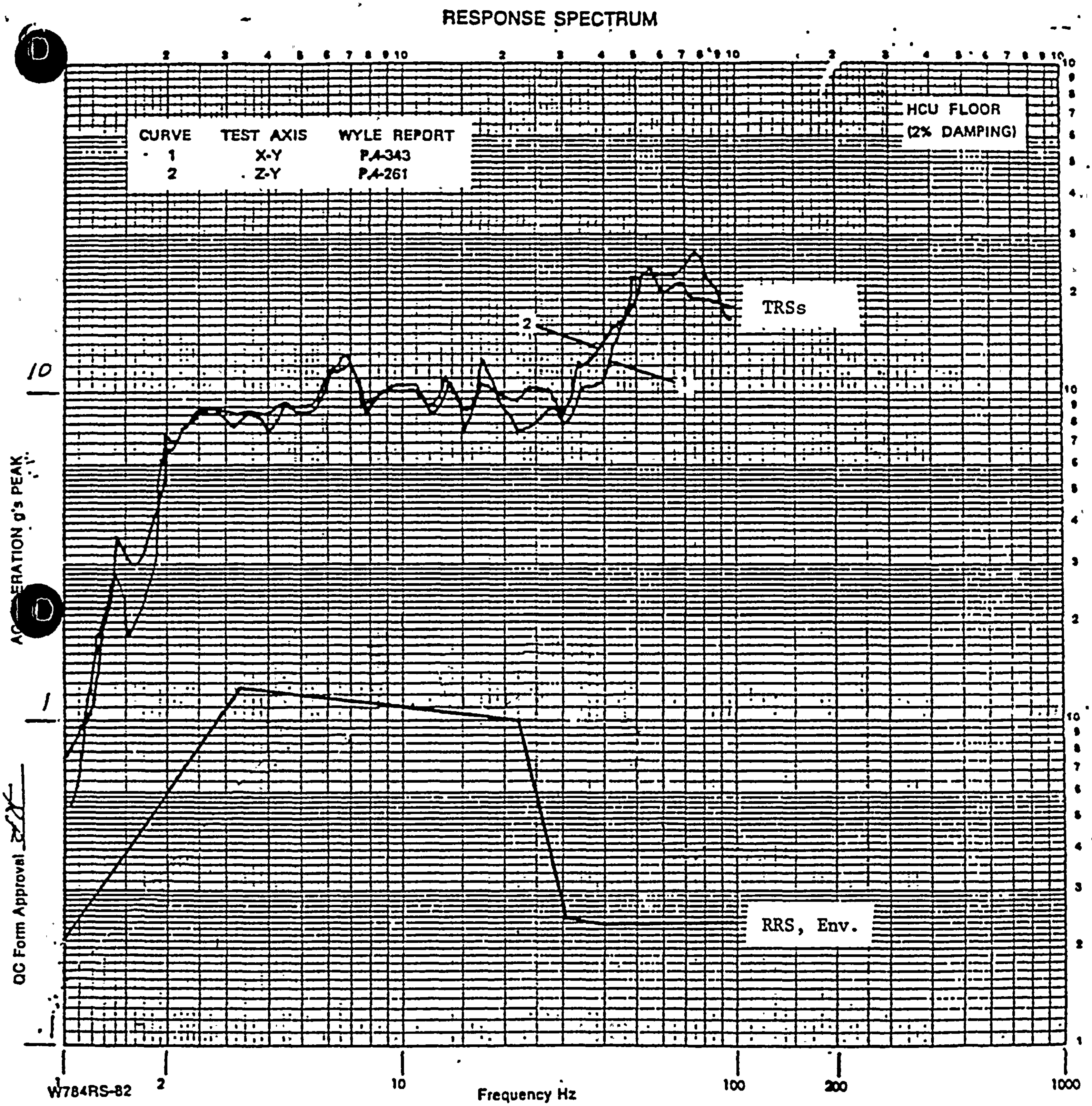


Figure 5, RRS and TRS, Horizontal Direction, Upset

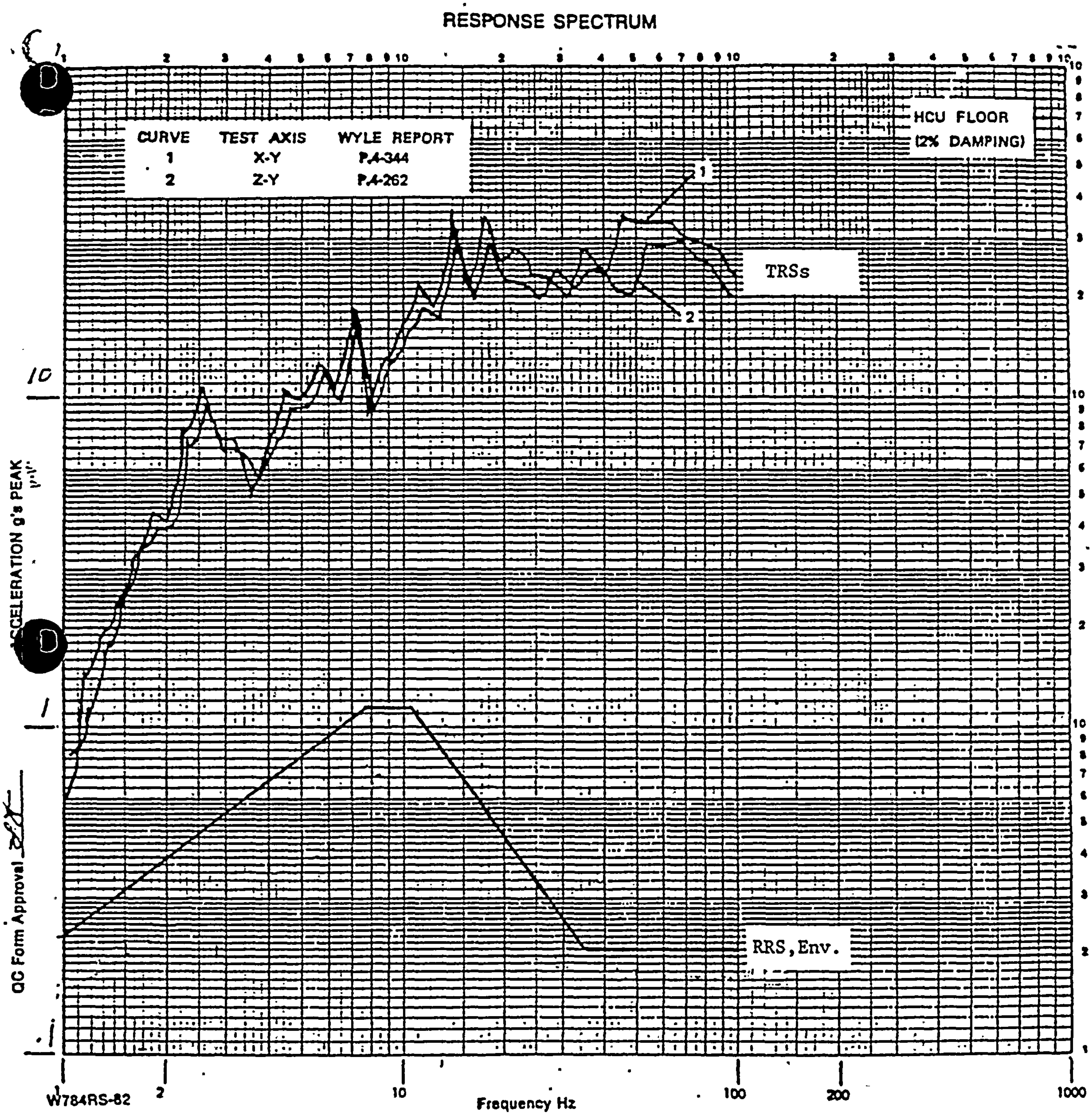


Figure 6, RRS and TRS, Vertical Direction, Upset Condition

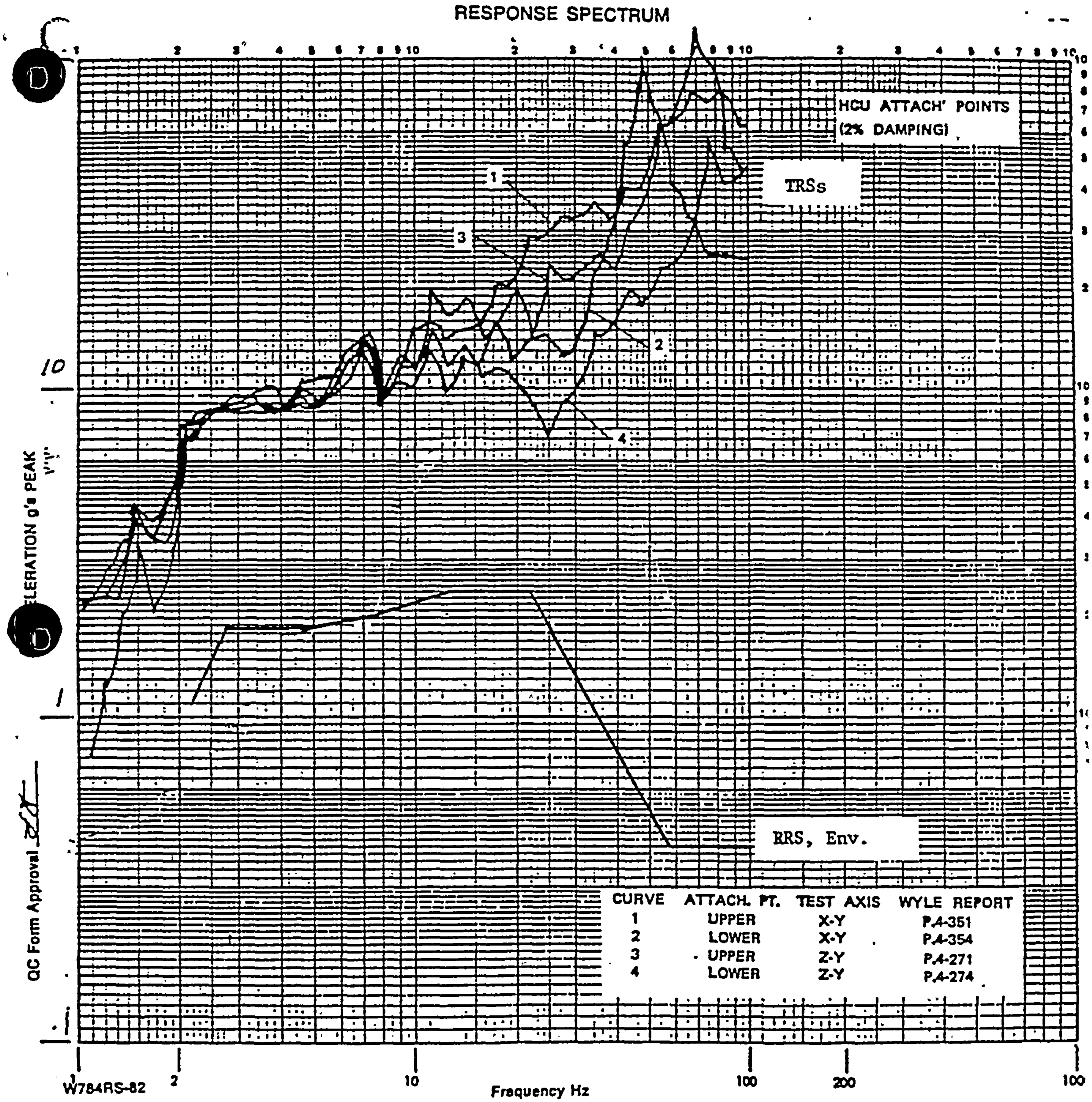


Figure 7, RRS and TRS, Horizontal Direction, Upset Condition

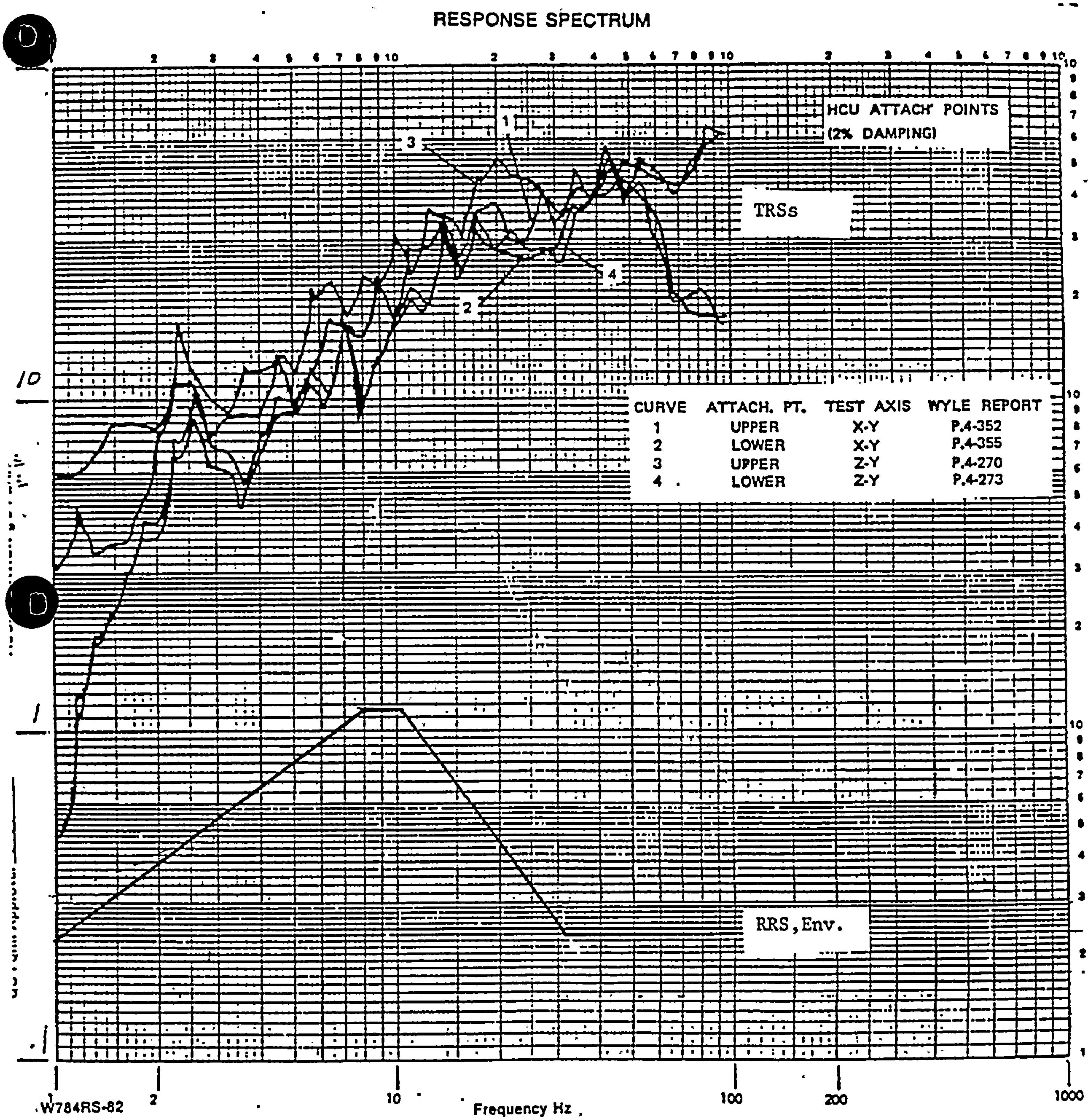


Figure 8, RRS and TRS, Vertical Direction, Upset Condition

RESPONSE SPECTRUM

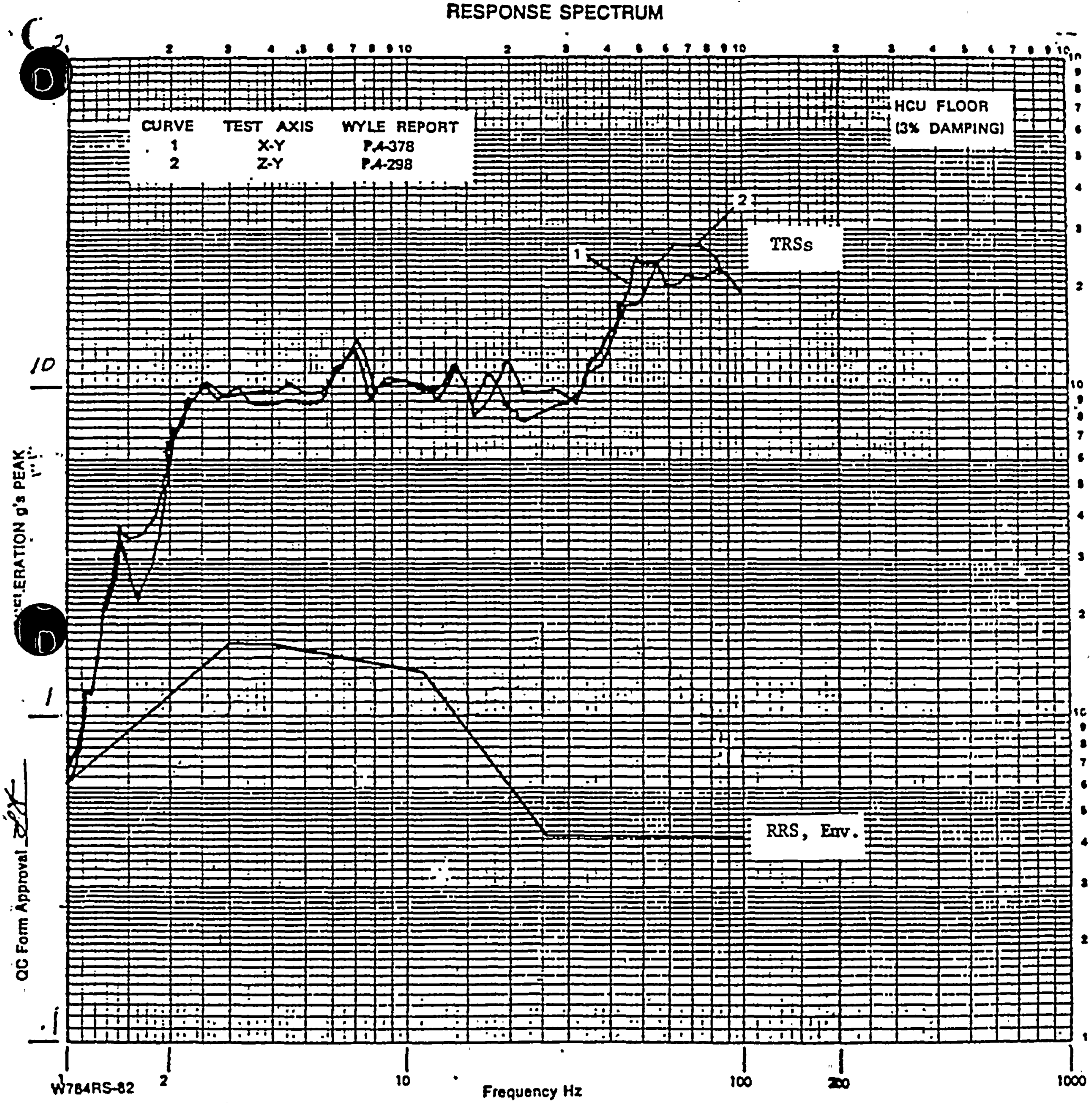


Figure 9, RRS and TRS, Horizontal Direction, Faulted Condition

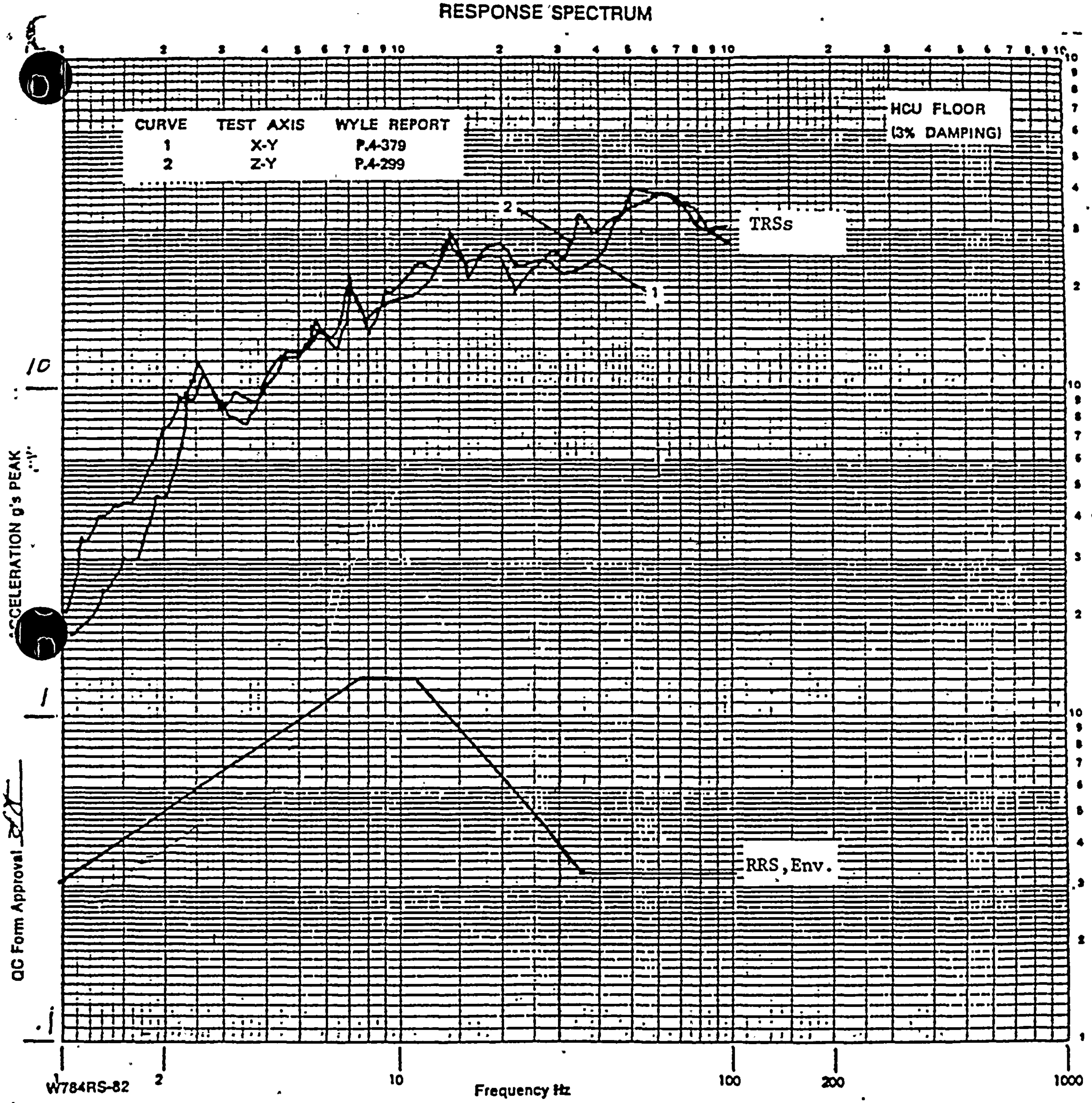


Figure 10 RRS and TRS, Vertical Direction, Faulted Condition

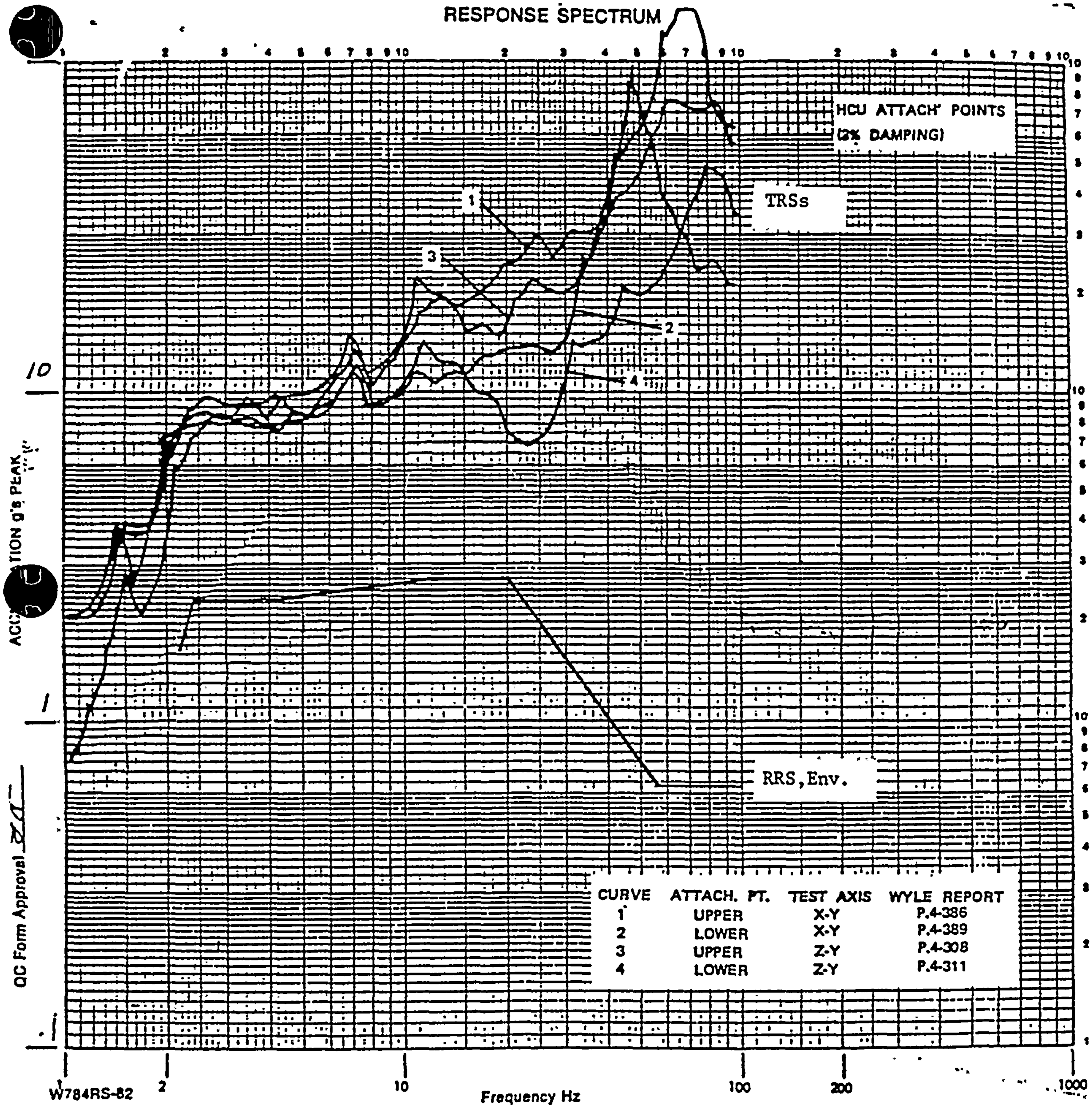


Figure 11, RRS and TRS, Horizontal Direction, Faulted Condition

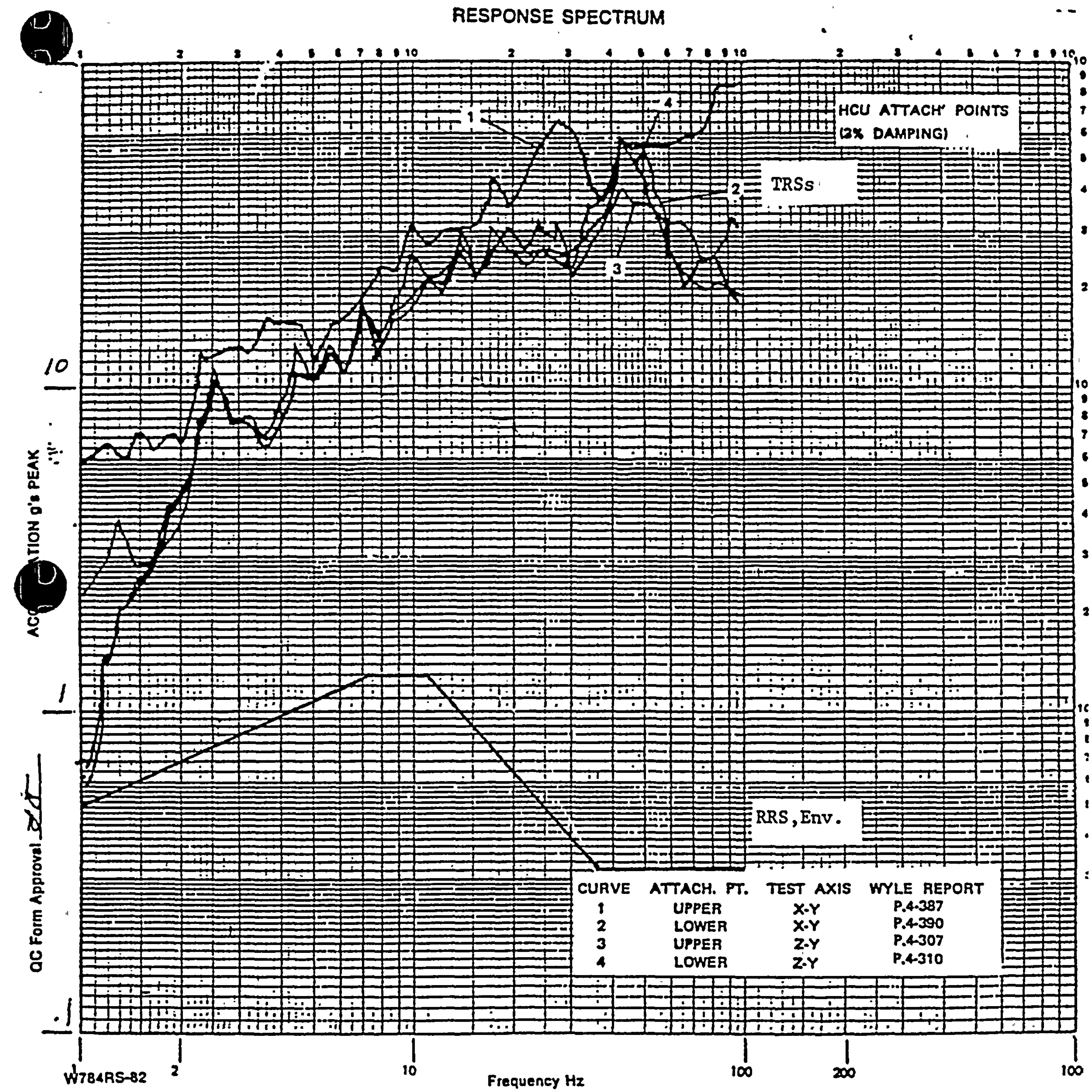


Figure 12, RRS and TRS, Vertical Direction, Faulted Condition

MPL: C12-D001

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point 2 — Type:
1. Utility: Niagara Mohawk Power Corp. — PWR ______
2. NSSS: General Electric — BWR 5, Mark II
3. A/E: Stone & Webster — Other ______

II. Component Name: Hydraulic Control Unit

1. Scope: [X] NSSS [ ] BOP [ ] Other
2. Model Number: 761E500G004 Quantity: 185
3. Size or Range: N/A
4. Vendor: N/A
5. If the component is a cabinet or panel, name and model number of the devices included: N/A
6. Physical Description:
   a. Appearance: Module assembly
   b. Dimensions: 102.38"x21.75"x17.00"
   c. Weight: 785 lb
7. Location: Building: Inside the Reactor Building, outside the containment.
   Elevation: 261 feet
8. Field Mounting Conditions
   [X] Bolt (No. 4, Size 1/2) Floor Mounting Bolts
   [X] Weld (Length ____) 1/4 fillet weld, 2" long, 5 places. (U.Bea
   * [X] Two Special U-Clamps, made from 3/16 St Pl. for the Lower Beam Attachment (2"x2"x1-3/8")
9. Mounting Orientation [e.g., on floor, cantilevered, suspended, etc.] Mounted on flor with the back side attached to beam structures
10. a. System in which located: CRD System
    b. Functional Description: To provide the stored accumulator energy to CRD during emergency shutdown
    c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both [ ] Neither [ ] Other ______

* Each U-clamp is welded to the HCU supporting structures by 1/8" fillet weld at both longitudinal sides.

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

MPL C12-D001

11. Pertinent Reference Design Specification for Qualification Requirements: 22A1342

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

III. Is Equipment Available for Inspection in the Plant:

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

IV. Equipment Qualification Method:

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

Qualification Report*: Wyle Report 58870

(No., Title and Date): Seismic Qualification of One Hydraulic Control Unit

Company that Prepared Report: Wyle Laboratory

Company that Reviewed Report: GE

Where Report is filed or available: NEDC 30927, Vol. 2 (Ref. 4)

Applicable Codes and/or Standards: IEEE 344, 1975

V. Vibration Input:

1. Loads considered:
   a. [ ] Seismic only
   b. [ ] Hydrodynamic only
   c. [ ] Vibration from normal operation
   d. [X] Combination of (a), (b), and (c)
2. Method of Combining RRS:
   [x] Absolute Sum [ ] SRSS [ ] ____________ (other, specify)
3. Required Response Spectra** (attach the graphs): ____________
   See attached Figure 3 thru Figure 12

NOTE:

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

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

RH:rm/A09104*-2

MPL: C12-D001

4. Damping Corresponding to RRS: OBE 2% SSE 3%
5. Required Acceleration in Each Direction:
   [ ] ZPA [ ] Other ________ (specify)
   OBE S/S = ________ F/B = ________ V = ________
   SSE S/S = ________ F/B = ________ V = ________

6. Were fatigue effects considered:
   [X] Yes [ ] No
   If yes, describe how they were treated in overall qualification program: Prior to the OBE and SSE tests, the HCU was subjected to 90 minutes vibration aging at 0.75g sinusoidal input for each axis. The frequency was varied from 5 to 100 Hz at a rate of two octaves per minute, plus two 15-minute SRV cycling fatigue aging tests (biaxial, multi-frequency, random test).

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [ ] Multi-Frequency [X]random
   [ ] sine beat
   [ ] ________
2. [ ] Single Axis [X] Multi-Axis (Bi-axial)
   [X] Independent Axis [ ] In-phase motions
3. Number of Qualifications Tests:
   OBE 5 SSE 1 Other ________ (specify)
4. Frequency Range: 1 to 100 Hz
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

MPL: C12-D001

8. Maximum Input g Level Test: See attached Figure 3 thru Figure 12.
   OBE S/S = ____ F/B = ____ V = ____
   SSE S/S = ____ F/B = ____ V = ____

9. Laboratory Mounting:
   A. *[X] Bolt (No. 4, Size 1/2) Floor
   [ ] Weld (Length ___) [ ] ____
   B. Orientation and Fixturing: ____

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

11. Test Results including modifications made:
    Wiring Trough Assembly supporting bracket (NOD No.1) and
    N_2 Bottle and Accumlator hold down hardwares (NOD No.2).

12. Other tests performed (such as aging or fragility test, including results):
    Vibration aging - no failure.
    SRV aging test - NOD No.1 & 2 occurred during this test.

13. Failure Modes (If appropriate) N/A

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

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

1. Method of Analysis:
   [ ] Static Analysis [ ] Equivalent Static Analysis
   [ ] Dynamic Analysis [ ] Time-History [ ] Response Spectrum

2. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
   S/S = ____ F/B = ____ V = ____

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

*Total number of seven 3/8" bolts were used for the beam attachment locations. Four bolts are located at the upper beam and three bolts are located at lower beam.

RH:rm/A09104*-4
9/23/82

MPL: __________

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

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

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

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

EQUIPMENT: Hydraulic Control Unit

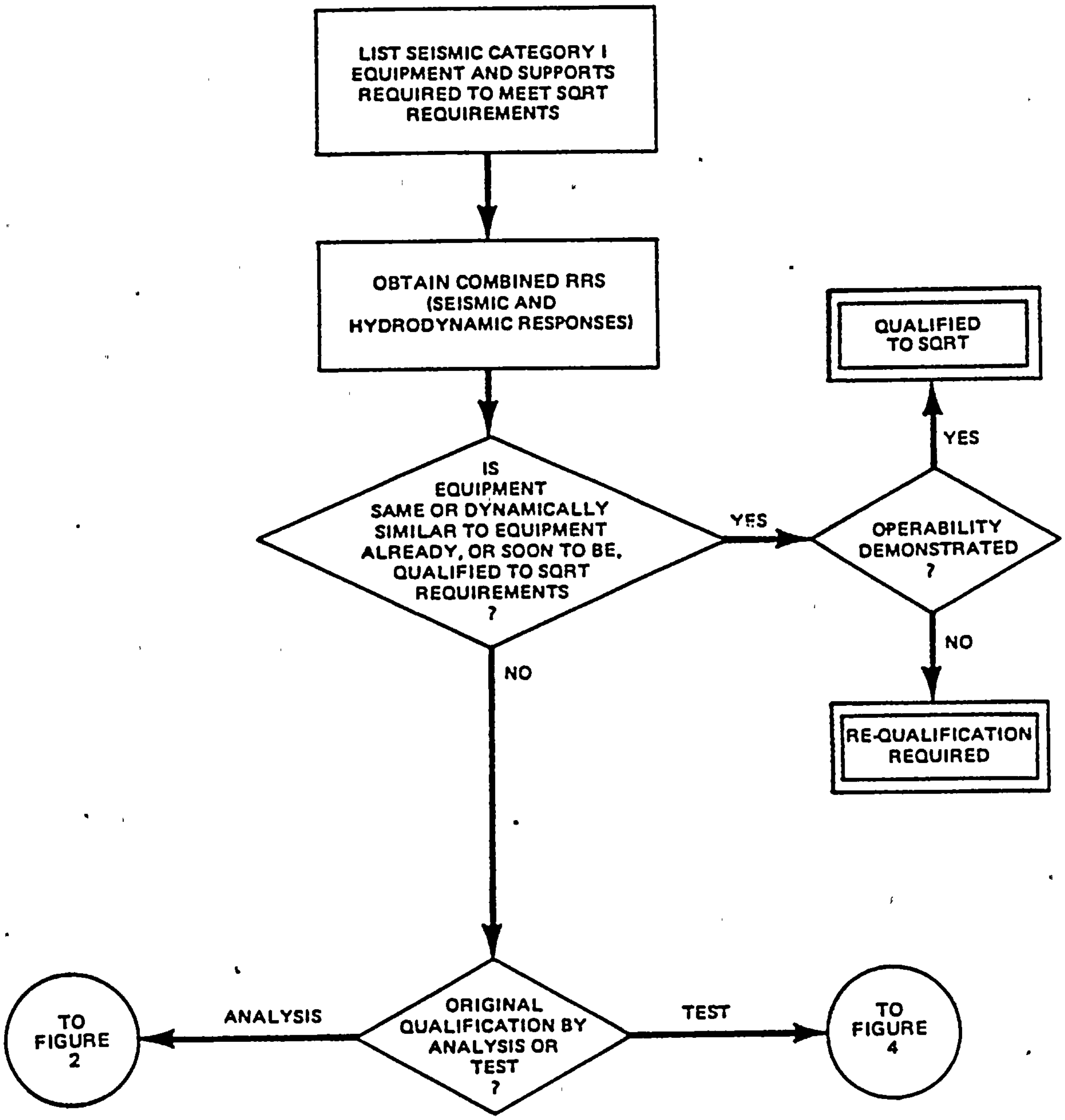
MPL NO: C11-D001

DECISION POINT	DECISION and/or BASIS FOR DECISION
1) Is equipment same or dynamically similar to equipment already, or soon to be, qualified to SQRT requirement?	Yes
2) Operability demonstrated?	Yes
3) Qualified to SQRT?	Yes

EQUIPMENT: Hydraulic Control Unit

MPL NO: C12-D001

DECISION POINT	DECISION and/or BASIS FOR DECISION
1) Is equipment same or dynamically similar to equipment already, or soon to be, qualified to SQRT requirement?	Yes
2) Operability demonstrated?	Yes
3) Qualified to SQRT?	Yes



FigurelA, SQRT Re-Evaluation Flow Chart

QUALIFICATION SUMMARY

1. Component Name: Intermediate Range Detector

2. A. MPL or EDL Item No.: C51-N002 A-H
   B. GE Drawing No.: 112C3144

3. Qualification Documentation

   A. Qualification Summary of Equipment (SQRT Form Attached)

   B. Reference Documents

Reference Number	Document Identification	Date	Title
1 *	Sensor Products Engineering Memo 994-79-007	5-14-1979	"Seismic Qualification Test Report, Intermediate Range Detector"
2 **	DRF NO. 943-C515120N*3	7-11-78	"IRM Detector Seismic Analysis"

4. Requirements

This device is classified as active and thus must maintain structural and functional operability when subjected to a seismic event.

5. Demonstrated Capability

A combination of test and analysis has been used to demonstrate qualification of this device to BWR seismic requirements.

Reference 1 documents testing performed on an intermediate range detector assembly in which BWR-6 fuel seismic motion was simulated. The electrical and nuclear performance of the detectors were checked before and after the seismic testing, the detectors were electrically monitored during the test.

The test data before, during and after the seismic testing show no appreciable change in the functional performance of the detector as a result of the seismic test.

Reference 2 contains an analysis of the IRM detector which determines the maximum allowable g loading for the detectors based on structural parameters only. This maximum allowable g - loading is then compared to a calculated load based on BWR-6 SSE fuel behavior and physical parameters. Results of this analysis show that the IRM detector can withstand 2 times the SSE seismic loading for the horizontal direction, and 21.0 g's in the vertical direction.

* See Attachment 4 for copy.

** See Attachment 3 for copy.

6. Rationale for Qualification

This equipment is qualified for both seismic and hydrodynamic conditions based on its ability to withstand a simulated seismic environment without compromise of structural or functional integrity. This qualification is based on the following:

(1) Analysis of BWR fuel seismic response shows that the detector assemblies will be driven at the natural frequency of the fuel assemblies (4.5 Hz). During seismic testing the detector assembly was impacted between two stops on a skotch yoke mechanism thereby subjecting the detector assemblies to a broad range of frequencies as in shock testing.

(2) The detector part of the IRM assembly is a rigid component.

(3) The most severe accelerations experienced by the device are those associated with impact as is the case when the IRM detector tube impacts the inside wall of the dry tube.

(4) The most severe acceleration will be met or exceeded provided the displacement experienced during testing exceeds that which the device will actually see inside the reactor vessel. The values of OBE = 2.0" and SSE = 3.0" exceed those displacements which will actually occur under OBE, SSE or either load in combination with the appropriate hydrodynamic loadings.

(5) The test was run at 7.0 Hz to account for operating temperature strength as described in attachment 4, Appendix B paragraph 3.0. Peak to peak displacement of the tests were 2.0" for OBE and 3.0" for SSE. Calculation of tested g-levels gives 5.0g OBE and 7.5g SSE. Comparison of test levels with the requirements of attachment 2 show that this device is qualified for application at NMP-2.

MPL: C51-N002 A-H

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point 2 — Type:

1. Utility: Niagara Mohawk Power Corp. — PWR ________
2. NSSS: General Electric Co. — BWR- 5, MK II
3. A/E: SWEC — Other ________

II. Component Name Intermediate Range Detector

1. Scope: [x] NSSS [ ] BOP [ ] Other
2. Model Number: 112C3144 Quantity: 8
3. Size or Range: ________
4. Vendor: General Electric
5. If the component is a cabinet or panel, name and model number of the devices included: N/A
6. Physical Description:
   a. Appearance: see attachment 1
   b. Dimensions: see attachment 1
   c. Weight: N/A
7. Location: Building: Primary Containment
   Elevation: Inside Reactor Pressure Vessel
8. Field Mounting Conditions [ ] Bolt (No. ___, Size ___)
   [ ] Weld (Length ____)
   [x] threaded connector
9. Mounting Orientation [e.g., on floor, cantilevered, suspended, etc.]
   dry tube
10. a. System in which located: Neutron Monitoring
    b. Functional Description: active, Class 1E
    c. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [ ] Both [x] Neither [ ] Other ________

11. Pertinent Reference Design Specification for Qualification Requirements: As specified on GE drawing

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

III. Is Equipment Available for Inspection in the Plant:

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

IV. Equipment Qualification Method:

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

Qualification Report*: Sensor Products Engineering Memo
(No., Title and Date): No. 994 79-007 "Seismic Qualification Test Report Intermediate Range Detector"

Company that Prepared Report: General Electric

Company that Reviewed Report: General Electric

Where Report is filed or available: GE

Applicable Codes and/or Standards:

V. Vibration Input:

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

NOTE:

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

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

4. Damping Corresponding to RRS: OBE 2.0% SSE 3.0%

5. Required Acceleration in Each Direction:
   [ ] ZPA [x] Other ZPA at top of reactor pedestal
   OBE S/S = 0.30 F/B = 0.30 V = 0.20
   SSE S/S = 0.80 F/B = 0.80 V = 0.40

6. Were fatigue effects considered:
   [ ] Yes [x] No
   If yes, describe how they were treated in overall qualification program: ______

VI. If Qualification by Test, then Complete:

1. [x] Single Frequency [ ] Multi-Frequency [ ]random
   [ ] sine beat
   [ ] ______
2. [x] Single Axis [ ] Multi-Axis
   [ ] Independent Axis [ ] In-phase motions
3. Number of Qualifications Tests:
   OBE 5 SSE 1 Other ______ (specify)
4. Frequency Range: N/A
5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical) Detector assemblies are driven by fuel seismic motion which has been determined to have a horizontal natural frequency of 4.5Hz
   S/S = N/A F/B = N/A V = N/A
6. Method of Determining Natural Frequencies:
   [ ] Lab Test [ ] In-Situ Test [x] Analysis (analysis of BWR 6 fuel assemblies)
7. TRS envelping RRS using Multi-Frequency Test:
   [ ] Yes (Attach TRS & RRS graphs)
   [x] No (TRS not applicable)

8. Maximum Input g Level Test:*

   OBE S/S = 5.0 g   F/B = 5.0 g   V = Not tested

   SSE S/S = 7.5 g   F/B = 7.5g   V = Not tested

9. Laboratory Mounting:

   A. [ ] Bolt (No. ___, Size ___)

   [ ] Weld (Length ___) [ ] ___

   B. Orientation and Fixturing: tube laid horizontally

10. Functional operability verified:

    [x] Yes   [ ] No   [ ] Not Applicable

11. Test Results including modifications made: The test data before, during and after the test show no appreciable change in detector functional preformance.

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

    N/A

13. Failure Modes (If appropriate) ___

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

VII. If Qualification by Analysis, then complete: See Attachment 3

1. Method of Analysis:

   [x] Static Analysis   [ ] Equivalent Static Analysis

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

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

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

3. Model Type:

   [ ] 3D [x] 2D   [ ] 1D

   [ ] Finite Element   [x] Beam

   [ ] Closed Form Solution   [ ] ___

* Analysis of IRM detector shows that the device vertical capability is 21 g's (See attachment 3 page A-15); OBE and SSE g levels calculated from frequency and displacement of tests.

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

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

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

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

ATTACHMENT 1

GE DRAWING NO. 112C3144

GENERAL ELECTRIC 112C3144 SH 2

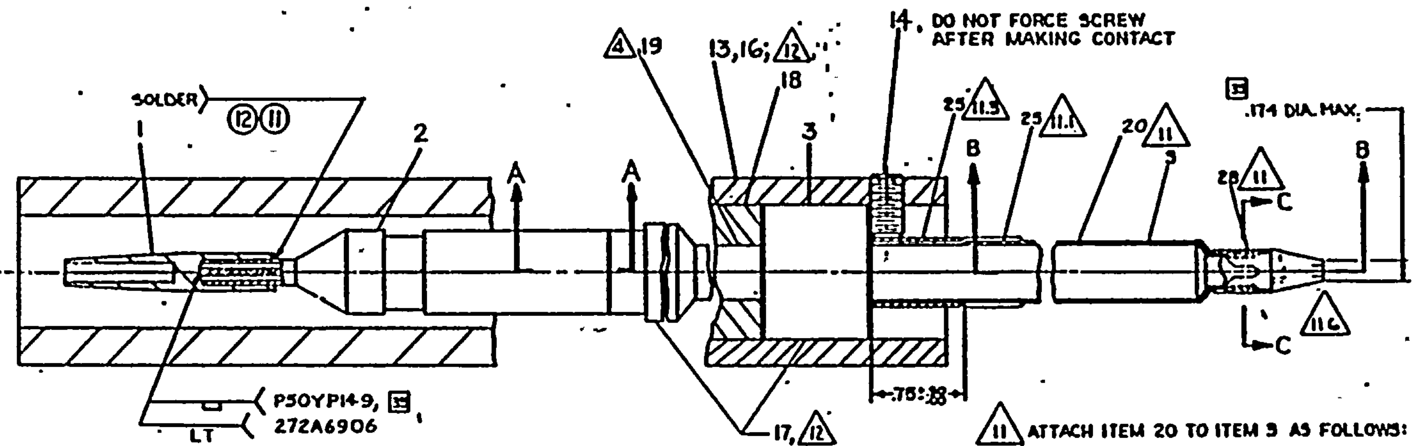
ASSY DETECTOR

PL ISSUED

NUCLEAR SAFETY RELATED

OVERALL REVISION 35

MPL: C51-N001/N002



NOTES:

1. BEFORE ASSEMBLY PROCESS AS FOLLOWS:
1.1 ITEMS 4 & 6 PER 175A7418
1.2 ITEMS 3,8,9,13,14 + 21 PER 272A6904
1.3 OUTGAS ITEMS 8,9 + 21 PER 272A6905P2

2. CLEAN AREA TO BE WELDED WITH ITEM 29.

3. CAPTURE SST BRAID (ITEM 3) BETWEEN ITEMS 2,21 AND WELD ALL AROUND

4. USE ITEM 19 TO CEMENT ITEM 18 IN PLACE. ITEM 18 SHALL BE CEMENTED AT ALL INTERFACES. AT JUNCTION OF ITEM 18 WITH ITEM 18 THE OD. SHALL BE .450±.015. THERE SHALL NOT BE ANY UNDERCUT OR RECESS EXCEEDING .015

5. ITEM 3 MIN. COILING DIA IS 66.00.

6. OUTGAS GROUPS 1,3,5,6,7,9,12,13,15,16,17 + 19, PER 175A7419P001. OUTGAS GROUPS 2, 4,8,10,11,14 + 18, PER 175A7419P002.

7. SHALL MEET THE REQUIREMENTS OF THE PRODUCT SPECIFICATION (SEE SHEET 2).

8. "NUCLEAR SAFETY RELATED" APPLIES ONLY TO GROUPS 2,4,8,10,11,14 + 18.

9. CRIMP BEFORE TRIMMING AND WELDING.

35 10. AFTER WELDING, ASSEMBLY OF ITEM 9, ITEM 8, AND ITEM 21 MUST PASS THROUGH A .192±.001 DIAMETER X 2.75 MIN LONG TEST FIXTURE.

11. ATTACH ITEM 20 TO ITEM 3 AS FOLLOWS:

11.1 WRAP ITEM 25 AROUND ITEM 3.

11.2 PULL ITEM 20 OVER ITEM 3 UP TO COLLAR OF ITEM 3.

11.3 WRAP ITEM 25 OVER ITEM 20 TO SECURE ITEM 20 TO ITEM 3.

11.4 GENTLY SMOOTH ITEM 20 TOWARD DETECTOR ELEMENT END TO SNUG ITEM 20 AGAINST ITEM 3, INCLUDING PINCHOFF TUBE.

11.5 PASS END OF ITEM 20 THROUGH ITEM 28. CRIMP ITEM 28 PER FIG. I ALIGN LONG DIAMETER OF ITEM 28 PARALLEL WITH FLATTENED END OF PINCHOFF TUBE OF ITEM 3. SLIDE ITEM 28 OVER PINCHOFF AND SEAT ITEM 28 AGAINST END OF ITEM 3. CRIMP ITEM 28 IN PLACE PER SECTION CC.

35 11.6 CRIMP ITEM 28 TO A CONICAL POINT. TRIM EXCESS ITEM 20 BEYOND ITEM 28. COMPLETED ASSEMBLY MUST PASS FREELY THROUGH TUBE 175A7278P019.

12. ELECTROLYTICALLY ETCH ITEMS 16 & 17 IN LOCATION SHOWN USING MATERIALS PER 408HA119.

35 13. DIMENSIONS OF SECTION C-C AND FIG. I ARE TOOL-CONTROLLED, AND ARE SHOWN FOR REFERENCE ONLY.

35 D. STARNINGER	34 E. AGUIRRE	33 S. MOLDKOUR	32 11-16-79
NJ42985 CHK BY: L. FRENCH ENGR:	NJ31492 CHKD BY: E. GETTELSOHN	NJ22289 CHKD BY: D. M. HOWLEY	GENERAL DOC CHANGE RETRACED WITH CHANGES

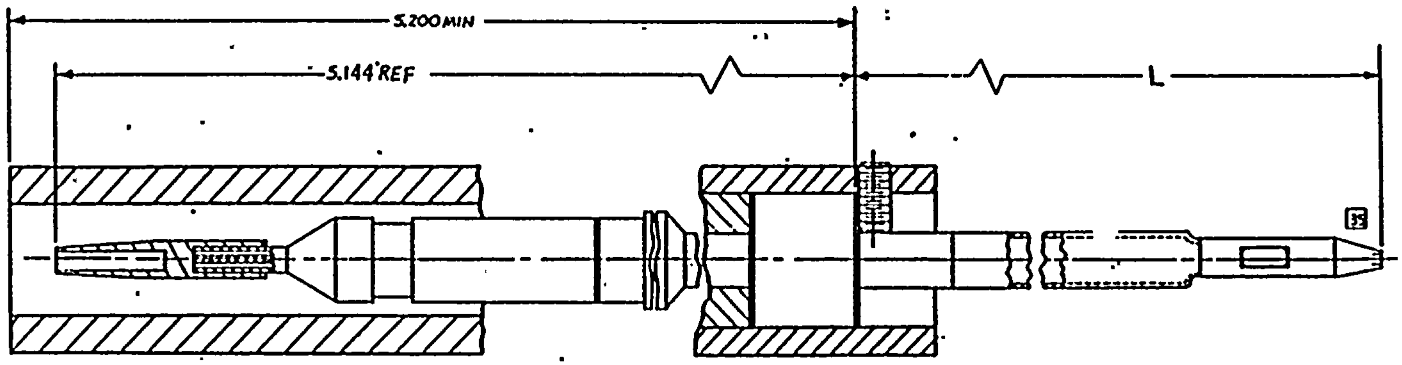
SAN JOSE 112C3144 SH 2 C1

GENERAL ELECTRIC 112C3144 SH 3 CONT ON SH 2

DETECTOR

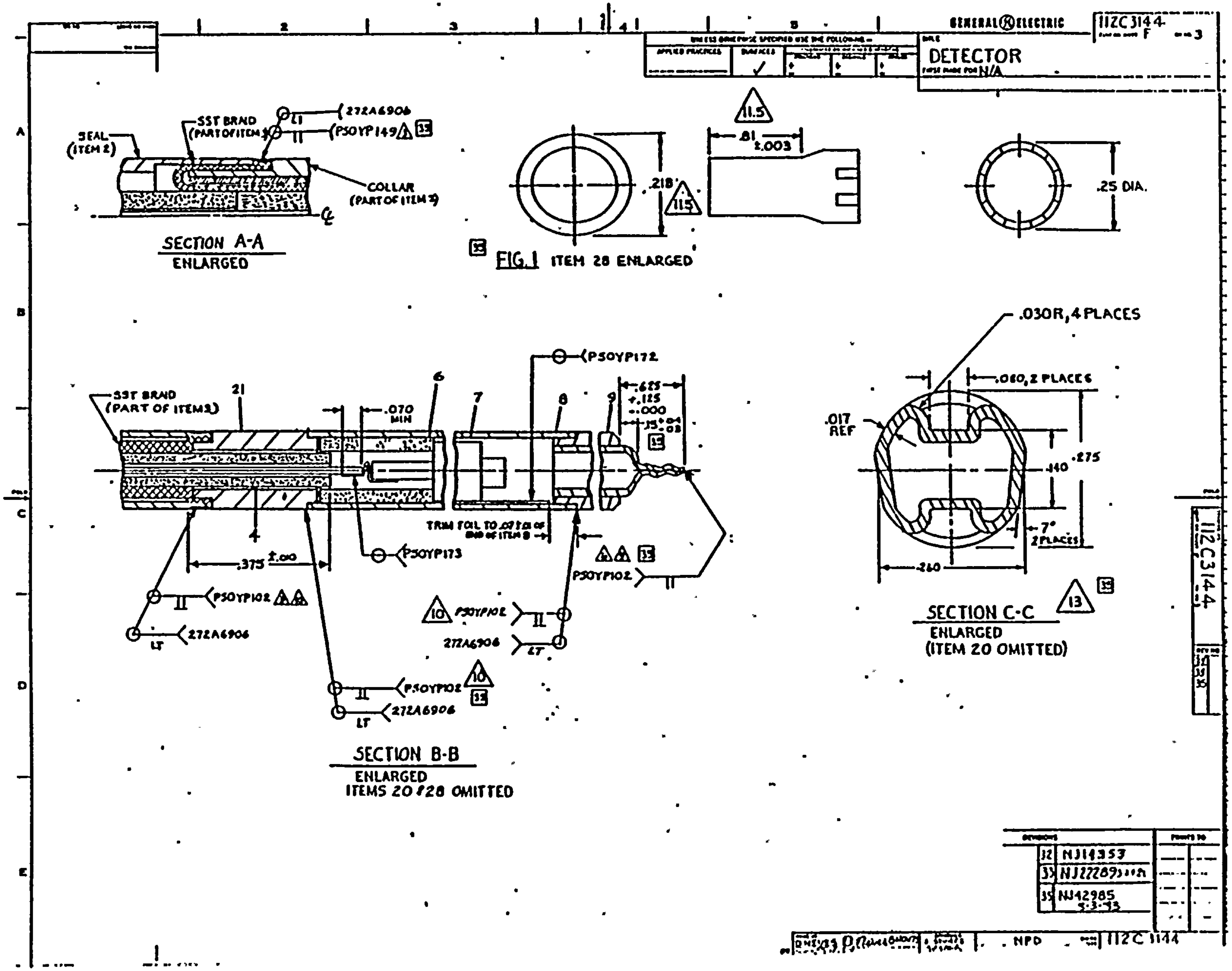
N/A

GROUP NO.	L ±1.00 INCHES	PRODUCT SPECIFICATIONS 7	GROUP NO.	L ±1.00 INCHES	PRODUCT SPECIFICATIONS 7
1	471.14	175A8239	12	503.64	175A8239
2 8	471.14	175A8240	13	558.44	175A8239
3	459.64	175A8239	14 8	558.44	175A8240
4 8	459.64	175A8240	15	120.44	175A8239
5	480.74	175A8239	16	381.54	175A8239
6	269.44	175A8239	17	380.44	175A8239
7	465.64	175A8239	18 8	380.44	175A8240
8 8	465.64	175A8240	19	423.54	175A8239
9	559.64	175A8239			
10 8	559.64	175A8240			
11 8	600.44	175A8240			

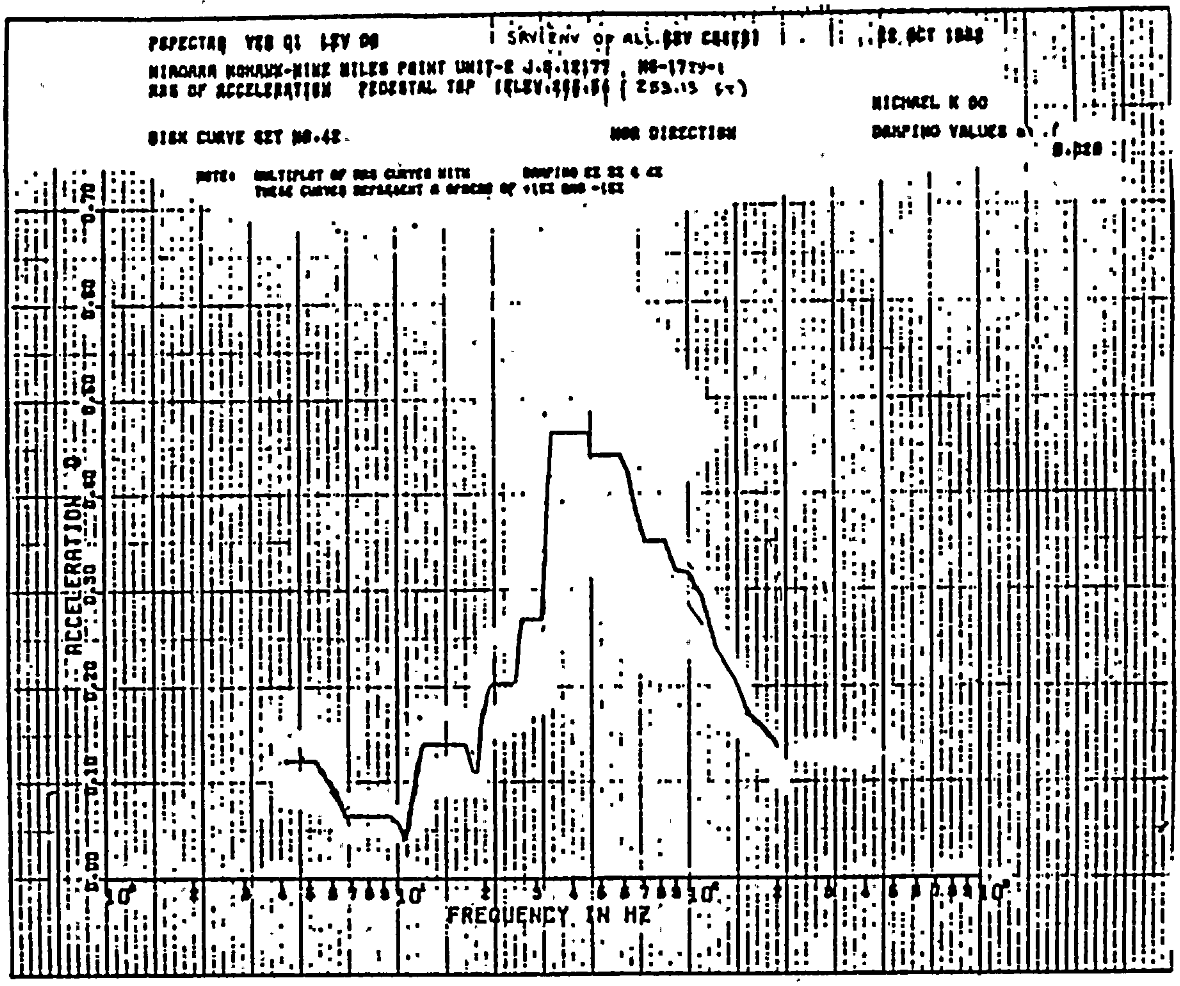


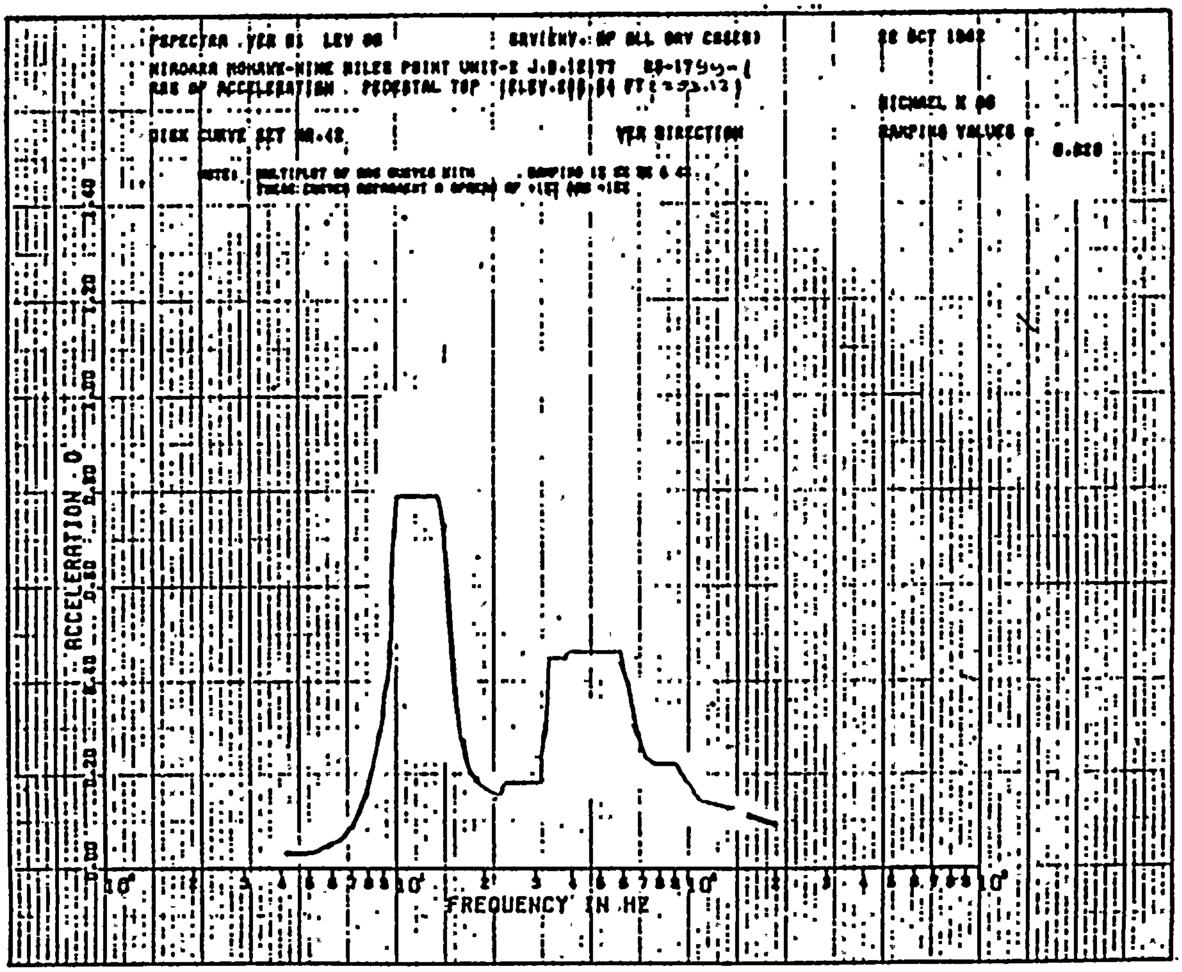
REVISIONS
32 NJ14353
35 NJ42985

AL HOLT, 27 MAY 71 LC WHITE NED 112C3144


GENERAL ELECTRIC
112C3144
DETECTOR
N/A
SEAL (ITEM 2)
SST BRAID (PART OF ITEM 3)
272A6906
P50YP149
COLLAR (PART OF ITEM 3)
SECTION A-A
ENLARGED
.218
.81 ±.003
.25 DIA.
FIG. 1 ITEM 28 ENLARGED
.030R, 4 PLACES
.080, 2 PLACES
.017 REF
.275
.140
7° 2 PLACES
.260
SECTION C-C
ENLARGED
(ITEM 20 OMITTED)
P50YP172
SST BRAID (PART OF ITEM 3)
21
6
7
8
9
.070 MIN
TRIM FOIL TO .07±.03 OF END OF ITEM 8
P50YP173
.375 ±.00
P50YP102
272A6906
SECTION B-B
ENLARGED
ITEMS 20 & 28 OMITTED
32 NJ14353
33 NJ22289
35 NJ42985 5-3-93
NPD
112C3144

ATTACHMENT 2


NINE MILES POINT UNIT-2
PEDESTAL TOP
HOR DIRECTION
DAMPING VALUES
ACCELERATION G
FREQUENCY IN HZ


NINE MILES POINT UNIT-2
PEDESTAL TOP
VER DIRECTION
DAMPING VALUES
ACCELERATION G
FREQUENCY IN HZ

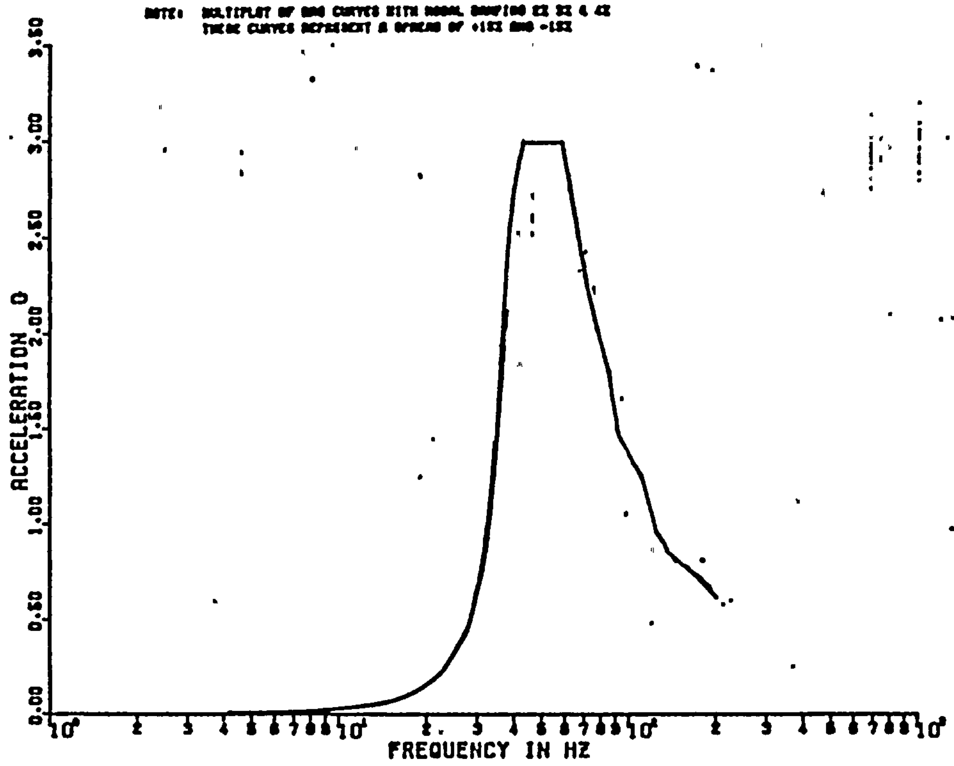
PSPECTRA VER 01 LEV 00 CHUGGING LOAD CASES 22 SEP 1982

NIAGARA MOHAWK-NINE MILES POINT UNIT-2 J.O.12177 , MG-17??-1
RRS OF ACCELERATION PEDESTAL TOP (ELEV.268.84 (253.15 ft)

MICHAEL K GO

DISK CURVE SET NO.42 HOR DIRECTION DAMPING VALUES = 0.030

NOTE: MULTIPLOT OF RRS CURVES WITH MODAL DAMPING 2% 3% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



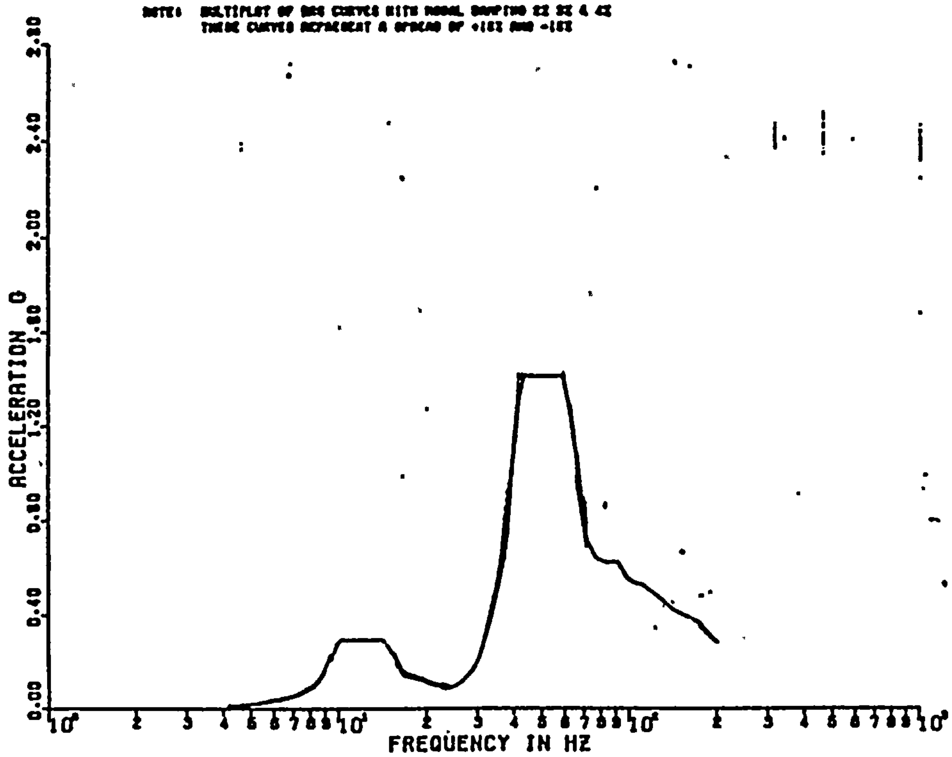
PSPECTRA VER 01 LEV 00 CHUGGING LOAD CASES 22 SEP 1982

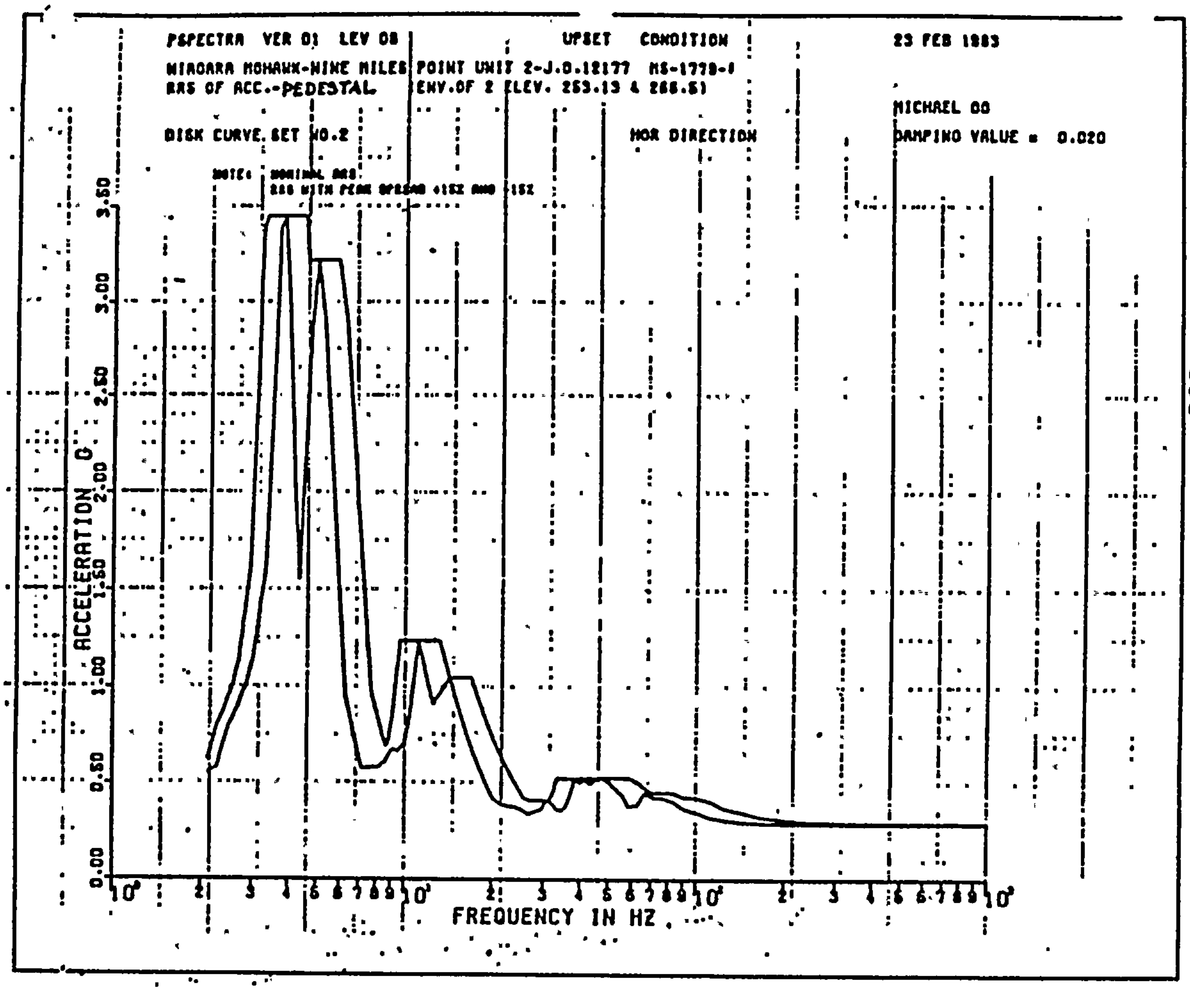
NIAGARA MOHAWK-NINE MILES POINT UNIT-2 J.O.12177 , MG-1779-1
RRS OF ACCELERATION PEDESTAL TOP (ELEV.268.84 (253.13 ft

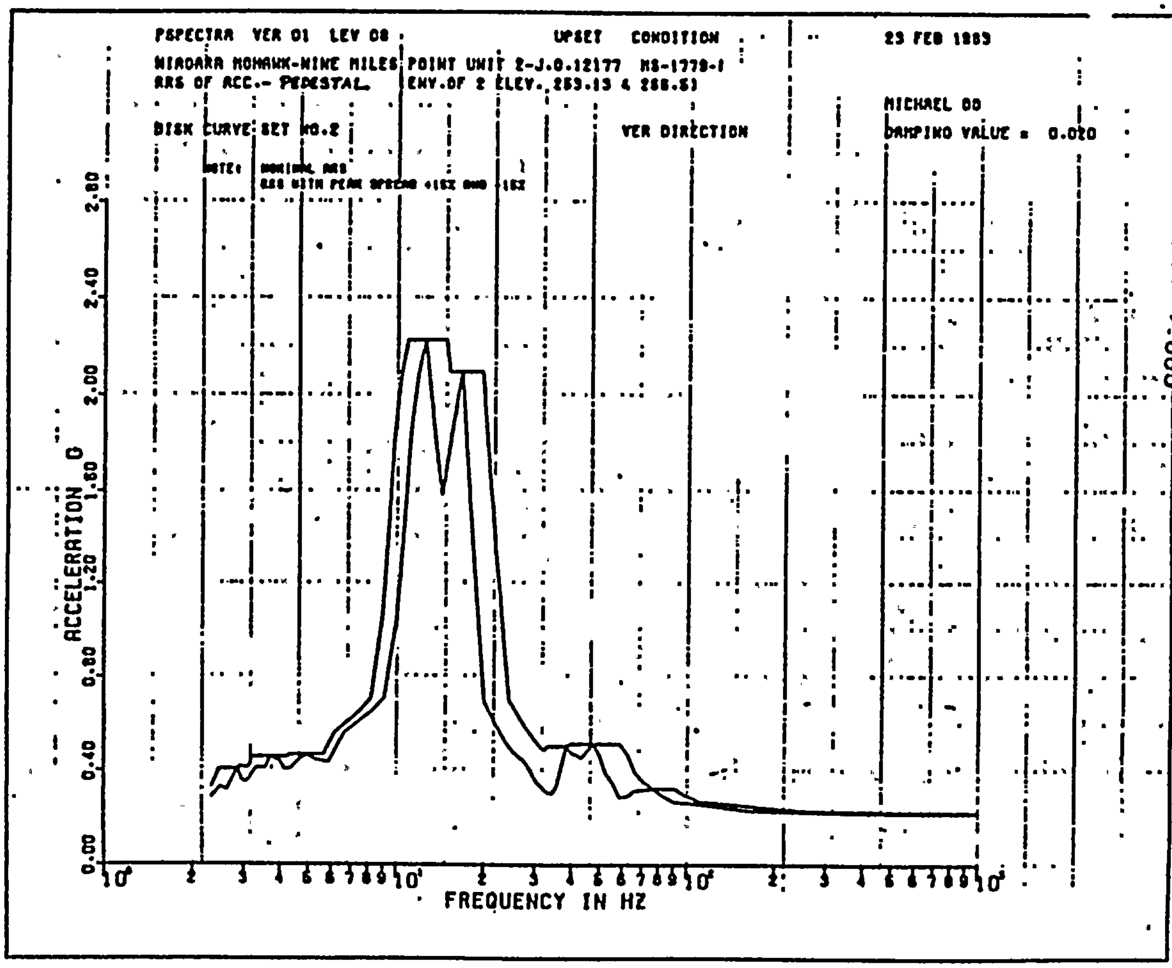
MICHAEL K GO

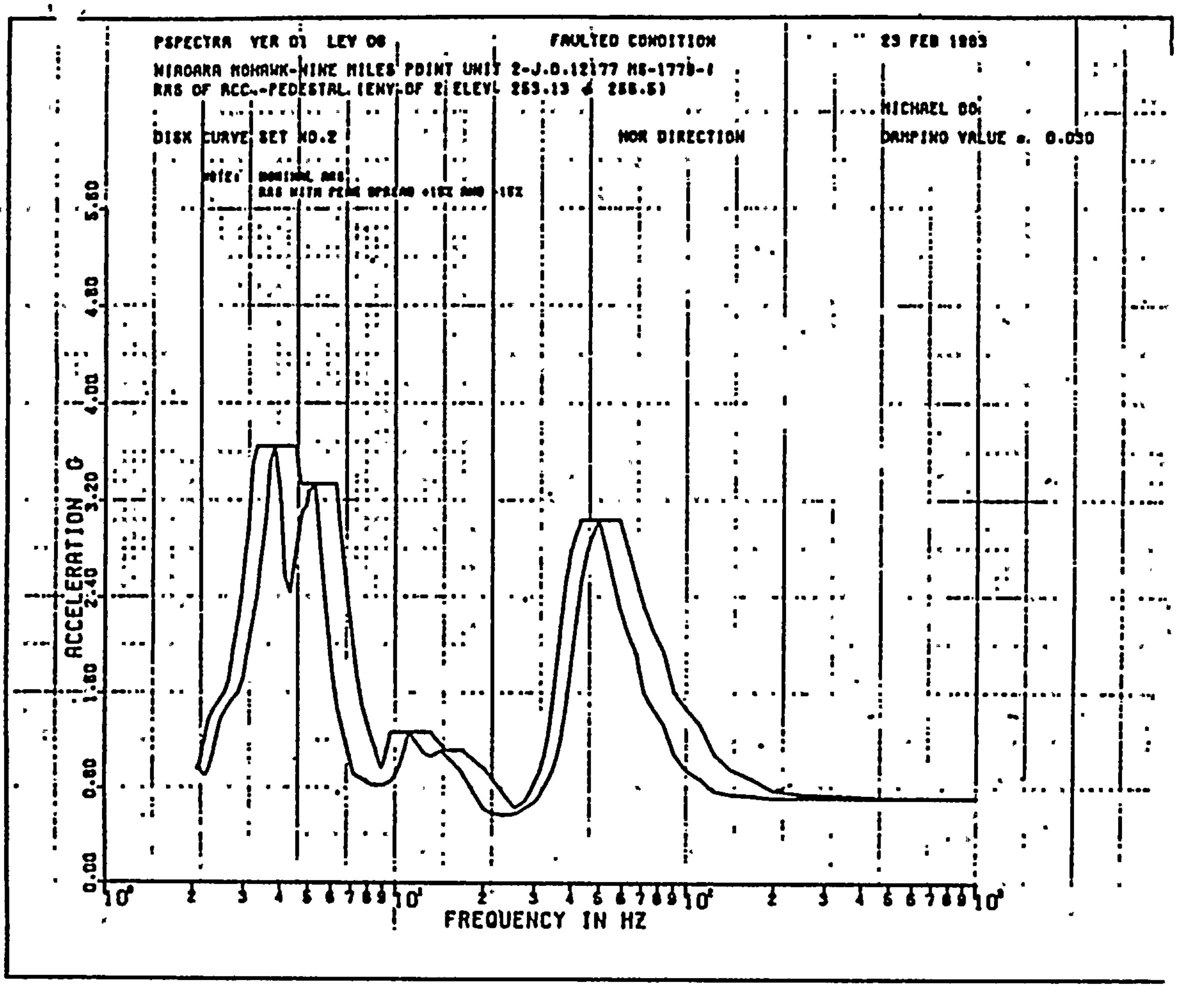
DISK CURVE SET NO.42 VER DIRECTION DAMPING VALUES = 0.030

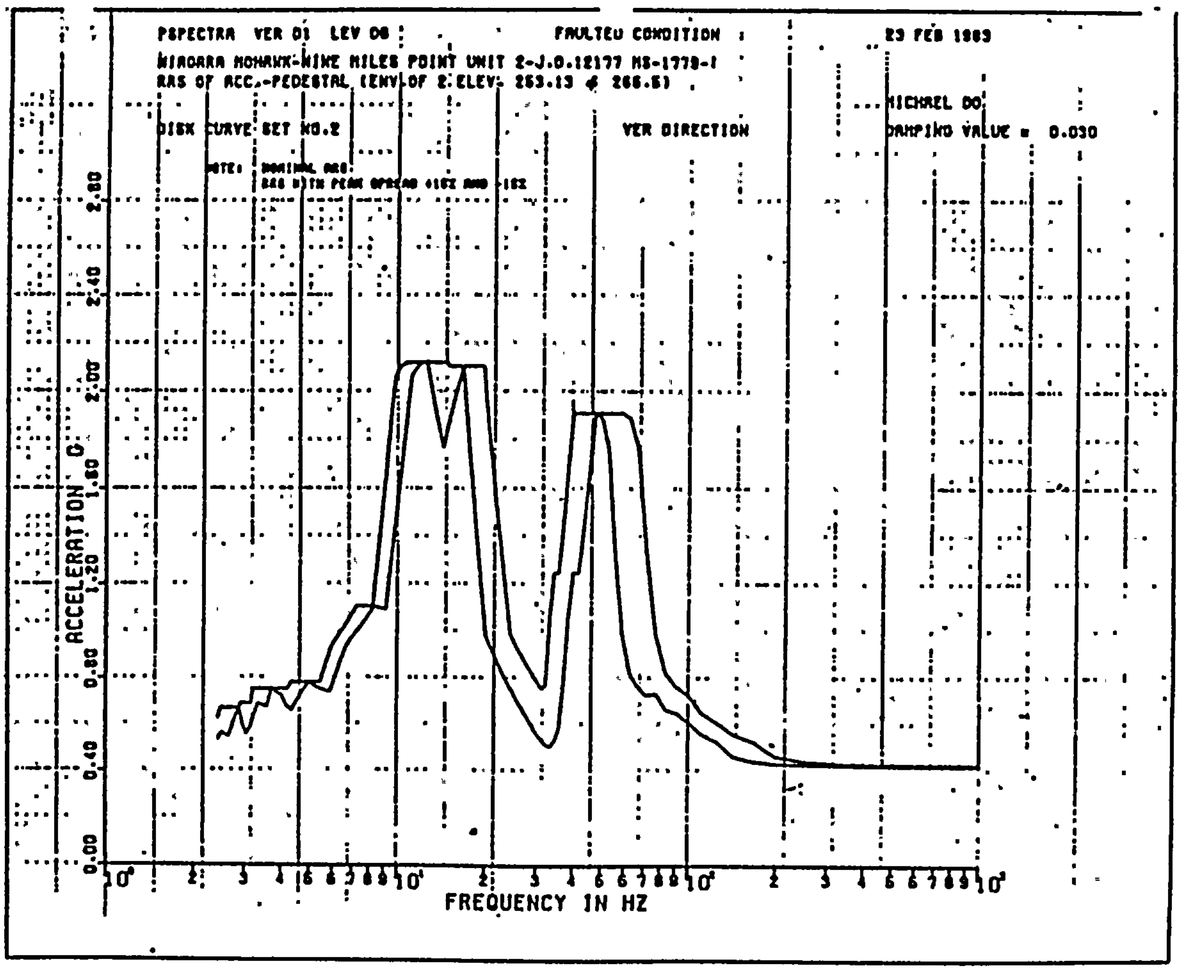
NOTE: MULTIPLOT OF RRS CURVES WITH MODAL DAMPING 2% 3% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%




PSPECTRA VER 01 LEV 08
UPSET CONDITION
23 FEB 1983
NIAGARA MOHAWK-NINE MILES POINT UNIT 2-J.O.12177 NS-1779-1
RRS OF ACC.-PEDESTAL
ENV.OF 2 ELEV. 253.13 & 266.51
MICHAEL OO
DISK CURVE SET NO.2
HOR DIRECTION
DAMPING VALUE = 0.020
NOTE: NOMINAL RRS
RRS WITH PEAK SPREAD +15% AND -15%
ACCELERATION G
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
FREQUENCY IN HZ


PSPECTRA VER 01 LEV 08
UPSET CONDITION
23 FEB 1983
NIAGARA MOHAWK-NINE MILES POINT UNIT 2-J.O.12177 NS-1779-1
RRS OF ACC.- PEDESTAL
ENV.OF 2 ELEV. 253.13 & 266.51
MICHAEL OO
DISK CURVE SET NO.2
VER DIRECTION
DAMPING VALUE = 0.020
NOTE: NOMINAL RRS
RRS WITH PEAK SPREAD +15% AND -15%
ACCELERATION G
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
FREQUENCY IN HZ


PSPECTRA VER 01 LEV 08
FAULTED CONDITION
23 FEB 1983
NIAGARA MOHAWK-NINE MILES POINT UNIT 2-J.O.12177 MS-1779-1
RRS OF ACC.-PEDESTAL (ENV. OF 2 ELEV. 253.13 & 266.5)
MICHAEL DO
DISK CURVE SET NO.2
HOR DIRECTION
DAMPING VALUE = 0.030
ACCELERATION G
0.00
0.80
1.60
2.40
3.20
4.00
4.80
5.60
FREQUENCY IN HZ


PSPECTRA VER 01 LEV 08
FAULTED CONDITION
23 FEB 1983
NIAGARA MOHAWK-NINE MILES POINT UNIT 2-J.O.12177 MS-1779-1
RRS OF ACC.-PEDESTAL (ENV. OF 2 ELEV. 253.13 & 266.5)
MICHAEL DO
DISK CURVE SET NO.2
VER DIRECTION
DAMPING VALUE = 0.030
ACCELERATION G
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
FREQUENCY IN HZ

ATTACHMENT 3

IRM DETECTOR SEISMIC ANALYSIS

FROM 408 925 4138 84.08.16 13:12

Extracted
DRF#943-CS15120N#3
For axial capability on the IRM detector

DRF ... N#3 A-10

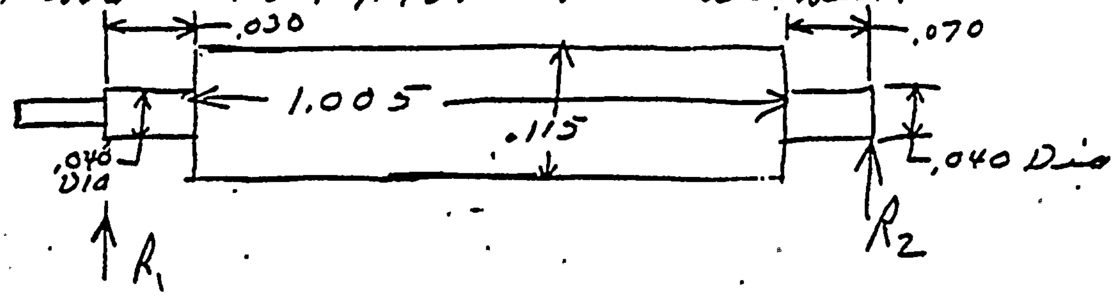
GENERAL ELECTRIC CO.
Nuclear Energy Division
ENGINEERING CALCULATION SHEET

NUMBER ____ DATE 7/14/78
SUBJECT IRM Detector Seismic Analysis BY [signature] SHEET 1 OF ____

Detector Assm 112C3144
Detector Element 112C3107 G18

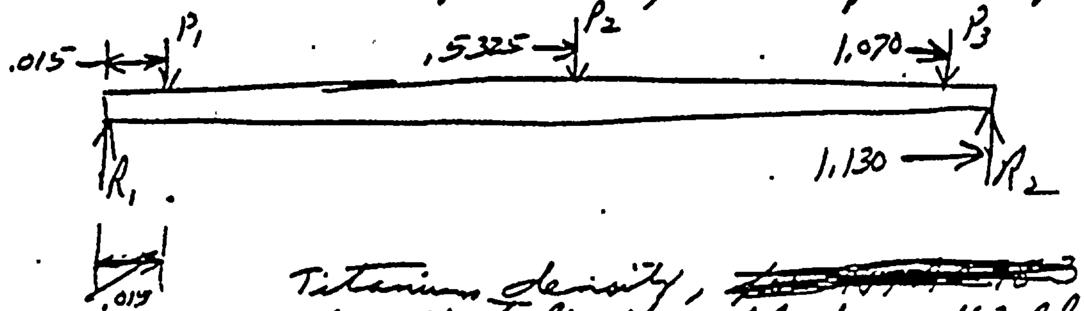
Anode 248A 9149 P001
~~259A7386~~
~~159A2470~~

Anode 248A9148P001 - Titanium



Dimensions are for worst case - Heaviest center and weakest end.

For loading on end, use the following simulation



Titanium density, per Metals Handbook, 0.163 lb/in³
Yield strength, per 167A2983 = 50,000 psi at Room Temp, 16,000 psi at 800°F per RMI, Inc.

$P_1 = .163(\frac{\pi}{4})(.040)^2(.030) = 6.145E-6$ lb
$P_2 = .163(\frac{\pi}{4})(.115)^2(1.005) = 1.7015E-3$ lb
$P_3 = .163(\frac{\pi}{4})(.040)^2(.070) = 1.4338E-5$ lb

Based on 1 g acceleration

$R_1 = [(1.130-.015)P_1 + (1.130-.5325)P_2 + (1.130-1.070)P_3] / 1.130 = 9.065E-4$ lb
$R_2 = [.015P_1 + .5325P_2 + 1.070P_3] / 1.130 = 8.155E-4$ lb

FORM NO. NED-67 (8-75)

FROM 408 925 4138 '84.08.16 13:14

GENERAL ELECTRIC CO.
Nuclear Energy Division
ENGINEERING CALCULATION SHEET

A-11

NUMBER ______ DATE 7/13/78

SUBJECT IRM Detector Seismic Analysis BY [illegible] SHEET 2 OF ____

Check bending moment at right end (worst case)

$M = .070 R_2 - .035 P_3 = 5.6582E-5$ in lb

Stress, $\sigma = \frac{Mc}{I}$

$\frac{I}{c} = \frac{\pi}{64}[.040]^4 / .020 = 6.2832E-6$

$\sigma = 5.6582E-5 / 6.2832E-6 = 9.005$ psi at 1g

Stress concentration factor = 3.4
(See DRF B13-167, section 7)

$\sigma = 3.4(9.005) = 30.618$ psi at 1 g

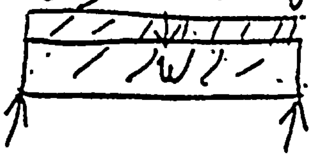
Consider yield strength at 800°F to get allowable g's

$g's = \frac{16000}{30.618} = 522.6$ g's

At 600°F, per RMI inc., Yield str = 19,000 psi

$g's = \frac{19000}{30.618} = 620.5$ g's

Consider bending of ~~the~~ center section



Per Roark, Case 13, Page 106

$M = \frac{1}{8} W l$ at center

$M = \frac{1}{8} P_2 l = \frac{1}{8}(1.7015E-3)(1.005) = 2.1375E-4$

$I/c = \frac{\pi}{64}(.115)^4 / .115/2 = \frac{\pi}{32}(.115)^3 = 1.4931E-4$

$\sigma = \frac{Mc}{I} = \frac{2.1375E-4}{1.4931E-4} = 1.43$ psi/g

This is much lower than at the end, so the end value is limiting.

FORM NO. NED-87 (8-75)

Nuclear Energy Division

ENGINEERING CALCULATION SHEET

A-12

NUMBER ____ DATE 7/13/78

SUBJECT IRM Detector Seismic Analysis BY [signature] SHEET 3 OF ____

The maximum acceleration of the fuel in a BWR-6 at the elevation of the IRM (See 384HA137 and 365HA603) is 3.405 g (SSE)

~~The~~ The IRM detector is mounted inside ~~a~~ a tube of 0.187 OD X .016 wall.

This in turn is installed inside a fiberglass "sock" inside the shuttle tube. The shuttle tube is inside the IRM Dry Tube and has a diameter of 0.375. This gives a radial clearance of 0.0625" between the 0.5" ID of the Dry Tube and the O.D. of the Shuttle tube.

The wall of the shuttle tube is .028, giving an ID of 0.319 and a radial clearance of .066 between the ID of the shuttle tube and the O.D. of the detector tube. The fiberglass "sock" fills this space and serves as a shock absorber to protect the detector.

Considering maximum acceleration of the fuel over the distance from the fuel to the dry tube, the fuel would reach a velocity of:

$$v_f = \sqrt{2aS} = \sqrt{2(3.405 \times 386.4)(.237)} = 24.97 \text{ in/sec}$$

(use 25 in/sec)

(Fuel water gap is as below for BWR-6)

See 762E824

~~Fuel Bundle 6~~

Nom diametral gap is 1.164

Nom Dry tube OD is 0.690

Δ gap $= \frac{1}{2}(1.164 - .69) = 0.237$

Impact w/ of the dry tube, assuming elastic impact will give double the velocity to the dry tube because the fuel is essentially infinite mass,

$V_{dt} = 2 \times 25 = 50$ in/sec

FORM NO. NED-87 (6-75)

GENERAL ELECTRIC CO.
Nuclear Energy Division
ENGINEERING CALCULATION SHEET

A-13

NUMBER DATE 7/14/78
SUBJECT IRM Seismic Analysis BY [signature] SHEET 4 OF

The dry tube will travel 0.0625 inches and then impact the shuttle tube. ~~Assum~~ Assuming elastic impact and conservation of momentum, the velocities will have a relationship in accordance with the section areas.

$$M_{dry\ tube} v_{dry\ tube} = M_{dt} v'_{dt} + M_{st} v_{st} \quad \text{(Cons. Momentum)}$$

$$M_{dt} v^2_{dt} = M_{dt} (v'_{dt})^2 + M_{st} v^2_{st} \quad \text{(Cons. Energy)}$$

$$M_{dt}(v_{dt} - v'_{dt}) = M_{st} v_{st}$$

$$M_{dt}(v^2_{dt} - v'^2_{dt}) = M_{st} v^2_{st}$$

$$v_{dt} + v'_{dt} = v_{st}$$

$$v_{dt} - v'_{dt} = v_{st} \frac{M_{st}}{M_{dt}}$$

$$2 v_{dt} = v_{st}\left[1 + \frac{M_{st}}{M_{dt}}\right]$$

$$v_{st} = \frac{2 v_{dt} M_{dt}}{M_{dt} + M_{st}} = \frac{2(50)\left[.69^2 - .50^2\right]}{\left[.69^2 - .50^2 + .375^2 - .319^2\right]} = 85.3 \text{ in/sec}$$

The fiberglass "sock" (175A8979) will compress by at least .02 inches to accelerate the detector tube. Also, the velocity of the shuttle tube will be reduced by picking up the detector tube and detector

$$85.3\left(.375^2 - .319^2\right) = v\left(.375^2 - .319^2 + .188^2 - .154^2\right)$$

$$v = 65.7 \text{ in/sec}$$

(By neglecting the weight of the detector, cable and "sock," this figure is conservative).

The acceleration is then, from $v^2 = 2as$

$$a = \frac{v^2}{2s} = \frac{(65.7)^2}{2(.02)} = 107912.25 \text{ in/sec}^2$$

FORM NO. NED-87 (8-75)

Nuclear Energy Division

A-14

ENGINEERING CALCULATION SHEET

NUMBER ______ DATE 7/14/78

SUBJECT IRM Seismic Analysis BY [signature] SHEET 5 OF ______

Convert acceleration in in/sec² to g's by dividing by 386.4

$$a = \frac{107912.25}{386.4} = 279 \text{ g's (use 280 g)}$$

This figure is very conservative because of the following:

1. Fuel acceleration was held at the maximum SSE value for the velocity calculation when actually the average acceleration would be less.

2. Elastic impacts were assumed for all cases except the fiberglass "sock" impact. Actually some plastic deformation would be expected in the fuel channel surface which would reduce the resulting velocities.

3. No damping effect of the water was considered for the dry tube. Actually, the water would provide an accelerating force on the dry tube before impact by the fuel so the net velocity difference at impact would be less, making the resulting velocity less and the water would slow the dry tube so the velocity at the point of contact with the shuttle tube would be lower for that reason also.

The actual operating temperature of the IRM detector, if considered as 800°F, would give an allowable acceleration of 522.6 g's (sheet 2)

This gives a safety factor of:

$$SF = \frac{522.6}{280} = 1.87$$

for 600°F operation, the safety factor is $\frac{620.5}{280} = 2.22$

GENERAL ELECTRIC CO.
Nuclear Energy Division
ENGINEERING CALCULATION SHEET

A-15

NUMBER ________ DATE 7/19/78
SUBJECT IRM Seismic Analysis BY [illegible] SHEET 6 OF ____

This says that for horizontal seismic conditions, the IRM detector can withstand about 2 times ~~[illegible]~~ the value of the SSE seismic event.

In the vertical direction - determine weight of detector.

Housing length - 159A2665 P1
length = 1.210 dia = .160
End Plug 159A2473
Length = .180
Insulator - 159A2471
length = .061

To be conservative, use weight of solid Ti cylinder $l = 1.21 + .18 + .06 = 1.45"$
dia = .16 " density = .163 lb/in³

$Wt = .163\left(\frac{\pi}{4}\right)(.16)^2(1.45) = 0.004752$ lb

The detector is held in place by a foil welded to the tube. (175A7403 p 3)

Foil is nickel, .003 thick, .030 wide

Assume the weld holds 10% of the section
Area = .003 x .030 x .1 = 9×10^{-6}

Using allowable stress of 10,000 psi, (ASME Code, table I-8.4, at 600°F)

The strength is then: $9 \times 10^{-6} \times 10^4 = .09$ lb

$\frac{.09}{.004752} = 18.94$ g's

Per ASME Code, III - 3310, the allowable strength can be 90% of the yield strength,
Then: $g's = \frac{1}{.9}(18.94) = 21$ g's

FORM NO. NED-87 (8-75)

GENERAL ELECTRIC CO.
Nuclear Energy Division
ENGINEERING CALCULATION SHEET

A-16

NUMBER ______ DATE 7/17/78
SUBJECT IRM Seismic Analysis BY [signature] SHEET 7 OF ____

There is no discrete resonance frequency for the IRM in the longitudinal direction due to the gearing. However, the IRM cable will give a resonance frequency of greater than 90 Hz.

Figure 6.20 of 384HA137 gives a vertical response for resonance above 33 Hz. of 1.5 g for SSE, 1.0 g for OBE.

Therefore, the 21 g capability greatly exceeds the requirements.

ATTACHMENT 4

B-10

SENSOR PRODUCTS

ENGINEERING MEMO

NUMBER 994-79-007

SEISMIC QUALIFICATION TEST REPORT
INTERMEDIATE RANGE DETECTOR 112C3144G008

B Y

R. J. Culbertson

R. J. CULBERTSON

DATE

May 14, 1979

REVIEWED BY:

L. C. Wimpee 14 May 1979

L. C. WIMPEE

APPROVED BY:

Yogeshwar Dayal

Y. DAYAL 14 May

B-11

TABLE OF CONTENTS

B-17

DISTRIBUTION

R. Culbertson

I. Layne

J. Terhune

L. Wimpee

1.0 SCOPE

This report documents the seismic qualification tests and test results of the 112C3144G008 intermediate range detector assembly.

2.0 REFERENCES

2.1 General Electric Documents

2.1.1 384HA137 Seismic Design, BWRSD Supplied Equipment

2.1.2 385HA603 Seismic Design BWRSD Supplied Equipment

2.1.3 385HA777 Dynamic Load Methods and Criteria-NSSS Equipment, Piping, RPV & Internals

2.1.4 175A8240 Final Product Spec. Incore Mean Square Fission Detector Assembly.

2.1.5 SPE Memo 994-76-017 Tolerance Analysis

2.1.6 SPE Memo 994-79-005 Seismic Qualification Test Plan - Intermediate Range Detector, 112C3144G008.

2.1.7 Letter, R. L. Crowther, 9/24/74, BWR-6 Reference Core & Fuel Design

2.1.8 22A1473 (*) Neutron Monitoring System Spec.

2.1.9 22A2843 (*) Neutron Monitoring System Spec.

2.1.10 22A3167 (*) Neutron Monitoring System Spec.

2.1.11 22A3789 (*) Neutron Monitoring System Spec.

2.1.12 Test Instruction T.I. 700

2.1.13 762E821 Reactor Core Interfaces

*All Suffixes

3.0 SUMMARY & CONCLUSIONS

3.1 Summary

The current output of the test detector with operating voltage applied was monitored during the seismic test with no measureable current due to OBE seismic conditions observed and with less than 0.2×10^{-6} Amperes as occasional excursions at SSE seismic conditions.

The electrical and nuclear performance parameters of the detector before and after the seismic tests, together with the specification values, are listed below. BWR-6 fuel seismic motion was the basis for the seismic test.

Test Parameter	Specification Value	Test Values Before Seismic	After Seismic
	Detector Serial Number 6,612,88		
Insulation Resistance	$>1X10^{12}\Omega$	$>1X10^{12}\Omega$	$>1X10^{13}\Omega$
Breakdown Voltage	500-800 Vdc	540 Vdc	546 Vdc
Neutron Sensitivity, dc	$6.6\text{-}8.4X10^{-18}$A/nv	$7.11X10^{-18}$A/nv	$7.06X10^{-18}$A/nv
Neutron Sensitivity, MSV	$3.75\text{-}6.25X10^{-31}A^2$/Hz/nv	$4.7X10^{-31}A^2$/Hz/nv	$4.95X10^{-31}A^2$/Hz

3.2 Conclusions

The test data before, during and after the seismic testing show no appreciable change in the functional performance of the detector as a result of the seismic test. Therefore, it is concluded that the detector was not damaged or otherwise affected by being subject to seismic conditions.

4.0 TEST DESCRIPTION

The tests reported in this document are run to confirm qualification of the 112C3144G008 intermediate range detector assembly for seismic conditions in its application in a nuclear power generating station. BWR-6 seismic requirements are used because they are the most stringent. Detector electrical and nuclear performance was tested before and after the seismic tests and the detector was electrically monitored during the seismic tests to determine the seismic effects on the detector.

4.1 Test Procedure

The test procedure used followed the test plan given in reference 2.1.6 and the test set-up is described in Figure 1.

4.2 Test Detector Selection

The test detector assembly was selected at random from available production units.

4.3 Pre-and Post-Seismic Tests

The tests of insulation resistance, voltage breakdown, and neutron sensitivity were run by Quality Control personnel in the prescribed manner, with the data being recorded in accordance with T.I. 700.

4.4 Seismic Test Facility

The seismic test fixture is a Scotch yoke machine with motion amplitude set by the radius of the drive pin location on the drive wheel. Drive speed is set by the adjustment of a variable speed drive motor (Skil #599 drill). Drive speed is monitored during the test with a General Radio Strobotac and constant speed is maintained by manual adjustment of the drive motor speed control. The Strobotac was calibrated prior to the tests with a 60Hz reference and the Shimpo tachometer. During the seismic tests, the

4.4 detector assembly was connected to a high voltage power supply, set at the detector operating voltage (100 Vdc), and the Keithly Picoammeter. The picoammeter output was recorded by the Brush recorder.

4.5 Test Data and Equipment Used

Justification of the test plan and procedure are contained in Appendix B.

GENERAL ELECTRIC

B-1½

TITLE

SEISMIC TEST ARRANGEMENT

FIRST MADE FOR

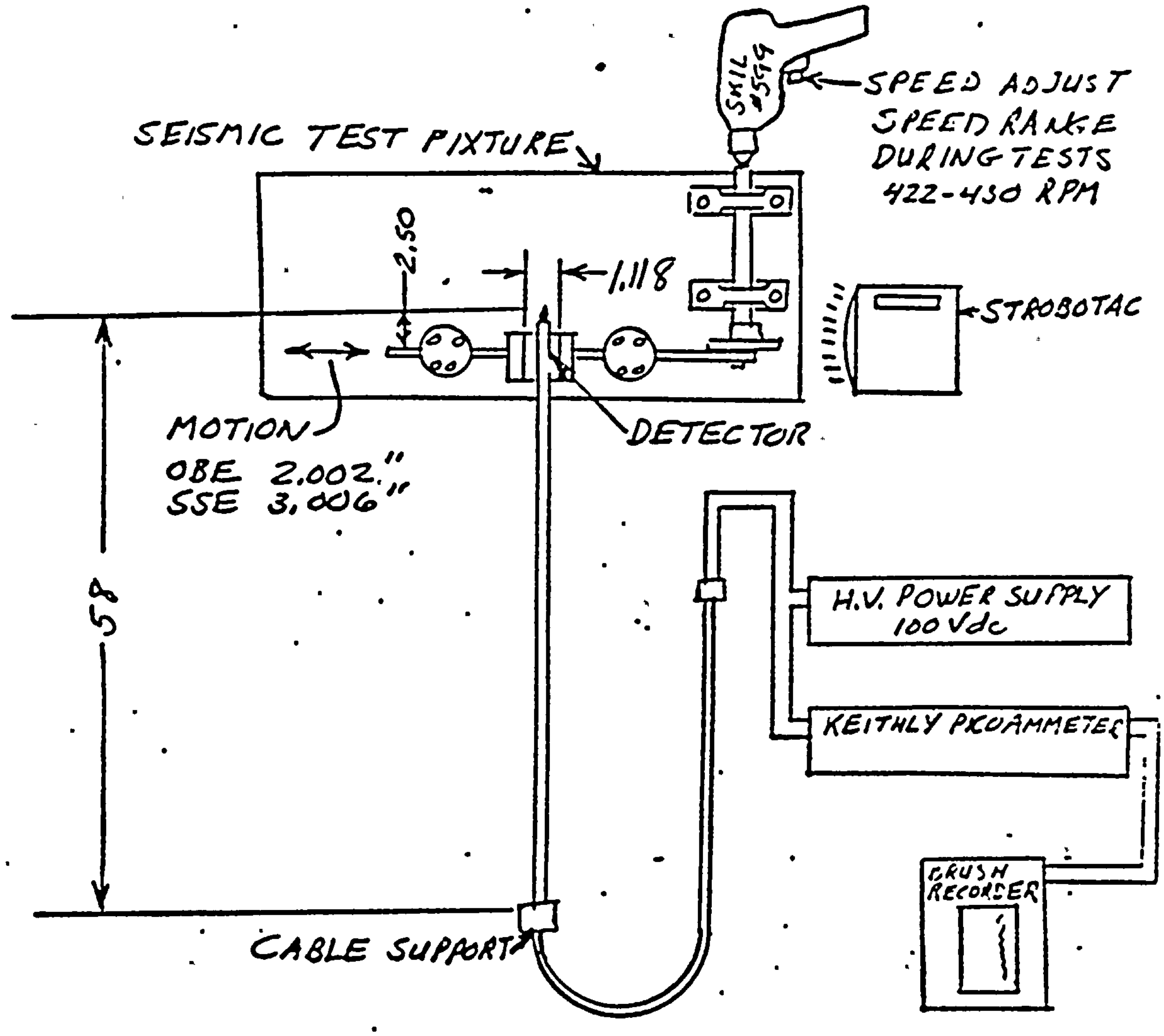


FIGURE 1

MADE BY R.J. Albert 5/9/79

ISSUED

APPROVALS

DIV OR DEPT

LOCATION

CONT ON SHEET

PRINTED IN U.S.A.

B-17

Appendix A

In accordance with the test plan, SPE Memo 994-79-005, the following is recorded.

Detector serial number 6,612,688

Detector diameter (over fiberglass) 0.263 inch

Pre-seismic data for insulation resistance, voltage breakdown and neutron sensitivity is given on the attached Quality Assurance data sheets (T.I.-700).

Insulation Resistance	Voltage Breakdown	Neutron Sensitivity D.C.	Neutron Sensitivity Mean Square
$>1X10^{12}\Omega$	540 Vdc	$7.11X10^{-18}$A/nv	$4.7X10^{-31}A^2$/Hz/nv

Seismic Test	OBE #1	OBE #2	OBE #3	OBE #4	OBE #5
duration, sec.	21.3	21.4	20.8	21.2	21.2
RPM	425-430	423-428	424-427	422-426	422-428

Seismic Test	SSE
duration, sec.	20.9
RPM	421-429

Post seismic data for insulation resistance, breakdown voltage, and neutron sensitivity is given on the attached Quality Assurance data sheets (T.I.-700).

Insulation Resistance	Voltage Breakdown	Neutron Sensitivity D.C.	Neutron Sensitivity Mean Square
$>1X10^{13}$	546 Vdc	$7.06X10^{-18}$A/nv	$4.95X10^{-31}A^2$/Hz/nv

The deviation from initial values is:

Insulation Resistance	Voltage Breakdown	Neutron Sensitivity D.C.	Neutron Sensitivity Mean Square
---	+1.11%	-0.70%	+5.32%

Equipment used in seismic test:

Keithly #445 Picoammeter S/N 9015 Calibrated March 21, 1979

High voltage power supply - made by GE, SPE Engrg. laboratory. Voltage checked by comparison with Fluke #341A power supply. I.D. No. G0430, calibrated Nov. 26, 1978 (at 100 volts, actual voltage is 100.2 Vdc).

Gould Brush #220 chart recorder. - Calibrated in lab 4/25/79. Serial No. 14659

Shimpo #DT-103, S/N 760620 Tachometer

General Radio #631-A Strobotach

Equipment used in seismic test (continued):

Tachometer and Strobotac check by comparison with 60Hz AC power line

Variable speed motor-Skil #599 3/8 drill

The seismic fixture had the following measurements:

Detector driver gap 1.118 inches

OBE Peak-to-peak travel 2.002 inches

SSE Peak-to-peak travel 3.006 inches

Suspended length of detector 58 inches

B-19

TEST DATA SHEETS Pre-seismic

IRM DETECTOR

DRAWING NO. 112C3144 GR. 009 REV. 3/31 SERIAL NO. 6612635

PROJECT STOCK T NO. TKKJ7 N NO. N9001

4.0 TEST PROCEDURES

4.1 Heat Run

4.1.2 Insulation Resistance @ 100 ±5 VDC = $>10^{12}$ ohms (Before heat run) (I.R. shall be greater than 1×10^{12} ohms).

TESTED BY [65] DATE 3/28/79

4.1.3 Insulation Resistance @ 100 ±5 VDC = $>10^{8}$ ohms (at 600 $\pm^{20}_{0}$ °F. (I.R. shall be greater than 1×10^{8} ohms).

4.1.4 Insulation Resistance @ 100 ±5 VDC = $\geq 1 \times 10^{13}$ ohms (After heat run) (I.R. shall be greater than 1×10^{12} ohms).

TESTED BY [19] DATE 3/28/79

4.1.5 Voltage Breakdown = 530 VDC (VBD shall be between 500-800 VDC)

TESTED BY [19] DATE 3/28/79

4.2 Capacitance

4.2.1 Capacitance 867PF 22 PFD/FT (Capacitance shall be 25PF/ft. + 10% — no lower limit).

TESTED BY [19] DATE 3/28/79

4.3 Neutron Sensitivity

4.3.1 Preliminary at NTR

4.3.1.5 Null C_X = 1675 Pfd. (Instrument)

4.3.1.6 Null C_X = 1740 Pfd. (Inst. and Cable)

4.3.1.7 Null C_X = 890 Pfd. (Inst., Cable & Detector)

4.3.1.8 Assembly Capacitance = 850 Pfd.

3/30/79

Co 60

11.06×10^{-8} a

NO.	TI 700
REV.	10
PAGE	1 OF 2

B-20

4.3.2 Chamber Testing

4.3.2.1 Peak Flux 7.43x10^11 NV (using standard detector)

3/30/79

4.3.2.3

SIG 5.28x10^-6
NTR 5.00
Sensi = 7.11x10^-18 A/NV

HIGH VOLTAGE	FREQ RANGE	MSV OUTPUT
80	8-16 Khz	6.5x10^-31
100	8-16 Khz	4.7 **
120	8-16 Khz	4.25
120	300-600 Khz	1.3
100	300-600 Khz	1.2
80	300-600 Khz	1.15

**(Chamber must read 3.75-6.25 x 10^{-31} amps ^{2}/hz/nv with these settings)

TESTED BY [327] DATE 3/20/79

4.4 Insulating Tube

4.4.1 Visual Inspection

INSPECTED BY [10] DATE 4-5-79

4.5 Final Inspection

4.5.1 Insulation resistance @ 100 ±5 VDC = >1X10^12 ohms (I.R. shall be greater than 1 x 10^{12} ohms).

4.5.2 Voltage breakdown = 540 VDC (VBD shall be between 500-800 VDC).

TESTED BY [10] DATE 4-5-79

4.5.3 Visual Inspection performed by [10] Date APR 5 1979.

4.6 Packaging Inspection

4.6.1 Bagging Inspection performed by [10] Date APR 5 1979.

4.6.2 I.D. Requirements verified by [10] Date APR 5 1979.

4.6.3 Neutron Sensitivity recorded by [10] Date APR 5 1979.

4.6.4 Coiling Inspection performed by ______ Date ______.

S/N 6,612,~~689~~ 688 4/4/79

NO.	TI 700
REV.	10
PAGE	2 OF 2

B-21 eng spec.

TEST DATA SHEETS

IRM DETECTOR . Post-seismic

DRAWING NO. 112C3144 GR. 008 REV. 34/31 SERIAL NO. 6612688

PROJECT STOCK T NO. TKKJ7 N NO. N9001

4.0 TEST PROCEDURES

4.1 Heat Run

4.1.1 Insulation Resistance @ 100 Vdc ± 5 Vdc = N/A ohms
(Before heat at room temperature I.R. shall be ≥ 1 X 10^{12} ohm).

TESTED BY N/A DATE N/A

4.1.2 Insulation Resistance @ 100 Vdc ± 5 Vdc = N/A ohms.
(At 600 + 30°F -0°F.) (I.R. shall be ≥ 1 X 10^8 ohm).

TESTED BY N/A DATE N/A

4.1.3 Insulation Resistance @ 100 Vdc ± 5 Vdc = N/A ohms.
(Room temperature after heat run) (I.R. shall be ≥ 1 X 10^{12} ohm).

4.1.4 Voltage Breakdown = N/A Vdc (VBD shall be 500-800 Vdc).

TESTED BY N/A DATE N/A

4.2 Capacitance Test

4.2.1 Capacitance = N/A pF Total.
Capacitance = N/A pF /FT (Calculate per Dwg. GP. No.)
(Capacitance shall be 25 pF /FT. + 10% - No Lower Limit).

TESTED BY N/A DATE N/A

4.3 Gamma Sensitivity Standard

4.3.2 Peak current @ 164 Vdc = 7.55×10^{-8} Amp. Std. S/N A126

Std. Sensitivity = ~~5.39x10^-6~~ 1.40×10^{-14} A/R/HR Flux = 5.39×10^6 R/HR.
GR 5/4/79

TESTED BY 327 DATE 5/8/79

TESTED 5/4/79

S/N 6612688

APPENDIX A

NO. TI 700
REV. 11
PAGE 1 OF 3

 B-37

TEST DATA SHEET

IRM DETECTOR

4.3.7 (Chamber under test)
Peak Current @ 100 ± 5 Vdc 10.15 X 10^-8 Amp.

Gamma Sensitivity = 10.15 X 10^-8 Amp. / 5.39 X 10^6 R/HR = 1.88 X 10^-14 A/R

(Gamma Sensitivity ≤ 3.0 X 10^{-14} A/R/HR)

TESTED BY 327 DATE 5/8/79

4.4 Neutron Sensitivity TESTED 5/4/79

4.4.1 Preliminary at NTR

4.4.1.5 Null C_x = 1871 pF. (Instrument only)

4.4.1.6 Null C_x = 1751 pF. (Instrument and cable)

4.4.1.7 Null C_x = 880 pF. (Instrument, Cable & Detector

4.4.1.8 Assembly Capacitance 871 pF.

4.4.2 Neutron Standard

4.4.2.1 Peak Current @ 164 Vdc 15.60X10^-6 Std. S/N 02

Std. Sensitivity 2.03x10^-17 A/nv. NTR #1 = 5.11X10^-6

Peak Flux = 2.03x10^-17 AMP / A/nv = 7.68X10^11 n.

4.4.3 Chamber Testing

4.4.3.1 Peak Current @ 100 Vdc 5.38 X 10^-6 AMP.
NTR #1 @ 100 Vdc 5.01 X 10^-6 AMP.

Calculated Flux = CURRENT OF NTR#1 (para. 4.4.3.1) / CURRENT OF NTR#1 (para. 4.4.2.1)

X Flux of (para. 4.4.2.1) = 7.62X10^11 A/nv.

DC Nuetron Sensitivity = PEAK CURRENT (para. 4.4.3.1) / CALCULATED FLUX (para. 4.4.3.1)
= 7.06 X 10^-18 A/nv.

DC Neutron Sensitivity shall be 6.6-8.4 x 10^{-18} A/nv.

S/N 6612688

APPENDIX A
NO. TI 700
REV. 11
PAGE 2 OF 3

B-73

TEST DATA SHEET

IRM DETECTOR

4.4.3.2 MSV Meter Reads = 4.95×10^{-31} A^2/Hz/nv @ 100V 8-16 kHz

(MSV Sensitivity shall be 3.75-6.25 X 10^{-31} A^2/Hz/nv).

TESTED BY 327 DATE 5/8/79

4.5 Insulating Tube

4.5.1 Visual Inspection

INSPECTED BY N/A DATE N/A

4.6 Final Inspection

4.6.1 Insulation Resistance @100 ± 5 Vdc= $>10^{13}$ ohms.
(I.R. shall be ≥ 1 X 10^{12} ohms).

4.6.2 Voltage Breakdown= 546 Vdc.
(VBD shall be 500-800 Vdc).

TESTED BY 111 DATE 5/8/79

4.6.3 Assembly Inspection performed by N/A Date N/A.

4.7 Packaging Inspection

4.7.1 Bagging Inspection performed by N/A Date N/A.

4.7.2 I.D. Requirements verified by N/A Date N/A.

4.7.3 Neutron Sensitivity Recorded by N/A Date N/A.

4.7.4 Coiling Inspection Performed by N/A Date N/A.

4.8 Accumulate Records for Records Package

S/N 6612688

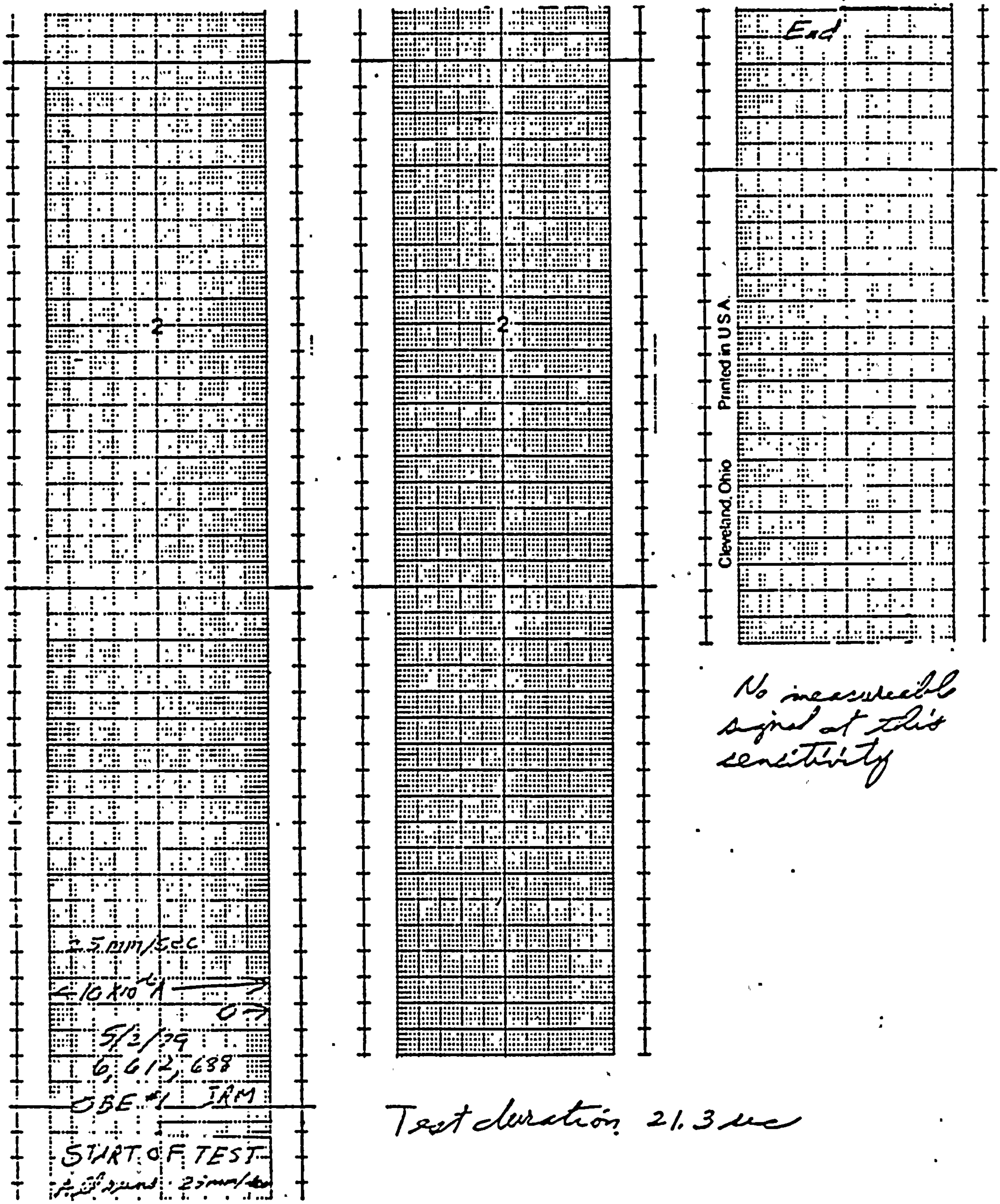
GENERAL ELECTRIC CO.
Nuclear Energy Division

B-31

ENGINEERING CALCULATION SHEET

NUMBER ______ DATE May 2, 1979

SUBJECT IRM Seismic Test BY [signature] SHEET ____ OF ____



No measurable signal at this sensitivity

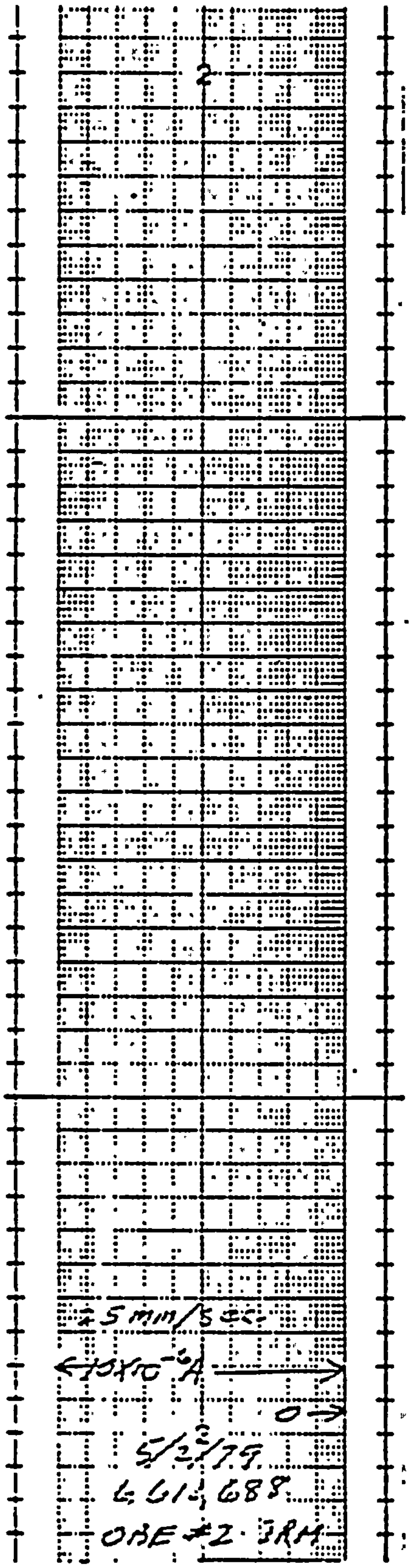
Test duration 21.3 sec

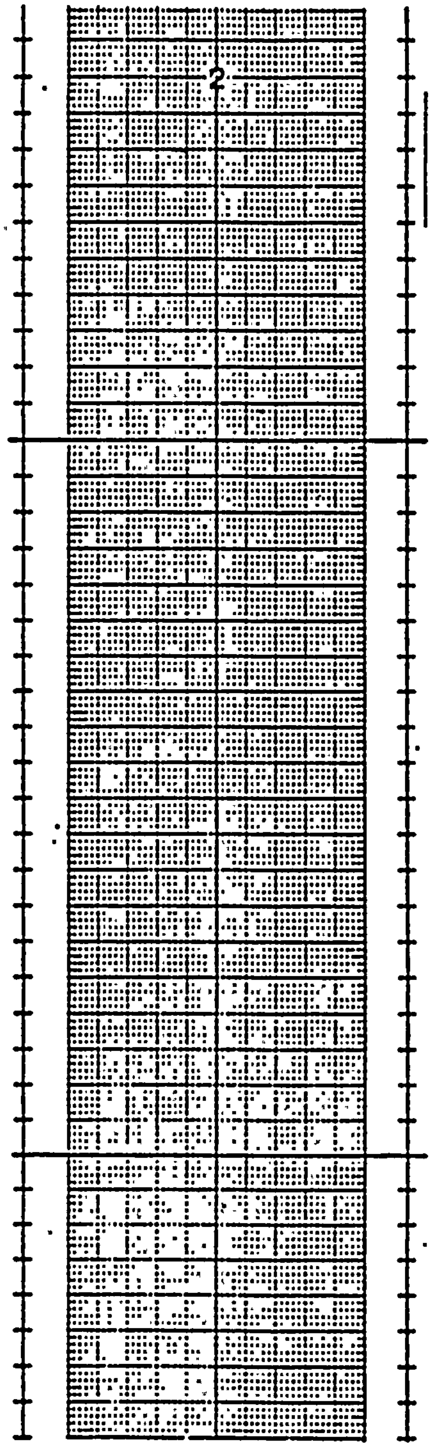
B-25

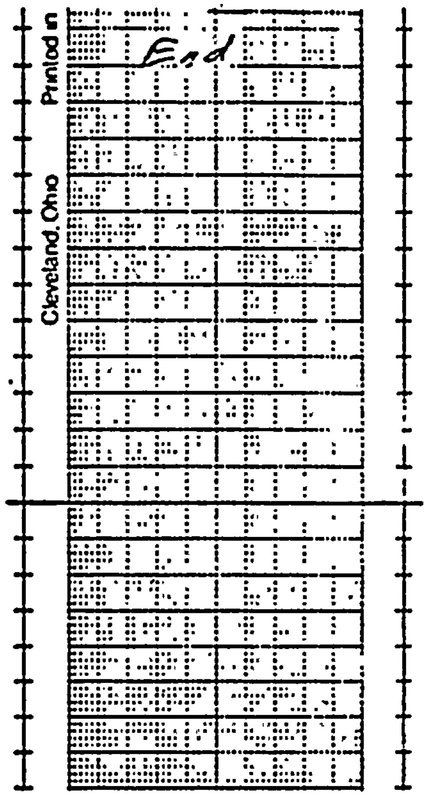
GENERAL ELECTRIC CO.
Nuclear Energy Division

ENGINEERING CALCULATION SHEET

NUMBER ______ DATE May 2, 1979
SUBJECT IRM Seismic Test BY [illegible signature] SHEET ___ OF ___







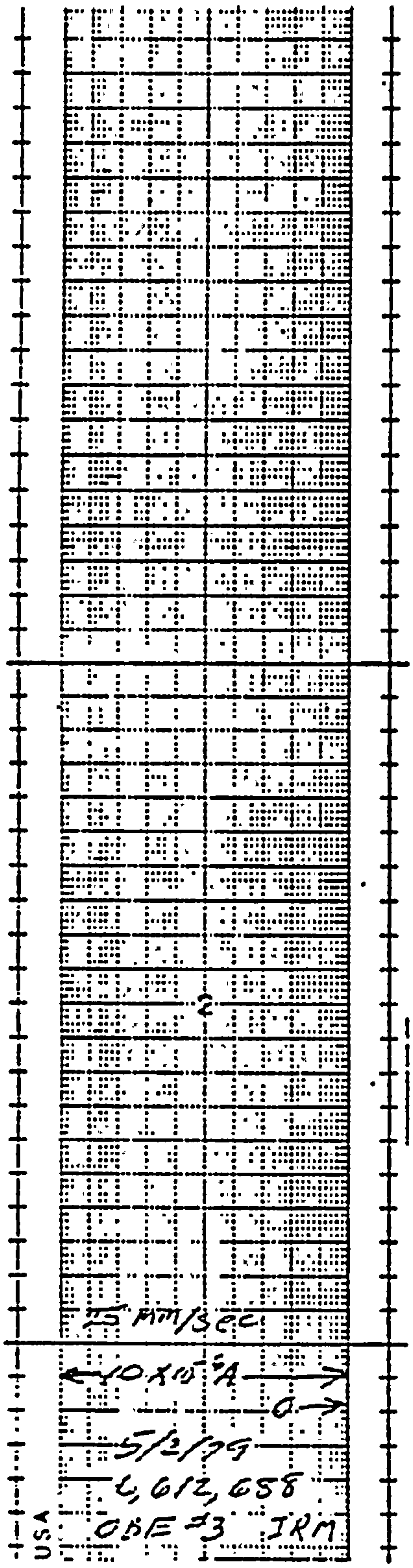
No measurable signal at this sensitivity

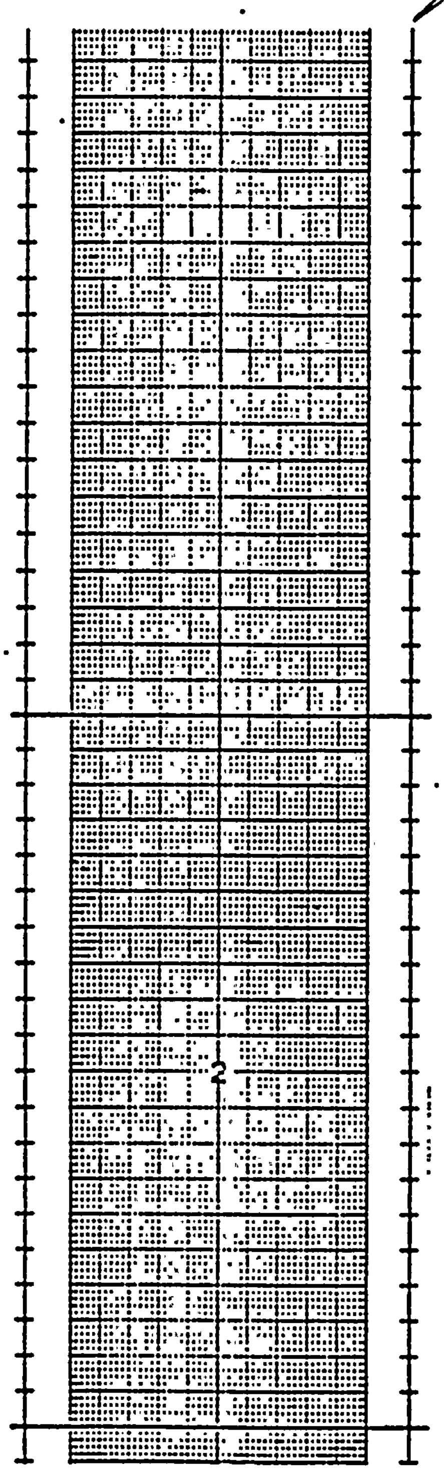
Test duration 21,4 sec

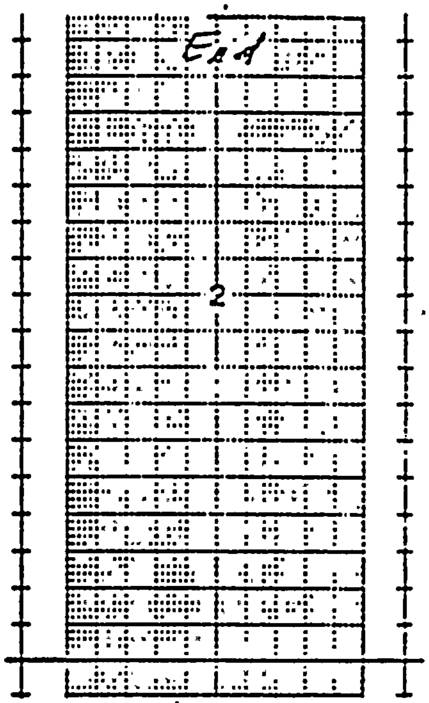
FORM NO. NED 87 (8-75)

GENERAL ELECTRIC CO.
Nuclear Energy Division
ENGINEERING CALCULATION SHEET

NUMBER ______ DATE May 2, 1979
SUBJECT IRM Seismic Test BY [illegible] SHEET ____ OF ____







No measurable signal at this sensitivity

Test duration 20.8 sec

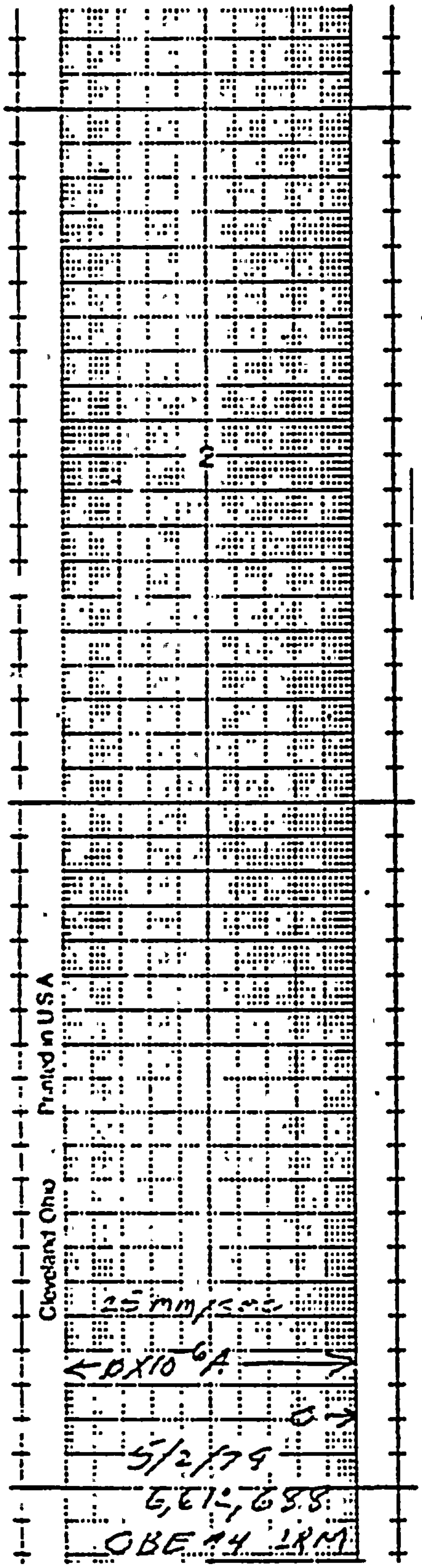
B-27

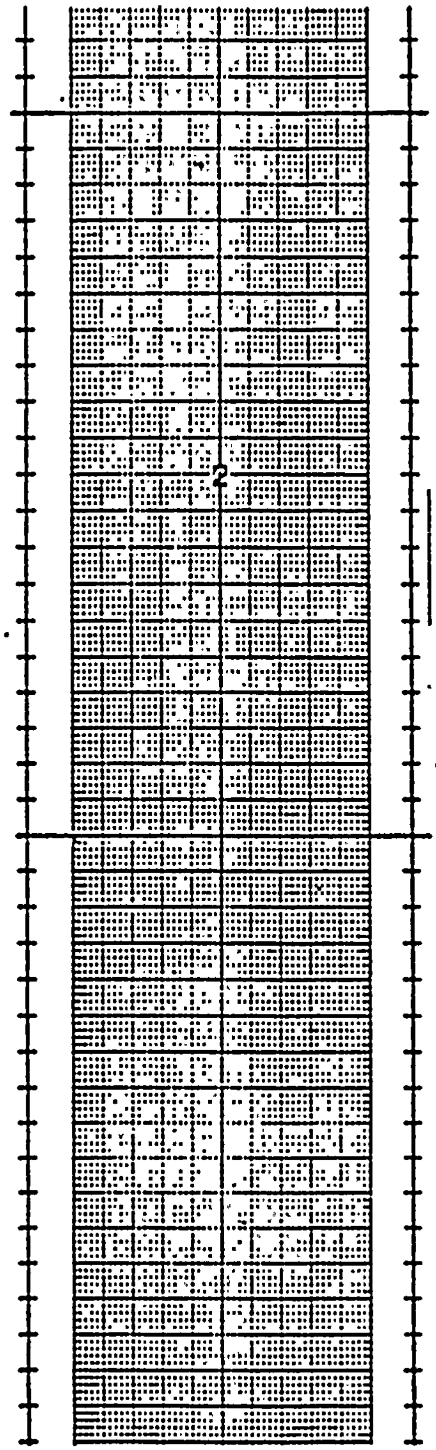
GENERAL ELECTRIC CO.
Nuclear Energy Division

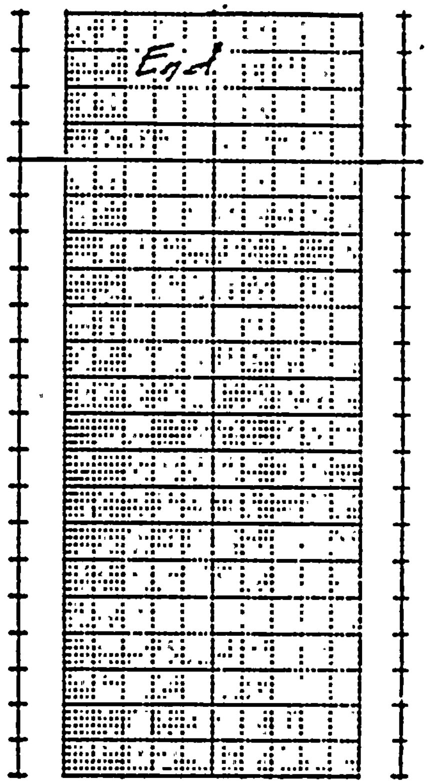
ENGINEERING CALCULATION SHEET

NUMBER ______ DATE May 2 1979

SUBJECT IRM Seismic Test BY [signature] SHEET ____ OF ____







No measureable signal at this sensitivity

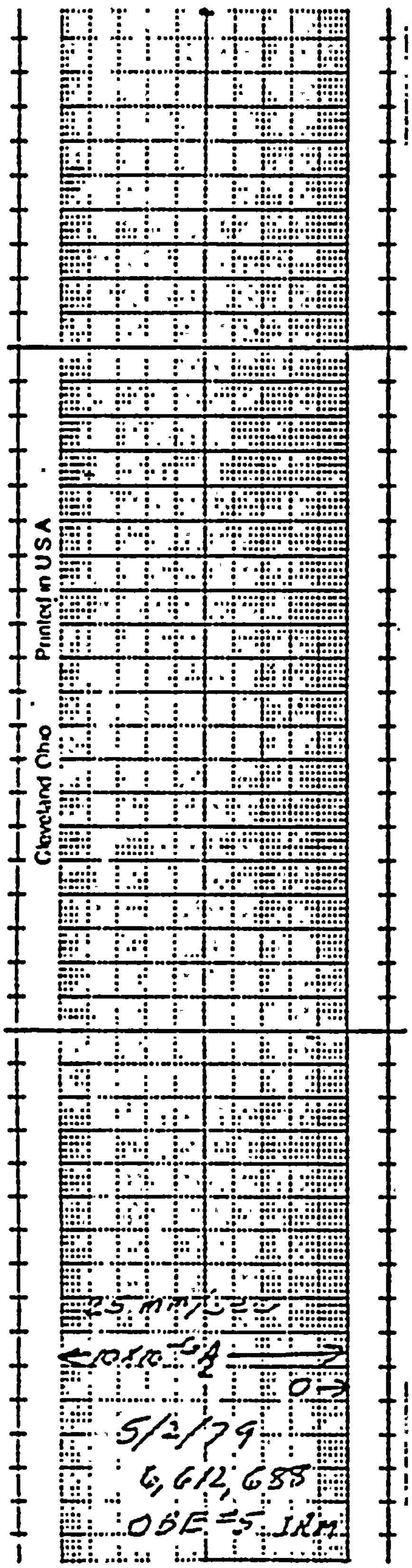
Test duration 21.2 sec

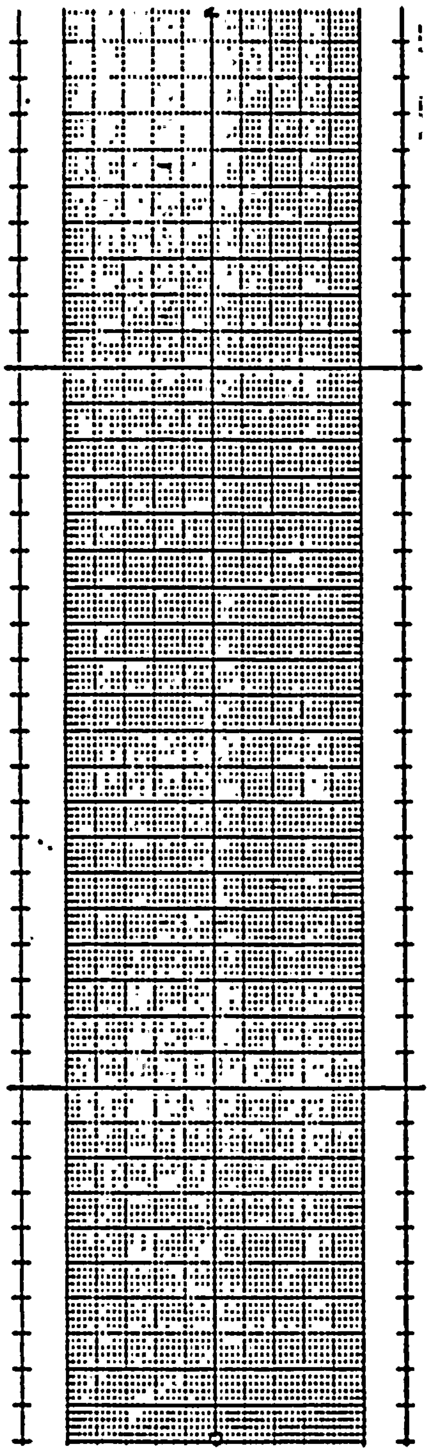
B-78

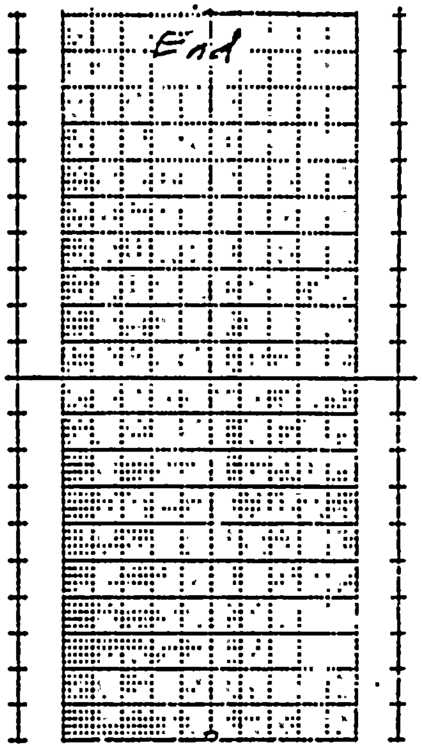
GENERAL ELECTRIC CO.
Nuclear Energy Division

ENGINEERING CALCULATION SHEET

NUMBER ________ DATE May 7 1979
SUBJECT IRM Seismic Test BY [illegible] SHEET ____ OF ____







No measurable signal at this sensitivity.

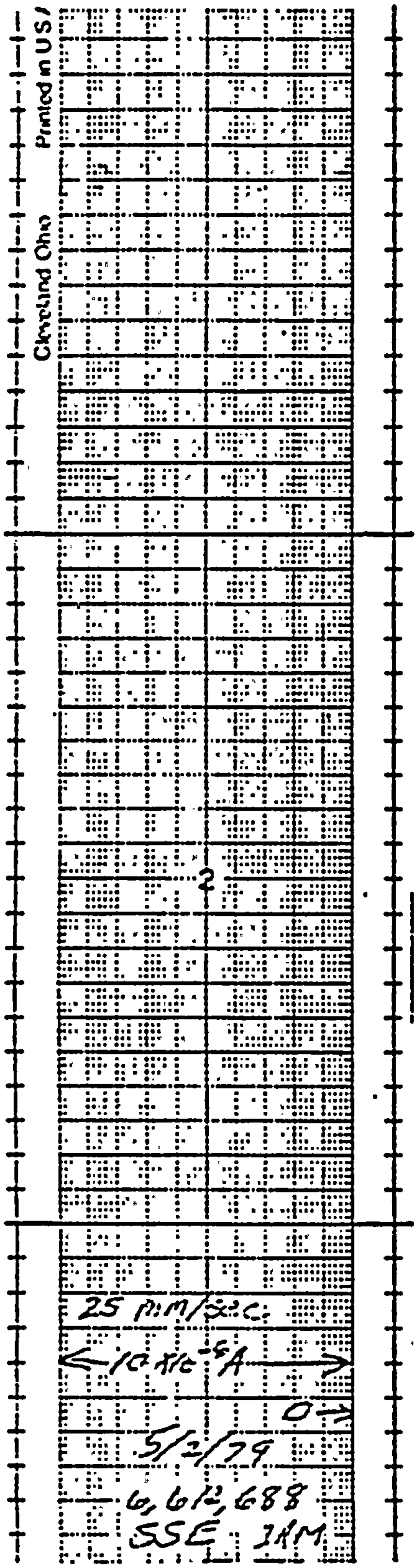
Test duration 21.2 sec

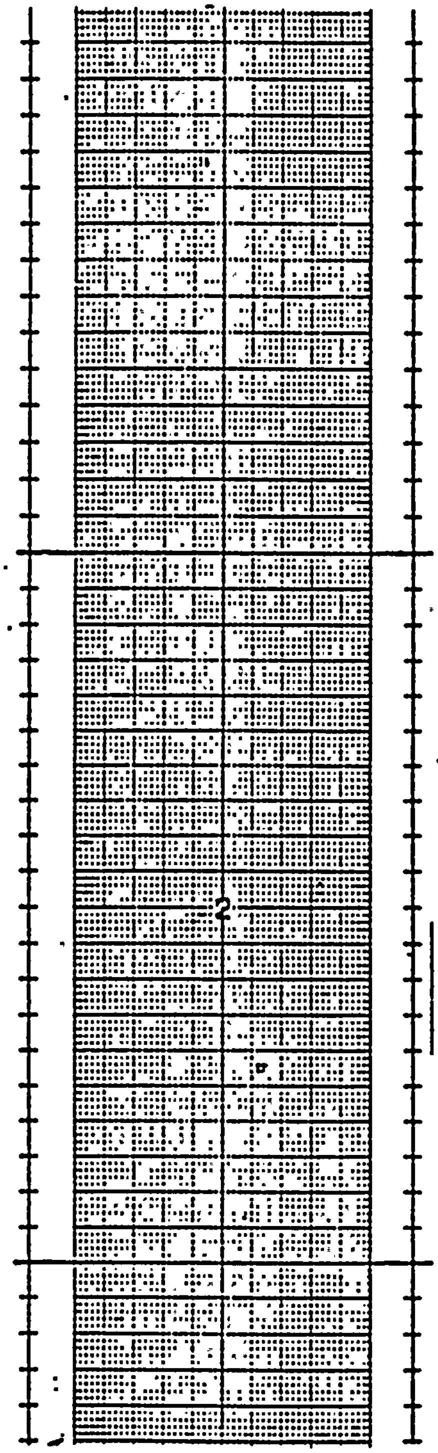
GENERAL ELECTRIC CO.
Nuclear Energy Division

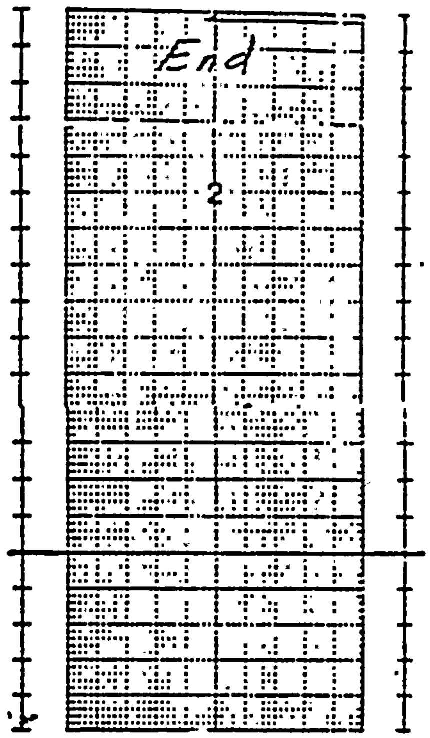
ENGINEERING CALCULATION SHEET

B-39

NUMBER ______ DATE May 2, 1979
SUBJECT IRM Seismic Test BY [signature] SHEET ___ OF ___







Max signal < .2x10⁻⁶ A at this sensitivity

Test duration 20.9 sec

APPENDIX B

Design of a Seismic Test for the Intermediate Range Detector, 112C3144G008

1.0 Seismic Motion

The BWR-6 seismic values will be used because they are more severe than those of earlier plant designs.

Fuel seismic motion will be used to govern the seismic conditions in the core region where the detectors are located. The great relative mass of the fuel assemblies, the low relative stiffness of the dry tube containing the intermediate range detector, and the small clearance between the fuel and the dry tube insures that the fuel motion will be followed by the dry tube and so by the detector.

Fuel natural frequency is 4.5 Hz.

References 2.1.1 and 2.1.2 list the following maximum accelerations for the fuel (g's).

Location	OBE	SSE
Top	0.895	1.342
Center	2.598	3.897
Bottom	0.585	0.878

This breaks into a uniform acceleration, a linearly varying acceleration, and a nodal acceleration.

	OBE Acceleration			SSE Acceleration		
Location	Uniform	Linear	Nodal	Uniform	Linear	Nodal
Top	0.585	0.310	0	0.878	0.464	0
Center	0.585	0.155	1.858	0.878	0.232	2.787
Bottom	0.585	0	0	0.878	0	0

The center deflection, relative to the end points, is due to the nodal acceleration (the linearly varying acceleration can be considered as a rotation).

With sinusoidal motion assumed, the deflection is proportional to the acceleration and inversely proportional to the square of frequency.

$$X = a/\omega^2 = a/(2\pi f)^2 \qquad a = 386.4 \times g\text{'s}$$

At the center, the maximum deflection is:

	OBE	SSE
X	0.898 in.	1.347 in.

B-31

2.0 Detector Clearance

From reference 2.1.5, the median space between full channels, neglecting channel bow, is 1.133 inches for the "C" lattice and 0.907 inches for the "D" lattice, at the center of the fuel. Also, the tolerances for both lattices, including bow of bow oriented fuel channels, are -0.306 inch and +0.131 inch. For the BWR-6, the space is 0.033 inch greater than the "C" lattice (see reference 2.1.7).

The worst case for impacting on the fuel comes with the greatest clearance. The values of maximum clearance are given below. The dry tube has the same diameter for each lattice (0.69 inch per 135139937).

Lattice	"C"	"D"	BWR-6
Max space	1.264	1.038	1.297
Dry Tube Dia	0.690	0.690	0.690
Net space	0.574	0.348	0.607

Additional spaces exist between the dry tube and shuttle tube and the shuttle tube and the detector. The dry tube has an I.D. of 0.500 inch and the shuttle tube (175A7278P019) has an O.D. of 0.375 inch and an I.D. of 0.305 inch. This provides a detector space of:

$$S = 0.305 + (0.500-0.375) = 0.430 \text{ inch}$$

This space is in addition to the space of the dry tube within the fuel. From the above, it is seen that the BWR-6 represents the greatest space and so the worst case. The total space about the detector is then 0.607 + 0.430 = 1.037 inch.

This is the space to be used as a standard for the test.

3.0 Test Frequency

The fuel natural frequency is 4.5 Hz, so the test is to be run corresponding to that value.

The test is run at room temperature rather than at the detector operating temperature, so the test will have to be increased in severity to account for the greater strength of material at room temperature.

The reactor operating temperature is 552°F.

Detector material is titanium with room temperature yield strength of 50,000 psi (167A2983). At 552°F, the yield strength will be about 21,000 psi (Reactive Metals, Inc.). The strength ratio is then 50/21 = 2.38 for room temperature vs. 552°F.

6-37

The impact energy is a function of velocity squared, so the square of the test frequency must equal the value of the square of the seismic frequency times the 2.38 factor.

$$(F_T)^2 = 2.38\,(F_S)^2 = 2.38\,(4.5)^2 = 48.195$$

$$F_T = 6.9 \text{ Hz or } 416.5 \text{ RPM}$$

4.0 Test Duration

The duration of the seismic event was determined by reviewing seismic durations for a number of plants.

Plant	Seismic duration, sec.
Perry	20
Black Fox	15
Clinton	10
Cofrentes	20

For conservatism, a 30 second duration is selected.

For the tests, the number of impacts should be kept the same as would be experienced in a seismic event. Since the tests are run at a higher frequency than actual, the test times can be shortened accordingly.

With the tests run at 420 RPM, the test duration should be:

$$T = \frac{(4.5\text{Hz}) \times (60 \text{ sec/min}) \times (30 \text{ sec})}{420 \text{ RPM}} = 19.29 \text{ seconds}$$

5.0 Recommended Test Parameters

The detector is to be run by a driver moving at the test frequency and amplitude and having a gap equal to the shuttle tube inside diameter and the other clearances. These values were determined above. For conservatism, the values will be increased to some recommended values.

Item	Calculated Value	Recommended Value
Driver Gap, in	1.037	1.125
OBE Travel*, in*	1.796	2.000
SSE Travel, in*	2.694	3.000
Test RPM	416.5	420
Test Duration, sec	19.29	20

*Travel is 2X calculated fuel deflection

6.0 Conservatism Factors

Conservatism factors can be divided into two categories: those that can be calculated and those that cannot readily have a value attached.

6.1 Calculated Conservatism Factors

6.1.1 Driver Gap

In this case, the impacting is proportional to the clearance between the driver and the detector. That value is the gap less the detector diameter (0.265 in).

$$C_{DG} = \frac{1.125-0.265}{1.037-0.265} = 1.114$$

6.1.2 Driver Travel

Here, impact is proportional to the amplitude of driver motion.

$$C_{DT,OBE} = \frac{2.000}{1.796} = 1.114$$

$$C_{DT,SSE} = \frac{3.000}{2.694} = 1.114$$

6.1.3 Driver Velocity

Impact energy is proportional to the square of the frequency (or RPM) of the driver.

$$C_{DV} = \left(\frac{420}{416.5}\right)^2 = 1.017$$

6.1.4 Detector Location

The calculation has been based on the maximum motion of the fuel at its center. The detector however is actually located 18 inches away from fuel center (references 2.18 through 2.1.11). Therefore, the actual movement is less. The fuel length is approximately 170 inches (Reference 2.1.13). Assuming a sinusoidal deflection curve, the fuel center is at 90° and the detector is located at:

$$90^\circ \pm \frac{18}{170}(180^\circ) = 90^\circ \pm 19.06^\circ$$

$$C_L = \frac{1}{\sin 109.06} = 1.058$$

b-34

6.1.5 Driver Material

The driver material is aluminum with an elastic modulus of $10X10^6$ psi at room temperature. The actual driver is the fuel channel (zirconium) with an elastic modulus of $11X10^6$ psi at operating temperature.

$$C_{DM} = \frac{10X10^6}{11X10^6} = 0.909$$

6.1.6 Test Duration

Based on a 30 second seismic event, the required test time is 19.29 seconds (above). The recommended test time is 20 seconds.

$$C_T = \frac{20.00}{19.29} = 1.037$$

6.1.7 Combination of Conservatism Factors

The total conservatism factor is the product of the above determined factors.

$$C = 1.114X1.114X1.017X1.058X0.909X1.037 = 1.259$$

Therefore, it is concluded that the test is about 26% more severe than the actual seismic conditions.

6.2 Non-Calculated Conservatism Factors

6.2.1 Dry Tube and Shuttle Tube

The dry tube and shuttle tube are not included in the test, the impacting being done directly on the detector. Each of these parts, being between the detector and the fuel, serve to reduce the impact energy by absorbing a portion, rather than delivering it all to the detector. Also, because of the length of these parts, the dry tube will be in contact with the fuel at places along its length and will likewise be in contact with the shuttle tube. These points of contact will serve as a form of spring-shock absorber, reducing the actual impacts still further. These effects cannot be readily calculated and so are omitted from the test, adding to the conservatism.

6.2.2 Reactor Water

The presence of reactor water around the dry tube will provide damping of the fuel-dry tube impacts and on the dry tube motion. The test is run in air, so the damping effect is not present and not considered in the test. The damping would reduce impacts, so the test is more severe than the actual case from this standpoint.

The complex geometry of the system makes calculation of this effect difficult.

7.0 Aging Effects

7.1 Temperature

Temperature does not cause a long term change in any of the detector material properties, so temperature againg effects are non-existent.

Short term temperature effects (property changes due to temperature changes) are considered in the test.

7.2 Radiation

The effect of radiation is to increase material yield strength and reduce ductility. The increase in yield strength will improve the ability of the detector to withstand seismic conditions, but the ductility change will have no effect.

Therefore, radiation effects need not be considered.

7.3 Corrosion

The detector is not located in a corrosive environment, so corrosion need not be considered.

8.0 Electrical Test Parameters

8.1 Applied Voltage

The voltage applied to the detector during the seismic test is set at 100 Vdc, as that is the normal operating voltage.

8.2 Test Current Range

The current range in the test was set at a full scale value of $10X10^{-6}$ Amperes because that is reasonably close to detector operating currents in normal service.

8.3 Chart Recorder Chart Speed

The chart speed was set at a minimum of 10 inches travel for 20 seconds of time to spread data over a long enough chart to see time variant effects.

GENERAL ELECTRIC

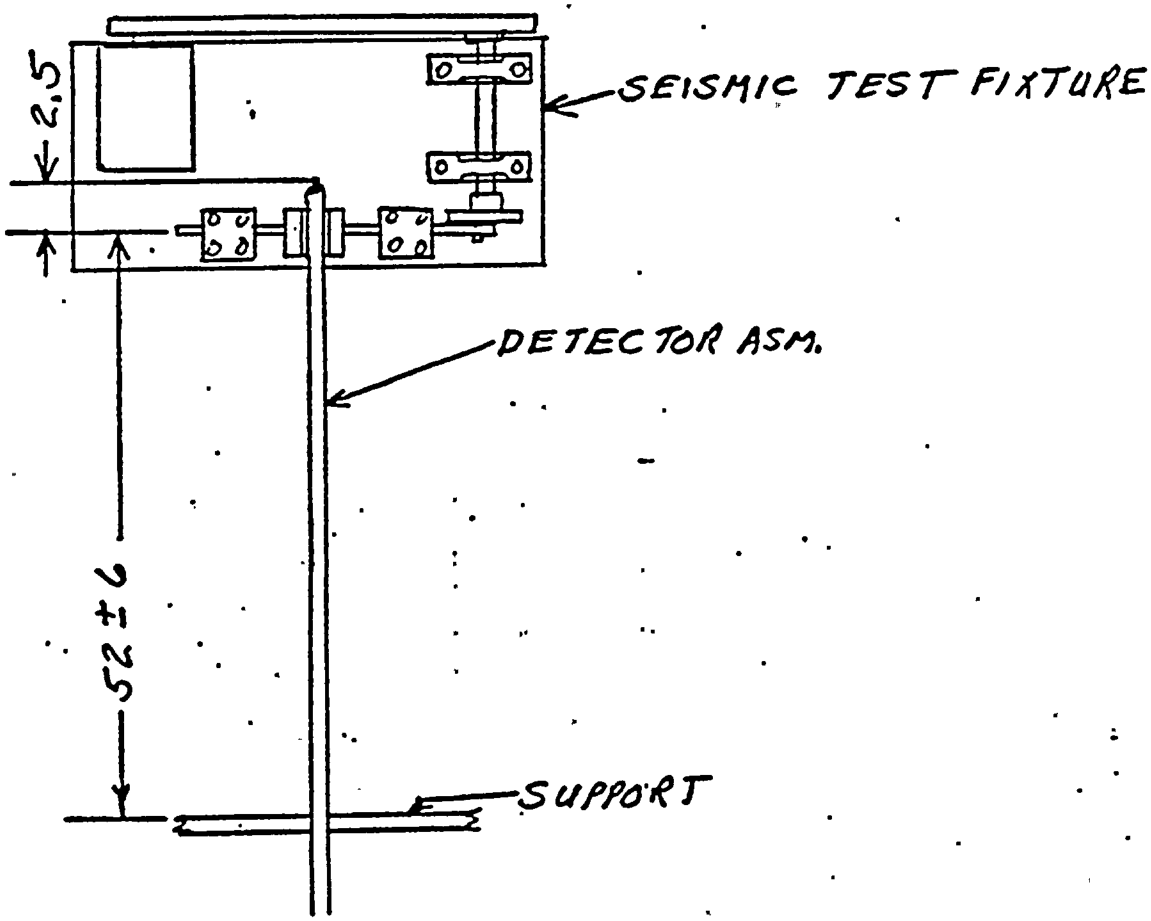
CONT ON SHEET | SH NO. B-36

CONT ON SHEET | SH NO.

TITLE

SEISMIC TEST ARRANGEMENT

FIRST MADE FOR



DETECTOR IS HORIZONTAL

FIGURE 2

UNLESS OTHERWISE SPECIFIED USE	APPLIED PRACTICES	SURFACES	TOLERANCES ON MACHINED DIMENSIONS FRACTIONS	DECIMALS	ANGLES
		✓	+ −	+ −	+ −

REVISIONS

PRINTS TO

[illegible signature] 4/27/79

APPROVALS

DIV OR DEPT.

LOCATION | CONT ON SHEET | SH NO.

SWEC
PVORT

Component No.	GE Part No.	FSAR P&ID
2SWP*P1A	--	9.2-1
2CSH*P2	E22-C003	6.3-6
2RHS*P2	E12-C003	5.4-13
2SWP*MOV30A	--	9.2-1
2MSS*HYV6A	B22-F022A	10.1-3
2RHS*AOV16A	E12-F041A	5.4-13
2SWP-MOV1A	--	9.2-1
2RHS*MOV9B	E12-F047B	5.4-13
2CCP*AOV37B	--	9.2-3
2MSS*MOV112	B22-F019	10.1-3
2HVK*SOV36A	--	9.4-1
2SVV*RVV101	--	10.1-3
2RHS*MOV2A	E12-F006A	5.4-13

SWEC
SQRT

Component No.	GE Part No.	FSAR P&ID	Remarks
2CMS*PNL66A	--	6.2-71	Not on P&ID
2CES*PNL405	--	None	
2CES*RAK107	--	None	
2CCP*PSLX90A	--	9.2-3	
2CMS*TY131	--	6.2-71	
2HVP*TYV11A	--	9.4-15	Not on P&ID
2CEC*PWRS828	--	None	
2EJS*PNL100A	--	None	
2ENS*SWG101	--	None	
2DMS*MCCA1	--	None	
2EGS*EG1	--	None	
2EGS*PNL11	--	None	
2VBA*UPS2A	--	None	
2HTS*PNL003	--	None	
2SWP*MOV30A	--	9.2-1	
2SWP*P1A & M1A	--	9.2-1	
2ICS*PS & M2	E51-C003	5.4-9	
2MSS*1PNL90A	--	None	
2RHS*MOV9A	E12-F047A	5.4-13	
2FWS*MOV21A	B22-F065A	10.1-6	
2HVC*ACU1A	--	9.4-1	
2HVC*CH11A	--	9.4-1	Noted on P&ID as CH1A (typographical error)

SPEC. NO. NMP2-E015Q

SQRT #10

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: 125V DC MOTOR CONTROL CENTER

MARK NUMBERS: 2DMS*MCCA1

STONE & WEBSTER

Acc# 8507170148

Ltr Hd. 7/8/85

SPEC. NO. NMP2-E015C

5927-1

SEISMIC QUALIFICATION STATUS, PLANT

2DMS*MCC01

NMP2-E015C

The subject equipment at present is not seismically qualified. During review of the vendor submitted qualification documents, it was discovered that question of an amount of clearance exists between the MCC NEMA 1 enclosure and its existing NEMA 3 enclosure. The MCC qualification was based on testing with a NEMA 3 enclosure. This condition was brought to the attention of the vendor, who in turn decided to perform a new seismic test on two MCC specimens which comprised of NEMA 1 and NEMA 3 enclosures. The test results of 5/23/85 showed that the existing NMP2 configuration of independent standing NEMA 1 and NEMA 3 enclosures (both enclosures are mounted on a common base) is unacceptable. The NEMA 1 and NEMA 3 enclosures of the test specimens were connected to each other with intermediate structural members and the second seismic testing was successfully performed. The seismic test report is prepared and is scheduled to be submitted by 9/9/85. Field modification of the equipment will be necessary.

SEISMIC QUALIFICATION STATUS SUMMARY

2DMS*MCCA1

NMP2-E015Q

The subject equipment at present is not seismically qualified. During review of the vendor submitted qualification documents, it was discovered that a questionable amount of clearance exists between the MCC NEMA 1 enclosure and its encapsulating NEMA 3 enclosure. The MCC qualification was based on testing without a NEMA 3 enclosure. This condition was brought to the attention of the vendor, who in turn decided to perform a new seismic test on two MCC specimens each comprised of NEMA 1 and NEMA 3 enclosures. The test results of 5/23/85 showed that the existing NMP2 configuration of independently standing NEMA 1 and NEMA 3 enclosures (both enclosures are mounted on a common base) is unacceptable. The NEMA 1 and NEMA 3 enclosures of the test specimens were connected to each other with intermediate structural members and additional seismic testing was successfully performed. The seismic test report is being prepared and is scheduled to be submitted by 9/9/85. Field modification of this equipment will be necessary.

SPEC. NO. NMP2-E016Q
Rev. No. [illegible]

Seismic and Dynamic Qualification Summary of Equipment

NMP-2

I. Plant: Nine Mile Point Nuclear Station – Unit 2

1. Utility: Niagara Mohawk Power Corporation
2. NSSS: General Electric Co. BWR 5 MK 2
3. A/E: Stone & Webster Engineering Corp. Other

II. Component Name: 125V DC MOTOR CONTROL CENTER

1. Scope: ( ) NSSS (X) BOP ( ) Other
2. Model Number: 5000 SERIES Quantity: 1
3. [illegible] or Range: 125V DC
4. Vendor: TELEMECANIQUE INC.
5. If the component is a cabinet or panel, name and model number of the devices included:

   SEE ATTACHMENT "A"

6. Physical Description:
   a. Appearance: RECTANGULAR BLOCK WITH DOORS
   b. Dimensions: 120" W x 20" DP x 90" HIGH
   c. Weight: 2400 LBS (MAX ESTIMATED)
7. Location: Building: AUX. BAY – N [illegible]

   Elevation: 261'

8. Mounting Conditions: ( ) Bolt (No. ___ Size ___) (X) Weld (Length ___)* ( ) ___
9. Mounting, other data (e.g., on floor, cantilevered, suspended, etc.)

   FLOOR MOUNTED

10. a. System in which located: MOTOR CONTROL CENTER
    b. Functional Description: 125V DC POWER [illegible]
    c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown (X) Both ( ) Neither ( ) Other ___

* WELDS ON FRONT AND BACK SIDES – [illegible] EACH END AND CENTER OF EACH SECTION [illegible] X 1 1/2 IN LONG ON EACH [illegible] MEMBERS [illegible] WELDS ON THE CENTER [illegible] EACH [illegible] [illegible] PER EACH [illegible]

SPEC. NO. NMP2-E015Q
Revision 0

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point Nuclear Station - Unit 2

1. Utility: Niagara Mohawk Power Corporation
2. NSSS: General Electric Co. BWR: 5 MK 2
3. A/E: Stone & Webster Engineering Corp. Other ______

II. Component Name: 125V DC MOTOR CONTROL CENTER

1. Scope: ( ) NSSS (X) BOP ( ) Other
2. Model Number: 5600 SERIES Quantity: 1
3. Size or Range: 125V DC
4. Vendor: TELEMECANIQUE, INC.
5. If the component is a cabinet or panel, name and model number of the devices included: SEE ATTACHMENT "A"
6. Physical Description:
   a. Appearance: RECTANGULAR BLOCK WITH DOORS ON FRONT
   b. Dimensions: 120" WIDE x 40" DEEP x 90" HIGH
   c. Weight: 6060 LBS (MAX. ESTIMATED)
7. Location: Building: AUX. BAY - NORTH
   Elevation: 240 FT
8. Field Mounting Conditions ( ) Bolt (No. - Size -)
   (X) Weld (Length *) SEE BELOW
   ( ) ______
9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   FLOOR MOUNTED
10. a. System in which located: MOTOR CONTROL CENTER DC-SYSTEM
    b. Functional Description: 125V DC POWER SUPPLY SYSTEM
    c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown (X) Both ( ) Neither ( ) Other ______

* WELDS ON FRONT AND BACK SIDES - 1/4" FILLET x 3" LONG AT EACH END AND CENTER OF EACH NEMA 3 ENCLOSURE; 1/4" FILLET x 1 1/2 IN. LONG ON EACH NEMA 3 ENCLOSURE AT EACH JOINT BETWEEN NEMA 3 ENCLOSURES.
WELDS ON THE CENTER CHANNEL BACK SIDE - 2 WELDS, 1/4" FILLET x 3" LONG, PER EACH 20" MCC SECTION.

From Reference Design Specifications for Qualification Requirements: NONE - EQUIP WITH ...

Seismic Input d. Service Conditions

Hydrodynamic Load Input e. Qualified Life

Fatigue Considerations

Equipment Available for Inspection in the Plant:

Yes ( ) No ( ) Partial or Limited availability

Equipment Qualification Method:

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

SEISMIC TESTING WAS COMPLETED ...

Qualification Report*: WYLE LABORATORIES HUNTSVILLE, ALA.

THE TEST REPORT WILL BE ...

(No., Title and Date): ... 8-5-1985

Company that Prepared Report: ______

Company Reviewed Report: ______

Is filed or available: ______

Other Industry Standards: ______

... Data

1. Loading considered: a. (X) Seismic only
b. ( ) Hydrodynamic only
c. ( ) Vibration from normal operation
d. ( ) Combination of (a), (b), (c)

2. Method of Combining RRS:

( ) Absolute Sum ( ) SRSS ( ) N.A. (other, specify)

Required Response Spectra** (attach the graphs): SEE ATTACHED

* ... complete items IV thru VII for each ...
** If other than RRS is used, describe method.

II. Pertinent Reference Design Specifications for Qualification Requirements: NMP2-E015Q WITH ADDENDA 1 THRU 6

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

III. Is Equipment Available for Inspection in the Plant:

(X) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: SEISMIC TESTING WAS COMPLETED ON 5-23-85 AT WYLE LABORATORIES, HUNTSVILLE, ALABAMA.

(No., Title and Date): THE TEST REPORT WILL BE AVAILABLE BY 8-9-1985

Company that Prepared Report: ______

Company that Reviewed Report: ______

Where Report is filed or available: ______

Applicable Codes and/or Standards: ______

V. Vibration Input:

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

2. Method of Combining RRS:

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

3. Required Response Spectra** (attach the graphs): SEE ATTACHMENT 'B'

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

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

5. Required Acceleration in Each Direct:

(X) ZPA ( ) Other ____________ (specify)

OBE S/S = 0.20 F/B = 0.20 V = 0.15

SSE S/S = 0.36 F/B = 0.36 V = 0.20

6. Were fatigue effects considered?

( ) Yes (X) No

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

VI. If Qualfication by Test, then Complete: VENDOR'S TEST REPORT WILL BE AVAILABLE ON 8-9-85

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) ____________

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ____________ SSE ____________ Other ____________ (specify)

4. Frequency Range: ____________

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

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

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.________ Size________)
( ) Weld (Length__________) ( ) __________

B. Orientation and Fixturing: ______________________________

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______________________

____

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

____

____

13. Failure Modes (If appropriate______________________________)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

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

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

4. ( ) Computer Codes:____________________ _______________

Frequency Range and No. of Modes

( ) Hand Calculations

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

( ) Absolute Sum ( ) SRSS ( ) Other:__________________ (specify)

6. Damping:

OBE________ SSE________ Basis for the Damping Used:_______

7. Support Considerations in the Model:__________________________

8. Critical Structural Elements:

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

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

9. Failure Modes:____

10. Margins Available: ( ) Input Spectrum ( ) Stress or Deflection

"ATTACHMENT "A"

DEVICE LIST

1.) DWG. NO. (S&W FILE) 0001.340-211-166C BILL OF MATERIALS (1 SHEET)
2) DWG. NO. MA-56593-02 SUPPLEMENTAL BILL OF MATERIALS

Rev	Date	DRN	By	Approved	Rev	Date	DRN	By	Approved
1	7-23-81	Per Cust. Req	DV	[signature]			[redacted]		
2	8-4-81	" " "	DV	[signature]					
3	3-82	55876	JH	[signature]					

SPECIFIC NOTES

1) This unit requires voltmeter; 0-750V; voltmeter switch; 2- 100VA PT's; test block and kirk key interlock.

2) Provide 1 J10A3111 control relay, 3 NO - 1 NC contacts, 110V coil and a 12 pt terminal block mounted in rear of vertical in approximate same elevation as unit in front.

3) Provide 1 J10A4011 control relay, 4 NO contacts, 110V coil; 1- J10A2211 control relay, 2 NO and 2 NC contacts, 110V coil; and a 12 pt terminal block for each relay mounted in rear of vertical in approximate same elevation as unit in front.

4) Provide 1- J10A0411 control relay, 4 NC contacts 110V coil and a 12 pt terminal block mounted in rear of vertical in approximate same elevation as unit in front.

5) Gould to provide bus-tie connection using 600 amp bus bar.

6) Provide 2- J10A2211 control relays, 2 NO and 2 NC contacts 110V coil and a 12 pt terminal block for each relay mounted in rear of vertical in approximate same elevation as unit in front.

7) Provide -1 J10A2211 control relay 2 NO and 2 NC contacts 110V coil and a 12 pt terminal block for each relay mounted in rear of vertical in approximate same elevation as unit in front.

8) Provide 1- TDB Agastat timer cat. #7014ABL 4 pole time delay pick up, 120V coil and a 12 pt terminal block for each mounted in rear of vertical in approximate same elevation as unit in front.

Material:

Surface Treatment:

NOTE: ALL DIMENSIONS TO BE AFTER PLATING

USED ON

REFERENCE DRAWING:

Scale:

Prod. Code 5600

TOLERANCES
Unless Otherwise Specified
Sheet metal up to 10" ±.06
10" to 60" ±.06
Hole Punched ±.006
Angle ±1°
Per ...

Drawn H M Date 1-20-81

Approved [signature] Date 1-29-81

Approved [signature] Date 1/29/81

Niagara Mohawk Power Corp.
Nine Mile Point Nuclear Station
Stone & Webster Engineering Corp.
P.O. #NMP2-E015Q Job #12177
84-56593

GOULD Gould Inc., Distribution & Control Division
Finksburg, Md. 21048

Sheet 1 of 3

Dwg. MA-56593-02

Rev. 3

Rev	Date	DRN	By	Approved
1	7-23-81	PER CUST. REQ.	DV	
2	8-4-81	" " "	DV	
3	8-19-81	54382	DV	
4	10-28-81	54603	DV	
5	11-16-81	54686	DV	
6	12-7-81	54700	DV	
7	3-10-82	55026	DV	
8	4-27-82	55208	DV	
9	6-10-82	55861	DV	
10	9-13-82	55676	JFH	

Specific Notes - continued

9) Provide 1- J11A2211 control relay 2 NO and 2 NC contacts 110V coil and a 12 pt terminal block for each relay mounted in rear of vertical in approximate same elevation as unit in front.

10) This unit requires kirk key interlock.

11) Provide 2- J10A3111 control relays 3 NO - 1 NC contacts 110V coil each with a 12 pt TB mounted in rear of vertical in approximate same elevation as starter.

△9 12) This section requires ASCO switch Cat. B-940-3-150-X-9.

13) Provide 1- TDB Agastat 4 pole time delay drop out "TDDO", Cat. #7024AHT, 120V coil and a 12- point terminal block for each mounted in rear of vertical in approximate same elevation as in front.

14) Two circuit breakers in series - same frame size same trip setting.

15) Gould to provide provision bus tie lugs for customer 2- 350 KCM cables per phase.

16) Provide 4- J10A3111 control relays 3 NO - 1 NC contacts 110V coil and 1- J10A4211 control relay 4 NO - 2NC contacts, 110V coil and a 12 pt terminal block for each relay mounted in rear of vertical in approximate same elevation as units in front.

17) Same as note 8 except Cat. #7014ADL.

18) Same as note 8 except Cat. #7014AEL.

19) Same as note 8 except Cat. #7014ADLL.

20) Same as note 8 except Cat. #7014ACL.

△7 △8 △10 21) Provide 1- J13P2212 control relay, 2 NC - 2 NO contacts, 125VDC coil; 1- J13P1312 control relay, 1 NO - 3 NC contacts, 125VDC and a 12 pt terminal block for each relay mounted in rear of vertical in approximate same elevation as unit in front.

Material:

Surface Treatment:

NOTE: ALL DIMENSIONS TO BE AFTER PLATING

USED ON

REFERENCE DRAWING:

Scale:

Prod. Code 5600

TOLERANCES
Unless Otherwise Specified
Sheet metal Up to 10" ±.03
10" to 60" ±.06
Hole Punched ±.005
Angle ±1°
Per RDS 1005

Drawn	Date
NM	1-28-81
	1-29-81
	1/29/81

Niagara Mohawk Power Corp.
Nine Mile Point Nuclear Station
Stone & Webster Engineering Corp.
P.O. #NMP2- E015Q Job. #12177
S.O. #84-56593

GOULD Gould Inc., Distribution & Control Division
Finksburg, Md. 21048

Sheet 2 of 3 Dwg. MA-56593-02 Rev. 10

 Manufacturer of ITE & Rowan Products

Rev	Date	DRN	By	Approved	Rev	Date	DRN	By	Approved

22) Same as Note 8 except Cat.#7014PBL.

23) (Not used.)

24) This unit contains: (1) contactor #P11C12, (1) Westinghouse resistor # and 1000 OHM 25W discharge resistor.

25) This unit contains: (1) contactor #P11C12, (1) Westinghouse resistor #R11SE2D80 (set at 2.8 OHM), and 1000 OHM 25W discharge resistor.

26) This unit contains: (1) contactor #P11C12, (1) Westinghouse resistor #R11SE1D80 (set at 1.5 OHM), and 1500 OHM 12W discharge resistor.

27) (Not used.)

28) Provide (1) 0-150 voltmeter.

Material:	Scale:	Prod. Code 5600	Niagara Mohawk Power Corp. Nine Mile Point Nuclear Station Stone & Webster Engineering Corp. P.O. #NMP2- E015Q Job. #12177 S.O. #84-56593
Surface Treatment: NOTE: ALL DIMENSIONS TO BE AFTER PLATING	TOLERANCES Unless Otherwise Specified Sheet metal Up to 10" ±.03 10" to 60" ±.06 Hole Punched ±.005 Angle ± 1° Per RDG 1005 ☐		GOULD Gould Inc., Distribution & Control Division Fliniksburg, Md. 21048
USED ON	Drawn NM	Date 9-13-82	
	Approved	Date 9-13-82	Sheet 3 of 3
REFERENCE DRAWING:	Approved	Date 9/15/82	Dwg. MA-56593-02 — Rev. 0

FORM 332-AC

Manufacturer of ITE & Rowan Products

ATTACHMENT "B"

RRS FOR AUX. BAY NORTH (SECONDARY CONT.) EL. 240 FT.

[illegible]

PSPECTRA VER 01 LEV 08 CONDITION 24 JAN 1989

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O.. /7 MS-1746-0

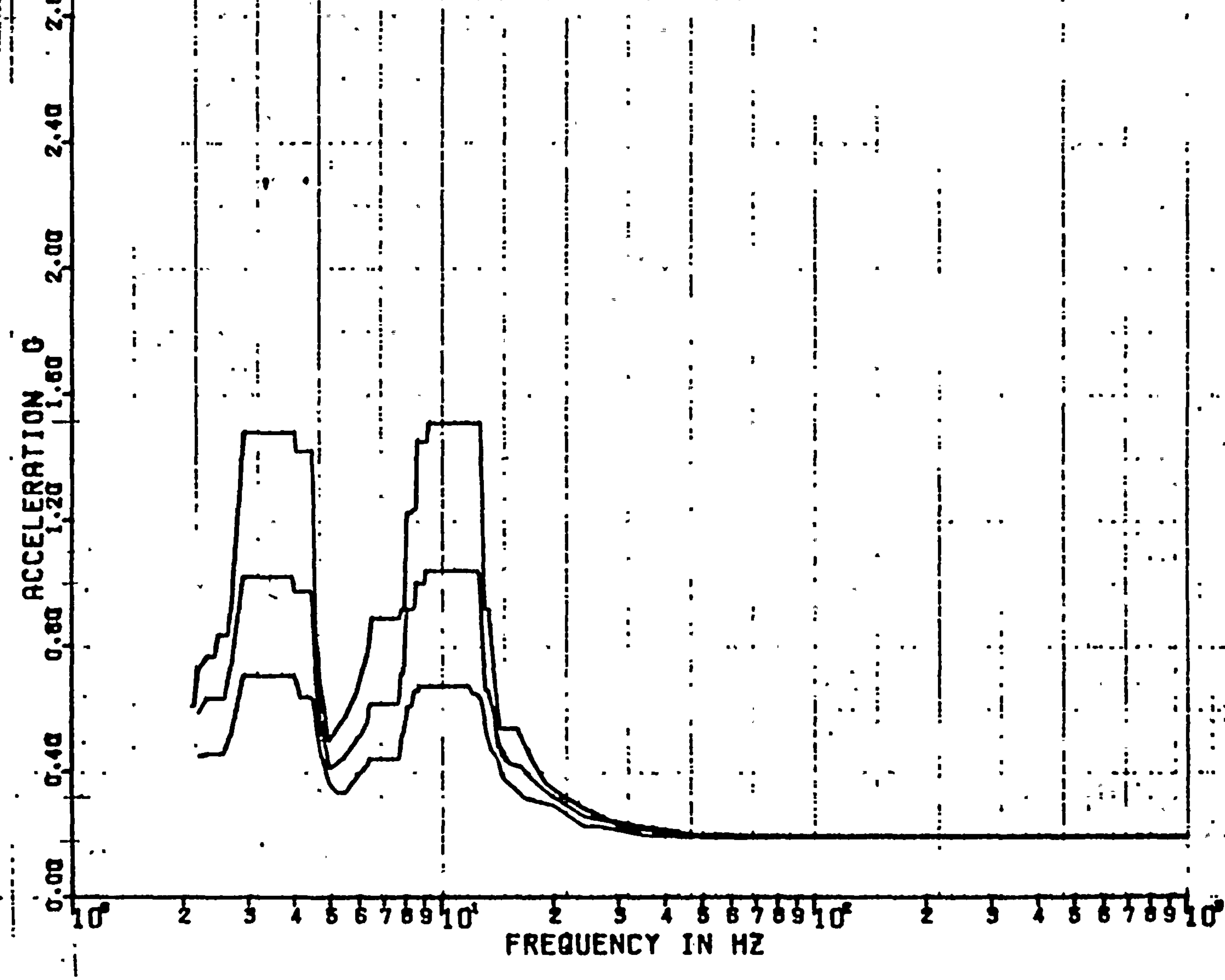
RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

MS 1746

MICHAEL K DO

DISK CURVE SET NO.29 HOR DIRECTION DAMPING VALUES = 0.010 0.020 0.040

NOTE: MULTIPLOT OF RRS CURVES WITH ... DAMPING 1% 2% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



PAGE # 79

PSPECTRA VER 01 LEV 08 CONDITION 24 JAN 1983

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O. 177 MS-1746-0

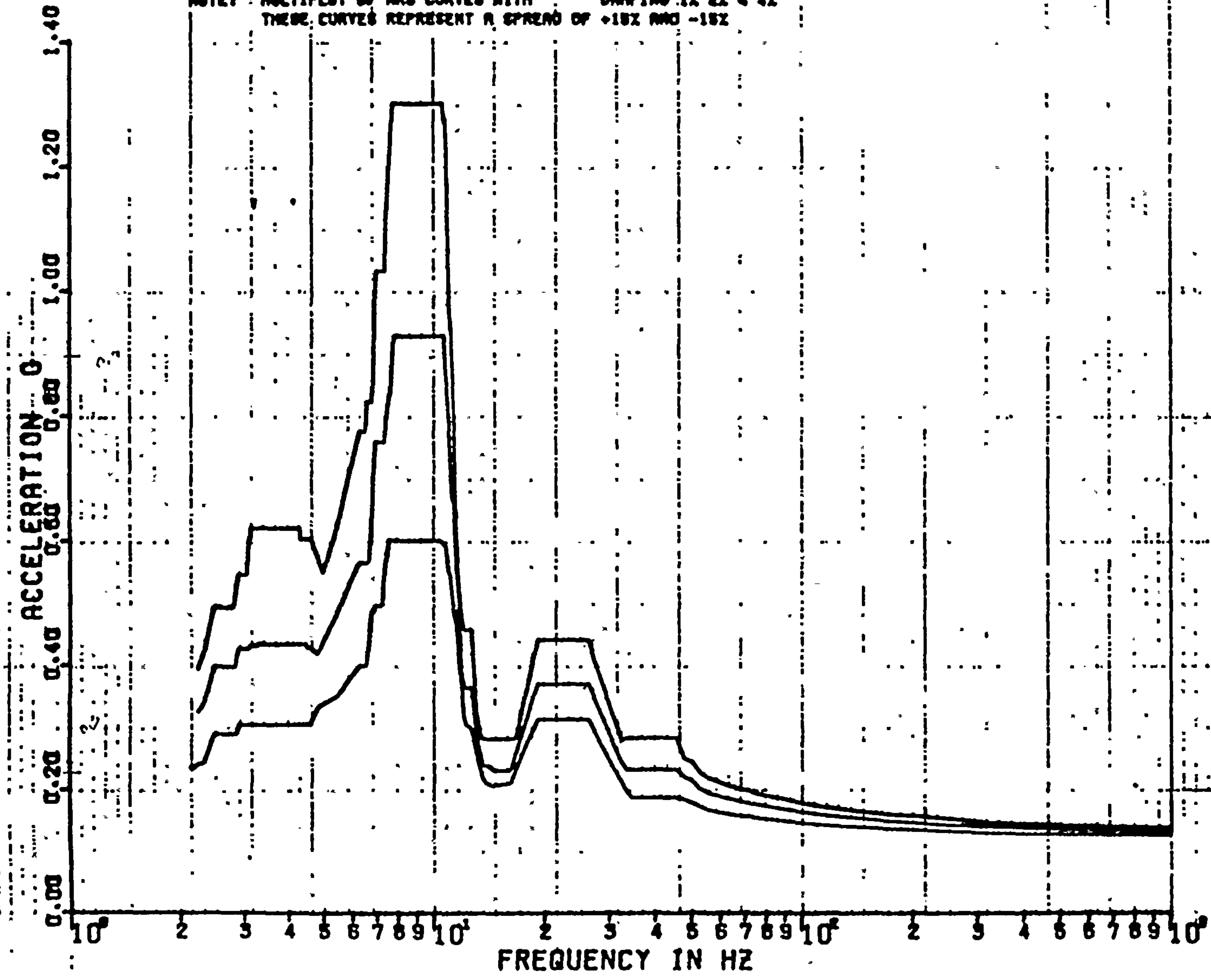
RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

MS 1746

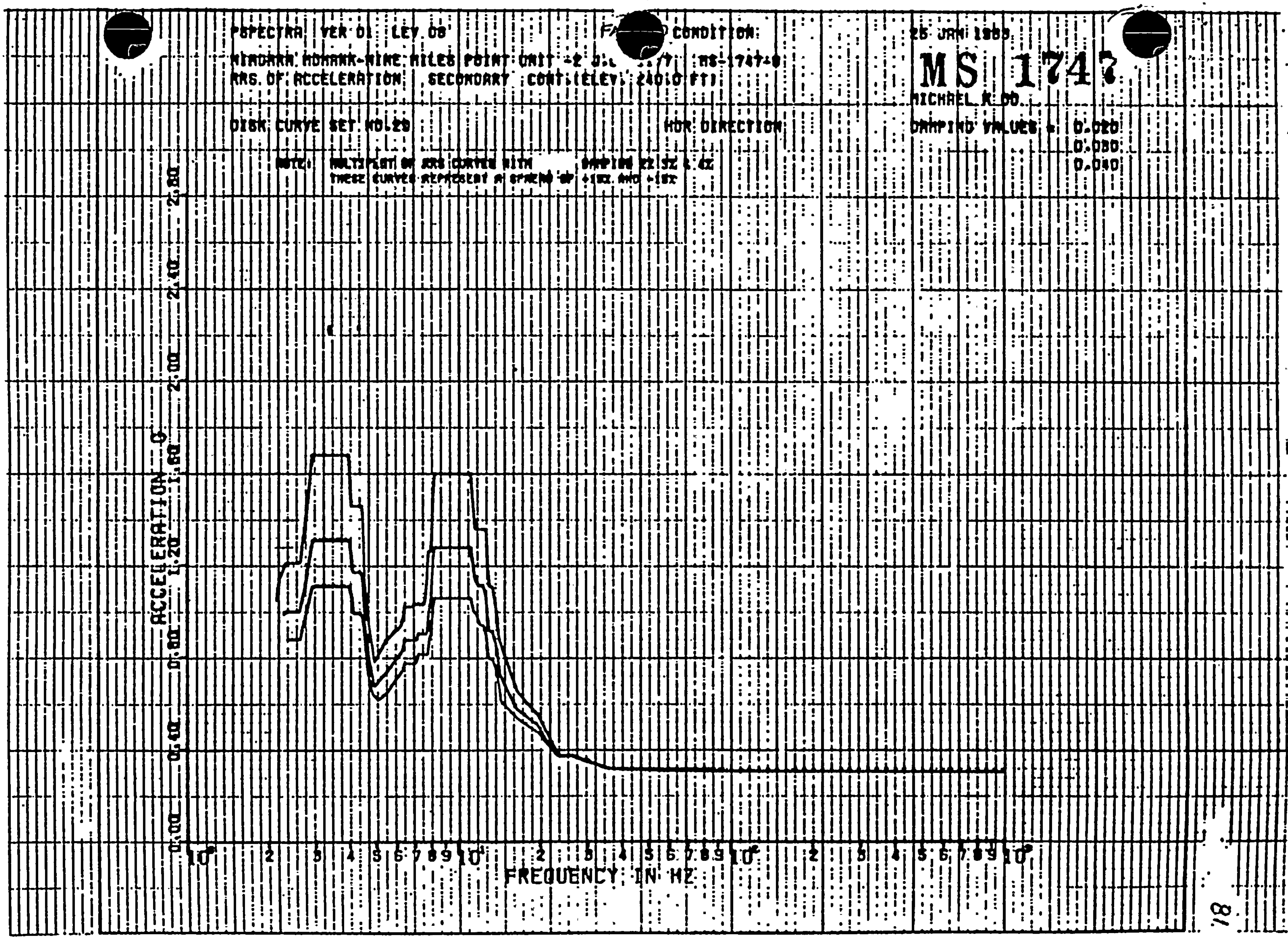
MICHAEL K OU

DISK CURVE SET NO.29 VER DIRECTION DAMPING VALUES = 0.010 0.020 0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 1% 2% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



PAGE # 80



CONDITION:
RRS. OF ACCELERATION
SECONDARY
HOR DIRECTION
MS 1747
DAMPING VALUES
0.020
0.030
0.040
ACCELERATION G
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
FREQUENCY IN HZ

PSPECTRA VER 01 LEV 08 FAULTED CONDITION 25 JAN 1985

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O.12177 MS-1747-0

RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

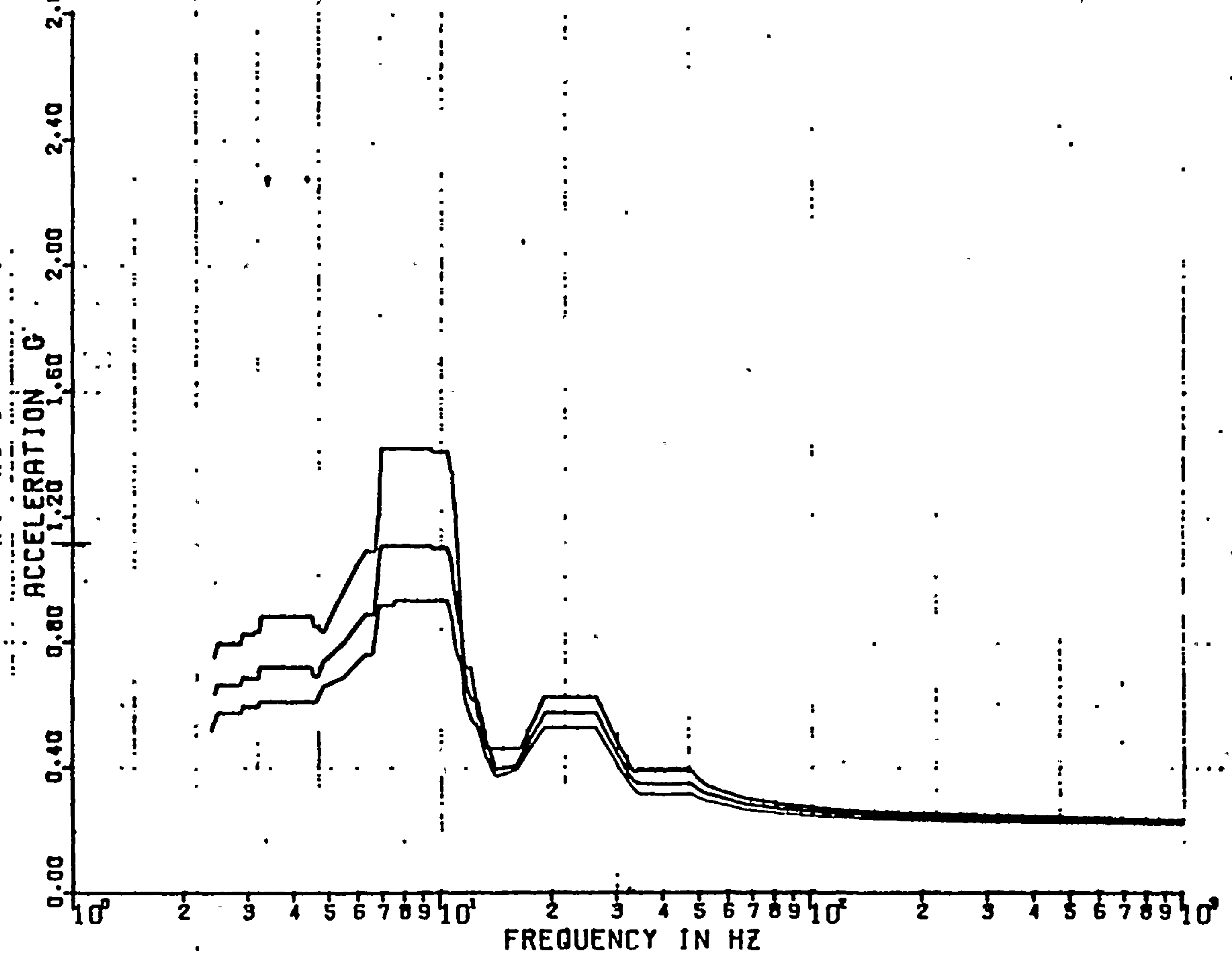
MS 1747

MICHAEL K OO

DISK CURVE SET NO.29 VER DIRECTION

DAMPING VALUES = 0.020
0.030
0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 2% 3% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



83

SPEC. NO. E031A

SQRT #11

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: DIESEL GENERATOR

MARK NUMBERS: 2EGS * EG1

STONE & WEBSTER

SPEC. NO. E031A
Revision 0

Seismic and Dynamic Qualification Summary of Equipment

I. **Plant Name:** Nine Mile Point Nuclear Station - Unit 2

1. **Utility:** Niagara Mohawk Power Corporation

2. **NSSS:** General Electric Co. **BWR:** 5 MK 2

3. **A/E:** Stone & Webster Engineering Corp. **Other** ______

II. **Component Name:** Div I Diesel Generator. Mark # 2EGS*EG1

1. **Scope:** ( ) NSSS (X) BOP ( ) Other

2. **Model Number:** KSV-16-T **Quantity:** 1

3. **Size or Range:** 43'-0" x 14'-0" x 15'-5"

4. **Vendor:** Cooper Energy Services

5. **If the component is a cabinet or panel, name and model number of the devices included:** ALL components except the main Engine structure (e.g. The Engine mounted systems manifolds, piping, governors, fuel, lube oil and starting air system) are in attachment II

6. **Physical Description:**

   a. **Appearance:** Engine / Generator / piping assy.

   b. **Dimensions:** 43'-0" x 14'-0" x 15'-5"

   c. **Weight:** 200,000 lbs

7. **Location: Building:** DG Building.

   Elevation: 261'-0" to 287'6"

8. **Field Mounting Conditions** (X) Bolt (No. 51 - Size *)
   ( ) Weld (Length ______)
   ( ) ______

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

   FLOOR MOUNTED

10. a. **System in which located:** EGP, EGS, EGA & EGF

    b. **Functional Description:** SUPPLY POWER TO 4.16 KV EMERGENCY SWITCHGEAR

    c. **Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown ( ) Both ( ) Neither (X) Other** LOSS OF OFFSITE POWER SUPPLY

* Different sizes as shown in DWG. EC-58BM-5

II. Pertinent Reference Design Specifications for Qualification Requirements: Spec E031A - Standby Diesel generator systems. upto ADD. 6

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

III. Is Equipment Available for Inspection in the Plant:

(X) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: *

(No., Title and Date): *

Company that Prepared Report: Cooper Energy Services

Company that Reviewed Report: SWEC

Where Report is filed or available: NMP2 Site.

Applicable Codes and/or Standards: IEEE 344-1975 RG. 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

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

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

*
1. DOC. ID. NO. CES-0407-1 RSTD Dated 9/11/80

2. IEEE 01.040-5010C Overview Cover Sheet. Dated 7/17/84

NOTE: — SEE ATTACHMENT II FOR THE DEVICE QUALIFICATION REPORTS —

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

5. Required Acceleration in Each Direct:

(X) ZPA ( ) Other ____________ (specify)

OBE S/S = 0.18g F/B = 0.18g V = 0.1g
SSE S/S = 0.32g F/B = 0.32g V = 0.19g
WORST OF THE TWO ELEVATIONS

6. Were fatigue effects considered?

( ) Yes (X) No

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

____

VI. If Qualfication by Test, then Complete: See attachment II

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) ________

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ________ SSE ________ Other ________ (specify)

4. Frequency Range: ______________________

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

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

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length______) ( ) ______

B. Orientation and Fixturing: ______

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______

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

13. Failure Modes (If appropriate ______)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete: MAIN ENGINE STRUCTURE
[SEE ATTACHMENT 'II' FOR COMPONENTS QUALIFIED BY ANALYSIS.]

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):

MAIN ENGINE STRUCTURE S/S = 38.06 Hz F/B = 28.52 Hz V = 65.92 Hz

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

4. ( ) Computer Codes: 'MOSSY' — COOPER INHOUSE PROGRAM

Frequency Range and No. of Modes FREQ RANGE : 0-37 HZ.

(X) Hand Calculations

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

( ) Absolute Sum ( ) SRSS (X) Other: N/A (specify)

6. Damping:

OBE 2% SSE 3% Basis for the Damping Used: FSAR

7. Support Considerations in the Model: Fixed at the Supports.

8. Critical Structural Elements:

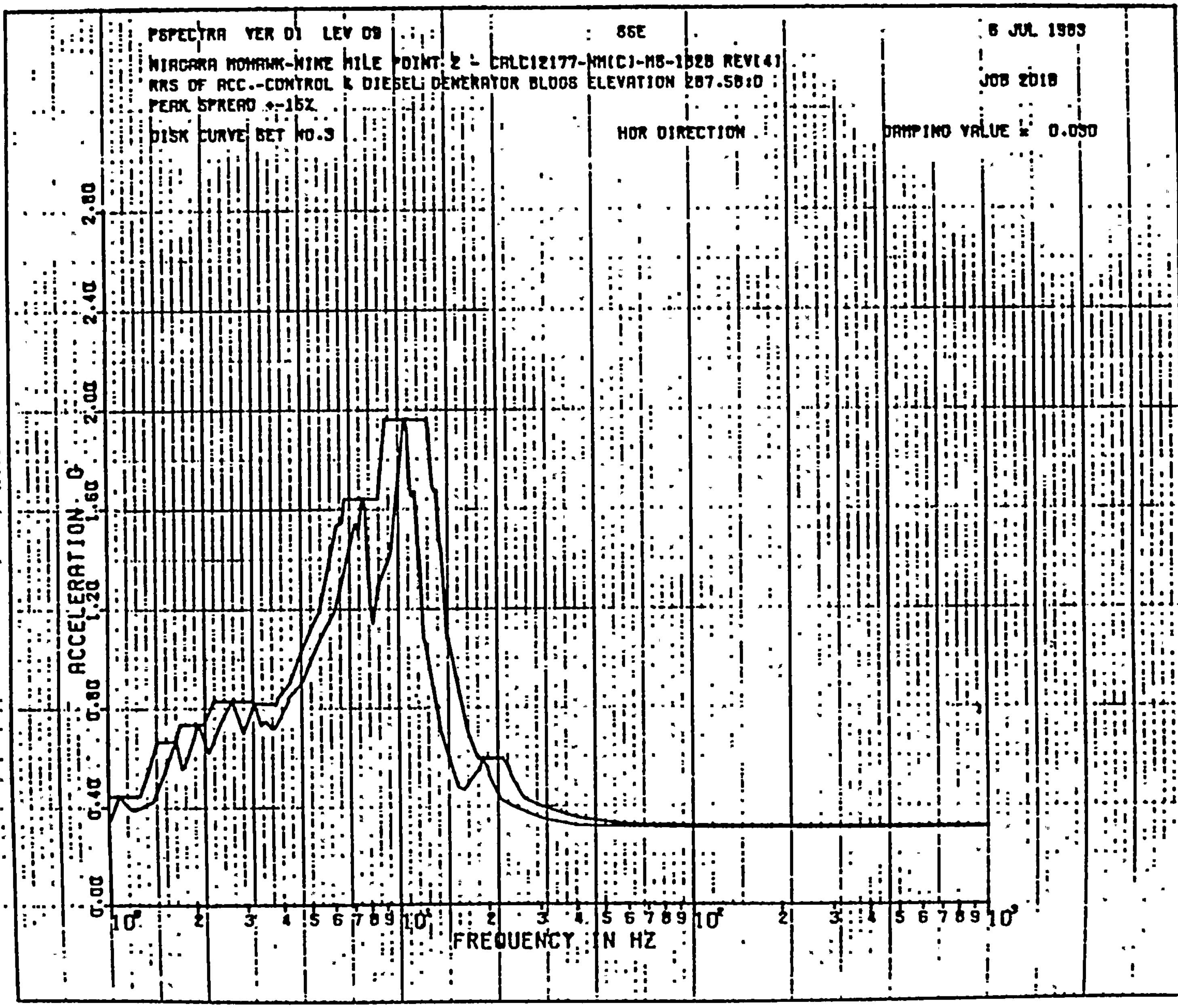
A. Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
Stator Foundation bolt	Seismic & operating	—	42.5* KSI	45.5 KSI
Outboard Bearing bolt	Seismic & operating	—	22.43 KSI	45.5 KSI
Centerframe to Base bolt	Seismic & operating	—	27.2 KSI	49.0 KSI
Turbocharger Support Saddle bolt	Seismic & operating	—	16.92 KSI	25.2 KSI

B. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.066 inch	Generator Shaft between Rotor and Stator	0.087

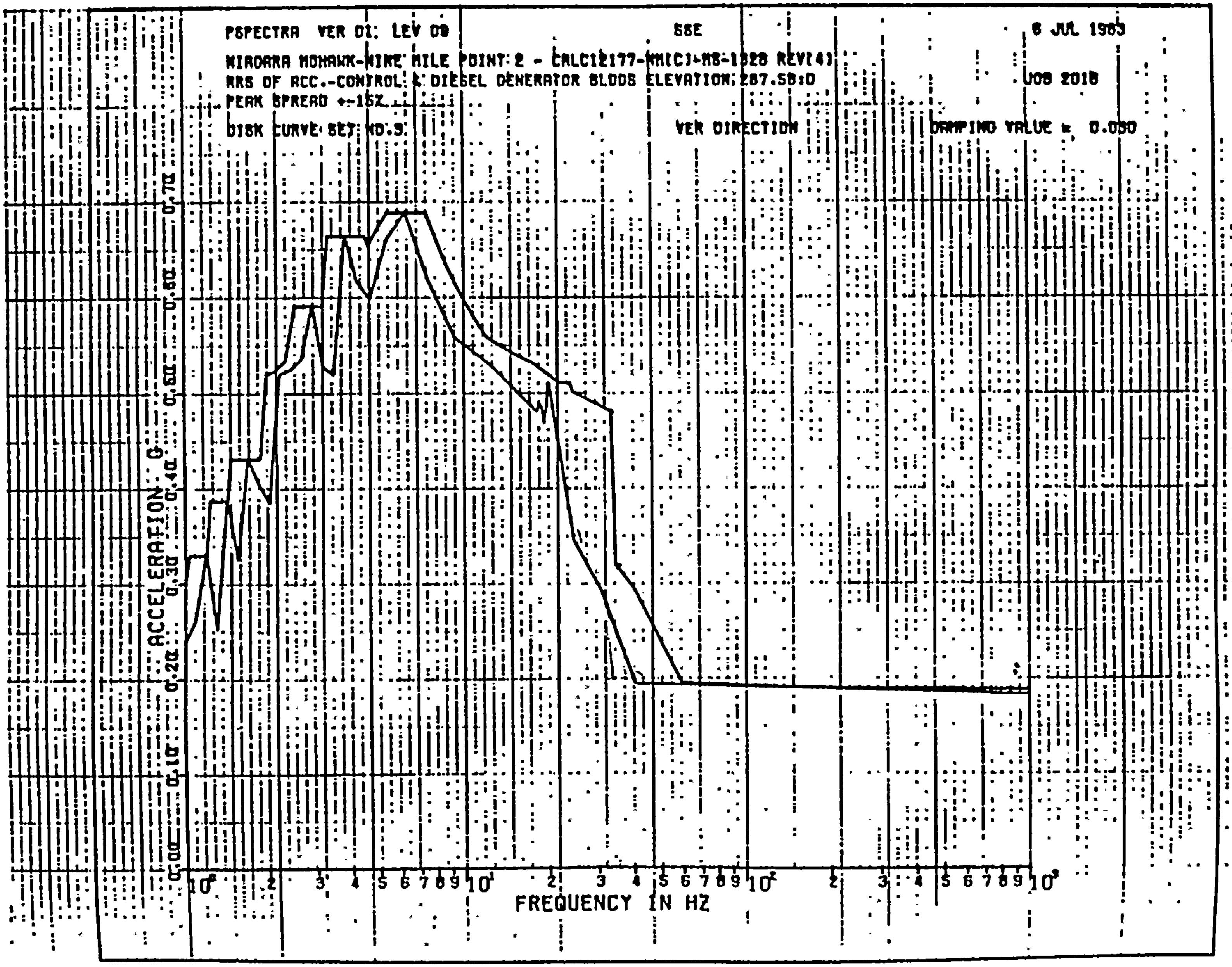
9. Failure Modes: Structural failure

10. Margins Available: (X) Input Spectrum (X) Stress or Deflection

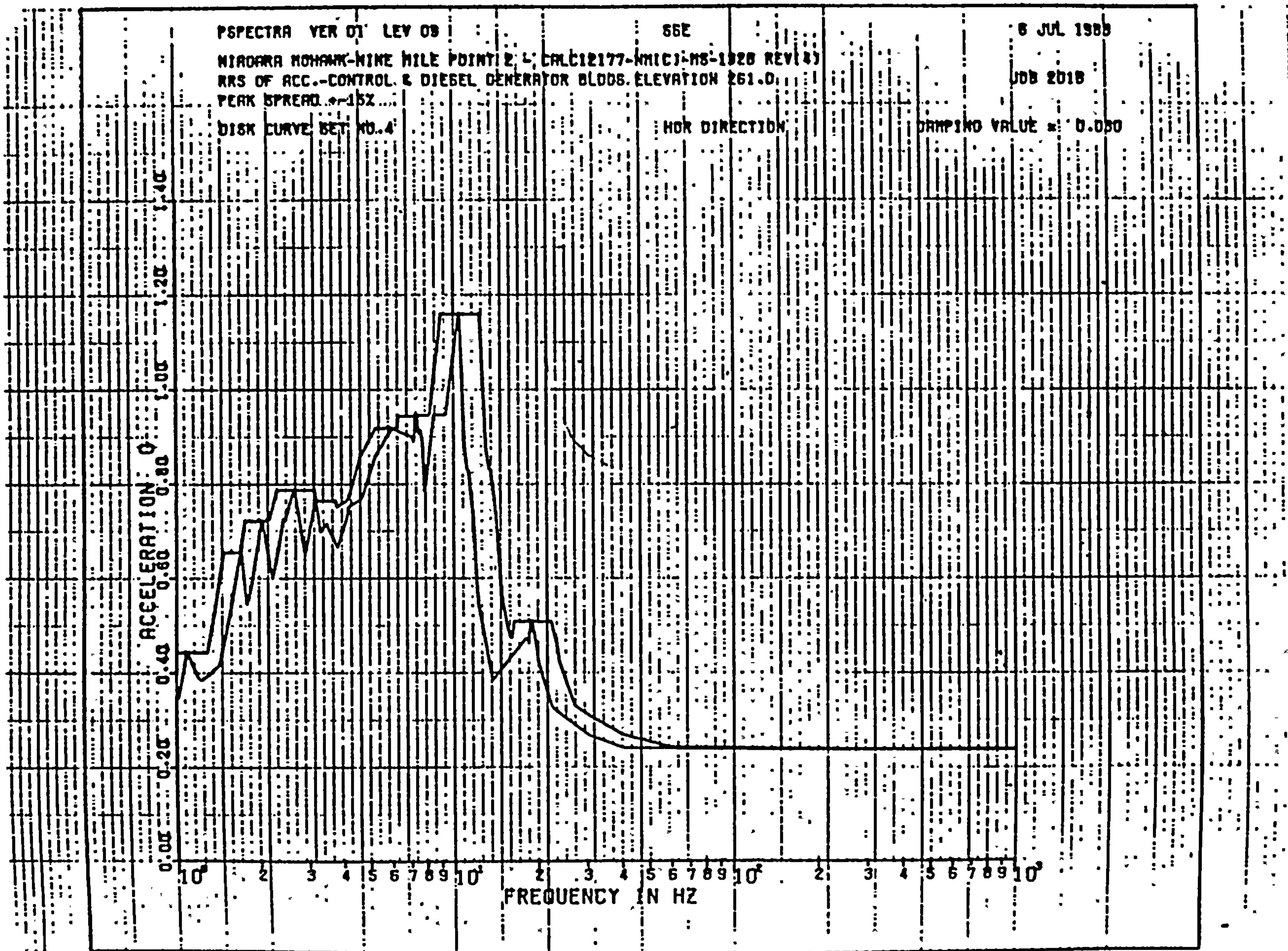
* This includes maximum short circuit torque on the generator



Attachment - I
(8 Pages)


PSPECTRA VER 01: LEV 09
SSE
6 JUL 1983
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 287.58:D
JOB 2018
PEAK SPREAD +-15%
DISK CURVE SET NO.3
VER DIRECTION
DAMPING VALUE = 0.050
ACCELERATION G
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
FREQUENCY IN HZ

PAGE 49



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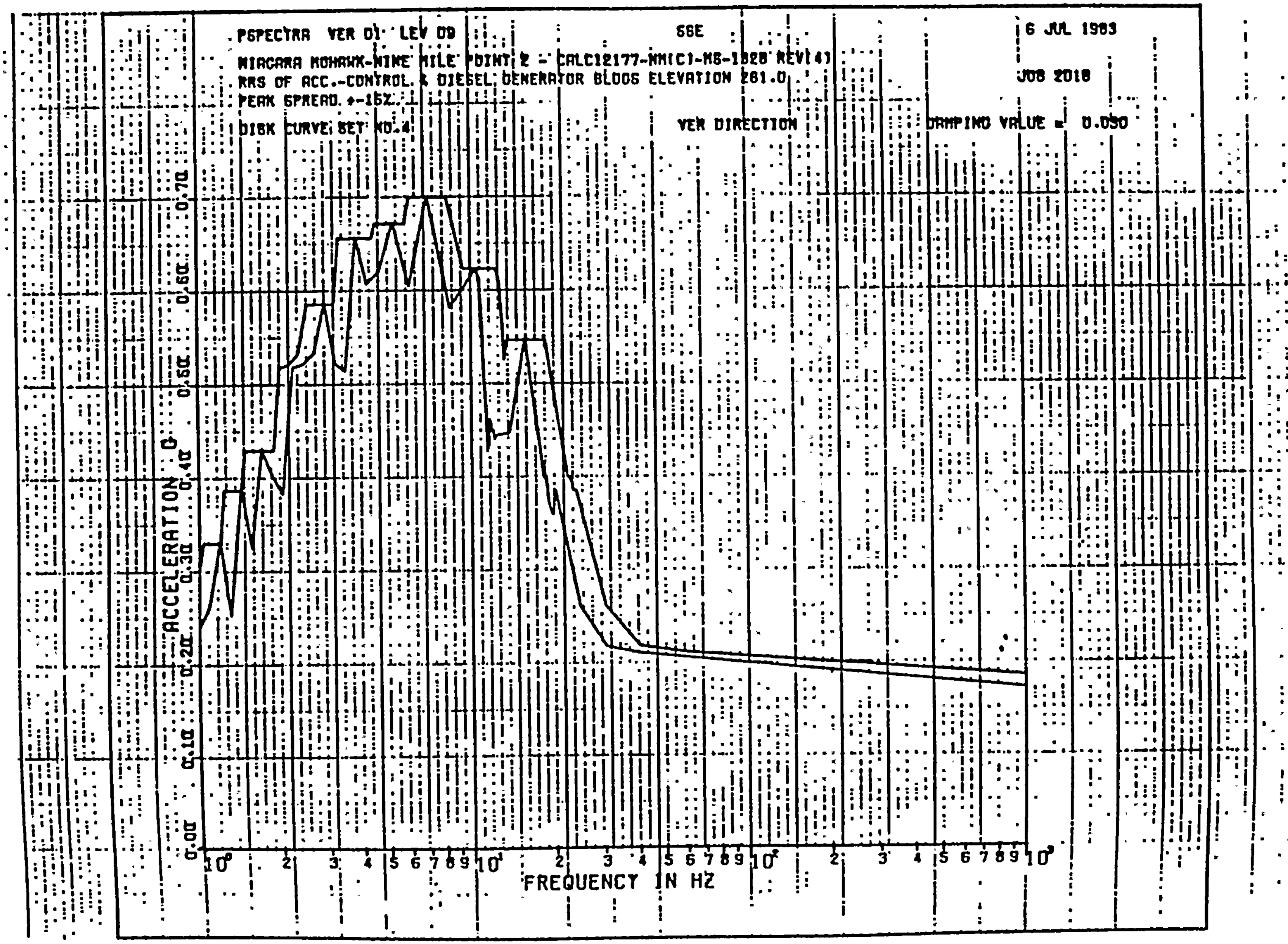
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1028 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS. ELEVATION 261.0
JOB 2018
PEAK SPREAD +-15%
DISK CURVE SET NO.4
HOR DIRECTION
DAMPING VALUE = 0.050
ACCELERATION G
FREQUENCY IN HZ

PAGE 49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6 JUL 1983
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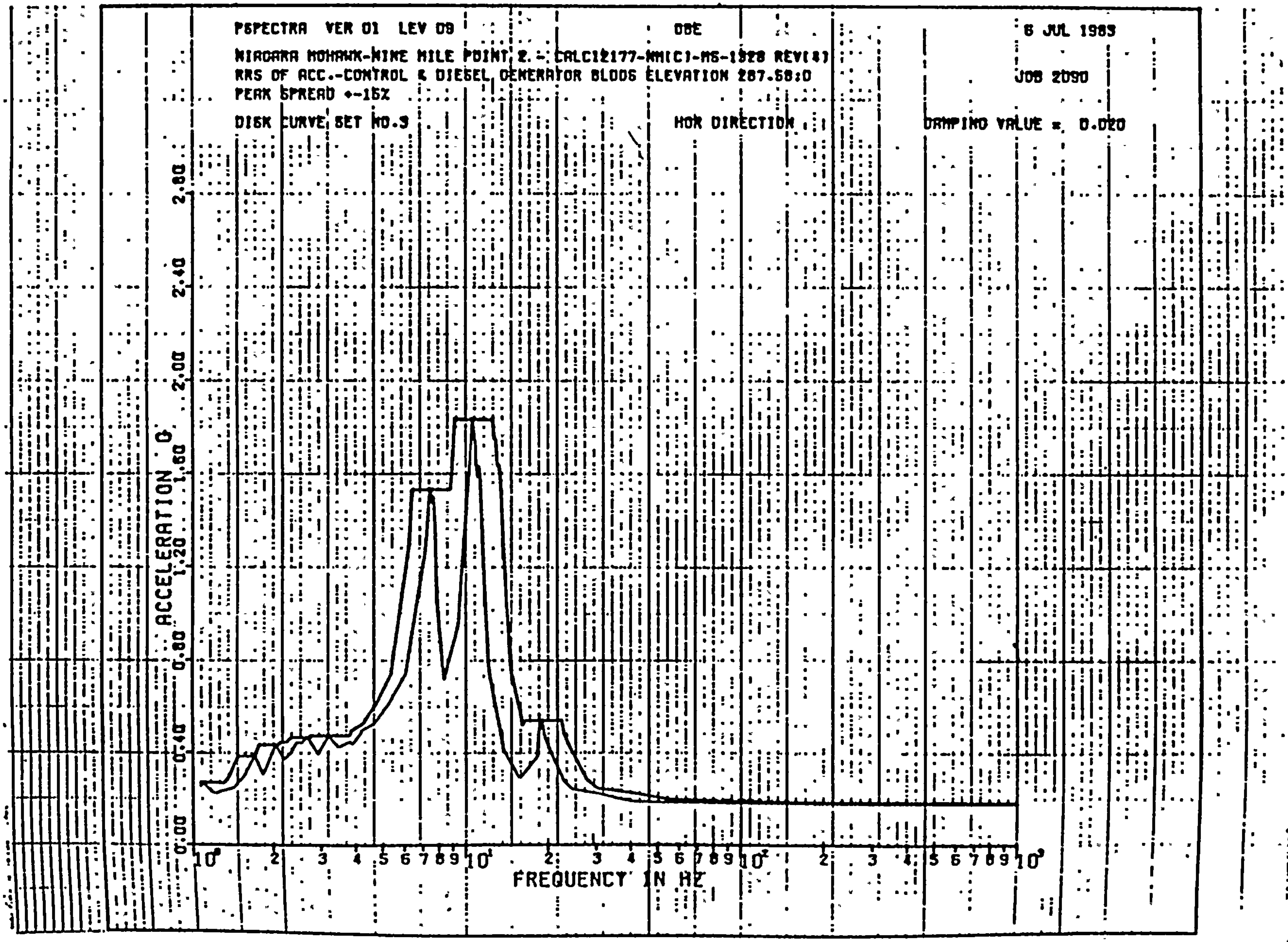
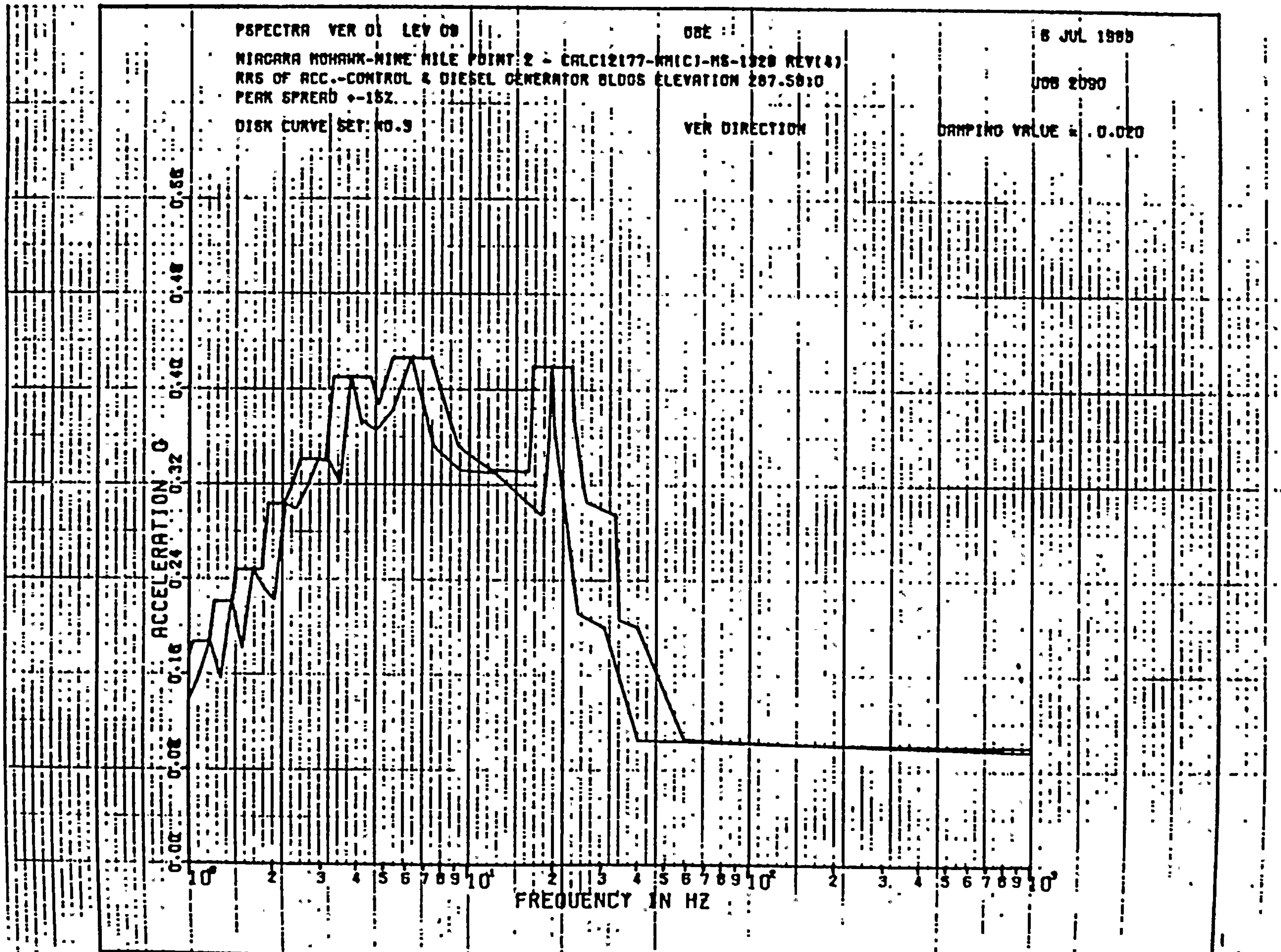
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2018
PEAK SPREAD +-15%
DISK CURVE SET NO.4
VER DIRECTION
DAMPING VALUE = 0.030
ACCELERATION G
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
FREQUENCY IN HZ
10^0
10^1
10^2
10^3

PAGE 50



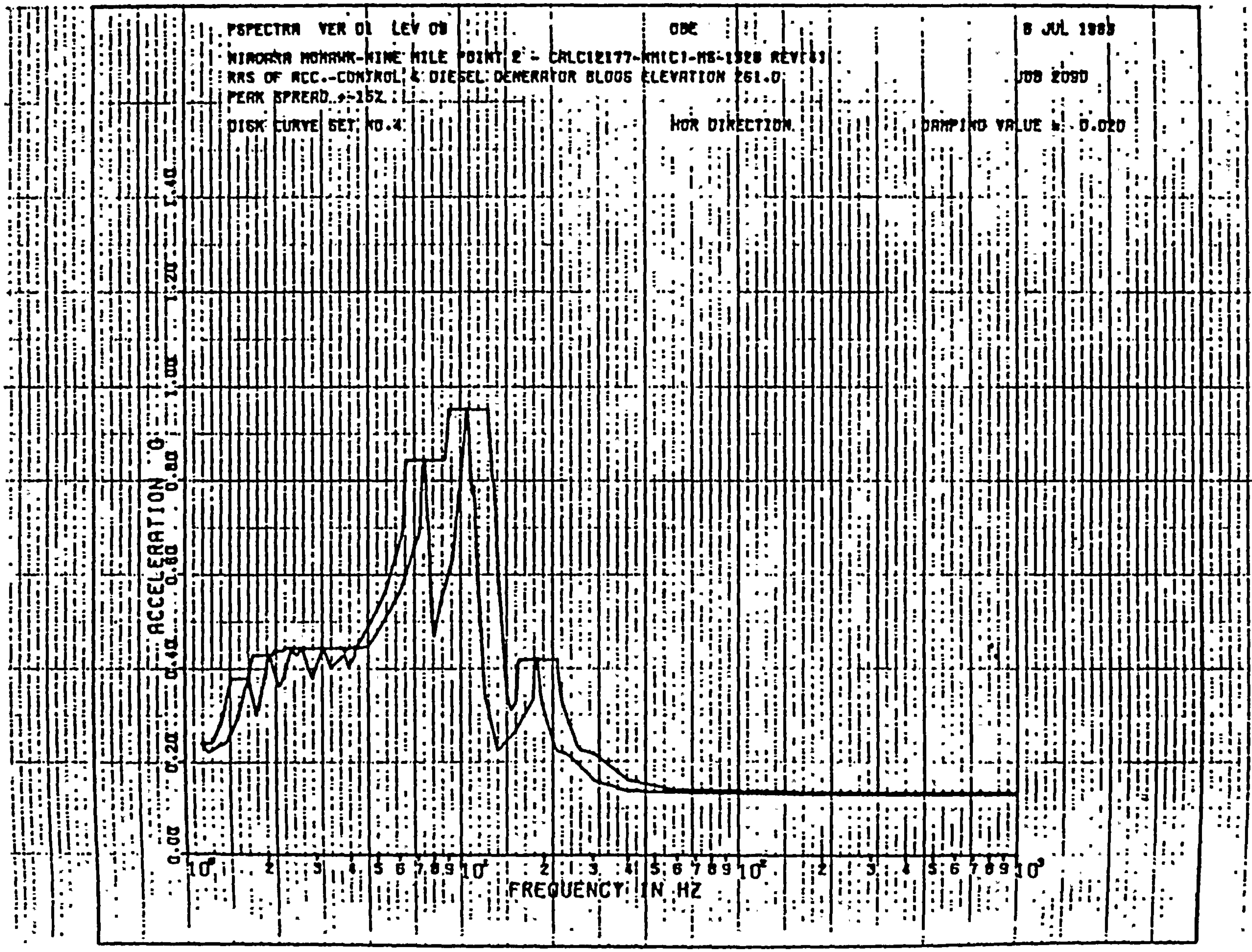
PSPECTRA VER 01 LEV 09
OBE
6 JUL 1983
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1928 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 287.50:0
JOB 2090
PEAK SPREAD +-15%
DISK CURVE SET NO.3
HOR DIRECTION
DAMPING VALUE = 0.020
ACCELERATION G
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
FREQUENCY IN HZ

PAGE 95



PSPECTRA VER 01 LEV 09
DDE :
8 JUL 1985
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 287.50:0
JOB 2090
PEAK SPREAD +-15%
DISK CURVE SET NO.3
VER DIRECTION
DAMPING VALUE = 0.020
ACCELERATION G
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.56
FREQUENCY IN HZ

PAGE 96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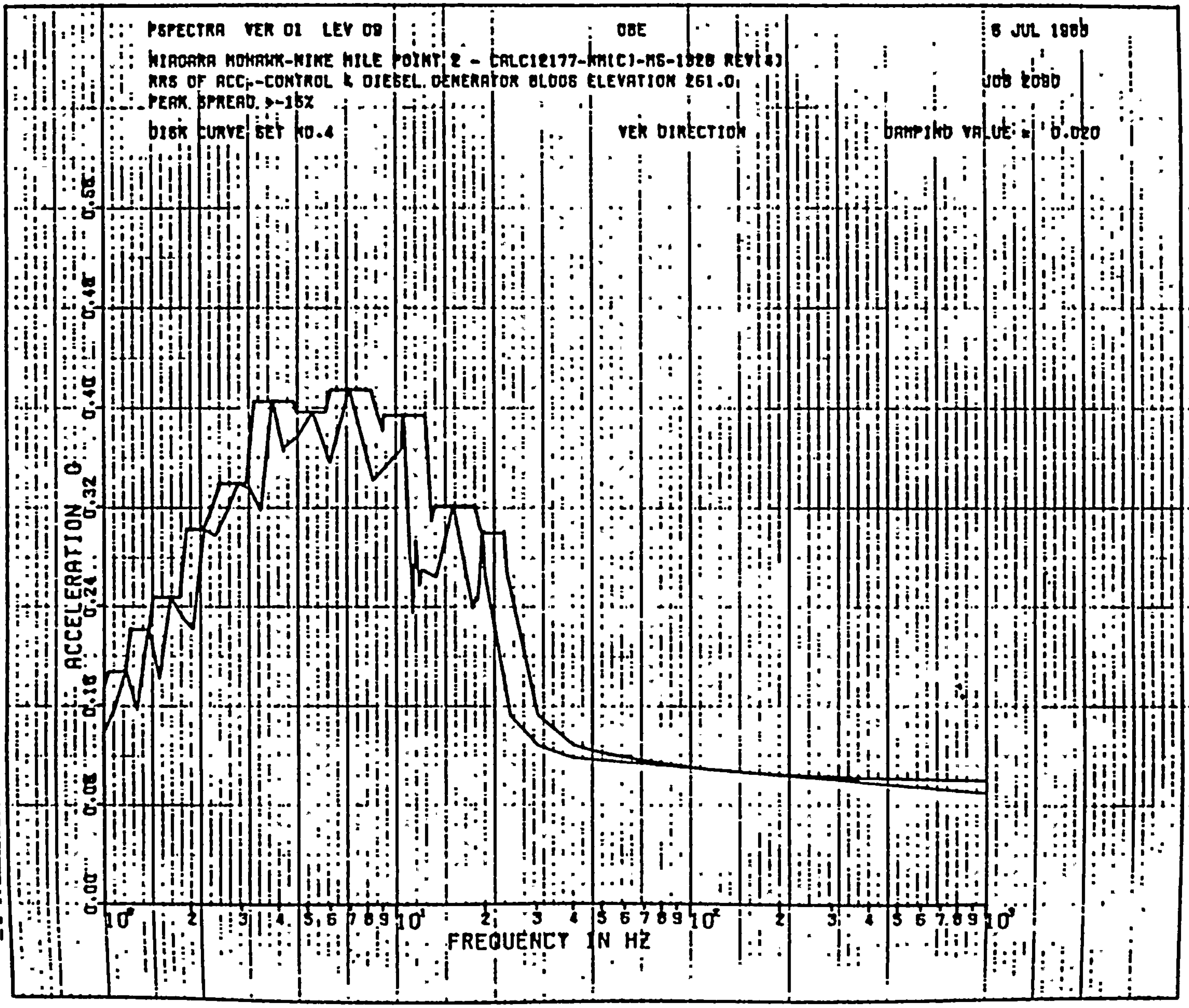
ODE
8 JUL 1983
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(1)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2090
PEAK SPREAD +-15%
DISK CURVE SET NO.4
HOR DIRECTION
DAMPING VALUE = 0.020
ACCELERATION G
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
FREQUENCY IN HZ

PAGE 97


PSPECTRA VER 01 LEV 09
OBE
6 JUL 1983
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2080
PEAK SPREAD +-15%
DISK CURVE SET NO.4
VER DIRECTION
DAMPING VALUE = 0.020
ACCELERATION G
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.56
FREQUENCY IN HZ

PAGE 98

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
1.	Engine Mounted Systems (This includes combustion air manifold, Exhaust manifold and shutdown butterfly valve, Jacket water headers. Governor Linkages, fuel oil and Lube oil systems and starting air System)	CES-0407-2	✓		
2.	Air Intake Filter	CES-0407-3 Rev. 1	✓		
3.	Air Intake Silencer	CES-0407-4 Rev. 1	✓		
4.	Exhaust Silencer	CES-0407-5 and Swec. Calc. 12177-NM(C)-MS-1952	✓		
5.	Engine driven Lube Oil Pump	CES-0407-6	✓		
6.	Jacket Water Standpipe	CES-0407-7 Rev. 1		✓	
7.	Jacket Water Circulating pump Model: Crane-Deming. Model 4221 Size 2M	CES-0407-8	✓		

Attachment-II (10 pages)

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
8.	Fuel oil filter & Strainer	CES-0407-9 Rev. 1		✓	
9.	Turbo charger Lube Oil Filter	CES-0407-10		✓	
10.	3" Check Valve	CES-0407-11	✓		
11.	6" Check Valve	CES-0407-12	✓		
12.	Lube Oil and Jacket water heater	CES-0407-14	✓		
13.	Auxiliary Skid Piping	CES-0407-15 Supplemented by SWEC Calc. 12177-NM(C)-MS-1870	✓	✓	

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
14.	Exhaust Expansion Joint P/N 2-05P-102-002	CES-0407-16	✓		
15.	Intake Expansion Joint P/N 2-05P-102-101	CES-0407-17	✓		
16.	Governor Actuator and Overspeed Governor Model # EGB-50 P/LS (actuator) Model # UG-8L (Overspeed Governor)	CES-0407-18			✓
17.	Intercooler Water Piping P/N KSV-91-23	CES-0407-19	✓		
18.	Starting Air Tank P/N KSV-48-21	CES-0407-20	✓		
19.	Lube Oil Filter Model 25410-S113-27-6FGK2	CES-0407-21	✓		

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
20.	Outboard Bearing P/N 2-05B-013-008	CES-0407-22	✓		
21.	Jacket Water Cooler	CES-0407-23		✓	
22.	Lube Oil Heat Exchanger	CES-0407-24		✓	
23.	Generator: 5500 KVA, 600 RPM - synchronous Generator and AC outlet box.	CES-0407-25			
	Stator & Brush mounting structure.			✓	
	AC outlet Box				✓
24.	Starting Air Separator P/N 2-07C-129-001		✓		
25.	Lube Oil Strainer Model: ZURN 6" SINLEX BASKET	CES-0407-27 Rev. 2	✓		

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
26.	Jacket Water thermostatic valve. Model: AMOT 4 BAS	CES-0407-28 Rev. B	✓		✓
27.	Lube Oil Thermostatic Valve Model: AMOT 5 HAS	CES-0407-29	✓		✓
28.	Standby Fuel Oil Booster Pump. Model: Delaval IMO Screw type N3DBS-137 & Westinghouse Motor	CES-0407-30 Rev. 4-6-83	✓		
29.	Lube Oil Circulating Pump Model: Delaval IMO Screw type NA3DVS275 & Westinghouse Motor	CES-0407-31 Rev. 4-6-83	✓		
30.	Starting Air Relief Valve on Compressor. MODEL: Crosby $\frac{3}{4}$x1 JMB Assy # 62551	CES-0407-32 Rev. 1	✓		

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
31.	Air Compressor Model: Kellogg American model B-352-SBT Compressor. Plus Reliance Motor 15HP, 1760 RPM, 575V, 3φ, 60 Hz. 254T Frame, type PB	CES-0407-33 Rev. 11-16-82	✓		
32.	Engine Driven Water Pump Model: Allis-Chalmers 6x5x11 NR C16 Wet End Kit Pump	CES-0407-34 with Add. A	✓		
33.	Intercooler Model: PERFEX # 500-L-242	CES-0407-35 with Add. 1	✓		
34.	Engine Driven Fuel Oil Booster Pump. Model: Roper Pump 17-AM-08	CES-0407-36	✓		

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
35.	Jacket Water thermo regulating Valve Model: Robert Shaw Controls 6" Model RT-1007-A1	CES-0407-37 Rev. A	✓		
36.	Control System Components	CES- 0407-38 including Wyle Report WR-83-06 as supplement			✓
	Control Valve	Z23-1-1#5			
	Two Way Valve	2-01V-044-001			
	Excess Flow Check Valve	2-01V-412-001			
	Ratio Relay	2-04C-094-003			
	Pressure Switch	2-04S-063-006-2			
	Differential Pressure Switch	2-04S-385-001			
	Temperature Switch	2-04S-031-010			
	Choke Check Valve	[illegible]			
	Pressure Switch	2-04S-063-004			
	Pressure Switch	2-04S-063-006-1			
	Differential Pressure Gauge with Switch	2-04S-187-107			
	Differential Pressure Gauge with Switch	2-04S-187-108-1			
	Differential Pressure Gauge with Switch	2-04S-187-108-2			
	Micro Switch	2-04S-378-001			
	Three Way Valve	2-05V-380-001			
	Two Way Valve	2-10C-016-001			
	50 Micron Filter	2-06C-136-101			
	Differential Temperature Switch	2-04S-031-012			

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD: ANALYSIS: STATIC	QUALIFICATION METHOD: ANALYSIS: DYNAMIC	QUALIFICATION METHOD: TEST
	Diaphragm Valve	2-01V-426-001			
	Pressure Switch	2-04S-399-001-1			
	Pressure Switch	2-04S-399-001-2			
	Three Way Valve	2-05V-396-001			
	10 Micron Filter	2-06C-161-103			✓
	Solenoid Valve	2-05V-399-001			
	Shuttle Valve	KD9-4540-9			
	Pressure Switch	2-04S-063-008-2			
	Solenoid Valve	2-05V-399-00[illegible]			
	Pressure Switch	2-04S-063-014			
	Shuttle Valve	2-01V-077-002			
	Pressure Switch	2-04S-063-008-1			
	Pressure Switch	2-04S-063-005-1			
	Pressure Switch	2-04S-063-005-2			
	Ball Valve	2-01V-411-004			
	Ball Valve	2-01V-411-010			
	Pressure Gauge	2-01J-709-068			
	Pressure Gauge	2-01J-709-069			

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
37.	Jacket Water Level Switches Model: Magnetrol International A103F-TDM-EP/VP-S1MD4 A103F-3X-TDM-EP/VP	CES-0407-39A Plus Letter dated 5/3/84 from Cooper to SWEC			✓
38.	Lube Oil Relief Valve Crosby 2J3 JO-25-WR, 2x3 Assy # N61878	CES-0407-40	✓		
39.	Fuel Oil Relief Valve Crosby 1x1½ JMB-WR Assy # N62581	CES-0407-41	✓		
40.	Starting Air Relief Valve Crosby ¾x1 JMBU-SPL Assy # N61877 N61876 N62550	CES-0407-42 Rev. 1	✓		

ITEM NO.	COMPONENT NAME/MODEL NO.	QUALIFICATION DOCUMENT NO.	QUALIFICATION METHOD		
			ANALYSIS		TEST
			STATIC	DYNAMIC	
41.	Fuel Oil Cooler Model : American Standard 5-241-05-024-001 CES P/N 2-02H-730-001	CES-0407-44 Rev. 1	✓		

SPEC. NO. NMP2-E031A

SQRT #12

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: HIGH VOLTAGE PANEL

MARK NUMBERS: 2EGS*PNL11

STONE & WEBSTER

SPEC. NO. NMP2-E031A
Revision 0

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point Nuclear Station - Unit 2

1. Utility: Niagara Mohawk Power Corporation
2. NSSS: General Electric Co. BWR: 5 MK 2
3. A/E: Stone & Webster Engineering Corp. Other

II. Component Name: STANDBY DIESEL GENERATOR SYSTEMS - DIV. I HIGH VOLTAGE CUBICLE; MARK NO. 2EGS*PNL11

1. Scope: ( ) NSSS (X) BOP ( ) Other
2. Model Number: N/A Quantity: 1
3. Size or Range: N/A
4. Vendor: COOPER ENERGY SERVICES
5. If the component is a cabinet or panel, name and model number of the devices included: SEE ATTACHMENT "A"
6. Physical Description:
   a. Appearance: RECTANGULAR BLOCK
   b. Dimensions: 80" WIDE x 48" DEEP x 84" HIGH
   c. Weight: 5520 LBS
7. Location: Building: DIESEL GENERATOR BUILDING
   Elevation: 261 FT.
8. Field Mounting Conditions (✓) Bolt (No. 14 - Size 5/8")
   ( ) Weld (Length____)
   ( )
9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   FLOOR MOUNTED ON INTERMEDIATE SUPPORT
10. a. System in which located: GENERATOR STANDBY SYSTEM & GENERATOR STANDBY PROTECTION SYSTEM
    b. Functional Description: POWER SUPPLY TO DIESEL GENERATOR STATIC EXCITER
    c. Is the equipment required for ( ) Hot Standby ( ) Cold Shutdown ( ) Both ( ) Neither (X) Other LOSS OF OFFSITE POWER OR LOCA OR DURING DIESEL GENERATOR TESTING

II. Pertinent Reference Design Specifications for Qualification Requirements: NMP2- E031A WITH ADDENDA 1 THRU 6

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

III. Is Equipment Available for Inspection in the Plant:

(X) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: S&W FILE NO. IEEE 01.090-5012A,B
(No., Title and Date): SEISMIC SIMULATION TEST PROGRAM ON A HIGH VOLTAGE CUBICLE, REPORT #CES-0407-45, 2-17-82

Company that Prepared Report: COOPER ENERGY SERVICES

Company that Reviewed Report: SWEC

Where Report is filed or available: NMP2 SITE

Applicable Codes and/or Standards: IEEE 344-1975, R.G. 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

3. Required Response Spectra** (attach the graphs): SEE ATTACHMENT "B"

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

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

5. Required Acceleration in Each Direct:

(X) ZPA ( ) Other ______________ (specify)

OBE S/S = 0.13 F/B = 0.13 V = 0.10

SSE S/S = 0.24 F/B = 0.24 V = 0.19

6. Were fatigue effects considered?

( ) Yes (X) No

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

VI. If Qualfication by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency (X) Random
( ) Sine Beat
( ) ______

2. ( ) Single Axis (X) Multi-Axis
(X) Independent MOTION ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE 5 SSE 1 Other ______________ (specify)

4. Frequency Range: 0.5 HZ TO 40 HZ

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

S/S= 6.2 HZ F/B= 6 HZ V= 16.5 HZ

6. Method of Determining Natural Frequencies
(X) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

(X) Yes (Attach TRS & RRS graphs) SEE ATTACHMENT "C"
( ) No

8. Maximum Input g Level Test:

OBE S/S = 0.85 F/B = 0.8 V= 0.3

SSE S/S = 1.05 F/B = 1.0 V = 0.6

9. Laboratory Mounting:

A. (X) Bolt (No.______ Size 5/8-11) GRADE 2
( ) Weld (Length________) ( ) ________

B. Orientation and Fixturing: MOUNTED TO A BASE-MOUNT TEST FIXTURE WHICH WAS WELDED TO THE TEST TABLE

10. Functional Operability Verified:

(X) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: THE EQUIPMENT SUCCESSFULLY PASSED THE SEISMIC TEST

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

NONE

13. Failure Modes (If appropriate ELECTRICAL & STRUCTURAL)

14. Margins Available: (X) Input Spectrum ( ) Fragility

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

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

4. ( ) Computer Codes:____________________ _______________

   Frequency Range and No. of Modes

   ( ) Hand Calculations

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

   ( ) Absolute Sum ( ) SRSS ( ) Other:__________________ (specify)

6. Damping:

   OBE_________ SSE_________ Basis for the Damping Used:_______

7. Support Considerations in the Model:________________________

8. Critical Structural Elements:

A.

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

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability

9. Failure Modes:______________________________________

10. Margins Available: ( ) Input Spectrum ( ) Stress or Deflection

NMP2-E031A
2EGS*PNL11

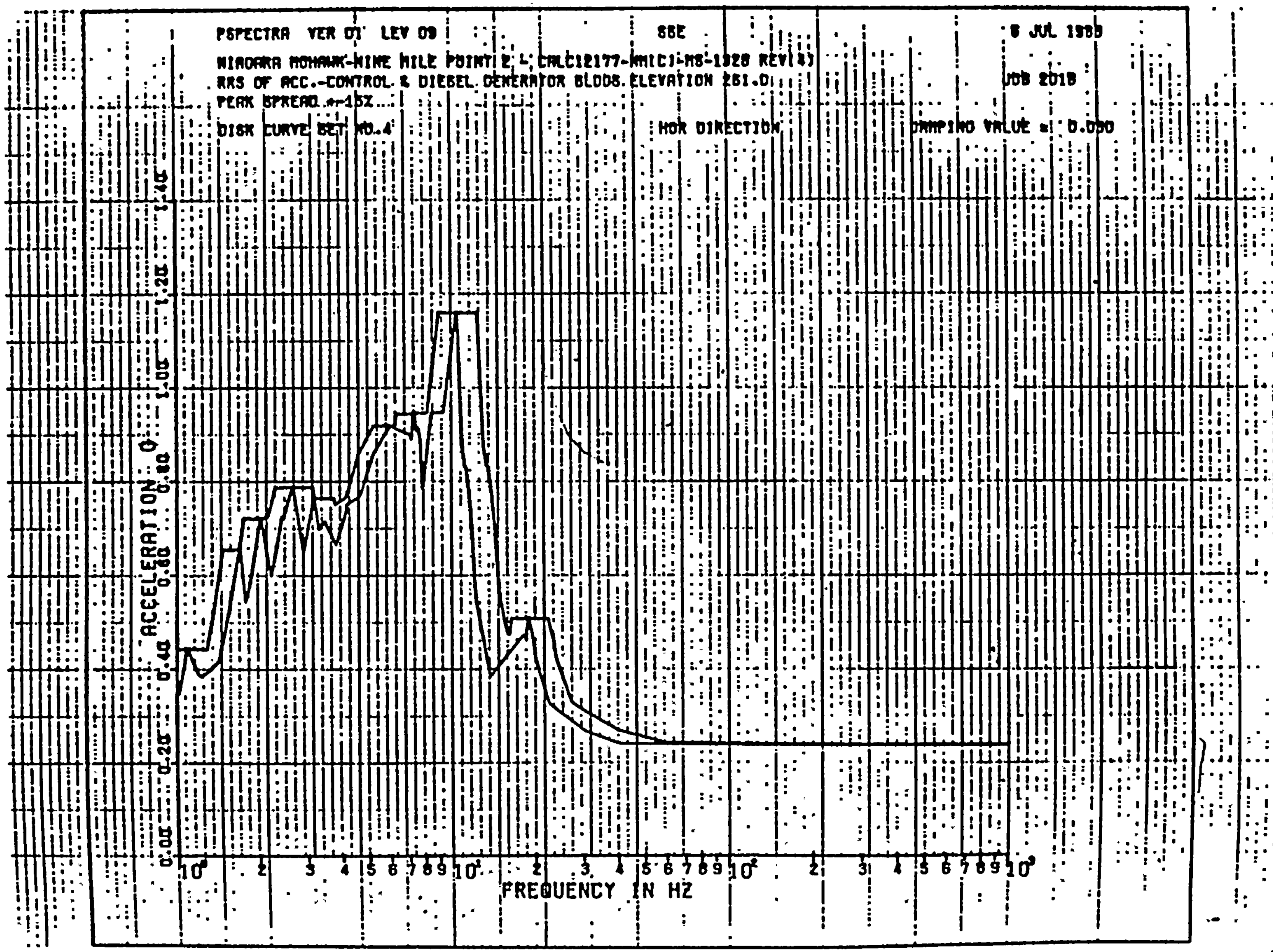
ATTACHMENT "A"

DEVICE LIST

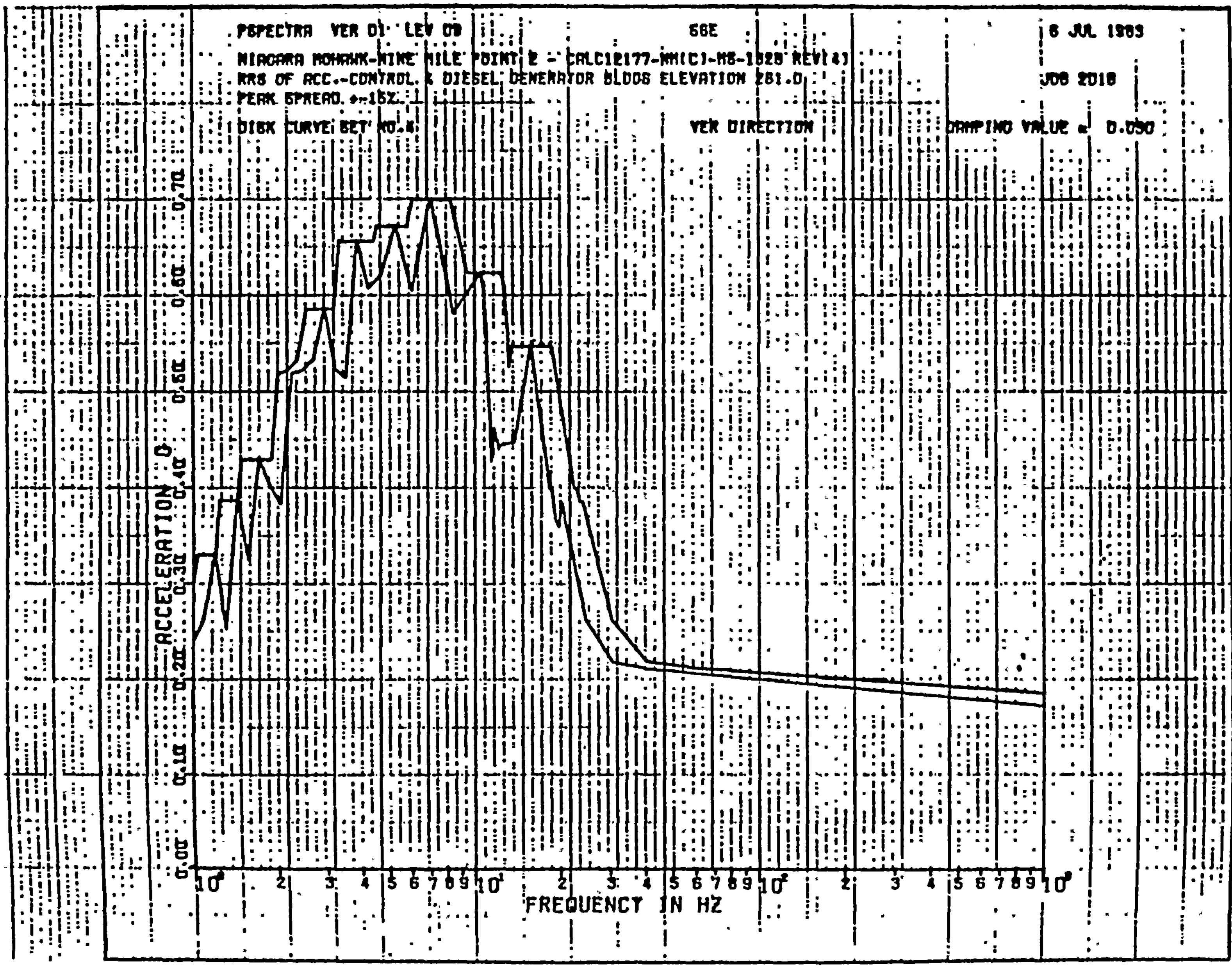
DESCRIPTION	PART NO.
FAN	DAYTON 2C100
SPACE HEATER	CHROMALOX 129374
THERMOSTAT	CHROMALOX 263185
POTENTIAL TRANSFORMER	W.H. TYPE PE60
PARALLELING CURRENT-TRANSFORMER	PORTEC AC1616-4
POTENTIAL TRANSFORMER	PORTEC CD1362
REACTORS	PORTEC CD1361
CURRENT TRANSFORMER	PORTEC CD1360

ATTACHMENT "8"

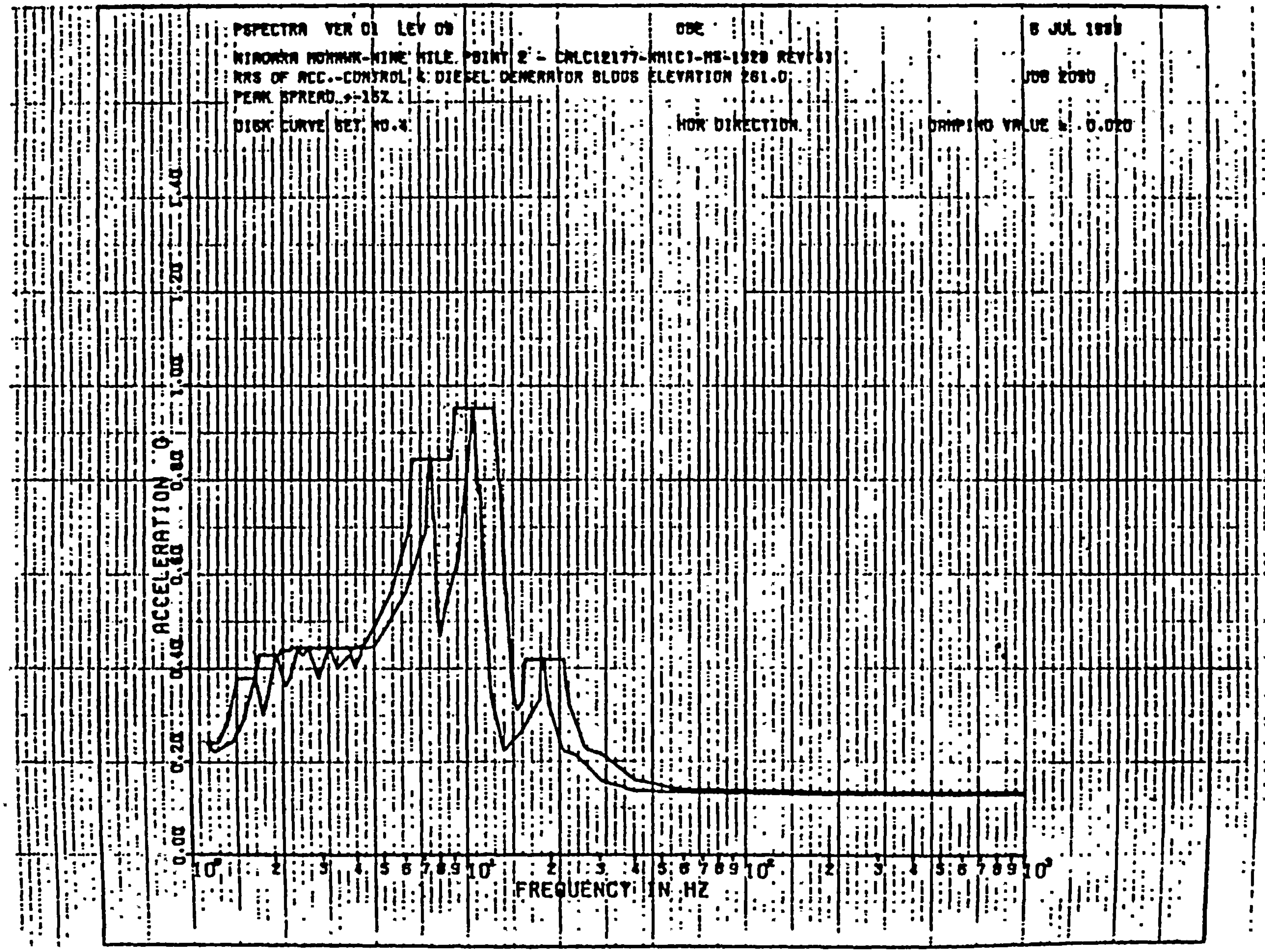
RRS FOR DIESEL GENERATOR BUILDING EL. 261 FT.


PSPECTRA VER 01 LEV 09
SSE
8 JUL 1988
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS. ELEVATION 261.0
JOB 2018
PEAK SPREAD +-15%
DISK CURVE SET NO. 4
HOR DIRECTION
DAMPING VALUE = 0.050
ACCELERATION G
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
FREQUENCY IN HZ
10⁰
2
3
4
5
6
7
8
9
10¹
10²
10³

PAGE 49

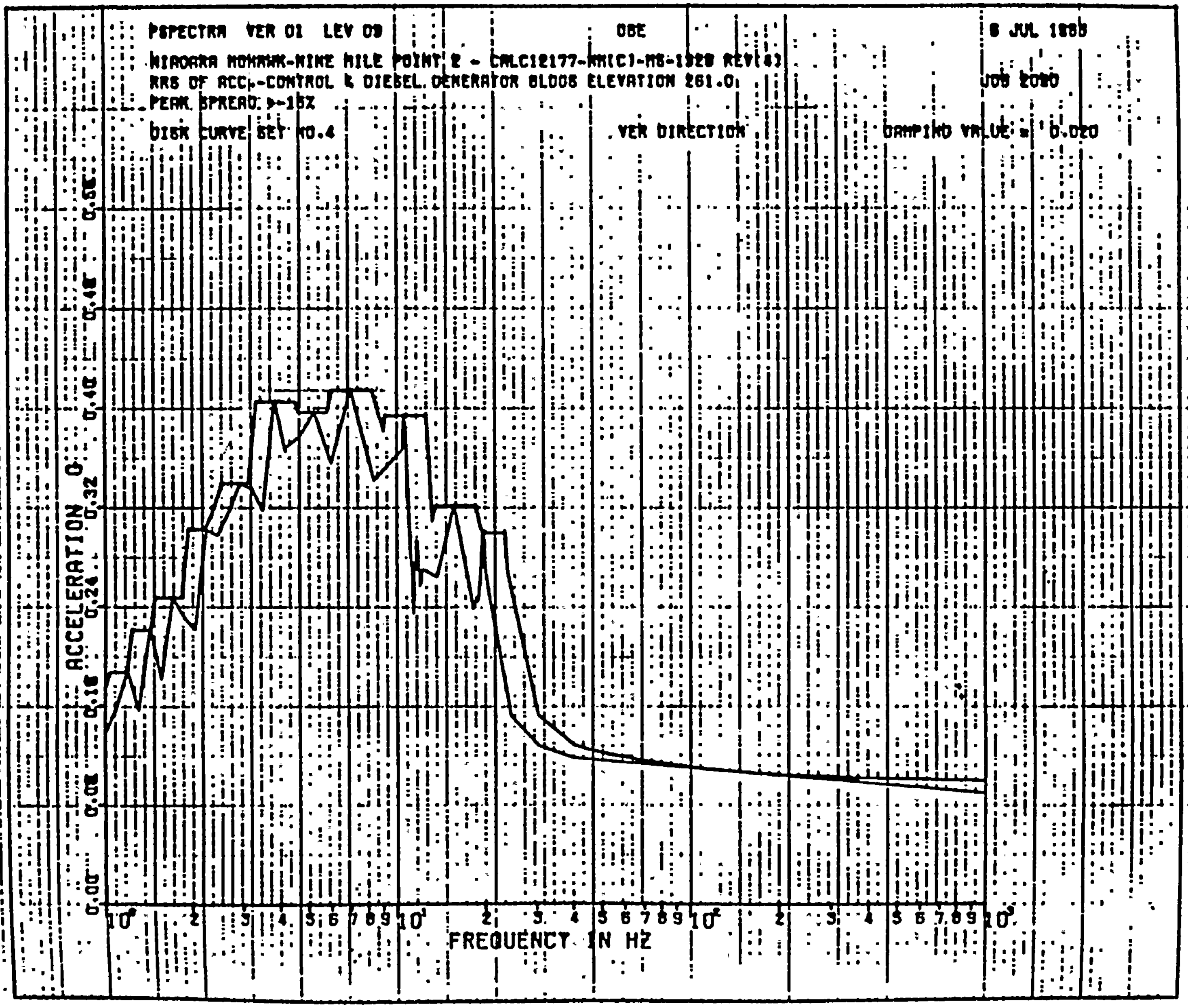

PSPECTRA VER 01 LEV 09
SSE
6 JUL 1983
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1028 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2018
PEAK SPREAD +-15%
DISK CURVE SET NO.4
VER DIRECTION
DAMPING VALUE = 0.050
ACCELERATION G
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
FREQUENCY IN HZ

PAGE 50



PSPECTRA VER 01 LEV 09
OBE
8 JUL 1983
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(3)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2080
PEAK SPREAD +-15%
DISK CURVE SET NO.4
HOR DIRECTION
DAMPING VALUE = 0.020
ACCELERATION G
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
FREQUENCY IN HZ

PAGE 97



PSPECTRA VER 01 LEV 09
OBE
8 JUL 1988
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2080
PEAK SPREAD +-15%
DISK CURVE SET NO.4
VER DIRECTION
DAMPING VALUE = 0.020
ACCELERATION G
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.56
10⁰ 2 3 4 5 6 7 8 9 10¹ 2 3 4 5 6 7 8 9 10² 2 3 4 5 6 7 8 9 10³
FREQUENCY IN HZ

PAGE 98

NMP2-E031A

ATTACHMENT "C"

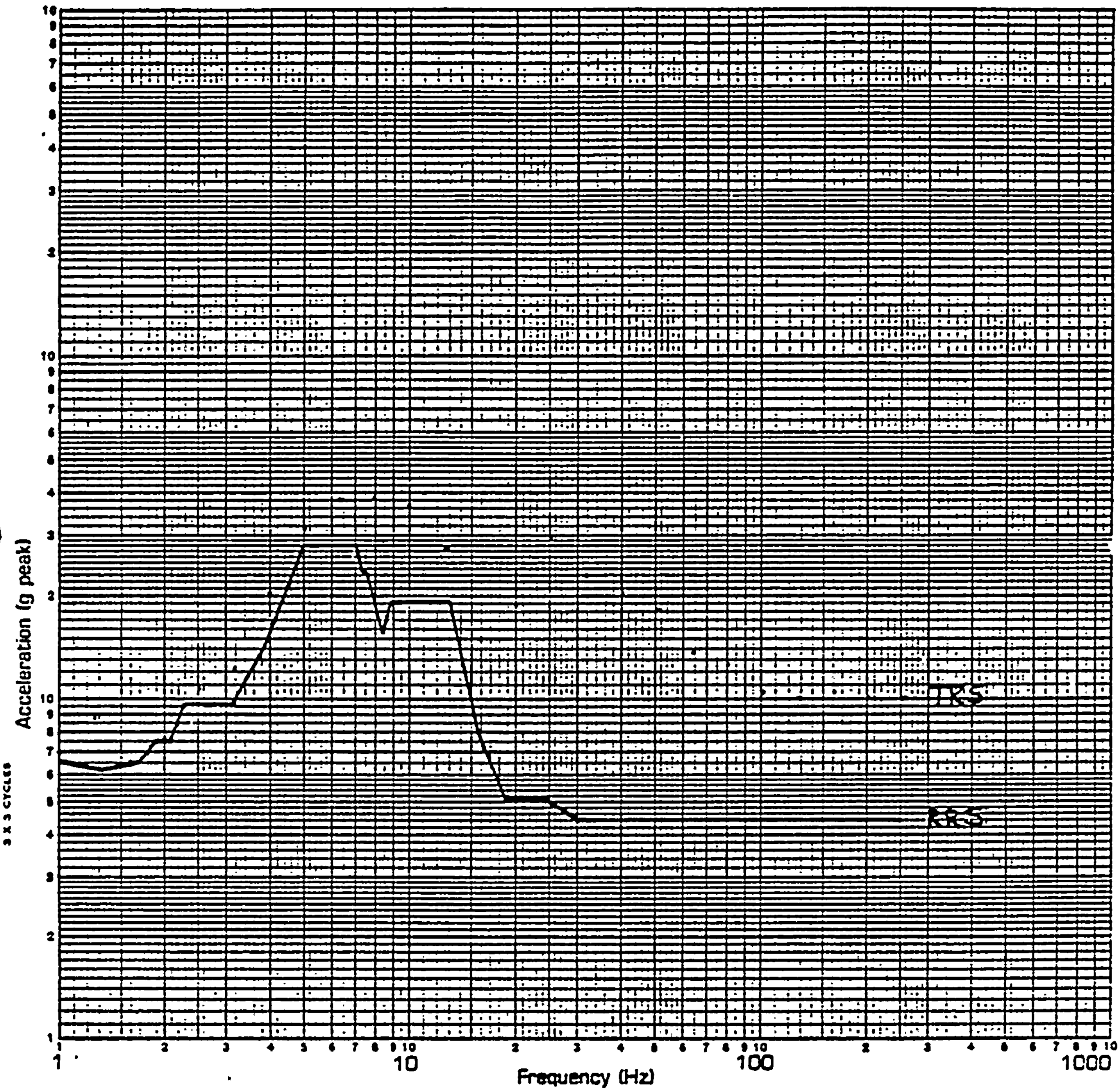
TRS FROM TEST REPORT

DESCRIPTION	PAGE NO.
FRONT-TO-BACK 3% SSE	44
VERTICAL 3% SSE	45
SIDE-TO-SIDE 3% SSE	54
VERTICAL 3% SSE	55
FRONT-TO-BACK 2% OBE	—
VERTICAL 2% OBE	—
SIDE-TO-SIDE 2% OBE	—
VERTICAL 2% OBE	—

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000☐

DAMPING 3%



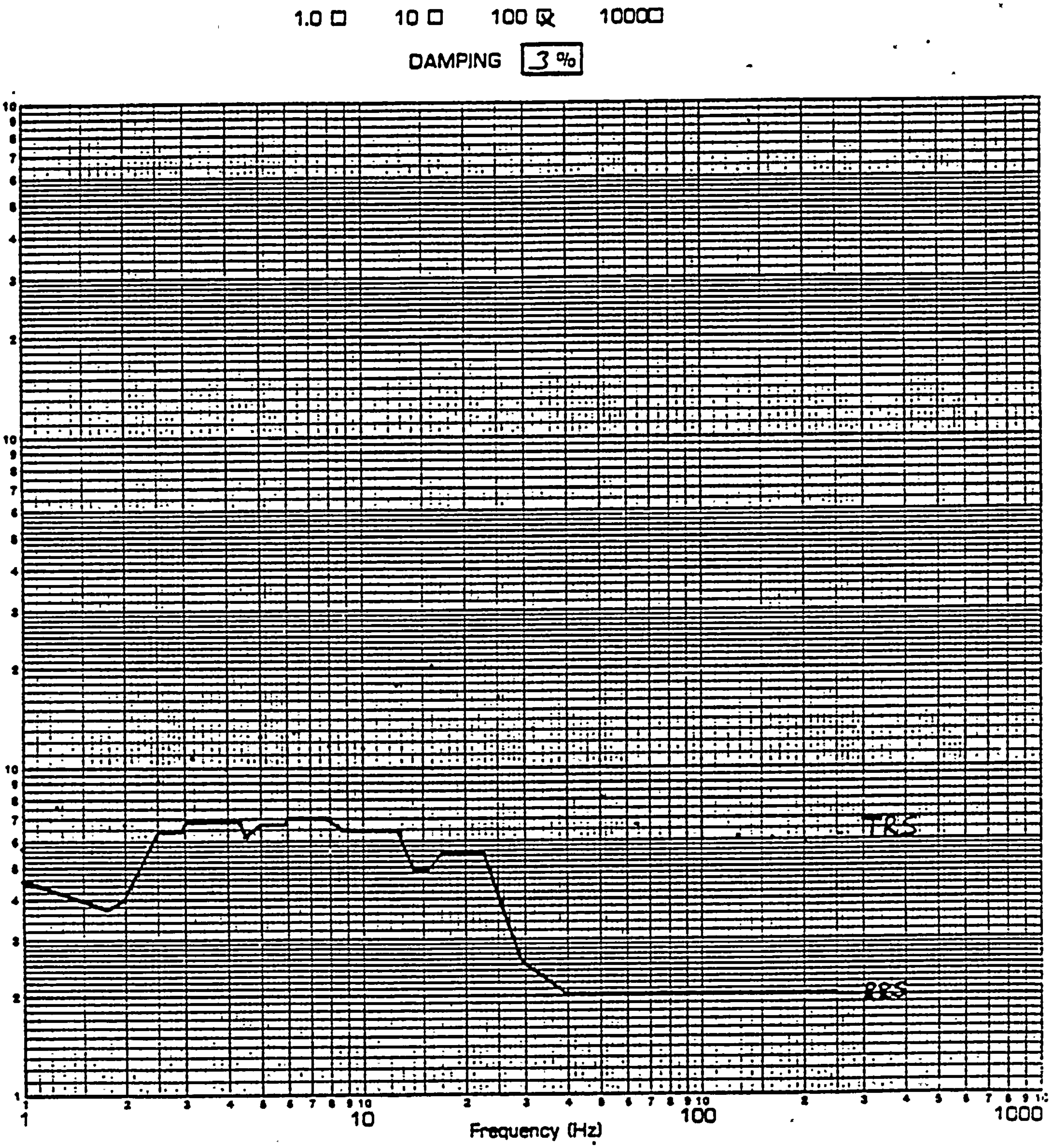
SPECIMEN —

LOCATION NO. HCA

AXIS FB/V

TEST RUN NO. 8

FULL SCALE SHOCK SPECTRUM (g Peak)



SPECIMEN —

LOCATION NO. VCA

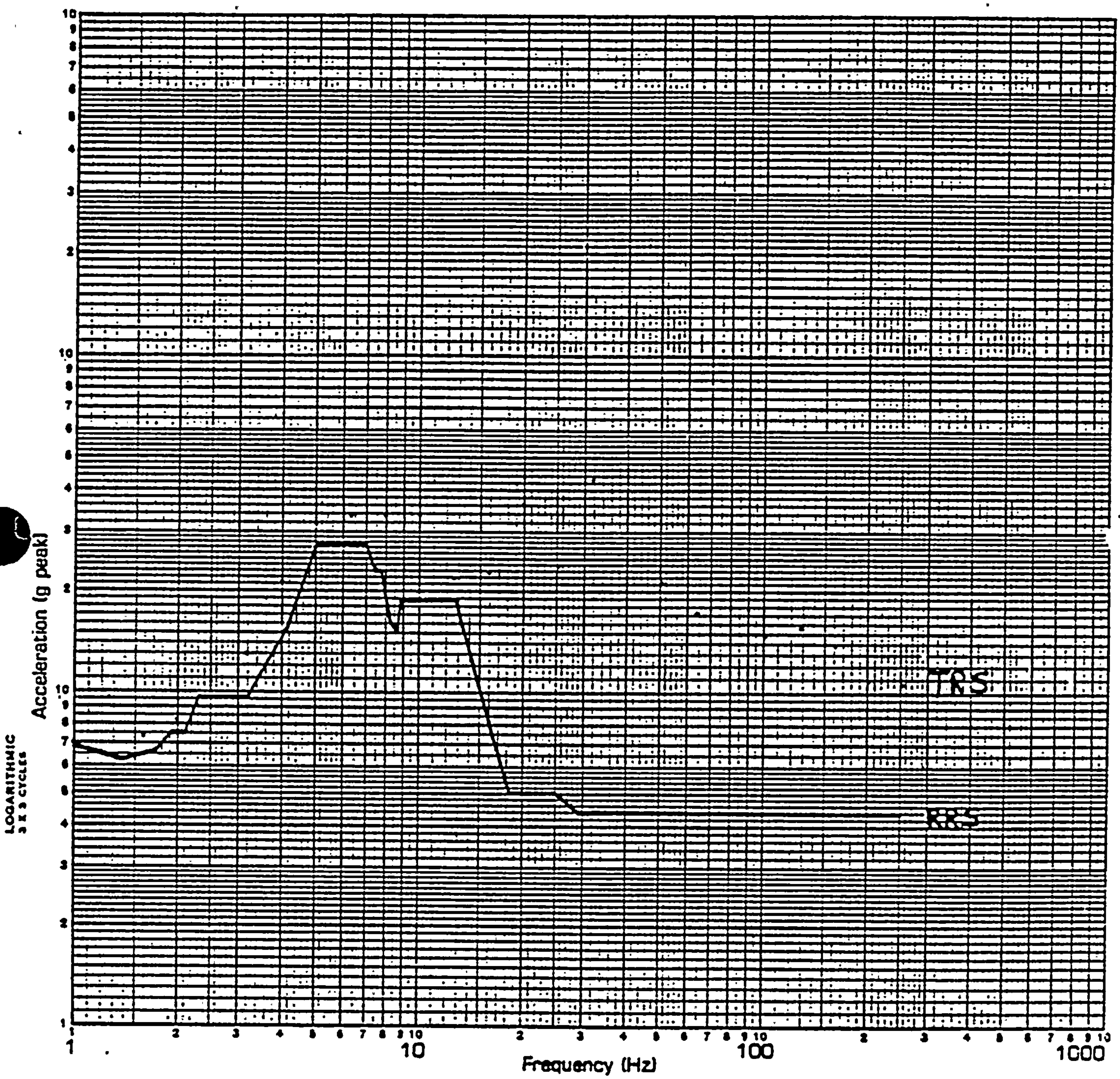
AXIS FB/V

TEST RUN NO. 8

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000☐

DAMPING 3 %



SPECIMEN —

LOCATION NO. HCA

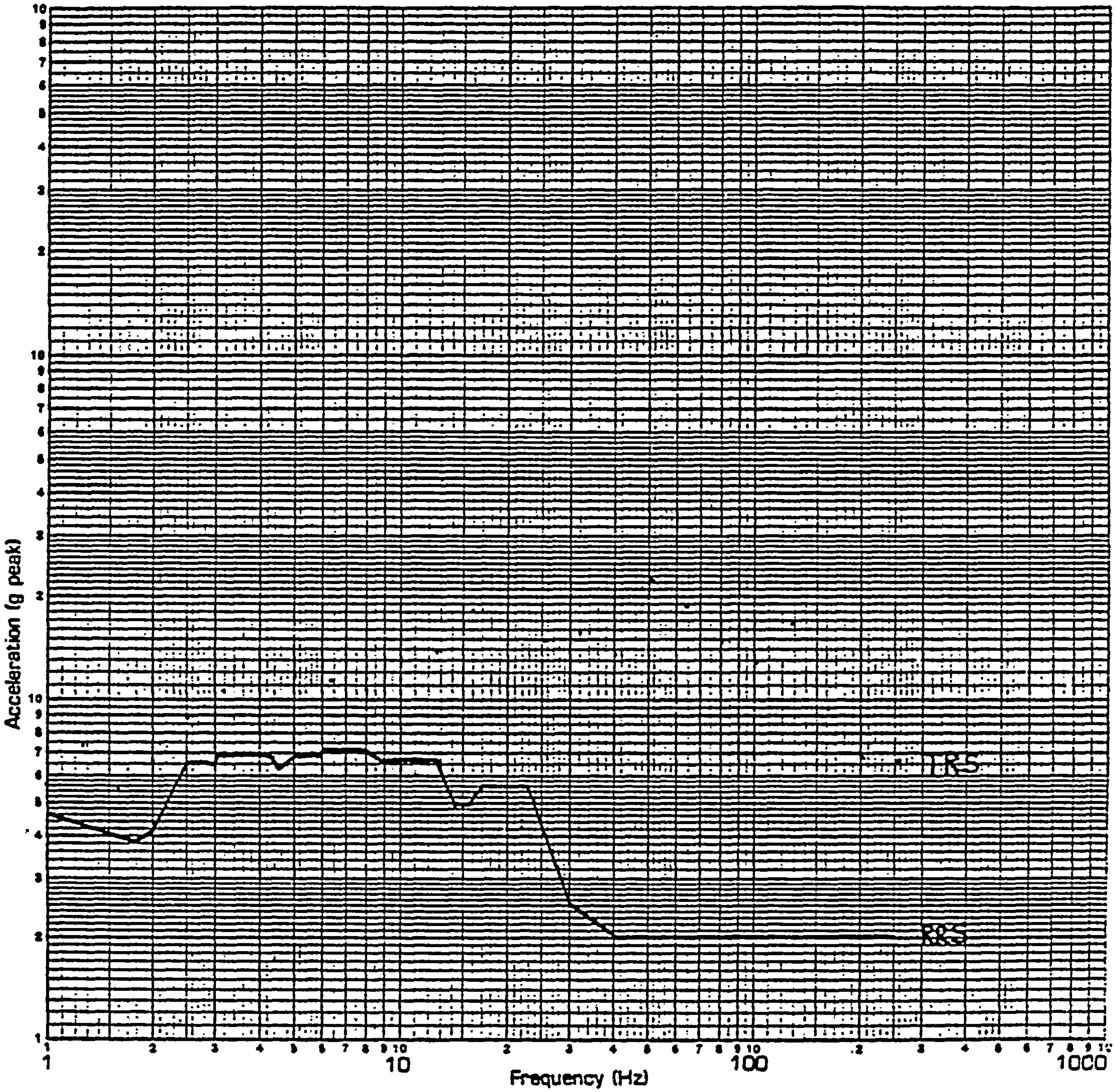
AXIS SS/U

TEST RUN NO. 15

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000☐

DAMPING [3 %]



SPECIMEN —

LOCATION NO. VCA

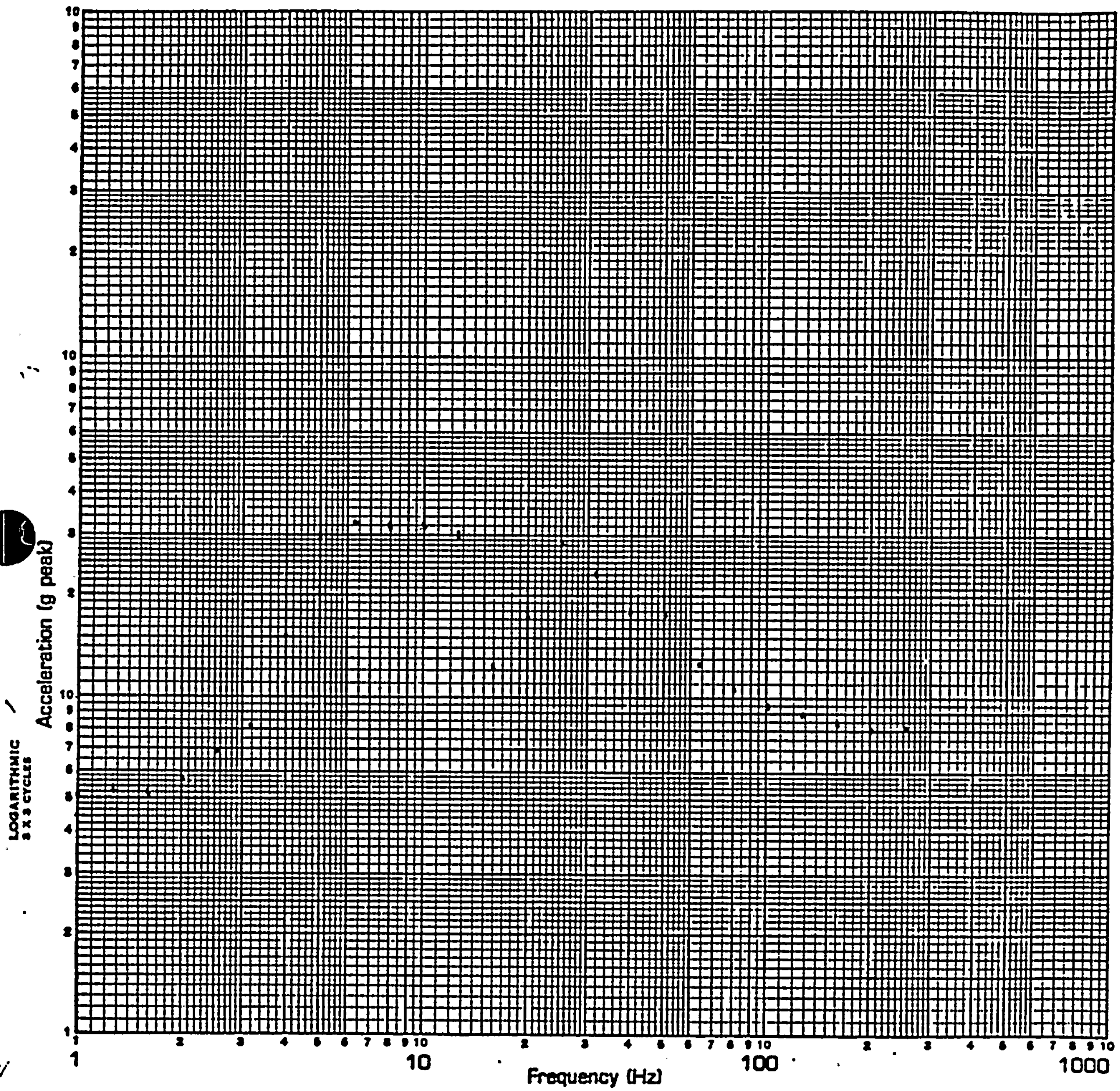
AXIS SS/V

TEST RUN NO. 15

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000☐

DAMPING $\boxed{2\%}$



SPECIMEN —

LOCATION NO. HCA

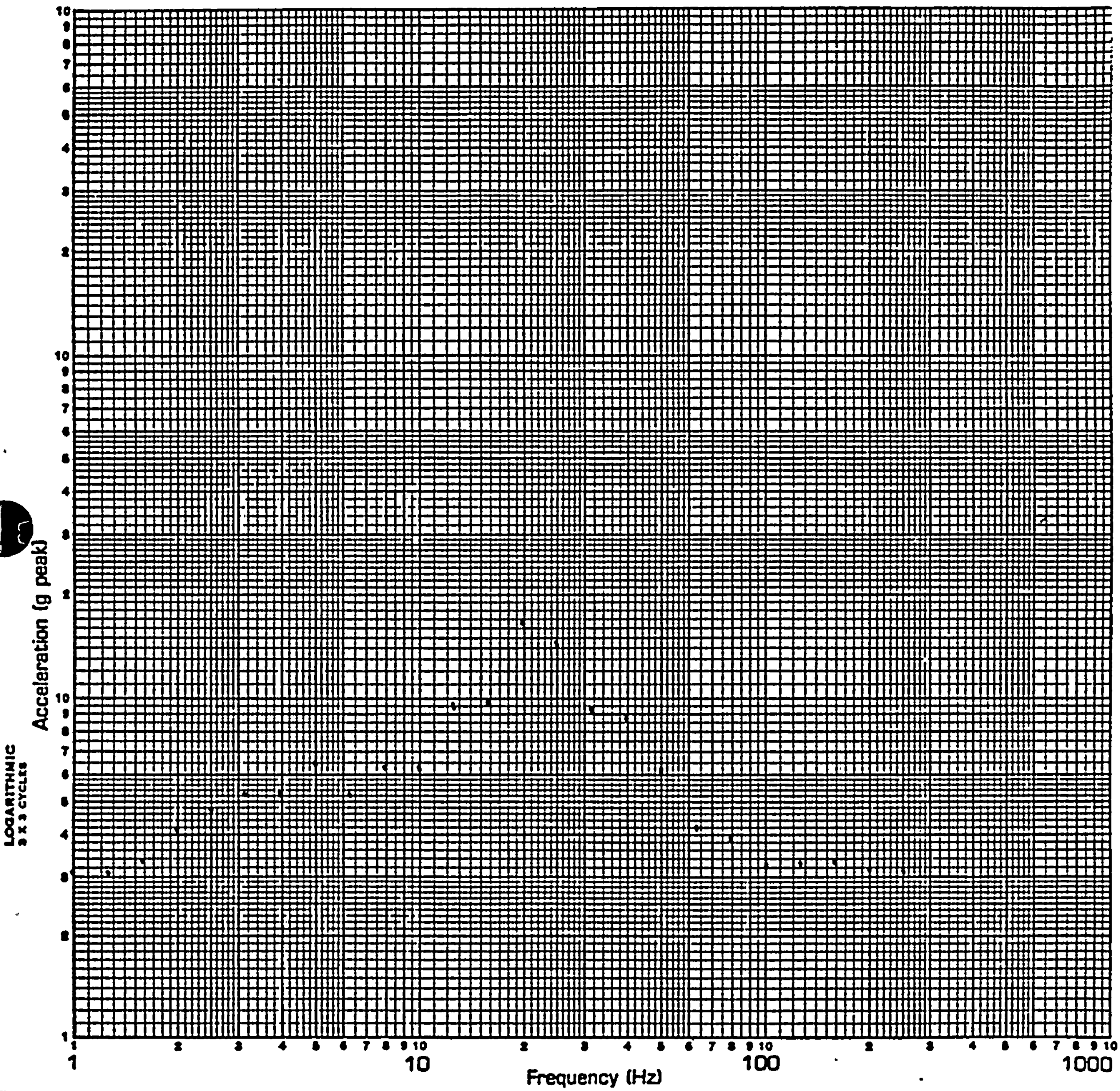
AXIS FB/V

TEST RUN NO. 3

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000☐

DAMPING 2%



SPECIMEN —

AXIS FB/V

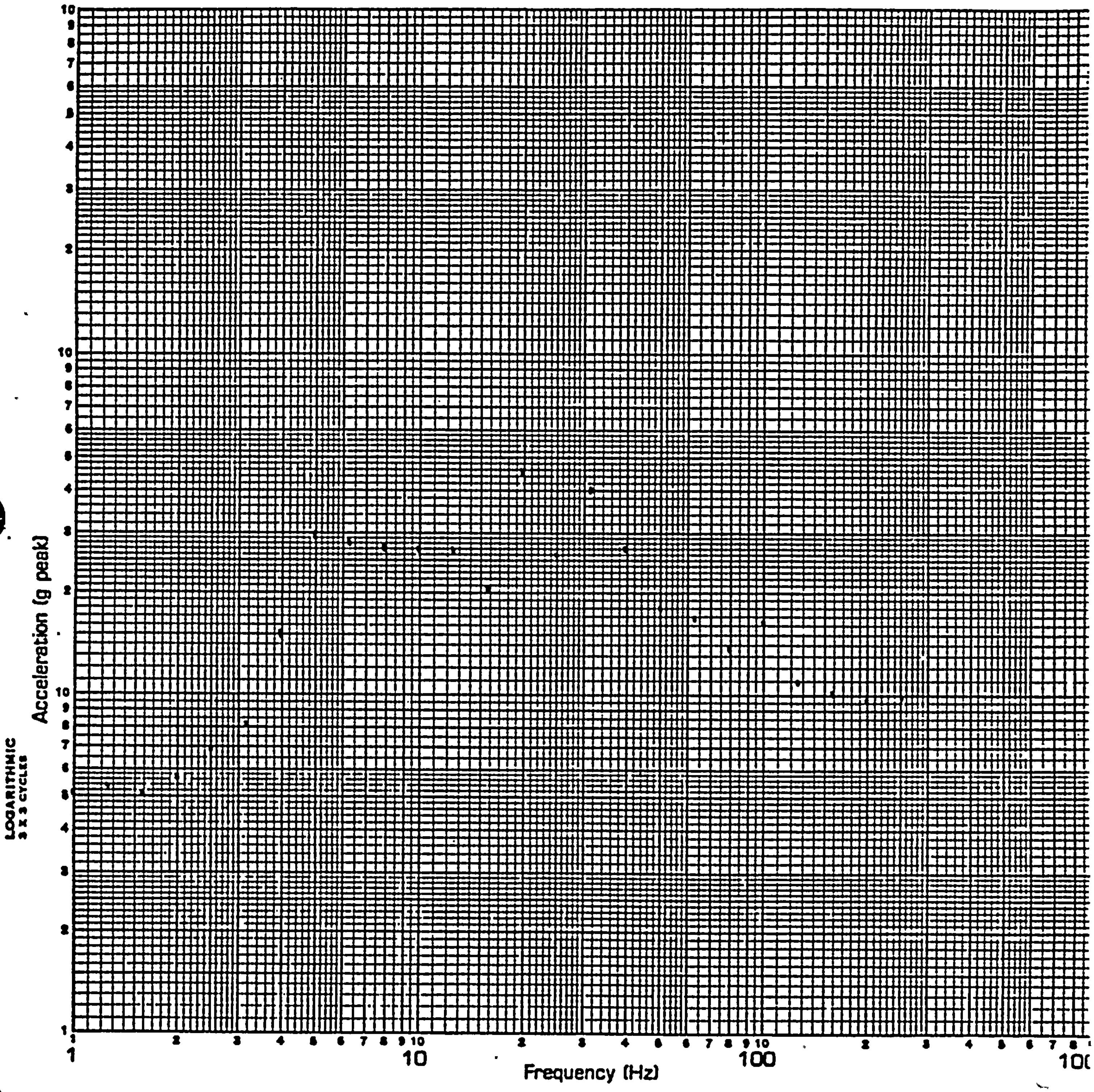
LOCATION NO. VCA

TEST RUN NO. 3

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING 2%



SPECIMEN —

AXIS SS/V

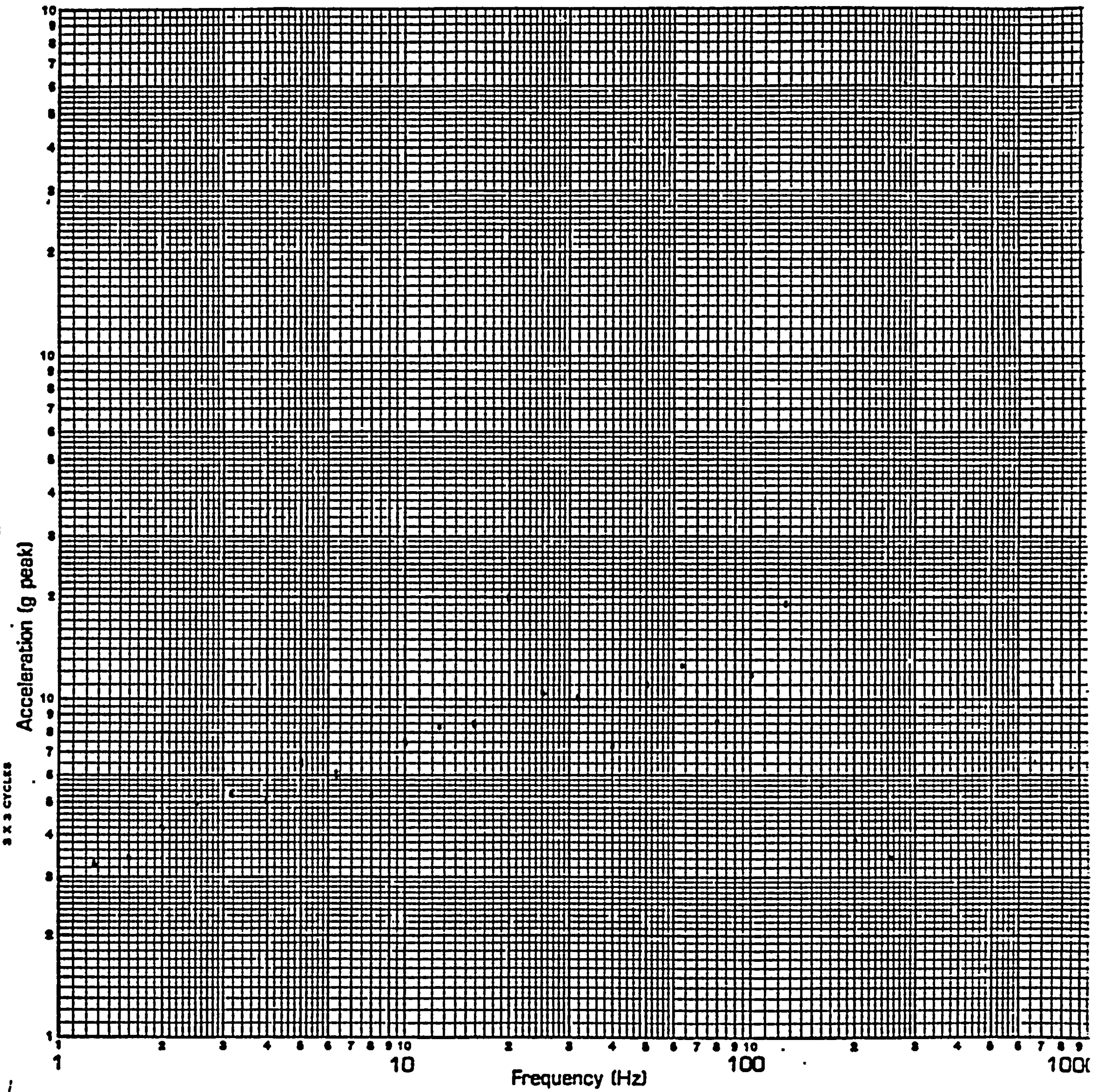
LOCATION NO. UCA

TEST RUN NO. 10

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING $\boxed{2\%}$



SPECIMEN —

AXIS SS/V

LOCATION NO. VCA

TEST RUN NO. 10

SPEC. NO. NMP2-E035A

SQRT #13

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: UNINTERRUPTIBLE POWER SUPPLY

MARK NUMBERS: 2VBA*UPS2A

STONE & WEBSTER

SPEC. NO. NMP2-E035A
Revision 0

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point Nuclear Station - Unit 2

1. Utility: Niagara Mohawk Power Corporation

2. NSSS: General Electric Co. BWR: 5 MK 2

3. A/E: Stone & Webster Engineering Corp. Other

II. Component Name: UNINTERRUPTIBLE POWER SUPPLY; MARK No. 2VBA*UPS2A

1. Scope: ( ) NSSS (✓) BOP ( ) Other

2. Model Number: UPS253-1-106 Quantity: 1

3. Size or Range: 25KVA

4. Vendor: ELGAR CORPORATION

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

SEE ATTACHMENT "A"

6. Physical Description:

a. Appearance: RECTANGULAR BLOCK WITH DOORS ON FRONT,

b. Dimensions: 102" WIDE x 32" DEEP x 77.75" HIGH

c. Weight: 4400 LBS

7. Location: Building: CONTROL BUILDING

Elevation: 261 FT.

8. Field Mounting Conditions ( ) Bolt (No. - Size -)
(X) Weld (Length *)
( )

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

FLOOR MOUNTED

10. a. System in which located: VBS SYSTEM - UNINTERRUPTIBLE 120V AC POWER SOURCE FOR CONTROL CIRCUIT

b. Functional Description: 120V AC POWER SUPPLY

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

* - (10) 3/16" x 5" LONG ON SIDES OF THE MOUNTING LEGS PLUS 3/16" WELDS ON THE ENTIRE WIDTH OF THE FRONT OF EACH OF THE FOUR MOUNTING LEGS.

II. Pertinent Reference Design Specifications for Qualification Requirements: NMP2-E035A WITH ADDENDA# 1 THRU 4; E&DCR# P40,962

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

III. Is Equipment Available for Inspection in the Plant:

(X) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: SEW FILE NO. IEEE 01.560-5011A
(No., Title and Date): QUALIFICATION REPORT ELGAR DOCUMENT NO. 1006617 FOR ELGAR MODEL UPS-1-106, OCTOBER-1984

Company that Prepared Report: PROBABILISTIC SOFTWARE, INC.

Company that Reviewed Report: SWEC

Where Report is filed or available: NMP2 SITE

Applicable Codes and/or Standards: IEEE 344-1975, R.G. 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

3. Required Response Spectra** (attach the graphs): SEE ATTACHMENT "B"

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

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

5. Required Acceleration in Each Direct:

(X) ZPA ( ) Other ______ (specify)

OBE S/S = 0.13 F/B = 0.13 V = 0.10

SSE S/S = 0.24 F/B = 0.24 V = 0.19

6. Were fatigue effects considered?

( ) Yes (X) No

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

VI. If Qualfication by Test, then Complete:

1. ( ) Single Frequency (X) Multi-Frequency (X) Random
( ) Sine Beat
( ) ______

2. ( ) Single Axis (X) Multi-Axis
(X) Independent MOTION ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE 5 SSE 1 Other ______ (specify)

4. Frequency Range: 1.25 HZ TO 35 HZ

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

S/S= 8 HZ F/B= 12 HZ V= 13 HZ

6. Method of Determining Natural Frequencies
(X) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

(X) Yes (Attach TRS & RRS graphs) SEE ATTACHMENT "C"
( ) No

8. Maximum Input g Level Test:

OBE S/S = 1.0g F/B = 0.9g V= 0.9g

SSE S/S = 1.7g F/B = 1.6g V = 2.0g

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
(✓) Weld (Length *) ( ) ______

* (10) 3/16 x 5" LONG WELDS ON SIDES OF LEGS + 3/16" FILLET WELDS ACROSS ENTIRE FRONT WIDTH OF MOUNTING LEGS.

B. Orientation and Fixturing: MOUNTED ON BASE-MOUNT FIXTURE WHICH IN TURN WAS WELDED TO THE TEST TABLE.

10. Functional Operability Verified:

(X) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: THE EQUIPMENT SUCCESSFULLY PASSED THE SEISMIC TEST WITH GREATER THAN 10% MARGIN

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

ALL TEST PERTINENT TO IEEE 323-1974

13. Failure Modes (If appropriate ELECTRICAL & STRUCTURAL)

14. Margins Available: (X) Input Spectrum ( ) Fragility

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

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

4. ( ) Computer Codes:____________________ _______________

Frequency Range and No. of Modes

( ) Hand Calculations

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

( ) Absolute Sum ( ) SRSS ( ) Other:__________________
(specify)

6. Damping:

OBE________ SSE________ Basis for the Damping Used:________

7. Support Considerations in the Model:________________________

8. Critical Structural Elements:

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

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

9. Failure Modes:____________________________________

10. Margins Available: ( ) Input Spectrum ( ) Stress or Deflection

ATTACHMENT "A"

DEVICE LISTS

TABLE NO.	DESCRIPTION	PAGE NO.
1-A	COMPARISON TABLE OF ASSEMBLIES INSTALLED IN UPS253-1-106 & UPS253-1-101	A-11
2-A	MATRIX OF COMPARABLE ENGINEERING DRAWINGS FOR UPS253-1-106 & UPS253-1-101	A-12
3-A	COMPARISON TABLE OF MAGNETIC COMPONENTS INSTALLED IN UPS253-1-106 & UPS253-1-101	A-14
4-A	TABLE OF COMPONENTS USED IN UPS253-1-106 & UPS253-1-101	A-15 TO A-22
5-A	TABLE OF NON-SAFETY RELATED COMPONENTS USED IN UPS253-1-106 & UPS253-1-101	A-23 & A-24

Table No. 1-A

Comparison Table of Assemblies

Installed in UPS 253-1-106 and UPS 253-1-101

UPS 253-1-106		UPS 253-1-101	
Assembly	Number	Assembly	Number
Filter Panel	5321074-01	Filter Panel	643-389-40
DC Ground Detect	5340400-01	Not Required	
Fuse Sense	5430002-20	Not Required	
Current Transducer	5430008-01	Not Required	
I/O Panel	5431003-01	I/O Panel	643-362-40
1% Ripple Filter	5431081-01	Filter Panel	643-389-40
Charger-SS-Diode	5431086-02	Charger-SS Panel	643-356-40
Circuit Breaker	5431112-01	CB/Switch Plate	643-382-40
Driver Logic	5490001-01	1-Phase 3-Bridge Driver	643-100-40
SS Logic	5490002-01	SS Logic	643-158-40
Alarm Logic	5490006-01	Alarm Logic	643-154-40
DC-DC Converter	5490008-01	DC-DC Converter	628-135-40
Charger Drive	5490009-01	Charger Drive	643-152-40
SS Drive	5490009-02	SS Drive	642-106-40
Inverter Drive	5490009-03	SS Drive	642-106-40
1-Phase 3-Bridge PWM Logic	5490014-01	1-Phase 3-Bridge PWM Logic	643-101-40
Backplane PCB	5490015-04	Charger/Inverter Backplane	643-353/ 354-40
Transducer	5490016-01	Transducer	643-148-40
Charger Logic A	5490018-01	Charger Logic A	643-156-40
Charger Logic D	5490019-01	Charger Logic D	643-155-40
Analog Logic	5490030-01	PWM Analog Logic	643-102-40
Fuse Sense	628-137-41	Not Required	
Relay Drive	633-270-40	Not Required	
Regulator/SS Drive	642-106-40	SS Drive	642-106-40
Oscillator	643-119-40	Oscillator	643-119-40
Fan Cover	643-377-40	Fan Cover	643-377-40
Heatsink Panel	643-383-40	Heatsink Panel	643-383-40
Fan Mount Panel	643-518-40	Fan Mount Panel	643-412-40
Inverter Panel 12kVA	643-523-40	Inverter Panel (A2)	643-291-40
Inverter Panel 7kVA	643-524-40	Inverter Panel (A3, A4)	643-415-40
Right Door Plate	643-530-41	Right Door Plate	643-408-40
Right Side Plate	643-563-40	Right Side Plate	643-381-40
Distribution Chassis	643-607-40	Distribution Chassis	643-380-40
UPS Cabinet	643-623-40	UPS Cabinet	643-386-40
UPS Chassis	643-624-40	Chassis	643-292-41
Distribution Cabinet	643-630-40	Distribution Cabinet	643-385-40
Control Panel	643-628-40	Left Door	643-395-40
Lamp PCB	643-628-40	Annunciator	643-308-40
Line Reg. Control	648-100-40	Line Reg. Control	648-100-40
Line Reg. Drive	648-101-40	Line Reg. Driver	648-101-40

Table No. 2-A

Matrix of Comparable Engineering Drawings
For UPS 253-1-106 and UPS 253-1-101

Drawing Title	Drawing No. UPS 253-1-106	Drawing No. UPS 253-1-101
Overall Schematic	543-625-60	543-288-60
Installation Drawing	543-514-70	543-288-71
Filter Panel	5321074-01	643-389-40
Fuse Sense	5/6430002-20	Not Required
Current Transducer	5/6430008-01	Not Required
Alarm Logic	5/6490006-01	643-1540-40/60
1% Ripple Filter	5431081-01	Not Required
Charger-SS-Diode Panel	5431086-02	643-356-40
Fan Mount Panel	643-518-40	643-412-40
I/O Panel	5431003-01	643-362-40
DC Ground Detect	5/6340400-01	Not Required
UPS Cabinet	643-623-40	643-386-40
Distribution Cabinet	643-630-40	643-385-40
Control Panel (Control Door)	643-626-40	643-395-40
Lamp PCB (Annunciator Assy)	643-628-40/60	643-308-40/
Driver Logic (1-Phase 3-Bridge Driver)	5/6490001-01	643-100-40/60
SS Logic	5/6490002-02	643-158-40/60
DC-DC Converter	5/6490008-01	628-135-40/60
Charger Drive	5/6490009-01	643-152-40/60
SS Drive	5/6490009-02	642-106-40/60
Inverter Drive	5/6490009-03	643-124/125-40/60
1-Phase 3-Bridge PWM Logic	5/6490014-01	643-101-40/60
Backplane	5/6490015-04	643-353/354-40/60
Transducer	5/6490016-01	643-148-40/60
Charger Logic A	5/6490018-01	643-156-40/60
Charger Logic D	5/6490019-01	643-155-40/60
Analog Logic	5/6490030-01	643-102-40/60
Fuse Sense	628-137-41/61	Not Required
Relay Drive	633-270-40/60	Not Required
Regulator/SS Drive	643-106-40/60	643-106-40/60
UPS Chassis	642-624-40	642-292-41
Fan Cover	643-377-40	643-377-40
Distribution Chassis	643-607-40	643-380-40
Heatsink Panel	643-383-40	643-383-40
Inverter Panel 12kVA	643-523-40/60	643-291-40/643-204-60
Inverter Panel 7kVA	643-524-40	643-415-40
Right Door Plate	643-530-41	643-408-40
Right Side Plate	643-563-40	643-381-40
Oscillator	643-119-40/60	643-119-40/60
Line Regulator Control	648-100-40/60	648-100-40/60
Line Regulator Drive	648-101-40/60	648-101-40/60

Table No. 3-A

Comparison Table of Magnetic Components

Installed in UPS 253-1-106 and UPS 253-1-101

UPS 253-1-106		UPS 253-1-101	
Magnetic Component	Number	Magnetic Component	Number
Input Power	9900048-01	Input Power	991-139-90
Isolation Transformer	9900049-01	Isolation Transformer	991-172-90
DC-DC Converter Choke	9900051-02	DC-DC Converter Choke	990-956-90
DC-DC Converter Power Transformer	9900053-01	DC-DC Converter Power Transformer	990-955-90
Current Transformer	990-361-91	Current Transformer	990-361-91
Input Filter Choke	990-769-90	Input Filter Choke	990-769-90
Cummutating Choke	990-846-90	Commutating Choke	990-846-90
Drive Transformer	990-892-90	Drive Transformer	990-892-90
Series Reactor	990-899-90	Series Reactor	990-899-90
Control Transformer	990-941-90	Control Transformer	990-941-90
DC-DC Converter Drive Transformer	990-954-90	DC-DC Converter Drive Transformer	990-954-90
12kVA Summer Transformer	990-990-90	12kVA Summer Transformer	990-990-90
7kVA Summer Transformer	990-991-90	7kVA Summer Transformer	990-991-90
12th Harmonic Choke	991-009-91	12th Harmonic Choke	991-009-91
Current Transformer Transformer	991-014-90	Current Transformer Transformer	991-014-90
Interphase Transformer	991-140-90	Interphase Transformer	991-140-90
Charger Filter Choke	991-141-90	Charger Filter Choke	991-141-90
Line Regulator Transformer	991-173-90	Line Regulator Transformer	991-173-90
Line Regulator Transformer	991-174-90	Line Regulator Transformer	991-174-90
Sense Transformer	991-182-90	Sense Transformer	991-182-90
Power Supply Transformer	991-191-90	Power Supply Transformer	991-191-90

Table No. 4-A

Table of Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
Ceramic Capacitors		
CK05	X	X
DD	X	X
DDM	X	X
HY	X	X
Y5U	X	X
811	X	X
Film Capacitors		
BA	X	X
ZA	X	X
6PS	X	X
715P	X	X
DA	X	P
Film/Paper Cap.		
KTNP	P	X
SCRN	X	X
26F	X	X
Paper Capacitors		
97F	X	X
28F	P	X
Mica Capacitors		
DM15	X	X
DM19	X	X
Tantalum Capacitors		
196D	X	X
Aluminum Electrolytic Capacitors		
39D	X	X
86F	X	X
500D	X	P

P = Parameter Difference

Table No. 4-A (Continued)

Table of Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
Signal Diodes		
1N914	X	X
Rectifier Diodes		
1N4004	X	X
1N4006	P	X
1N4936	X	X
1N5624	X	X
1N5625	X	P
3SF4/MR854	X	X
A397E	X	X
A430M	X	X
Rectifier Diode Bridge		
MDA 990	X	X
VM48	X	X
Voltage Reference Diodes		
1N821	X	X
Voltage Regulator Diodes		
1N753	X	X
1N4742	X	X
1N4757	P	X
1N4936	X	X
1N5245	X	P
1N5352	X	X
Thyristors		
C6A	X	X
C350M	X	X
C355E	X	X
C380M	X	X
C384E	X	X
C385E	X	X
C430M	X	X
S2800M	X	X

P = Parameter Difference

Table No. 4-A (Continued)

Table of Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
Unilateral Switch		
2N4984	X	X
Fuses		
A25	X	P
A50	X	X
KAB	X	P
KLM	X	P
AGC	X	X
313002	X	X
3AG	P	X
Fuse Holders		
P243	X	X
P266	X	X
3530	X	X
3823	P	X
4561	X	X
342004	X	X
4287	X	P
Connectors		
156	X	P
08-56	X	P
09-50	P	X
09-65	P	X
09-72	X	X
H4	X	X
Relays		
ARD	X	X
R10	X	X
CSJ	P	X

P = Parameter Difference

Table No. 4-A (Continued)

Table of Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
Transistors		
2N2222A	X	P
2N3440	X	X
2N3567	X	X
2N3585	X	P
2N3767	P	X
2N3772	X	X
2N3585	X	P
2N4236	X	X
2N5682	P	X
GE6060	X	X
Circuit Breaker		
CD2	P	X
TED	P	X
THED	X	P
TFJ	P	X
TJJ	X	X
C. C. Resistors		
RC07	X	X
RC20	X	X
RC32	X	X
RC42	X	X
M. F. Resistors		
RN60	X	X
V53	X	P
316	P	X
W. W. Resistors		
CW5	X	X
CW10	X	X
RH50	X	X
RH250	X	P
RS5	P	X

P = Parameter Difference

Table No. 4-A (Continued)

Table of Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
Potentiometers		
3059	X	X
3250	X	X
3255	X	X
Current Shunt		
PR0400	X	X
I.C. Op Amplifiers		
741	X	X
LF356	X	P
LM301	X	X
LM308	X	P
LM348	X	X
TL084	X	X
I.C. Comparators		
LM2311	X	X
LM311	X	X
LM339	X	X
I.C. Switch		
CD4016	X	X
DG302	X	X
DG303	X	X
I.C. Transistor Array		
ULN2004	X	X
I.C. Dual Drivers		
DS3632	X	X
I.C. Timers		
LM555	X	X

P = Parameter Difference

Table No. 4-A (Continued)

Table of Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
I.C. Decoder		
CD4028	X	X
I.C. PWM Regulator		
SG3524	X	X
I.C. Opto-Isolator		
MCA 230	X	X
MCS 2400	X	P
I.C. Voltage Regulators		
LM342P15	X	X
7815	X	X
7824	X	X
7915	X	X
I.C. Hex Inverter/Buffer		
CD4069	X	X
74C04	P	X
CD4049	P	X
I.C. Gates		
CD4001	X	X
CD4011	X	X
CD4023	P	P
CD4025	X	X
CD4070	X	X
CD4073	X	X
CD4081	X	X
I.C. Schmitt Trigger		
CD4093	X	X
CD40106	X	X

P = Parameter Difference

Table No. 4-A (Continued)

Table of Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
I.C. Flip-Flops		
CD4013	X	X
CD4027	X	X
I.C. Quad Latches		
CD4043	X	X
CD4044	P	X
I.C. Mono M.V.		
CD4098	X	X
I.C. Phase-Lock Loop		
CD4046	X	X
I.C. Counters		
CD4017	X	X
CD4028	X	X
CD4040	X	P
CD40192	X	X
Varistors		
V130	X	X
V150	X	X
V320	X	P
Quartz Crystals		
815A	X	X
Switches		
REK	X	X
107/407	X	X
10250	P	X
7101	X	P

P = Parameter Difference

Table No. 4-A (Continued)

Table of Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
Thermo Switch		
2450	X	X
Terminal Blocks		
140	X	X
170	X	X
172	X	P
601	X	X
642	X	X
EB25	P	X
OP10	X	X
Current Sensor		
ID-5001M	X	NR

P = Parameter Difference
NR = Not Required

Table No. 5-A

Table of Non-Safety Related Components
Used in UPS 253-1-106 and UPS 253-1-101

Component and Type	UPS 253-1-106	UPS 253-1-101
LED Indicators		
91	P	X
5082	X	P
DC Voltmeters		
50-112	P	X
237-01	X	P
DC Amperemeterss		
50-112	P	X
237-01	X	P
AC Voltmeters		
50-105	P	X
237-01	X	P
AC Amperemeters		
50-105	P	X
237-02	X	P
Frequency Meters		
50-112	P	X
237-41	X	P
Instrument Swiches		
C7B	P	X
8373	X	P
AC Amperemeter Transformers		
605	P	X
802	X	P

P = Parameter Difference

Table No. 5-A (Continued)

Table of Non-Safety Related Components
Used in UPS 253-1-106 and UPS 253-1-101

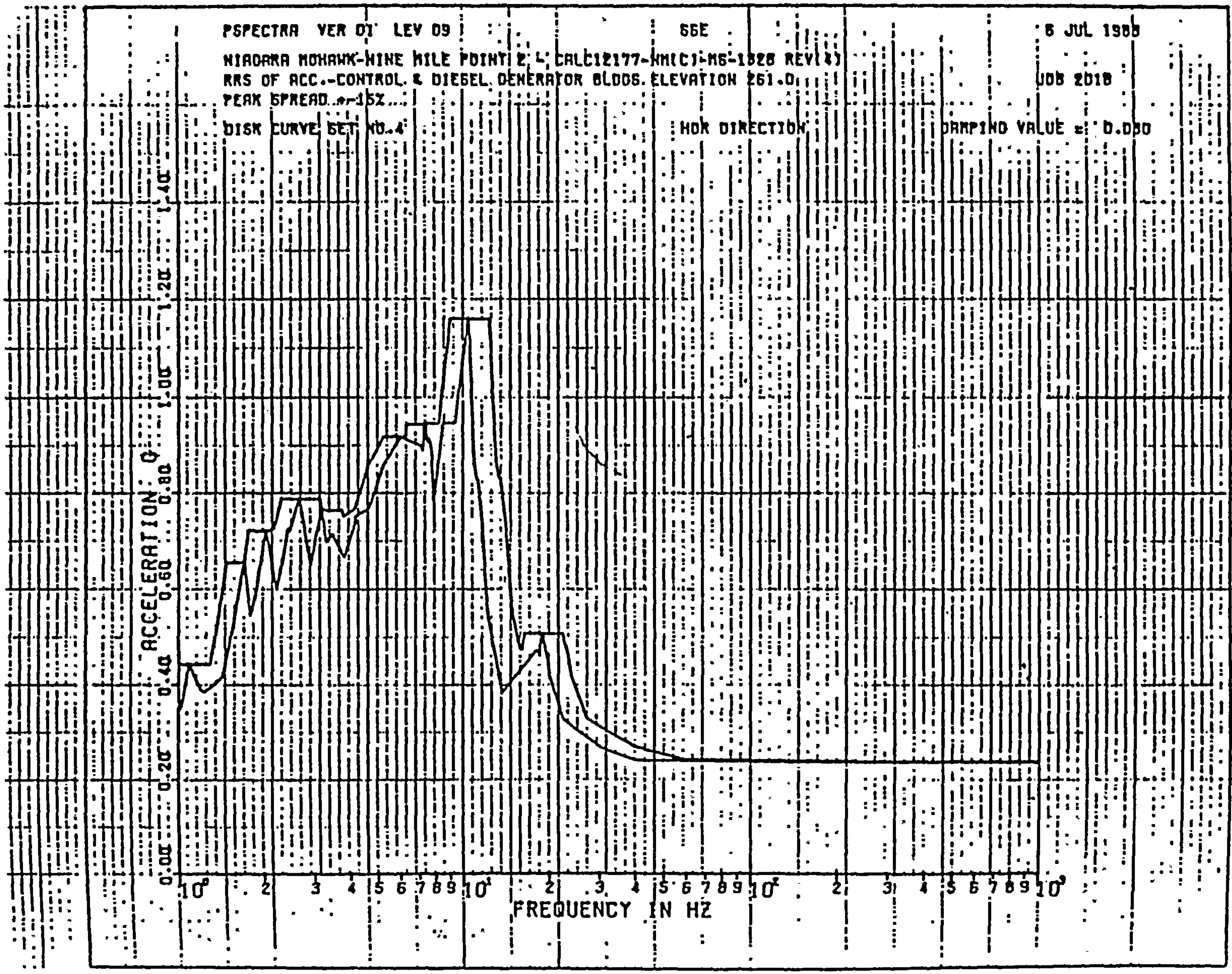
Component and Type	UPS 253-1-106	UPS 253-1-101
Elapsed Time Meter		
235-156	X	NR
Fans		
CL2	X	X
Air Switches		
FS3101	X	NR
Space Heater		
FS1022	NR	X

P = Parameter Difference
NR = Not Required

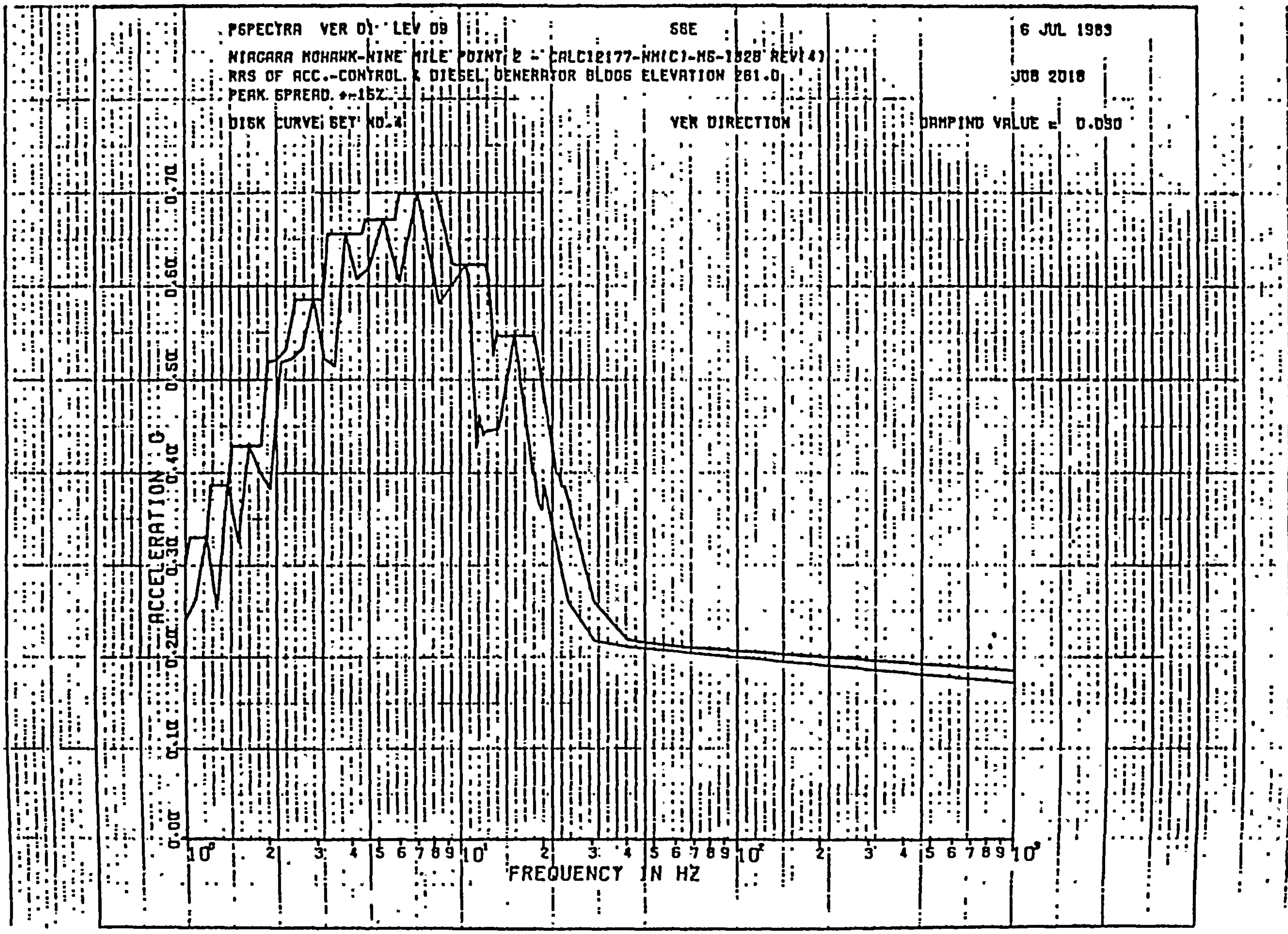
ATTACHMENT "B"

RRS FOR CONTROL BUILDING EL. 261 FT.

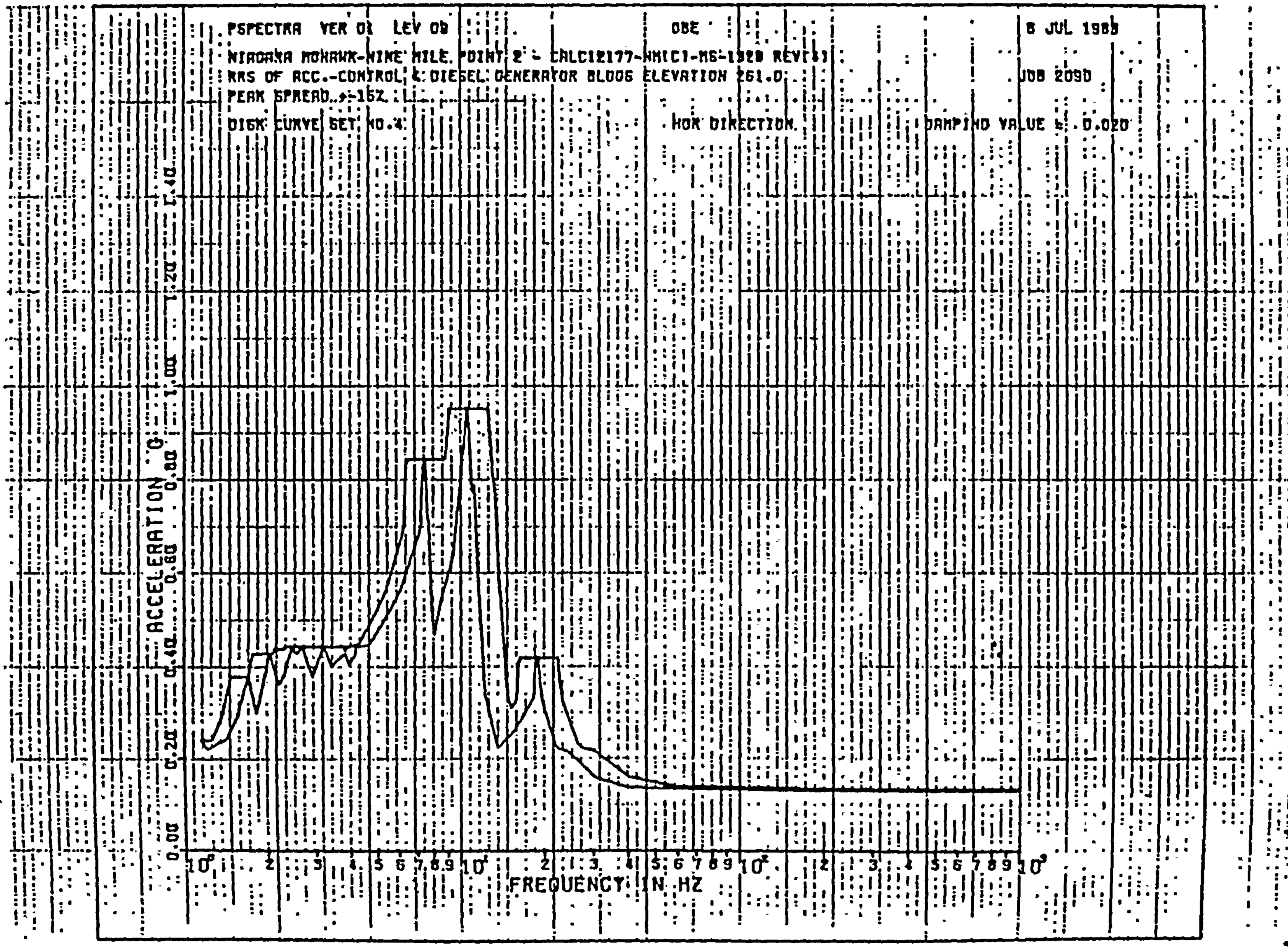
PAGE NO.	DESCRIPTION
49	HORIZONTAL RRS - 3% SSE
50	VERTICAL RRS - 3% SSE
97	HORIZONTAL RRS - 2% OBE
98	VERTICAL RRS - 2% OBE


PSPECTRA VER 01 LEV 09
SSE
5 JUL 1985
NIAGARA MOHAWK-NINE MILE POINT 2 CALC12177-NM(C)-MS-1328 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS. ELEVATION 261.0
JOB 2018
PEAK SPREAD +/-15%
DISK CURVE SET NO. 4
HOR DIRECTION
DAMPING VALUE = 0.050
ACCELERATION G
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
FREQUENCY IN HZ

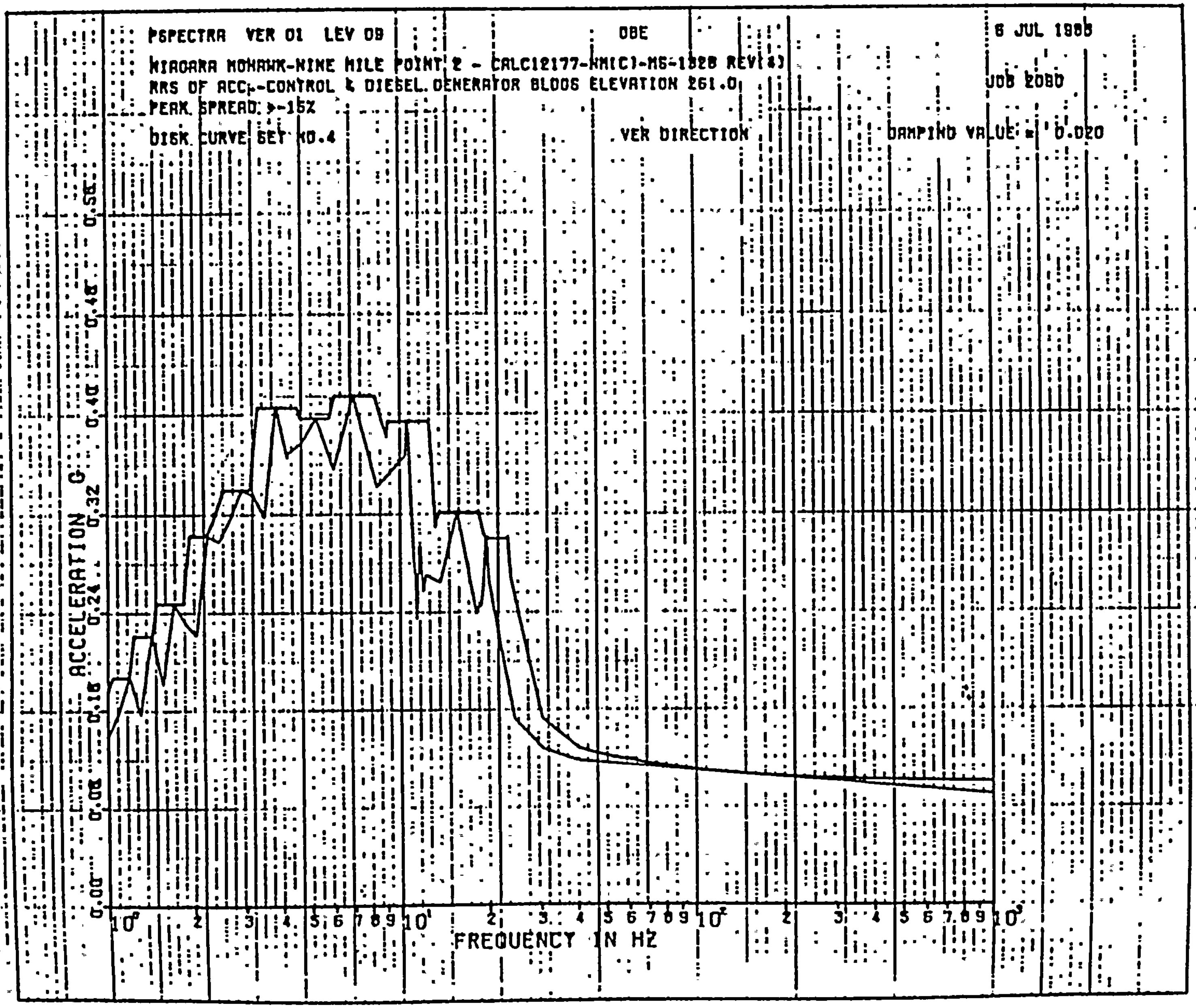
PAGE 49


PSPECTRA VER 01 LEV 09
SSE
6 JUL 1983
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2018
PEAK SPREAD +-15%
DISK CURVE SET NO.4
VER DIRECTION
DAMPING VALUE = 0.030
ACCELERATION G
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
10⁰
2
3
4
5
6
7
8
9
10¹
2
3
4
5
6
7
8
9
10²
2
3
4
5
6
7
8
9
10³
FREQUENCY IN HZ

PAGE 50


PSPECTRA VER 01 LEV 00
OBE
8 JUL 1988
NIADARA MOHAWK-NINE MILE POINT 2 - CALC12177-NMIC1-MS-1328 REV(1)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2090
PEAK SPREAD +-15%
DISK CURVE SET NO.4
HOR DIRECTION
DAMPING VALUE = 0.020
ACCELERATION G
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
FREQUENCY IN HZ
10⁰ 2 3 4 5 6 7 8 9 10¹ 2 3 4 5 6 7 8 9 10² 2 3 4 5 6 7 8 9 10³

PAGE 97



PSPECTRA VER 01 LEV 09
OBE
6 JUL 1988
NIAGARA MOHAWK-NINE MILE POINT 2 - CALC12177-NM(C)-MS-1328 REV(4)
RRS OF ACC.-CONTROL & DIESEL GENERATOR BLDGS ELEVATION 261.0
JOB 2080
PEAK SPREAD: >-15%
DISK CURVE SET NO.4
VER DIRECTION
DAMPING VALUE = 0.020
ACCELERATION G
0.56
0.48
0.40
0.32
0.24
0.16
0.08
0.00
FREQUENCY IN HZ

PAGE 98

ATTACHMENT "C"

TRS FROM TEST REPORT

PAGE NO.	DESCRIPTION
2-89	FRONT-TO-BACK 3% SSE (X-Y)
2-90	VERTICAL 3% SSE (X-Y)
2-151	SIDE-TO-SIDE 3% SSE (Z-Y)
2-152	VERTICAL 3% SSE (Z-Y)
2-41	FRONT-TO-BACK 2% OBE (X-Y)
2-42	VERTICAL 2% OBE (X-Y)
2-125	SIDE-TO-SIDE 2% OBE (Z-Y)
2-126	VERTICAL 2% OBE (Z-Y)

WYLE LABORATORIES

Report No. 58733

Page No. 2-89

CUSTOMER Elgar Job No. 58733 Date 2-17-82

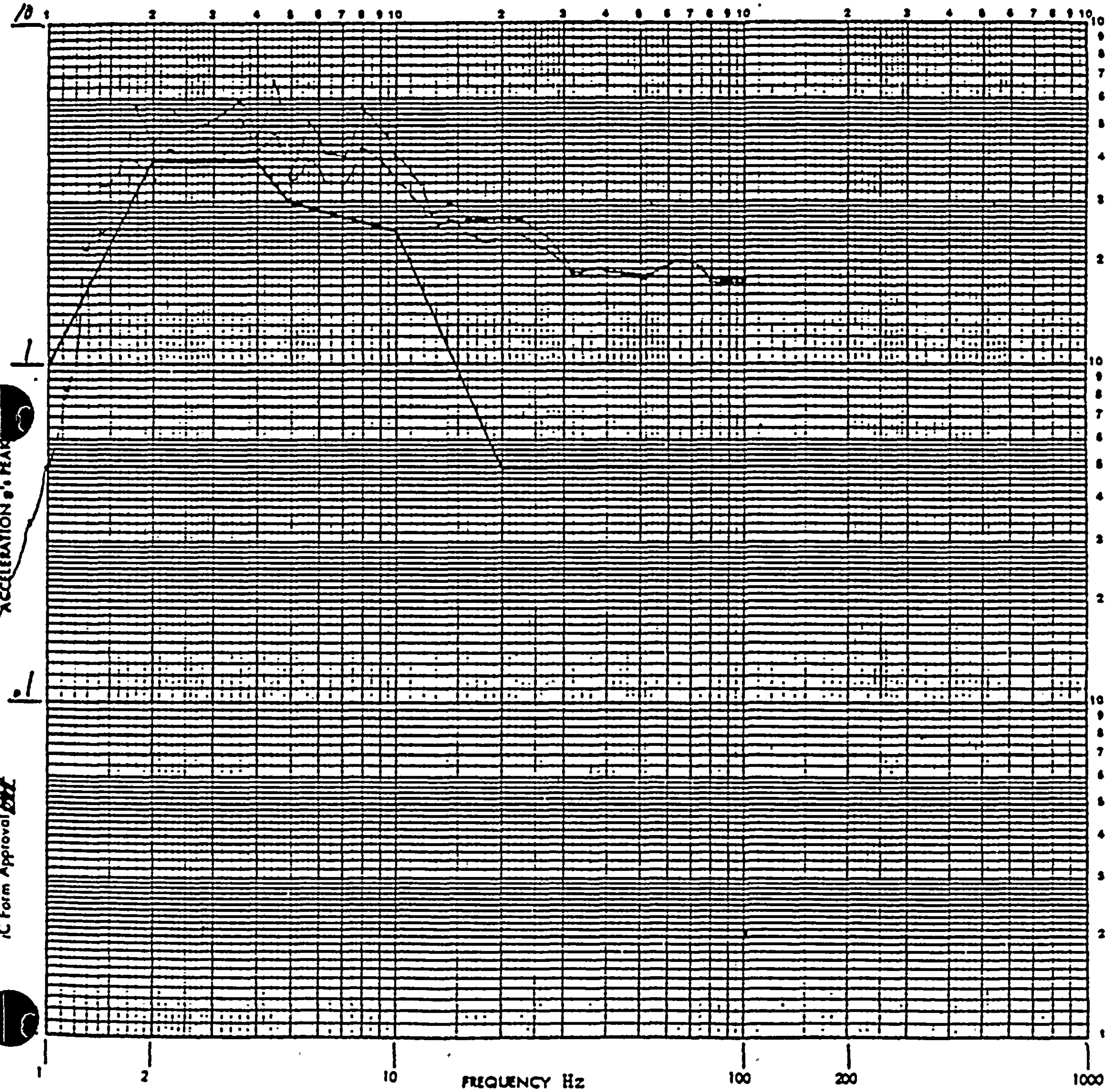
Specimen U. P. S. Axis of Test X-Y

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

Full Scale 10 g Damping 3.5% Run No. 10

Operator Q E Engineer MP

RESPONSE SPECTRUM



IC Form Approval

WYLE LABORATORIES

Report No. 58733

Page No. 2-90

CUSTOMER Elgar Job No. 58733 Date 2-17-82

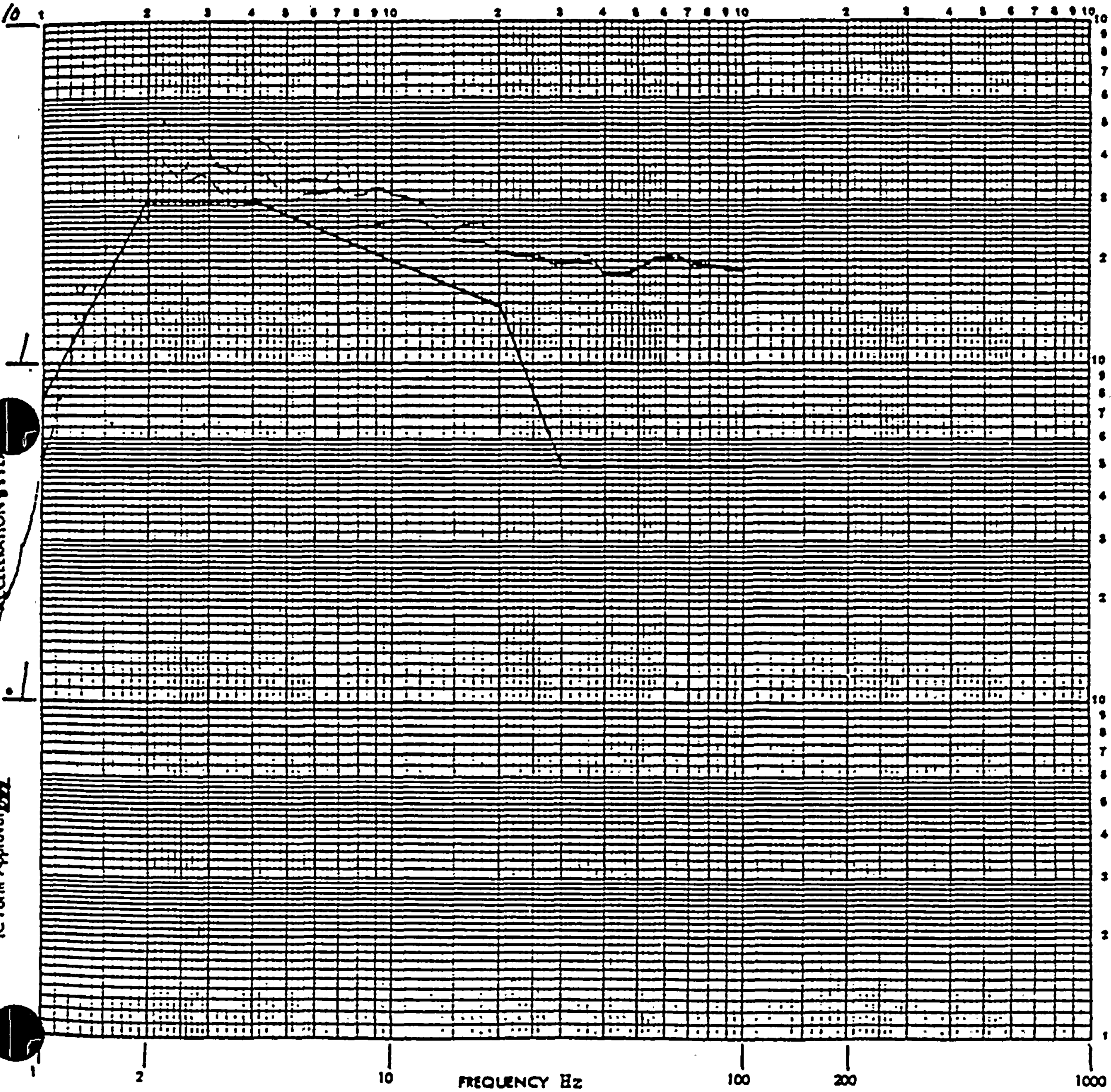
Specimen U.P.S Axis of Test X-Y

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

Full Scale 10 g Damping 3,5% Run No. 10

Operator JE Engineer MCf

RESPONSE SPECTRUM



IC Form Approval

WYLE LABORATORIES

ATTACHMENT C

Report No. 58733

Page No. 2-151

CUSTOMER Elgar Job No. 58733 Date 2-17-92

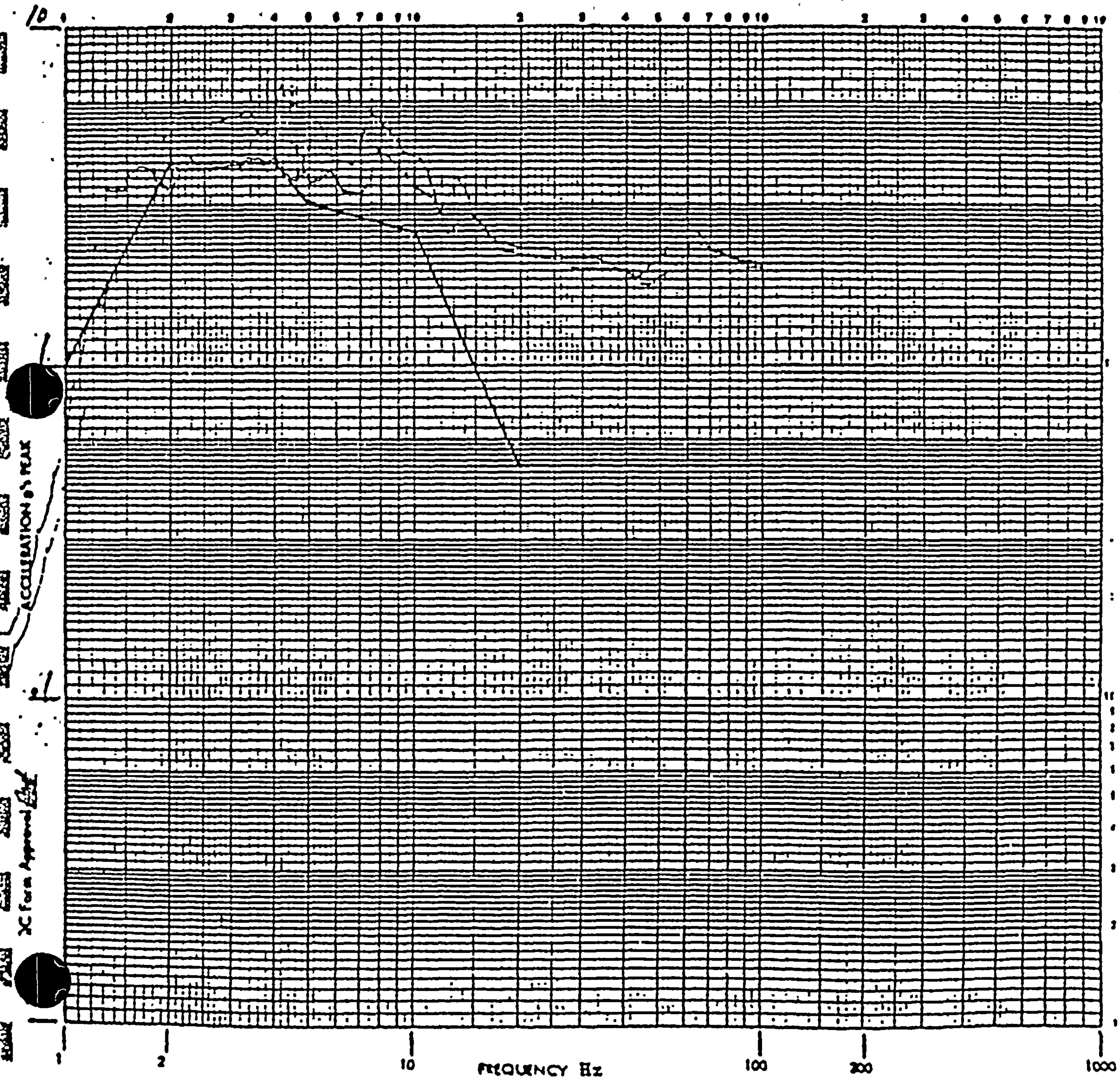
Specimen U.P.S. Axis of Test Z-Y

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

Full Scale 10 g Damping 3.5 Run No. 17

Operator J.E. Engineer M.H.

RESPONSE SPECTRUM



WYLE LABORATORIES

ATTACHMENT C

Report No. 58733

Page No. 2-152

[illegible]CHER Elgzz Job No. 58733 Date 2-12-92

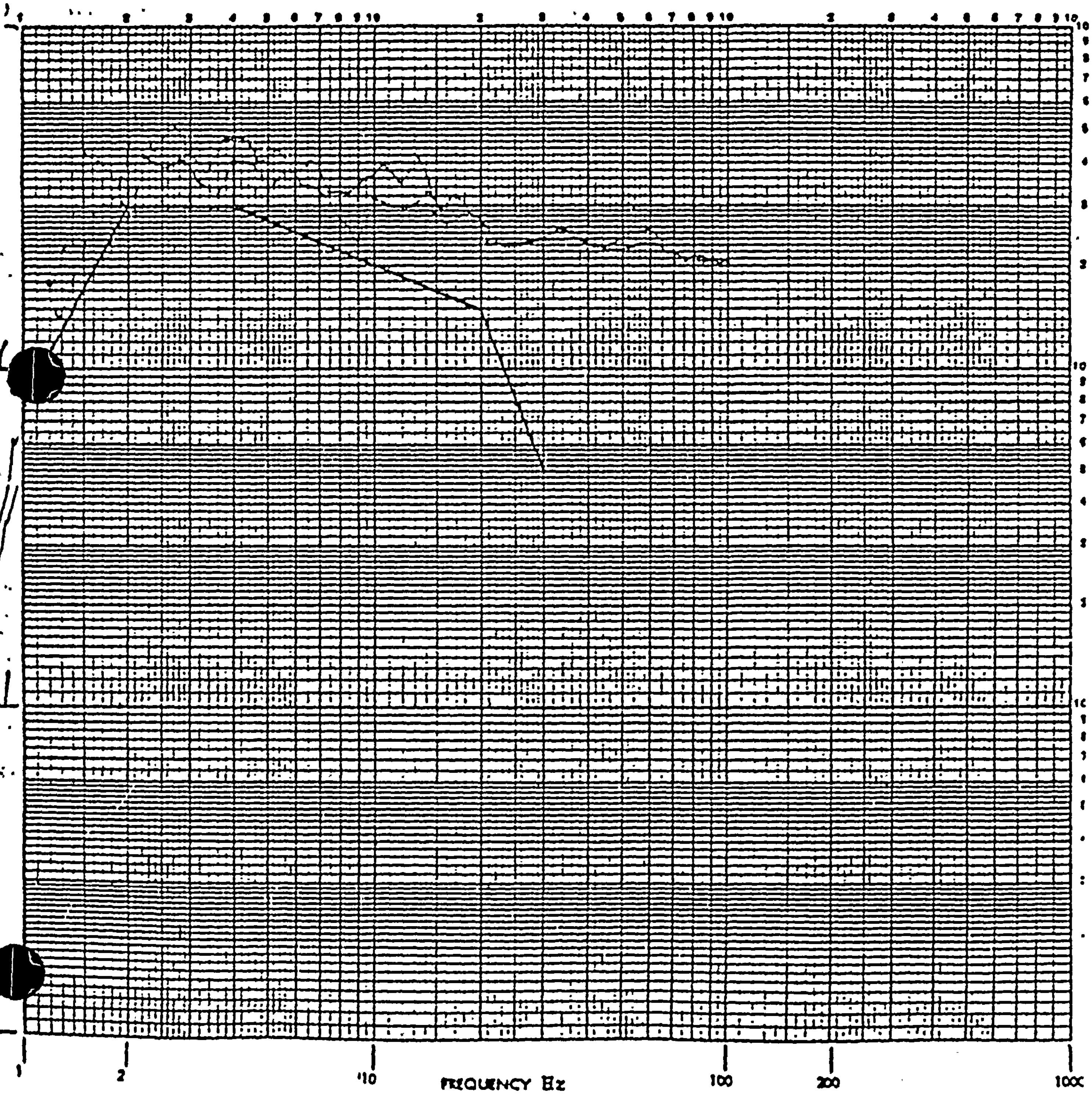
Specimen U.P.S. Axis of Test Z-Y

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

Full Scale 10 g Damping 3.5 Run No. 17

Operator JE Engineer MH

RESPONSE SPECTRUM



FREQUENCY Hz

XC Form Approval

WYLE LABORATORIES

ATTACHMENT C

Report No. 58733

Page No. 2-61

CUSTOMER Elgar Job No. 58733 Date 2-17-82

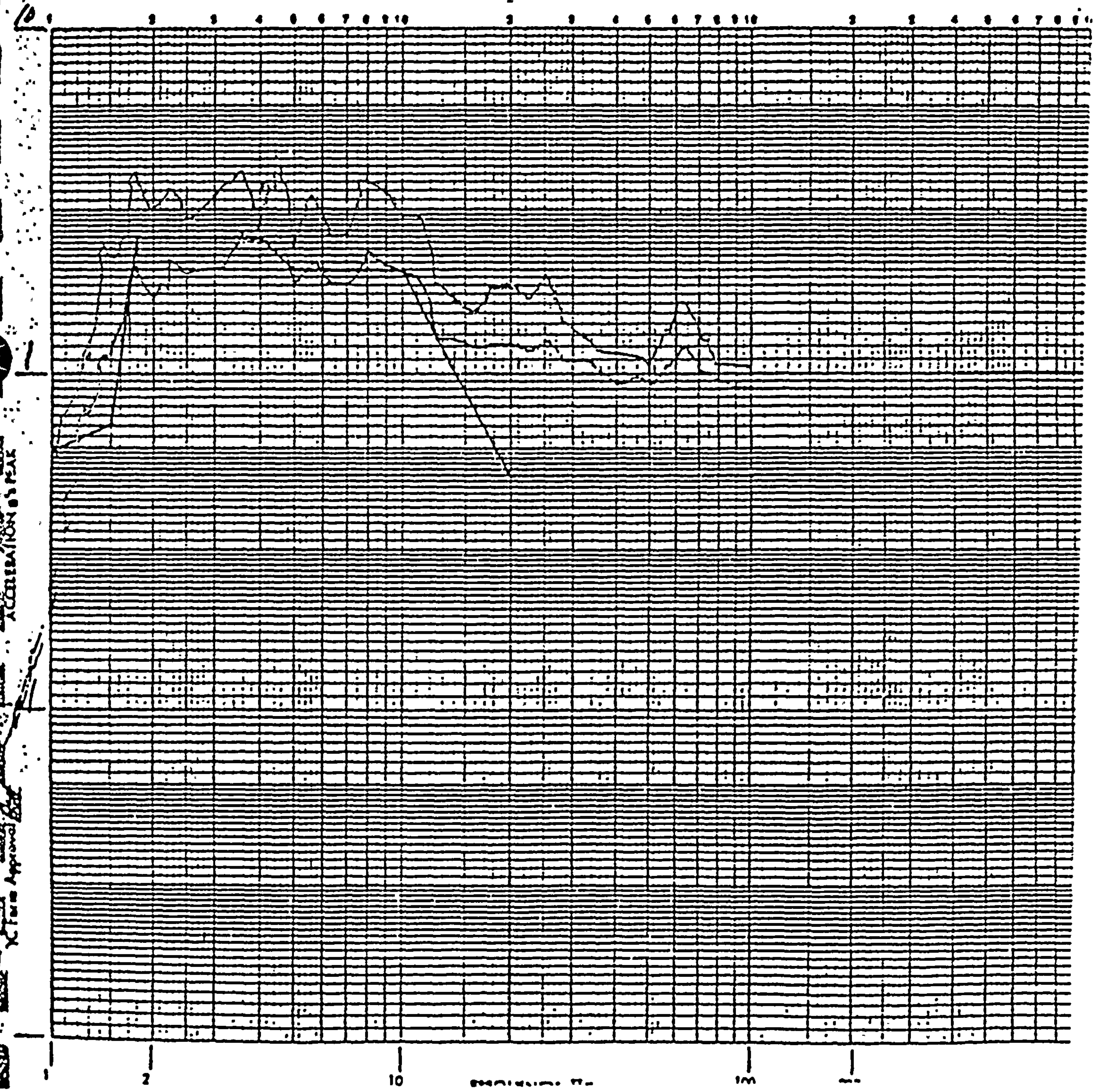
Specimen U.P.S. Axis of Test XY

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

Full Scale 10 g Damping 2.5 % Run No. 6

Operator J.E. Engineer M.H.

RESPONSE SPECTRUM



WYLE LABORATORIES

ATTACHMENT C

Report No. 58733

Page No. 2-62

CUSTOMER Elgar Job No. 58733 Date 2-17-82

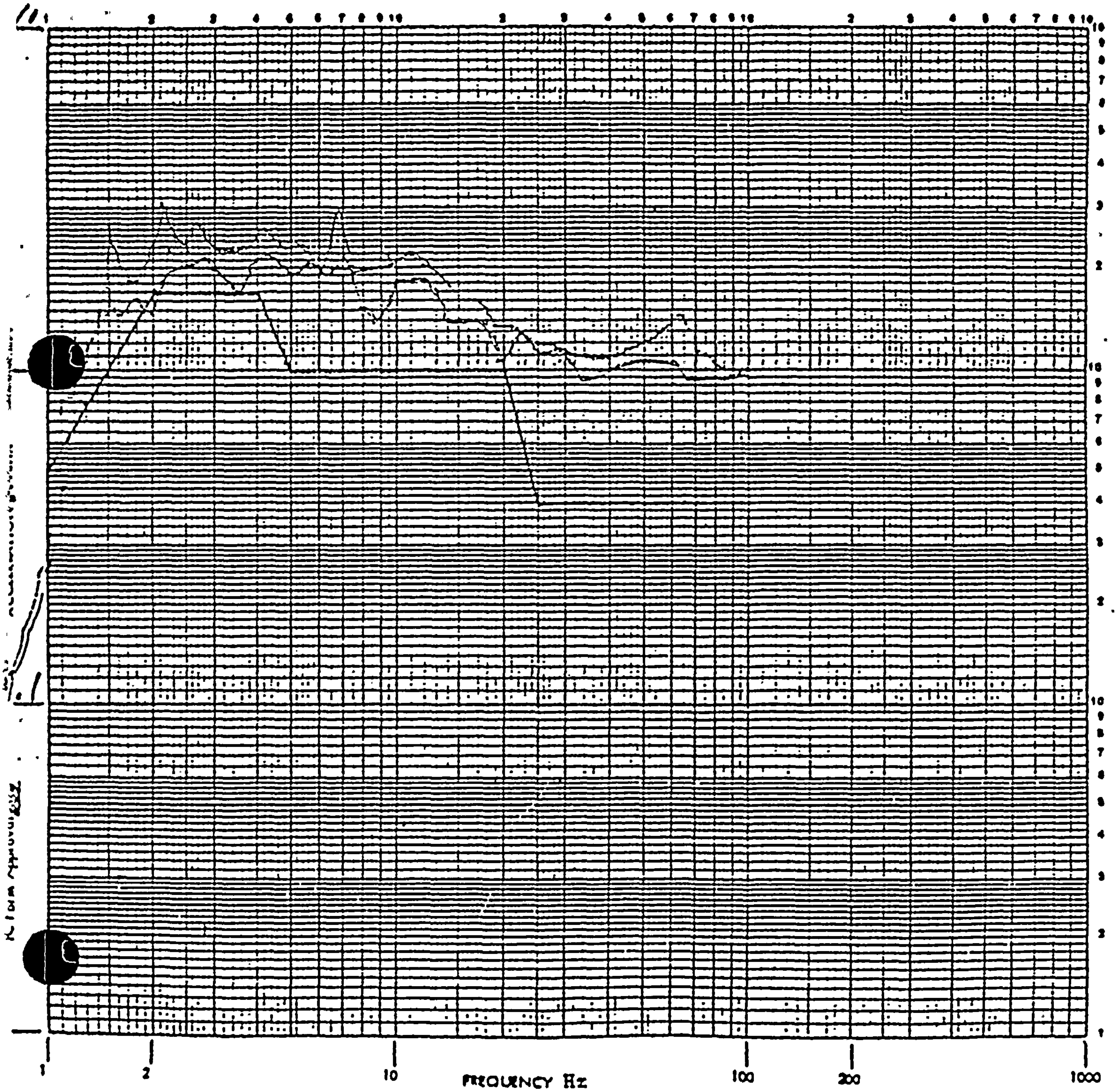
Specimen U.P.S. Axis of Test XY

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

Full Scale 11 g Damping 2.5 % Run No. 6

Operator J.E. Engineer MCL

RESPONSE SPECTRUM



CUSTOMER Elgar Job No. 58733 Date

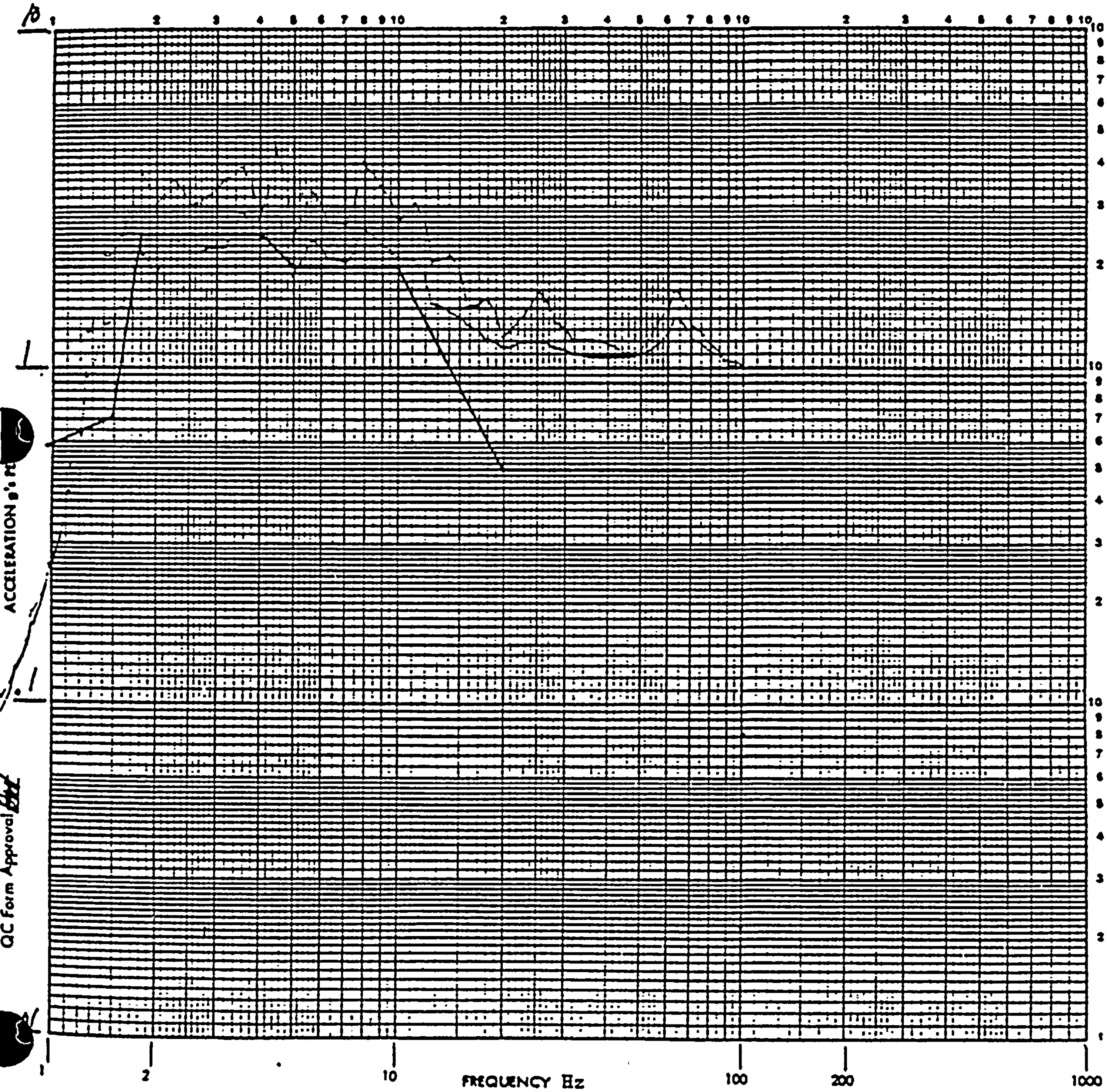
Specimen U.P.S. Axis of Test Z-Y

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

Full Scale 10 g Damping 2.5 % Run No. 14.

Operator J E Engineer MH

RESPONSE SPECTRUM



QC Form Approval

WYLE LABORATORIES

ATTACHMENT C

Report No. 58733

Page No. 2-126

Customer Elgar Job No. 58733 Date 2-17-82

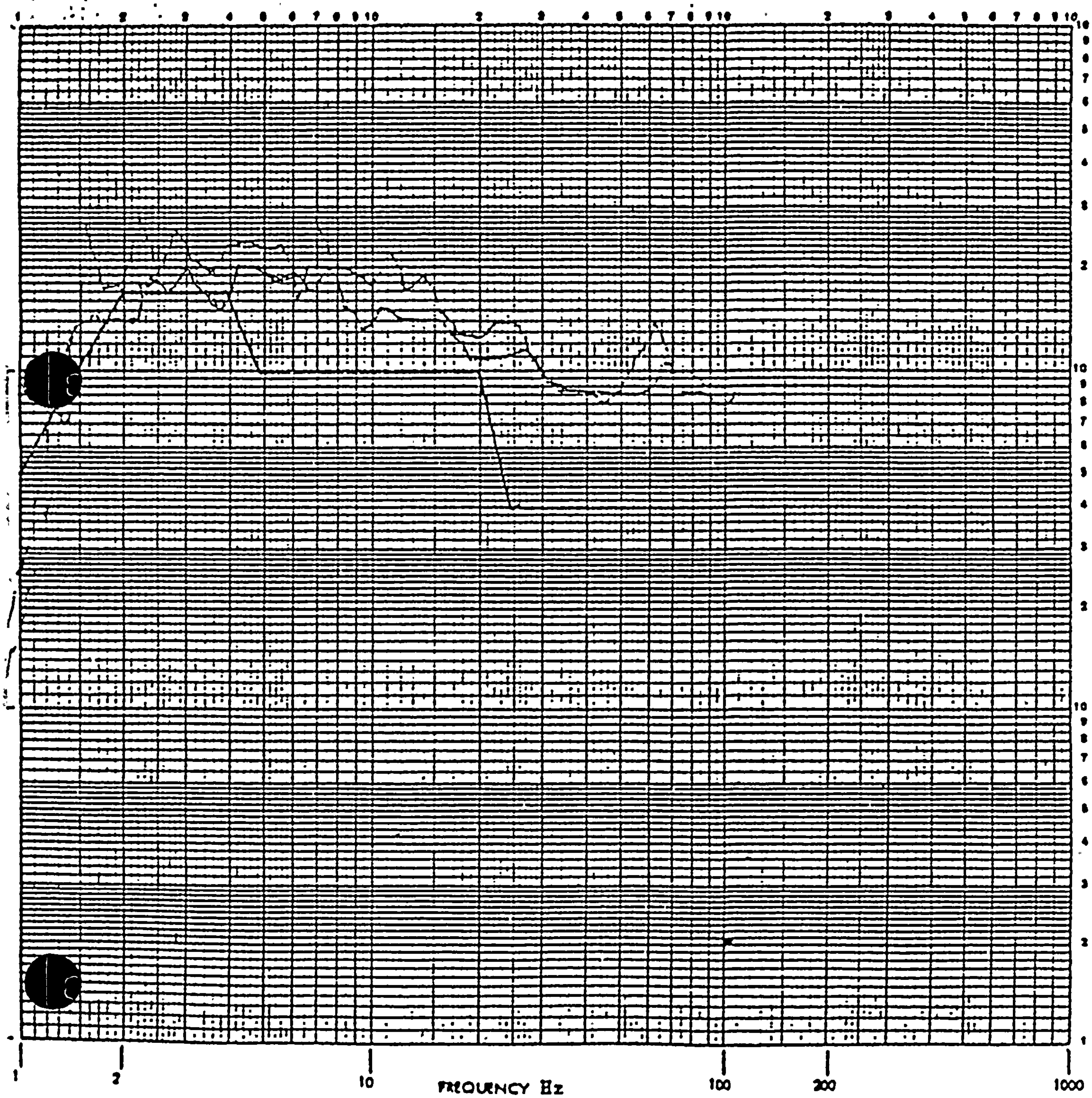
Specimen U.P.S. Axis of Test Z-Y

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

Full Scale 10 g Damping 2.5% Run No. 14

Operator JE Engineer MP

RESPONSE SPECTRUM



SPEC. NO. NMP2-E092B

SQRT # 14

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: HEAT TRACING PANEL

MARK NUMBERS: 2HTS*PNL003

STONE & WEBSTER

SPEC. NO. E092B
Revision 1 5-14-84

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point Nuclear Station - Unit 2

1. Utility: Niagara Mohawk Power Corporation

2. NSSS: General Electric Co. BWR: 5 MK 2

3. A/E: Stone & Webster Engineering Corp. Other ____________

II. Component Name: HEAT TRACING CONTROL PANEL
MARK NO. 2HTS*PNL003

1. Scope: ( ) NSSS (✓) BOP ( ) Other

2. Model Number: N/A Quantity: 1

3. Size or Range: 15 VOLTS DC, 60 WATTS

4. Vendor: THERMON MANUFACTURING CO.

5. If the component is a cabinet or panel, name and model number of the devices included: ____________
ATTACHMENT 1

6. Physical Description:

a. Appearance: VERTICAL BOX

b. Dimensions: 72" x 24" x 90" HIGH

c. Weight: 5000 LBS.

7. Location: Building: AUX. BAY SOUTH
Elevation: 240'

8. Field Mounting Conditions (✓) Bolt (No. 18 - Size 1/2") HILTI BOLTS
( ) Weld (Length ____)
( ) ____________

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

10. a. System in which located: HTS SYSTEM 120VAC POWER/CONTROL PANEL FOR HEAT TRACING SYSTEM

b. Functional Description: 120 VAC POWER SUPPLY

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

II. Pertinent Reference Design Specifications for Qualification Requirements: ______

SPEC. NO. NMP2-E092B, REV 1, MAY 14, 1984

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

III. Is Equipment Available for Inspection in the Plant:

(✓) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

(✓) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: SWEC SDDF # IEEE 1.620-5000 B

(No., Title and Date): QUALIFICATION TEST REPORT NMP-2/EQR-1, MAY 14, 1984

Company that Prepared Report: THERMON MANUFACTURING CO.

Company that Reviewed Report: SWEC

Where Report is filed or available: NMP2 SITE

Applicable Codes and/or Standards: IEEE 344-1975. RG 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

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

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

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

5. Required Acceleration in Each Direct:

(✓) ZPA ( ) Other ____________ (specify)

OBE S/S = 0.20g F/B = 0.20g V = 0.15g

SSE S/S = 0.30g F/B = 0.30g V = 0.20g

6. Were fatigue effects considered?

( ) Yes (✓) No

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

N/A

VI. If Qualfication by Test, then Complete:

1. ( ) Single Frequency (✓) Multi-Frequency (✓) Random
( ) Sine Beat
( ) ____________

2. ( ) Single Axis (✓) Multi-Axis
(✓) Independent ~~Axis~~ MOTIONS ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE 5 SSE 1 Other ____________ (specify)

4. Frequency Range: 1 - 50 Hz.

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

S/S= 8.75 Hz F/B= 7.5 Hz V= 14.5 Hz

6. Method of Determining Natural Frequencies
(✓) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

(✓) Yes (Attach TRS & RRS graphs) ATTACHMENT 3
( ) No

8. Maximum Input g Level Test:

OBE S/S = 0.537 F/B = 0.493 V= 0.425

SSE S/S = 0.816 F/B = 0.591 V = 0.562

9. Laboratory Mounting:

A. (✓) Bolt (No. 16 Size 1/2-13) X-Z AXIS TEST; (NO. 14 SIZE 1/2-13) Y-Z AXIS TEST
( ) Weld (Length ________) ( ) ________

B. Orientation and Fixturing: MOUNTED RIGIDLY ON SHAKE TABLE

10. Functional Operability Verified:

(✓) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: FUNCTIONED SATISFACTORILY. NO MODIFICATIONS.

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

ALL TESTS PERTINENT TO IEEE 323-1974

13. Failure Modes (If appropriate STRUCTURAL & ELECTRICAL)

14. Margins Available: (✓) Input Spectrum ( ) Fragility

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

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

4. ( ) Computer Codes:________________ ________________

Frequency Range and No. of Modes

( ) Hand Calculations

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

( ) Absolute Sum ( ) SRSS ( ) Other:________________ (specify)

6. Damping:

OBE________ SSE________ Basis for the Damping Used:________

7. Support Considerations in the Model:________________

8. Critical Structural Elements:

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

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

9. Failure Modes:________________

10. Margins Available: ( ) Input Spectrum ( ) Stress or Deflection

3.0 DEFINITIONS

Term definitions are as given in Section 3.0 of Reference 2.2 and Section 2.0 of Reference 2.1.

4.0 TEST ITEM IDENTIFICATION

The following is Thermon equipment which was seismically qualified.

4.1 Control Panel, 2HTS-PNL107, 90" x 72" x 24", NEMA 12 Hoffman Enclosure with installed subcomponents.

The following is a list of unaged subcomponents in the panel for which components of the same type were aged in a previous project, Reference 2.9. The number in parentheses is the identification number found in the final report, Reference 2.9.

4.2 Control Card, Solid State, Thermon Cat. #CC-10 (3.4)

4.3 Relay, Solid State, 15 Amp, Opto 22 Cat. #240D25 (3.5)

4.4 Fuse Block, Bussman Cat. #4407 w/5 Amp Fuse, Bussman Cat. #ABC-05 (3.6)

4.5 Main Circuit Breaker, Square D Cat. #KAL-36225 (3.11)

4.6 Breaker Frame, Square D Cat. #NQOB-330-SP (3.13)

4.7 Branch Circuit Breaker, Square D Cat. #QOB-120 (3.15)

4.8 Wire SIS, #14 AWG, G.E. Vulkene, with Burndy Type YAV Lugs (3.18)

4.9 Wire, #22 AWG, Tefzel Insulated, with Burndy Type YAV Lugs (3.20)

4.10 Power Distribution Block, Taylor Cat. #66013 (3.22)

4.11 D.C. Power Supply, Thermon Cat. #PS-10 (3.24)

4.12 Auxiliary Electronics Module, Thermon Cat. #EP-10, Part of Control Card Rack, Thermon Cat. #RA356 (3.25)

4.13 Terminal Block, Marathon Cat. #1500 (3.26)

4.14 Terminal Block, Marathon Cat. #200 (3.27)

4.15 Fan, Condor Model 12, 575 CFM with Finger Guard (3.7)

4.16 Operator, Pushbutton Station with Two Pushbuttons, Square D Cat. #BF-214 (3.21)

The following item is prequalified nuclear grade wire:

4.17 Main Frame Wiring, Firewall EP, 2/0, Rockbestos (prequalified by Rockbestos)

The following items in the panel have not been previously aged either because they are non-ageable or not considered critical to the 1E function of the panel:

4.18 Heat Sink for Solid State Relays, Thermon Cat. #HS-10 (non-ageable, metal)

4.19 Relay, Alarm, Square D Cat. #8501, LO-20 (non-critical)

4.20 Wire Duct, White, Chlorine-free, Panduit (non-critical)

4.21 Mounting Track, Pre-Punched Aluminum, Buchanan (non-ageable, metal)

4.22 Thermostat, SPDT, Seymour Cat. #ETD-5S (non-critical)

4.23 Light Base w/Globe and Guard, Hubbell #VB-152 (non-critical)

4.24 Light Switch, SPST, Seymour Cat. #501-I (non-critical)

4.25 Receptacle, 15 Amp, Hubbell Cat. #5262 (non-critical)

4.26 Receptacle Cover, Appleton Cat. #2510 (non-ageable, metal)

4.27 Handy Box, Appleton Cat. #4CS-1/2 (non-ageable, metal)

4.28 Filter, 24" x 24" x 1", Farr Cat. #30/30 (non-critical)

4.29 Filter Frame, Air San Cat. #AH2-45 (non-ageable, metal)

4.30 Ground Bar, Copper (non-ageable)

4.31 Brace, Heat Sink, Thermon Cat. #19520 (non-ageable, metal)

4.32 Brace, Top Rack Assy, Thermon Cat. #19522 (non-ageable, metal)

4.33 Brace, Bottom Rack Assy, Thermon Cat. #19523 (non-ageable, metal)

Differences between those items previously aged in Ref. 2.9 and those provided in this panel, 2HTS-PNL107:

1. Item 4.2, Control Card #CC-10 is identical to the CC-20, Item 3.4 of Ref. 2.9 with the exception that the CC-20 has an additional switch.

2. Item 4.4, Fuse, 5A, Bussman, is identical to the 3A Fuse, Item 3.6 of Ref. 2.9 with the exception of the current rating.

3. Item 4.6, Breaker Frame, Square D #NQOB-330-SP is constructed of the same ageable materials as the NQOB-424, Item 3.13 of Ref. 2.9. The NQOB-330-SP is a single phase, 3 pole, 30 space frame with silver plated copper busses. The NQOB-424 is a 3 phase, single pole, 42 space frame with copper busses.

4. Item 4.10, Power Distribution Block, Taylor Cat. #66013 is constructed of the same materials as the Taylor Cat. #66011, Item 3.22 of Ref. 2.9. The 66013 has 3 poles and the 66011 is a single pole block. Both are used in 2HTS-PNL107.

5. Item 4.13, Terminal Block, Marathon Cat. #1500 series are all constructed of the same materials. The Cat. #1504DJ, #1506DJ and #1512DJ are used in 2HTS-PNL107. The 04, 06 and 12 denote number of terminals.

6. Item 4.14, Terminal Block, Marathon Cat. #200 series are all constructed of the same materials. The Cat. #214 is used in 2HTS-PNL107. The 14 denotes number of terminals.

5.0 SEISMIC QUALIFICATION TEST PROCEDURE

The test items in Section 4.0 will be tested in accordance with paragraph 6.3, "Type Test" of IEEE 323-1974. All test items will be qualified as Class 1E equipment. The test procedure conforms to the requirements for the Random Motion Tests of paragraph 6.6.3.3 of IEEE 344-1975.

Components of the same type listed in Section 4.0 were thermally aged, exposed to radiation, and seismically tested in a previous Thermon project. Results of these tests are found in the final report, Reference 2.9. Also the thermal and radiation aging is summarized in Table 5.1. A qualified life for these components has been calculated using the Arrhenius Equation, the average service temperature of 87°F from the SWEC letter No. 9M2-15,431, Reference 2.8, and the aging temperatures and activation energy constants found in the SwRI final report, Reference 2.9. This qualified life is given in Table 5.1. The equipment operation after the radiation total integrated dose of 3.08×10^4 plus 10% margin, as taken from the SWEC letter, Reference 2.8, has been demonstrated in the previous project, as shown in Table 5.1. The components were not seismically tested, however, per the requirements of the SWEC specification, Reference 2.7, in the previous project.

At the request of Thermon, unaged components will be tested in this program similar to those listed in Reference 2.9. It will be demonstrated that the Class 1E function of the usage equipment is not impaired during and after seismic excitation per the SWEC specification, Reference 2.7.

5.1 Mounting

Item 4.1 will be mounted to our biaxial hydraulically actuated seismic facility. A description of this facility is given in Appendix C. Subcomponents 4.2 through 4.14 will be mounted in 4.1. Mounting will be in a manner that simulates the intended in-service mounting; i.e., the same orientation of the component to the vertical, the same bolt location, bolt size, etc. This is in accordance with paragraph 6.1.1 of IEEE 344-1975. Detail on the current in-service mounting will be provided by Thermon.

PSPECTRA VER 01 LEV 08 UPSET CONDITION 24 JAN 1989

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O... /7 MS-1746-0

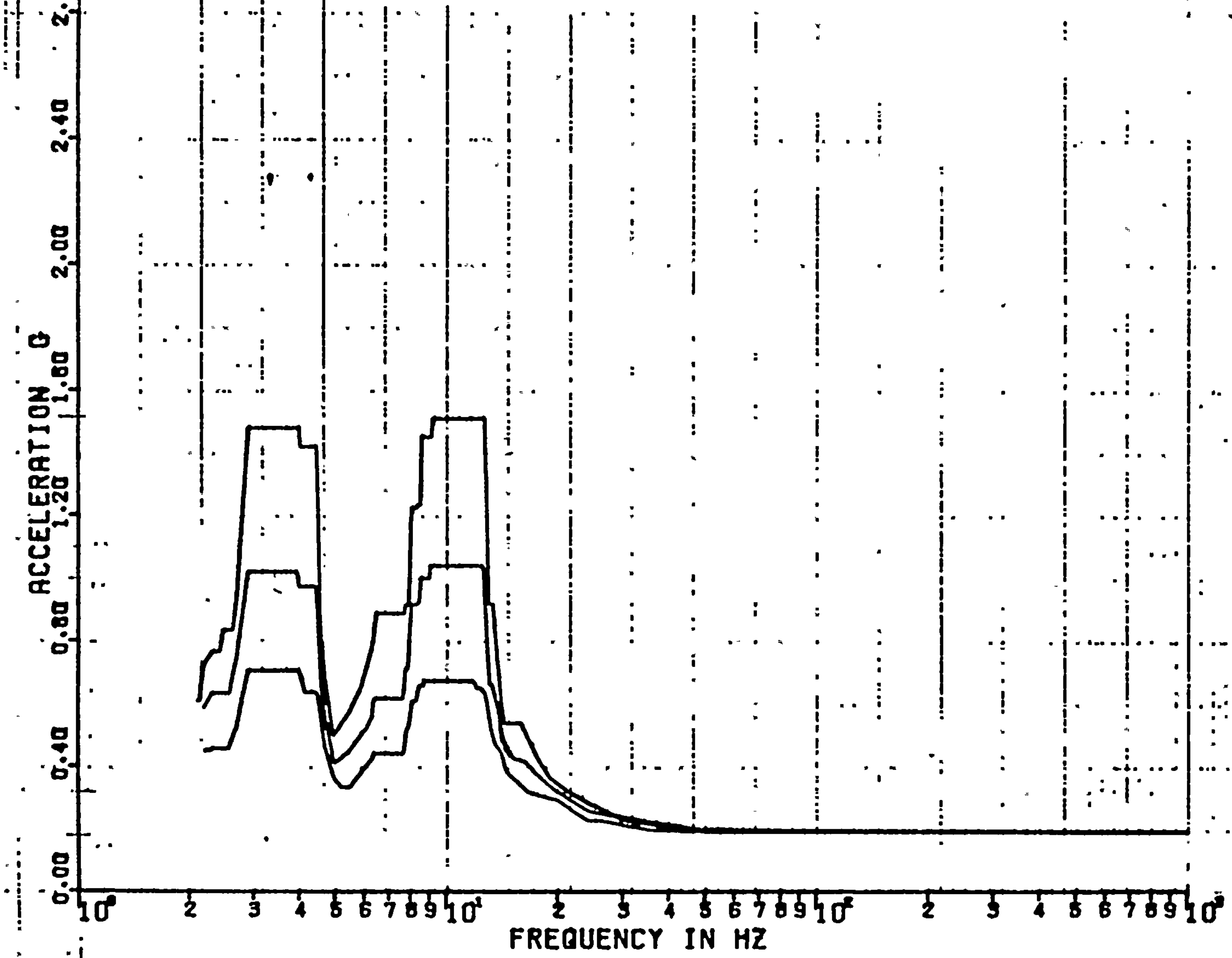
RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

MS 1746

MICHAEL K DO

DISK CURVE SET NO.29 HOR DIRECTION DAMPING VALUES = 0.010 0.020 0.040

NOTE: MULTIPLOT OF RRS CURVES WITH .... DAMPING 1% 2% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%.



ATTACHMENT 2

PAGE 1 OF 4

PAGE # 79

PSPECTRA VER 01 LEV 08 UPSET CONDITION 24 JAN 1989

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O. 177 MS-1746-0

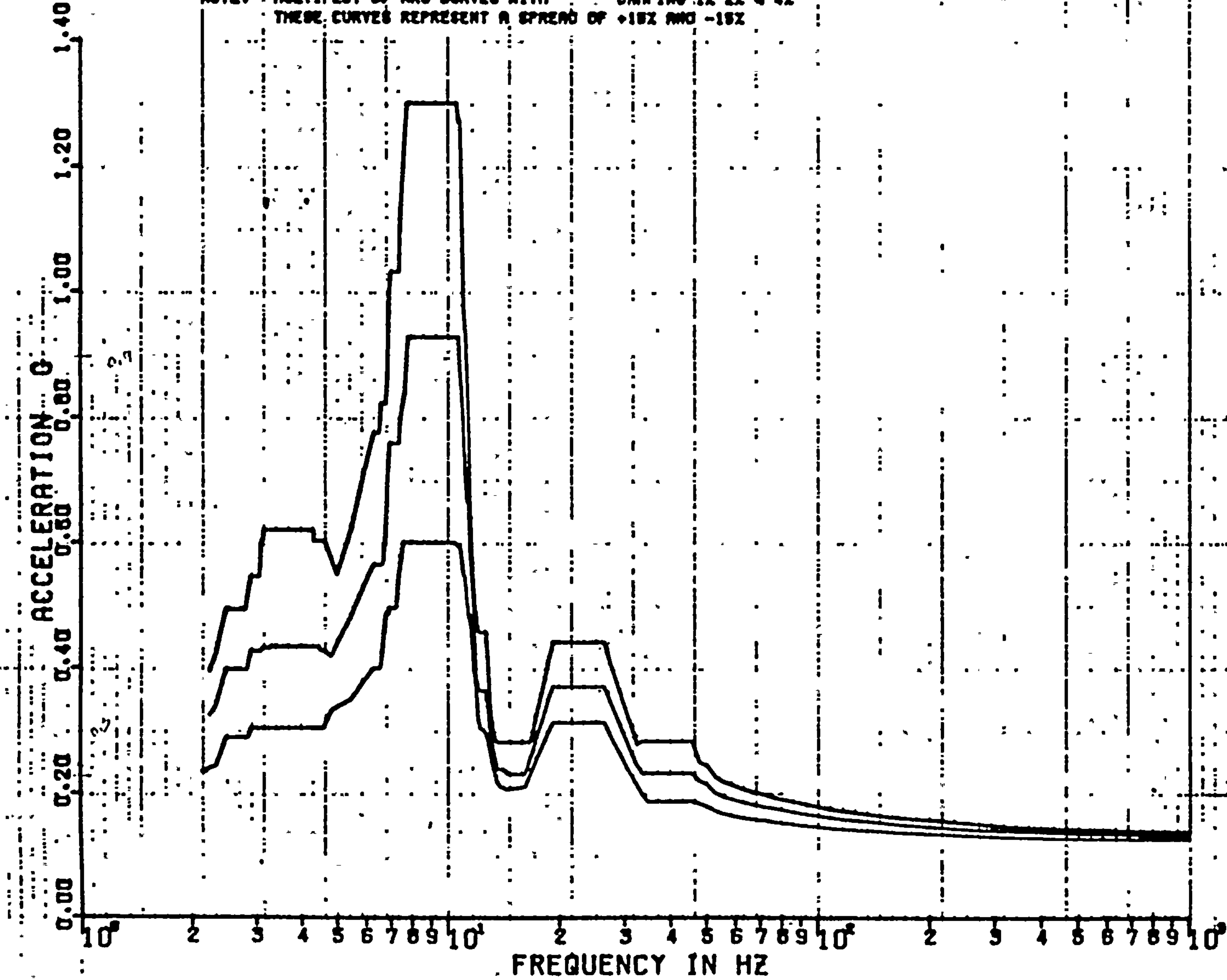
RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

MS 1746

MICHAEL K DO

DISK CURVE SET NO.28 VER DIRECTION DAMPING VALUES = 0.010 0.020 0.040

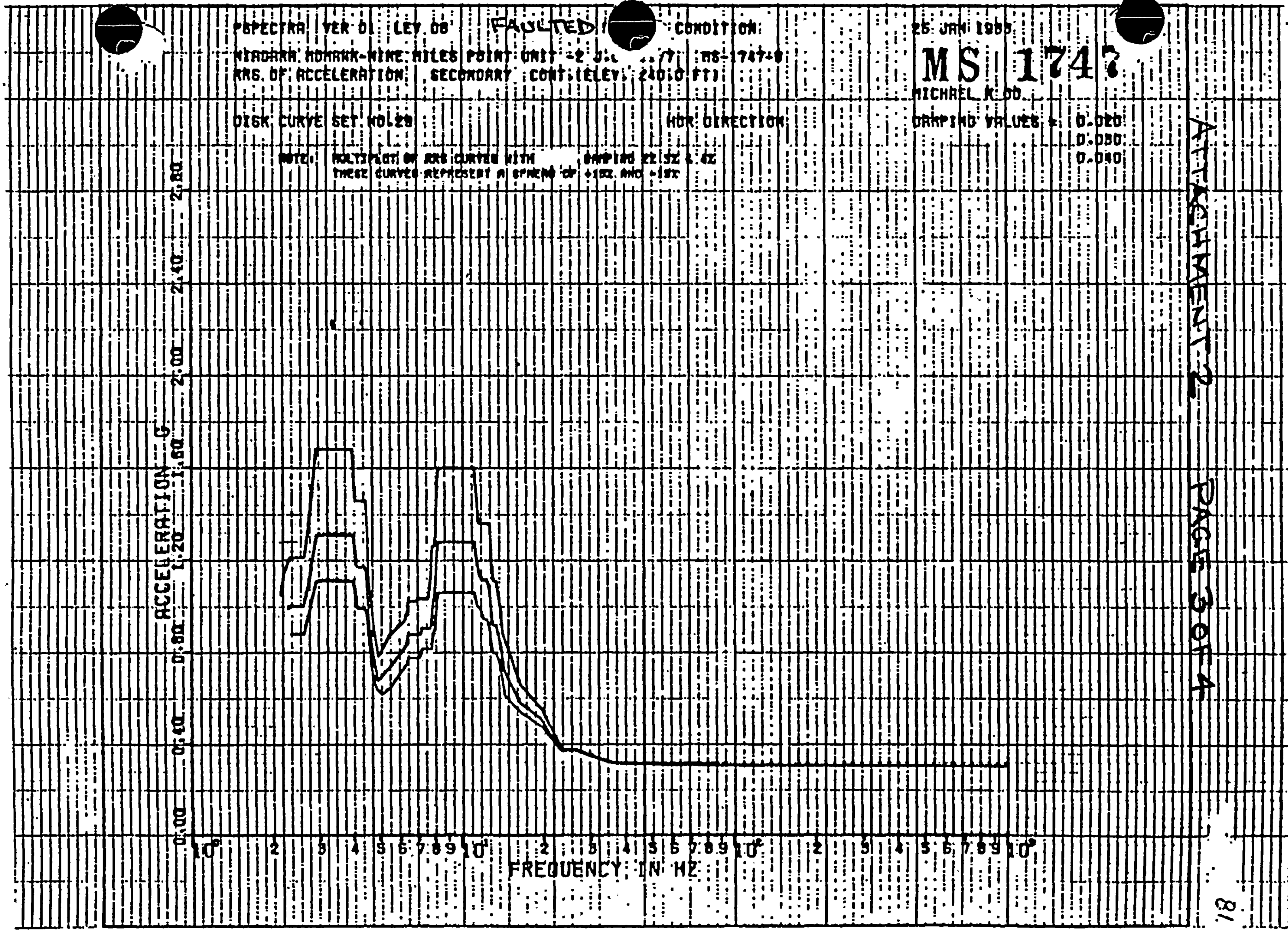
NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 1% 2% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



ATTACHMENT 2

PAGE 2 OF 4

PAGE # 80


PSPECTRA VER 01 LEV 08
FAULTED CONDITION
25 JAN 1985
NIAGARA MOHAWK-NINE MILES POINT UNIT -2
MS-1747-0
RRS OF ACCELERATION SECONDARY CONT. (ELEV. 240.0 FT)
MS 1747
MICHAEL K. DO
DISK CURVE SET NO.29
HOR DIRECTION
DAMPING VALUES = 0.020
0.030
0.040
ACCELERATION G
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
FREQUENCY IN HZ
10^0 2 3 4 5 6 7 8 9 10^1 2 3 4 5 6 7 8 9 10^2 2 3 4 5 6 7 8 9 10^3
ATTACHMENT 2
PAGE 3 OF 4
18

PSPECTRA VER 01 LEV 08 FAULTED F TONDITION 25 JAN 1983

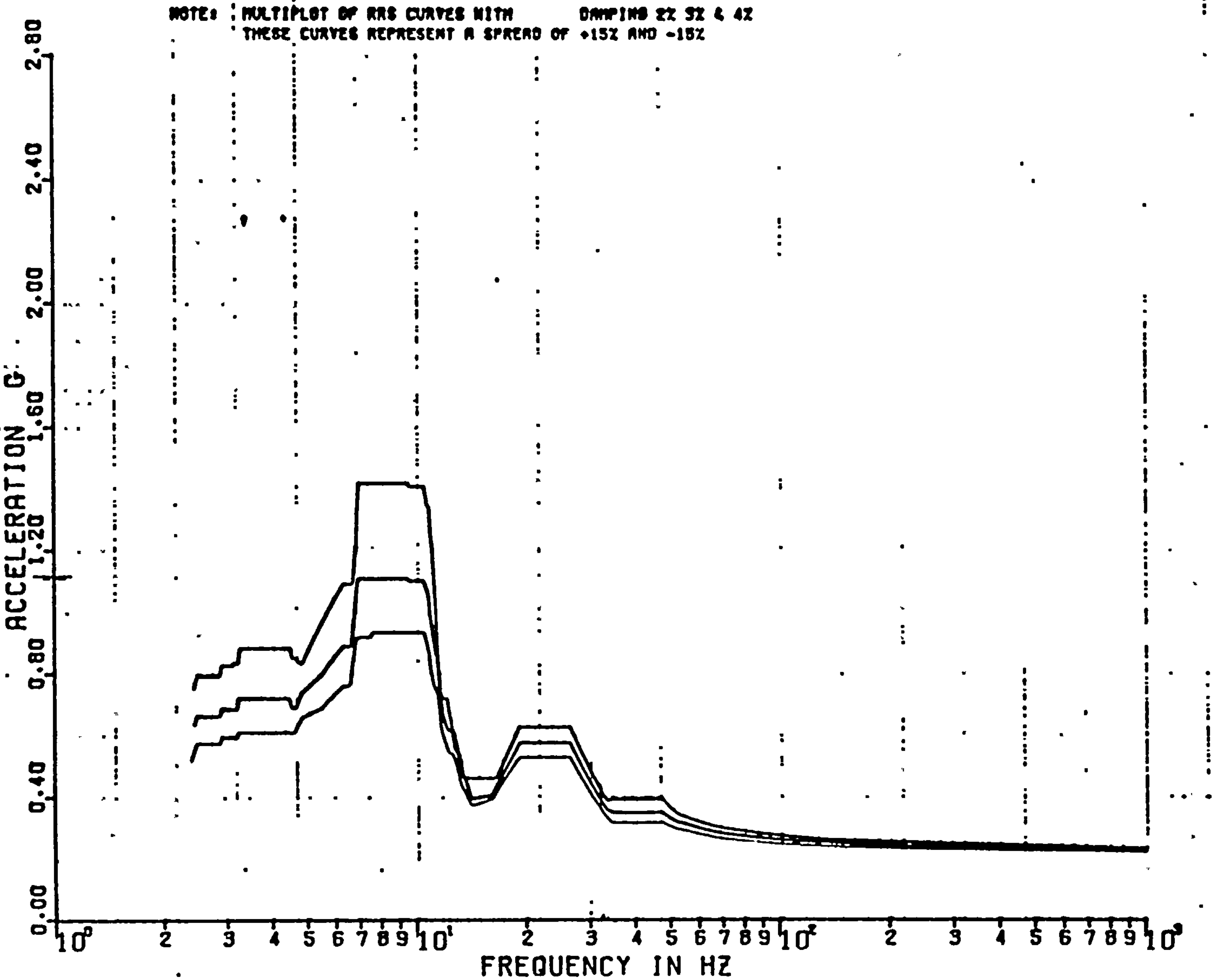
NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O.12177 MS-1747-0 MS 1747

RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

MICHAEL K OO

DISK CURVE SET NO.29 VER DIRECTION DAMPING VALUES = 0.020
0.030
0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 2% 3% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



ATTACHMENT 2 PAGE 4 OF 4

E2

Figure 11.1 Run OBEXZ1 AH

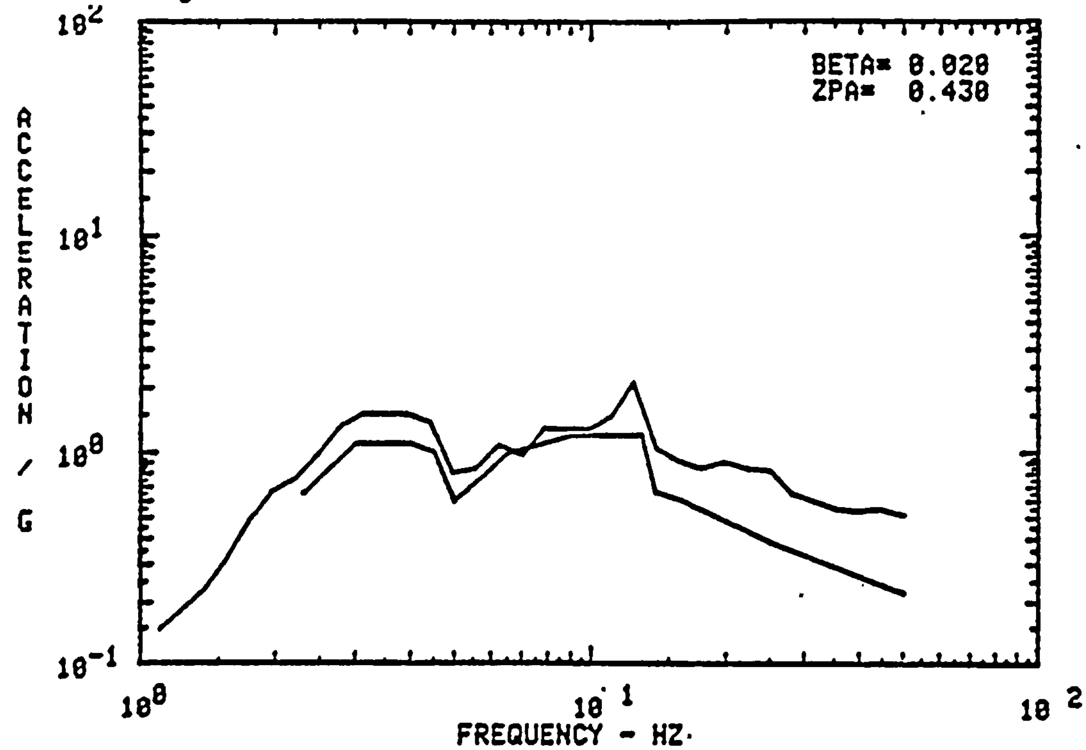


Figure 11.2 Run OBEXZ1 AV

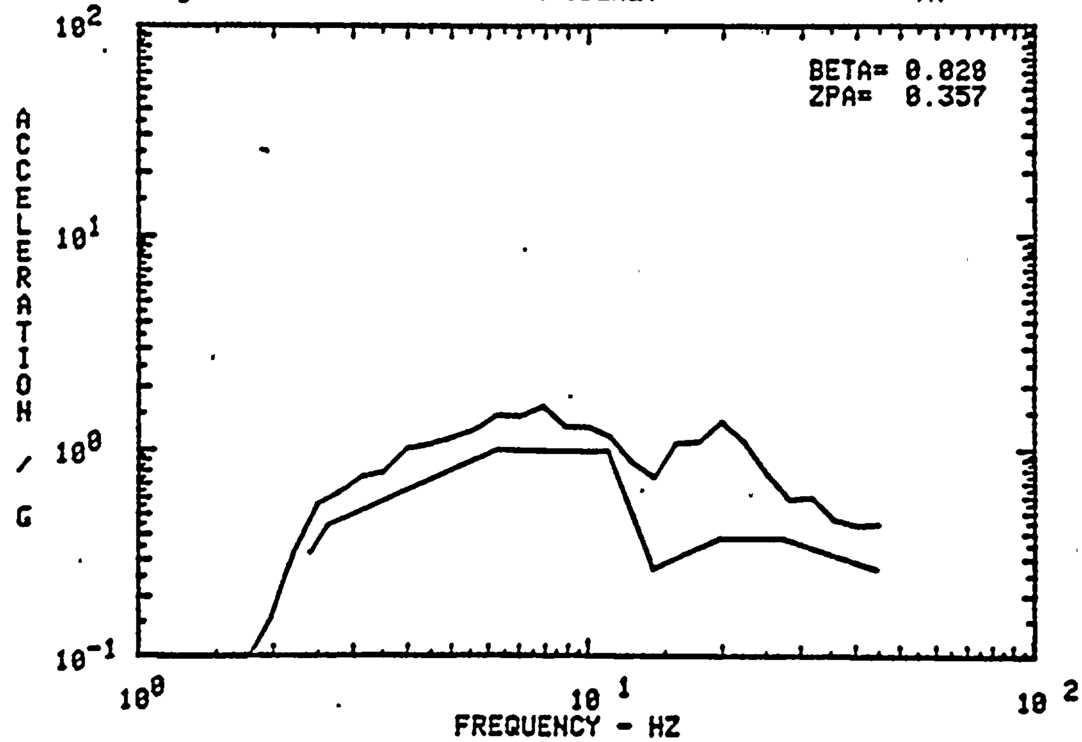


Figure 11.3 Run OBEXZ1A AH

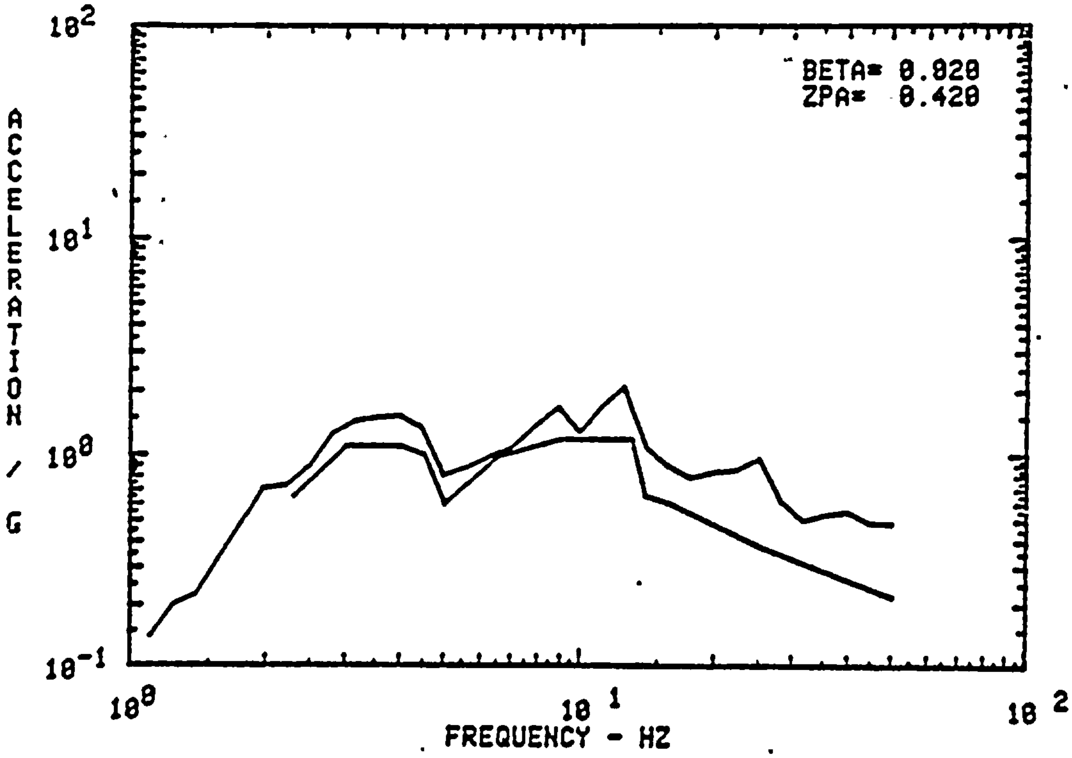


Figure 11.4 Run OBEXZ1A AV

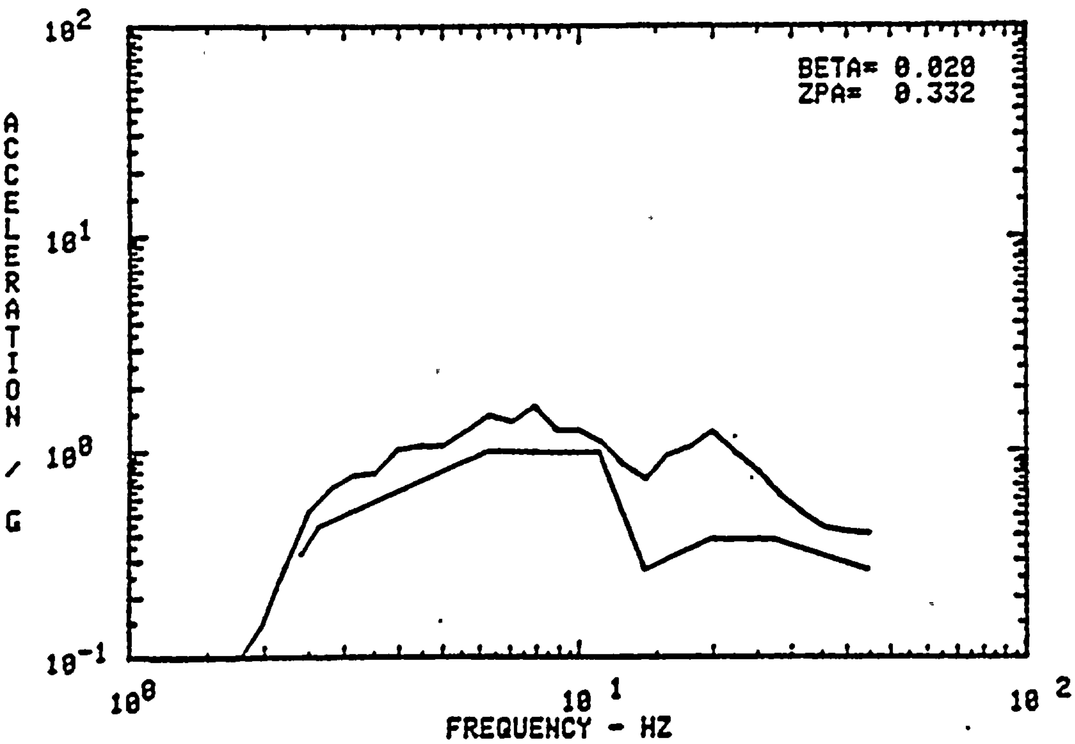


Figure 11.5 Run OBEXZ2 AH

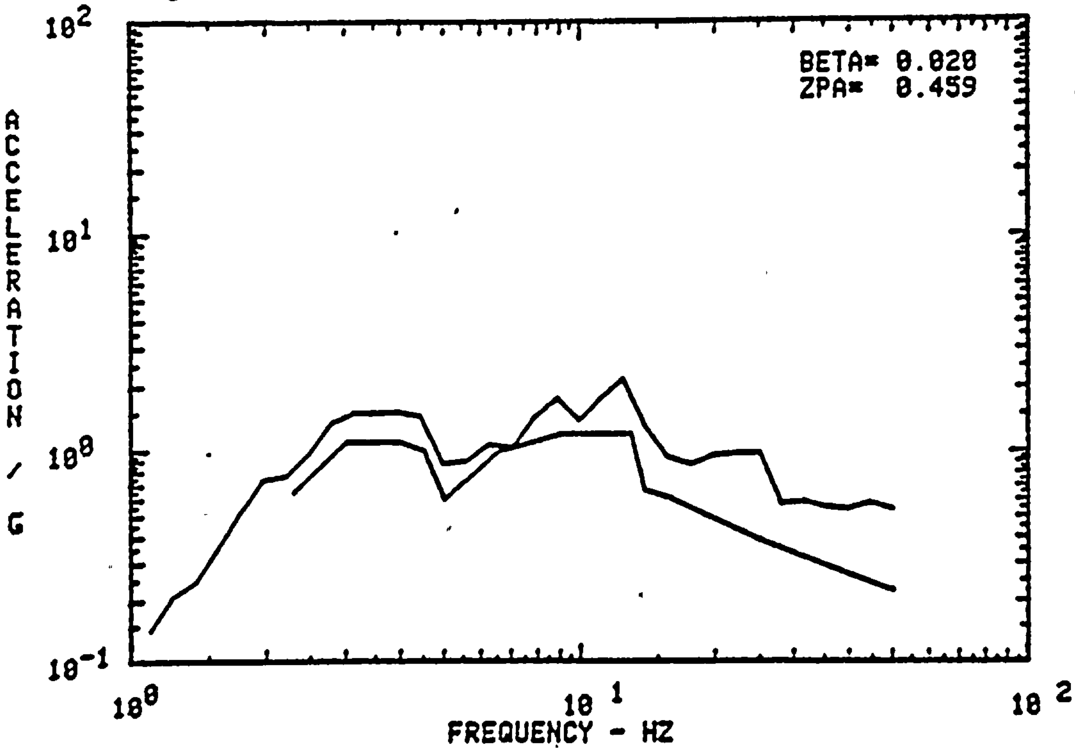


Figure 11.6 Run OBEXZ2 AV

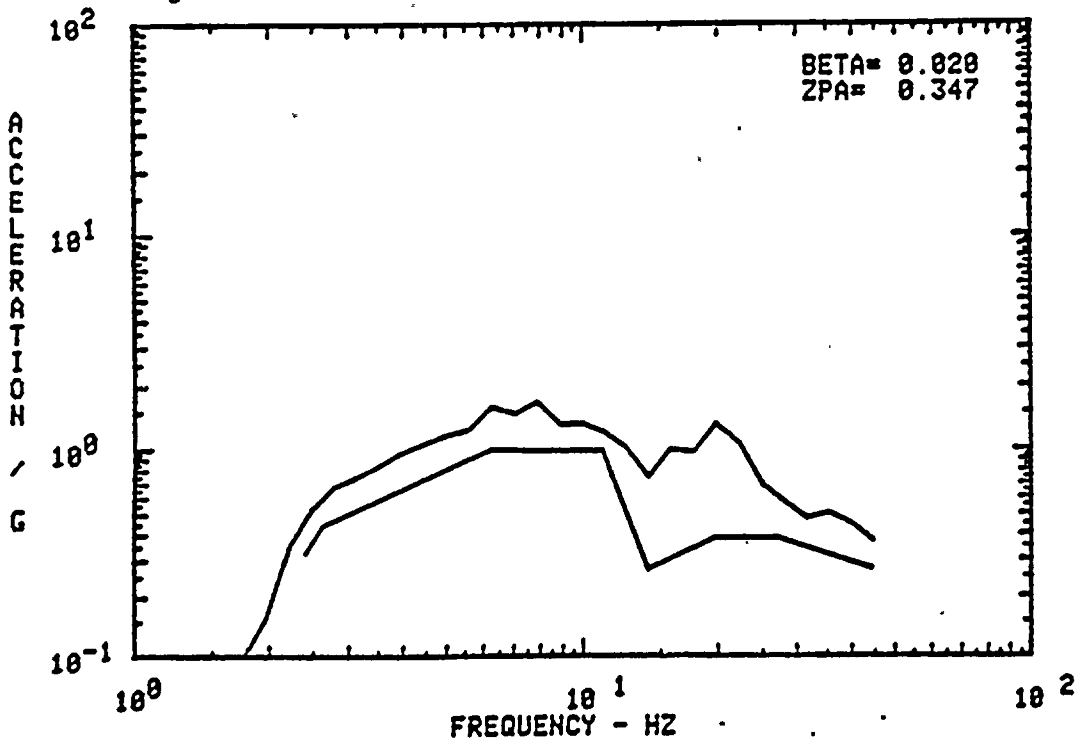


Figure 11.7 Run OBEXZ3 AH

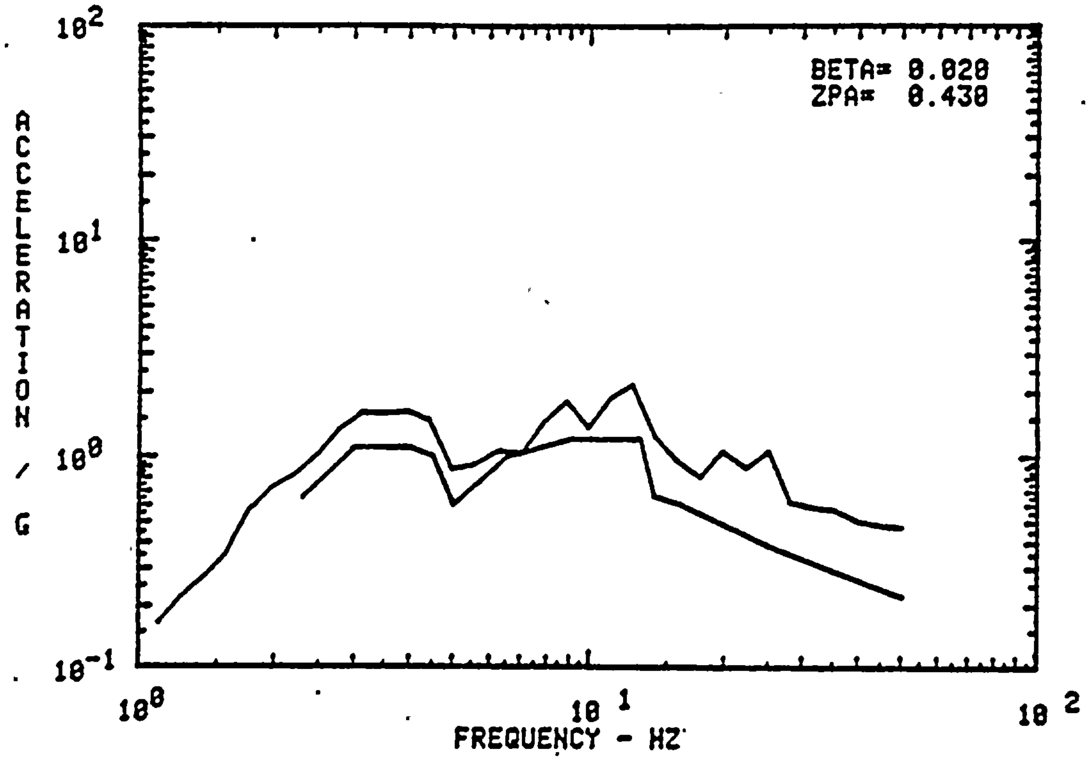
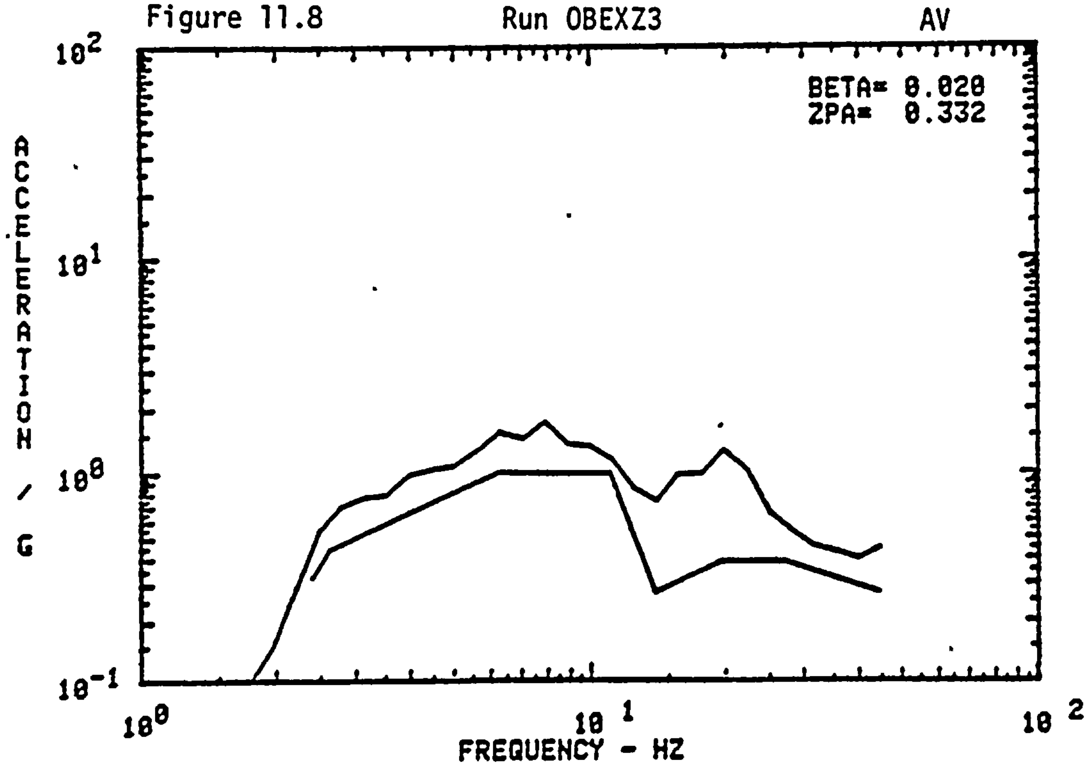


Figure 11.8 Run OBEXZ3 AV



ATTACHMENT 3

Figure 11.9 Run OBEXZ4 AH

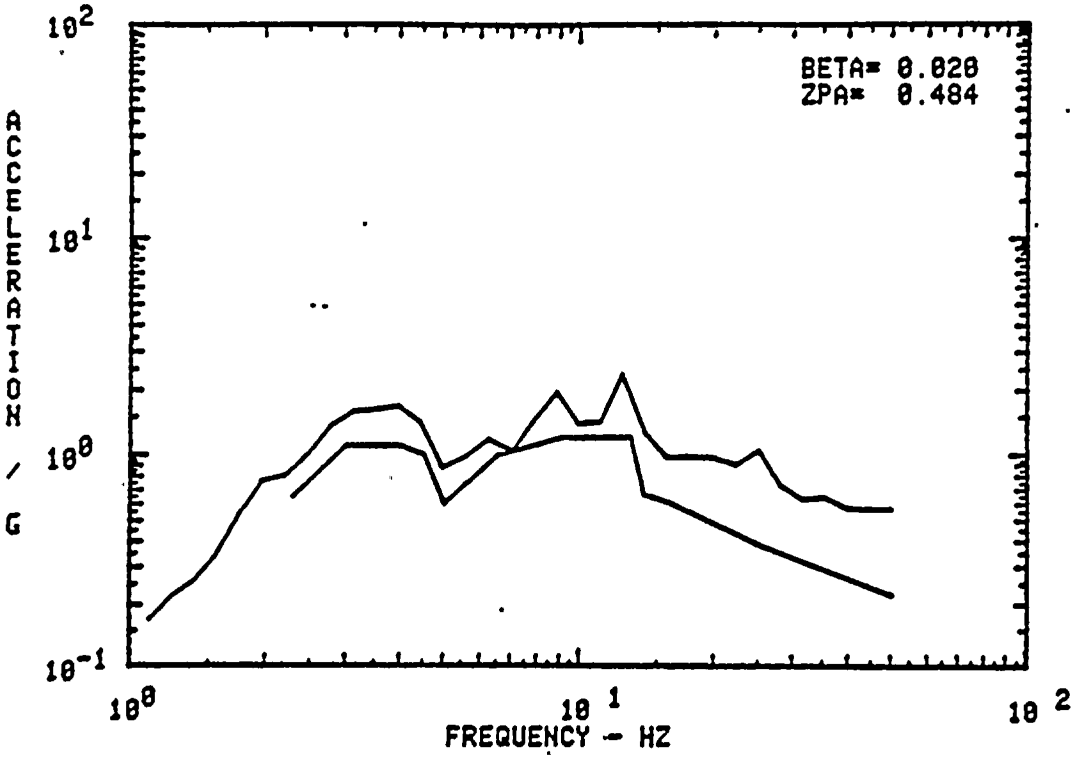


Figure 11.10 Run OBEXZ4 AV

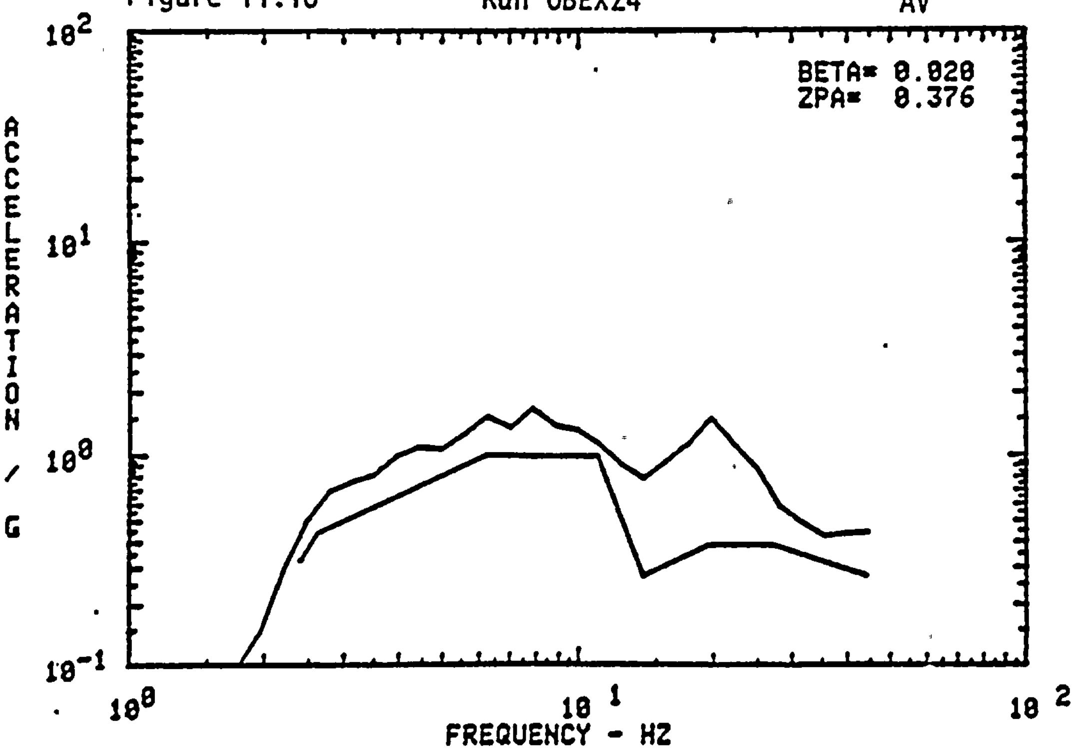


Figure 11.11 Run OBEXZ5 AH

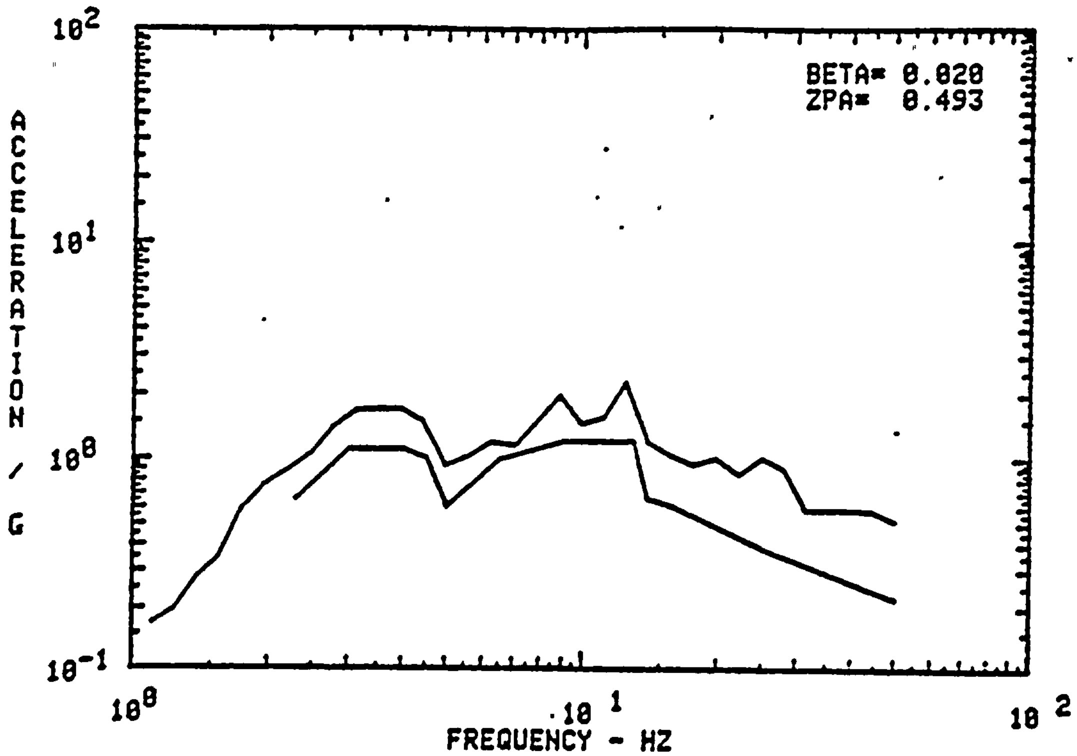
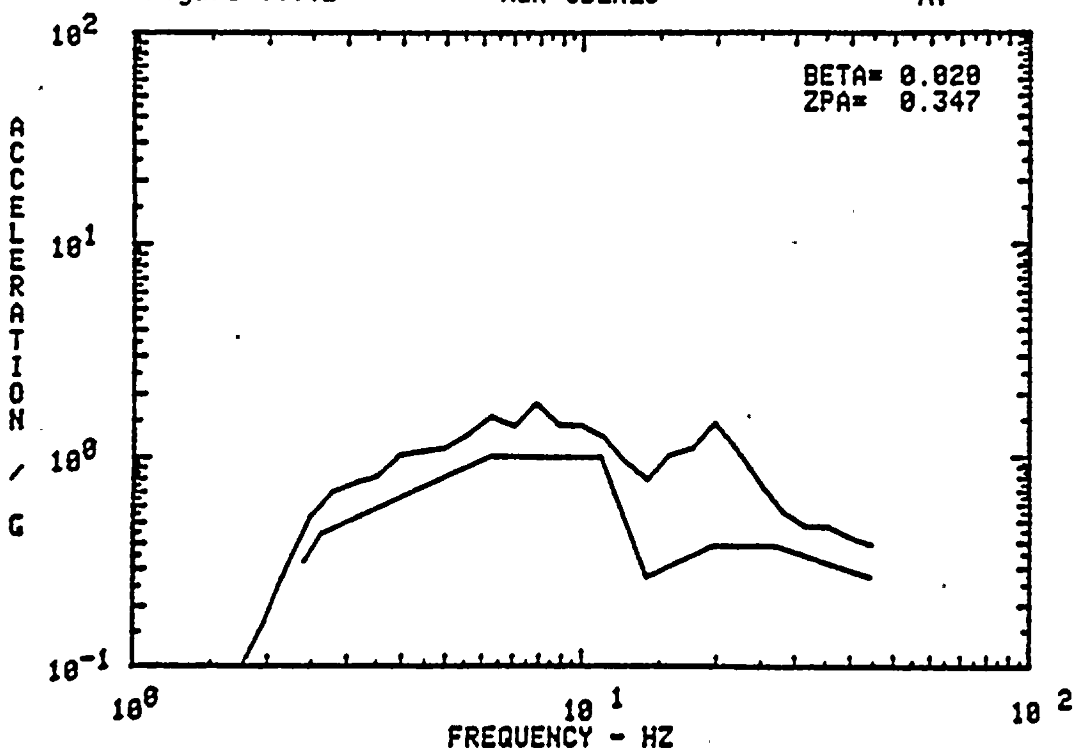


Figure 11.12 Run OBEXZ5 AV



ATTACHMENT 3

Figure 11.13 Run SSEXZ1 AH

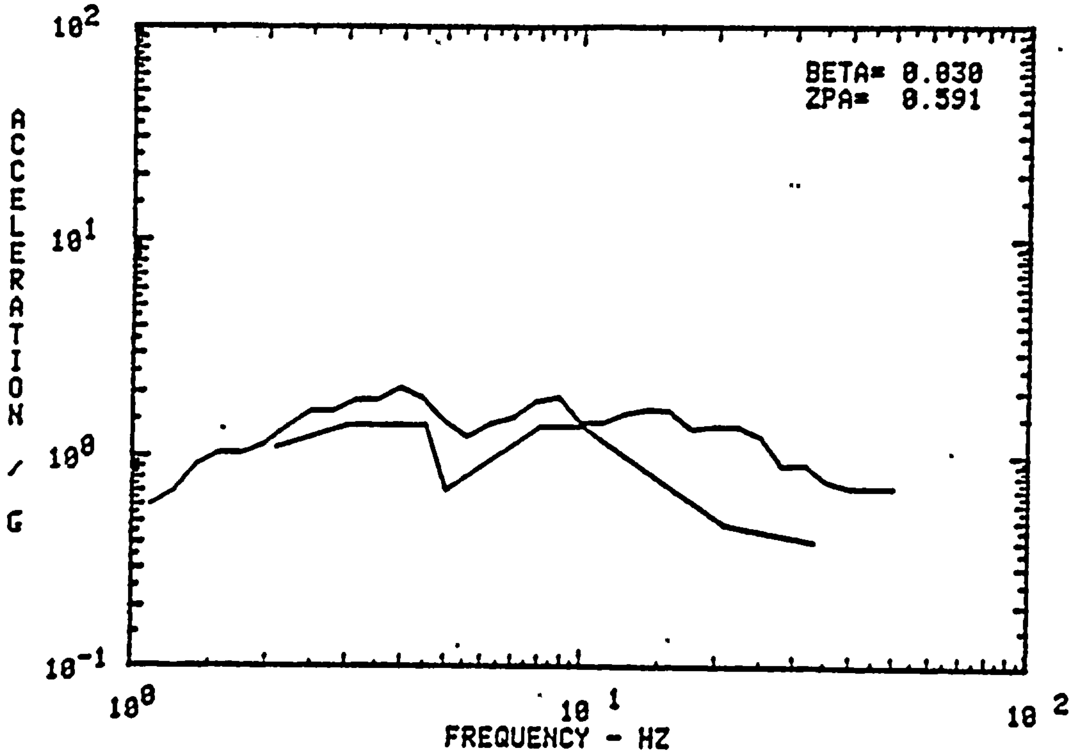
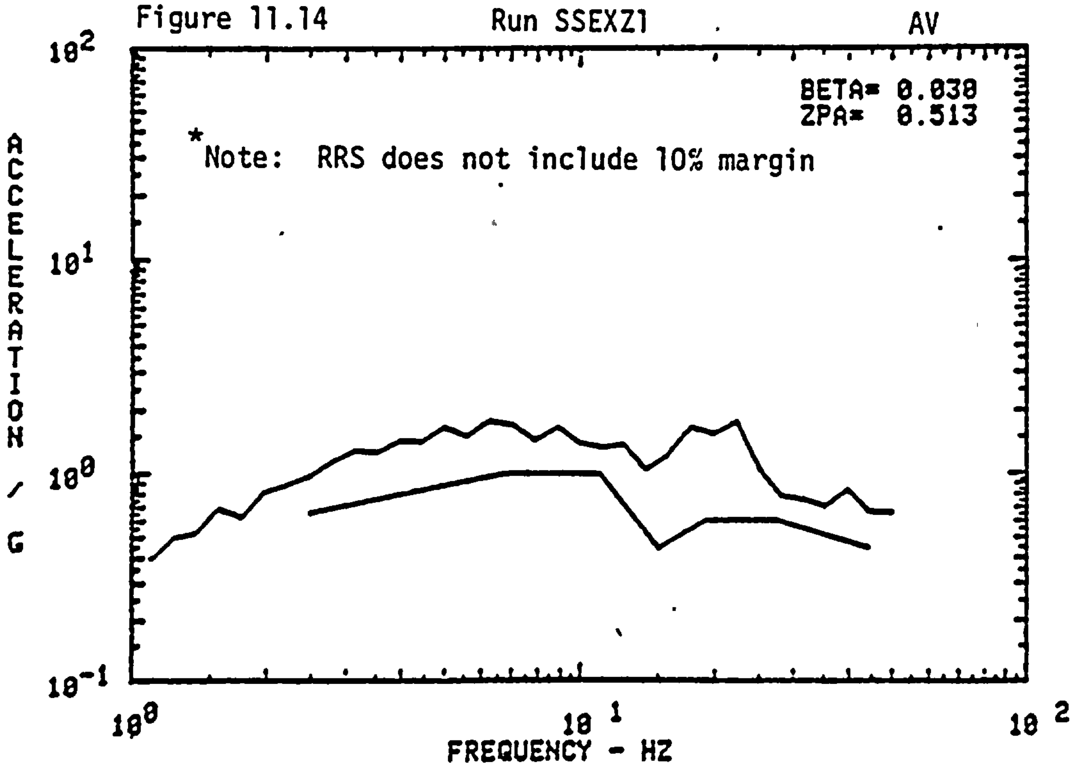


Figure 11.14 Run SSEXZ1 AV



Rev. 1

Figure 11.15 Run OBEYZ1 AH

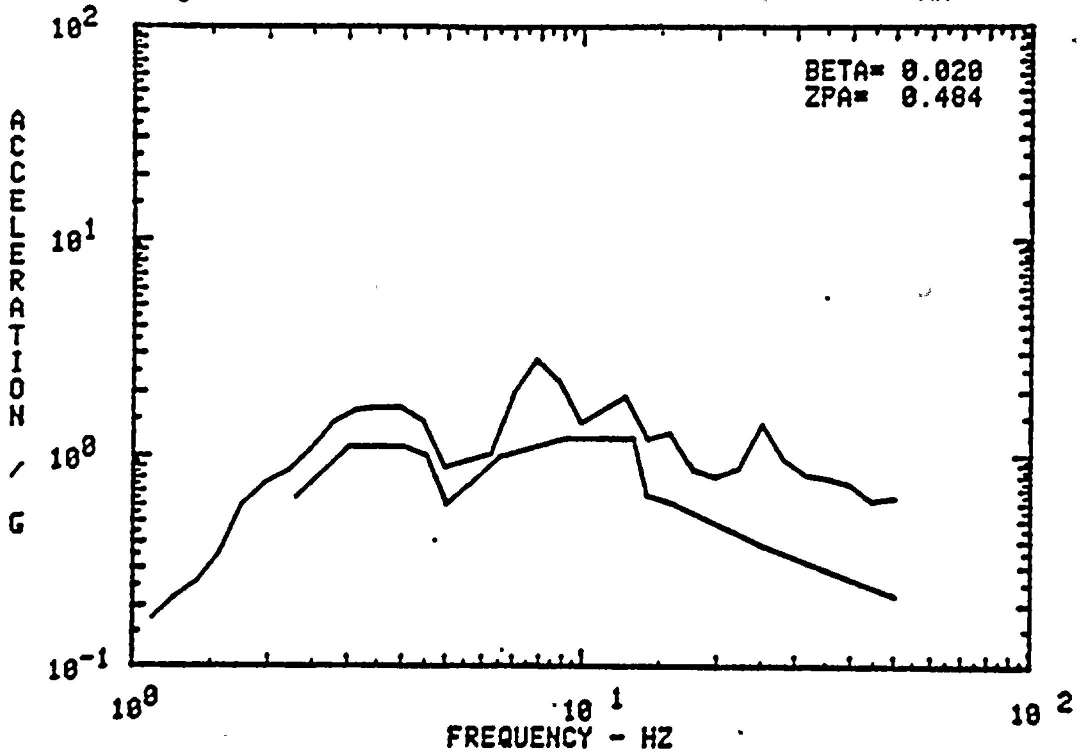


Figure 11.16 Run OBEYZ1 AV

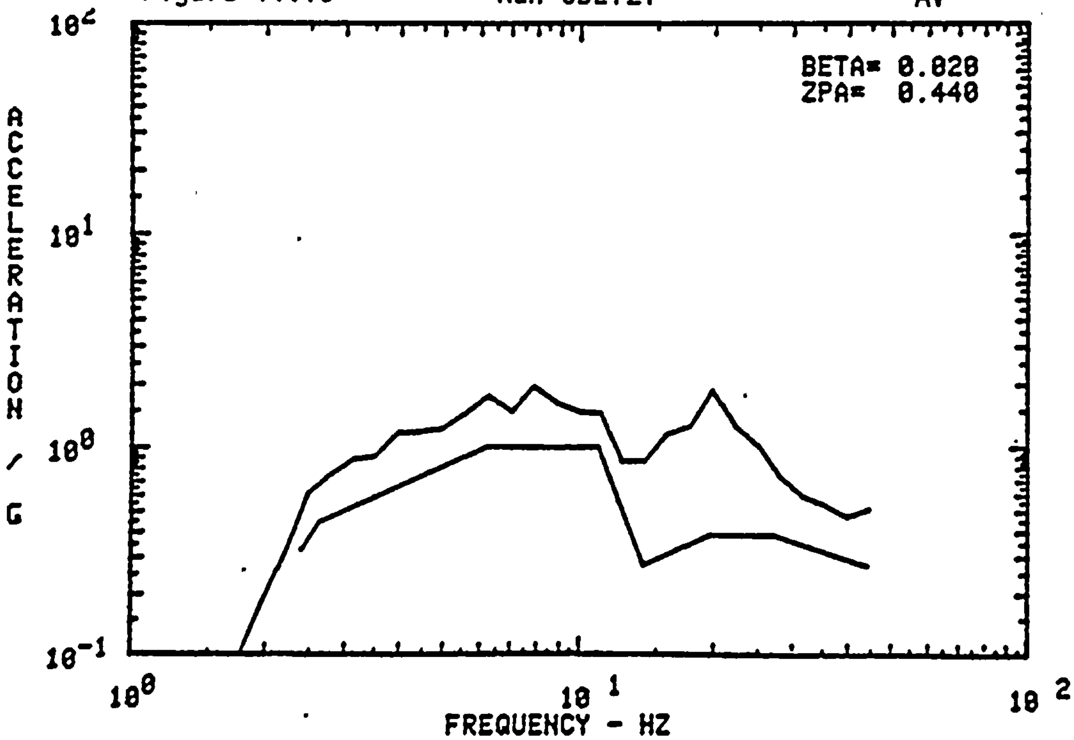


Figure 11.17 Run OBEYZ2 AH

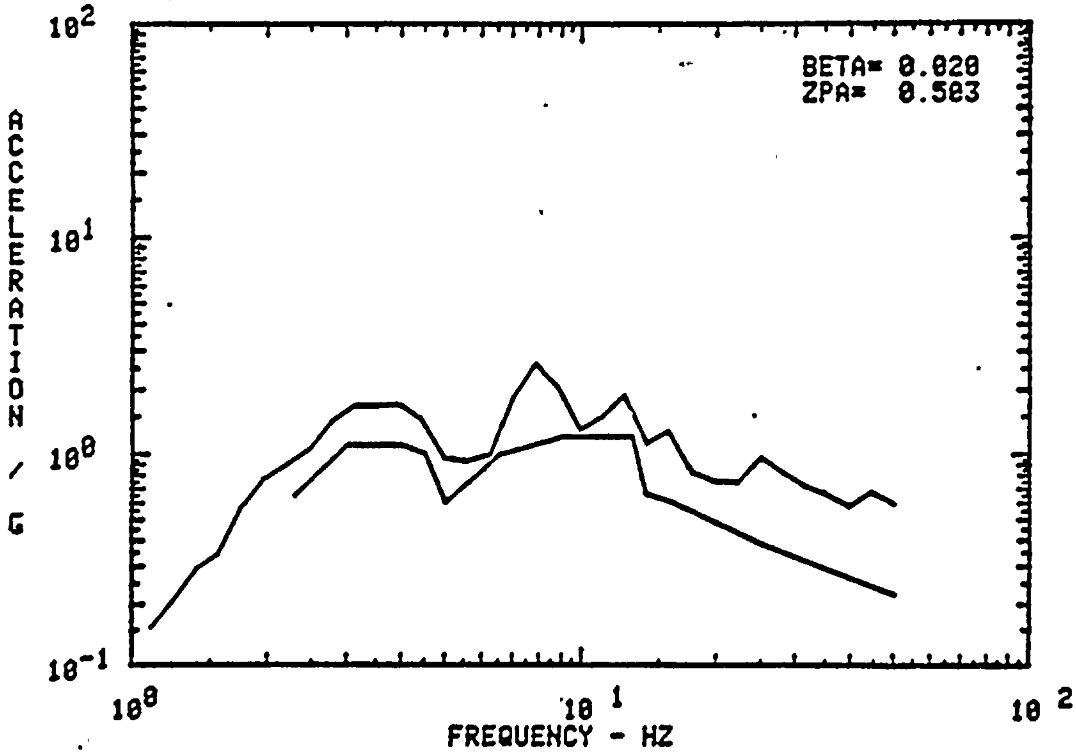


Figure 11.18 Run OBEYZ2 AV

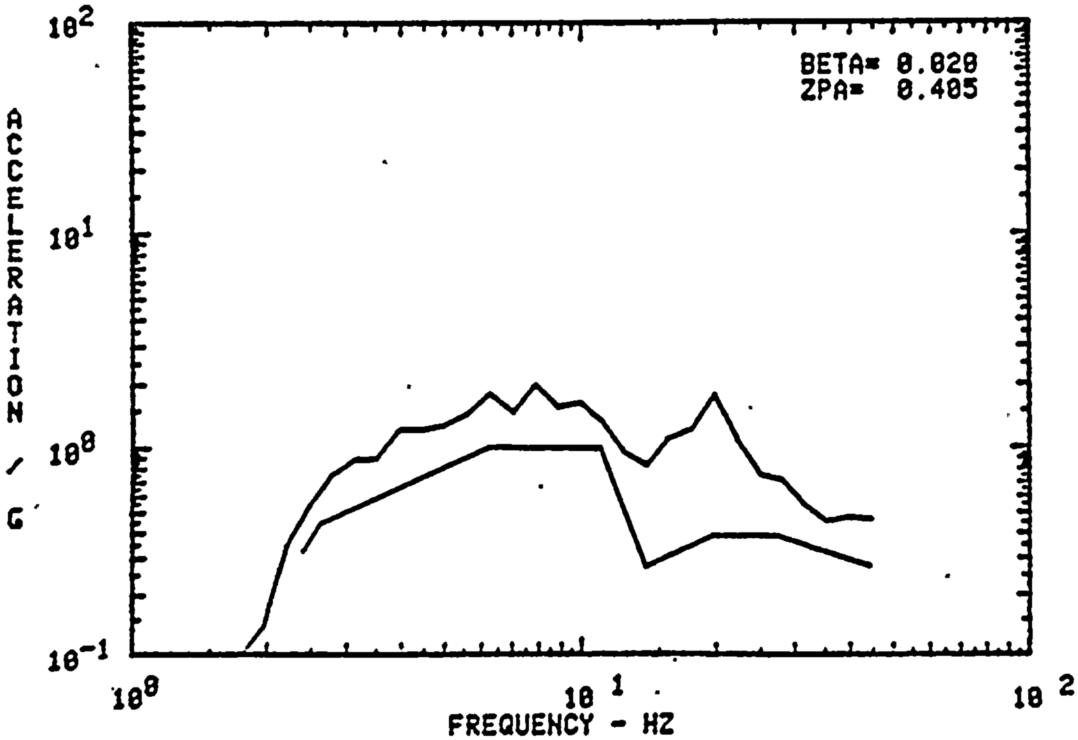


Figure 11.19 Run OBEYZ3 AH

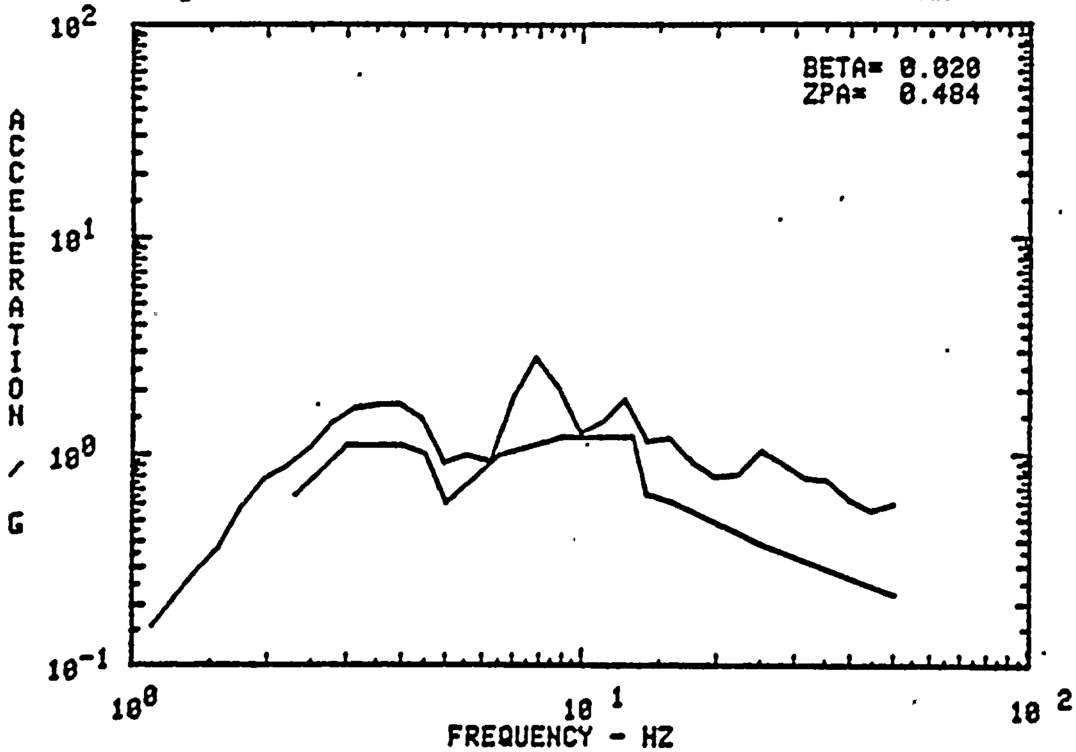


Figure 11.20 Run OBEYZ3 AV

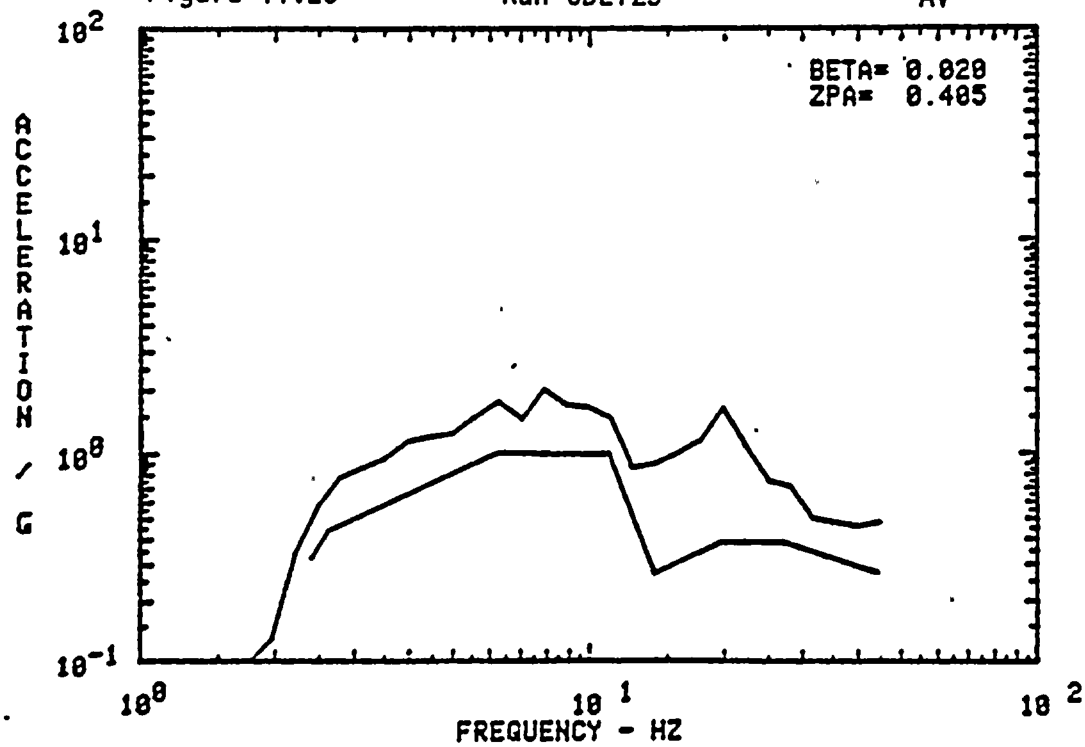


Figure 11.21 Run OBEYZ4 AH

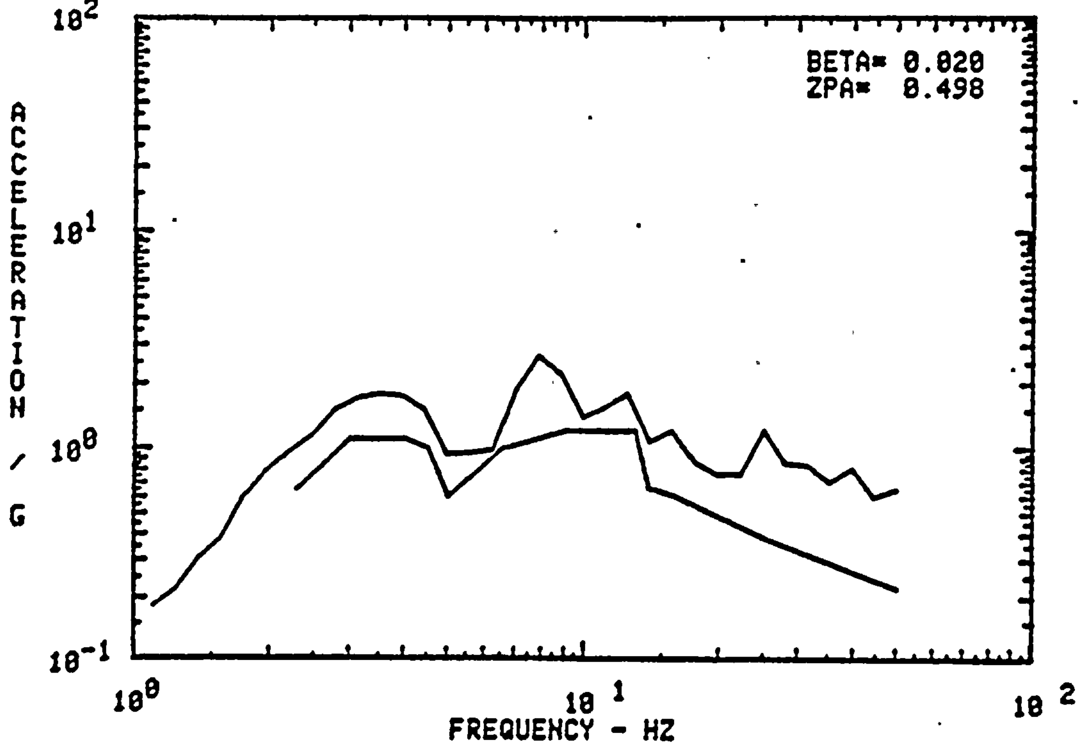


Figure 11.22 Run OBEYZ4 AV

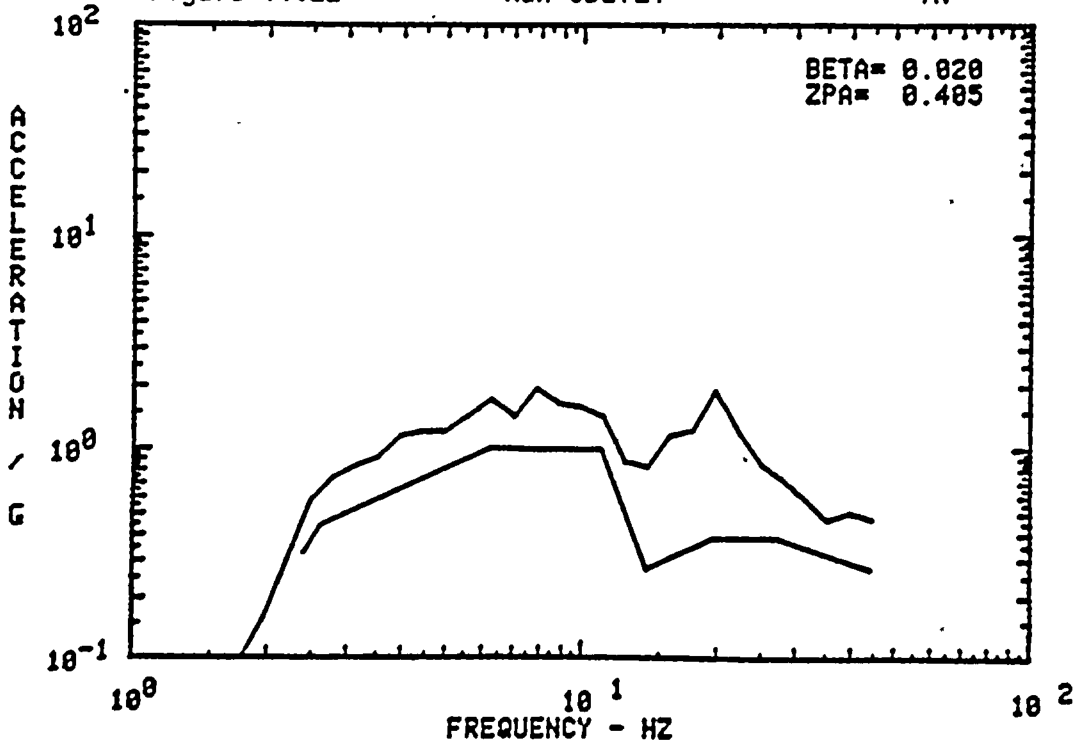


Figure 11.23 Run OBEYZ5 AH.

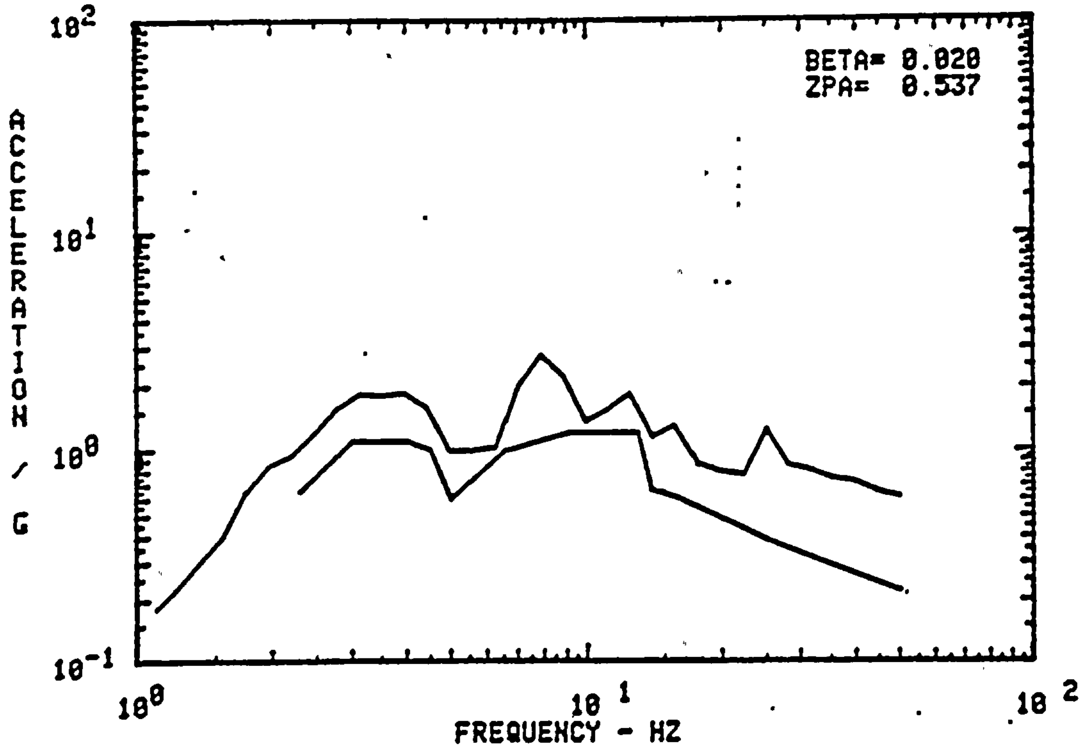


Figure 11.24 Run OBEYZ5 AV

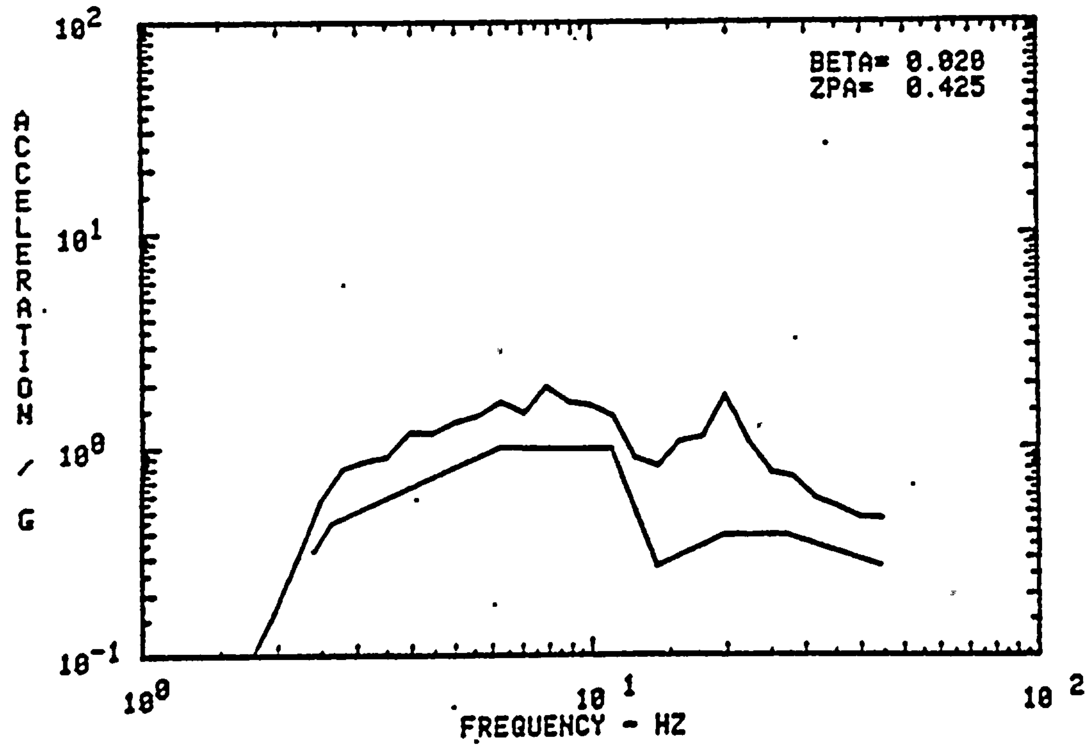


Figure 11.25 Run SSEYZ1 AH

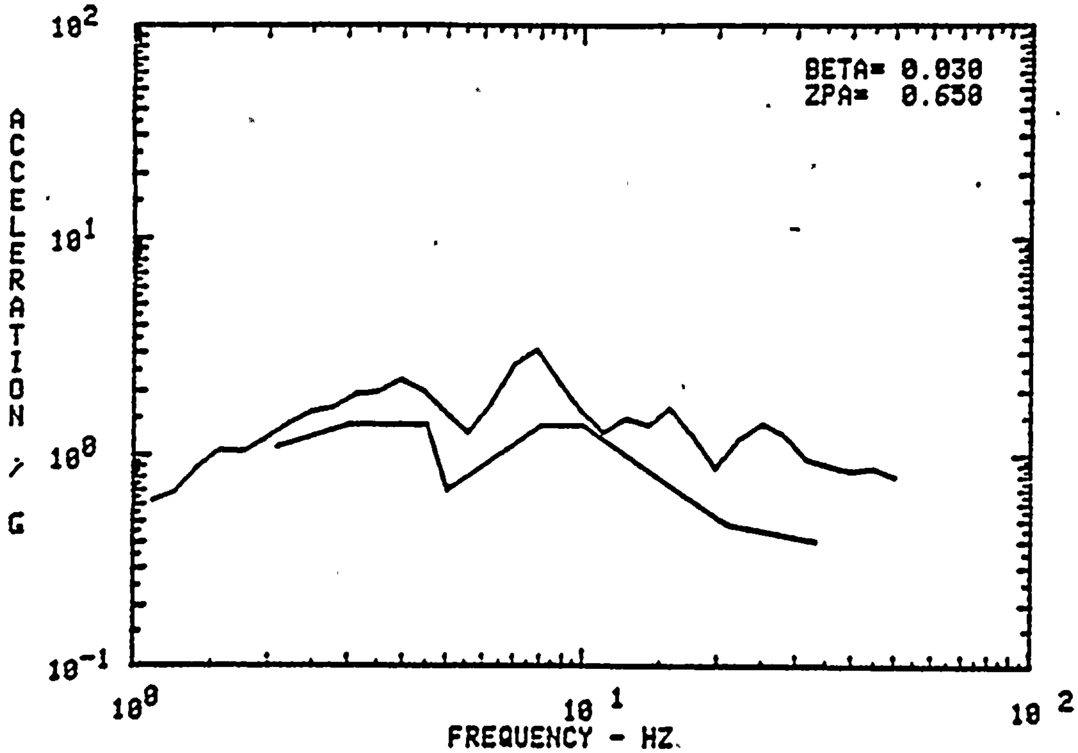
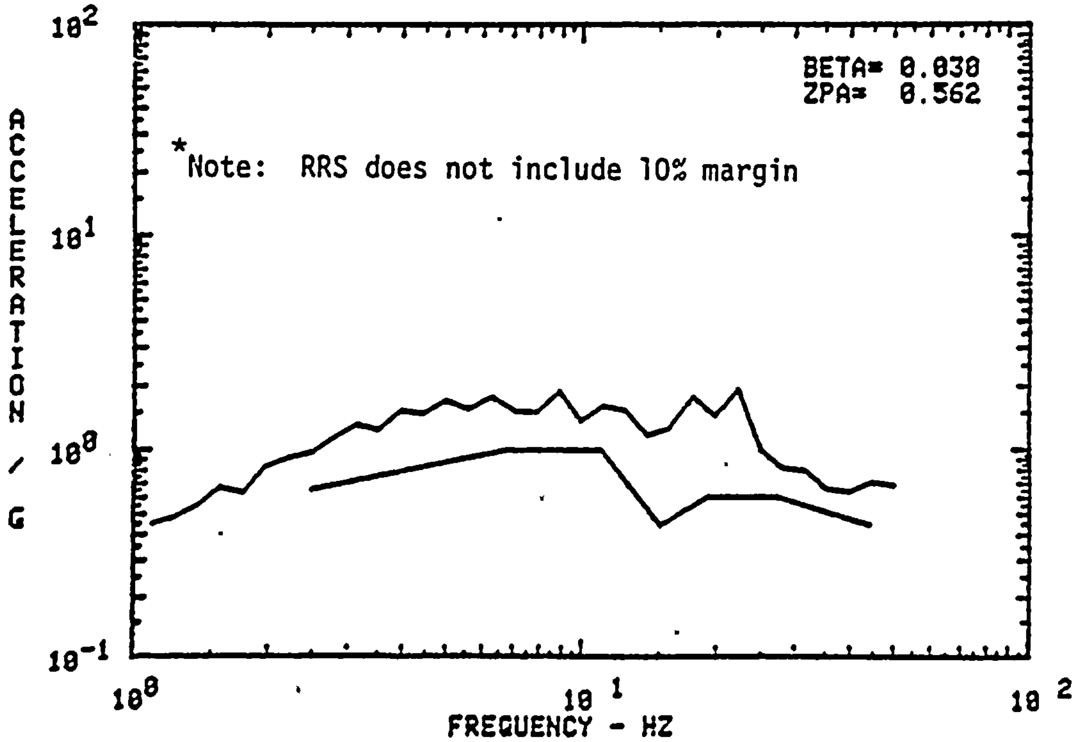


Figure 11.26 Run SSEYZ1 AV



Rev. 1

Figure 11.27 Run SSEYZ1A AH

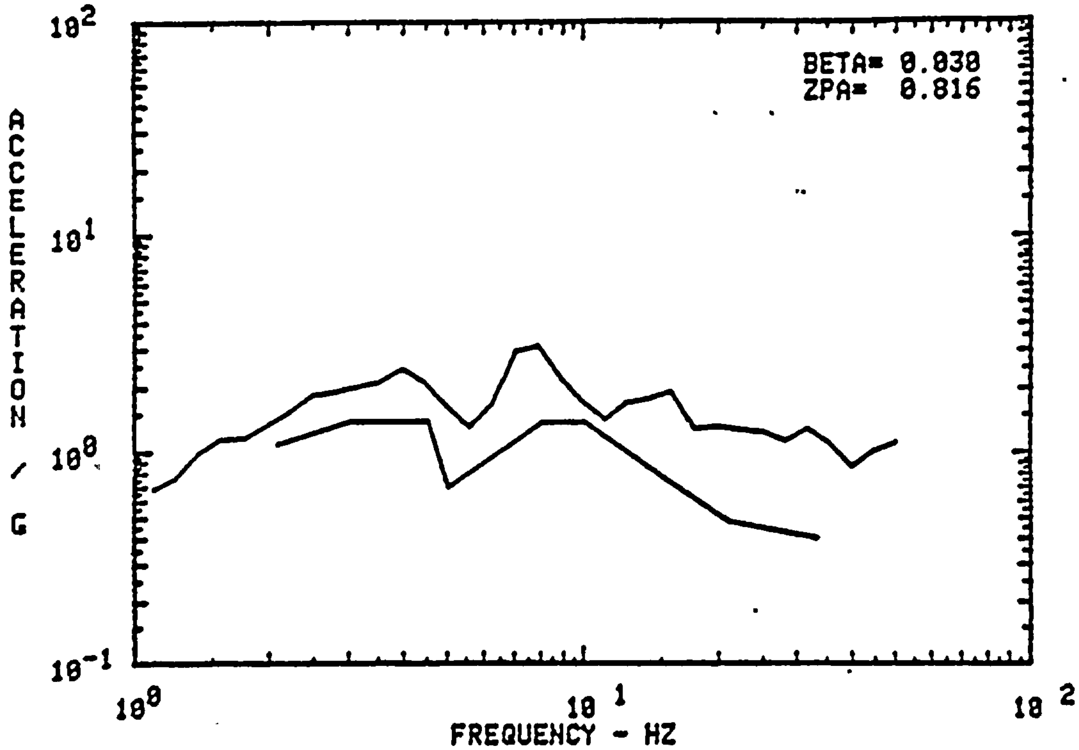
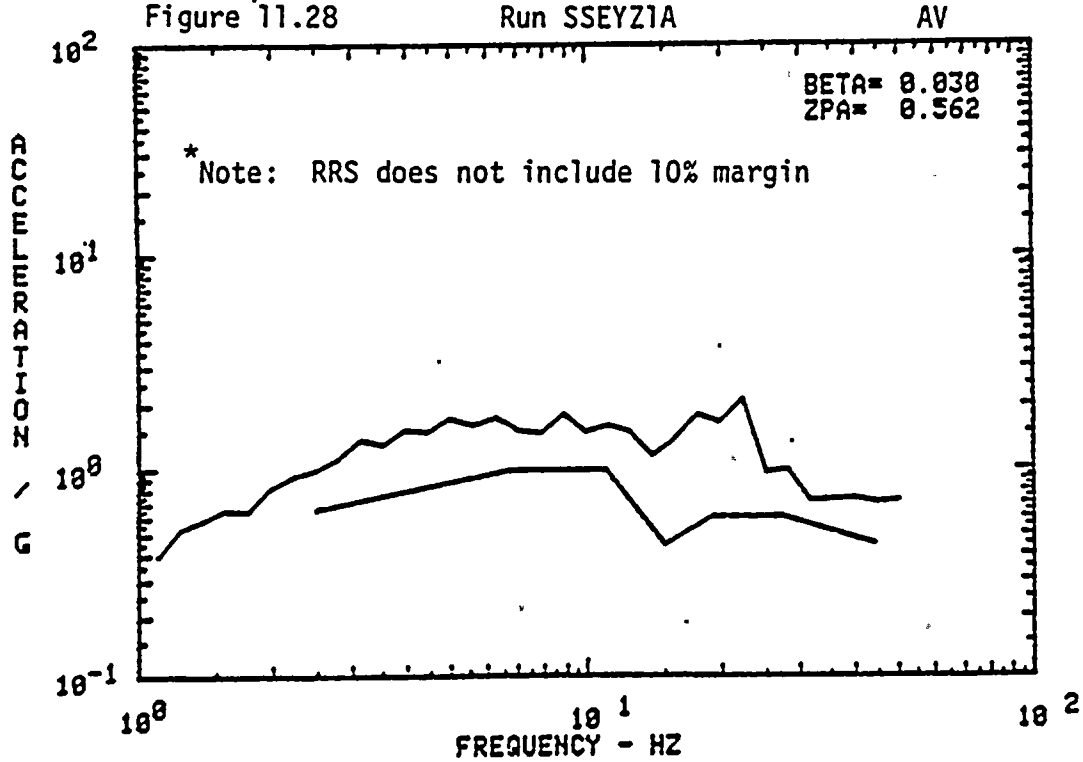


Figure 11.28 Run SSEYZ1A AV



Rev. 1

.15S

SPEC. NO. P121A

SQRT # 15

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: MOTOR OPERATED ROTARY GATE

MARK NUMBERS: 2SWP*MOV 30A

STONE & WEBSTER

SPEC. NO. P121A
Revision ______

Seismic and Dynamic Qualification Summary of Equipment

I. **Plant Name:** Nine Mile Point Nuclear Station - Unit 2

1. **Utility:** Niagara Mohawk Power Corporation

2. **NSSS:** General Electric Co. **BWR:** 5 MK 2

3. **A/E:** Stone & Webster Engineering Corp. **Other** ______

II. **Component Name:** MOTOR OPERATED ROTARY GATE

1. **Scope:** ( ) NSSS (X) BOP ( ) Other

2. **Model Number:** RECT. B.V. **Quantity:** 1

3. **Size or Range:** 48" W x 72" H.

4. **Vendor:** HENRY PRATT Co.

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

6. **Physical Description:**

   a. **Appearance:** RECT. GATE WITH EXTENDED MOTOR - OPERATOR

   b. **Dimensions:** 48"W. X 72" H. GATE; 4½" DIA STEM DRIVE

   c. **Weight:** 6915 lbs.

7. **Location: Building:** SCREENWELL

   Elevation: 285' (FLOORSTAND & OPERATOR)

8. **Field Mounting Conditions** (X) Bolt (No. 4 - Size 1"φ)
   ( ) Weld (Length ______)
   (X) TORQUE TUBE IS SUPPORTED FROM THE WALL AT INTERMEDIATE LEVELS

9. **Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)**
   DISC GATE (EMBEDDED IN CONCRETE), EXTENDED OPERATOR ON FLOORSTAND

10. a. **System in which located:** SERVICE WATER

    b. **Functional Description:** ISOLATE NORTH INTAKE SHAFT

    c. **Is the equipment required for** ( ) Hot Standby ( ) Cold Shutdown ( ) Both ( ) Neither (X) Other ALL CONDITIONS EXCEPT COLD SHUTDOWN

11. Pertinent Reference Design Specifications for Qualification Requirements: SPEC. NO P121A, "MOTOR-OPERATED ROTARY GATES", REV. 1 AND ADDENDA 2 & 3.

a. Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

(X) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: SECTIONS IV THRU VII FOR
(No., Title and Date): EACH REPORT FOLLOW:

Company that Prepared Report: ______

Company that Reviewed Report: ______

Where Report is filed or available: ______

Applicable Codes and/or Standards: ______

V. Vibration Input:

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

2. Method of Combining RRS:

   ( ) Absolute Sum ( ) SRSS ( ) ______ (other, specify)

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

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

SPEC. P121A

SEISMIC ANALYSIS

2SWP*MOV30A

II. Pertinent Reference Design Specifications for Qualification Requirements: ______________________

a. Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: "RECTANGULAR BUTTERFLY VALVE - SEISMIC ANALYSIS" 8/20/80; "RESPONSE TO SEISMIC ANALYSIS REVIEW," 11/19/80

(No., Title and Date):

Company that Prepared Report: HENRY PRATT CO

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE SITE

Applicable Codes and/or Standards: ANSI B31.1, 1977; AWWA C504, 1974 IEEE 323, 1974; IEEE 344, 1975 AWS D1.1 Rev 2-1977; NEMA MG-1

V. Vibration Input:

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

2. Method of Combining RRS:

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

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

NOTE: (STATIC ANALYSIS, RIGID RANGE)

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

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

5. Required Acceleration in Each Direct:

(X) ZPA ( ) Other ____ (specify)

OBE S/S = 0.26g F/B = 0.26g V = 0.13g

SSE S/S = 0.41g F/B = 0.41g V = 0.24g

6. Were fatigue effects considered?

( ) Yes (X) No

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

VI. If Qualfication by Test, then Complete: N/A

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) ____

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ____ SSE ____ Other ____ (specify)

4. Frequency Range: ____

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

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

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length______) ( ) ______

B. Orientation and Fixturing: ______

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______

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

13. Failure Modes (If appropriate ______)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete: ✓

1. Method of Analysis:

(X) Static Analysis ( ) Equivalent Static Analysis

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

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

BODY) S/S = 88 Hz. F/B = >88 Hz V = >88 Hz

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

* 2. (CONT)
DISC) S/S = 262 Hz F/B = — V = 53 Hz.
FLOORSTAND) S/S = 73 Hz TORS = 37 Hz.
TORQE TUBE) S/S = 39 Hz

4. ( ) Computer Codes: N/A ______ ______

Frequency Range and No. of Modes N/A

(X) Hand Calculations

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

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

6. Damping: N/A

OBE ______ SSE ______ Basis for the Damping Used: ______

7. Support Considerations in the Model: SIMPLY SUPPORTED

8. Critical Structural Elements:

A.

Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
DISC	DESIGN PRESSURE + SEISMIC	—	10.24 ksi	12.6 ksi

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
i) 4.8°	FLOORSTAND & TORQUE TUBE	5°
ii) 0.032 inch	BODY SIDE CHANNEL	0.040 inch

9. Failure Modes: STRUCTURAL, DEFLECTION,

10. Margins Available: ( ) Input Spectrum (X) Stress or Deflection

DYNAMIC TESTING
SMB-0-15/H4BC OPERATOR

11. Pertinent Reference Design Specifications for Qualification Requirements: ______

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

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: "LIMITORQUE VALVE ACTUATOR QUALIFICATION" REPORT B0058, APPENDIX 9 OF APPENDIX 'F'.
(No., Title and Date): 1/11/80 (UNIT TESTED WAS SMB-1-25/H4BC)

Company that Prepared Report: LIMITORQUE CORP.

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE SITE

Applicable Codes and/or Standards: IEEE 344-75

V. Vibration Input:

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

2. Method of Combining RRS:

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

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

NOTE: METHOD - SINGLE FREQUENCY TESTING

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

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

5. Required Acceleration in Each Direct:

(X) ZPA (X) Other ______ (specify)

OBE S/S = 0.26G. F/B = 0.26G V = 0.13G.

SSE S/S = 0.41G. F/B = 0.41G V = 0.24G.

6. Were fatigue effects considered?

( ) Yes (X) No

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

VI. <u>If Qualfication by Test, then Complete:</u>

1. (X) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
(X) FRAGILITY

2. (X) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other FIVE 30 SEC. SINE DWELLS, EACH AXIS (specify)

4. Frequency Range: 1-33 HZ (NO LOWER NATURAL FREQUENCIES)

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

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

6. Method of Determining Natural Frequencies
(X) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test N/A

( ) Yes (Attach TRS & RRS graphs)
( ) No

8. Maximum Input g Level Test:

SINE DWELL ~~OBE~~ S/S = 8.0G. F/B = 7.9G. V= 8.4G.

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

9. Laboratory Mounting:

A. (X) Bolt (No.______ Size______)
( ) Weld (Length______) ( ) ______

B. Orientation and Fixturing: H4BC GEARBOX STEM NUT-VERTICAL

10. Functional Operability Verified:

(X) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: UNIT FUNCTIONED PROPERLY DURING & AFTER ALL TESTS. NO INDICATION OF CONTACT CHATTER OR PHYSICAL DAMAGE.

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

ALL TESTS PERTINENT TO
IEEE-323-1974

13. Failure Modes (If appropriate STRUCTURAL, ELECTRICAL)

14. Margins Available: ( ) Input Spectrum (X) Fragility

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

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

SPEC. NO. NMP2-P222X
SQRT #16

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: SERVICE WATER PUMP
MARK NUMBERS: 2SWP*P1A

STONE & WEBSTER

SPEC. NO. NMP2-Y222X
Revision O

SQRT #16

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point Nuclear Station - Unit 2

1. Utility: Niagara Mohawk Power Corporation

2. NSSS: General Electric Co. BWR: 5 MK 2

3. A/E: Stone & Webster Engineering Corp. Other ______

II. Component Name: SERVICE WATER PUMP, 2SWP*P1A

1. Scope: ( ) NSSS (✓) BOP ( ) Other

2. Model Number: 3415M Quantity: 6

3. Size or Range: 14" DISCHARGE, 16" SUCTION, 600 HP

4. Vendor: GOULD PUMPS INC.

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

6. Physical Description:

   a. Appearance: HORIZONTAL CENTRIFUGAL PUMP

   b. Dimensions: 11'-4" LG. x 6' WIDE x 5'-2¼" HIGH

   c. Weight: 13,810 LBS WET, 13,060 LBS DRY

7. Location: Building: SCREENWELL

   Elevation: 224'-0"

8. Field Mounting Conditions (X) Bolt (No. 10 - Size 1¾")
   ( ) Weld (Length ______)
   ( ) ______

9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   PUMP ASSEMBLY MOUNTED ON FLOOR

10. a. System in which located: SERVICE WATER

    b. Functional Description: PROVIDE COOLING WATER TO SAFETY-RELATED EQUIPMENT

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

SQRT # 16
SPEC. No NMP2-P222X
REVISION 0

II. Pertinent Reference Design Specifications for Qualification Requirements: SAFETY RELATED HORIZONTAL CENTRIFUGAL PUMPS; SPEC. No NMP2-P222X THRU ADDENDA 11 (FORMERLY SPEC. No. 50 TO ADDENDA No. 3)

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

III. Is Equipment Available for Inspection in the Plant:

(✓) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method: (PUMP)

( ) Test (✓) Analysis ( ) Combination of Test and Analysis

Qualification Report*: SWEC No. STRS 2.170-5002C, SEISMIC STRESS ANALYSIS

(No., Title and Date): OF SERVICE WATER PUMPS, (VENDOR REPORT # ME-1158) 6/19/85

Company that Prepared Report: McDONALD ENGINEERING ANALYSIS Co.

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE SITE

Applicable Codes and/or Standards: ASME III '71 THRU SUMMER 73 ADDENDA. CODE CASE 1677, IEEE-344-1975, REGULATORY GUIDE 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

3. Required Response Spectra** (attach the graphs): SEE ATTACHMENT "A"

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

SQRT #16
SPEC No. NMP2-P222X
REVISION 0

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

5. Required Acceleration in Each Direct:

( ) ZPA (X) Other RIGID RANGE RESPONCE (specify)

OBE S/S = 0.13g F/B = 0.13g V = 0.10g

SSE S/S = 0.23g F/B = 0.23g V = 0.19g

6. Were fatigue effects considered?

( ) Yes (✓) No

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

VI. If Qualfication by Test, then Complete: N/A

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) ____

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ____ SSE ____ Other ____ (specify)

4. Frequency Range: ____

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

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

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

SQRT #16
SPEC. No NMP2-P222X
REVISION 0

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length______) ( ) ______

B. Orientation and Fixturing: ______

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______

______

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

______

______

13. Failure Modes (If appropriate ______)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

(X) Static Analysis ( ) Equivalent Static Analysis

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

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

S/S = $\geq$ 34.1 Hz F/B = $\geq$ 34.1 Hz V = $\geq$ 34.1 Hz

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

SQRT #16
SPEC No NMP2-P222X
REVISION 0

4. (X) Computer Codes: ICES- STRUDL

Frequency Range and No. of Modes N/A

( ) Hand Calculations

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

(X) Absolute Sum ( ) SRSS ( ) Other: ________ (specify)

6. Damping:

OBE 2% SSE 2% Basis for the Damping Used: FSAR

7. Support Considerations in the Model: BEDPLATE RIGIDLY SUPPORTED AT FOUNDATION BOLTS

8. Critical Structural Elements:

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable (2)	
PUMP HOLD-DOWN BOLTS	PUMP/ BEDPLATE INTERFACE	SSE + OPERATING	2951 PSI	29,792 PSI	29,956 PSI	TENSION
			2950 PSI	12,527 PSI	14,784 PSI	SHEAR

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.005 INCHES	IMPELLER/ IMPELLER HOUSING	0.007 INCHES

9. Failure Modes: STRESS, DEFLECTION

10. Margins Available: (X) Input Spectrum (1) (X) Stress or Deflection

(1) STATIC ANALYSIS CALCULATION OF STRESSES WAS BASED ON HORIZONTAL/VERTICAL SSE ACCELERATIONS OF 1.0g/ 1.2g RESPECTIVELY. CALCULATION OF DEFLECTIONS WAS BASED ON HORIZONTAL/ VERTICAL ACCELERATIONS OF 0.5g/0.5g RESPECTIVELY. (REQUIRED SSE ACCELERATIONS ARE 0.23g/0.19g)

(2) COMBINED TENSION AND SHEAR SATISFY REQUIREMENTS OF XVII-2461.

SQRT #16
SPEC No. NMP2-P222X
REVISION 0

II. Pertinent Reference Design Specifications for Qualification Requirements: ______

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

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method: (MOTOR)

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

Qualification Report*: SWEC No. STRS 02.170-5003A, SEISMIC ANALYSIS

(No., Title and Date): OF SERVICE WATER PUMP MOTOR, 5/4/79
(VENDOR REPORT No. 77F14708)

Company that Prepared Report: WESTINGHOUSE ELECTRIC CORP.

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE SITE

Applicable Codes and/or Standards: IEEE 334-1974, IEEE 344-1975, IEEE-323-1974; REGULATORY GUIDE 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

3. Required Response Spectra** (attach the graphs): SEE ATTACHMENT "A"

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

SQRT #16
SPEC No NMP2-P220
REVISION 0

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

5. Required Acceleration in Each Direct:

( ) ZPA (X) Other RIGID RANGE RESPONCE (specify)

OBE S/S = 0.13g F/B = 0.13g V = 0.10g
SSE S/S = 0.23g F/B = 0.23g V = 0.19g

6. Were fatigue effects considered?

( ) Yes (X) No

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

N/A

VI. If Qualfication by Test, then Complete: (CONDUIT BOX ONLY)

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
(X) IMPACT *
("BUMP TEST")

2. (X) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other N/A (specify)

4. Frequency Range: N/A

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

S/S= $\geq$ 53 HZ F/B= $\geq$ 53 HZ V= $\geq$ 53 HZ

6. Method of Determining Natural Frequencies
(X) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test N/A

( ) Yes (Attach TRS & RRS graphs)
( ) No

* TEST PERFORMED TO IDENTIFY NATURAL FREQUENCY ONLY

SQRT #16
SPEC. No. NMP2-P222X
REVISION 0

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length________), ( ) ________

B. Orientation and Fixturing:________

10. Functional Operability Verified:

( ) Yes ( ) No (X) Not Applicable

11. Test Results Including Modifications Made:________

N/A

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

N/A

13. Failure Modes (If appropriate N/A)

14. Margins Available: ( ) Input Spectrum ( ) Fragility N/A

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

(X) Static Analysis ( ) Equivalent Static Analysis

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

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

S/S = ≥53 Hz F/B = ≥53 Hz V = ≥53 Hz

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

4. (X) Computer Codes: WESTINGHOUSE INTERNAL PROGRAM ME-9032

Frequency Range and No. of Modes

(X) Hand Calculations

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

( ) Absolute Sum ( ) SRSS (X) Other: ALGEBRAIC SUM (specify)

6. Damping:

OBE 2% SSE 2% Basis for the Damping Used: FSAR

7. Support Considerations in the Model: SUPPORTED AT MOTOR HOLD DOWN BOLTS (1)

8. Critical Structural Elements:

A. Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
SHAFT SHEAR STRESS	SHAFT	SSE + OPERATING LOADS	1 PSI	7,936 PSI	15,000 PSI

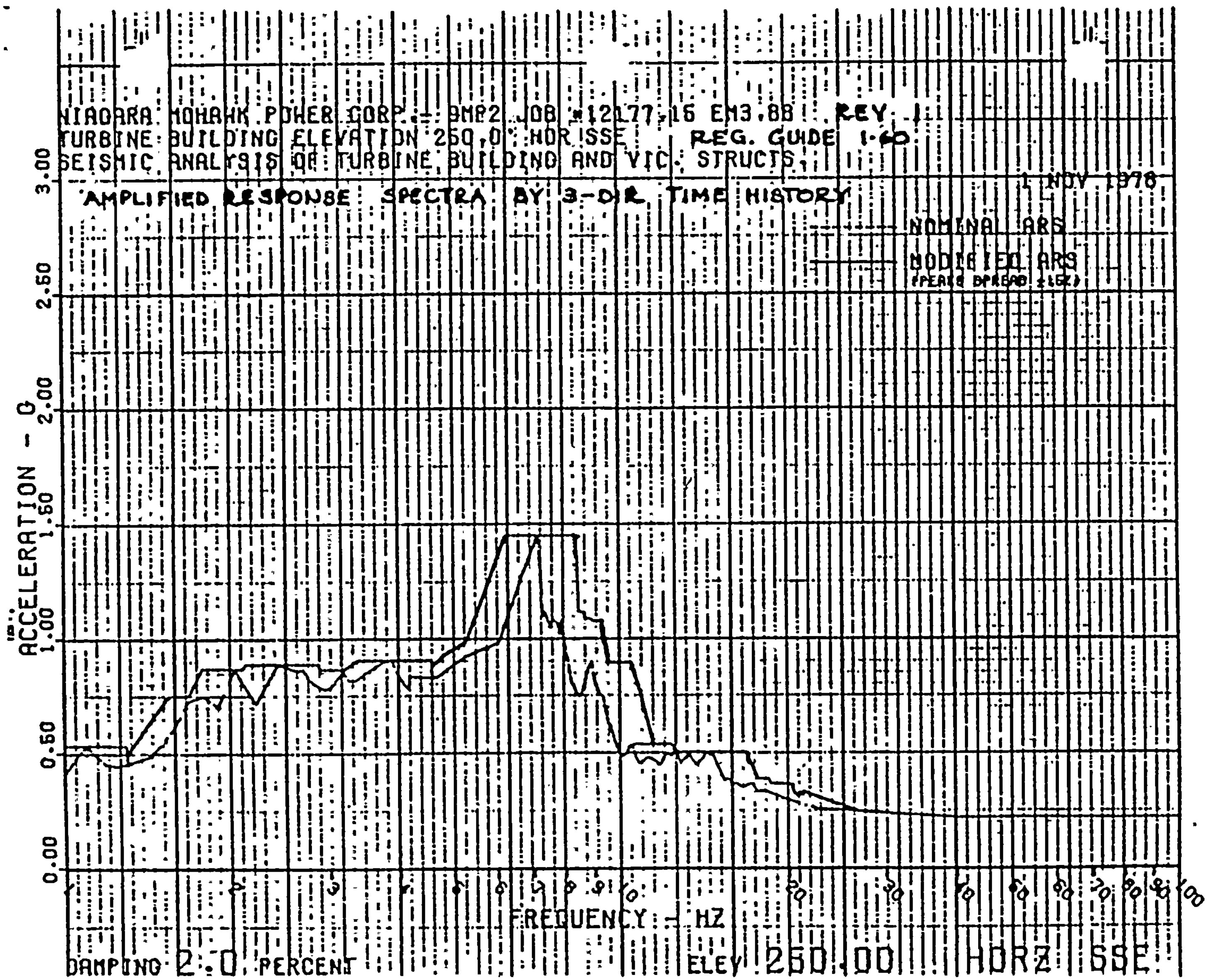
B. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.001 INCH	MOTOR SHAFT AT COUPLING	0.104 INCH *

9. Failure Modes: STRESS, DEFLECTION

10. Margins Available: (X) Input Spectrum (X) Stress or Deflection

* ALLOWABLE DEFLECTION TAKEN FROM PUMP ASSEMBLY SEISMIC ANALYSIS (STRS 2.170-5002C), Pg. 27.

(1) HOLD DOWN BOLTS ADDRESSED IN PUMP ASSEMBLY REPORT.

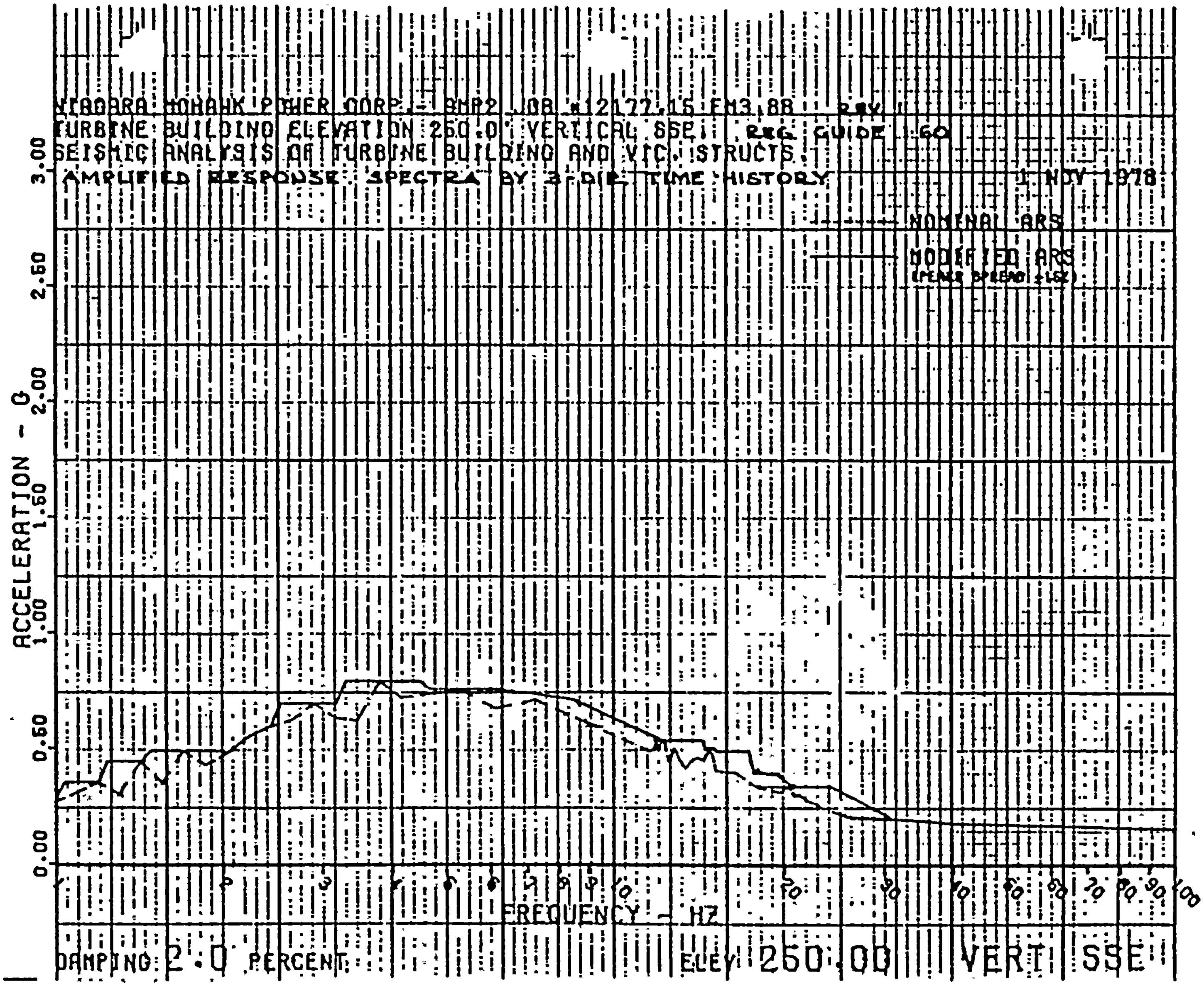


ATTACHMENT "A"

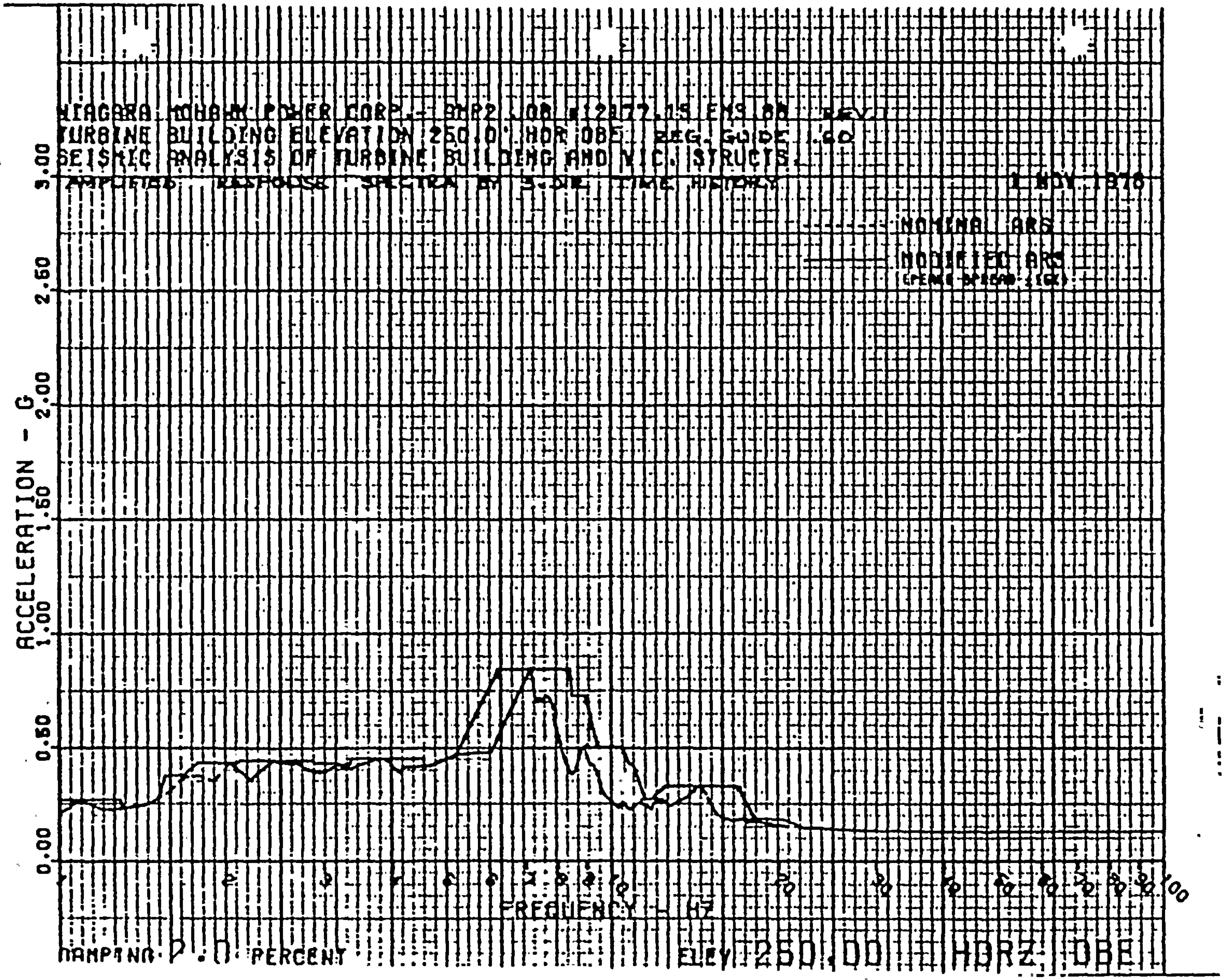
MS 1373 REV 0 PG 045

12177

Pg 1 of 4

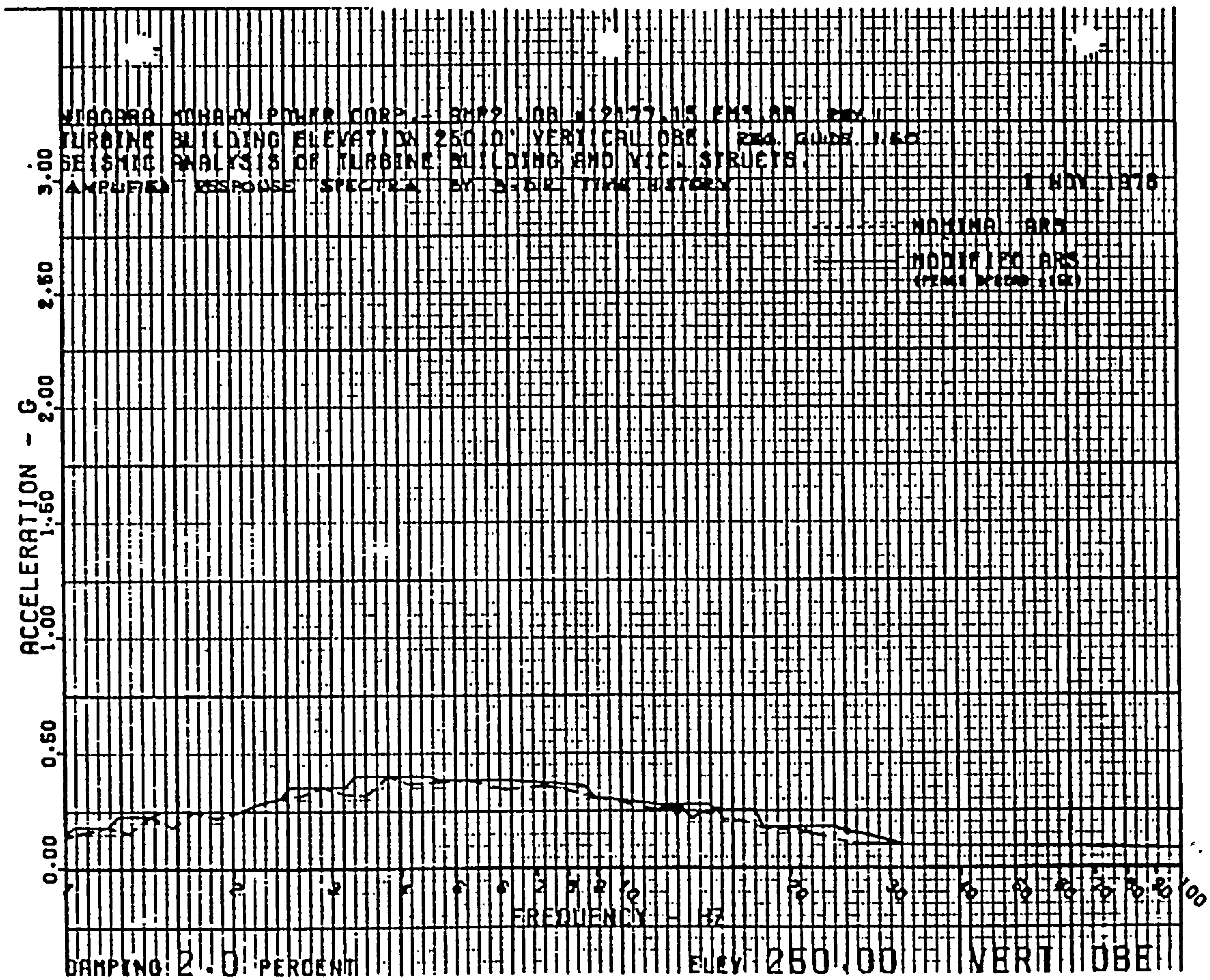


MS-1373 REV 0 PG 054
12177
ATTACHMENT A
Pg 2 of 4



NS-1373 REV 0 PG 090
12177

ATTACHMENT A
Pg. 3 of 4



NS-1373 REV 0 PG 081

12177

ATTACHMENT "A"

Pg 4 of 4

SPEC. NO. NMP2-P222X
SQRT #17

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: REACTOR (RCIC) SYSTEM PRESSURE PUMPS
MARK NUMBERS: 2ICS*P2

STONE & WEBSTER

SPEC. NO. NMP2-P222X
Revision O
SQRT # 17

Seismic and Dynamic Qualification Summary of Equipment

I. **Plant Name:** Nine Mile Point Nuclear Station - Unit 2

1. **Utility:** Niagara Mohawk Power Corporation

2. **NSSS:** General Electric Co. **BWR:** 5 MK 2

3. **A/E:** Stone & Webster Engineering Corp. Other ____________

II. **Component Name:** RCIC SYSTEM PRESSURE PUMP, 2ICS*P2

1. **Scope:** ( ) NSSS (X) BOP ( ) Other

2. **Model Number:** 3196 ST **Quantity:** 5

3. **Size or Range:** 1 INCH DISCHARGE, 1 1/2 INCH SUCTION, 10 HP.

4. **Vendor:** GOULDS PUMPS, INC

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

6. **Physical Description:**

a. **Appearance:** HORIZONTAL CENTRIFUGAL PUMP

b. **Dimensions:** 42" LG x 18" WIDE x 16 3/8" HIGH

c. **Weight:** 417 LBS. WET, 415 LBS. DRY

7. **Location: Building:** REACTOR BUILDING SECONDARY CONTAINMENT

Elevation: 175'-0"

8. **Field Mounting Conditions** (X) Bolt (No. 4 Size 5/8")
( ) Weld (Length ______)
( ) ____________

9. **Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)**
PUMP ASSEMBLY MOUNTED ON FLOOR SILL

10. a. **System in which located:** REACTOR CORE ISOLATION COOLING (RCIC)

b. **Functional Description:** MAINTAIN RCIC DISCHARGE LINE PRESSURIZED

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

II. Pertinent Reference Design Specifications for Qualification Requirements: SAFETY RELATED HORIZONTAL CENTRIFUGAL PUMPS, SPEC. No. NMP2-P222X THRU ADDENDA 11 (FORMERLY SPEC No. 50 TO ADDENDA No. 3)

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

III. Is Equipment Available for Inspection in the Plant:

(X) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method: (PUMP)

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

Qualification Report*: ME-563 REV.0 (WITH ADDENDA 1), SEISMIC

(No., Title and Date): ANALYSIS OF PRESSURE PUMPS, 4/23/84

Company that Prepared Report: McDONALD ENGINEERING ANALYSIS CO., INC.

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE SITE

Applicable Codes and/or Standards: ASME III '74 THRU WINTER 1976 ADDENDA, IEEE-344-1975; REGULATORY GUIDE 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

3. Required Response Spectra** (attach the graphs): SEE ATTACHMENT "A"

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

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

5. Required Acceleration in Each Direct:

( ) ZPA (X) Other RIGID RANGE VALUES
(specify)

OBE S/S = 0.64g F/B = 0.64g V = 1.11g
SSE S/S = 0.74g F/B = 0.74g V = 1.19g

6. Were fatigue effects considered?

( ) Yes (X) No

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

N/A

VI. If Qualfication by Test, then Complete: N/A

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) ______

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other ______
(specify)

4. Frequency Range: ______

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

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

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length______) ( ) ______

B. Orientation and Fixturing: ______

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______

______

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

______

______

13. Failure Modes (If appropriate ______)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

(X) Static Analysis ( ) Equivalent Static Analysis

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

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

S/S = $\geq$ 49 Hz F/B = $\geq$ 49 Hz V = $\geq$ 49 Hz

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

SPEC. No NMP2-P222X
REVISION 0
SQRT # 17

4. (X) Computer Codes: ICES- STRUDL

Frequency Range and No. of Modes N/A

( ) Hand Calculations

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

(X) Absolute Sum ( ) SRSS ( ) Other: ____ (specify)

6. Damping:

OBE 2% SSE 2% Basis for the Damping Used: FSAR

7. Support Considerations in the Model: BEDPLATE RIGIDLY SUPPORTED AT FOUNDATION BOLTS

8. Critical Structural Elements:

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
FLANGE STRESS	FRAME ADAPTOR FLANGE	SSE + OPERATING LOAD	570 PSI	19,278 PSI	26,250 PSI

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.003 INCH	IMPELLER/ IMPELLER HOUSING	0.025 INCH

9. Failure Modes: STRESS, DEFLECTION

10. Margins Available: (X) Input Spectrum (1) (X) Stress or Deflection

1) STATIC ANALYSIS WAS BASED ON SSE HORIZONTAL/VERTICAL ACCELERATION VALUES OF 1.0g/1.5g. THE SPECIFICATION REQ'D SSE HORIZONTAL/VERICAL ACCELERATIONS ARE 0.74g/1.19g.

SPEC. No. NMP2-P222X
REVISION 0
SQRT # 17

11. Pertinent Reference Design Specifications for Qualification Requirements: ______________________

____

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

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method: (MOTOR)

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

Qualification Report*: SWEC No. STRS 02.260-5007A, SEISMIC ANALYSIS

(No., Title and Date): OF PRESSURE PUMP MOTORS 6/12/79
(VENDOR No. SY45591)

Company that Prepared Report: WESTING HOUSE

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE SITE

Applicable Codes and/or Standards: IEEE-334-1974, IEEE 344-1975
IEEE-323-1974; REGULATORY GUIDE 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

3. Required Response Spectra** (attach the graphs): SEE ATTACHMENT "A"

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

SPEC. No. NU12-P222X
REVISION 0
SQRT #17

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

5. Required Acceleration in Each Direct:

( ) ZPA (X) Other RIGID RANGE
(specify)

OBE S/S = 0.64g F/B = 0.64g V = 1.11g
SSE S/S = 0.74g F/B = 0.74g V = 1.19g

6. Were fatigue effects considered?

( ) Yes (X) No

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

VI. If Qualfication by Test, then Complete: N/A

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) ______

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE______ SSE______ Other______
(specify)

4. Frequency Range:______

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

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

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

SPEC. No NMP2-P222X
REVISION 0
SQRT # 17

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length______) ( ) ______

B. Orientation and Fixturing: ______

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______

______

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

______

______

13. Failure Modes (If appropriate ______)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

(X) Static Analysis ( ) Equivalent Static Analysis

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

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

S/S = $\geq$ 151.7 Hz F/B = $\geq$ 151.7 Hz V = $\geq$ 151.7 Hz

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

4. (X) Computer Codes: WESTINGHOUSE INTERNAL PROGRAMS (eg. ME-7701)
Frequency Range and No. of Modes

( ) Hand Calculations

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

( ) Absolute Sum (X) SRSS [(1)] ( ) Other: ________ (specify)

6. Damping:

OBE 2% SSE 2% Basis for the Damping Used: FSAR

7. Support Considerations in the Model: SUPPORTED AT MOTOR HOLD DOWN BOLTS [(2)]

8. Critical Structural Elements:

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
SHAFT STRESS	MOTOR SHAFT	SSE + OPERATING LOAD	306 psi (BENDING) 10 psi (TENSION)	1049 psi (COMBINED)	36,000 psi

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.00638 INCH	ROTOR DEFLECTION	0.0202 INCH

9. Failure Modes: STRESS, DEFLECTION

10. Margins Available: ( ) Input Spectrum (X) Stress or Deflection

(1) SEISMIC LOADS ARE COMBINED BY SRSS METHODOLOGY. THESE LOADS ARE THEN ADDED DIRECTLY TO THE NORMAL OPERATING LOADS.

(2) HOLD DOWN BOLTS ADDRESSED IN PUMP ASSEMBLY REPORT ME-563

PSPECTRA VER 01 LEV 08 CONDITION 24 JAN 1983

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O. /7 MS-1746-0

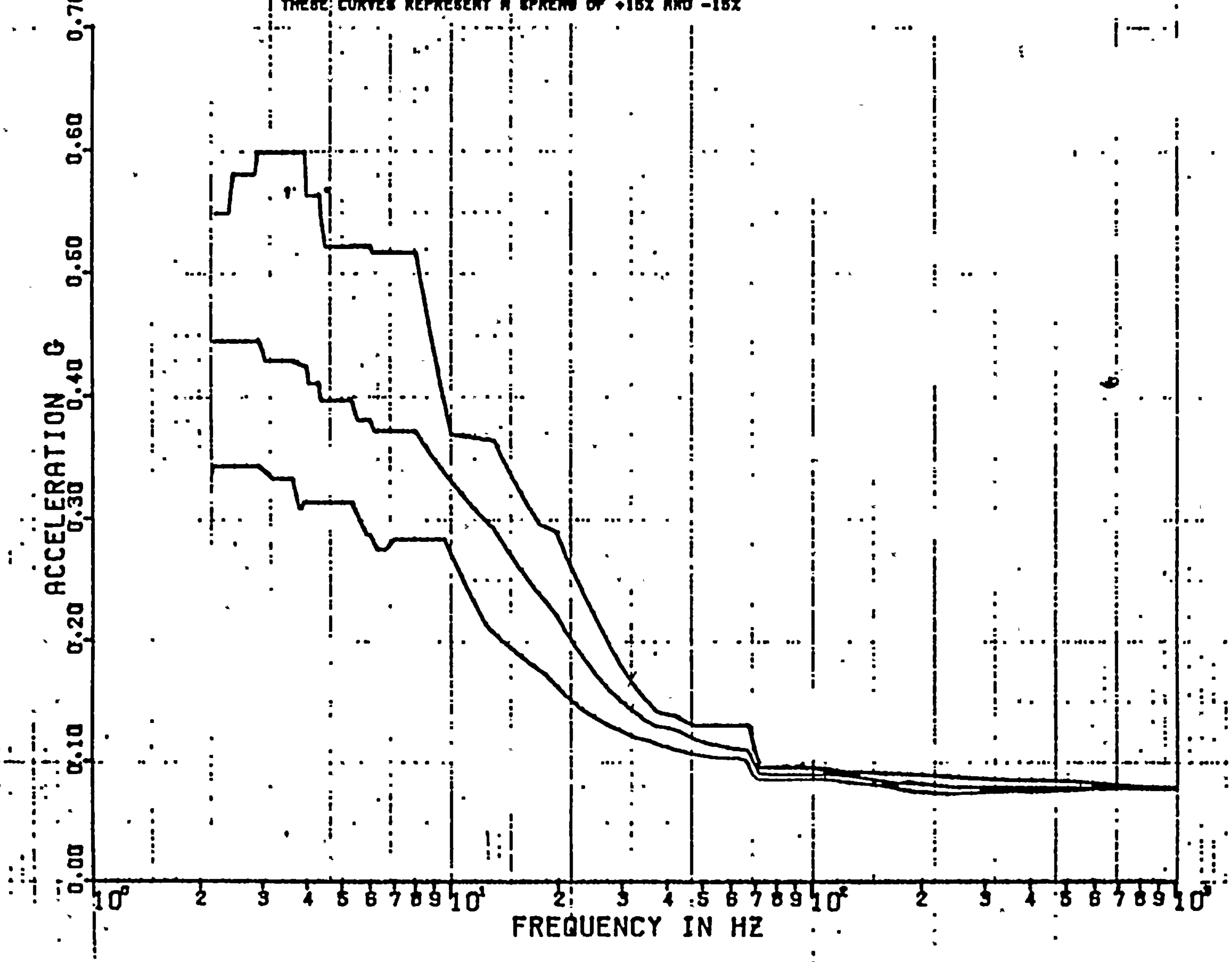
RRS OF ACCELERATION SECONDARY CONT.(ELEV. 175.0 FT)

MS 1746

MICHAEL K OO

DISK CURVE SET NO.32 HOR DIRECTION DAMPING VALUES = 0.010 0.020 0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 1% 2% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



ATTACHMENT "A"

REF 64

PG 1 OF 4

PSPECTRA VER 01 LEV 08 CONDITION 24 JAN 1985

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O. ...77 MS-1746-0

RRS OF ACCELERATION SECONDARY CONT.(ELEV. 175.0 FT)

MS 1746

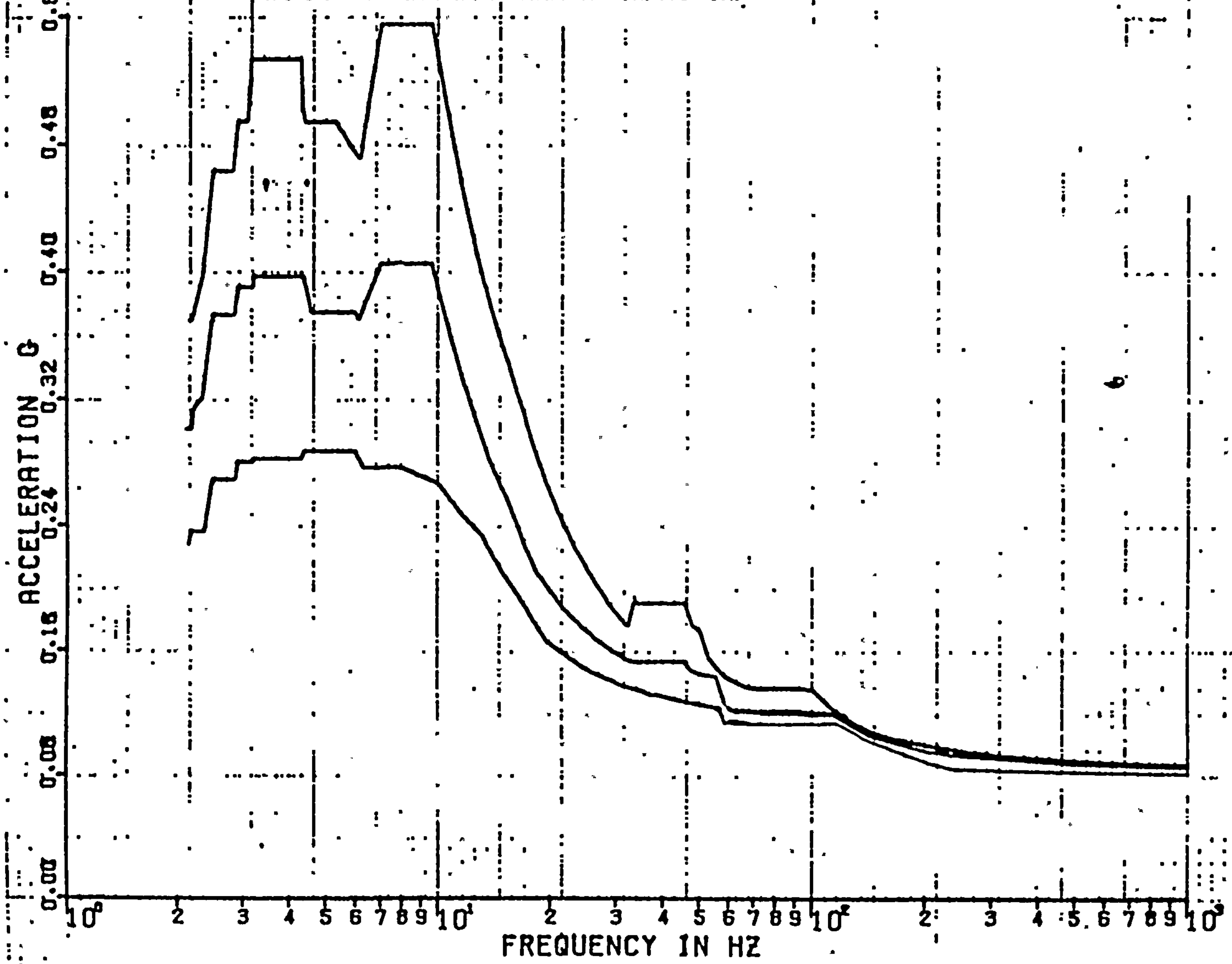
MICHAEL K DO

DISK CURVE SET NO.32 VER DIRECTION DAMPING VALUES = 0.010

0.020

0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 1% 2% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



ATTACHMENT 4
pg 2 of 4

REF 64

PSPECTRA , VER 01 LEV 08 · ED CONDITION 25 JAN 1988

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O.12177 MS-1747-0

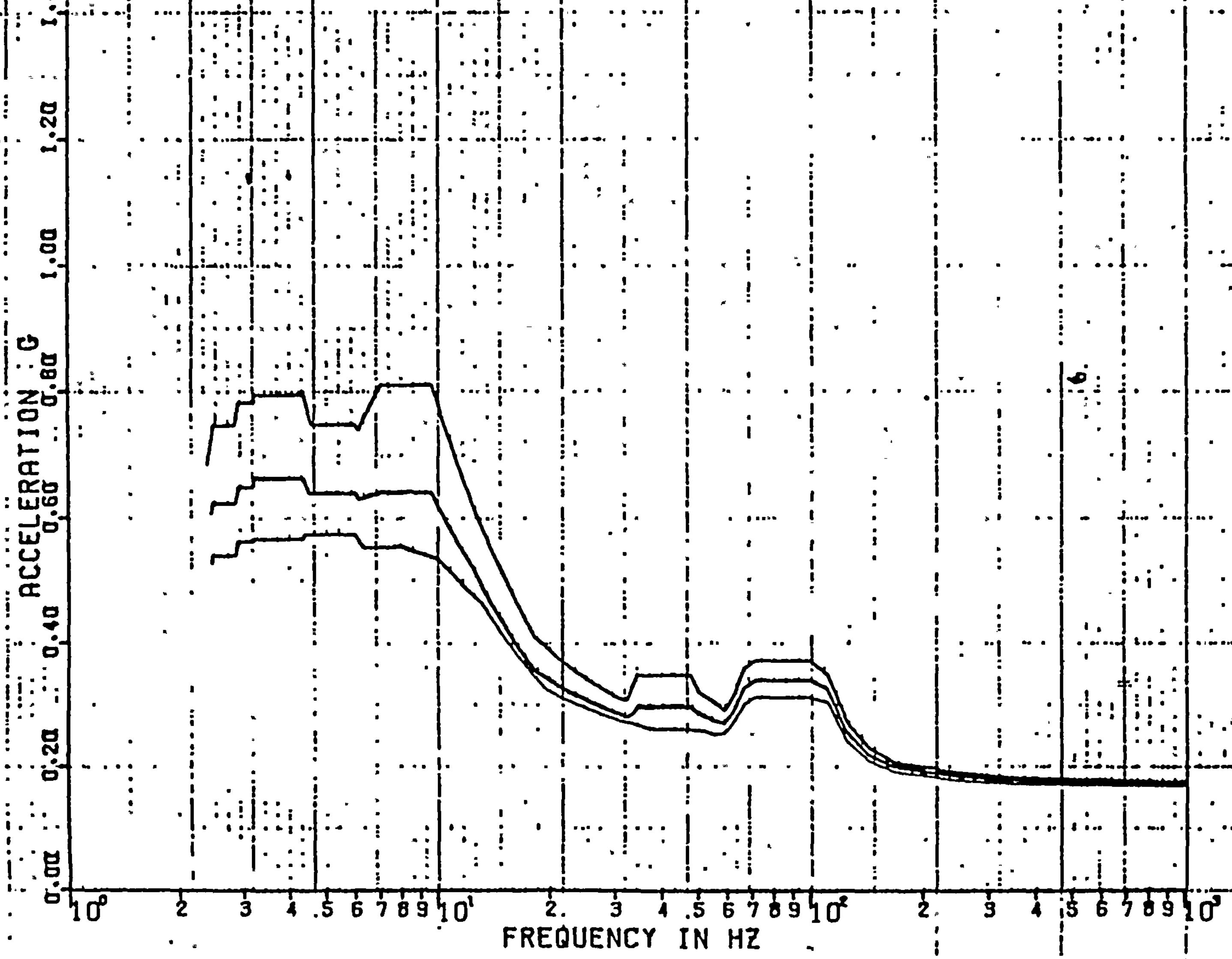
RRS OF ACCELERATION SECONDARY CONT.(ELEV. 175.0 FT)

MS 1747

MICHAEL K GO

DISK CURVE SET NO.32 VER DIRECTION DAMPING VALUES = 0.020 0.030 0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 2% 3% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



pg 3 of 4
REF 64

PSPECTRA VER 01 LEV 08 ED CONDITION 25 JAN 1989

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J. 2177 MS-1747-0

RRS OF ACCELERATION SECONDARY CONT.(ELEV. 175.0 FT)

MS 1747

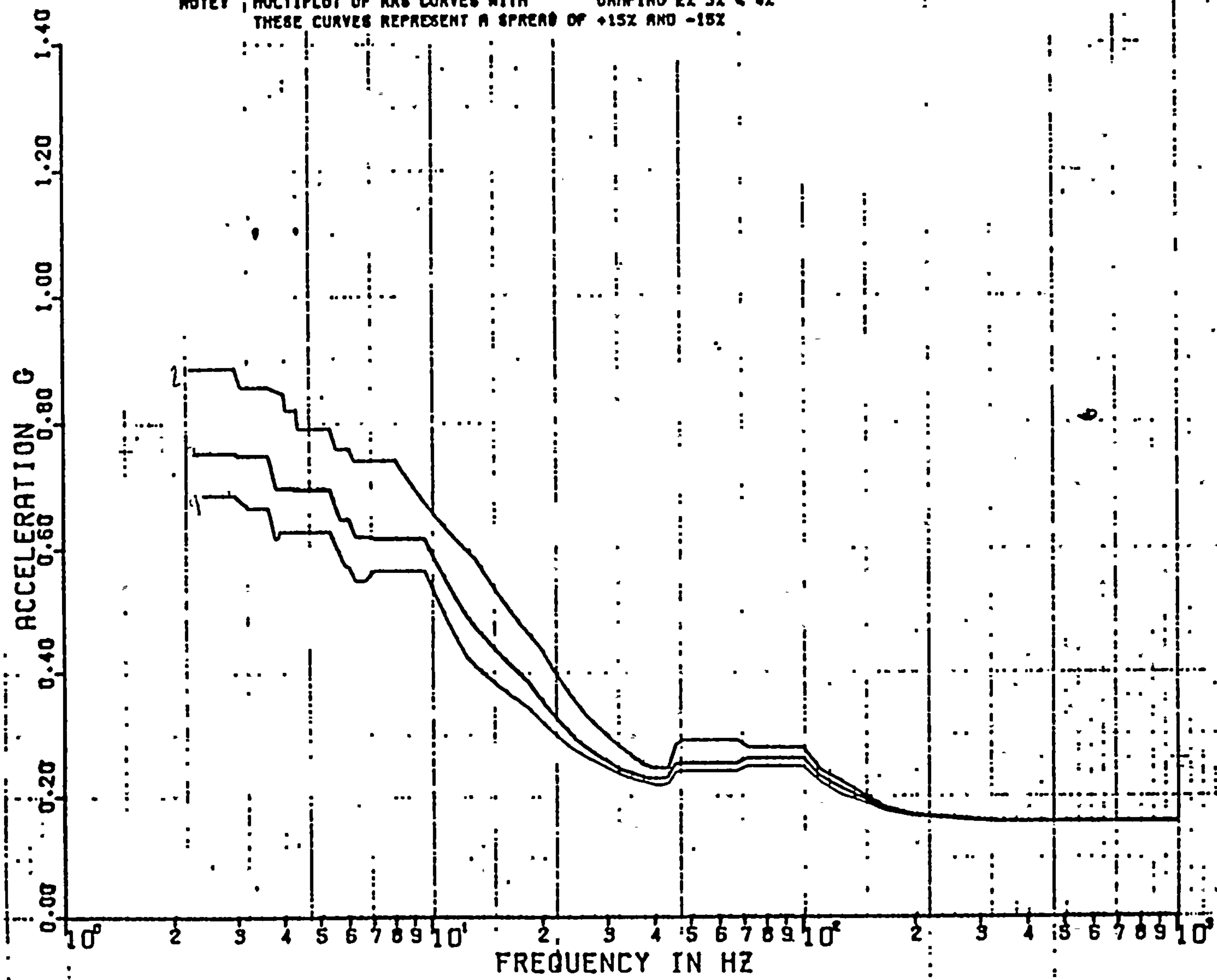
MICHAEL K DO

DISK CURVE SET NO.32

HOR DIRECTION

DAMPING VALUES = 0.020
0.030
0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 2% 3% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



PG 4 OF 4
REF 64

SPEC. NO. NMPZ-P303D

SQRT # 18

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: LOGIC CABINET

MARK NUMBERS: 2MSS*1PNL90A

STONE & WEBSTER

SPEC. NO. P303D
Revision 0

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point Nuclear Station - Unit 2

1. Utility: Niagara Mohawk Power Corporation

2. NSSS: General Electric Co. BWR: 5 MK 2

3. A/E: Stone & Webster Engineering Corp. Other ______

II. Component Name: LOGIC CABINET, MARK NO. 2MSS*IPNL90A

1. Scope: ( ) NSSS (✓) BOP ( ) Other

2. Model Number: N/A Quantity: 1

3. Size or Range: 30 1/16" X 18 1/16" X 72 1/16" HIGH

4. Vendor: CROSBY

5. If the component is a cabinet or panel, name and model number of the devices included: ATTACHMENT-1

6. Physical Description:

a. Appearance: VERTICAL BOARD

b. Dimensions: 30 1/16" X 18 1/16" X 72 1/16" HIGH

c. Weight: 400 LBS.

7. Location: Building: AUX. BAY SOUTH

Elevation: 240'.

8. Field Mounting Conditions (✓) Bolt (No. 9 - Size 3/8)
( ) Weld (Length ______)
( ) ______

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

10. a. System in which located: MAIN STEAM

b. Functional Description: CONTROL OF CONTAINMENT ISOLATION OF VALVE 2MSS*HYV6A

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

OTHER THAN COLD SHUT DOWN

II. Pertinent Reference Design Specifications for Qualification Requirements: SPEC NO. NMP2-P303D REV 1, E&DCR'S P12582, P12632 P12333

(a.) Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

(✓) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

(✓) Test ( ) Analysis ( ) Combination of Test and Analysis

Qualification Report*: SWEC JDDF# STRS 05.360-5022A

(No., Title and Date): SEISMIC SIMULATION TEST REPORT REPORT NO. 46912-1 SEPT. 29, 1983

Company that Prepared Report: WYLE LABORATORIES

Company that Reviewed Report: SWEC

Where Report is filed or available: NMP2 SITE

Applicable Codes and/or Standards: IEEE-344-1975, RG 1.100

V. Vibration Input:

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

2. Method of Combining RRS:

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

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

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

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

5. Required Acceleration in Each Direct:

(X) ZPA ( ) Other ________ (specify)

OBE S/S = 0.200 F/B = 0.200 V = 0.150
SSE S/S = 0.360 F/B = 0.360 V = 0.200

6. Were fatigue effects considered?

( ) Yes (✓) No

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

VI. If Qualfication by Test, then Complete:

1. ( ) Single Frequency (✓) Multi-Frequency (✓) Random
( ) Sine Beat
( ) ________

2. ( ) Single Axis (✓) Multi-Axis
(✓) Independent ~~Axis~~ MOTIONS ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE 5 SSE 1 Other ________ (specify)

4. Frequency Range: 1 – 100 Hz

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): NOT DETERMINED – RANDOM MULTIFREQUENCY TEST

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

6. Method of Determining Natural Frequencies N/A
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

(✓) Yes (Attach TRS & RRS graphs) ATTACHMENT 3
( ) No

8. Maximum Input g Level Test:

OBE S/S = 0.41 F/B = 0.40 V= 0.36

SSE S/S = 0.88 F/B = 0.70 V = 1.00

9. Laboratory Mounting:

A. (✓) Bolt (No. 4 Size 3/4-10)
( ) Weld (Length) ( )

B. Orientation and Fixturing: BOLTED TO RIGID FIXTURE WHICH IS IN TURN WELED TO THE SHAKE TABLE

10. Functional Operability Verified:

(✓) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: FUNCTIONED SATISFACTORILY. NO MODIFICATIONS WERE MADE

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

ALL TESTS PERTINENT TO IEEE 323-1974

13. Failure Modes (If appropriate STRUCTURAL & ELECTRICAL)

14. Margins Available: (✓) Input Spectrum ( ) Fragility

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

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

S/S = F/B = V =

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

4. ( ) Computer Codes:____________________ ______________

Frequency Range and No. of Modes

( ) Hand Calculations

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

( ) Absolute Sum ( ) SRSS ( ) Other:__________________ (specify)

6. Damping:

OBE________ SSE________ Basis for the Damping Used:________

7. Support Considerations in the Model:___________________________

8. Critical Structural Elements:

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

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

9. Failure Modes:____

10. Margins Available: ( ) Input Spectrum ( ) Stress or Deflection

MAIN STEAM ISOLATION VALVE DATA [illegible] BY SELLER/ENGINEER

ELECTRICAL COMPONENT LIST FOR MSIV EFCO/600 A[illegible]TOR AND LOGIC CONTROL CABINET(1) [illegible]8

Client: Niagara Mohawk Power Corporation
Project: Nine Mile Point Nuclear Station - Unit 2

S&W Mark No. 2MSS*HYV6A,B,C,D
2MSS*HYV7A,B,C,D

Page 4-24
Spec. No. NMP2-P303D
J.O. No. 12177

By: H. J. Cobb
Date: 11/5/82

Equipment	Component Number	Location	Supplier	Description	IEEE 323-74	IEEE 344-75	ASTM D635	Additional Consideration	Class 1E
~~Trip Sol.~~	~~SFA SFB~~	~~Actuator~~	~~Valcor~~	~~40 lb, 120 V ac, 60 Hz~~	~~Yes~~	~~Yes*~~	~~Not Combustible~~	~~Wire Leads meet IEEE 323-1974~~	~~Yes~~
~~Limit Switches~~	~~CLS 2,4,6,8, 10,11,12 OLS 1,3,5,7 ICLS 13,14,15~~	~~Actuator~~	~~Namco~~	~~EA180-14302~~	~~Yes~~	~~Yes*~~	~~Not Combustible~~		~~Yes~~
~~1-1/2 Sol. Valves~~	~~SVB-A SVB-B~~	~~Actuator~~	~~Target Rock~~	~~Model No. 81AL-001~~	~~Yes~~	~~Yes*~~	~~Not Combustible~~	~~Class H Coil~~	~~Yes~~
~~1/2 Sol. Valve~~	~~SVC~~	~~Actuator~~	~~Target Rock~~	~~Model No. 81AL-002~~	~~No~~	~~Yes*~~	~~Not Combustible~~	~~Class H Coil~~	~~No(3)~~
~~Motor~~	~~M~~	~~Actuator~~	~~Westinghouse~~	~~MAC, 3 hp 575 V ac, 60 Hz, 1750 rpm~~	~~No~~	~~Yes*~~	~~Not Combustible~~	~~Class H Coil, Rad Resistant~~	~~No~~
~~Pressure Trans.~~	~~N/A~~	~~Actuator~~	~~Computer** Instr.~~	~~Model 5000 B501545~~	~~No~~	~~Yes*~~	~~Minimal Internal Plastics~~		~~No~~
~~Level Switch~~	~~N/A~~	~~Actuator~~	~~Delaval**~~	~~GEMS-LS 2050-20200~~	~~No~~	~~Yes*~~	~~Minimal Internal Plastics~~		~~No~~
Wire	N/A	Logic Cab. & Actuator	Rockbestos (Cerro)	#14 AWG, NEC, SIS	Yes	Yes*	N/A	IEEE 383-74	Yes
~~Conduit~~	~~N/A~~	~~Actuator~~	~~Anaconda~~	~~NMC Jacket~~	~~Yes~~	~~Yes*~~	~~N/A~~	~~IEEE 383-74~~	~~Yes~~
Terminal Block	N/A	Logic Cab. & Actuator	Buchanan	NQB106, NQB108, and NQB112	Yes	Yes*	UL-94 94V-1		Yes
Wire Lugs	N/A	Logic Cab. & Actuator	Thomas Betts	Sta-Kon Ring Tefzel	Yes	Yes*	UL-94 94V-0		Yes

ATTACHMENT 1 PAGE 1 OF 2

Equipment	Component Number	Location	Supplier	Description	IEEE 323-74	IEEE 344-75	ASTM D635	Additional Consideration	Class 1E
Relays	CR	Logic Cab.	Gould**	J10, J13	Yes	Yes*	UL-94 94V-0	ANSI C19.3-73, C19.6-73 NEMA ICS1&2, 1978	Yes
Wire Trays	N/A	Logic Cab.	Panduit	Noryl	No	Yes*	UL-94 94V-1		No
Cable Ties	N/A	Logic Cab. & Actuator	Panduit	Sta-Strap	N/A	Yes*	N/A		No
Wire Marker	N/A	Logic Cab. & Actuator	Electromark Co.	Style No. WA-1000	N/A	Yes*	Yes - Self-Extinguishing		No
Conduit	N/A	Logic Cab.	American Boe, Inc.	NB Series Unbraided	N/A	Yes*	N/A		No
~~Control Switch (2)~~	~~CS1&2~~	~~Shop Test Panel~~			~~N/A~~	~~N/A~~			~~No~~
~~Push-buttons (2) and Lights~~	~~PBETA PBETB PBR PBT1 PBT2 LT1-LT12~~	~~Shop Test Panel~~			~~N/A~~	~~N/A~~			~~No~~

(1)Data taken from Seller's procedure "G+W (FSD) - MSIV Actuator - Environmental Qualification Plan for Class 1E" - PS-1185.
(2)Identical components being supplied by SWEC in the control room with the exception of being Class 1E and meeting IEEE 323-74 and IEEE 344-75.
(3)Provided that for accident closure this solenoid valve is not required to be open for the MSIV to close and remain closed.
*Seismically tested in actuator or logic cabinet assembly.
**These suppliers previously "Approved" by Engineers.

ATTACHMENT 1 PAGE 2 OF 2

PSPECTRA VER 01 LEV 08 UPSET UP ITION

24 JAN 1988

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O.. ./7 MS-1746-0

RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

MS 1746

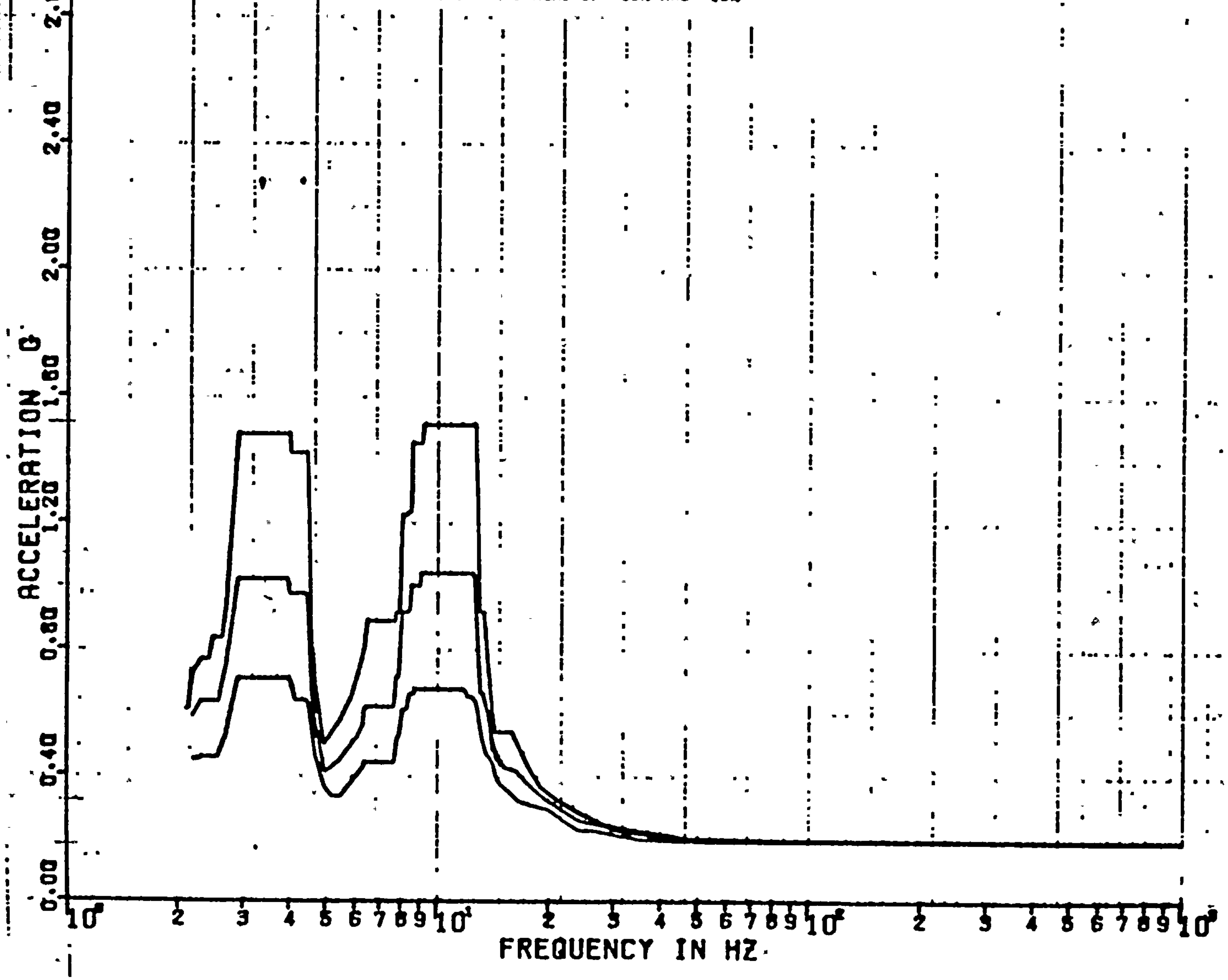
MICHAEL K DO

DISK CURVE SET NO.29

HOR DIRECTION

DAMPING VALUES & 0.010
0.020
0.040

NOTE: MULTIPLOT OF RRS CURVES WITH .... DAMPING 1% 2% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%.



ATTACHMENT 2

PAGE 1 OF 4

PAGE # 79

PSPECTRA VER 01 LEV 08 UPSET CONDITION 24 JAN 1989

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O. 177 MS-1746-0

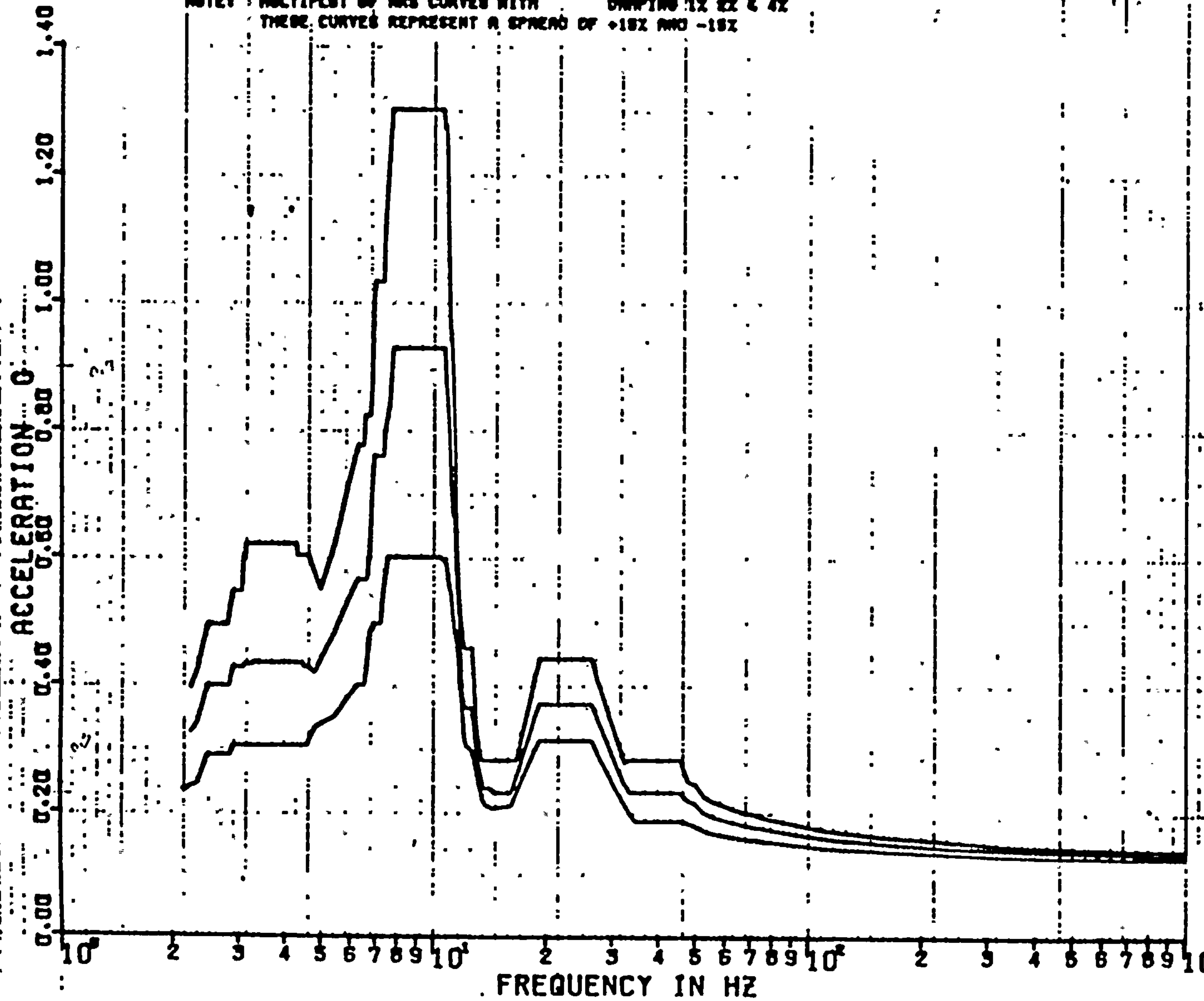
RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

MS 1746

MICHAEL K DO

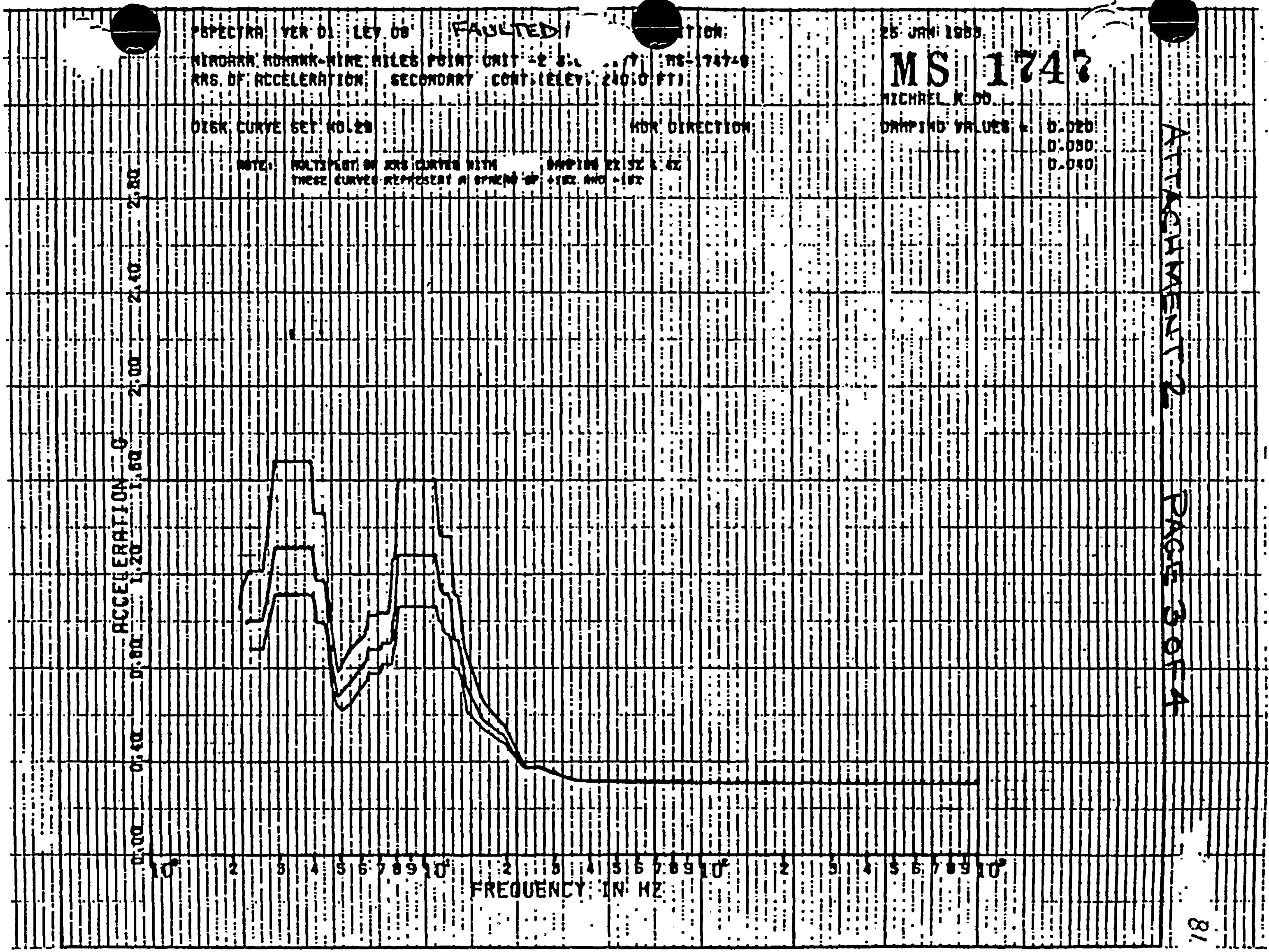
DISK CURVE SET NO.29 VER DIRECTION DAMPING VALUES = 0.010 0.020 0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 1% 2% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



ATTACHMENT 2 PAGE 2 OF 4

PAGE # 80



FAULTED
25 JAN 1985
MS 1747
MICHAEL K. DO
DISK CURVE SET NO.29
HOR DIRECTION
DAMPING VALUES = 0.020
0.030
0.040
ACCELERATION G
0.00
0.40
0.80
1.20
1.60
2.00
2.40
2.80
FREQUENCY IN HZ
ATTACHMENT 2 PAGE 3 OF 4
18

PSPECTRA VER 01 LEV 08 FAULTED F[illegible] [illegible]DITION 25 JAN 1989

NIAGARA MOHAWK-NINE MILES POINT UNIT -2 J.O.:12177 MS-1747-0

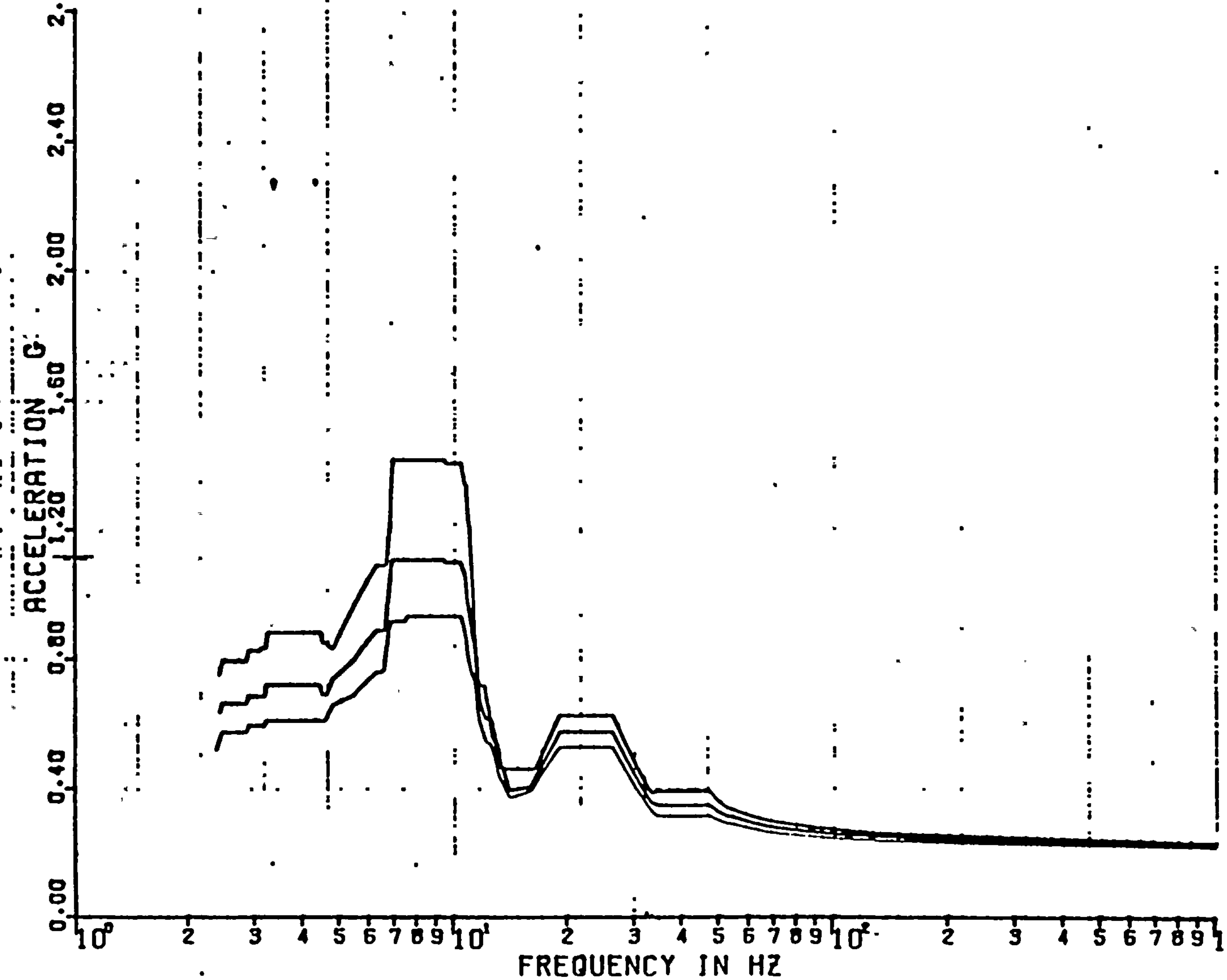
RRS OF ACCELERATION SECONDARY CONT.(ELEV. 240.0 FT)

MS 1747

MICHAEL K OO

DISK CURVE SET NO.29 VER DIRECTION DAMPING VALUES = 0.020 0.030 0.040

NOTE: MULTIPLOT OF RRS CURVES WITH DAMPING 2% 3% & 4%
THESE CURVES REPRESENT A SPREAD OF +15% AND -15%



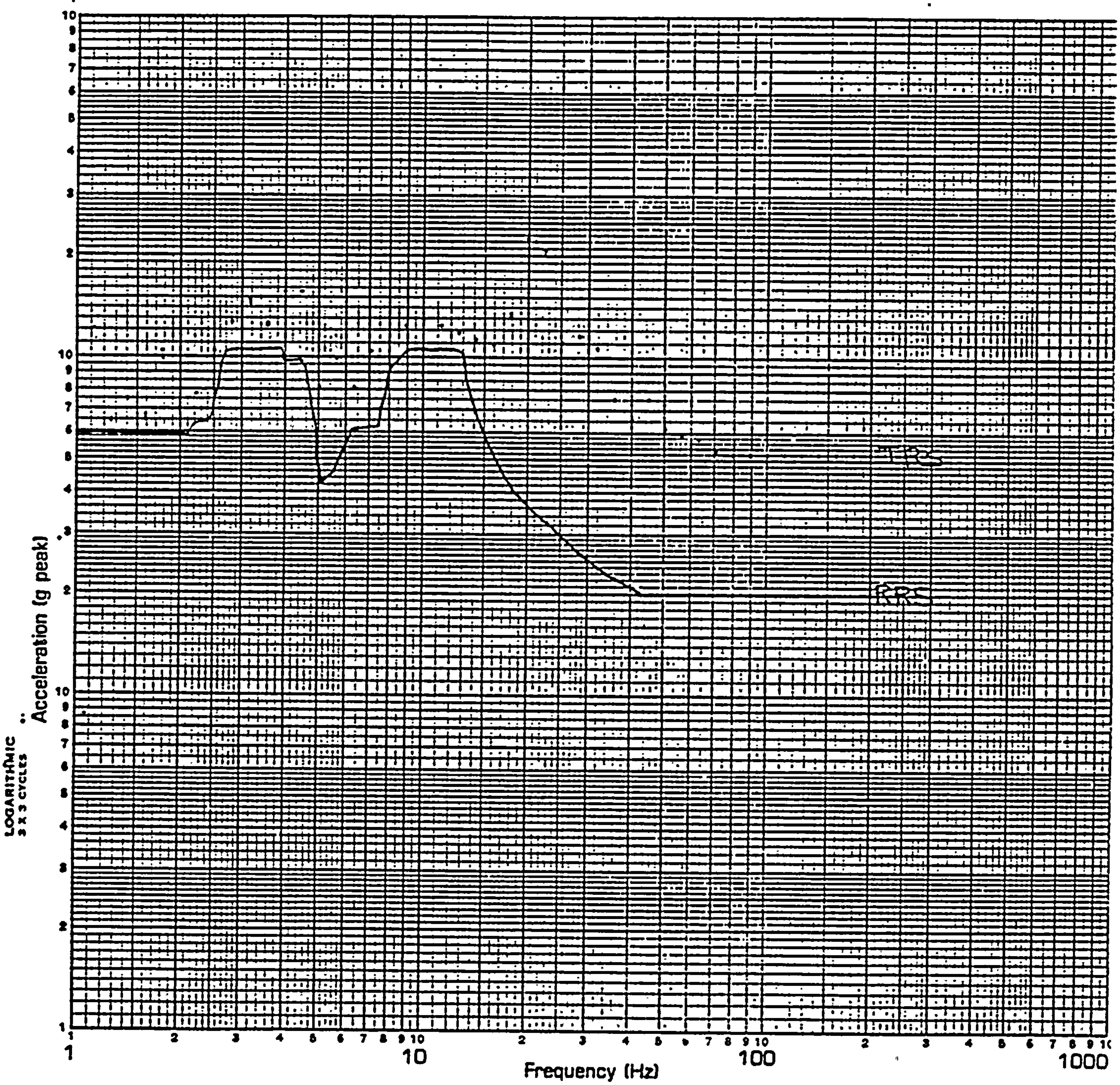
ATTACHMENT 2 PAGE 4 OF 4

E2

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☑ 100 ☐ 1000☐

DAMPING $\boxed{2\%}$



SPECIMEN ———

AXIS Triax

LOCATION NO. SS HCA

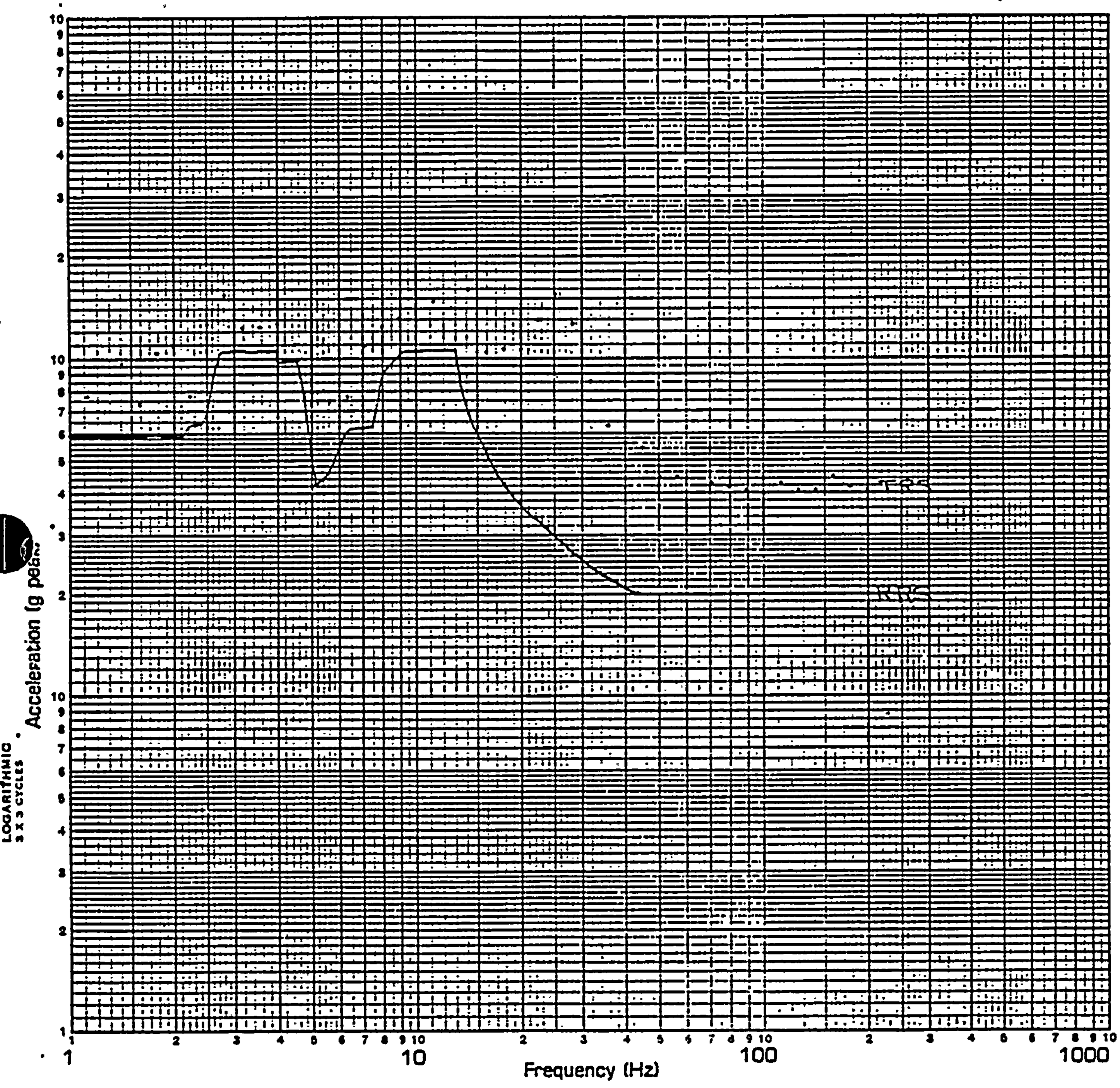
TEST RUN NO. 2

ATTACHMENT 3

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☒ 100 ☐ 1000☐

DAMPING $\boxed{2\%}$



SPECIMEN ______

AXIS Triax

LOCATION NO. FB HCA

TEST RUN NO. 2

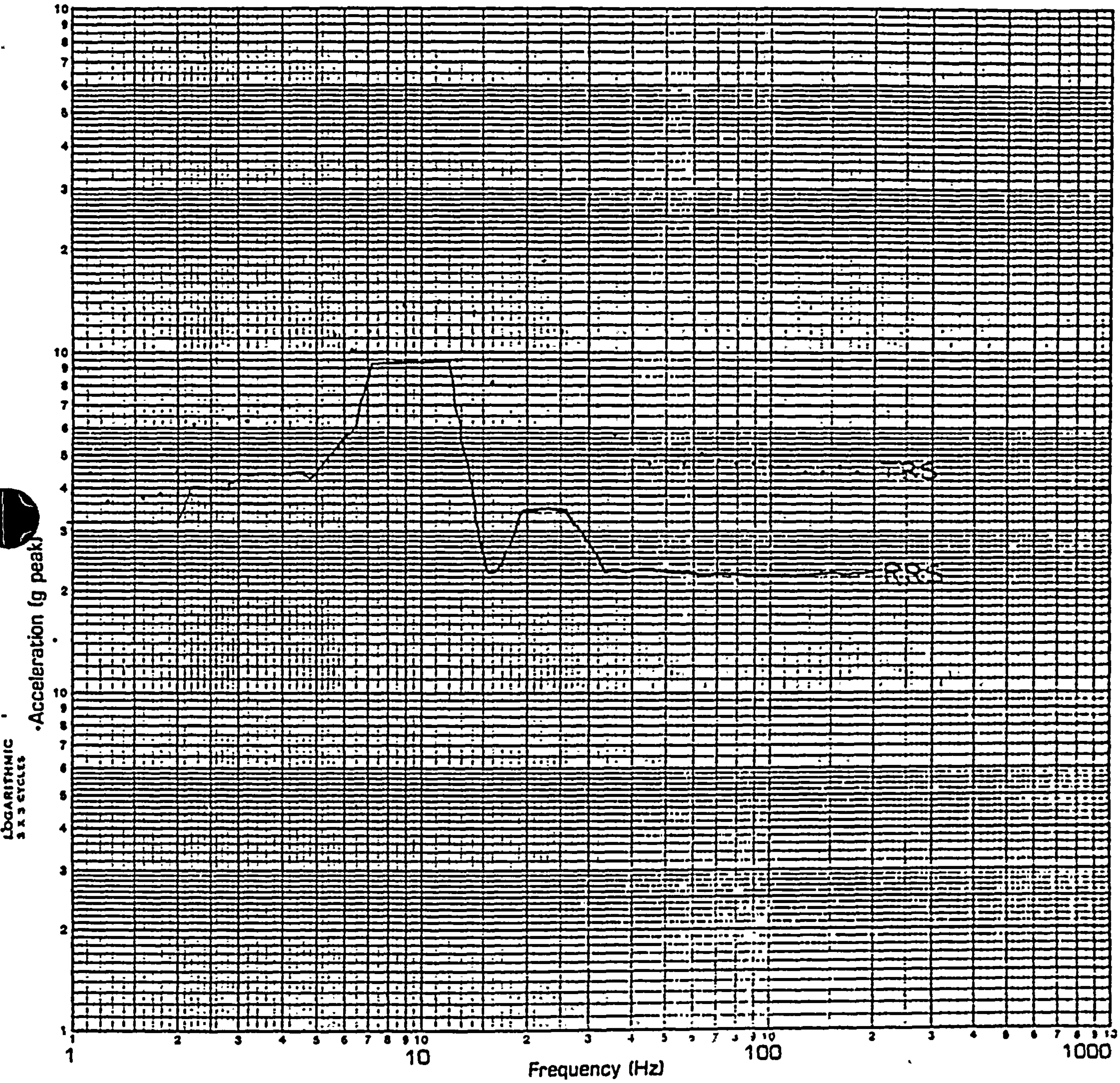
ATTACHMENT 3 PAGE 3 OF 6

Page No. 26
Report No. 46912-1

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☑ 100 ☐ 1000☐

DAMPING 2%



SPECIMEN ——

AXIS Triax

LOCATION NO. VCA

TEST RUN NO. 2

ATTACHMENT 3 PAGE 4 OF 6

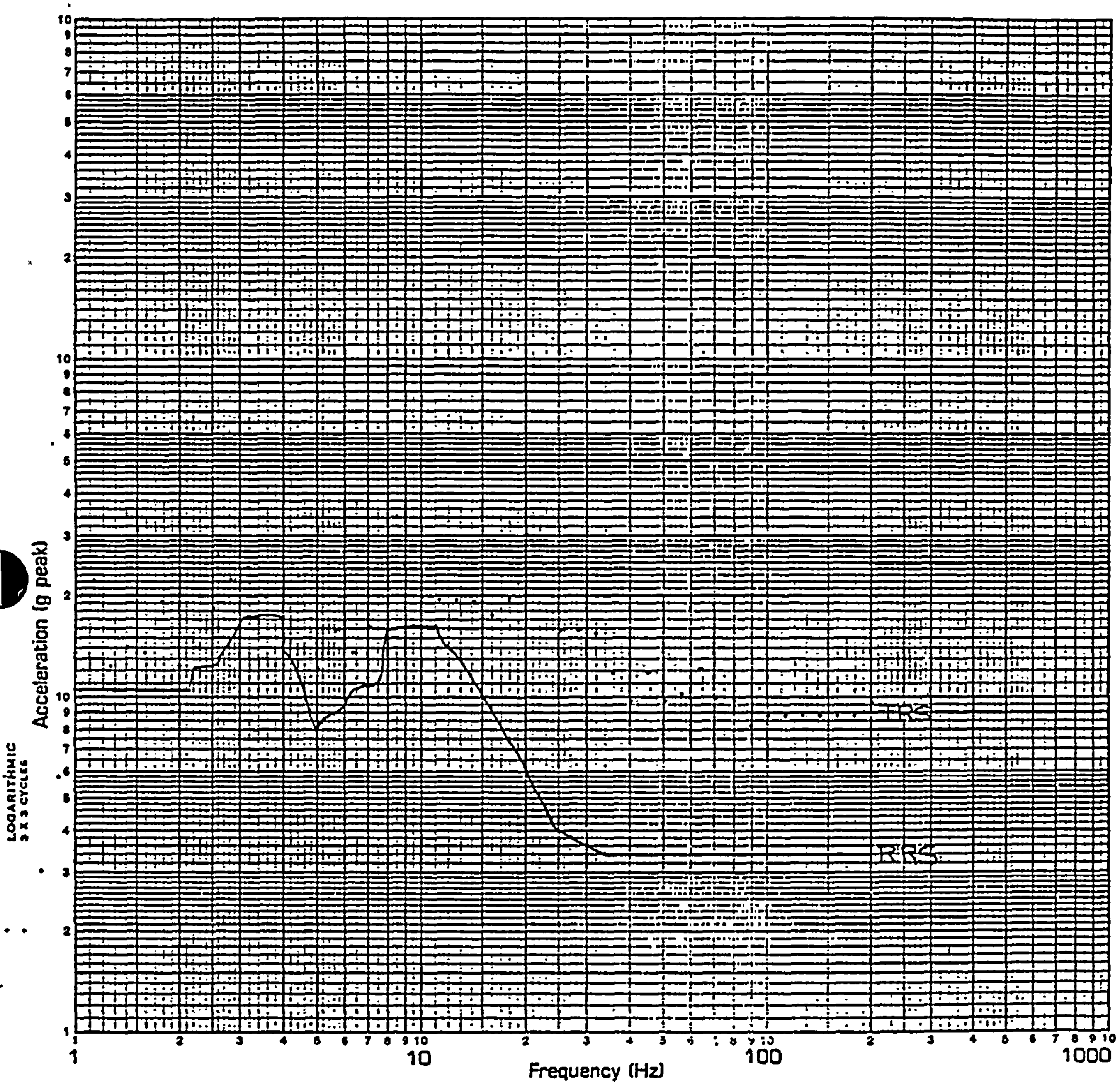
Page No. 40

Report No. 46912-1

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000☐

DAMPING 2 %



SPECIMEN ——

AXIS Triax

LOCATION NO. SS HCA

TEST RUN NO. 7

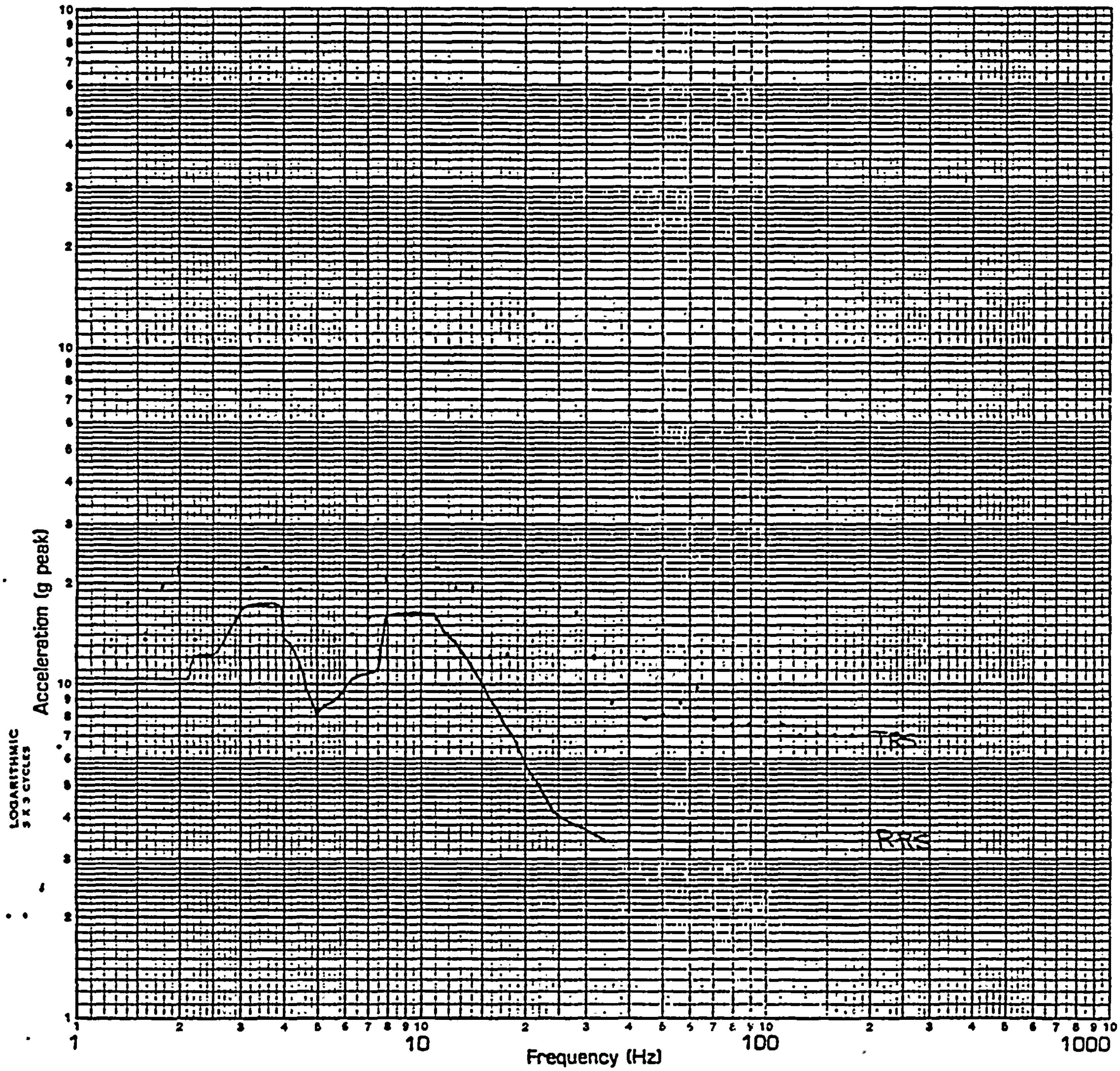
ATTACHMENT 3 PAGE 5 OF 6

Page No. 39
Report No. 46912-1

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING $\boxed{2\%}$



SPECIMEN ___________

AXIS Triax

LOCATION NO. FB HCA

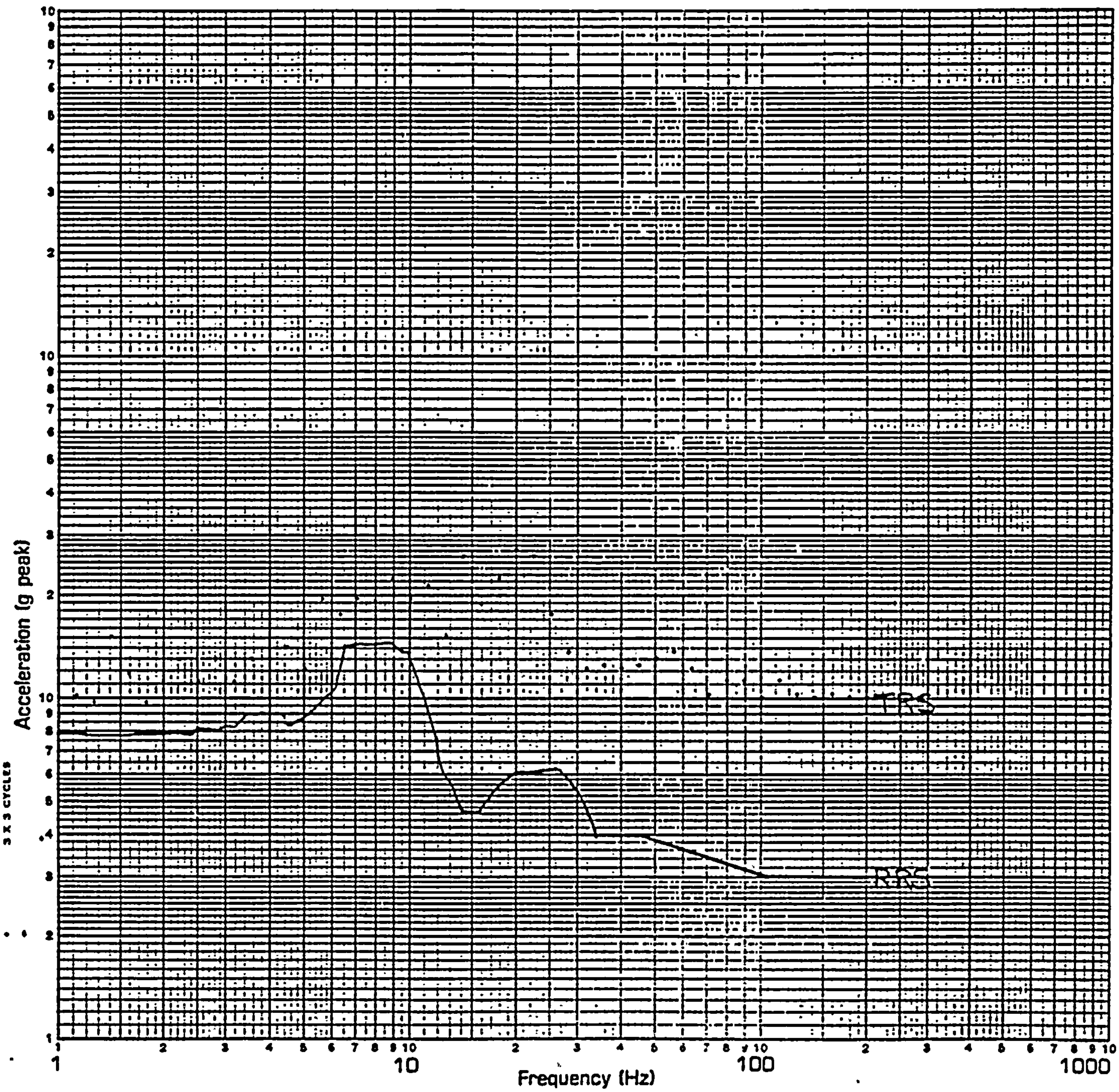
TEST RUN NO. 7

ATTACHMENT 3

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000☐

DAMPING $\boxed{2\%}$



SPECIMEN ——

LOCATION NO. VCA

AXIS Triax

TEST RUN NO. 7

SPEC. NO. P304D

SQRT # 19

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: 18"-300# BUTTERFLY VALVE WITH SMB-00-10/H3BC ACTUATOR

MARK NUMBERS: 2 RHS * MOV 9A

STONE & WEBSTER

SPEC. NO. P 304 V, Rev. 1
Revision 0

Seismic and Dynamic Qualification Summary of Equipment

I. Plant Name: Nine Mile Point Nuclear Station - Unit 2

1. Utility: Niagara Mohawk Power Corporation

2. NSSS: General Electric Co. BWR: 5 MK 2

3. A/E: Stone & Webster Engineering Corp. Other ~

II. Component Name: 18"-300# BUTTERFLY VALVE W/ SMB-00-10/H3BC ACTUATOR

1. Scope: ( ) NSSS (X) BOP ( ) Other

2. Model Number: N/A Quantity: 1

3. Size or Range: 18"- 300#

4. Vendor: POSI SEAL INC

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

(NOT APPLICABLE)

6. Physical Description:

a. Appearance: MOTOR OPERATED VALVE (MOV)

b. Dimensions: 18" MOV

c. Weight: 1414# TOTAL 886# VALVE 528# ACTUATOR/BRACKET

7. Location: Building: ABN (AUXILIARY BAY - NORTH)

Elevation: 201' COL. 46.00 LINE W

8. Field Mounting Conditions ( ) Bolt (No. - Size -)
( ) Weld (Length)
( ) NOT INSTALLED

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

PIPE MOUNTED

10. a. System in which located: RESIDUAL HEAT REMOVAL (RHS/RHR)

b. Functional Description: VALVE IS NORMALLY OPEN, IT PROVIDES A FLOWPATH TO HEAT EXCHANGER 2RHS*E1A. FOR SHUTDOWN, SUPPRESSION POOL AND CONTAINMENT SPRAY

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

11. Pertinent Reference Design Specifications for Qualification Requirements: SPEC. P304D, REV.1, "SPECIFICATION FOR MOTOR OPERATED, AIR OPERATED & MANUAL BUTTERFLY VALVES EIDCRS: P13057, P13248, C91957, P13078A, P13090

a. Seismic Input d. Service Conditions

b. Hydrodynamic Load Input e. Qualified Life

c. Fatigue Considerations

III. Is Equipment Available for Inspection in the Plant:

( ) Yes (X) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: SECTIONS IV THRU VII FOR

(No., Title and Date): EACH REPORT FOLLOWS:

Company that Prepared Report: __________

Company that Reviewed Report: __________

Where Report is filed or available: __________

Applicable Codes and/or Standards: __________

V. Vibration Input:

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

2. Method of Combining RRS:

   ( ) Absolute Sum ( ) SRSS ( ) __________ (other, specify)

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

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

STATIC ANALYSIS ~ VALVE ASSEMBLY

II. Pertinent Reference Design Specifications for Qualification Requirements: ______

a. Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: STRS 5.332-5000A

(No., Title and Date): 34077-01, "NUCLEAR SEISMIC ANALYSIS" 9-27-84

Company that Prepared Report: POSI SEAL, INC.

Company that Reviewed Report: POSI SEAL / SWEC

Where Report is filed or available: NINE MILE POINT 2 JOB SITE

Applicable Codes and/or Standards: ASME SECT. III, SUBSECT. NC, 1977 edition & Addenda up to & including 7-30-77, Code Case N-142-1 (1774-1)

V. Vibration Input:

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

2. Method of Combining RRS: (NOT APPLICABLE)

   ( ) Absolute Sum ( ) SRSS ( ) ______ (other, specify)

3. Required Response Spectra** (attach the graphs): (NOT APPLICABLE)
   VALVE ACCELERATIONS FROM PIPING ANALYSIS

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

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

5. Required Acceleration in Each Direct:

( ) ZPA (X) Other PIPING ANALYSIS
(specify)

OBE S/S = 2.0g F/B = 2.0g V = 2.0g

SSE S/S = 3.0g F/B = 3.0g V = 3.0g

6. Were fatigue effects considered?

( ) Yes (X) No

If yes, describe how they were treated in overall qualification program: (NOT APPLICABLE)

VI. If Qualfication by Test, then Complete: NOT APPLICABLE

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) ___________

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent MOTION ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE_____________ SSE_____________ Other_____________
(specify)

4. Frequency Range:_____________

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

S/S=_____________ F/B=_____________ V=_____________

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

*NOTE: DAMPING VALUES CORRESPOND TO THE DAMPING USED IN GENERATING THE RRS WHICH INTURN WAS USED IN THE RESPONSE SPECTRUM MODAL ANALYSIS FOR THE PIPING ANALYSIS. THE PIPING ANALYSIS PROVIDES THE ACCELERATION LEVELS FOR THE VALVE.

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length______) ( ) ______

B. Orientation and Fixturing: ______

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______

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

______

13. Failure Modes (If appropriate ______)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

(X) Static Analysis ( ) Equivalent Static Analysis

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

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

LONG. = 58 hz TRANS. = 89 hz V = 453 hz

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

4. ( ) Computer Codes: (NOT APPLICABLE)

Frequency Range and No. of Modes

(X) Hand Calculations

5. Method of Combining Dynamic Responses from Seismic and Other Dynamic Loads: (NOT APPLICABLE)

( ) Absolute Sum ( ) SRSS ( ) Other:________ (specify)

6. Damping: (NOT APPLICABLE)

OBE — SSE ~ Basis for the Damping Used: ~

7. Support Considerations in the Model: FIXED AT RING ENDS

8. Critical Structural Elements:

A. Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress **	Stress Allowable
1. BRACKET BOLT	OPERATING + SEISMIC + DWT	21083 PSI (TENSILE) 6479 PSI (SHEAR)	27131 PSI	37500 PSI
2. STEM	OPERATING + SEISMIC + DWT	3711 PSI (BENDING)	32603 PSI	52800 PSI

B. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
N / A		

9. Failure Modes: STRUCTURAL

10. Margins Available: ( ) Input Spectrum (X) Stress or Deflection

DYNAMIC TESTING ~ LIMITORQUE ACTUATOR
(SMB-00-10/H3BC)

7

II. Pertinent Reference Design Specifications for Qualification Requirements: ______________________

____

a. Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: IEEE 05.312-5000 B & C

(No., Title and Date): B0058, "VALVE ACTUATOR QUALIFICATION REPORT," 1-11-80 1)

Company that Prepared Report: LIMITORQUE

Company that Reviewed Report: POSI SEAL INC. / SWEC

Where Report is filed or available: NINE MILE POINT 2 JOB SITE

Applicable Codes and/or Standards: IEEE 323-1974, 344-1975, 382-1972

V. Vibration Input:

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

2. Method of Combining RRS: (NOT APPLICABLE)

   ( ) Absolute Sum ( ) SRSS ( ) ______________ (other, specify)

3. Required Response Spectra** (attach the graphs): (NOT APPLICABLE) VALVE ACCELERATIONS FROM PIPING ANALYSIS.

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

1)... APPENDIX F (B0037), APPENDIX 11 - LIMITORQUE REPORT B0047 (SMB-3-150/H5BC) & REPORT B0048 (SMB-1-60/H3BC)

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

5. Required Acceleration in Each Direct:

( ) ZPA (X) Other PIPING ANALYSIS (specify)

OBE S/S = 2.0 g F/B = 2.0 g V = 2.0 g

SSE S/S = 3.0 g F/B = 3.0 g V = 3.0 g

6. Were fatigue effects considered?

( ) Yes (X) No

If yes, describe how they were treated in overall qualification program: (NOT APPLICABLE)

VI. If Qualfication by Test, then Complete: FOR ACTUATOR ONLY

1. (X) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
(X) SINE DWELLS

2. (X) Single Axis ( ) Multi-Axis
( ) Independent MOTION ( ) In-phase Motions

3. Number of Qualifications Tests:
OBE 5~2.2g INPUT 30 SEC. DWELL @ 35hz SSE 1~4.4g INPUT 30 SEC. DWELL @ 35hz Other ~ (specify)

4. Frequency Range: 1 TO 35 HERTZ

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): RPT. 80048

PARALLEL TO MOTOR = 34hz ⊥ TO MOTOR 41hz V= > 60HZ

6. Method of Determining Natural Frequencies
(X) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test (NOT APPLICABLE)

( ) Yes (Attach TRS & RRS graphs)
( ) No

* NOTE: DAMPING VALUES CORRESPOND TO THE DAMPING USED IN GENERATING THE RRS WHICH INTURN WAS USED IN THE RESPONSE SPECTRUM MODAL ANALYSIS FOR THE PIPING ANALYSIS. THE PIPING ANALYSIS PROVIDES THE ACCELERATION LEVELS FOR THE VALVE.

8. Maximum Input g Level Test: SINGLE FREQUENCY TESTS AT 35Hz.

OBE S/S = 2.2g F/B = 2.2g V= 2.2g

SSE S/S = 4.4g F/B = 4.4g V = 4.4g

9. Laboratory Mounting:

A. (X) Bolt (No. ~ Size ~)
( ) Weld (Length) ( ) ______

B. Orientation and Fixturing: ACTUATOR BOLTED TO TEST FIXTURE

10. Functional Operability Verified:

(X) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: SUCCESSFULLY PASSED TEST

12. Other Tests Performed (such as aging or fragility test, including results): PLANT VIBRATION SINE SWEEP, TESTING AT .75g INPUT BETWEEN 10 TO 100 HZ AT A RATE OF 2 OCTAVES/MIN. FOR 90 MIN. IN EACH AXIS.

13. Failure Modes (If appropriate STRUCTURAL, FUNCTIONAL)

14. Margins Available: (X) Input ACCELERATIONS ( ) Fragility

VII. If Qualification by Analysis, Then Complete: (NOT APPLICABLE)

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

STATIC OPERABILITY TEST ~ VALVE ASSEMBLY

10

II. Pertinent Reference Design Specifications for Qualification Requirements: ______________________

a. Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: STRS 05.312.5008 B & A

(No., Title and Date): 34077 OT-01, "STATIC SEISMIC OPERABILITY TEST PROC. & RESULTS"

Company that Prepared Report: POSI SEAL INC.

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE POINT 2 JOB SITE

Applicable Codes and/or Standards: NRC REG. GUIDE 1.48, 1.148,

V. Vibration Input:

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

2. Method of Combining RRS: (NOT APPLICABLE)

   ( ) Absolute Sum ( ) SRSS ( ) ______________ (other, specify)

3. Required Response Spectra** (attach the graphs): (NOT APPLICABLE)
   ** VALVE ACCELERATIONS FROM PIPING ANALYSIS

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

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

5. Required Acceleration in Each Direct:*

( ) ZPA (X) Other Spec. Requirements
(specify)

OBE S/S = 2.0 g F/B = 2.0 g V = 2.0 g

SSE S/S = 3.0 g F/B = 3.0 g V = 3.0 g

6. Were fatigue effects considered?

( ) Yes (X) No

If yes, describe how they were treated in overall qualification program: (Not Applicable)

VI. If Qualfication by Test, then Complete:

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
(X) Static Operability

2. (X) Single Axis ( ) Multi-Axis
( ) Independent Motion ( ) In-phase Motions

3. Number of Qualifications Tests: 1)

OBE ~ SSE ~ Other Valve/Actuator cycled 3 times at 460V with equivalent static load (3636Lb) + pressure
(specify)

4. Frequency Range: (Not Applicable)

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): (Not Applicable)

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

6. Method of Determining Natural Frequencies (Not Applicable)
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test (Not Applicable)

( ) Yes (Attach TRS & RRS graphs)
( ) No

* Note: Damping Values Correspond To The Damping Used in Generating The RRS which inturn was used in the Response Spectrum Modal Analysis for the Piping Analysis. The Piping Analysis Provides The Acceleration Levels For The Valve.

1) The equivalent acceleration level of 7.5 g's was applied (3636 Lbs)

8. Maximum Input g Level Test:[1]

OBE S/S = ~ F/B = ~ V= ~

SSE S/S = 7.5 g's F/B = ~ V = ~
APPLIED ALONG WEAKEST AXIS

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length________) ( ) ________

B. Orientation and Fixturing: CLAMPED IN FIXTURE - VALVE WAS HORIZONTAL

10. Functional Operability Verified:

(X) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: VALVE CYCLED WITH STATIC LOAD APPLIED - NO MODIFICATIONS

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

HYDROSTATIC SEAT TEST

13. Failure Modes (If appropriate STRUCTURAL, FUNCTIONAL)

14. Margins Available: (X) Input (Spectrum) ( ) Fragility
Acceleration

VII. If Qualification by Analysis, Then Complete: (NOT APPLICABLE)

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

1) THE EQUIVALENT ACCELERATION LEVEL OF 7.5 g's WAS APPLIED TO VALVE ASSEMBLY
FORCE APPLIED - 3636 #

SPEC. NO. P304R.

SQRT # 20

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: 24" - 900# GATE VALVE WITH SMB-4-200 ACTUATOR

MARK NUMBERS: 2 FWS * MOV 21A

STONE & WEBSTER

SPEC. NO. P304R
Revision ________

/

Seismic and Dynamic Qualification Summary of Equipment

I. **Plant Name:** Nine Mile Point Nuclear Station - Unit 2

1. **Utility:** Niagara Mohawk Power Corporation

2. **NSSS:** General Electric Co. **BWR:** 5 MK 2

3. **A/E:** Stone & Webster Engineering Corp. **Other** ~

II. **Component Name:** RPV LONG TERM ISOLATION VALVE — 24"-900# GATE VALVE WITH SMB-4-200 ACTUATOR

1. **Scope:** ( ) NSSS (X) BOP ( ) Other

2. **Model Number:** (NOT APPLICABLE) **Quantity:** 1

3. **Size or Range:** 24"- 900#

4. **Vendor:** VELAN ENGINEERING

5. **If the component is a cabinet or panel, name and model number of the devices included:** (NOT APPLICABLE)

6. **Physical Description:**

   a. **Appearance:** MOTOR OPERATED VALVE (MOV)

   b. **Dimensions:** 24" MOV

   c. **Weight:** 10850 Lbs (APPROX) INCL. OPERATOR

7. **Location: Building:** RB - REACTOR BLDG COL. 01.30 LINE B

   Elevation: 257'

8. **Field Mounting Conditions** ( ) Bolt (No. - Size -)
   (X) Weld (Length 75") APPROX.
   ( ) ________

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

10. a. **System in which located:** FEEDWATER SYSTEM

    b. **Functional Description:** LONG-TERM FEED FLOW ISOLATION

    c. **Is the equipment required for** ( ) Hot Standby ( ) Cold Shutdown ( ) Both ( ) Neither (X) Other ALL CONDITIONS EXCEPT COLD SHUTDOWN

II. Pertinent Reference Design Specifications for Qualification Requirements: Spec. P304R, Rev. 2, Addenda 1 to 6 "Specification for Motor-Operated Carbon Steel Valves"

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

III. Is Equipment Available for Inspection in the Plant:

(X) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: Sections IV thru VII for

(No., Title and Date): Each Report Follows:

Company that Prepared Report: ____________________

Company that Reviewed Report: ____________________

Where Report is filed or available: ____________________

Applicable Codes and/or Standards: ____________________

V. Vibration Input:

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

2. Method of Combining RRS:

   ( ) Absolute Sum ( ) SRSS ( ) ____________ (other, specify)

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

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

STATIC ANALYSIS - VALVE ASSEMBLY

II. Pertinent Reference Design Specifications for Qualification Requirements: ________________

a. Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

(,) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: 1) STRS 05.321.5077A & 2) 12177-EM/EQS-MS-1887 REV. 1

(No., Title and Date): 1) SR-6485, REV.0, "SEISMIC ANALYSIS 24" GATE VALVE", 6-16-80 2) SWEC CALC. "QUALIF OF MOV'S FOR SPEC. P304R" REV 1; 6-13-85

Company that Prepared Report: 1) VELAN 2) SWEC

Company that Reviewed Reports: SWEC

Where Report is filed or available: NINE MILE POINT 2 JOB SITE

Applicable Codes and/or Standards: ASME SECT III, NB, 1974 ed. WITH Addenda through Winter 1975. NRC REG. GUIDE 1.61

V. Vibration Input:

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

2. Method of Combining ~~RRS~~ ACCELERATIONS:

   ( ) Absolute Sum (X) SRSS ( ) ________ (other, specify)

3. Required Response Spectra** (attach the graphs): (NOT APPLICABLE)
   ** VALVE: ACCELERATIONS FROM PIPING ANALYSIS

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

4. Damping Corresponding to RRS:* UPSET ~~OBE~~ 2% FAULTED ~~SSE~~ 2%

5. Required Acceleration in Each Direct:

( ) ZPA (X) Other PIPING ANALYSIS
(specify)

UPSET ~~OBE~~ S/S = 4.0 g F/B = 4.0 g V = 4.0 g
FAULTED ~~SSE~~ S/S = 6.5 g F/B = 6.5 g V = 6.5 g

6. Were fatigue effects considered?

(X) Yes ( ) No

If yes, describe how they were treated in overall qualification program: PEAK STRESSES ARE CALCULATED AT THE CRITICAL SECTIONS, USING S/N CURVES FROM ASME SECT. III APPENDICES + MINER'S RULE, CUMULATIVE USAGE FACTORS ARE DETERMINED TO BE LESS THAN UNITY.

VI. <u>If Qualfication by Test, then Complete:</u>

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) __________

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent MOTION ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE__________ SSE__________ Other__________
(specify)

4. Frequency Range:__________

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

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

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

* NOTE: DAMPING VALUES CORRESPOND TO THE DAMPING USED IN GENERATING THE RRS WHICH INTURN WAS USED IN THE RESPONSE SPECTRUM MODAL ANALYSIS FOR THE PIPING ANALYSIS. THE PIPING ANALYSIS PROVIDES THE ACCELERATION LEVELS FOR THE VALVE.

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length________) ( ) __________

B. Orientation and Fixturing: ______________________________

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______________

____

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

____

____

13. Failure Modes (If appropriate ______________________________)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

(X) Static Analysis ( ) Equivalent Static Analysis

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

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

* FUNDAMENTAL FREQUENCY IN HORIZONTAL DIRECTION ⊥ TO RUN OF PIPE

*S/S = 59 Hz F/B = >59 Hz V = >59 Hz

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

6

4. ( ) Computer Codes: (NOT APPLICABLE)

Frequency Range and No. of Modes

(X) Hand Calculations

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

( ) Absolute Sum (X) SRSS ( ) Other: ________ (specify)

6. Damping: (NOT APPLICABLE)

OBE ________ SSE ________ Basis for the Damping Used: ________

7. Support Considerations in the Model: FIXED AT PIPING ENDS

8. Critical Structural Elements:

A. Identification Location	Governing Load or Response Combination	Seismic** Stress	Total Stress	Stress Allowable
BOTTOM OF YOKE ARMS	SEISMIC + HYDRODYNAMIC + OPERATING	16107	21620	29100 PSI

B. Maximum Critical*** Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.0244 IN	STEM	.05 INCH

9. Failure Modes: STRUCTURAL

10. Margins Available: ( ) Input Spectrum (X) Stress or Deflection

** SEISMIC STRESS IS CALCULATED BASED ON AN ACCELERATION VALUE OF 6.5 G'S.
*** STEM DEFLECTION " " " " " " " " "

DYNAMIC TESTING ~ LIMITORQUE ACTUATOR (SMB-4-200)

7

II. Pertinent Reference Design Specifications for Qualification Requirements: ______________________________

____

a. Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method: (see Page 8 for General Comment)

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

Qualification Report*: TEST 05.321.5013A

(No., Title and Date): REPORT No B-0115, HYDRODYNAMIC VIBRATION TESTING (NEW LOADS) 6-24-82

Company that Prepared Report: LIMITORQUE

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE POINT 2 JOB SITE

Applicable Codes and/or Standards: IEEE 323-1974, 344-1975 382-1972

V. Vibration Input:

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

2. Method of Combining ~~RRS~~ ACCELERATIONS:

   ( ) Absolute Sum (X) SRSS ( ) ______________ (other, specify)

3. Required Response Spectra** (attach the graphs): (NOT APPLICABLE)
   ACTUATOR QUALIFIED BY RIM TESTING

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

GENERAL COMMENT:

Qualification of the Limitorque Actuators for hydrodynamic loading is accomplished by referring to the following documents:

1. SWEC Calc. 12177-NM(C)-MS-1942, Rev.0, dated 5-31-85, "Similarity Analysis for Dynamic Qualification of Limitorque Motor Operators"
2. IEEE 05.321.5001C, 1D
   Limitorque Qualification Report, B0058, "Valve Actuator Qualification Report," 1-11-80.
3. IEEE 05.321.5013A
   Hydrodynamic Vibration Testing (New Loads)
   Limitorque Report No. B-0115, 6-24-82
4. SWEC Transmittal Ltrs # T 42,842 (1-19-82) & T 47622 (6-10-82) for P 801H, "Dynamic Testing of Limitorque Operators & Modified Limit Switches"
   NTS Report # 548-9291, Rev. 2 3 Volumes (5-25-82)

4. Damping Corresponding to RRS:* ~~OBE~~ UPSET 2% ~~SSE~~ FAULTED 2%

5. Required Acceleration in Each Direct:

( ) ZPA (X) Other PIPING ANALYSIS
(specify)

~~OBE~~ UPSET S/S = 4.0 g F/B = 4.0 g V = 4.0 g
~~SSE~~ FAULTED S/S = 6.5 g F/B = 6.5 g V = 6.5 g

6. Were fatigue effects considered?

(X) Yes ( ) No

If yes, describe how they were treated in overall qualification program: FATIGUE EFFECTS WERE INCORPORATED IN THE NUMBER OF SINE BEATS, AND NUMBER & DURATIONS OF THE TESTS.

VI. If Qualfication by Test, then Complete: FOR ACTUATOR ONLY

1. (X) Single Frequency ( ) Multi-Frequency ( ) Random
(X) Sine Beat D
( ) ______

2. (X) Single Axis ( ) Multi-Axis
( ) Independent Motion ( ) In-phase Motions

3. Number of Qualifications Tests: (EQUIVALENT) D

~~OBE~~ UPSET 5 ~~SSE~~ FAULTED 1 Other ADDITIONAL TESTING TO ACCOUNT FOR SRV + LOCA LOADS
(specify)

4. Frequency Range: 1 TO 100 hertz

5.** Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): LOWEST MOTOR FREQUENCY = 70 HZ (HORIZONTAL) ⊥ TO MOTOR (LMB-4-250)
= 29 HZ (HORIZONTAL) PARALLEL TO MOTOR } OPEN ACTUATOR
= 58 HZ (VERT.)
S/S= HANDWHEEL (UNDEFINED) F/B= V=
NONE BETWEEN 20 AND 40 HZ ~ CLOSED ACTUATOR

6. Method of Determining Natural Frequencies
(X) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test (NOT APPLICABLE)

( ) Yes (Attach TRS & RRS graphs)
( ) No

*NOTE: DAMPING VALUES CORRESPOND TO THE DAMPING USED IN GENERATING THE RRS WHICH IN TURN WAS USED IN THE RESPONSE SPECTRUM MODAL ANALYSIS FOR THE PIPING ANALYSIS. THE PIPING ANALYSIS PROVIDES THE ACCELERATION LEVELS FOR THE VALVE.

** IEEE 0S.321 S013A, ... REPORT No. B-0115, APPENDIX B, ACTON TEST RPT. 16511-11, Rev. 2

8. Maximum Input g Level Test:

UPSET/FAULTED EQUIVALENT
~~OBE~~ S/S = 7g's F/B = 7g's V= 7g's

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

9. Laboratory Mounting:

A. (X) Bolt (No. ~ Size ~)
( ) Weld (Length ______) ( ) ______

B. Orientation and Fixturing: BOLTED TO TEST FIXTURE ACTUATOR STEM - VERTICAL

10. Functional Operability Verified:

(X) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: PERFORMED ALL REQUIRED FUNCTIONS WITH NO INDICATION OF MALFUNCTION.

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

NONE

13. Failure Modes (If appropriate STRUCTURAL, FUNCTIONAL)

14. Margins Available: ( ) Input ~~Spectrum~~ ACCELERATION ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

DYNAMIC TESTING - LIMITORQUE ACTUATOR

//

11. Pertinent Reference Design Specifications for Qualification Requirements: ______________________________

____

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

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method: (see Page 8 for General Comment)

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

Qualification Report*: SPEC. P801H, SWEC TRANS. LTR. T47622 (6/10/82)

(No., Title and Date): NTS REPORT 548-9291, REV. 3 VOLUMES (5·25·82) DYNAMIC TESTING OF LIMITORQUE OPERATORS & MODIFIED UNIT SWITCHES

Company that Prepared Report: NTS/SWEC

Company that Reviewed Report: NTS/SWEC

Where Report is filed or available: NINE MILE POINT 2 JOB SITE

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

V. Vibration Input:

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

2. Method of Combining RRS:

   ( ) Absolute Sum (X) SRSS ( ) ______________ (other, specify)

3. Required Response Spectra** (attach the graphs): NOT APPLICABLE ACTUATOR QUALIFIED BY RIM TESTING†

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

† A GENERIC TYPE TESTING PROGRAM WAS CONDUCTED WHEREIN RMF TESTING WAS INCLUDED, GENERIC RRS WERE USED; HOWEVER THE ACTUATOR IS QUALIFIED BY RIM TESTING. THEREFORE. RRS ARE NOT INCLUDED IN THIS PACKAGE

4. Damping Corresponding to RRS: * ~~OBE~~ UPSET 2% ~~SSE~~ FAULTED 2%

5. Required Acceleration in Each Direct:

( ) ZPA (✓) Other PIPING ANALYSIS
(specify)

~~OBE~~ UPSET S/S = 4.0 g F/B = 4.0 g V = 4.0 g
~~SSE~~ FAULTED S/S = 6.5 g F/B = 6.5 g V = 6.5 g

6. Were fatigue effects considered?

(X) Yes ( ) No

If yes, describe how they were treated in overall qualification program: FATIGUE EFFECTS WERE INCORPORATED IN THE NUMBER OF SINE BEATS, & NUMBER & DURATIONS OF THE TESTS

VI. If Qualfication by Test, then Complete:

1. (X) Single Frequency (X) Multi-Frequency (X) Random
(X) Sine Beat
(X) FRAGILITY TESTS

2. (X) Single Axis (X) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests: (EQUIVALENT)
~~OBE~~ UPSET 5 ~~SSE~~ FAULTED 1 Other ADDITIONAL TESTING TO ACCOUNT FOR SRV + LOCA LOADS
(specify)

4. Frequency Range: 1 TO 100 HERTZ -

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, (SMB-0-25 MODEL) Vertical): LOWEST MOTOR FREQUENCY = 64 HZ.
GROSS STRUCTURE = 130 HZ.
LIMIT SWITCH = 150 HZ.
S/S= ~ F/B= ~ V= ~

6. Method of Determining Natural Frequencies
(X) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test (NOT APPLICABLE)

( ) Yes (Attach TRS & RRS graphs)
( ) No

* THE DAMPING VALUES CORRESPOND TO THE RRS USED IN PIPING ANALYSIS.

8. Maximum Input g Level Test:

OBE S/S = 14.0g F/B = 14.0g V= 14.0g

~~SSE~~ S/S = ~ F/B = ~ V = ~

9. Laboratory Mounting:

A. (X) Bolt (No. 4 Size .75" DIA)
( ) Weld (Length ______) ( ) ______

B. Orientation and Fixturing: No Fixture, Bolted To Test Table, Actuator Stem in Vertical Position

10. Functional Operability Verified:

(X) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: Performed All Required Functions with no indication of malfunction, Limit Switch Screw Torques were adjusted and finger assembly gaps were adjusted.

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

Vibration Aging & Random Multifrequency Tests.

13. Failure Modes (If appropriate Structural, Functional)

14. Margins Available: (X) Input ~~Spectrum~~ Acceleration ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

STATIC OPERABILITY TEST - VALVE ASSEMBLY

14

II. Pertinent Reference Design Specifications for Qualification Requirements: ______

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

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

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

Qualification Report*: STRS 05.321.5053A

(No., Title and Date): P3-7026-N (ITEM 50) "OPERABILITY TEST RESULTS," 12/12/83

Company that Prepared Report: VELAN

Company that Reviewed Report: SWEC

Where Report is filed or available: NINE MILE POINT 2 JOB SITE

Applicable Codes and/or Standards: —

V. Vibration Input:

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

2. Method of Combining ~~RRS:~~ ACCELERATIONS

   ( ) Absolute Sum (X) SRSS ( ) ______ (other, specify)

3. Required Response Spectra** (attach the graphs): (NOT APPLICABLE)
   — VALVE ACCELERATION FROM PIPING ANALYSIS

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

4. Damping Corresponding to RRS:* UPSET ~~OBE~~ 2% FAULTED ~~SSE~~ 2%

5. Required Acceleration in Each Direct:*

( ) ZPA (X) Other PIPING ANALYSIS
(specify)

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

FAULTED ~~SSE~~ S/S = 6.5g F/B = 6.5g V = 6.5g

6. Were fatigue effects considered?

( ) Yes (X) No

If yes, describe how they were treated in overall qualification program: (NOT APPLICABLE)

VI. If Qualfication by Test, then Complete:

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
(X) STATIC OPERABILITY

2. (X) Single Axis ( ) Multi-Axis
( ) Independent MOTION ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ~ SSE ~ Other VALVE/ACTUATOR CYCLED 3 TIMES EACH 1) AT 632V + 460V WITH EQUIVALENT STATIC LOAD (27840 Lb) + PRESSURE APPLIED
(specify)

4. Frequency Range: (NOT APPLICABLE)

5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical): (NOT APPLICABLE)

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

6. Method of Determining Natural Frequencies (NOT APPLICABLE)
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test (NOT APPLICABLE)

( ) Yes (Attach TRS & RRS graphs)
( ) No

* NOTE: DAMPING VALUES CORRESPOND TO THE DAMPING USED IN GENERATING THE RRS WHICH INTURN WAS USED IN THE RESPONSE SPECTRUM MODAL ANALYSIS FOR THE PIPING ANALYSIS. THE PIPING ANALYSIS PROVIDED THE ACCELERATION LEVELS FOR THE VALUE.

1) THE EQUIVALENT ACCELERATION

8. Maximum Input g Level Test: *

UPSET ~~OBE~~ S/S = ~ F/B = ~ V= ~

FAULTED ~~SSE~~ S/S = 11.6 g's F/B = ~ V = ~
APPLIED ALONG WEAKEST AXIS

9. Laboratory Mounting:

A. (X) Bolt (No. ~ Size ~)
( ) Weld (Length ______) ( ) ______

B. Orientation and Fixturing: CLAMPED AT BODY ENDS - VALVE STEM AXIS WAS VERTICAL

10. Functional Operability Verified:

(X) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: VALVE CYCLED WITH STATIC LOAD APPLIED - NO MODIFICATIONS

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

SEAT LEAKAGE TEST

CYCLE TEST

13. Failure Modes (If appropriate STRUCTURAL, FUNCTIONAL)

14. Margins Available: (X) Input ~~Spectrum~~ Accelerations ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

( ) Static Analysis ( ) Equivalent Static Analysis

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

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

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

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

* THE EQUIVALENT ACCELERATION LEVEL OF 11.6 g's WAS APPLIED TO VALVE ASSEMBLY
FORCE APPLIED · 27840 LBS.

SPEC. NO. P 413 E/V

SQRT # 21

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: CENTRAL STATION AIR CONDITIONING UNIT FOR CONTROL ROOM

MARK NUMBERS: 2HVC*ACU1A

STONE & WEBSTER

SPEC. NO. P413 E/V
Revision 0

Seismic and Dynamic Qualification Summary of Equipment

I. **Plant Name:** Nine Mile Point Nuclear Station - Unit 2

1. **Utility:** Niagara Mohawk Power Corporation
2. **NSSS:** General Electric Co. **BWR:** 5 MK 2
3. **A/E:** Stone & Webster Engineering Corp. Other ______

II. **Component Name:** Central Station Air Conditioning Unit For Control Room. (2HVC*ACU1A).

1. **Scope:** ( ) NSSS (✓) BOP ( ) Other
2. **Model Number:** 39 ED 57 **Quantity:** 1
3. **Size or Range:** 23280 CFM
4. **Vendor:** Carrier Corporation
5. If the component is a cabinet or panel, name and model number of the devices included: N.A.
6. **Physical Description:**
   a. Appearance: Rectangular box
   b. Dimensions: 141" W x 123.5" D x 81.68" H
   c. Weight: 8039 lb.
7. **Location:** Building: Control Building
   Elevation: 288' 6"
8. **Field Mounting Conditions** (✓) Bolt (No. 10 Size 5/8" Φ)
   ( ) Weld (Length ______)
   ( ) ______
9. Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)
   Floor
10. a. System in which located: Control Building - Air Conditioning (HVC)
    b. Functional Description: Provides air-conditioned air to Control Room & EL. 306'
    c. Is the equipment required for (✓) Hot Standby (✓) Cold Shutdown (✓) Both ( ) Neither (✓) Other. All normal and accident conditions

II. Pertinent Reference Design Specifications for Qualification Requirements: 1. Spec # P 413 E, Central Station Air Conditioning units For control & Relay Rooms, Rev. 1. 2. Spec. # P 413 V, Safty Related Air Cooling Coils For Control & Relay Room Air Conditioning units, Rev. 1.

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

III. Is Equipment Available for Inspection in the Plant:

(✓) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method: Housing, Coil & fan

( ) Test (✓) Analysis ( ) Combination of Test and Analysis

Qualification Report*: 1. MS-1846, Suplemental Calculation, 1-6-84. 2. A-266-79, Seismic Qualification Report of Control & Relay Rooms Central station Air

(No., Title and Date): Conditioning Units, 12-10-79, and Addenda (cont'd below)***

Company that Prepared Report: 1. SWEC for report 1
2. CCDC/carrier for report 2

Company that Reviewed Report: SWEC

Where Report is filed or available: Nine Mile site

Applicable Codes and/or Standards: I.E.E.E 344-1975, AISC Code & ASME Code, Sec. III, Appendices & NF (1974 - winte '76)

V. Vibration Input:

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

2. Method of Combining RRS:

( ) Absolute Sum ( ) SRSS (✓) N. A. (other, specify)

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

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

*** Add. 1, 10-2-80,
Add. 2, 11-26-80
& Add. 3, 1-9-81

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

5. Required Acceleration in Each Direction:

( ) ZPA (✓) Other Rigid Range (specify)

OBE S/S = 0.34 F/B = 0.34 V = 0.33

SSE S/S = 0.48 F/B = 0.48 V = 0.49

6. Were fatigue effects considered?

( ) Yes (✓) No

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

VI. If Qualfication by Test, then Complete: N. A.

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
   ( ) Sine Beat
   ( ) ________

2. ( ) Single Axis ( ) Multi-Axis
   ( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

   OBE______ SSE______ Other______ (specify)

4. Frequency Range:__________

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

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

6. Method of Determining Natural Frequencies
   ( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

   ( ) Yes (Attach TRS & RRS graphs)
   ( ) No

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length__________) ( ) __________

B. Orientation and Fixturing: ______________________________

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______________________________

____

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

____

____

13. Failure Modes (If appropriate ______________________________)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

(✓) Static Analysis ( ) Equivalent Static Analysis

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

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

S/S = > 43.29 HZ / 29.35 HZ F/B = 43.29 HZ / 16.72 HZ V = > 43.29 HZ / 18.56 HZ Coil Assembly

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

4. (✓) Computer Codes: 1. CAP, CCL Proprietary Coil Analysis Program
2. STARDYNE

Frequency Range and No. of Modes
0 - 33.4 HZ / 4 modes. for STARDYNE

(✓) Hand Calculations

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

( ) Absolute Sum ( ) SRSS (✓) Other: N. A. (specify)

6. Damping:

OBE 2 % SSE 3 % Basis for the Damping Used: FSAR

7. Support Considerations in the Model: The air conditioning unit is free standing with 10 nodes at the base, fixed in translation & rotation.

8. Critical Structural Elements:

A. Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
1. Beam, fan section top panel	SSE + DW + operating load.		27209	43200
2. Plate, fan section end panel			15784	28350
3. plate, fan side plate			15958	28350
4. Anchor bolt, underneath coil section			13014	13300
5. Attachment bolt, Coil X-brace center bracket			10125	13300
6. Attachment weld, Coil X-brace corner bracket			6510	7500

B. Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
1. 0.08855"	Fan inlet cone relative to fan wheel	0.235"

9. Failure Modes: Structural

10. Margins Available: ( ) Input Spectrum (✓) Stress or Deflection

Spec. No. P413E/V

II. Pertinent Reference Design Specifications for Qualification Requirements: ______________________

____

a. Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

( ) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method: Motor

( ) Test (✓) Analysis ( ) Combination of Test and Analysis

Qualification Report*: 1. MS-1846, Suplemental Calculation, 1-6-84. 2. Carrier No. 7110PZ009, Seismic Qualification Report of Westinghouse Motor for the Carrier Air Handling Units, Rev. 2, 4-1-80.

(No., Title and Date): 3. (cont'd below) ***

Company that Prepared Report: 1. SWEC for report 1 2. Westinghouse for reports 2 & 3.

Company that Reviewed Report: SWEC

Where Report is filed or available: Nine Mile site

Applicable Codes and/or Standards: R.G. 1.100 IEEE 344-1975, 117-1974 & 334-1974

V. Vibration Input:

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

2. Method of Combining RRS:

   ( ) Absolute Sum ( ) SRSS (✓) N.A. (other, specify)

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

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

*** 3. NM-9112, Qualification Document Class 1E Medium AC Motors, 1-18-80.

Spec No. P413 E/v

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

5. Required Acceleration in Each Direct:

( ) ZPA (✓) Other Rigid range (specify)

OBE S/S = 0.34 F/B = 0.34 V = 0.33

SSE S/S = 0.48 F/B = 0.48 V = 0.49

6. Were fatigue effects considered?

( ) Yes (✓) No

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

______

VI. If Qualfication by Test, then Complete: N. A.

1. ( ) Single Frequency ( ) Multi-Frequency ( ) Random
( ) Sine Beat
( ) ______

2. ( ) Single Axis ( ) Multi-Axis
( ) Independent Axis ( ) In-phase Motions

3. Number of Qualifications Tests:

OBE ______ SSE ______ Other ______ (specify)

4. Frequency Range: ______

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

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

6. Method of Determining Natural Frequencies
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

( ) Yes (Attach TRS & RRS graphs)
( ) No

Spec. NO. P.413 E/V

8. Maximum Input g Level Test:

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

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

9. Laboratory Mounting:

A. ( ) Bolt (No.______ Size______)
( ) Weld (Length__________) ( ) __________

B. Orientation and Fixturing: ______________________________

10. Functional Operability Verified:

( ) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: ______________

____

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

____

____

13. Failure Modes (If appropriate ______________________________)

14. Margins Available: ( ) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete:

1. Method of Analysis:

(✓) Static Analysis ( ) Equivalent Static Analysis

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

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

S/S = 112.5 HZ F/B = > 112.5 HZ V = > 112.5 HZ

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

4. (✓) Computer Codes: ME-7701, Proprietary Program of Westinghouse Motor & Gearing Div.
Frequency Range and No. of Modes

( ) Hand Calculations

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

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

6. Damping:

OBE 2% SSE 3% Basis for the Damping Used: FSAR

7. Support Considerations in the Model: Motor feet hinged at the base restraining bolt displacement

8. Critical Structural Elements:

A.

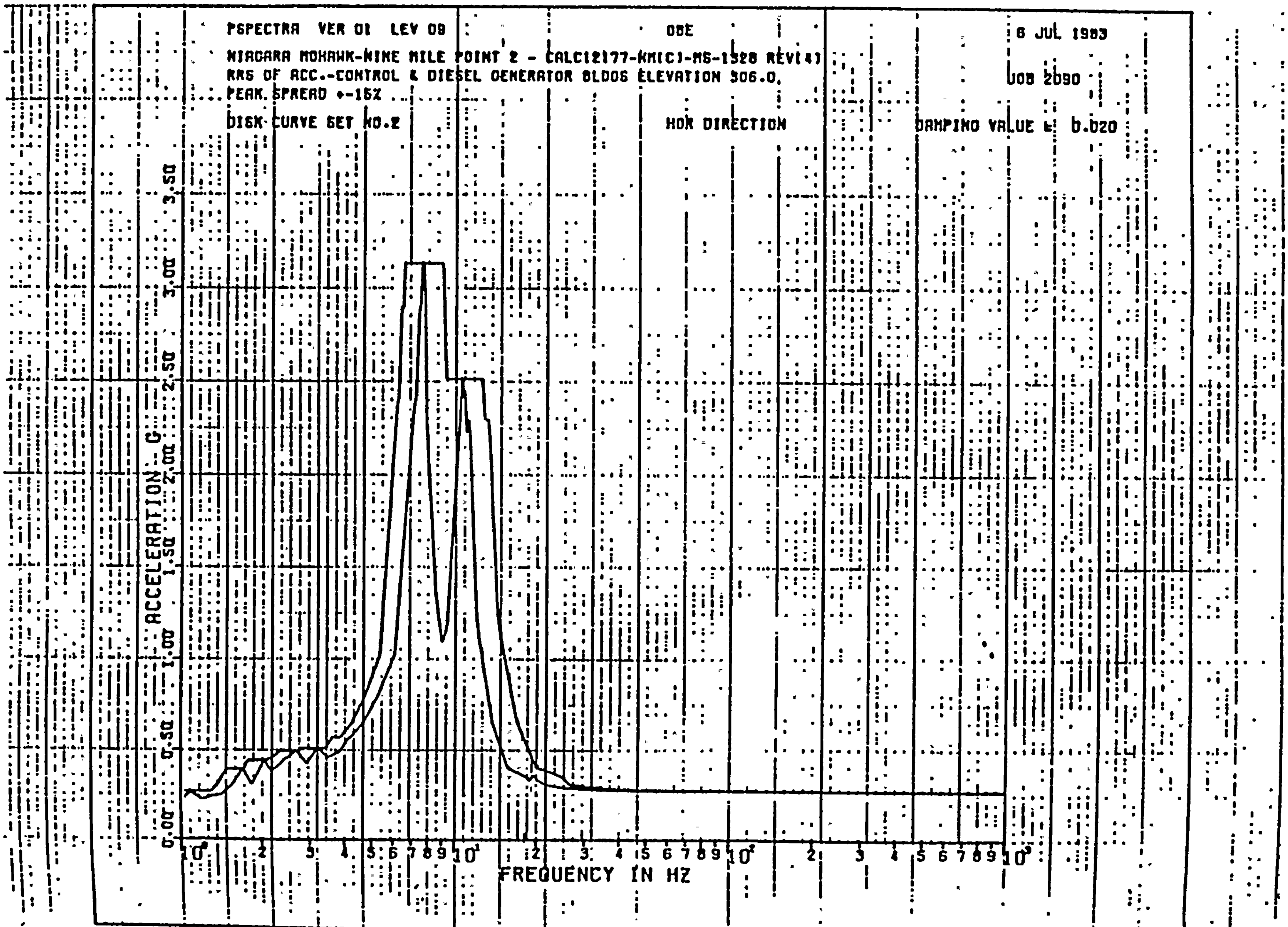
Identification Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
shaft	SSE+DW+ Operating load		16021	36000

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.004026"	Air gap between the motor stator & the motor rotor	0.0238"

9. Failure Modes: Structural

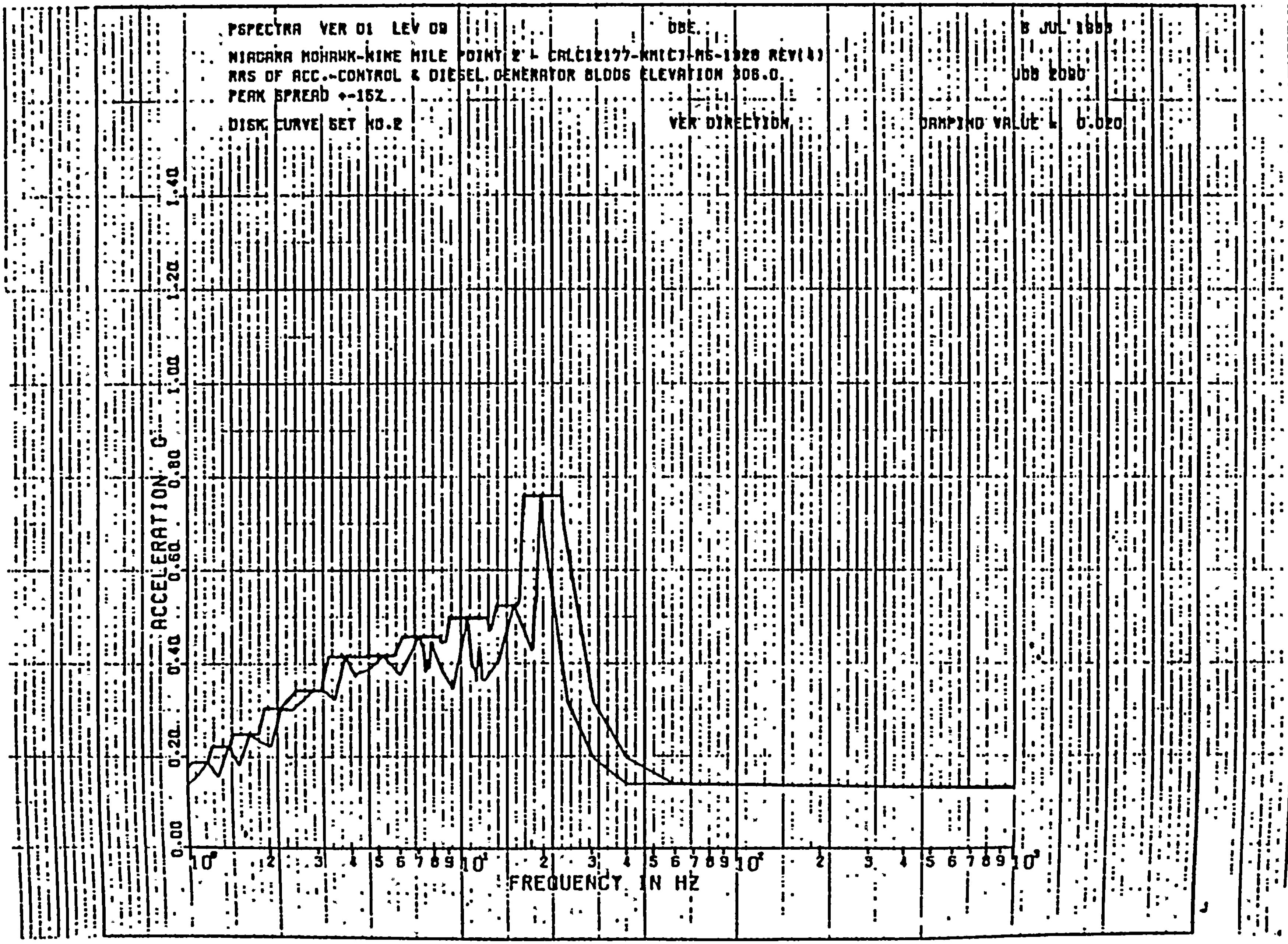
10. Margins Available: ( ) Input Spectrum (✓) Stress or Deflection



Attachment A

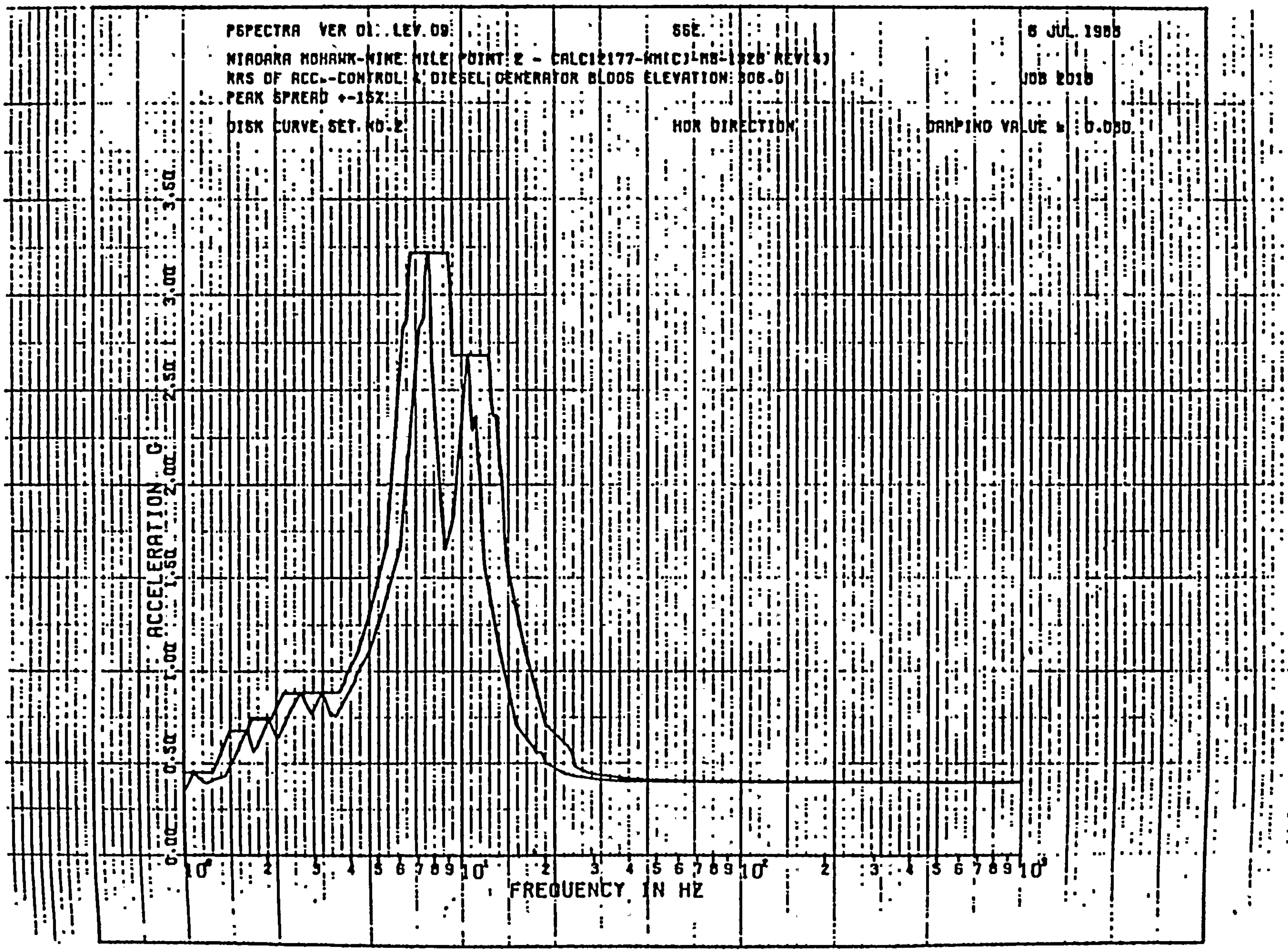
~~REF 18~~

P. 81 of 84



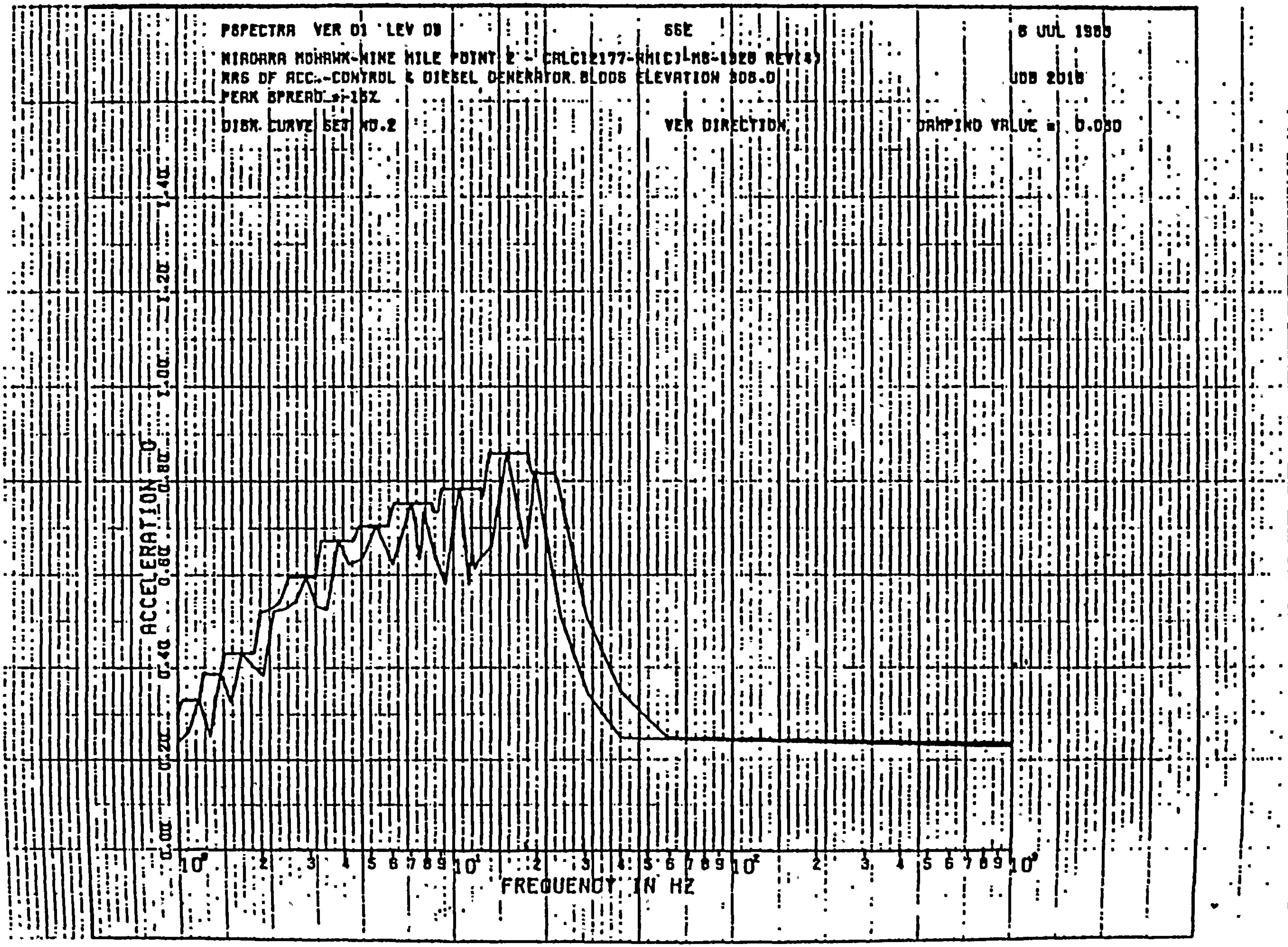
P. 72 of 74

REF 1B



~~REF 18~~

P. A3 of A4



REF 18

p. A4 of A4

SPEC. NO. P413L

SQRT # 22

NINE MILE POINT
NUCLEAR STATION
UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: ELECTRIC DUCT HEATER CONTROL PANEL

MARK NUMBERS: 2HVC*PNLCH11A

STONE & WEBSTER

SPEC. NO. P413L
Revision 0

Seismic and Dynamic Qualification Summary of Equipment

I. **Plant Name:** Nine Mile Point Nuclear Station - Unit 2

1. **Utility:** Niagara Mohawk Power Corporation
2. **NSSS:** General Electric Co. **BWR:** 5 MK 2
3. **A/E:** Stone & Webster Engineering Corp. **Other** ____

II. **Component Name:** Electric Duct Heater Control Panel
Mark NO. ZHVC*PNLCH11A

1. **Scope:** ( ) NSSS (✓) BOP ( ) Other
2. **Model Number:** N. A. **Quantity:** 1
3. **Size or Range:** N. A.
4. **Vendor:** Schneider Inc. / Nutherm International
5. **If the component is a cabinet or panel, name and model number of the devices included:**
See Attachment A
6. **Physical Description:**
   a. **Appearance:** Rectangular box
   b. **Dimensions:** 9.25" (D) x 48" (H) x 48" (W)
   c. **Weight:** 215 lb
7. **Location:** **Building:** Control Building
   Elevation: 306'
8. **Field Mounting Conditions** (✓) Bolt (No. 6 Size 3/8")
   ( ) Weld (Length ____)
   ( ) ____
9. **Mounting Orientation (e.g., on floor, cantilevered, suspended, etc.)**
Wall mounted
10. a. **System in which located:** Control Building (HVC)
    b. **Functional Description:** To operate duct heater ZHVC*CH11A
    c. **Is the equipment required for** (✓) Hot Standby (✓) Cold Shutdown (✓) Both ( ) Neither (✓) Other All normal & accident Conditions

11. Pertinent Reference Design Specifications for Qualification Requirements: Spec No. P413L, Ventilation & Air-Conditioning System Ductwork, Rev. 5

(a.) Seismic Input

b. Hydrodynamic Load Input

c. Fatigue Considerations

d. Service Conditions

e. Qualified Life

III. Is Equipment Available for Inspection in the Plant:

(✓) Yes ( ) No ( ) Partial or limited availability

IV. Equipment Qualification Method:

( ) Test ( ) Analysis (✓) Combination of Test and Analysis

Qualification Report*: No. 51123, Rev. 1, Qualification Report Electric Air Duct Heaters/Remote Control Panels, 10-19-84,

(No., Title and Date): SDDF NO. IEEE 10.460 - 5001B

Company that Prepared Report: Nutherm Int'l

Company that Reviewed Report: SWEC

Where Report is filed or available: Nine mile site

Applicable Codes and/or Standards: IEEE 344-1975, R.G. 1.89 & R.G. 1.100, AISC code, ASME code, Sec. III, NA & NF

V. Vibration Input:

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

2. Method of Combining RRS:

   ( ) Absolute Sum (✓) SRSS ( ) ____________ (other, specify)

3. Required Response Spectra** (attach the graphs): See Attachment B

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

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

5. Required Acceleration in Each Direct:

(✓) ZPA ( ) Other ______________ (specify)

OBE S/S = 0.27 F/B = 0.27 V = 0.13

SSE S/S = 0.39 F/B = 0.39 V = 0.24

6. Were fatigue effects considered?

( ) Yes (✓) No

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

VI. If Qualfication by Test, then Complete: For Devices Only

1. ( ) Single Frequency (✓) Multi-Frequency (✓) Random
( ) Sine Beat
( ) ________

2. (✓) Single Axis EDI Test (✓) Multi-Axis F & H Test, Wyle Test - Triaxial; Bailey Controls Test - Biaxial
(✓) Independent Motions - F & H Test, Wyle Test (✓) In-phase Motions Bailey Test, EDI Test

3. Number of Qualifications Tests:

OBE 5 SSE 1 Other ________ (specify)

4. Frequency Range:
1. 1-80 HZ F & H Test
2. 1-100 HZ Bailey Controls Test
3. 1-40 HZ EDI Test
4. 1-50 HZ Wyle Lab Test

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

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

6. Method of Determining Natural Frequencies N. A.
( ) Lab Test ( ) In-Situ Test ( ) Analysis

7. TRS Enveloping RRS Using Multi-Frequency Test

(✓) Yes (Attach TRS & RRS graphs)
( ) No

Attachment C - TRS by F & H
" D - " " Bailey
" E - " " EDI
" F - " " Wyle

8. Maximum Input g Level Test:

Test		S/S		F/B		V
1. F&H Test	OBE S/S =	3.28	F/B =	3.82	V=	3.45
2. Bailey Test		4-5		4-5		4-5
3. EDI Test		3		3		3.6
4. Wyle Test		3.87		3.87		3.87
1. F&H "	SSE S/S =	4.54	F/B =	6.56	V =	6.93
2. Bailey "		7-8		7-8		7-8
3. EDI "		5.4		5.4		6.9
4. Wyle "		5.8		5.8		5.8

9. Laboratory Mounting: Simulating the actual in-service configurations

A. (✓) Bolt (No. N.A. Size N.A.)
(✓) Weld (Length N.A.) (✓) clamped

B. Orientation and Fixturing: The specimen is attached to the vertical mounting fixture. The fixture is welded or clamped to the test table

10. Functional Operability Verified:

(✓) Yes ( ) No ( ) Not Applicable

11. Test Results Including Modifications Made: N.A.

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

N.A.

13. Failure Modes (If appropriate Electrical & structural)

14. Margins Available: (✓) Input Spectrum ( ) Fragility

VII. If Qualification by Analysis, Then Complete: "For Panel Only

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 = >39 Hz F/B = 39 Hz V = >39 Hz

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

4. (✓) Computer Codes: STARDYNE

Frequency Range and No. of Modes N. A.

(✓) Hand Calculations

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

( ) Absolute Sum ( ) SRSS ( ) Other: ________ (specify)

6. Damping:

OBE 2 % SSE 3 % Basis for the Damping Used: FSAR

7. Support Considerations in the Model: The back panel is supported at 3 points along each of the upper and lower edges of the panel

8. Critical Structural Elements:

	A. Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress, psi	Stress Allowable, psi
1.	Plate	Center, subpanel	Faulted		1200	13700
2.	Anchor bolt direct stress	Corner, back panel	"		1688	20000
3.	Anchor bolt shear stress	Corner, back panel	"		3645	10000

B.

Maximum Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Operability
0.42"	Center, back panel	Within operational limit
0.19"	Center, subpanel	" " "

9. Failure Modes: Structural

10. Margins Available: ( ) Input Spectrum (✓) Stress or Deflection

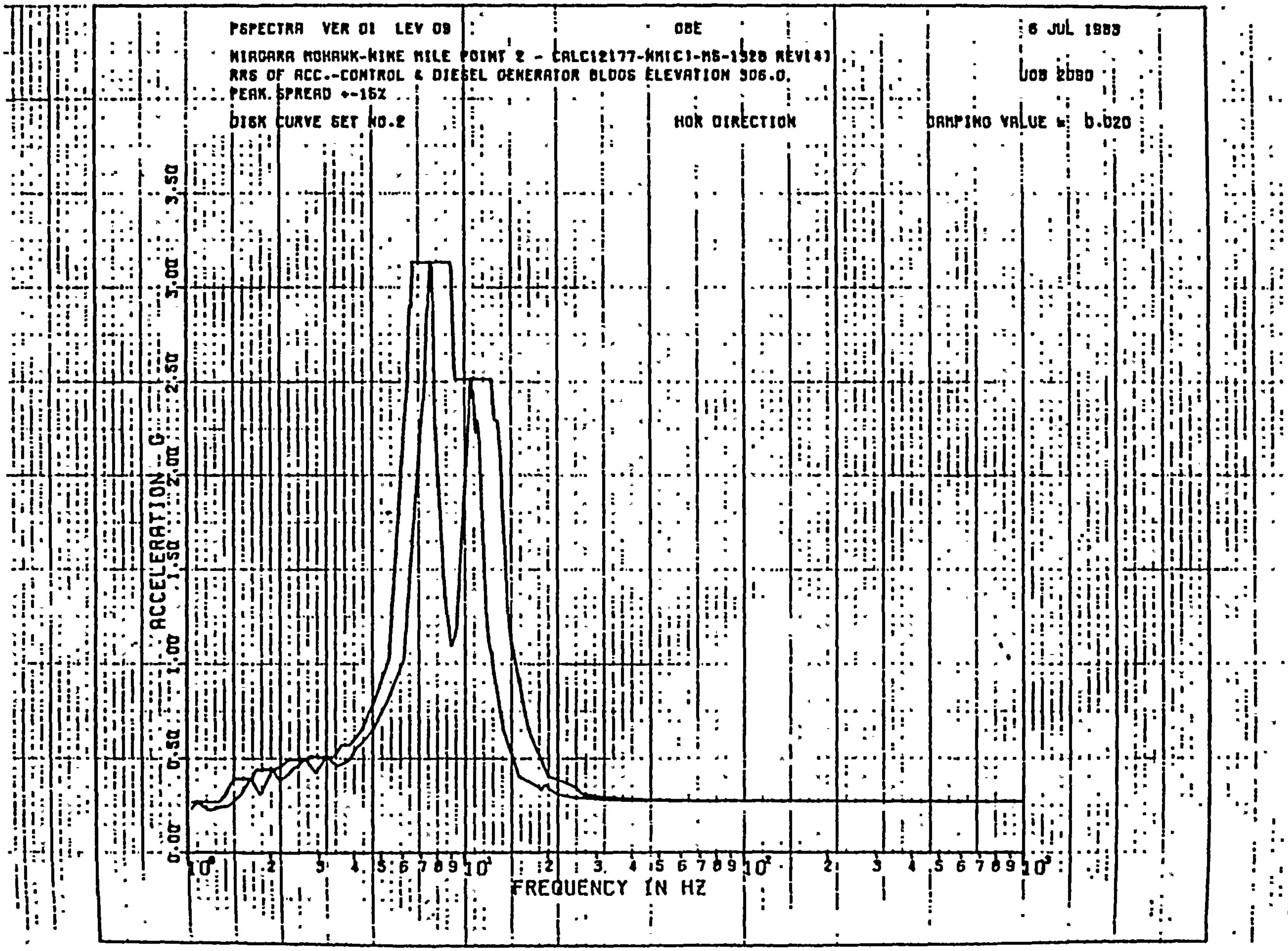
Attachment A

NO.	Devices		Model Number
1	Disconnect Switch	American Solenoid	K50-A292-120VE
2	Fuse	Bussmann	ABC-15
3	Fuse	Bussmann	FRS-R40
4	Airflow Switch	Cemco	RH15-05-D1
5*	External Reset Operator	Cutler-Hammer	10935H6
6	Contactor, 24V Coil	Elmwood	30-F0-30-24
7	Transformer, 575/24 Volt	Hevi-Duty	W075 Design 2B19253T00
8	Fuse Holder	Hevi-Duty	FB-1
9	SCR Controller	Loyola	DPAC-3S-600-31-RHS
10	Door Switch	McGill	100
11	Terminal Block	Marathon	1606
12	Terminal Block	Marathon	1608
13	Fuse Holder	Marathon	R6F60A3S
14	Power Block	Marathon	1423123
15	Automatic Thermal Cutout	Ranco	L6-476
16	Manual Thermal Cutout	Ranco	LM5-2507-00
17	Wire, 90°C, 8 AWG SISF133 Strand	Rockbestos	AB3-0086-05S
18	Wire, 90°C, 10 AWG SISF10 Strand	Rockbestos	AB3-0116-05S
19	Wire, 90°C, 14 AWG SISS7 Strand	Rockbestos	AB2-0146 05S
20	Indicator	Westinghouse	PB1HBUT4

* Not a safety related device

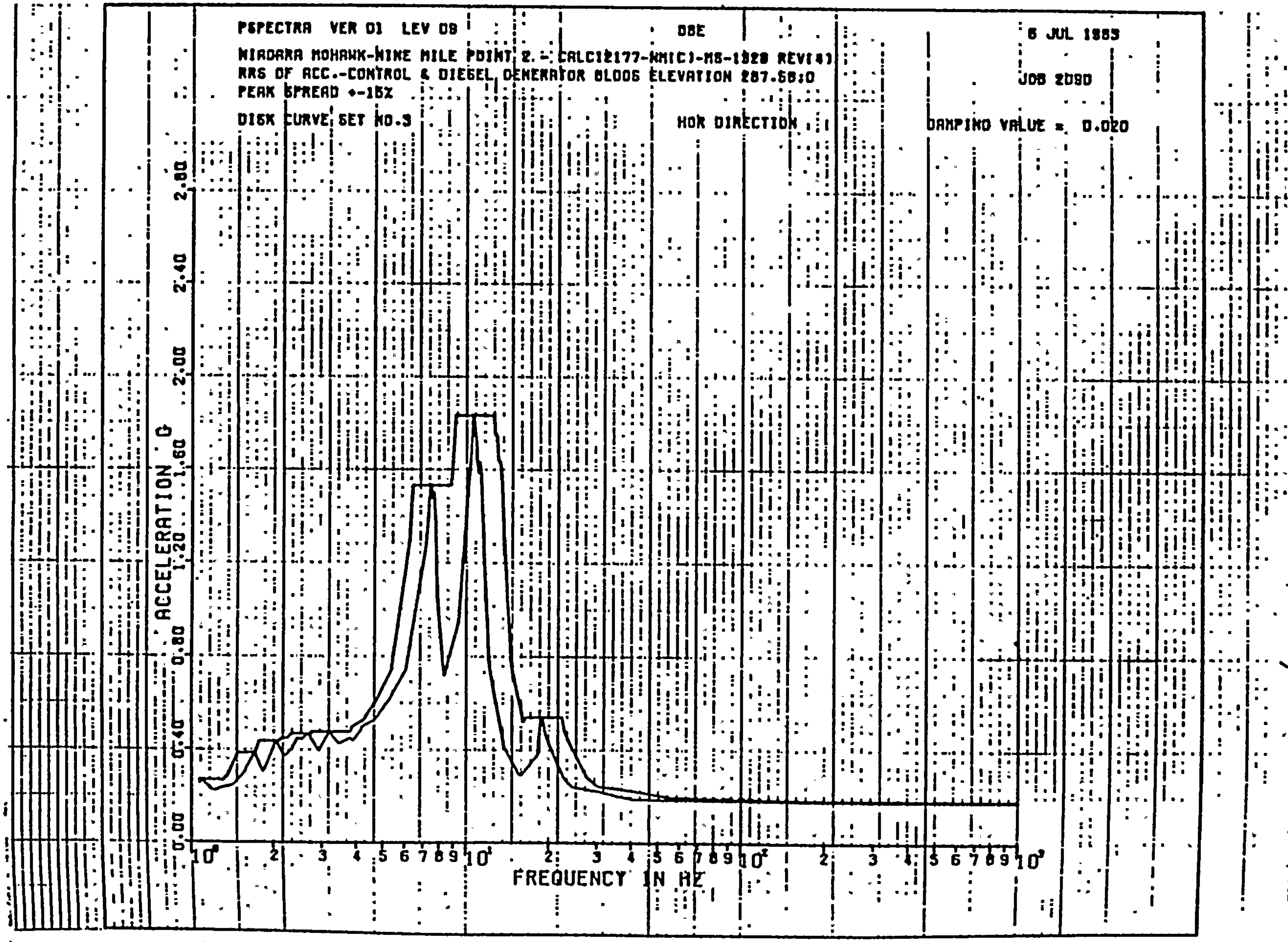
Attachment B

RRS



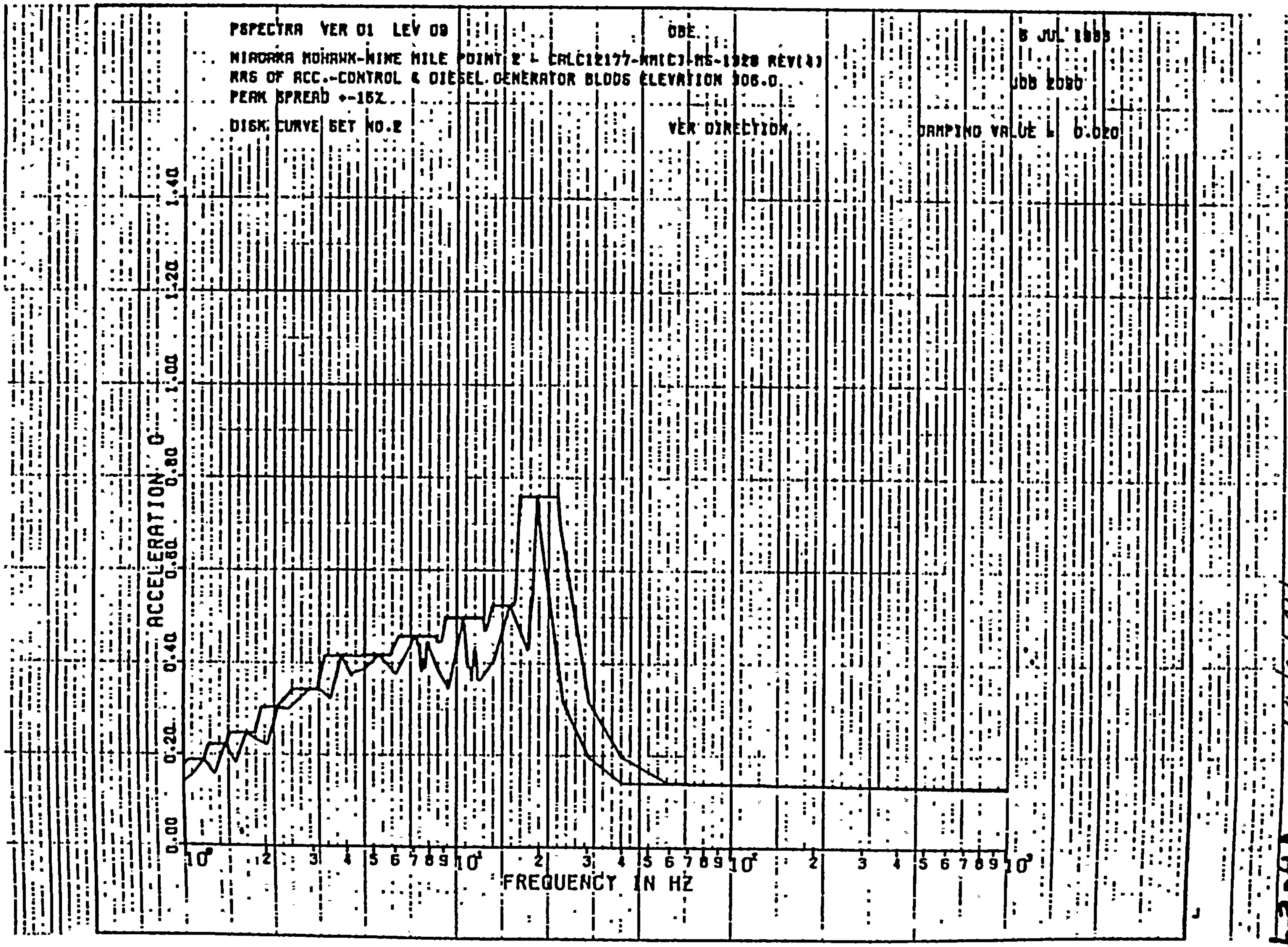
8.82 of 89

PAGE 93



p. B3 of B9

~~PAGE 95~~



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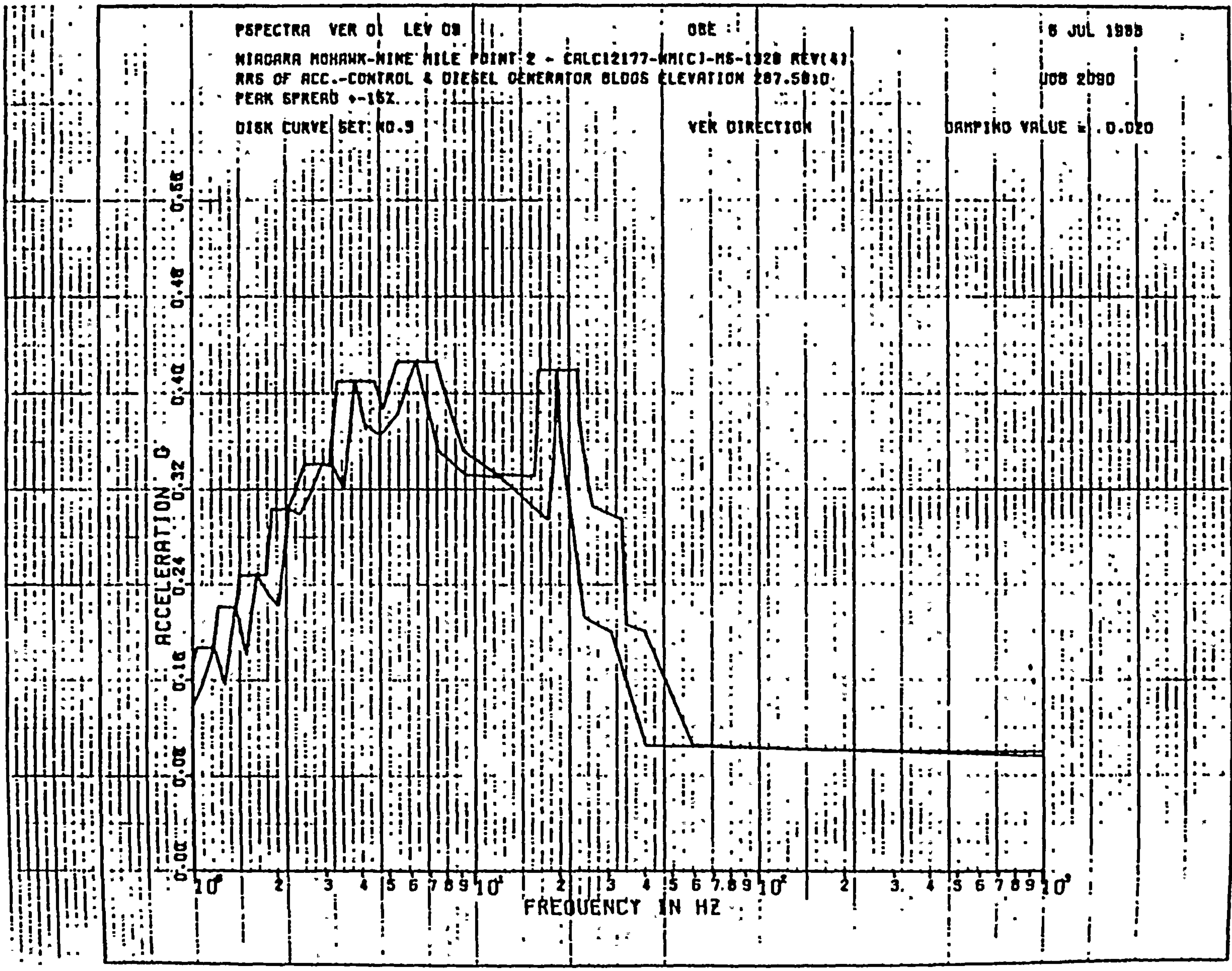
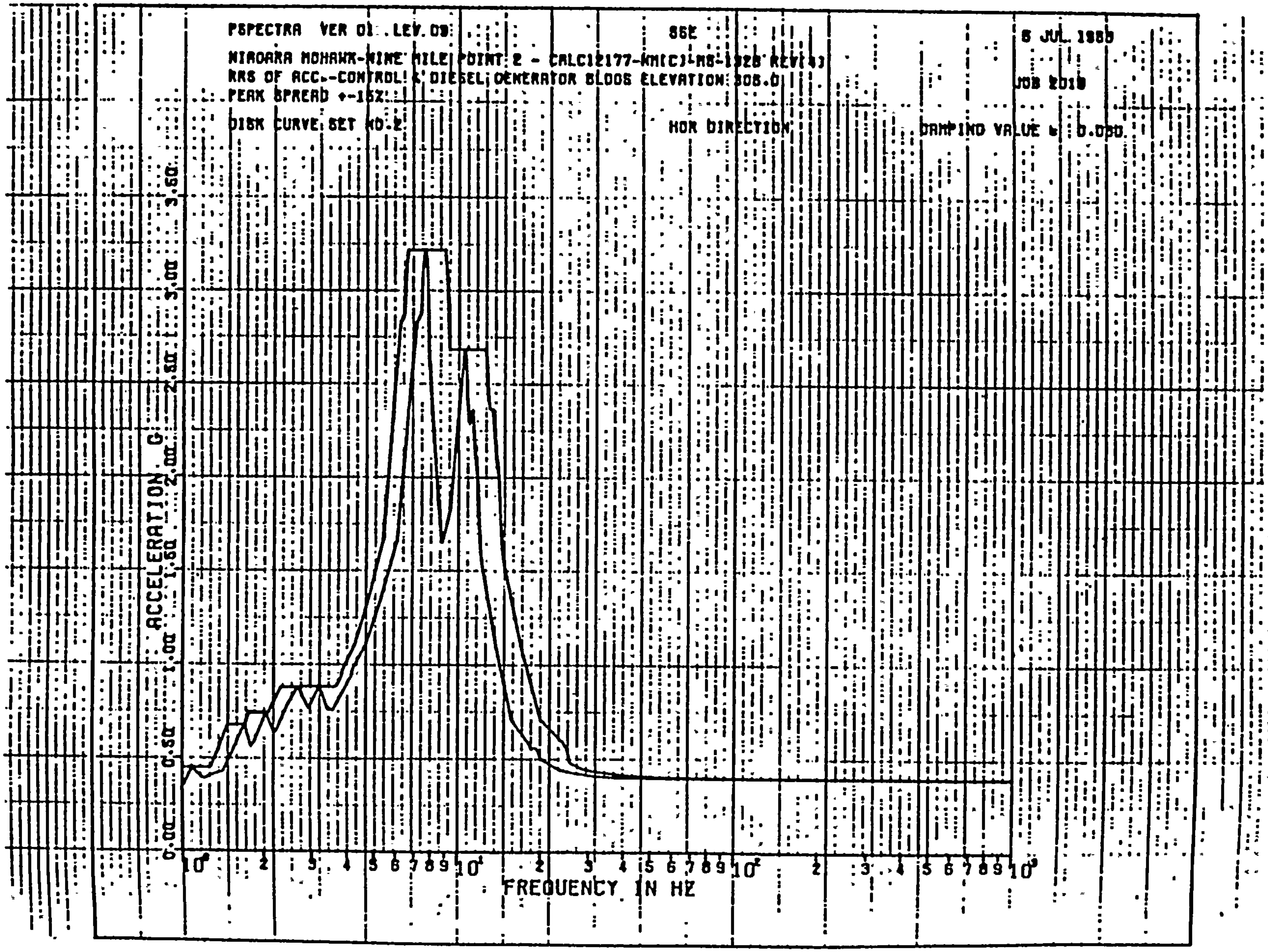
PAGE 94



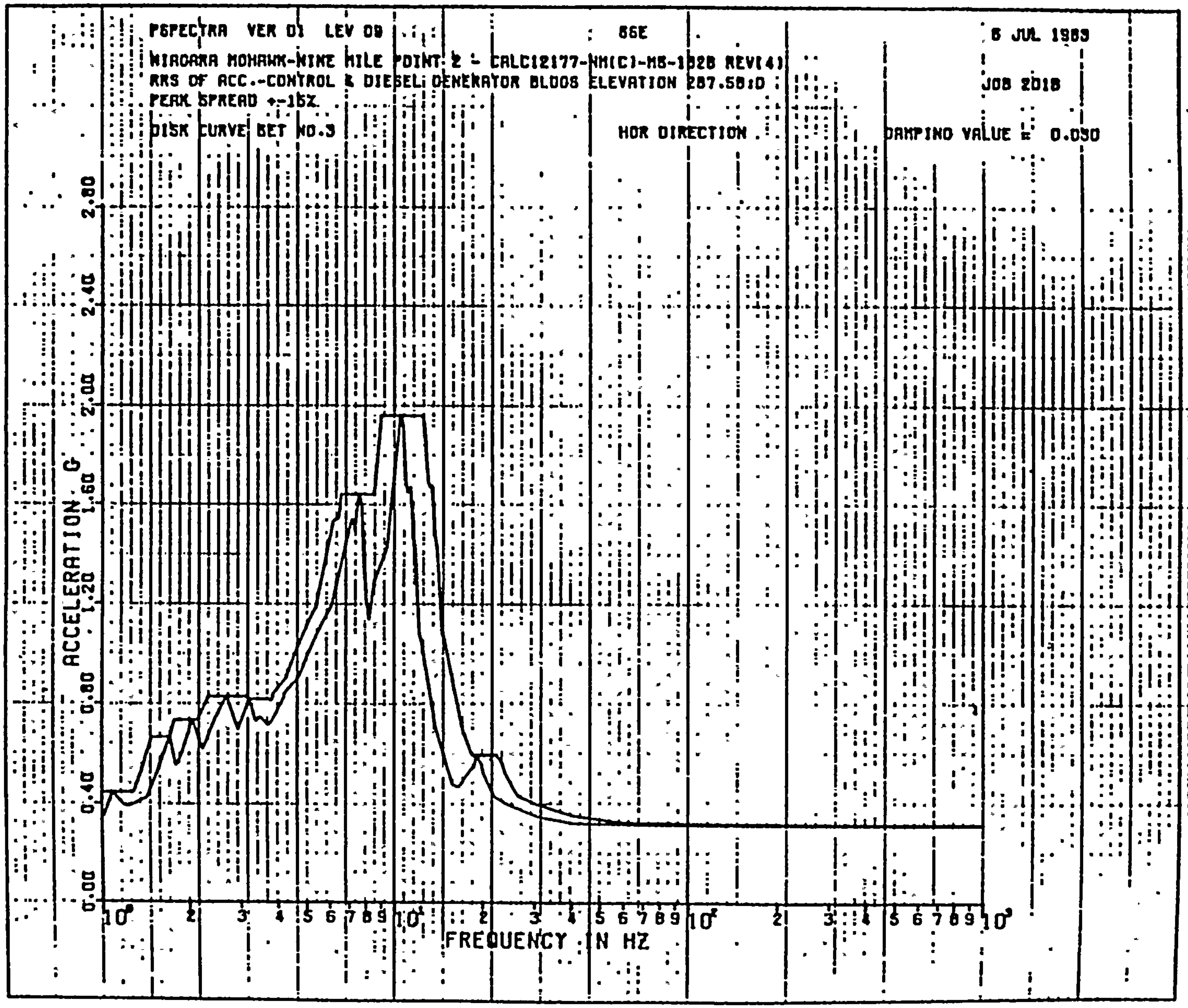
P.B5 of B9

PAGE 96



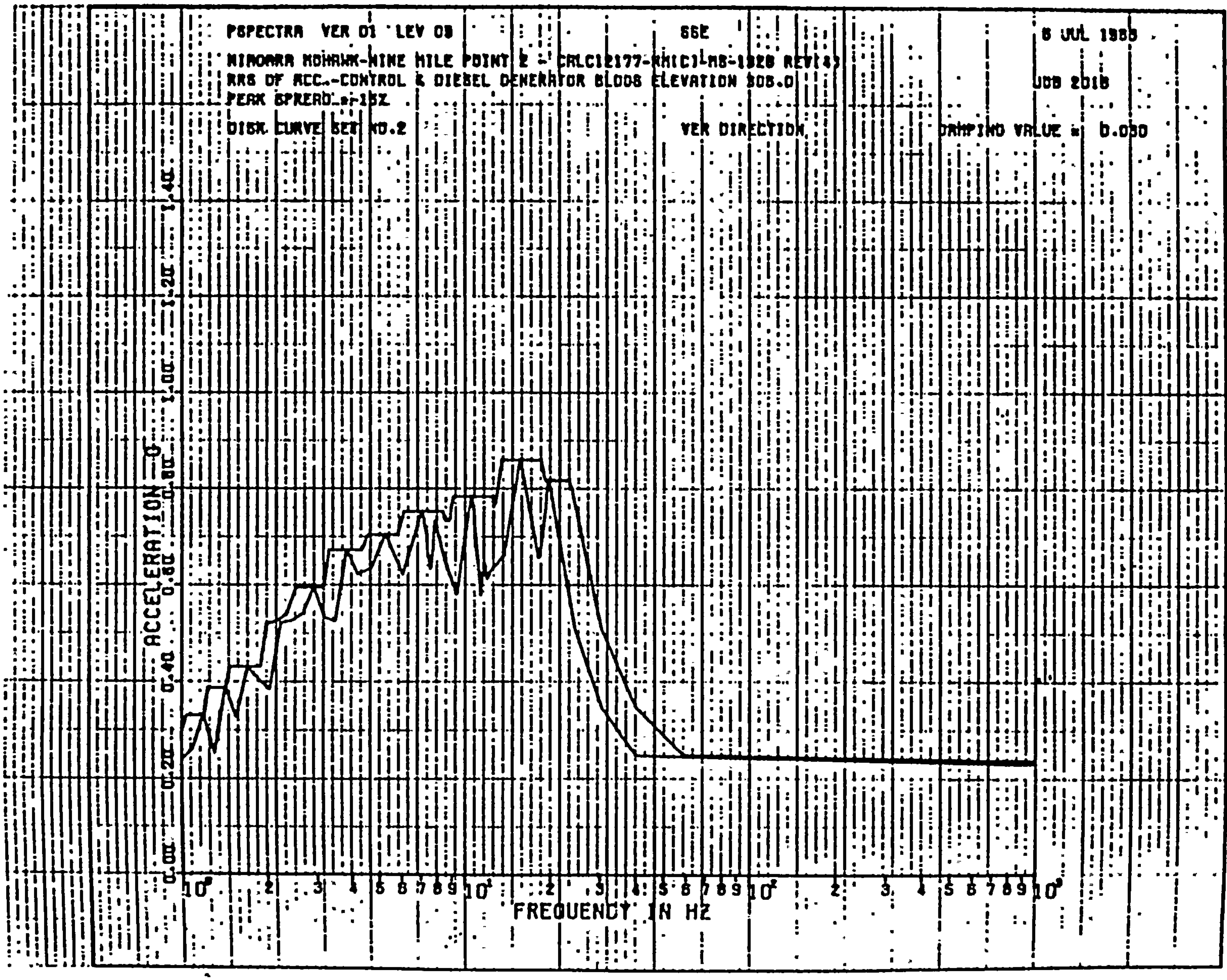
P.86 of 139

PAGE 45



p. 87 of 89

~~PAGE 47~~



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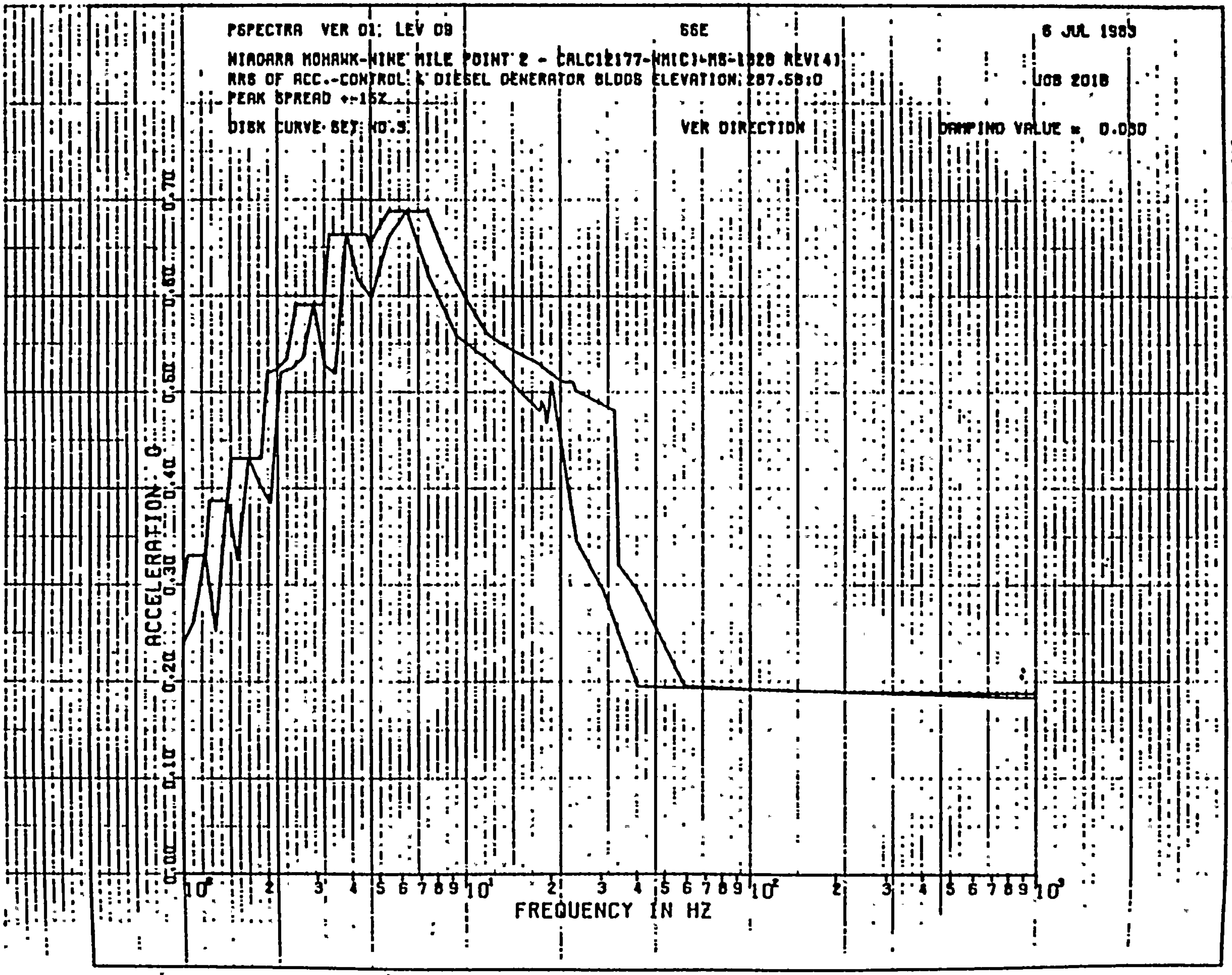
~~PAGE 46~~



p.B9 of B9

~~PAGE 49~~

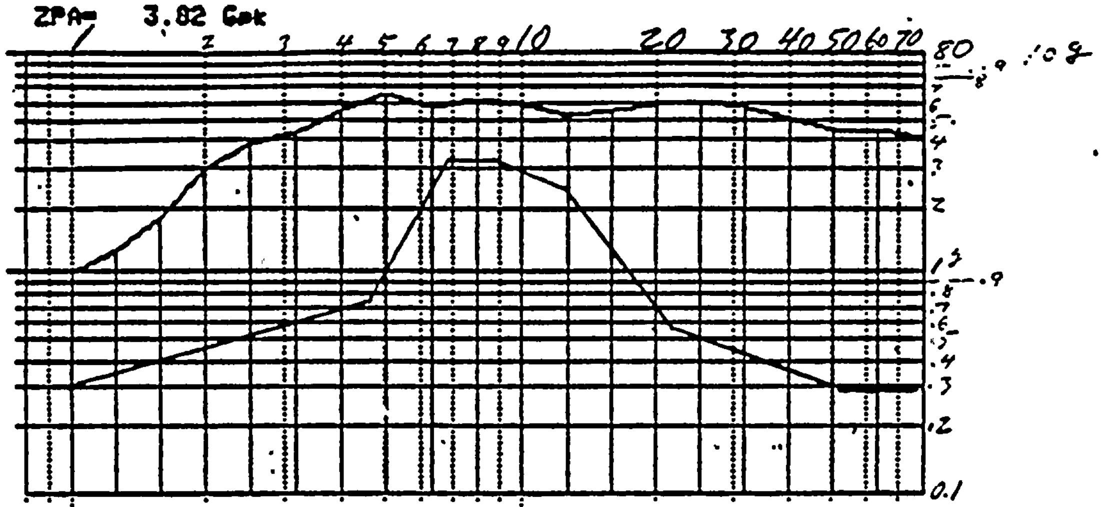
Attachment C

TRS* by F & H for Devices No.

3, 7, 10, 13, 14 & 20

of Attachment A

* From document No. F & H 10200-C

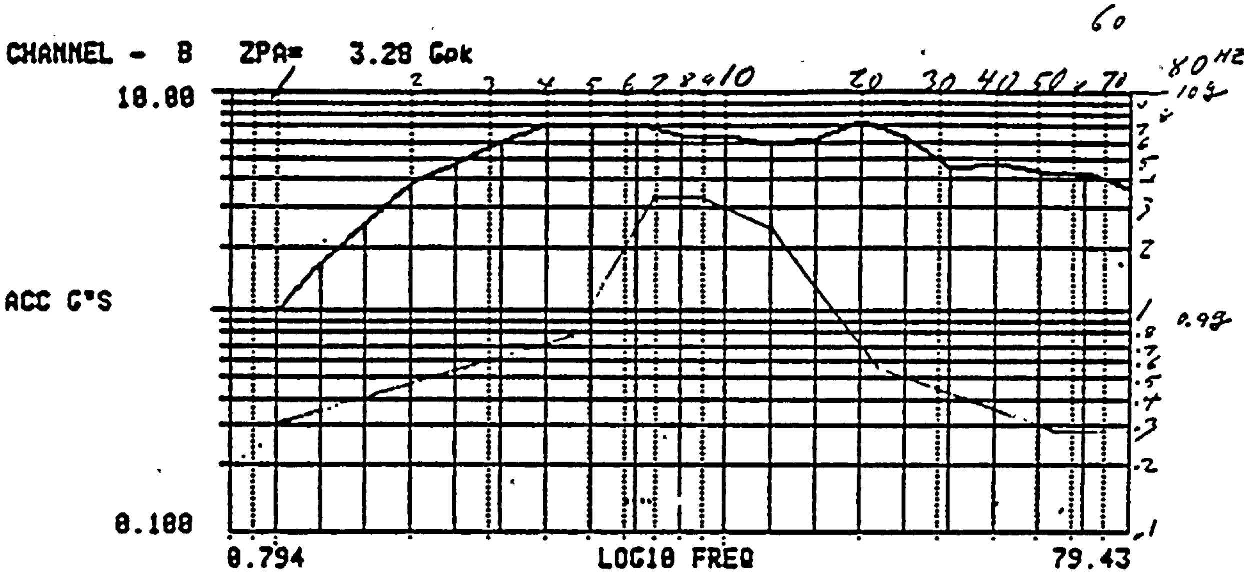


12-MAR-84 SHOCK RESPONSE 5.0 % Damp Abs Acc
03:05:00 10200 OBE 5 CONTROL X Y Z 1/3 Octave Max:-Max
?

Freq	Ampl	Freq	Ampl	Freq	Ampl
1.00	0.97	5.01	6.43	25.12	5.83
1.26	1.25	6.31	5.58	31.62	5.53
1.58	1.75	7.94	6.13	39.81	4.92
2.00	2.92	10.00	5.65	50.12	4.32
2.51	3.77	12.59	5.13	63.10	4.31
3.16	4.29	15.85	5.42	79.43	4.06
3.98	5.42	19.95	5.81		

FIGURE 6.2

- p. C3 of C7 -

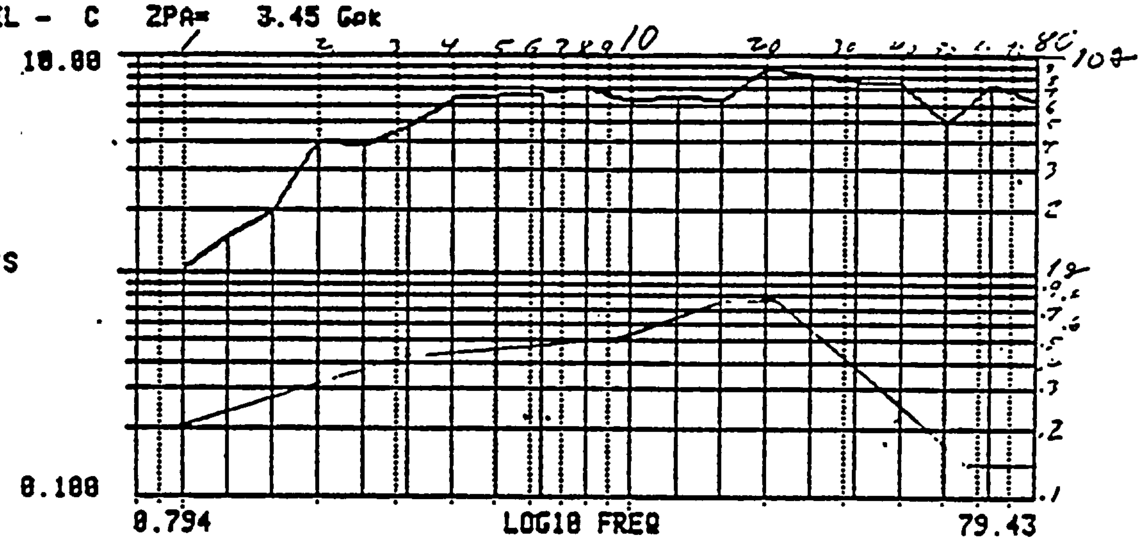


12-MAR-84 SHOCK RESPONSE 5.8 % Damp Abs Acc
83:87:18 18288 OBE 5 CONTROL X Y Z 1/3 Octave Maxi-Max
?

Freq	Ampl	Freq	Ampl	Freq	Ampl
1.88	8.99	5.81	6.98	25.12	6.82
1.26	1.65	6.31	6.97	31.62	4.36
1.58	2.58	7.94	6.25	39.81	4.59
2.88	3.83	18.88	6.31	58.12	4.23
2.51	4.68	12.59	5.79	63.18	4.38
3.16	5.89	15.85	6.88	79.43	3.59
3.98	7.84	19.95	7.14		

FIGURE 6.3

p. C4 of C7



12-MAR-84
03:09:28
?

SHOCK RESPONSE
10200 OBE 5 CONTROL X Y Z

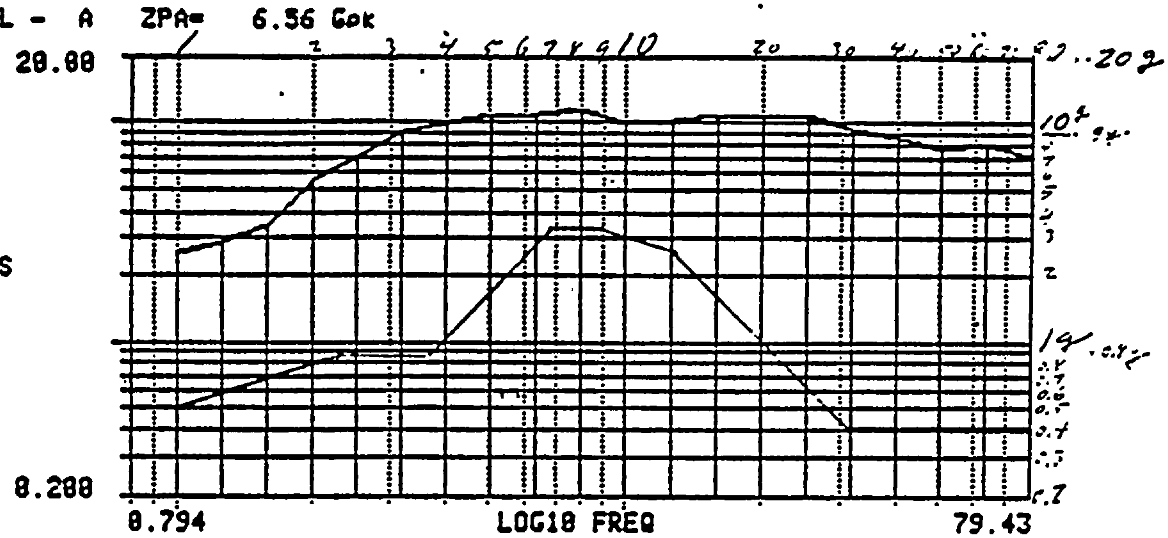
5.0 % Damp Abs Acc
1/3 Octave Maxi-Max

Freq	Ampl	Freq	Ampl	Freq	Ampl
1.00	1.03	5.01	6.51	25.12	7.91
1.26	1.49	6.31	6.61	31.62	7.38
1.58	1.94	7.94	7.06	39.81	7.22
2.00	4.02	10.00	6.16	50.12	4.76
2.51	3.82	12.59	6.35	63.10	7.22
3.16	4.63	15.85	6.01	79.43	6.08
3.98	6.20	19.95	8.50		

FIGURE 6.4

p. C5 of C7

CHANNEL - A ZPA= 6.56 Gpk



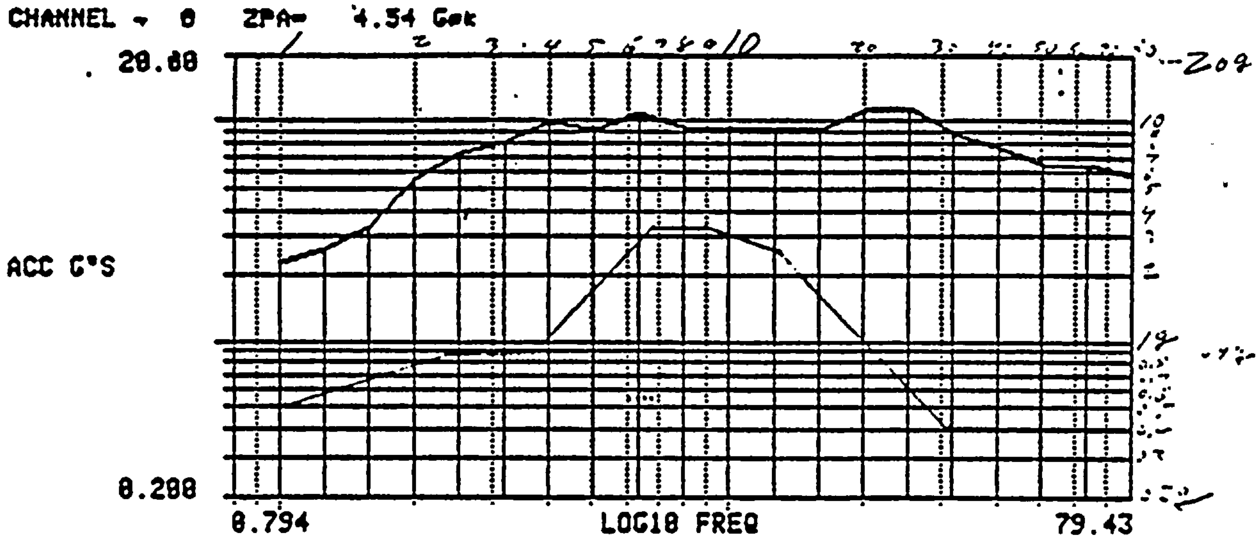
12-MAR-84 SHOCK RESPONSE 5.0 % Damp Abs. Acc
02:55:30 10200 SSE1 CONTROL X Y Z 1/3 Octave Maxi-Max
?

Freq	Ampl	Freq	Ampl	Freq	Ampl
1.00	2.59	5.01	10.00	25.12	10.97
1.26	2.87	6.31	10.94	31.62	9.43
1.58	3.46	7.94	11.30	39.81	8.62
2.00	5.42	10.00	9.86	50.12	7.56
2.51	6.93	12.59	10.06	63.10	8.11
3.16	9.01	15.85	10.79	79.43	6.88
3.98	9.80	19.95	10.00		

FIGURE 6.5

p. C6 of C7

CHANNEL - 0 ZPA= 4.54 Gpk



12-MAR-84
02:57:30

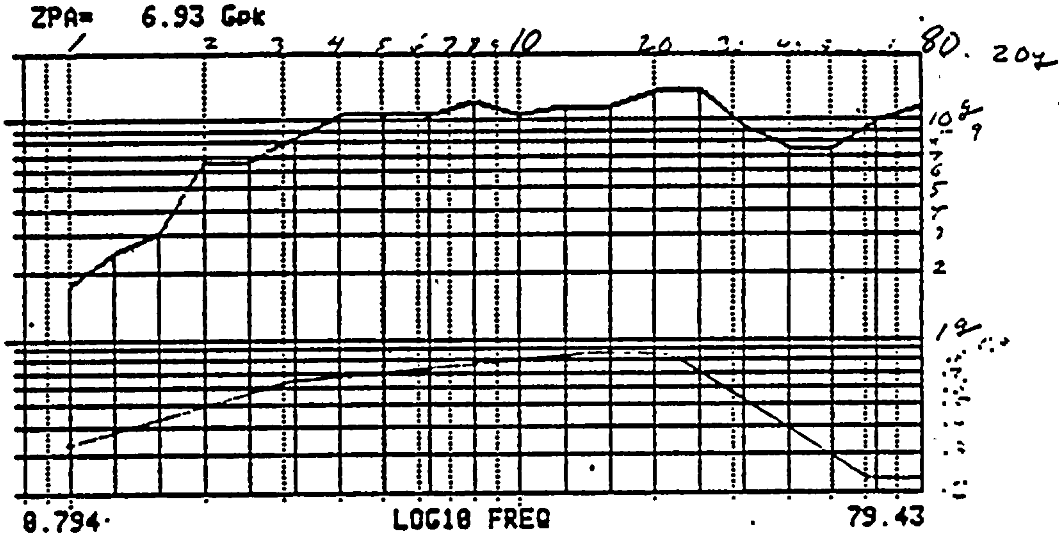
SHOCK RESPONSE
10200 SSE1 CONTROL X Y Z

5.0 % Damp Abs Acc
1/3 Octave Maxi-Max

Freq	Ampl	Freq	Ampl	Freq	Ampl
1.00	2.29	5.01	9.00	25.12	11.61
1.26	2.65	6.31	10.77	31.62	8.72
1.58	3.34	7.94	9.41	39.81	7.61
2.00	5.51	10.00	9.24	50.12	6.29
2.51	7.15	12.59	9.43	63.10	6.35
3.16	8.00	15.85	9.06	79.43	5.62
3.98	9.00	19.95	11.19		

FIGURE 6.6

p. C7 of C7



12-MAR-84 03:00:28 ?
SHOCK RESPONSE
10200 SSE1 CONTROL X Y (2)
5.0 % Damp Abs Acc
1/3 Octave Maxi-Max

Freq	Ampl	Freq	Ampl	Freq	Ampl
1.00	1.75	5.01	10.03	25.12	13.77
1.26	2.44	6.31	10.38	31.62	9.38
1.58	3.08	7.94	12.31	39.81	7.42
2.00	6.61	10.00	10.54	50.12	7.37
2.51	6.58	12.59	11.35	63.10	9.78
3.16	8.21	15.85	11.43	79.43	11.31
3.98	10.42	19.95	13.32		

FIGURE 6.7

Attachment D

TRS* by Bailey Controls for

Devices No. 1, 4, 6, 9, 15 & 16

of Attachment A

* From document No. QR-4405-N-

194P-1

Plotted by: S. Mandeville

Checked by: Gittozzo

Date: 8-29-84 Time:

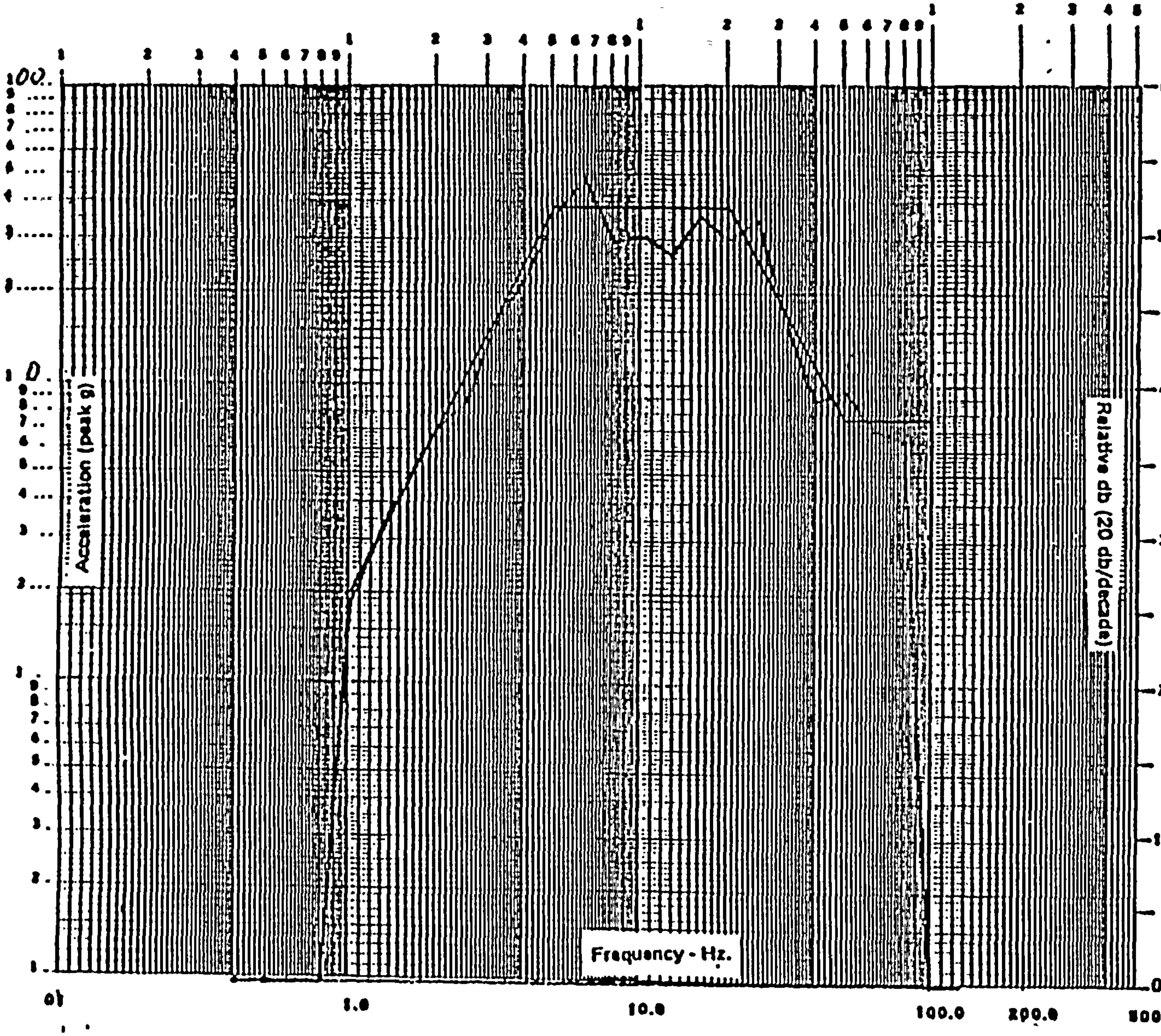
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Northern Item #1A

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52% RH

Test Type: ORE

Duration:

Sweep Speed: — oct/minute

Damping: 2%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: XZ

☒ Live ☐ Tape

Graph Number: 1

Tolerance:

P. 22 of 225

Plotted by: S. Mandeville

Checked by: Gittings

Date: 8-29-84 Time:

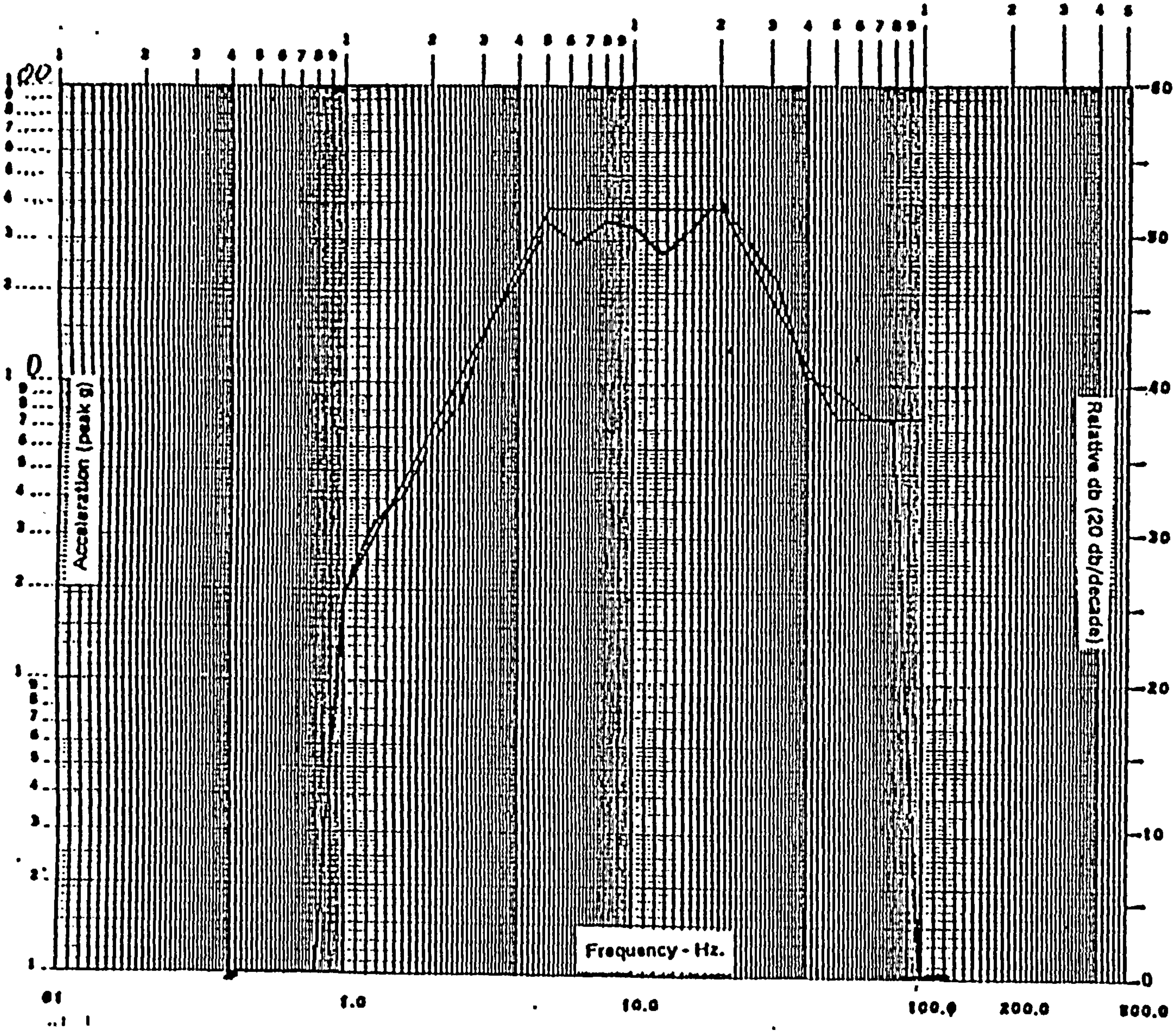
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERM Item #1A

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52% RH

Test Type: OBE

Duration:

Sweep Speed: oct/minute

Damping: 2%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -4Z

☒ Live ☐ Tape

Graph Number: 4

Tolerance:

-P. D3 of D25

Plotted by: [illegible]

Checked by: [illegible]

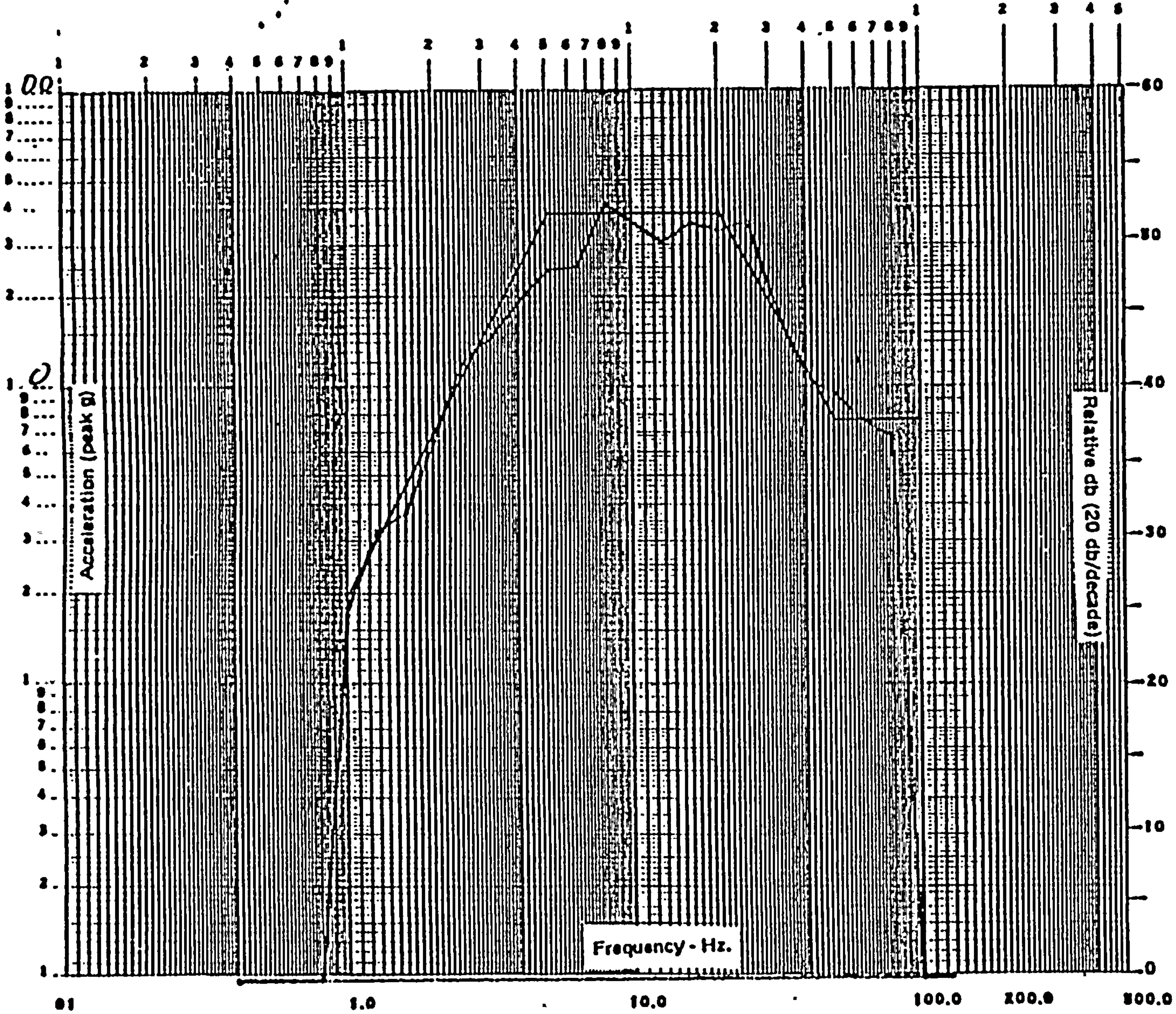
Date: 8-29-84 **Time:** ____

Babcock & Wilcox
Bailey Controls Company
QUALIFICATION TEST LAB.

Test Item: NUTHERM ITEM #1A

Item P/N: ____

Item S/N: ____



Ref. Spec.: ____

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52% RH

Test Type: OBE

Duration: ____

Sweep Speed: ____ oct/minute

Damping: 2%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +XZ

☒ Live ☐ Tape

Graph Number: 10

Tolerance: ____

P.D4 of D25

Page No. C-1

Plotted by: L Mandeville

Checked by: Gattozzi

Date: 8-29-84 Time:

Babcock & Wilcox

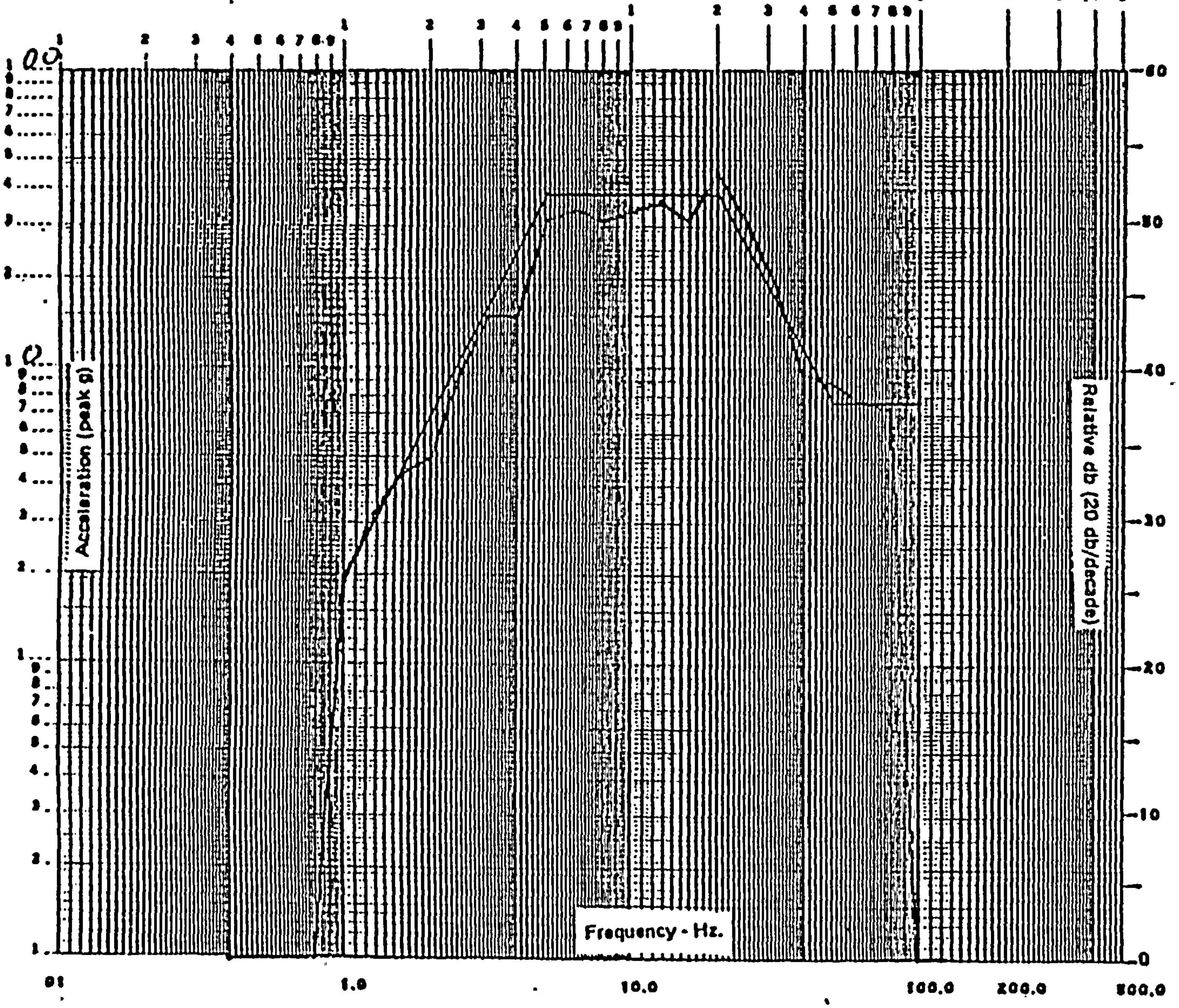
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERM ITEM # 1A

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52% RH

Test Type: ORE

Duration:

Sweep Speed: ______ oct/minute

Damping: 2%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +YZ

☒ Live ☐ Tape

Graph Number: 16

Tolerance:

P. D-5 of D-25

Plotted by: R.L. Simmers Jr.

Checked by: Gattyi

Date: 9-10-84 Time:

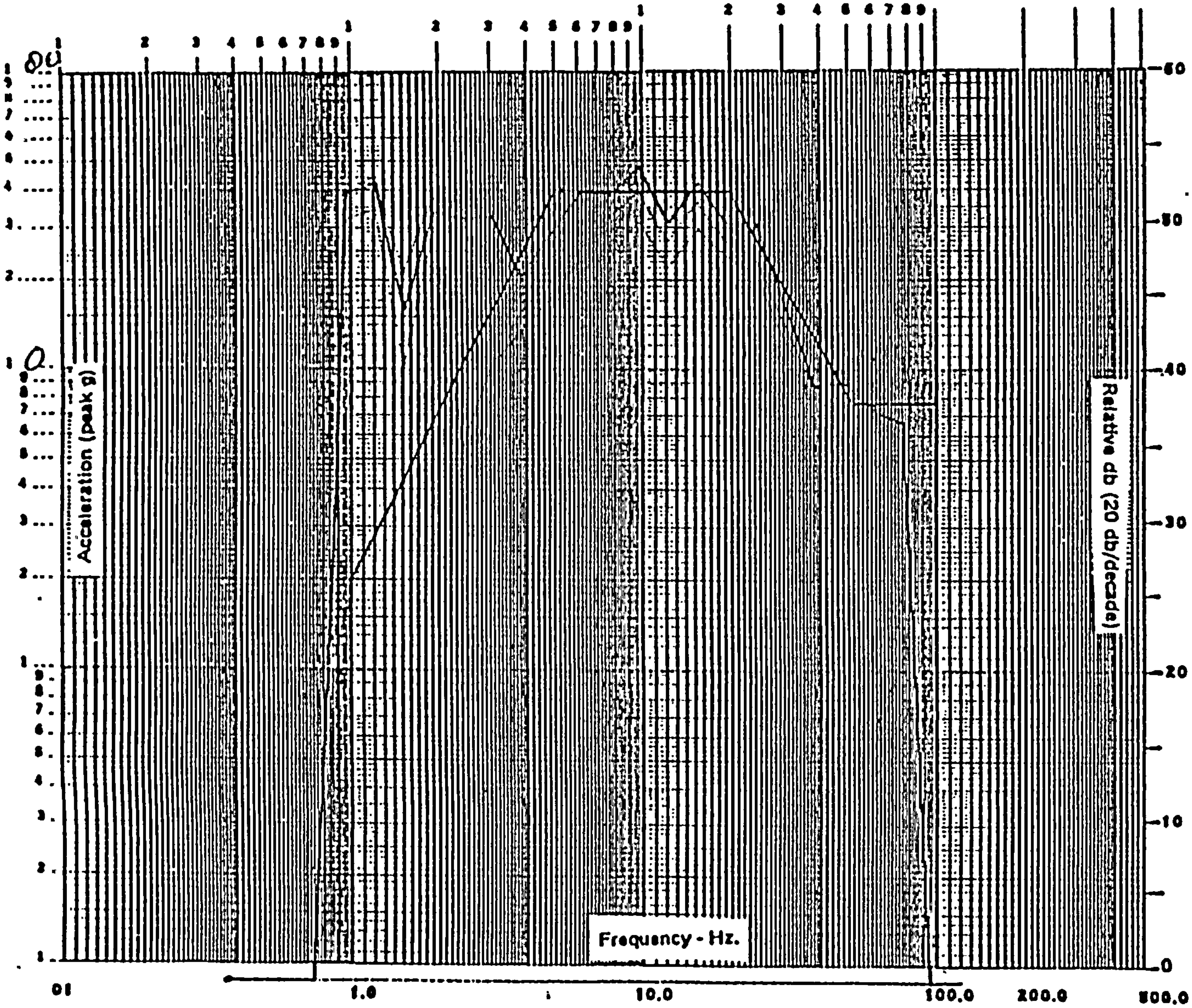
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nutherm Item # 1A

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71 F@52%Rh.

Test Type: SSE

Duration:

Sweep Speed: ______ oct/minute

Damping: 2,3,5 %

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -XZ

☒ Live ☐ Tape

Graph Number: 3 RE

Tolerance:

p. D6 of 225

Babcock & Wilcox
Bailey Controls Company
QUALIFICATION TEST LAB.

Plotted by: R.L. Simmerer Jr

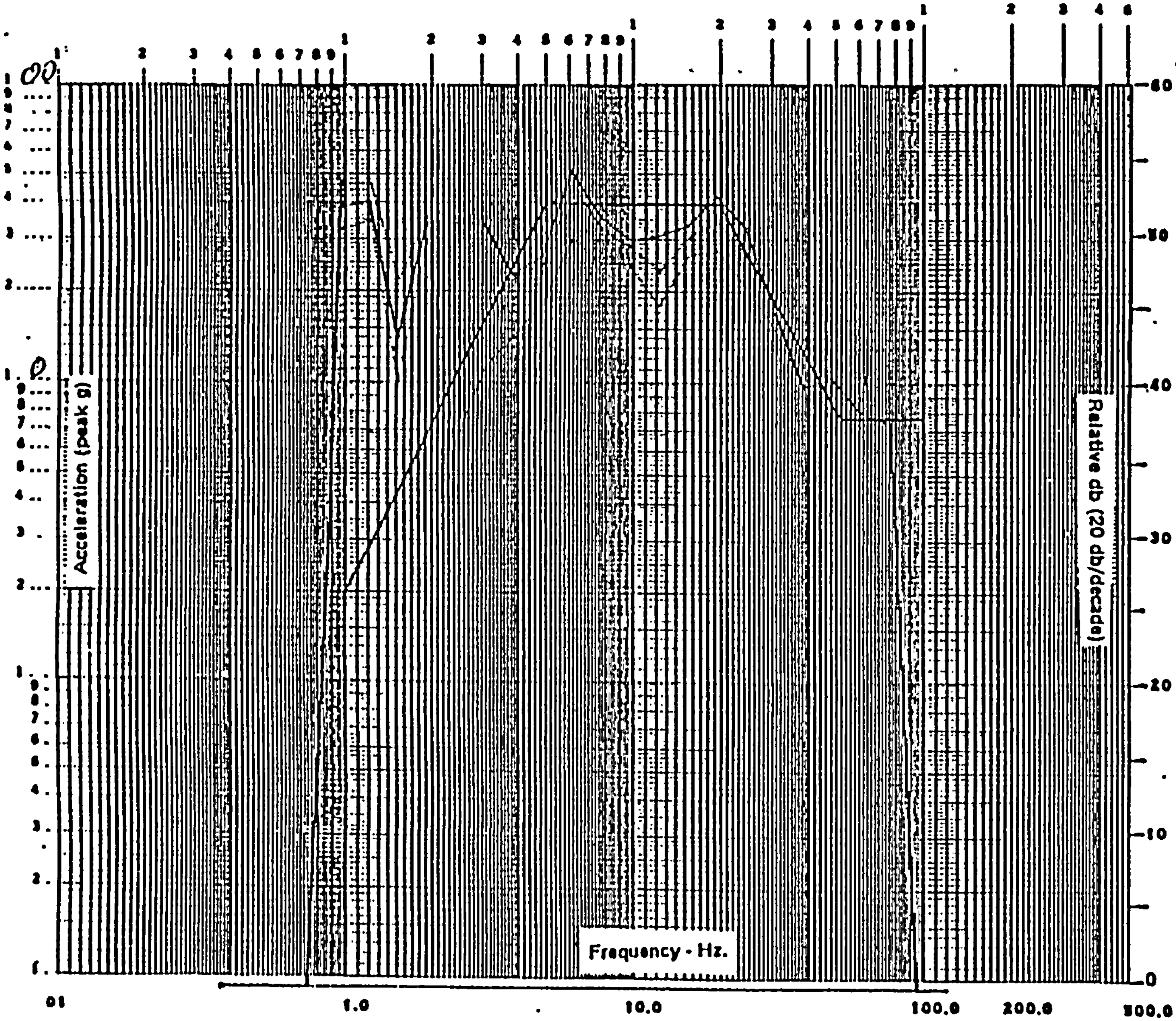
Checked by: Galtiger

Date: 9-10-84 Time: ______

Test Item: Nutherm Item # 1A

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71 F@52%Rh.

Test Type: SSE

Duration: ______

Sweep Speed: ______ oct/minute

Damping: 2,3,5 %

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -YZ

☒ Live ☐ Tape

Graph Number: 9 RE

Tolerance: ______

P.07.0f.025

Plotted by: R.L. Simmons Jr

Checked by: Gallegos

Date: 9-10-84 Time:

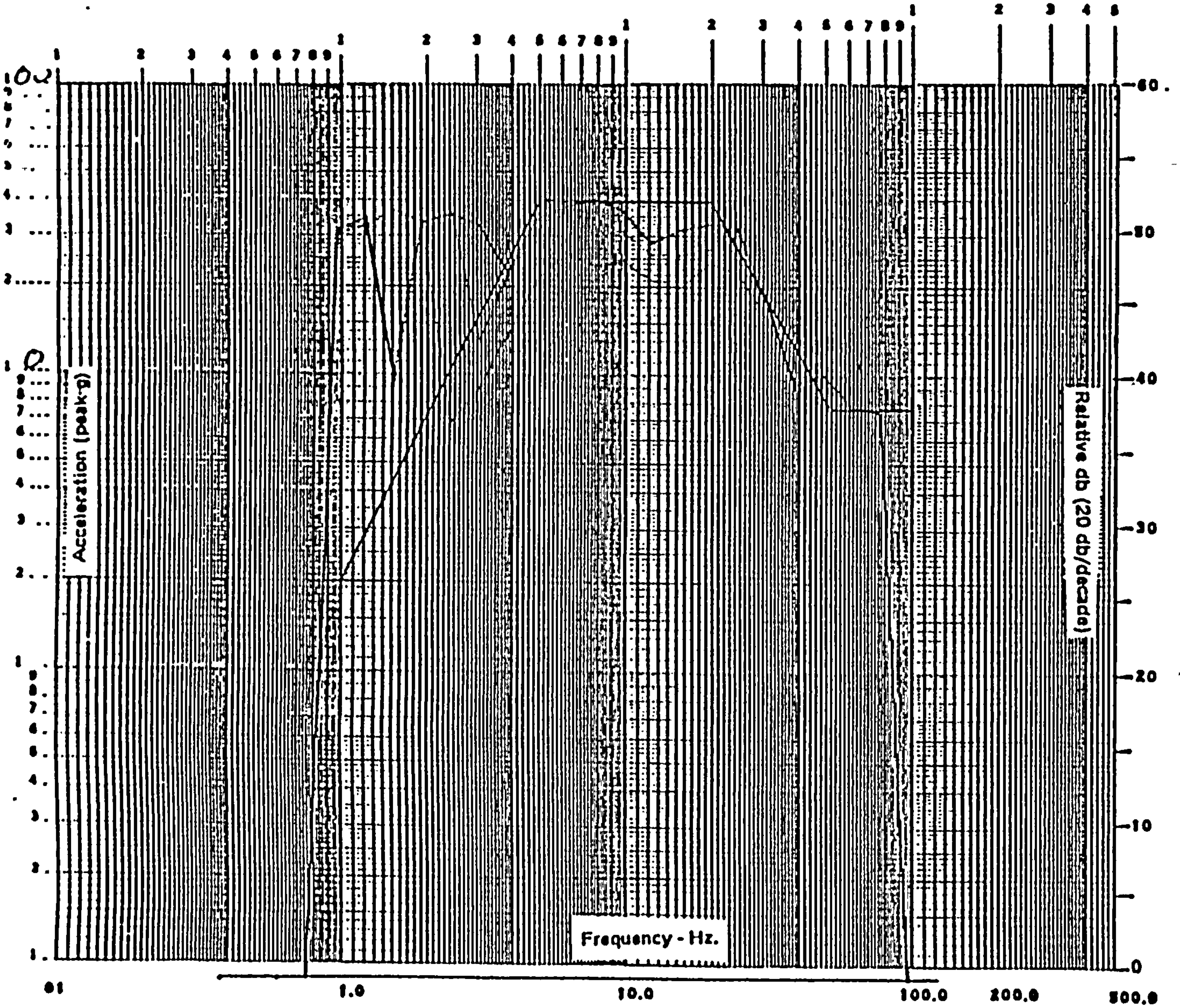
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nutherm Item # 1A

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71 F@52%Rh.

Test Type: SSE

Duration:

Sweep Speed: ______ oct/minute

Damping: 2, 3, 5

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: + X Z

☒ Live ☐ Tape

Graph Number: 15 RE

Tolerance:

P. 28 of 125

Plotted by: R. L. Simmons Jr

Checked by: Gattys

Date: 9-10-84 Time:

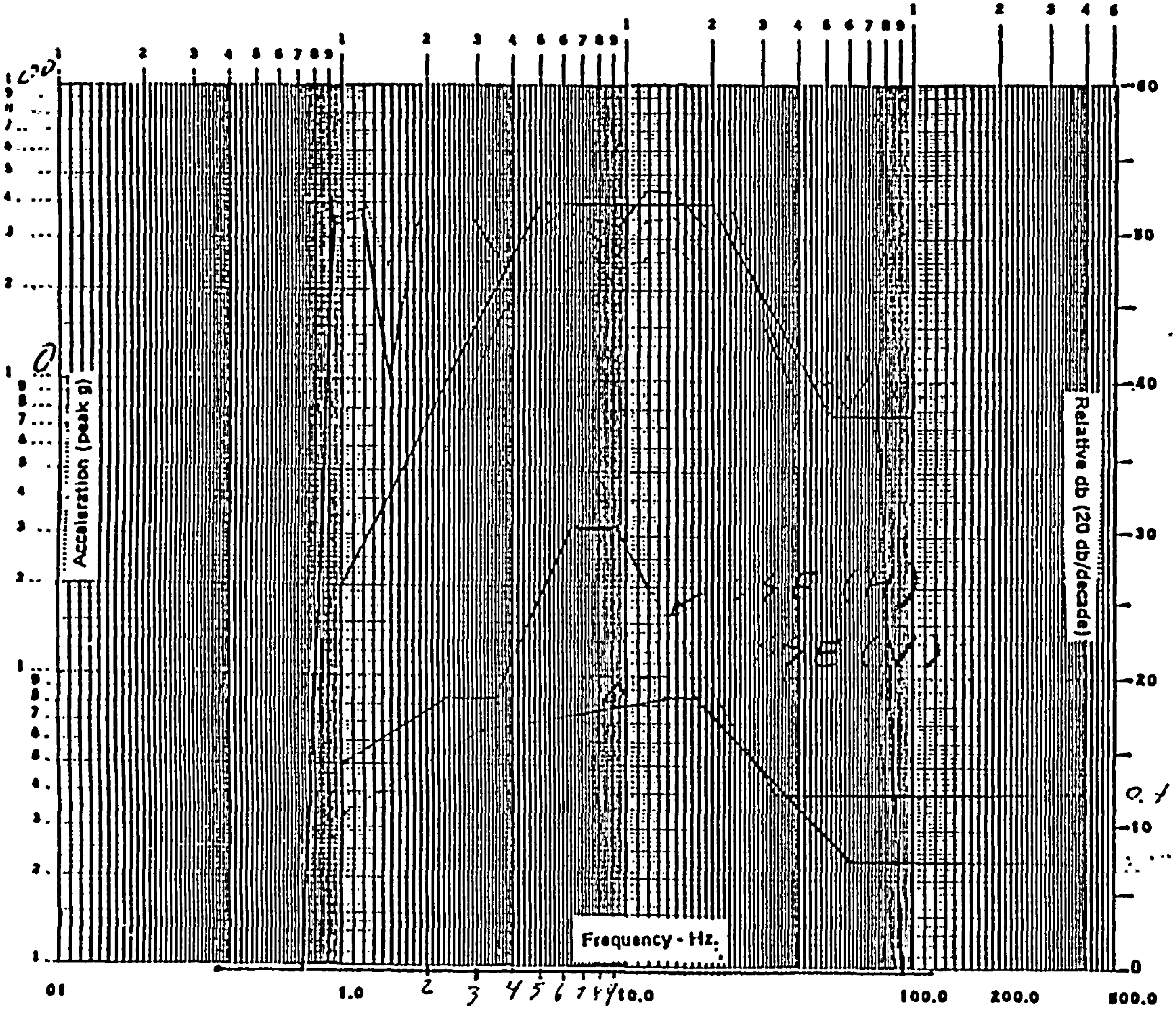
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nutherm Item # 1A

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71 F@52%Rh.

Test Type: SSE

Duration:

Sweep Speed: ______ oct/minute

Damping: 2,3,5 %

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +YZ

☒ Live ☐ Tape

Graph Number: 21 RE

Tolerance:

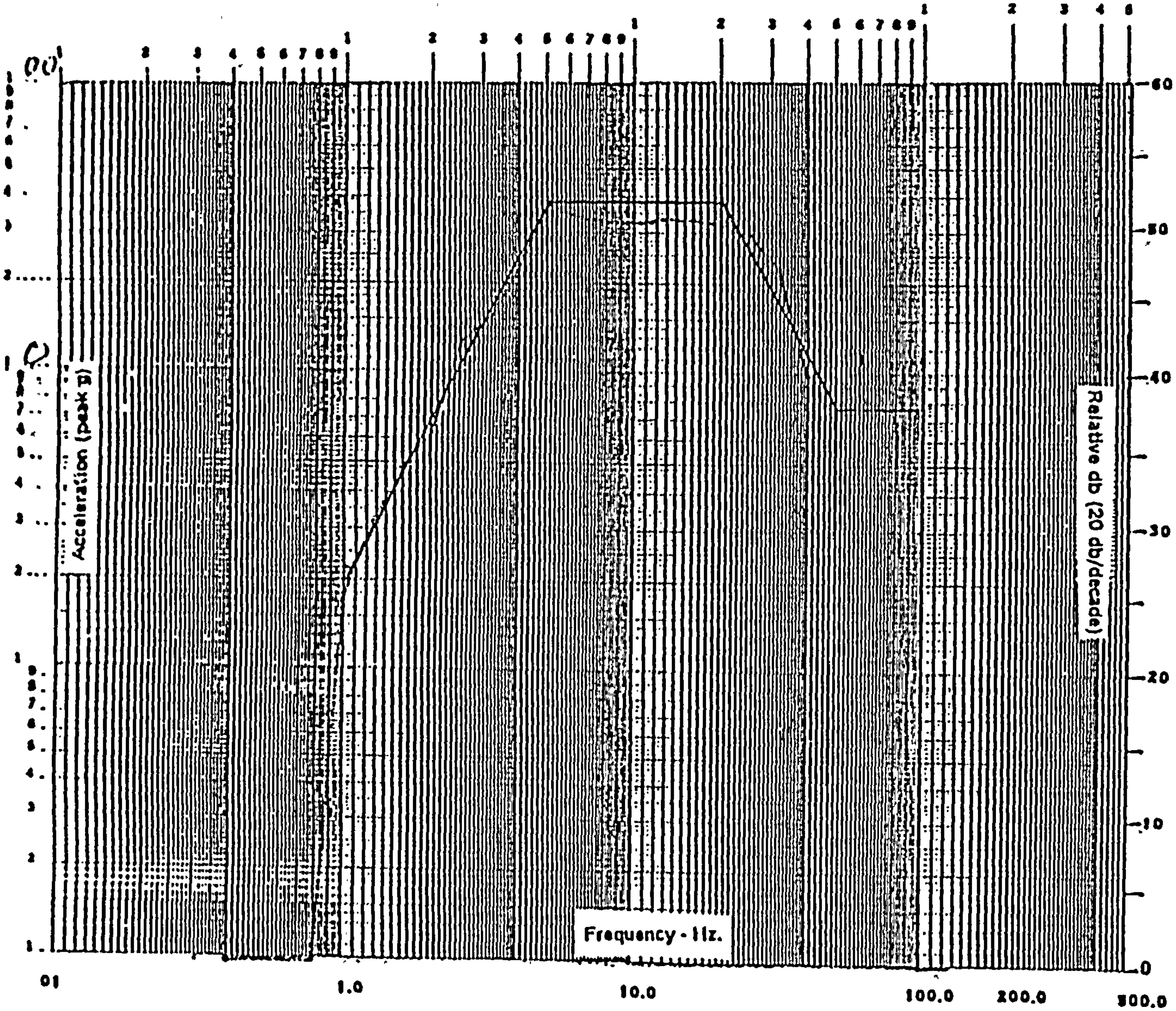
P. 29 of 225

Page No. C-36

Babcock & Wilcox
Bailey Controls Company
QUALIFICATION TEST LAB.

Plotted by: [illegible signature]
Checked by: Gatteri
Date: 8-30-84 Time: ______

Test Item: Nutherm Item #1C
Item P/N: ______
Item S/N: ______



Ref. Spec.: ______
Unit: Operational ☒ Non-operational ☐
Temp. & Humidity: 71°F @ 51% RH
Test Type: OBE
Duration: ______
Sweep Speed: ______ oct/minute
Damping: 2%
Pickup Sensing Axis: Z
Pickup Sensitivity: 100 mv peak / g peak
Vibration Axis: -XZ

☒ Live ☐ Tape

Graph Number: 1

Tolerance: ______

p. 10 of 25

Plotted by: G. Mandeville

Checked by: Guttozi

Date: 8-30-84 Time:

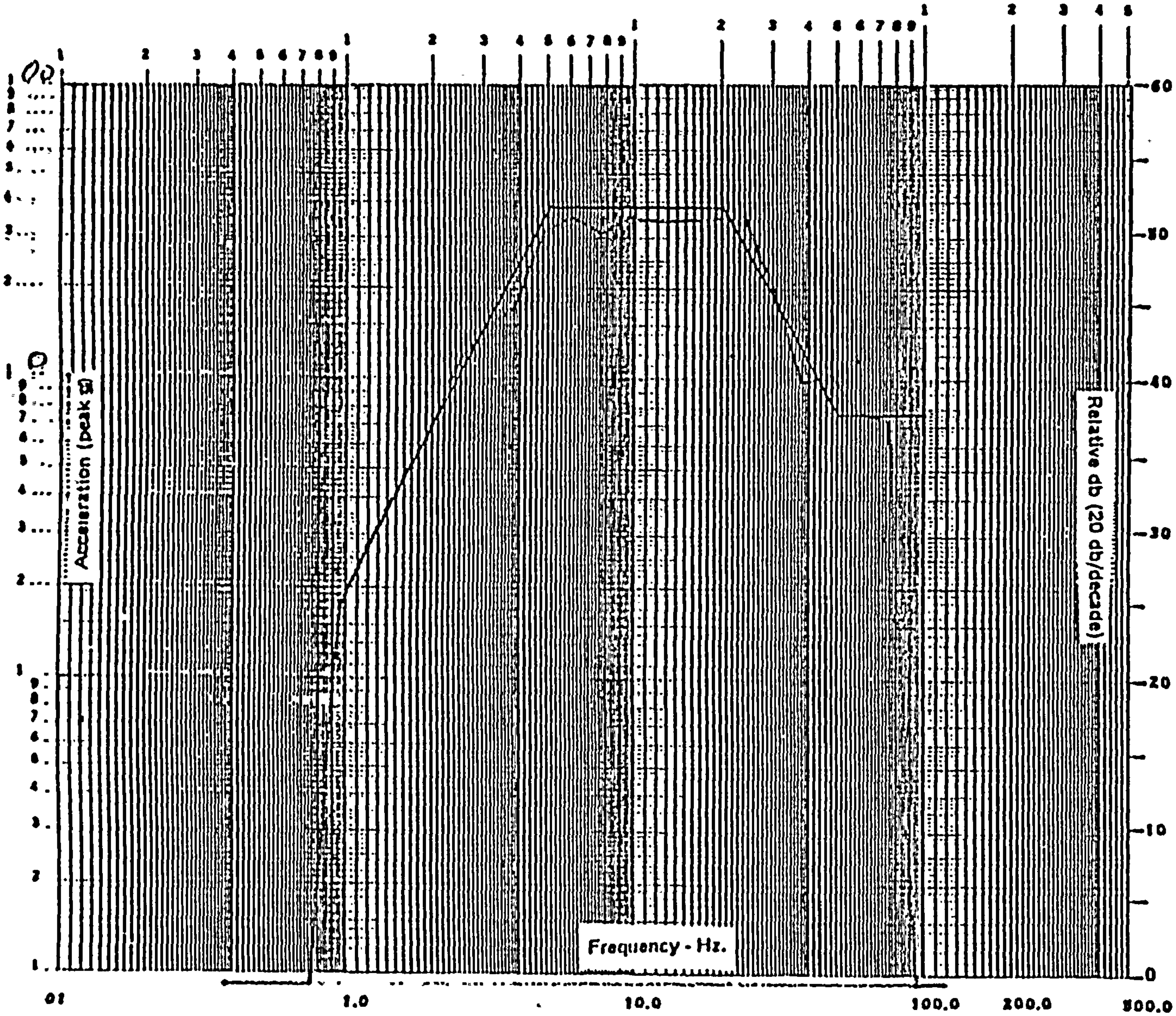
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERM Item #1C

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 51% RH

Test Type: OBE

Duration:

Sweep Speed: ______ oct/minute

Damping: 2%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -YZ

☒ Live ☐ Tape

Graph Number: 7

Tolerance:

-p. 711 of 725-

Plotted by: [illegible signature]

Checked by: [illegible signature]

Date: 9-20-94 Time: ______

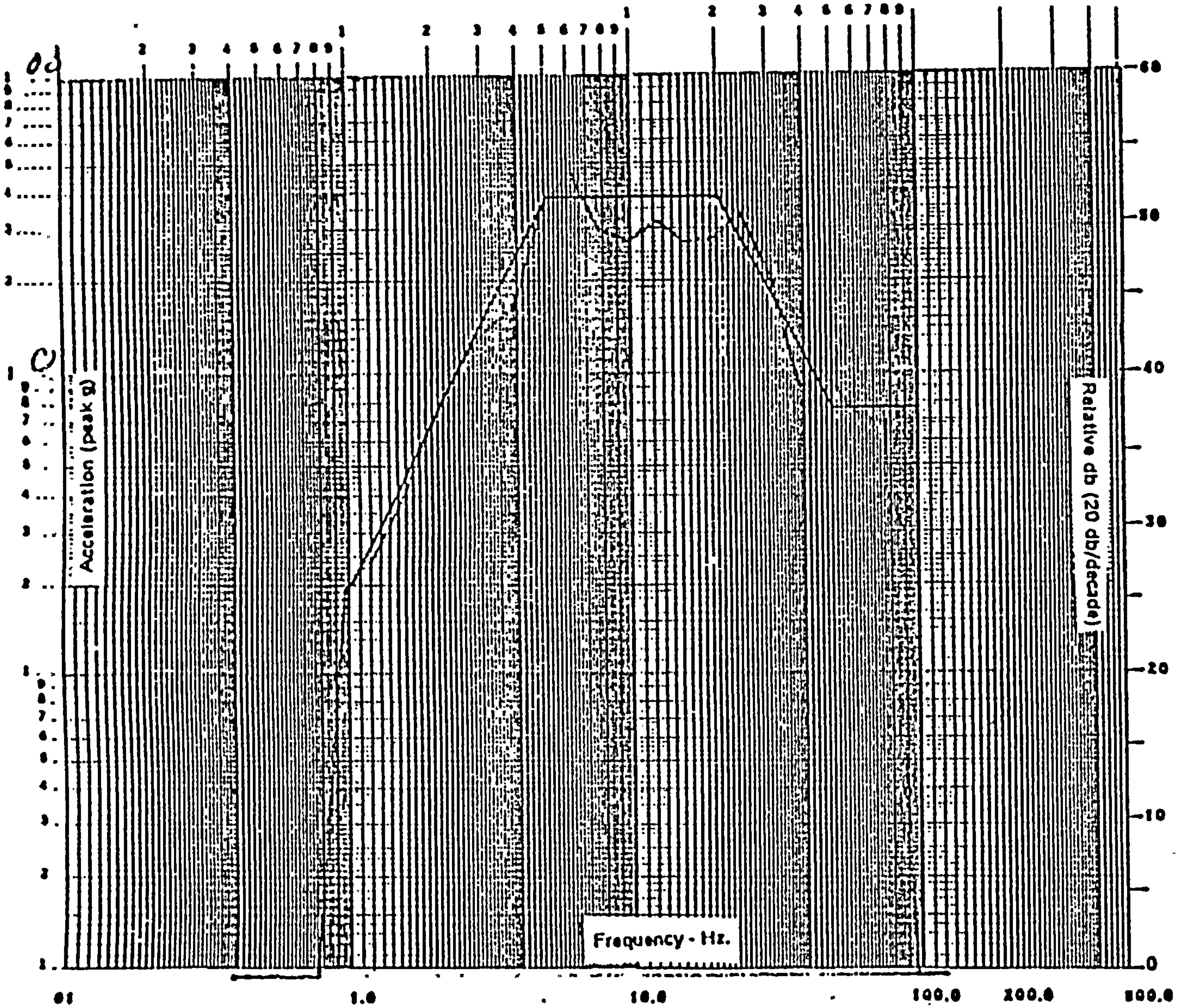
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Northern Item #1C

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 51% RH

Test Type: OBE

Duration: ______

Sweep Speed: ______ oct/minute

Damping: 2%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +XZ

☒ Live ☐ Tape

Graph Number: 14

Tolerance: ______

P. D12 of D25

Plotted by: [illegible]

Checked by: Gattozzi

Date: 8-30-84 Time: ______

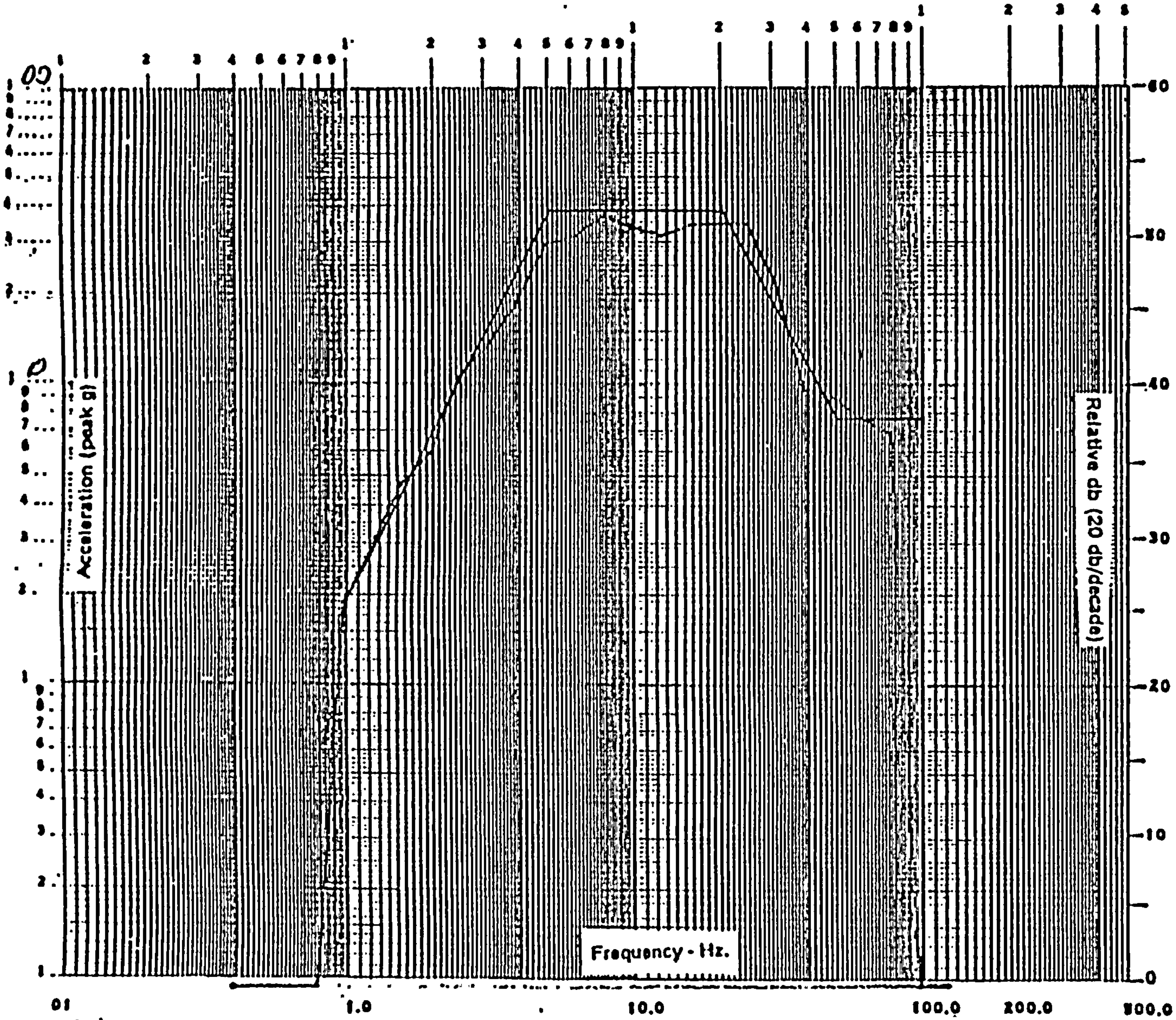
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERM ITEM #1C

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 53% RH

Test Type: OBE

Duration: ______

Sweep Speed: ______ oct/minute

Damping: 2%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +Z

☒ Live ☐ Tape

Graph Number: 19

Tolerance: ______

P. D13 of D25

Plotted by: R L Simmons Jr

Checked by: Gattozzi

Date: 9-10-84 Time:

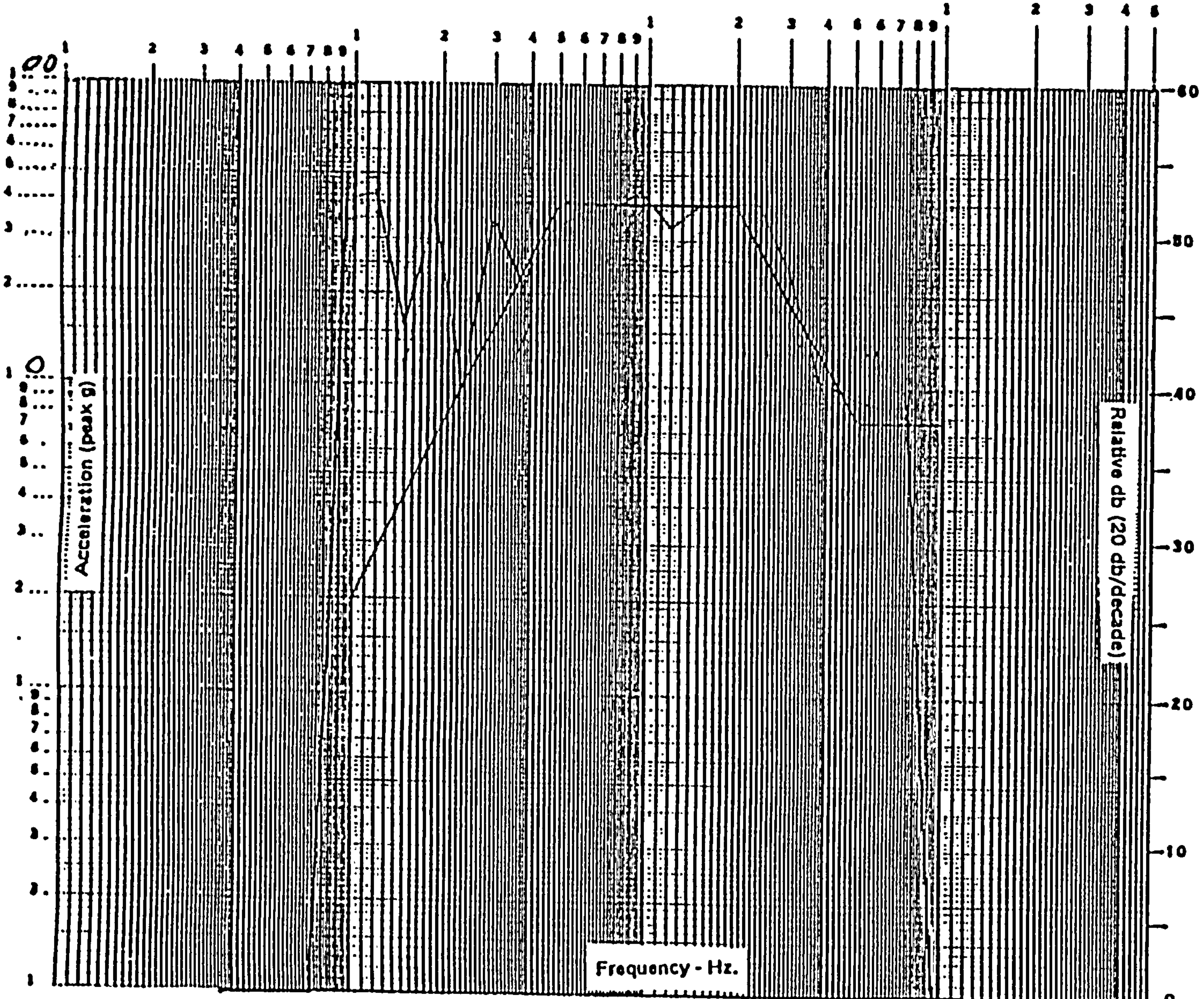
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nutherm Item #: 16

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71 F@52%Rh.

Test Type: SSE

Duration:

Sweep Speed: oct/minu

Damping: 2,3,5 %

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv pea / g pea

Vibration Axis: ~~XZ~~ RLS -XZ

☒ Live ☐ Tape

Graph Number: 6RE

Tolerance:

P. D14 of D25

C-94

Plotted by: R. L. Simmons Jr

Checked by: Guttozzi

Date: 9-10-84 Time: ______

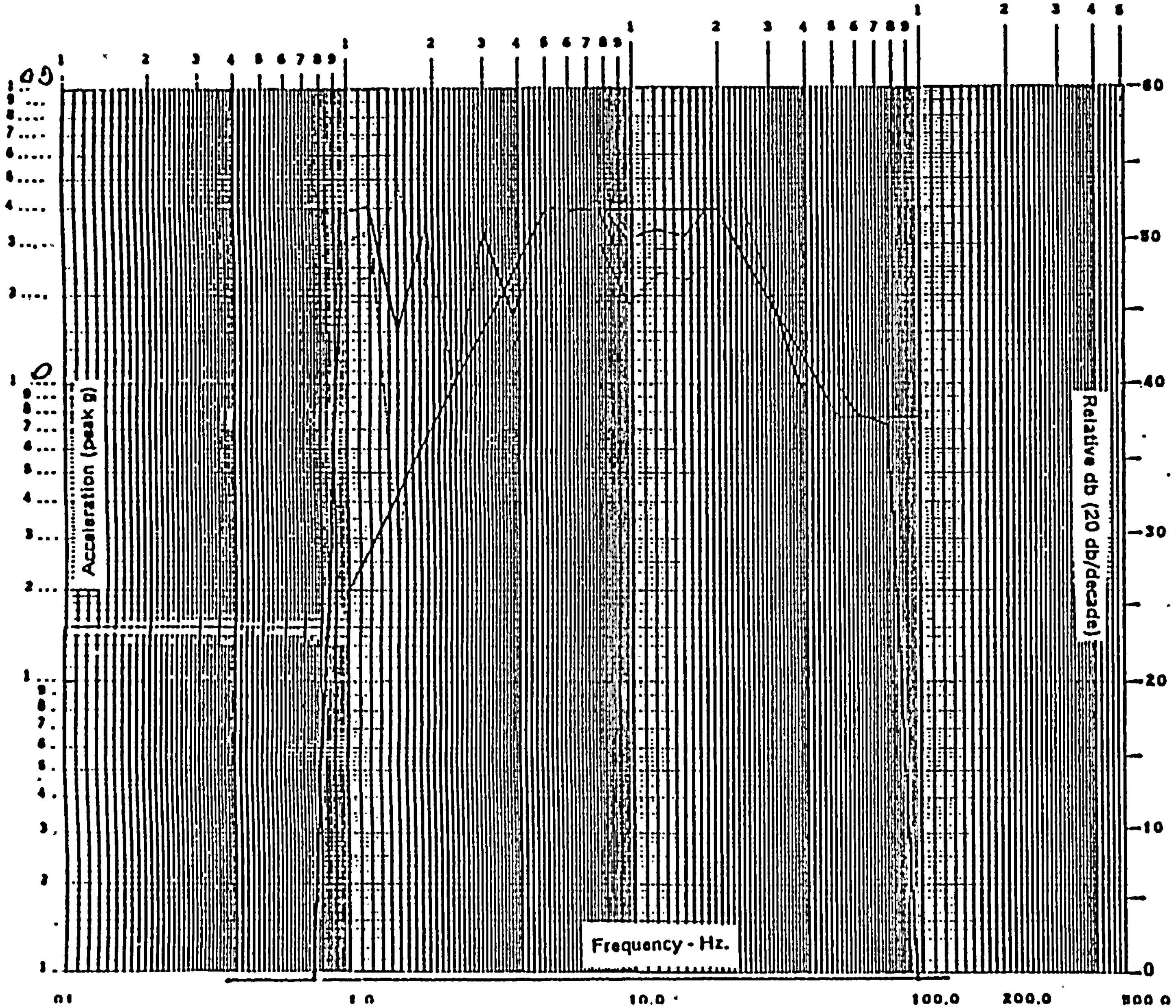
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nutherm Item # : 1C

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☑ Non-operational ☐

Temp. & Humidity: 71 F@52%Rh.

Test Type: SSE

Duration: ______

Sweep Speed: ______ oct/minu

Damping: 2,3,5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv pea / g pea

Vibration Axis: -YZ

☑ Live ☐ Tape

Graph Number: 12RE

Tolerance: ______

p. 015 of 025

C-96

Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Plotted by: R L Summer Jr

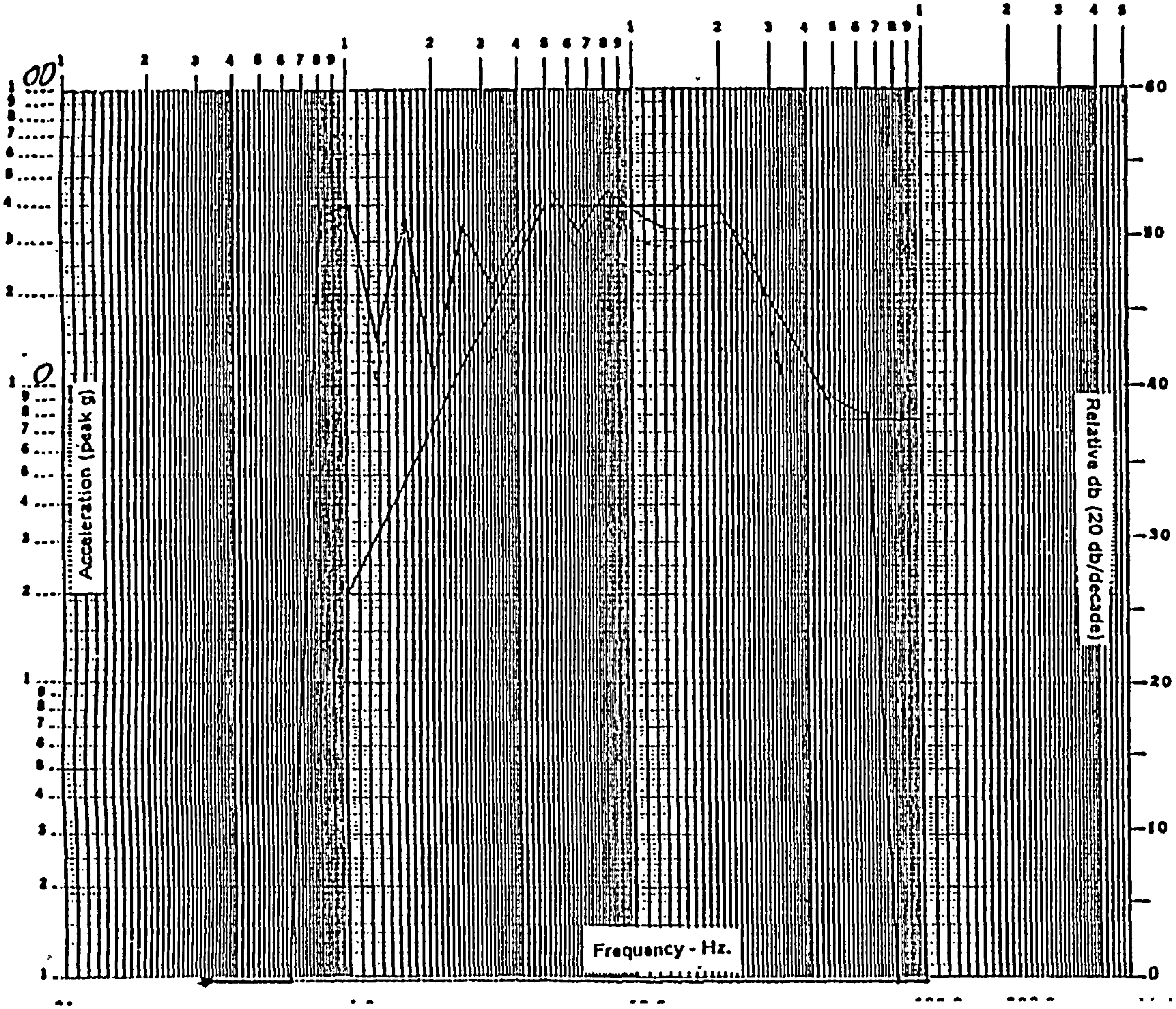
Checked by: Gutlizzi

Date: 9-10-84 Time: ______

Test Item: Nutherm Item # 1 L

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☒ Non-operational

Temp. & Humidity: 71 F@52%Rh.

Test Type: SSE

Duration: ______

Sweep Speed: ______ oct/min

Damping: 2, 3, 5

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv per g pk

Vibration Axis: +Y Z

☒ Live ☐ Tape

Graph Number: 18 RQ

Tolerance: ______

p. D16 of D25

C-98

Page No. C-5

Plotted by: R. L. Simmons Jr

Checked by: Gattozzi

Date: 9-10-84 Time:

Babcock & Wilcox

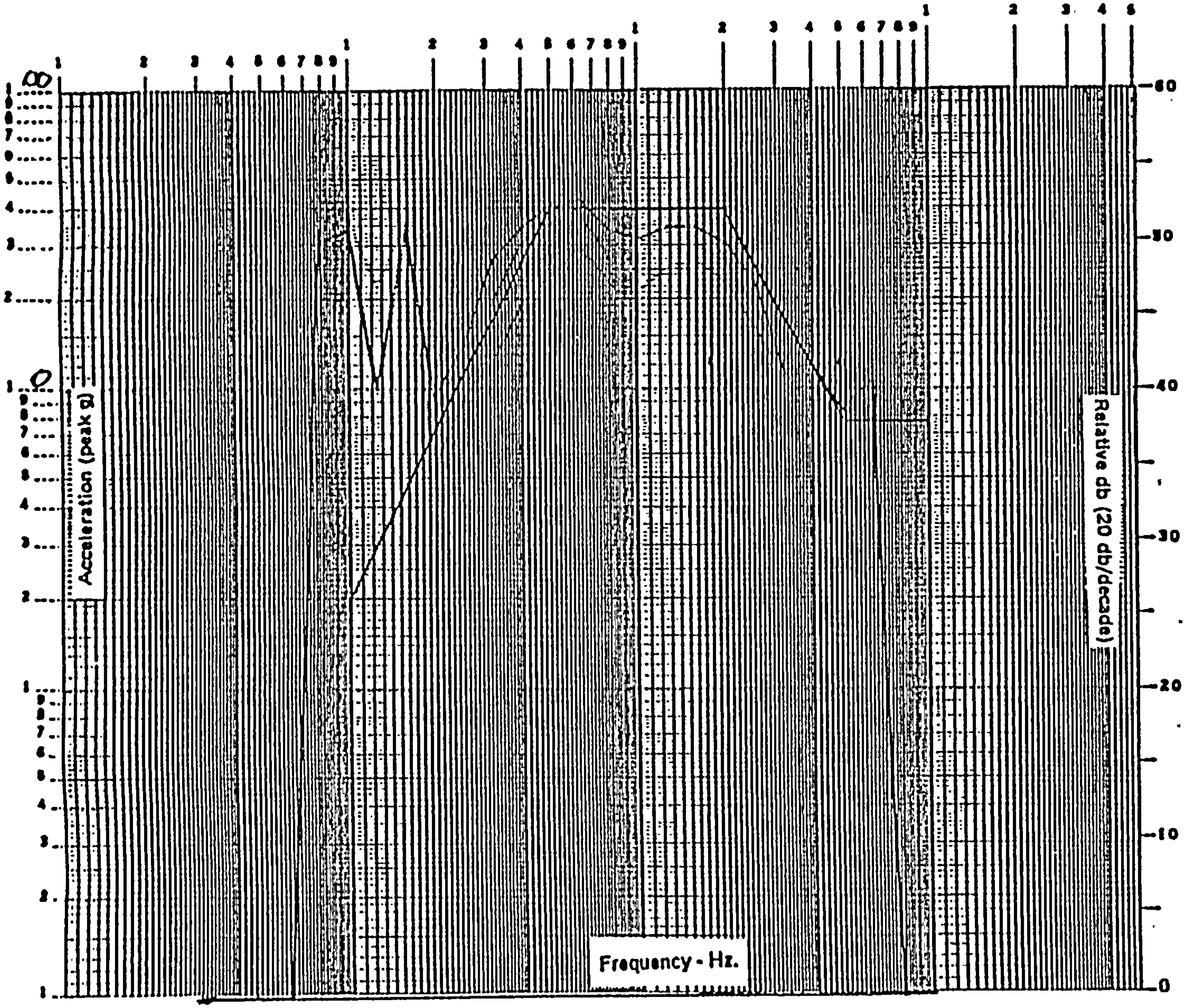
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nutherm Item # 1C

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational

Temp. & Humidity: 71 F@52%Rh.

Test Type: SSE

Duration:

Sweep Speed: oct/min

Damping: 2,3,5

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv pk / g pk

Vibration Axis: +1/2

☒ Live ☐ Tape

Graph Number: 2dRE

Tolerance:

P.217 of 225

C-100

Page No. C-

Plotted by: S. Mandeville

Checked by: Gottzy

Date: 8-31-84 Time: ______

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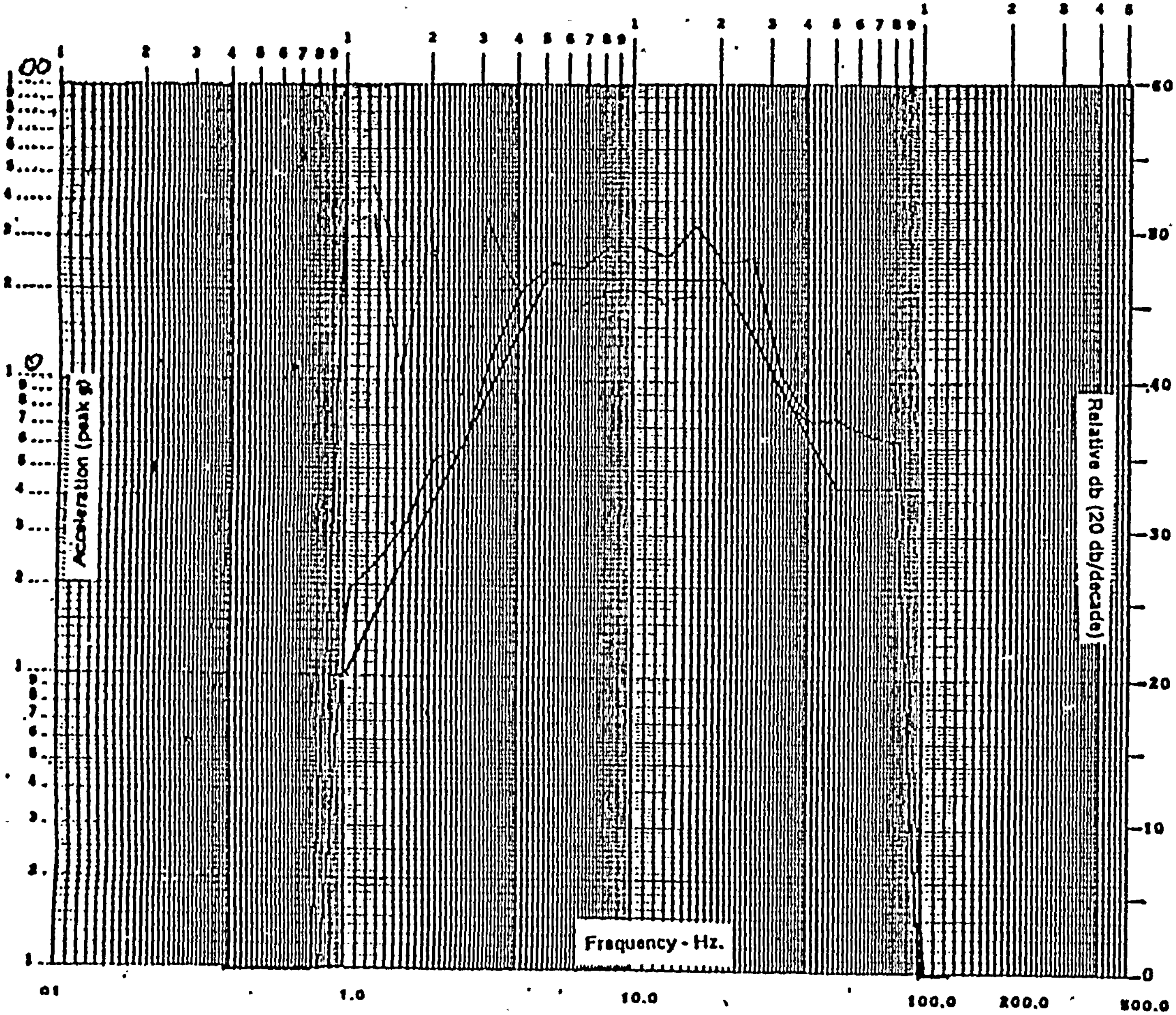
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERN ITEM # 1E

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F@52%RH

Test Type: OBE

Duration: ______

Sweep Speed: ______ oct/minute

Damping: 2%, 3%, 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -XZ

☒ Live ☐ Tape

Graph Number: 1

Tolerance: ______

P. D18 of 225

Page No. C-138

C-138

Plotted by: S. Mandeville

Checked by: Sattozzi

Date: 8-31-94 Time:

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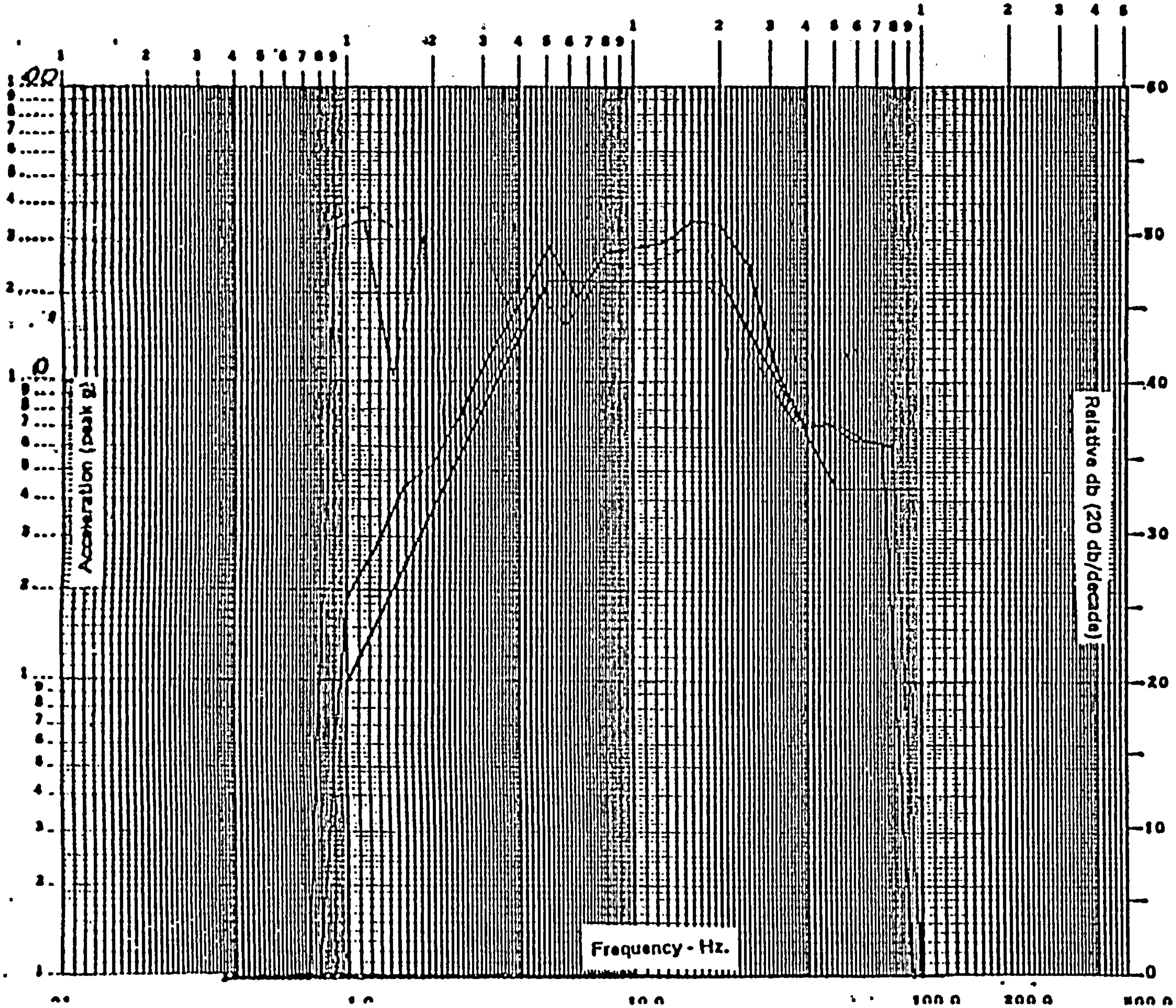
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nuttherm Item #1E

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F 52% R

Test Type: OBE

Duration:

Sweep Speed: oct/minute

Damping: 2%, 3%, 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +YZ

☒ Live ☐ Tape

Graph Number: 6

Tolerance:

A019 of 225

Page No. C-143

Plotted by: G. Mandwelk

Checked by: Gatozzi

Date: 8-31-84 Time:

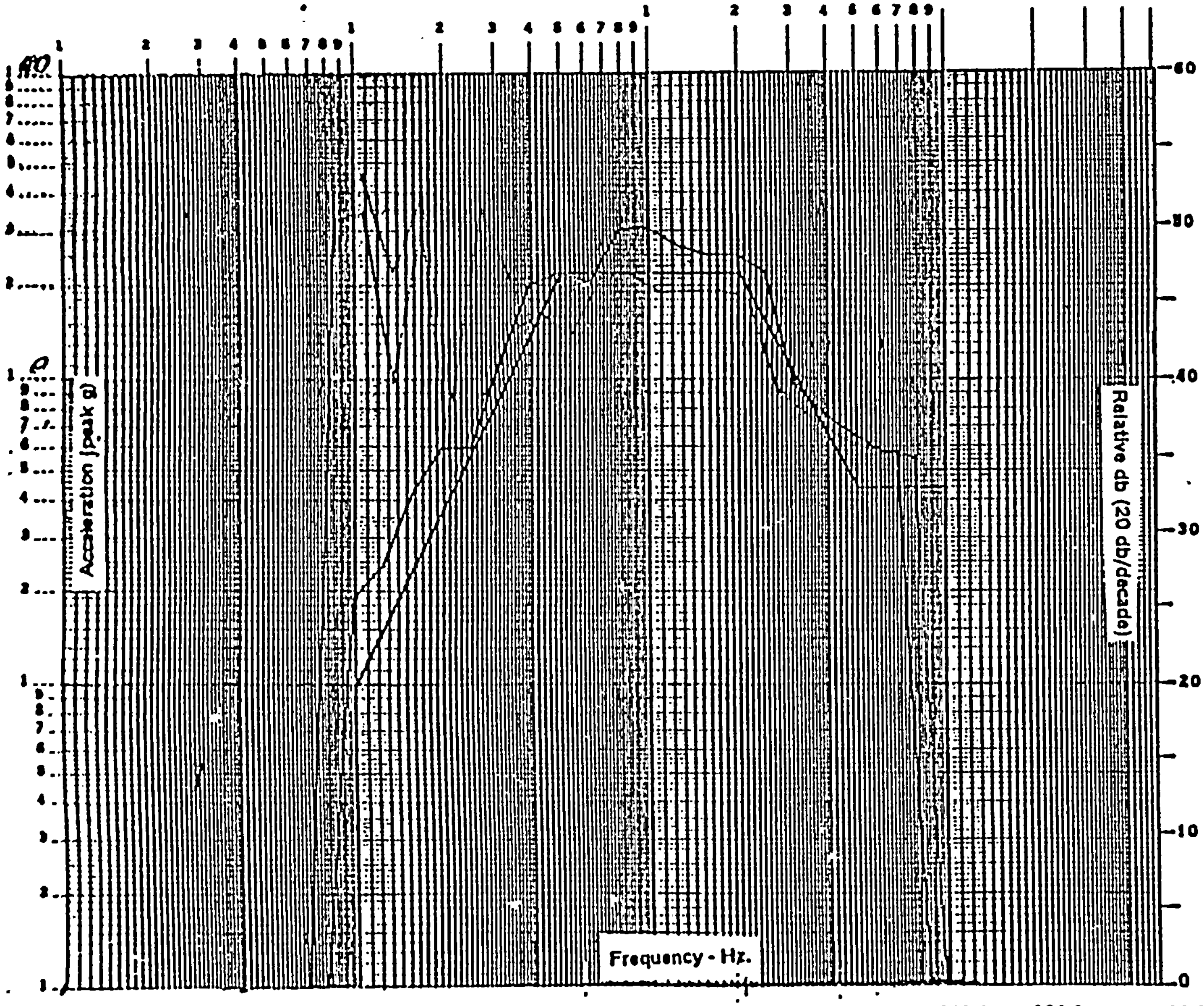
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERM ITEM #1E

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52% RH

Test Type: OBE

Duration:

Sweep Speed: oct/minute

Damping: 2%, 3%, 5% ...

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +XZ

☒ Live ☐ Tape

Graph Number: 11

Tolerance:

P. 020 of 025

Page No. C-148

Plotted by: K. Mandeville

Checked by: Sattozzi

Date: 8-31-84 Time: ______

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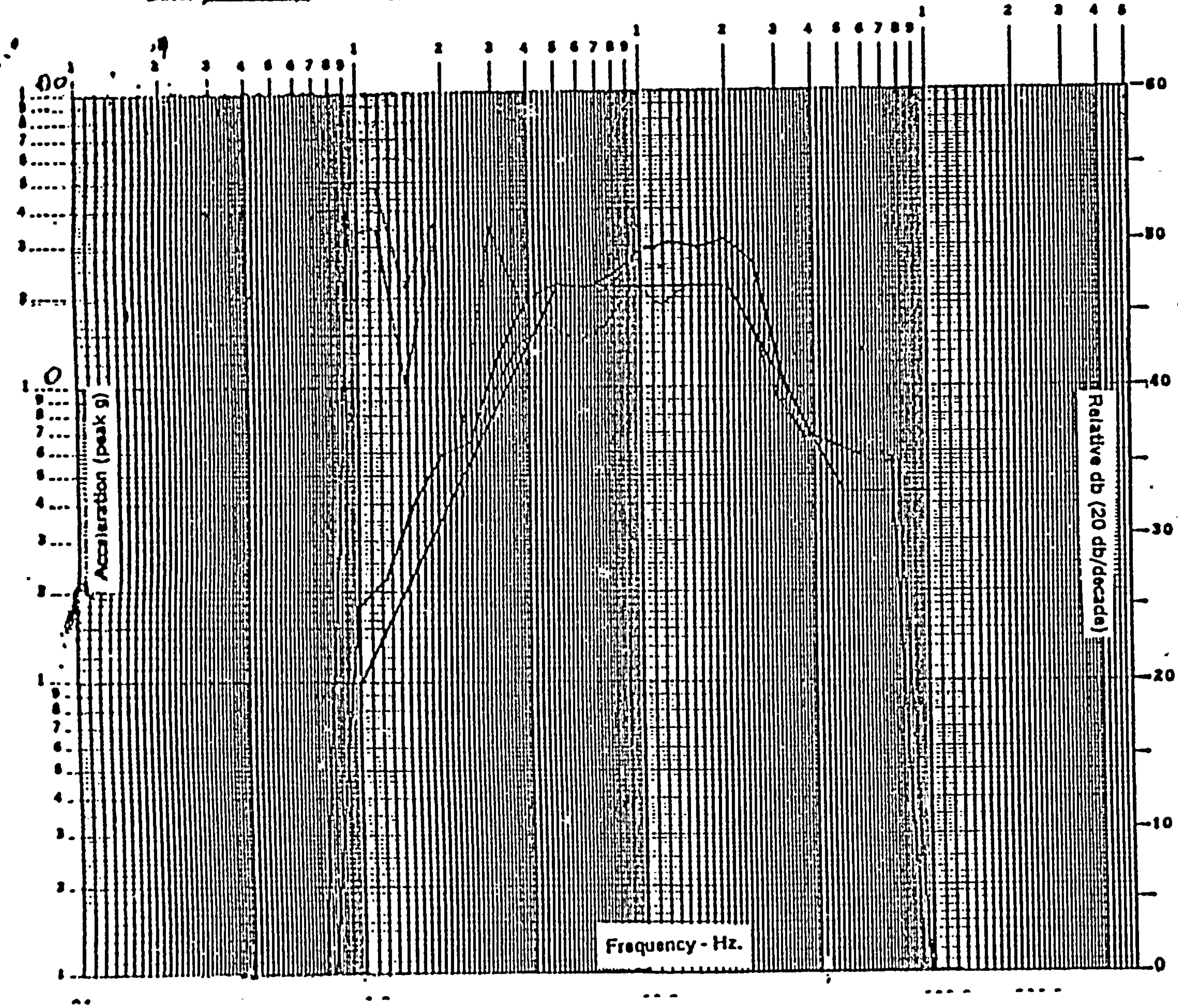
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERM ITEM # 1E

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52%

Test Type: OBE

Duration: ______

Sweep Speed: ______ oct/minu

Damping: 2%, 3%, 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +YZ

☒ Live ☐ Tape

Graph Number: 16

Tolerance: ______

p. D21 of D25

C-153

Page No. C-153

Plotted by: S. Mandeville

Checked by: Gattoni

Date: 8-31-84 Time:

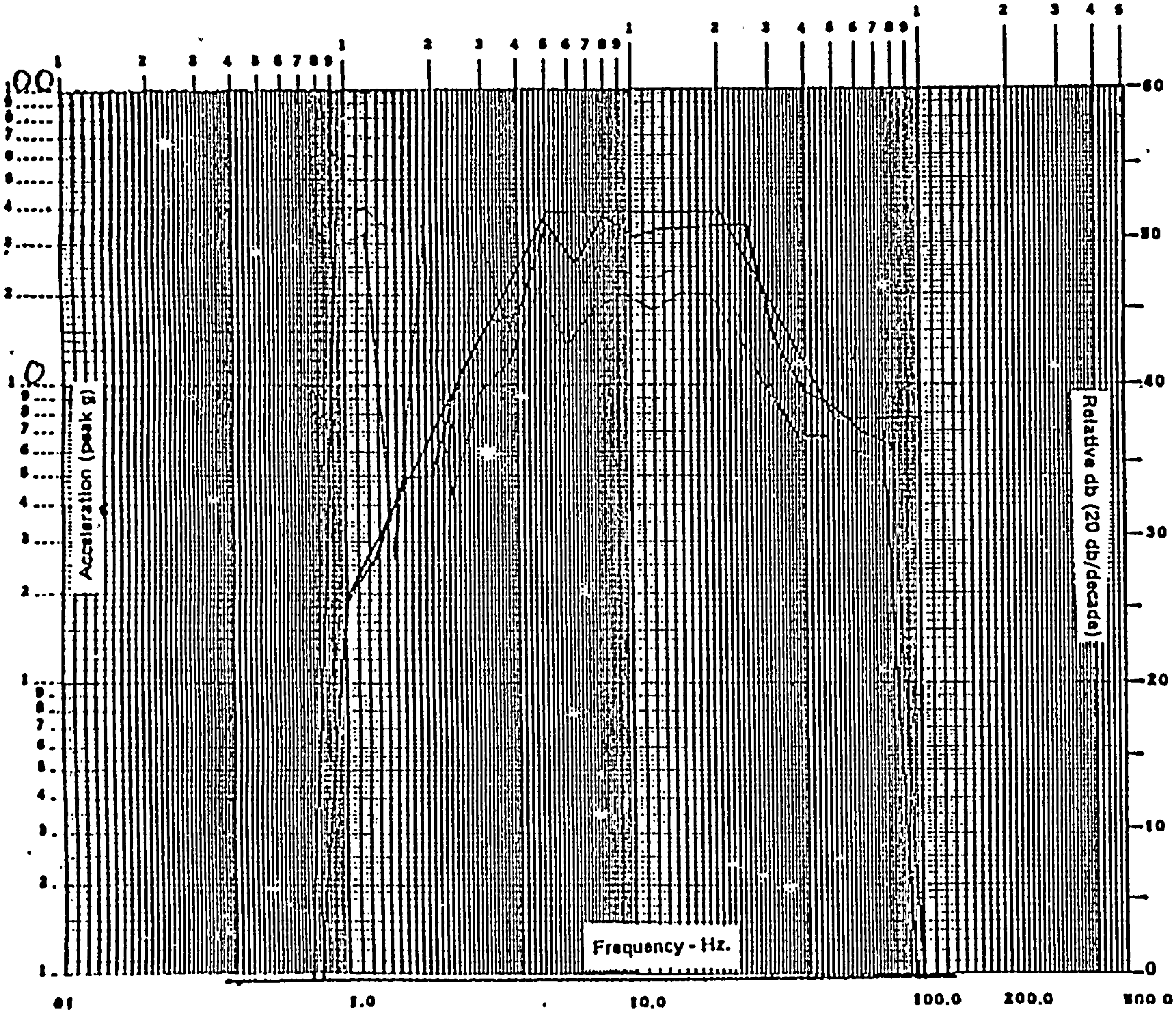
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERM ITEM #1E

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52%

Test Type: SSE

Duration:

Sweep Speed: ______ oct/min

Damping: 2%, 3%, 5%, 9%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -XZ

☒ Live ☐ Tape

Graph Number: 21

Tolerance:

324 of 622

C-158

Plotted by: S. Mandeville

Checked by: Gattozzi

Date: 8-31-84 Time: ______

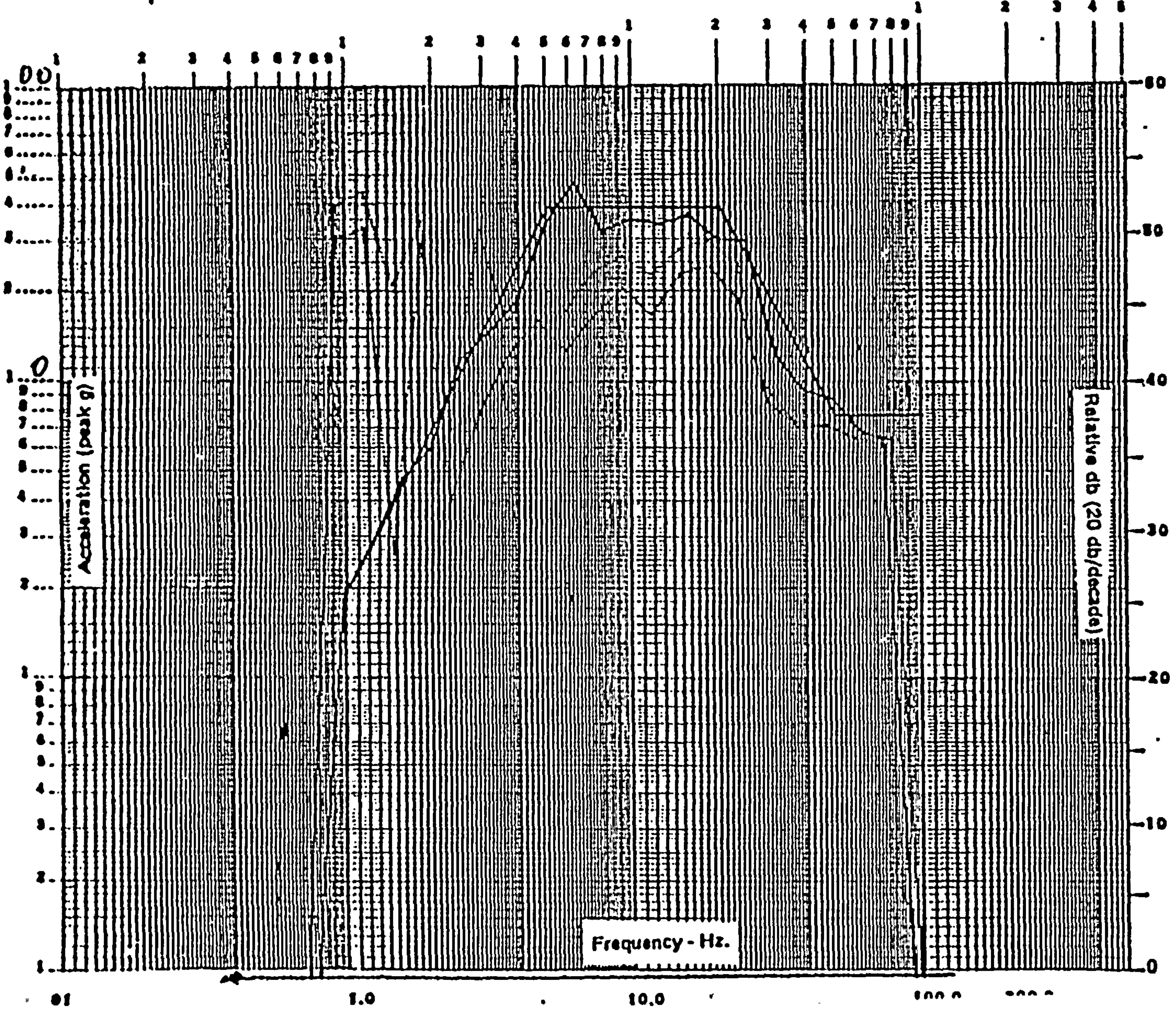
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: NUTHERM ITEM #1E

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52% RH

Test Type: SSE

Duration: ______

Sweep Speed: ______ oct/min

Damping: 2%, 3%, 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: -YZ

☒ Live ☐ Tape

Graph Number: 22

Tolerance: ______

P.023 of 225

C-159

Page No. C-I.

Plotted by: L Mandeville

Checked by: Gullo?ti

Date: 8-31-84 Time:

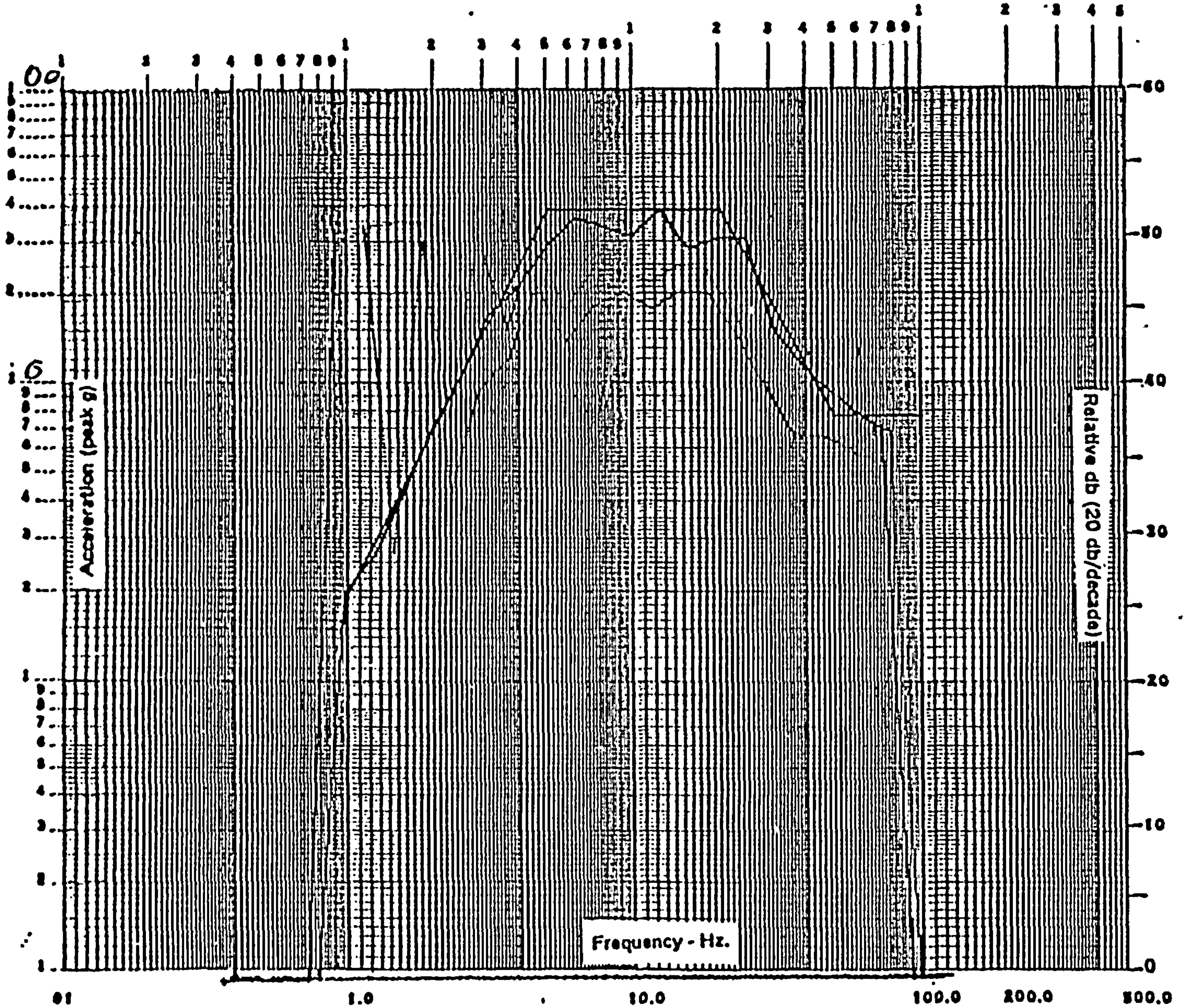
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nutherm Item #1E

Item P/N:

Item S/N:



Ref. Spec.:

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F@52%RH

Test Type: SSE

Duration:

Sweep Speed: oct/minute

Damping: 2%, 3%, 5% RS

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +XZ

☒ Live ☐ Tape

Graph Number: 23

Tolerance:

P. D24 of D25

Page No. C-160

Plotted by: S. Mandeville

Checked by: Gattozzi

Date: 8-31-84 Time: ______

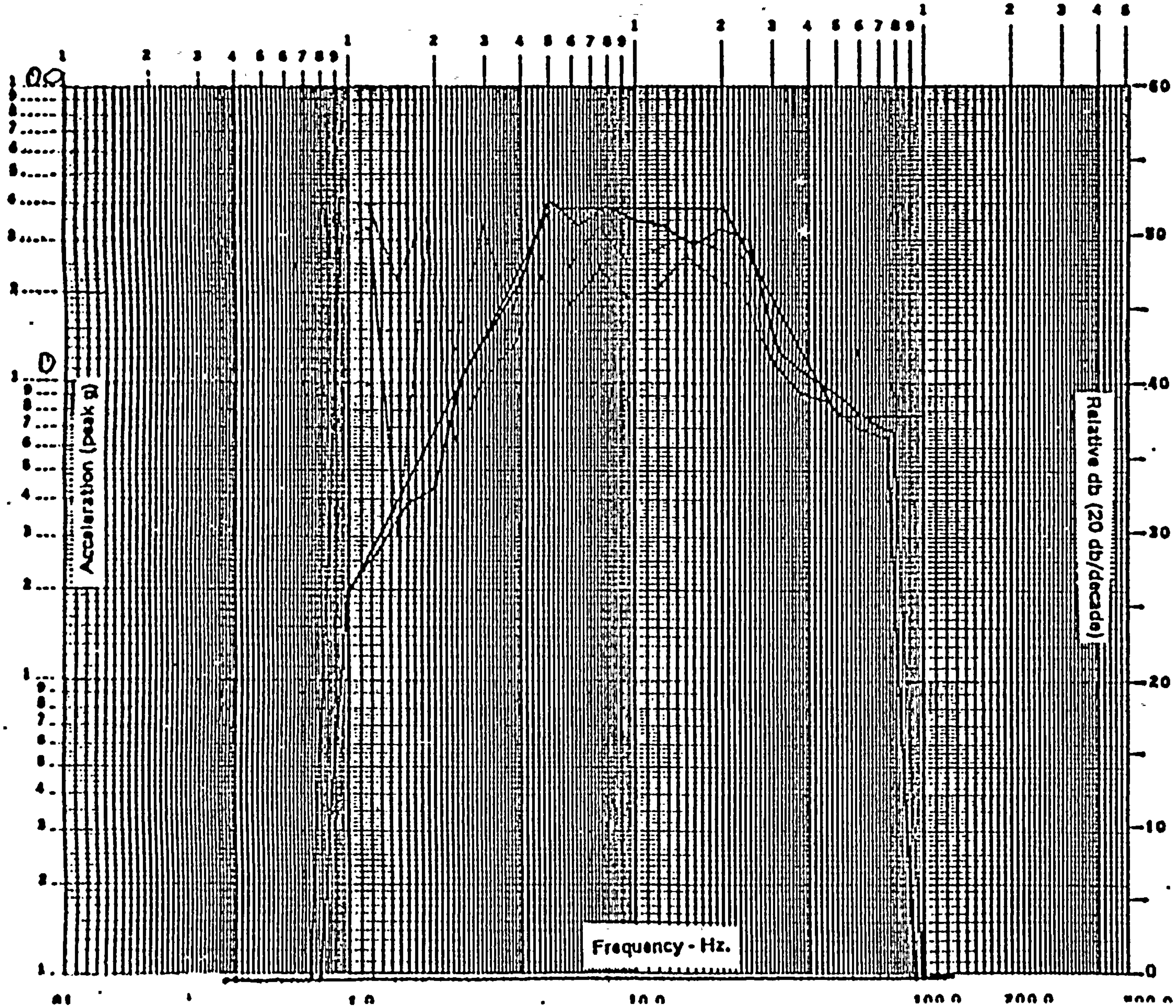
Babcock & Wilcox
Bailey Controls Company

QUALIFICATION TEST LAB.

Test Item: Nutherm Item #1E

Item P/N: ______

Item S/N: ______



Ref. Spec.: ______

Unit: Operational ☒ Non-operational ☐

Temp. & Humidity: 71°F @ 52%

Test Type: SSE

Duration: ______

Sweep Speed: ______ oct/minute

Damping: 2%, 3%, 5%

Pickup Sensing Axis: Z

Pickup Sensitivity: 100 mv peak / g peak

Vibration Axis: +YZ

☒ Live ☐ Tape

Graph Number: 24

Tolerance: ______

225 of 225

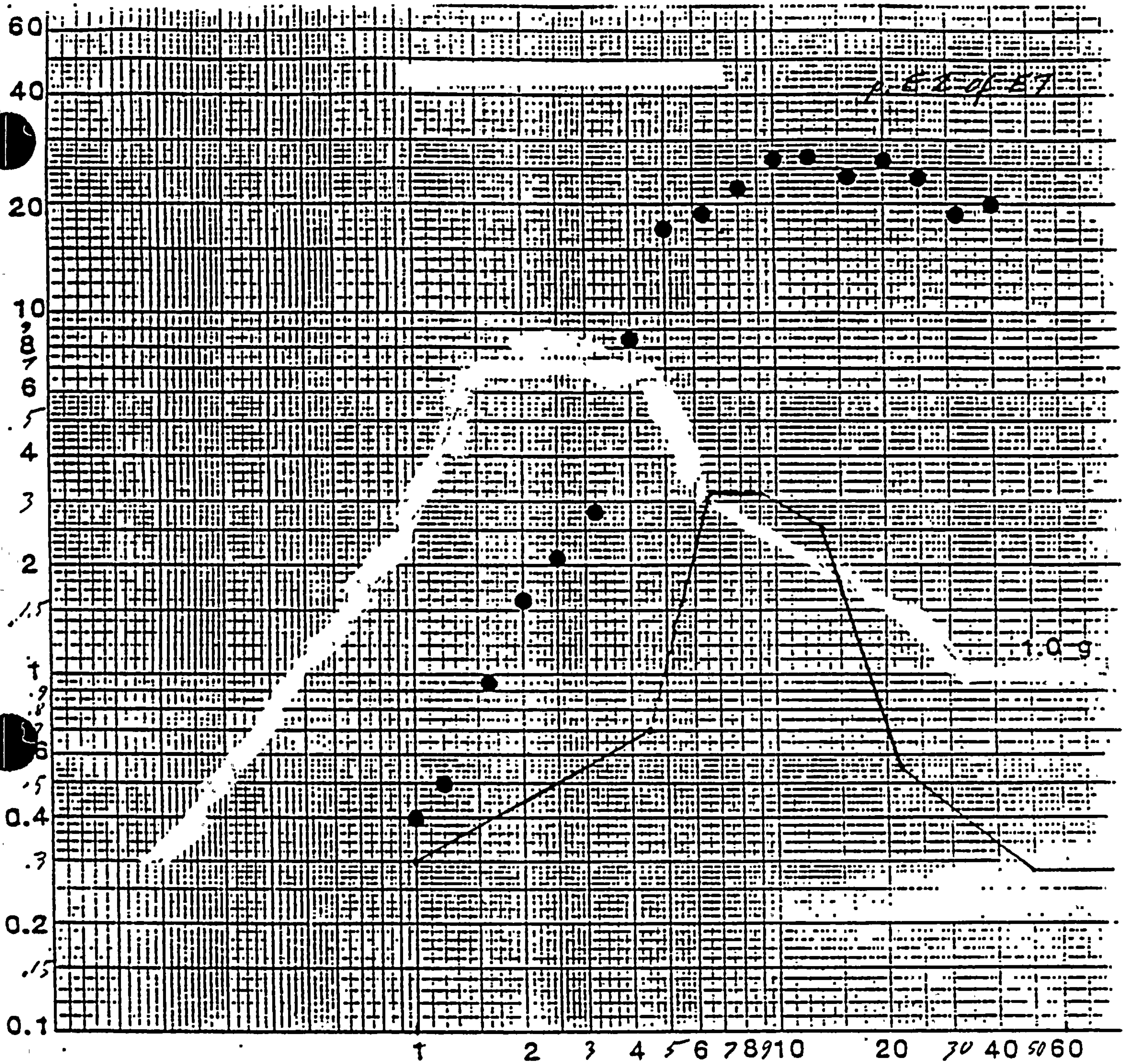
Attachment E

TRS* by EDI for Devices No.

8 & 11

of Attachment A

* See EDI test document



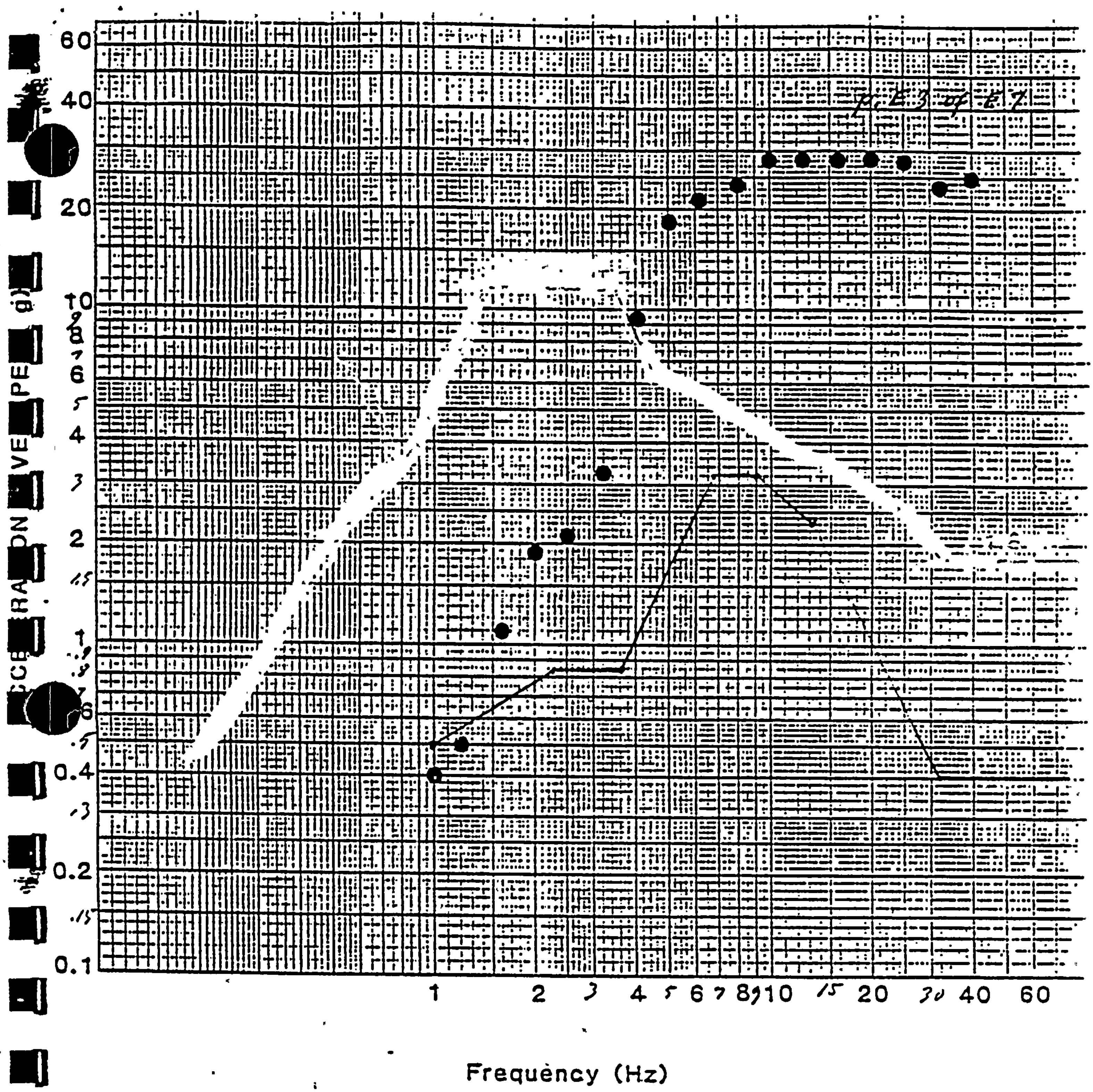
Frequency (Hz)

HORIZONTAL OBE RESPONSE SPECTRA

FRONT-BACK EXCITATION

Damping - 0.02

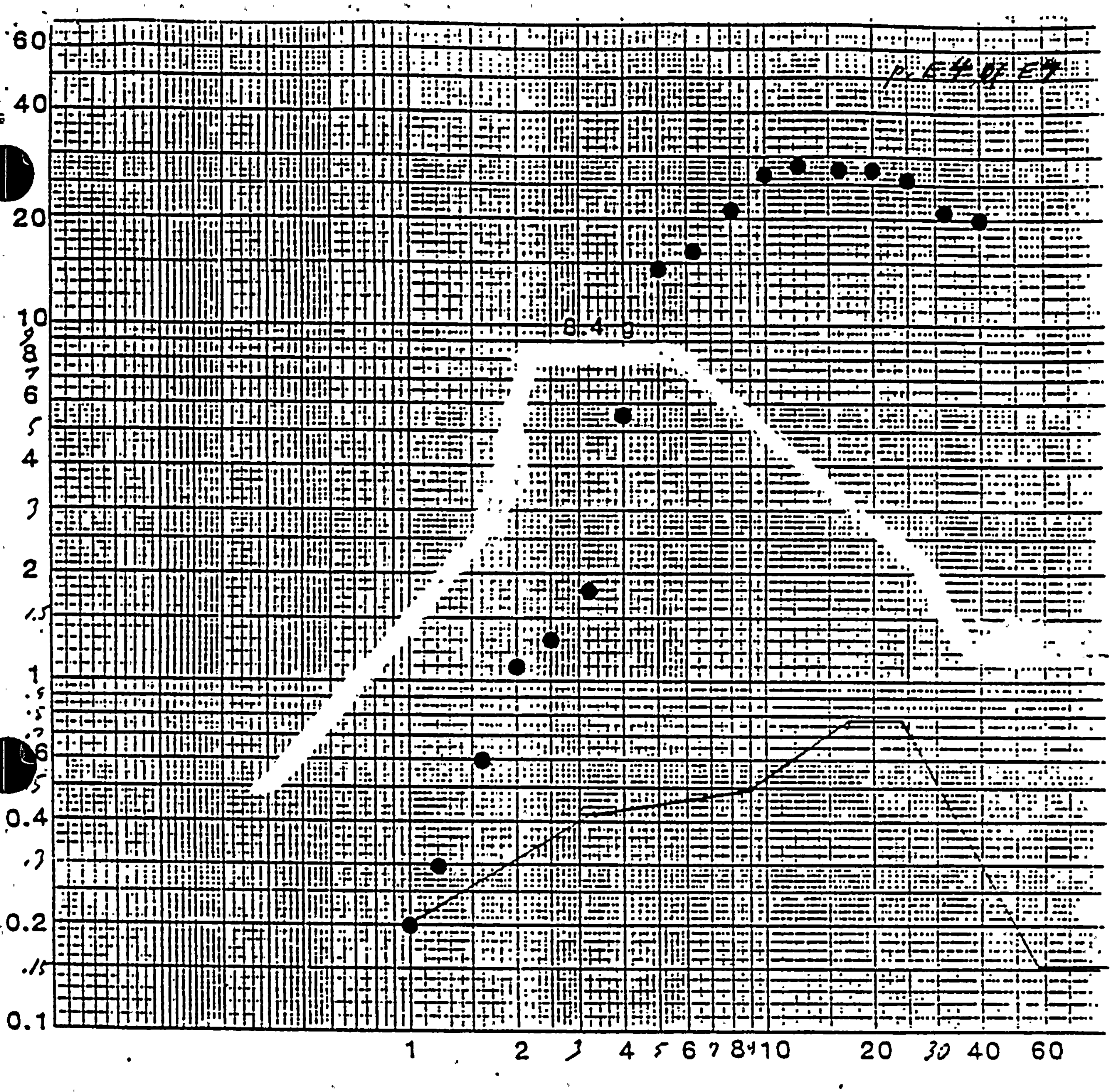
FIGURE 7-1



HORIZONTAL SSE RESPONSE SPECTRUM
FRONT-BACK EXCITATION

Damping - 0.03

FIGURE 7-2

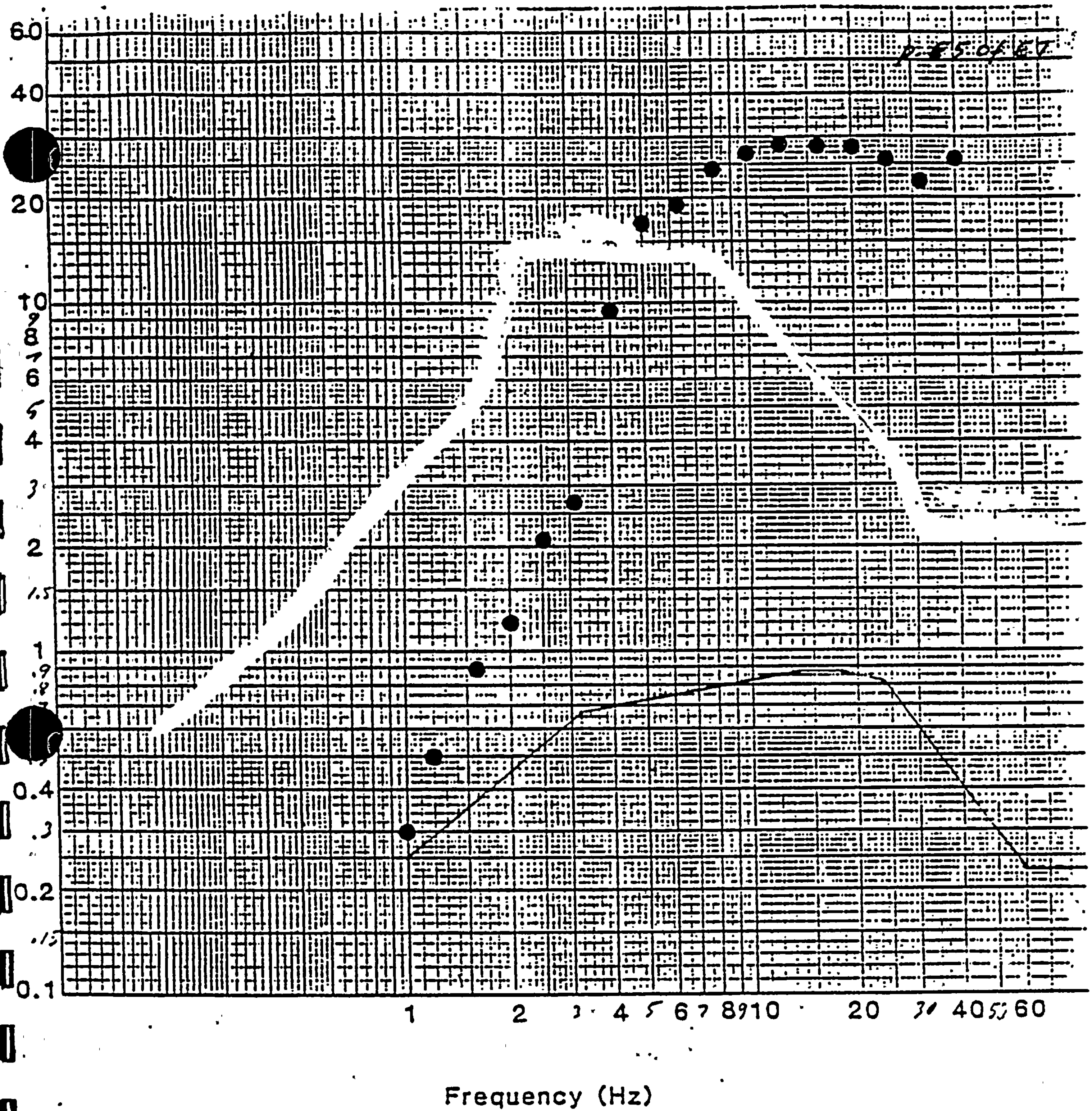


VERTICAL OBE RESPONSE SPECTRUM

VERTICAL EXCITATION

Damping - 0.02

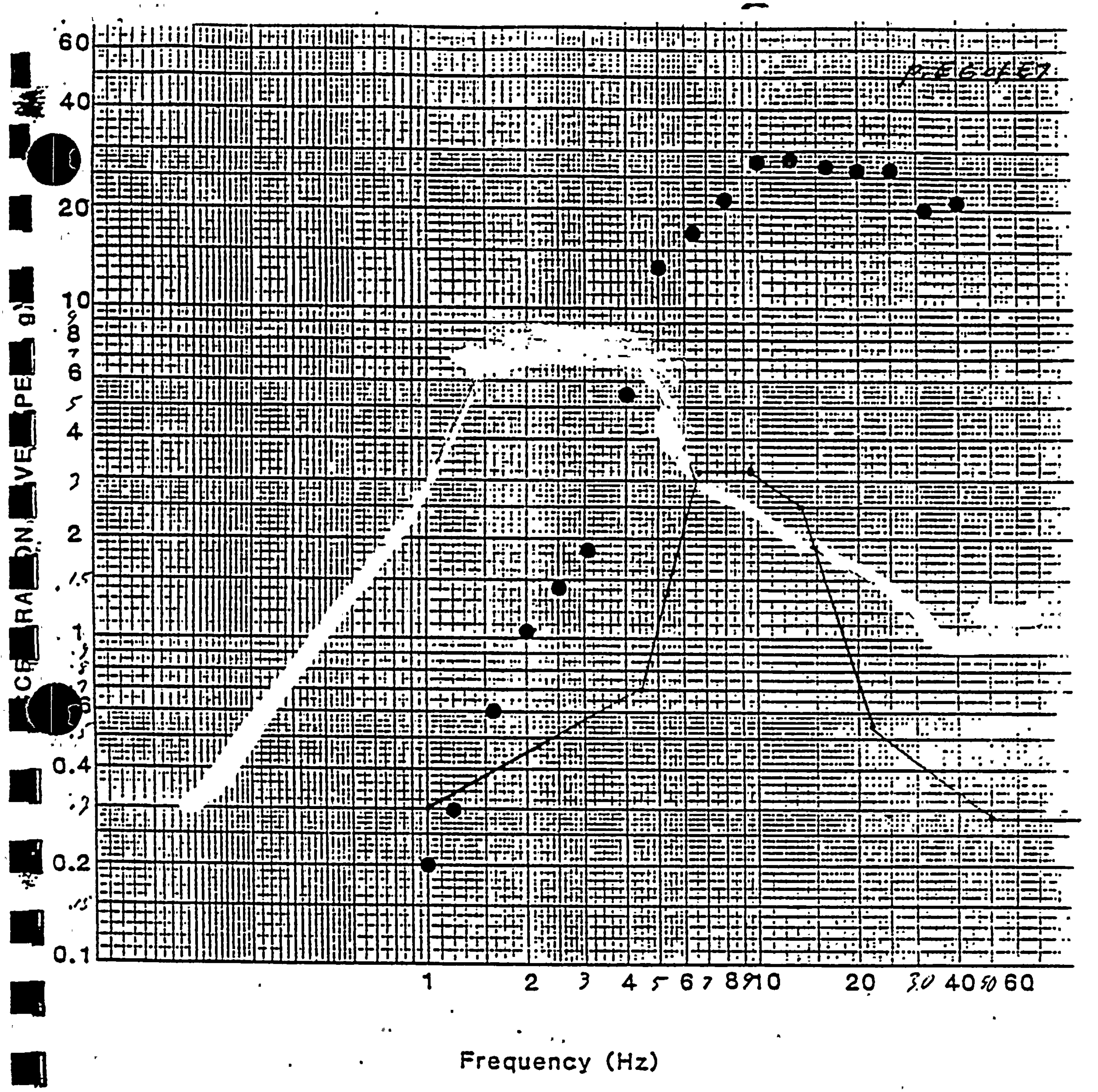
FIGURE 7-3



VERTICAL SSE RESPONSE SPECTRUM
VERTICAL EXCITATION

Damping - 0.03

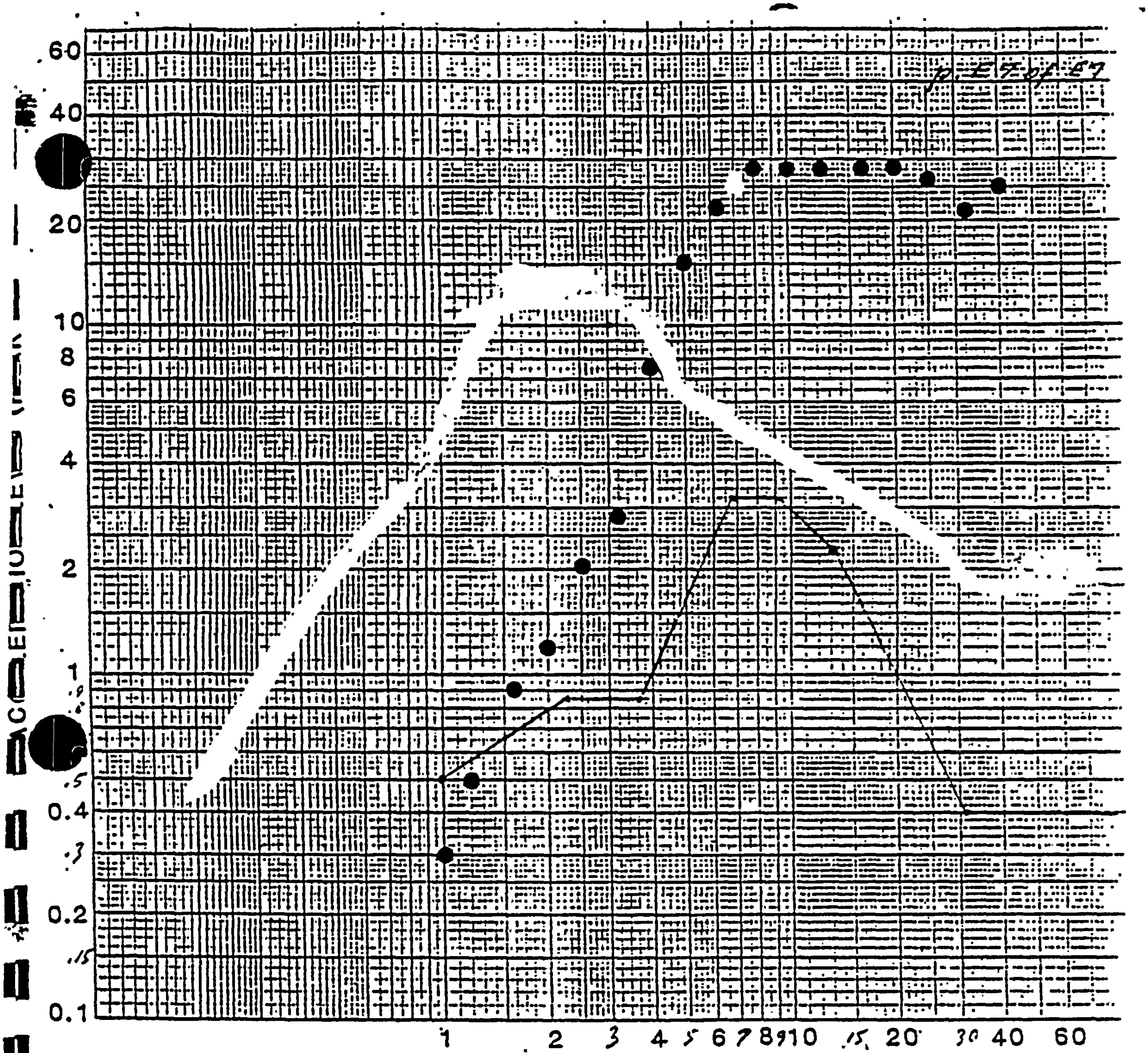
FIGURE 7-4



HORIZONTAL OBE RESPONSE SPECTRA
SIDE-SIDE EXCITATION

Damping - 0.02

FIGURE 7-5



Frequency (Hz)

HORIZONTAL SSE RESPONSE SPECTRUM
SIDE-SIDE EXCITATION

Damping - 0.03

FIGURE 7-6

Attachment F

TRS* by Wyle Lab for Devices

No. 17, 18 & 19 of

Attachment A

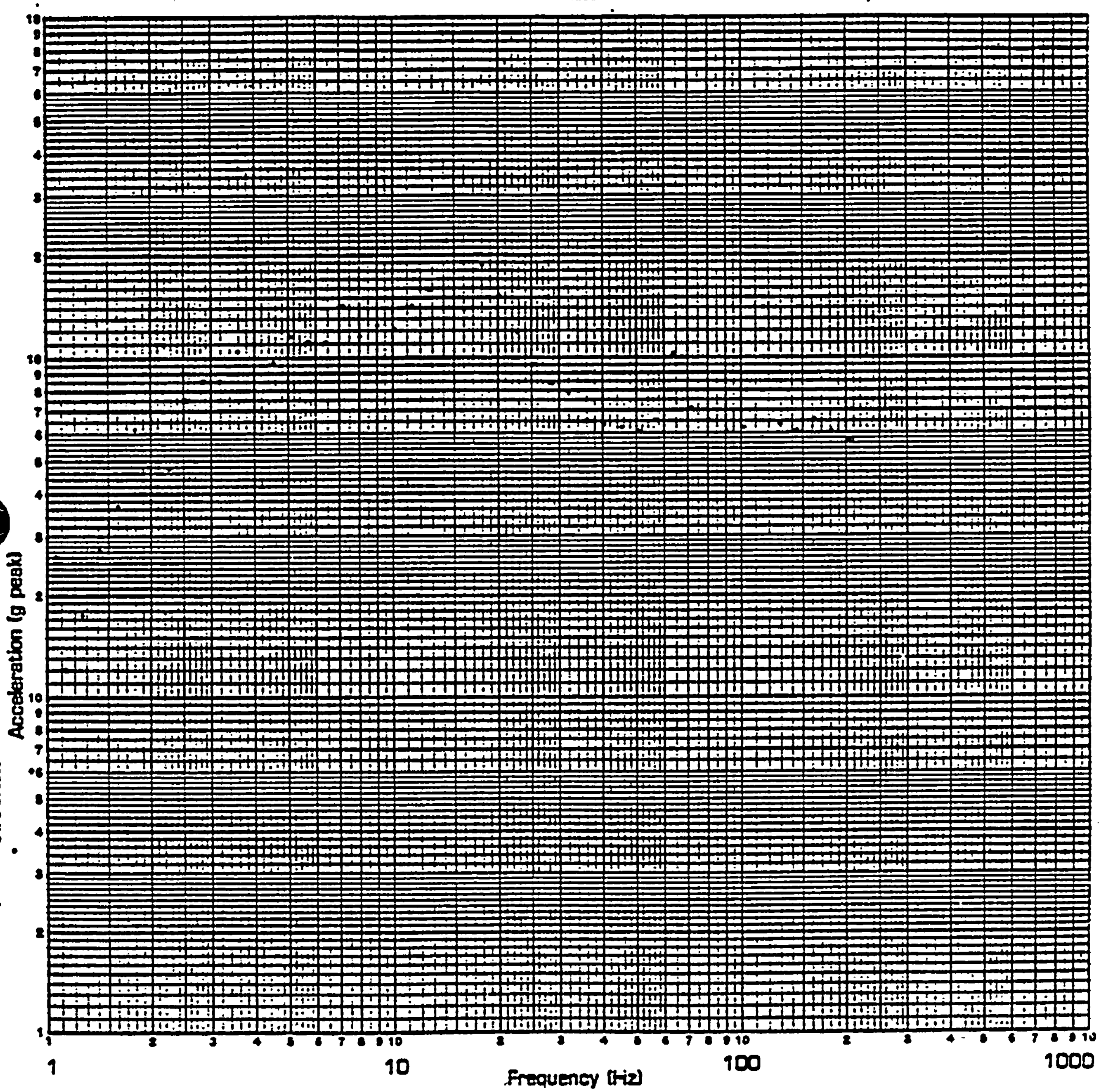
* See Wyle Lab test document

p. E2 of E7

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING 2%



SPECIMEN —

LOCATION NO. FB HCA

AXIS TR.1

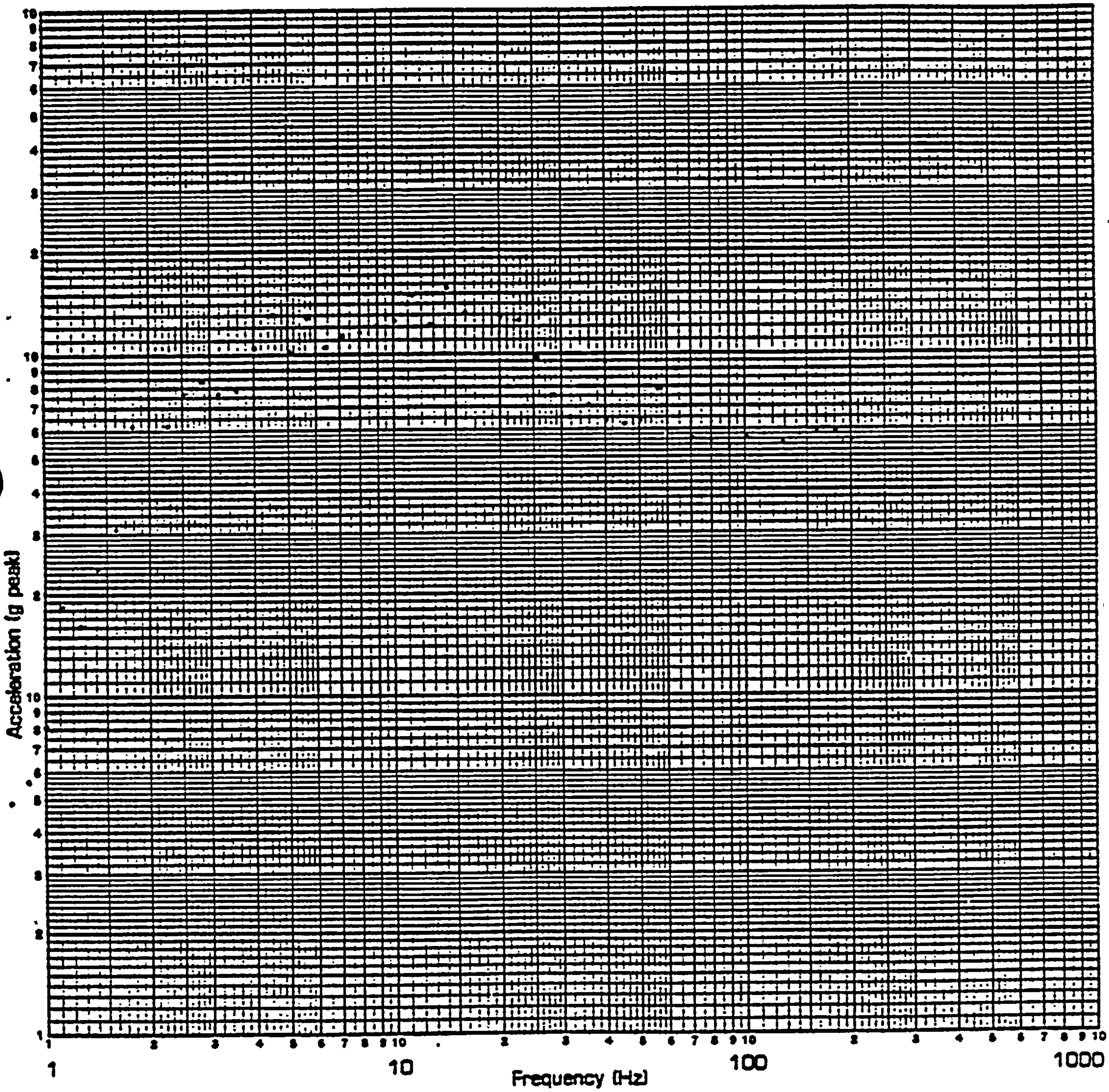
TEST RUN NO. 2 (OBE)

p.F3 of F7

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000☐

DAMPING 2%



SPECIMEN —

AXIS TR1

LOCATION NO. 3S HC4

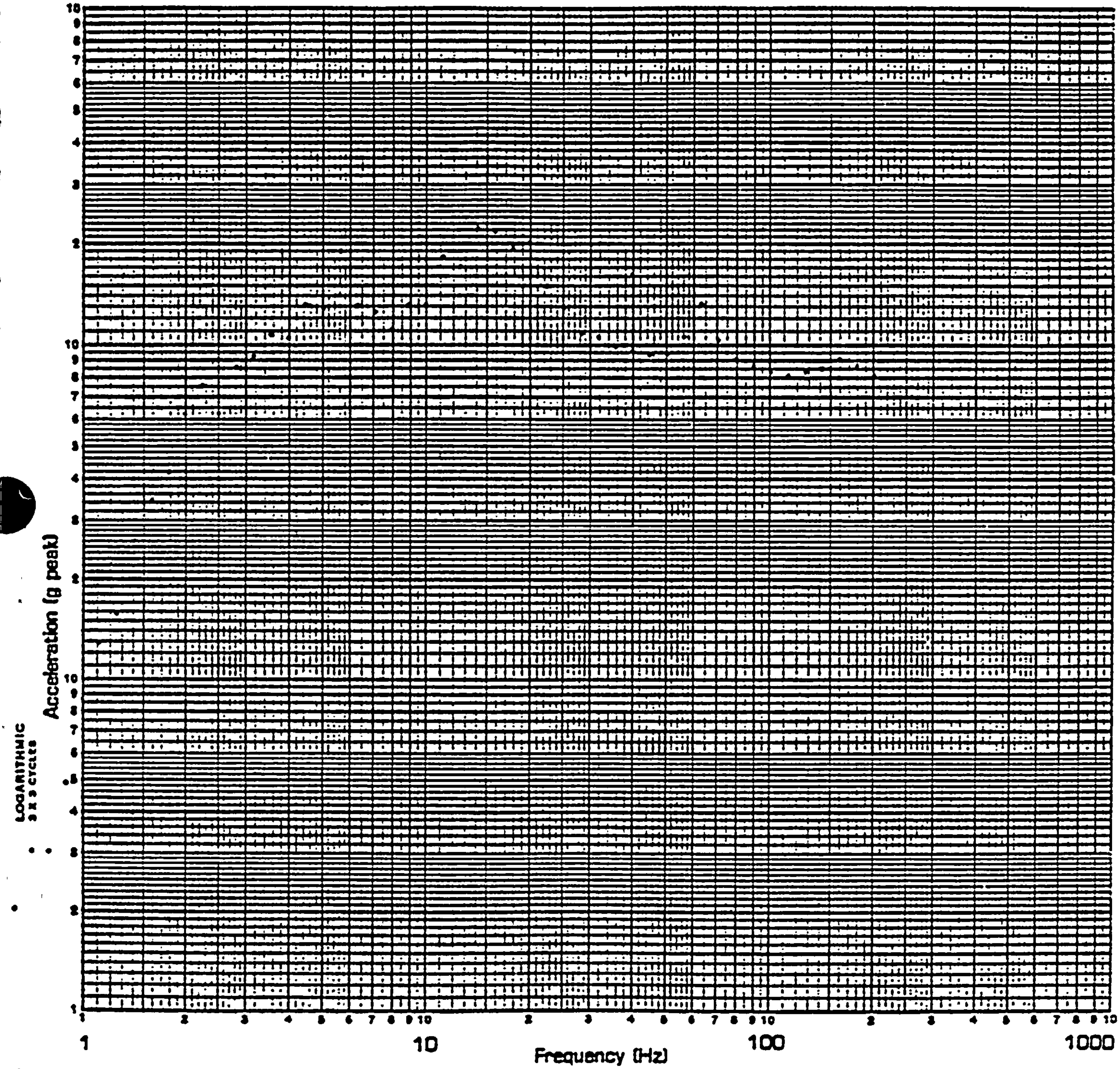
TEST RUN NO. 2 (OBE)

p. F4 of F7

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☑ 1000 ☐

DAMPING 2%



SPECIMEN —

LOCATION NO. VCA

AXIS TR1

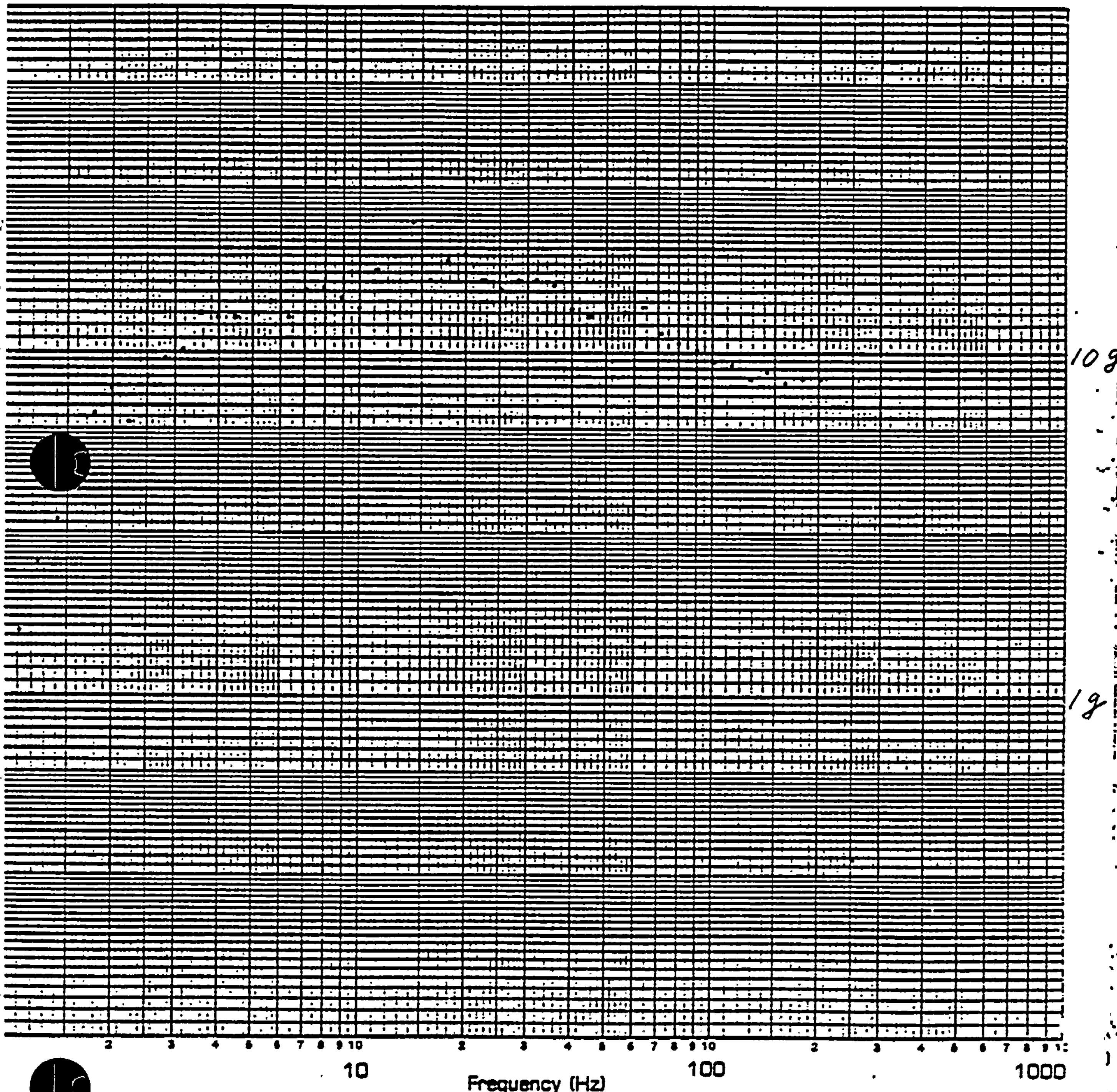
TEST RUN NO. 2 (OBE)

P. F5 of F7

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING $\boxed{3\ \%}$



SPECIMEN —

LOCATION NO. FB HCA

AXIS TR1

TEST RUN NO. 8 (SSE)

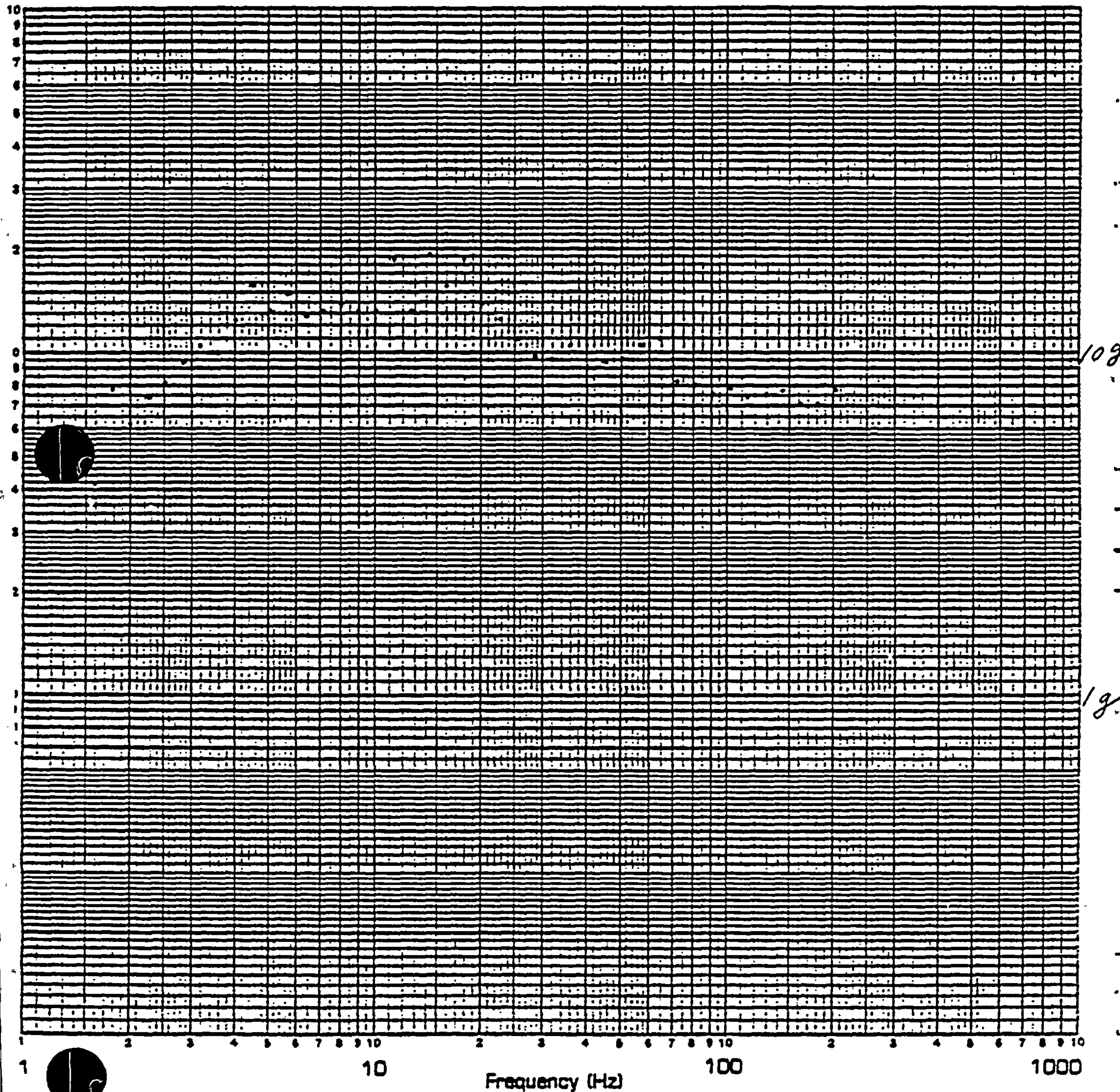
Page No. 90
Report No. 47577-1

P. F6 of F7

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING $\boxed{3\ \%}$



SPECIMEN —

LOCATION NO. SS HCA

AXIS TRA

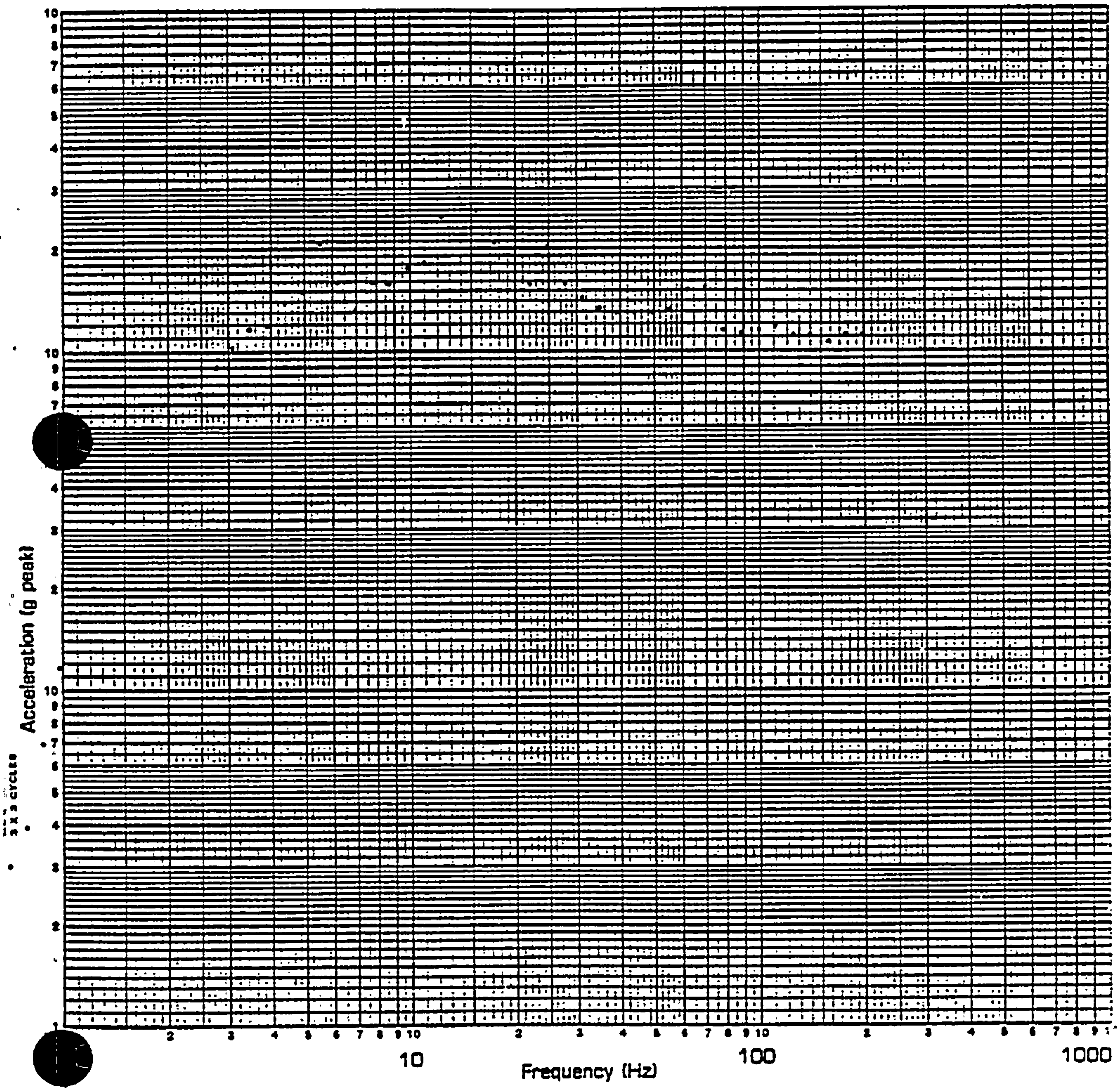
TEST RUN NO. 8 (SSE)

P. F7 of F7

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☐ 100 ☒ 1000 ☐

DAMPING $\boxed{3\%}$



SPECIMEN —

AXIS TRA

LOCATION NO. VCA

TEST RUN NO. 8 (SSE)

SPEC. NO. NMP2-P222X
PVORT *5

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: SERVICE WATER PUMP
MARK NUMBERS: 2SWP* P1A

STONE & WEBSTER

SPEC. NO. NMP2-P222X
Revision 0

PVORT *5

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP
2. Location: a. Building/Room SCREENWELL
   b. Elevation 224'
   c. System SERVICE WATER
3. Component I.D. No. on P&ID dwg. 2SWP*P1A
4. If component is a (X) Pump complete II.5.
   If component is a ( ) Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name	SERVICE WATER PUMP	Name	SERVICE WATER PUMP ELECTRIC MOTOR
Mfg.	GOULDS PUMPS, INC.	Mfg.	WESTINGHOUSE
Model	3415 M	Model	FRAME 5809L
S/N	N 239B505-1	S/N	77F14707-1S-78
Type	HORIZONTAL CENTRIFUGAL	Type	HORIZONTAL SQUIRREL CAGE INDUCTION MOTOR

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

SPEC No. NMPZ-P222X
REVISION 0
PVORT * 5

a. Pump (Continued)

Overall Dimensions 62.25" — HEIGHT, 55" — WIDTH, 60" — LENGTH

Weight 4810 LBS (WET)

Mounting Method BOLTED

Required B.H.P. 556.2 AT 10,000 GPM

Parameter	Component Design	System Normal/Accident
Press (PSIG)	150	92 / 90
Temp (°F)	100	32-78 / 32-78
Flow (GPM)	10,085	10,000 / 10,000
Head (FT)	188.1	185 / 185
Media	LAKE WATER	LAKE WATER / LAKE WATER

Required NPSH at maximum flow 27 FT. AT 10,000 GPM

Available NPSH 38 FT.

Operating Speed 1188 RPM

Critical Speed 2046 RPM

b. Prime-mover (Continued)

Overall Dimensions 29" — HEIGHT, 48.9" — WIDTH, 59.5" — LENGTH

Weight 4650 LB.

Mounting Method BOLTED

H.P. 600

Prime Mover Requirements: (include normal, maximum and minimum)

Motor (Voltage)
4000/3Ø/60 Hz NORMAL OPERATING
3000/3Ø/60 Hz REDUCED VOLTAGE ACCELERATION REQ'MNT (75%)

Turbine (pressure) N/A

If MOTOR list:

Duty cycle CONTINUOUS

Stall current 447 Amps (LOCKED ROTOR)

Class of insulation CLASS B WITH THERMOLASTIC EPOXY

List functional accessories:* N/A

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

SPEC. NO. NMP2-P222X
REVISION 0
PVORT *5

6. General Valve Data N/A

a. Valve	b. Actuator (if not an integal unit)
Name ________	Name ________
Mfg. ________	Mfg. ________
Model ________	Model ________
S/N ________	S/N ________
Type ________	Type ________
Size ________	Size ________
Weight ________	Weight ________
Mounting Method ________	Mounting Method ________
Max. Required Torque ________	Max. Delivered Torque ________

Parameter	Component Design	System Normal/Accident
Press	____	____/____
Temp	____	____/____
Flow	____	____/____
Media	____	____/____

Max P across valve ________

Closing time @ max P ________

Opening time @ max P ________

Power Requirements: (include normal, maximum and minimum).

Electrical ________

____

____

____

____

Other: ( )Pneumatic ( )Hydraulic

____

List functional accessories:* ________

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

SPEC. No. NMP2-P222X
REVISION 0
PVORT # 5

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: PROVIDE COOLING AND MAKEUP WATER TO VARIOUS CAT. I, II AND III COMPONENTS

Safety: PROVIDE COOLING AND MAKEUP WATER TO PLANT SAFETY RELATED SYSTEMS

2. The components normal state is: (X)Operating ( )Standby

3. Safety function:

   a. (X) Emergency reactor shutdown
   b. (X) Containment heat removal
   c. ( ) Containment isolation
   d. (X) Reactor heat removal
   e. (X) Reactor core cooling
   f. ( ) Prevent significant release of radio-active material to environment
   g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X)Yes ( ) No
      (X) LOCA (X) HELB (X) MSLB
      ( ) Other ______

4. Safety requirements:

   ( ) Intermittent Operation (X) During postulated event

   (X) Continuous Operation (X) Following postulated event

   If component operation is required following an event, give approximate length of time component must remain operational.
   100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

   does the component ( )Fail open ( )Fail closed ( )Fail as is

   Is this the fail safe position? ( ) Yes ( ) No

   Is the valve used for throttling purposes? ( ) Yes ( ) No

   What is the maximum acceptable internal and external leakrate?

   ______ ______

SPEC. No. NMP2-P222X
REVISION 0
PVORT #5

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME III, DIVISION I, 1971 CODE THRU SUMMER 1973 ADDENDA – SUBSECTION ND.

2. Reference those qualification standards, used as a guide to qualify the component: IEEE-334-1974, IEEE-117-1974, IEEE-344-1975, IEEE-323-1974
REGULATORY GUIDES 1.48, 1.84, 1.85, 1.89, 1.61 & 1.100

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
(X) Yes(1) ( ) No

4. Are the margins* identified in the qualification documentation? (X) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) BY SUB-ASSEMBLIES (i.e., PUMP, MOTOR)

6. List all component tests performed or to be performed that demonstrate qualification:

PUMP HYDROSTATIC TEST
PUMP PERFORMANCE TEST
MOTOR ROUTINE TESTS
COLD HYDRO TEST
VIBRATION & BEARING TEMPERATURE TEST
MOTORETTE ENVIRONMENTAL QUALIFICATION

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

(1) MAINTAINED AT VENDOR'S SHOP

SPEC No. NMP2-P222X
REVISION 0
PVORT #5

7. List all component analyses performed that demonstate qualification:

1) PUMP ASSEMBLY SEISMIC STRESS ANALYSIS

2) MOTOR SEISMIC STRESS ANALYSIS

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ( ) Yes (X) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? ( ) Yes (X) No* If "No"* is installed component ( ) oversized or ( ) undersized?

* MOTORETTE USED IN ENVIRONMENTAL TESTS ARE IDENTICAL

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

SEE ATTACHMENT "A"

SPEC. No NMP2-P222X
REVISION 0
PVORT #5

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

( ) Yes (X) No If "Yes" identify:__________

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YEARS

13. Which of the components normal maintenance items requires the most frequent replacement? LUBE OIL

What is the normal time interval between replacements of this item?

6 MONTHS

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

MILD ENVIRONMENT
TEMPERATURE – 104°F
PRESSURE — ATMOSPHERIC
HUMIDITY — 90% RELATIVE HUMIDITY
RADIATION — 277 RADS (T.I.D.)
NO SUBMERGENCE

ATTACHMENT "A"

LOADS USED IN ANALYSES

1) NOZZLE LOADS

	SUCTION	DISCHARGE
F AXIAL (LBS)	5,959	7,216
F SHEAR (LBS)	1,066	3,472
M BENDING (IN-LBS)	74,304	196,344
M TORSION (IN-LBS)	3,744	92,220

2) SEISMIC LOADS (PUMP ASSEMBLY)

	SSE	OBE
HORIZONTAL (X & Z)	1.0 g	0.6 g
VERTICAL (Y)	1.2 g	1.1 g

3) INTERNAL PRESSURE

THE INTERNAL PRESSURE DESIGN CONDITIONS ARE; 150 PSIG AT 100°F

4) SHAFT TORSIONAL LOADING

FOR 600 HP. MOTOR AT 1186 RPM, SHAFT TORQUE = (63,000 × HP)/RPM

S.T. = (63,000 × 600)/1186

S.T. = 31,872 IN-LBS

5) IMPELLER LOADS

IMPELLER LOADS ARE 500 LBS RADIAL AND 2000 LBS AXIAL

LOAD COMBINATIONS

THE ANALYSIS WAS MADE FOR THE FOLLOWING LOAD CASES (BASED ON ALL THE LOADS PROVIDED ABOVE)

1. NOZZLE LOADS + IMPELLER LOADS IN "X" DIRECTION
2. 1.0g LATERAL "X" LOAD
3. 1.0g LATERAL "Z" LOAD
4. 1.0g VERTICAL "Y" LOAD
5. NOZZLE LOADS + IMPELLER LOADS IN "Y" DIRECTION

LOADS FOR THE "X", "Y" AND "Z" ARE ADDED DIRECTLY

ENVIRONMENTAL

MILD ENVIRONMENT

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
SPECIFICATIONS				
SPEC. P222X THRU ADD. 11	SAFETY RELATED HORIZONTAL CENTRIFUGAL PUMPS	8-8-73 TO 5-5-83	SWEC	SWEC
E&DCR P01964	REVISE INSULATION CLASS REQUIREMENTS	12-21-83	SWEC	SWEC
E&DCR P02451	REVISED SEISMIC ACCELERATIONS	11-21-84	SWEC	SWEC
E&DCR P02455A	REVISED NOZZLE ALLOWABLES	1-3-85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
DRAWINGS				
2.170-050-003E	SWP CROSS-SECTIONAL DRAWING	12-4-78	GOULDS PUMPS	SWEC
2.170-050-12E	SWP PUMP-MOTOR OUTLINE DRAWING	8-21-79	GOULD'S PUMPS	SWEC
2.170-050-023B	SWP BEDPLATE DRAWING	10-3-78	GOULD'S PUMPS	SWEC
2.170-050-026E	SWP PUMP OUTLINE DWG	4-26-85	GOULD'S PUMPS	SWEC
12177-EM-8C REV. 11	MACHINE LOCATION DRAWING	4-19-84	SWEC	SWEC
12177-EM-8E REV. 10	MACHINE LOCATION DRAWING	4-19-84	SWEC	SWEC
12177-EC-14A REV. 10	SCREENWELL FOUNDATION PLAN	2-11-83	SWEC	SWEC
12177-EC-14Z REV. 6	FOUNDATION DETAILS	3-30-84	SWEC	SWEC
12177-EC-14AC REV. 2	FOUNDATION DETAILS	4-8-83	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
FSAR FIG. 9.2-1b	PIPING AND INSTRUMENTATION DRAWING	—	SWEC	SWEC
12177-FSK 9-10A	FLOW DIAGRAM	2/14/85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QUALIFICATION DOCUMENTS				
STRS 02.170-5002C	SEISMIC STRESS ANALYSIS OF SERVICE WATER PUMPS	6-14-85	GOULD'S PUMPS	SWEC
STRS 02.260-5003A	SEISMIC ANALYSIS OF SERVICE WATER PUMP MOTOR	5-4-79	WESTINGHOUSE / GOULD PUMPS	SWEC
STRS 02.260-5005A	GOULD LETTER No. 80-BCA-5 (SUPPLEMENT TO MOTOR SEISMIC ANALYSIS)	1-25-80	WESTINGHOUSE / GOULD PUMPS	SWEC
STRS 02.170-5002	SEISMIC CERTIFICATE OF COMPLIANCE	—	GOULD'S PUMPS	SWEC
QCP-120	HYDROSTATIC TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS
QCP-133	HYDRAULIC PERFORMANCE TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS
QCP-130A	VIBRATION AND BEARING TEMP. TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS
MP.GENE.001	GENERIC ASME III PRESSURE TEST PROCEDURE, REV. 3	11-12-84	SWEC / NMPC	SWEC / NMPC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
2.170-050-013C	SWP MOTOR SPEED VS. TORQUE CURRENT	1-29-79	GOULD'S PUMPS	SWEC
2.170-050-015D	SWP MOTOR TEMP. VS. HP CURVE	7-31-79	GOULD'S PUMPS	SWEC
2.170-050-016D	SWP TIME VS. CURRENT CURVE	7-29-79	GOULD'S PUMPS	SWEC
2.170-050-044A	SWP BEARING T/C CURVE	3-20-79	GOULD'S PUMPS	SWEC
—	HYDROSTATIC TEST RESULTS	10-19-78	GOULD'S PUMPS	SWEC
QA-110	VIBRATION AND BEARING TEMP. TEST LOG	11-19-80	GOULD'S PUMPS	SWEC
A 25939 REV. A	SERVICE WATER CERTIFIED PUMP PERFORMANCE CURVE REV. 1	8-20-79	GOULD'S PUMPS	SWEC
—	REPORT OF MOTOR COMMERCIAL TESTS (ROUTINE)	3-4-80	GOULD'S PUMPS	SWEC
WCAP 8754	WESTINGHOUSE ENVIRONMENTAL QUALIFICATION OF CLASS IE MOTORS	1-25-84	GOULD'S PUMPS	SWEC
—	SERVICE WATER PUMP DOCUMENTATION PACKAGE	11-1-79	GOULD'S PUMPS	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
--	DOCUMENTATION CHECKLIST - SERVICE WATER REV. 1	12-29-78	GOULD'S PUMPS	SWEC
INST. 2.170 5002A	INSTRUCTION BOOK FOR NMPC/NMP2 P.O.# NMP2-P222X	8-11-82	GOULD'S PUMPS	SWEC
EQEDC-1	EQUIPMENT QUALIFICATION ENVIRONMENTAL DESIGN CRITERIA	5-2-84	SWEC	SWEC
MEQ-P222X, REV.1	ENVIRONMENTAL QUALIFICATION OF MECHANICAL EQUIPMENT	3-27-85	SWEC	SWEC

SPEC. NO. NMP2-P222X
PVORT #6

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: HIGH PRESSURE CORE SPRAY (CSH) SYSTEM PRESSURE PUMP

MARK NUMBERS: 2CSH*P2

STONE & WEBSTER

SPEC. NO. NMP2-P222X
Revision 0
PVORT *6

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410

3. Utility: Niagara Mohawk Power Corporation

4. NSSS: General Electric Co. ( ) PWR (X) BWR

5. A/E: Stone & Webster Engineering Corporation

6. C.P. and/or O. L. SER date 6/24/74

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP

2. Location: a. Building/Room REACTOR BUILDING SECONDARY CONTAINMENT

b. Elevation 175'

c. System HIGH PRESSURE CORE SPRAY (CSH)

3. Component I.D. No. on P&ID dwg. 2CSH*P2

4. If component is a (X) Pump complete II.5.

If component is a ( ) Valve complete II.6.

5. General Pump Data

a. Pump		b. Prime-mover	
Name	HIGH PRESSURE CORE SPRAY SYSTEM PRESSURE PUMP	Name	CSH PUMP ELECTRIC MOTOR
Mfg.	GOULDS PUMPS INC.	Mfg.	WESTINGHOUSE
Model	3196ST	Model	TBDP, FRAME 215T
S/N	N-773B980-3	S/N	78D36029-7808-01-003
Type	HORIZONTAL CENTRIFUGAL	Type	SQUIRREL CAGE INDUCTION MOTOR

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

SPEC No NMP2-P222X
REVISION 0
PVORT #6

a. Pump (Continued)

Overall Dimensions: LENGTH — 17.5"; WIDTH — 18"; HEIGTH — 12"

Weight 102 LBS (WET)

Mounting Method BOLTED

Required B.H.P. 5.5 AT 50 GPM

Parameter	Component Design	System Normal/Accident
Press (PSIG)	185	100 / 100
Temp (°F)	212	70 / 212
Flow (GPM)	50	50 / 50
Head (FT)	175	140 / 140
Media	DEMIN. WATER	DEMIN. WATER / DEMIN. WATER

Required NPSH at maximum flow 2.4 FT AT 50GPM

Available NPSH 14.78 FT

Operating Speed 3500 RPM

Critical Speed 2960 RPM

b. Prime-mover (Continued)

Overall Dimensions: LENGTH — 17.31"; WIDTH — 14"; HEIGTH — 12.64"

Weight 140 LBS

Mounting Method BOLTED

H.P. 10

Prime Mover Requirements: (include normal, maximum and minimum)

Motor (Voltage)

575/3Ø/60Hz NORMAL OPERATING

431.25/3Ø/60Hz REDUCED VOLTAGE ACCELERATION REQ'M'T (75%)

Turbine (pressure) N/A

If MOTOR list:

Duty cycle CONTINUOUS

Stall current 51 AMPS LOCKED ROTOR

Class of insulation H

List functional accessories:* N/A

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

SPEC. No NMPZ-P222A
REVISION 0
PVORT # 6

6. General Valve Data N/A

a. Valve

Name ____________________

Mfg. ____________________

Model ____________________

S/N ____________________

Type ____________________

Size ____________________

Weight ____________________

Mounting Method ____________________

Max. Required Torque ____________________

b. Actuator (if not an integal unit)

Name ____________________

Mfg. ____________________

Model ____________________

S/N ____________________

Type ____________________

Size ____________________

Weight ____________________

Mounting Method ____________________

Max. Delivered Torque ____________________

Parameter	Component Design	System Normal/Accident
Press	______	______/______
Temp	______	______/______
Flow	______	______/______
Media	______	______/______

Max P across valve ____________

Closing time @ max P ____________

Opening time @ max P ____________

Power Requirements: (include normal, maximum and minimum).

Electrical ____________________

____

____

____

____

Other: ( )Pneumatic ( )Hydraulic

____

List functional accessories:* ____________________

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

SPEC No NMP2-P222X
REVISION 0
PVORT # 6

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: MAINTAIN PRESSURE IN CSH PUMP DISCHARGE PIPING TO PREVENT WATERHAMMER DURING CSH PUMP START-UP.

Safety: SAME AS ABOVE

2. The components normal state is: (X) Operating ( ) Standby

3. Safety function:

a. ( ) Emergency reactor shutdown
b. ( ) Containment heat removal
c. ( ) Containment isolation
d. ( ) Reactor heat removal
e. (X) Reactor core cooling
f. ( ) Prevent significant release of radioactive material to environment
g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X) Yes ( ) No
(X) LOCA (X) HELB (X) MSLB
( ) Other

4. Safety requirements:

( ) Intermittent Operation ( ) During postulated event

(X) Continuous Operation ( ) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.
100 DAYS (e.g., hours, days, etc.)

5. For VALVES: N/A

does the component ( )Fail open ( )Fail closed ( )Fail as is

Is this the fail safe position? ( ) Yes ( ) No

Is the valve used for throttling purposes? ( ) Yes ( ) No

What is the maximum acceptable internal and external leakrate?

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME III, DIVISION I, 1974 EDITION THROUGH WINTER 1976 ADDENDA - SUBSECTION NC

2. Reference those qualification standards, used as a guide to qualify the component: IEEE-334-1974, IEEE-117-1974, IEEE-344-1975, IEEE-323-1974
REGULATORY GUIDES 1.48, 1.84, 1.85, 1.89, 1.61 & 1.100

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
(X) Yes(1) ( ) No

4. Are the margins* identified in the qualification documentation? (X) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) BY SUBASSEMBLIES (ie, PUMP, MOTOR)

6. List all component tests performed or to be performed that demonstrate qualification:
   - PUMP HYDROSTATIC TEST
   - PUMP PERFORMANCE TEST
   - MOTOR ROUTINE TESTS
   - COLD HYDRO TEST
   - VIBRATION AND BEARING TEMPERATURE TEST
   - MOTORETTE ENVIRONMENTAL QUALIFICATION

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

(1) MAINTAINED AT VENDOR'S SHOP

SPEC. NO. UMP2-P222X
REVISION 0
PVORT #6

7. List all component analyses performed that demonstate qualification:

1) PUMP ASSEMBLY SEISMIC STRESS ANALYSIS

2) MOTOR SEISMIC STRESS ANALYSIS

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ( ) Yes (X) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? ( ) Yes (X) No*. If "No"*, is installed component ( ) oversized or ( ) undersized?

*MOTORETTE USED IN ENVIRONMENTAL TESTS ARE IDENTICAL

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

SEE ATTACHMENT "A"

SPEC. No NMPZ-P222X
REVISION 0
PVORT #6

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

(X) Yes ( ) No If "Yes" identify:

INBOARD/OUTBOARD "BUNA N" OIL SEALS AND BEARING HOUSING SEALS

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YEARS

13. Which of the components normal maintenance items requires the most frequent replacement? MOTOR-CHEVRON SRI-2 GREASE; PUMP - LUBE OIL What is the normal time interval between replacements of this item?

MOTOR - 2 YEARS; PUMP - SURVIELLANCE/PERIODIC SAMPLING OR LUB OIL MANUFACTURER RECOMENDATION

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

		NORMAL	ACCIDENT
TEMPERATURE °F		85 -	175
PRESSURE	(PSIG)	-.25 IN WATER	2.8 PSIG
HUMIDITY	(% RH)	50	100
RADIATION	(RADS) GAMMA	1.8×10^3	4.6×10^7
	BETA	N/A	1.3×10^7

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
SPECIFICATIONS				
SPEC. P222X THRU ADD. 11	SAFETY RELATED HORIZONTAL CENTRIFUGAL PUMPS	8-8-73 TO 5-5-83	SWEC	SWEC
E&DCR P02,455A	REVISED NOZZLE ALLOWABLES	1-3-85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
DRAWINGS				
2.170-050-009A	PRESSURE MAINTENANCE PUMPS CROSS-SECTION DRAWING	2-28-78	GOULD'S PUMPS	SWEC
2.170-050-035A	SYS. PRESSURE PUMPS BEDPLATE DRAWING	6-8-78	GOULD'S PUMPS	SWEC
16.300-050.002E	PRESSURE PUMPS OUTLINE DRAWING	7-22-80	GOULD'S PUMPS	SWEC
2.170-050-027H	SYS. PRESSURE PUMPS MOTOR OUTLINE DRAWING	4-6-78	GOULD'S PUMPS	SWEC
16.300 050-001B	MECHANICAL SEAL SYS. PRESSURE PUMPS	11-17-78	GOULD'S PUMPS	SWEC
12177 EM-2A REV. 18	REACTOR BLDG MACHINE LOCATION	11-5-84	SWEC	SWEC
12177 EC-30HB REV. 7	PAD LOCATIONS REACTOR BLDG. & AUX. BAY	5-3-84	SWEC	SWEC
12177 EC-30AC REV. 6	REACTOR BLDG. PAD DETAILS	7-9-82	SWEC	SWEC
12177 EM-2N REV. 12	MACHINE LOCATION REACTOR BLDG. & AUX. BAY	10-8-84	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
FSK 27-4B	FLOW DIAGRAM	10-31-84	SWEC	SWEC
FSAR FIGURE 6.3-6	PIPING + INSTRUMENTATION DRAWING	—	GE	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QUALIFICATION DOCUMENTS				
ME-563 REV. b WITH ADD. #1	SEISMIC ANALYSIS OF PRESSURE PUMPS	4-23-84	GOULD'S PUMPS	SWEC
STRS 02.260-5007A	SEISMIC ANALYSIS OF PRESSURE PUMP MOTOR	6-12-79	WESTINGHOUSE / GOULD	SWEC
STRS 02.260-5005A	GOULD LETTER No. 80-BCA-5 (SUPPLEMENT TO MOTOR SEISMIC ANALYSIS	1-25-80	GOULD'S PUMPS	SWEC
ME-563 REV. 0 & ADD. #1	SEISMIC CERTIFICATE OF COMPLIANCE	4-23-84	GOULD'S PUMPS	SWEC
QCP-122	HYDROSTATIC TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS
QCP-132	HYDRAULIC TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS
QCP-130A	VIBRATION AND BEARING TEMP. TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
MP. GENE. 001	GENERIC ASME III PRESSURE TEST PROCEDURE, REV. 3	11-12-84	SWEC / NNIPC	SWEC / NMPC
16.300 050-003B	SYS. PRESSURE PUMPS MOTOR SPEED VS. TORQUE CURVE	2-12-79	GOULDS PUMPS	SWEC
16.300 050-004B	SYS. PRESS. PUMPS SPEED VS. TORQUE CURRENT - 75%	7-26-79	Gould's PUMPS	SWEC
16.300 050-005B	SYS PRESS. PUMPS SPEED VS. TORQUE CURRENT - 80%	7-26-79	GOULD'S PUMPS	SWEC
16.300 050-006B	SYS. PRESS. PUMPS SPEED VS. TORQUE CURRENT - 100%	7-31-79	GOULD'S PUMPS	SWEC
16.300 050-007A	SYS. PRESS. PUMPS TYP. NOISE DATA	2-12-79	GOULD'S PUMPS	SWEC
—	HYDROSTATIC TEST RESULTS	8-14-79	GOULD'S PUMPS	SWEC
QA-110	VIBRATION AND BEARING TEMP. TEST LOG	—	GOULD'S PUMPS	SWEC
2.170-050-028A	SYS. PRESS. PUMPS MOTOR SPEED VS. TORQUE DATA	4-6-78	GOULD'S PUMPS	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
A26438 REV. A	PUMP PERFORMANCE TEST LOGS AND CURVES	11-2-79	GOULD'S PUMPS	SWEC
MAC-A-2 REV. 2	REPORT OF COMPLETE TEST FOR INDUCTION MOTORS - JOCKEY PUMP MOTORS	8-24-78	GOULD'S PUMPS	SWEC
MAC-A-1 REV. 1	ROUTINE TESTS ON INDUCTION MOTORS - JOCKEY PUMP MOTORS	8-24-78	GOULD'S PUMPS	SWEC
MM-9112	WESTINGHOUSE ENVIRONMENTAL QUALIFICATION OF CLASS IE MOTORS	9-1-81	WESTINGHOUSE / GOULD	SWEC
—	PRESSURE PUMP DOCUMENTATION PACKAGE	6-22-82	GOULD'S PUMPS	SWEC
—	DOCUMENT CHECKLIST - REV. 1 - SYS. PRESSURE PUMPS	12-29-78	GOULD'S PUMPS	SWEC
INST. 2.170-5002 H	INSTRUCTION BOOK FOR NMPC/NMP2 P.O. # NMP2 -P222X	8-11-82	GOULD'S PUMPS	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
EQEDC-1	EQUIPMENT QUALIFICATION ENVIRONMENTAL DESIGN CRITERIA	5/2/84	SWEC	SWEC
MEQ-P222X, REV.1	ENVIRONMENTAL QUALIFICATION OF MECHANICAL EQUIPMENT	3-27-85	SWEC	SWEC

ATTACHMENT "A"

LOADS USED IN ANALYSES

1) NOZZLE LOADS

	SUCTION	DISCHARGE
F_{AXIAL} (LBS)	300	245
F_{SHEAR} (LBS)	180	147
$M_{BENDING}$ (IN-LBS)	1619	914
$M_{TORSION}$ (IN-LBS)	1943	1097

2) SEISMIC LOADS (PUMP ASSEMBLY)

	SSE	OBE
HORIZONTAL (X & Z)	1.0g	0.75g
VERTICAL (Y)	1.5g	1.25g

3) INTERNAL PRESSURE

THE INTERNAL PRESSURE DESIGN CONDITIONS ARE; 185 PSIG AT 212°F

4) SHAFT TORSIONAL LOADING

FOR 10 Hp. MOTOR AT 3500 RPM, SHAFT TORQUE = (63,000 x Hp)/RPM

S.T. = 63,000 x 10/3500

S.T. = 180 IN-LBS

5) IMPELLER LOADS

IMPELLER LOADS ARE 60 LBS RADIAL AND 500 LBS AXIAL

LOAD COMBINATIONS

THE ANALYSIS WAS MADE FOR THE FOLLOWING LOAD CASES (BASED ON ALL THE LOADS PROVIDED ABOVE)

1) 1.0g LATERAL "X" LOAD
2) 1.0g LATERAL "Z" LOAD
3) 1.0g VERTICAL "Y" LOAD
4) NOZZLE LOADS + IMPELLER LOADS IN "Z" DIRECTION
5) NOZZLE LOADS + IMPELLER LOADS IN "X" DIRECTION

LOADS FOR THE "X", "Y" AND "Z" ARE ADDED DIRECTLY

ENVIRONMENTAL

		NORMAL	ACCIDENT
APPLIED IN COMBINATION	TEMPERATURE (°F)	85	175
	PRESSURE	ATMOSPHERIC	2.8 PSIG
	RELATIVE HUMIDITY (%)	50	100
	RADIATION	2.0×10^8 RADS	

SPEC. NO. NMP2-P222X
PVORT #7

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: RESIDUAL HEAT REMOVAL (RHS) SYSTEM PRESSURE PUMP

MARK NUMBERS: 2RHS*P2

STONE & WEBSTER

SPEC. NO. NMP2-P222X
Revision 0
PVORT # 7

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP
2. Location: a. Building/Room AUXILIARY BAY SOUTH
   b. Elevation 175'
   c. System RESIDUAL HEAT REMOVAL (RHS)
3. Component I.D. No. on P&ID dwg. 2RHS*P2
4. If component is a (X) Pump complete II.5.
   If component is a ( ) Valve complete II.6.
5. General Pump Data

a. Pump		b. Prime-mover	
Name	RESIDUAL HEAT REMOVAL (RHS) SYSTEM PRESSURE PUMP	Name	RHS PRESSURE PUMP MOTOR
Mfg.	GOULDS PUMPS	Mfg.	WESTINGHOUSE
Model	3196 ST	Model	TBDP, FRAME 215T
S/N	N-773B980-1	S/N	78D36029-7808-01-001
Type	HORIZONTAL CENTRIFUGAL	Type	SQUIRREL CAGE INDUCTION MOTOR

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* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

SPEC. No. NMPZ-P222X
REVISION 0
PVORT #7

a. Pump (Continued)

Overall Dimensions: LENGTH — 17.5"; WIDTH — 18"; HEIGTH — 12"

Weight: 102 LBS (WET)

Mounting Method: BOLTED

Required B.H.P. 5.5 AT 50 GPM

Parameter	Component Design	System Normal/Accident
Press (PSIG)	185	87 / 121
Temp (°F)	212	70 / 212
Flow (GPM)	50	50 / 50
Head (FT)	175	110 / 110
Media	DEMIN. WATER	DEMIN. WATER / DEMIN. WATER

Required NPSH at maximum flow: 2.4 FT AT 50 GPM.

Available NPSH: 20.3 FT

Operating Speed: 3500 RPM

Critical Speed: 2960. RPM

b. Prime-mover (Continued)

Overall Dimensions: LENGTH — 17.31"; WIDTH ≃ 14"; HEIGTH — 12.64"

Weight: 140 LBS

Mounting Method: BOLTED

H.P.: 10

Prime Mover Requirements: (include normal, maximum and minimum)

Motor(Voltage):

575/3Ø/60 HZ NORMAL OPERATING

431.25/3Ø/60 HZ REDUCED VOLTAGE ACCELERATION REQ'MNT (75%)

Turbine (pressure): N/A

If MOTOR list:

Duty cycle: CONTINUOUS

Stall current: 51 AMPS LOCKED ROTOR

Class of insulation: H

List functional accessories:* N/A

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

SPEC No NMP2-P222X
REVISION 0
PVORT # 7

N/A

6. General Valve Data

a. Valve

Name ______________________

Mfg. ______________________

Model ______________________

S/N ______________________

Type ______________________

Size ______________________

Weight ______________________

Mounting Method ______________________

Max. Required Torque ______________________

Parameter	Component Design	System Normal/Accident
Press	______	______/______
Temp	______	______/______
Flow	______	______/______
Media	______	______/______

Max P across valve ______________

Closing time @ max P ______________

Opening time @ max P ______________

b. Actuator (if not an integal unit)

Name ______________________

Mfg. ______________________

Model ______________________

S/N ______________________

Type ______________________

Size ______________________

Weight ______________________

Mounting Method ______________________

Max. Delivered Torque ______________________

Power Requirements: (include normal, maximum and minimum).

Electrical ______________________

____

____

____

____

Other: ( )Pneumatic ( )Hydraulic

____

List functional accessories:* ______________________

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

SPEC. No. NMP2-P222X
REVISION 0
PVORT *7

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: MAINTAIN RHR MAIN PUMP DISCHARGE LINE FILLED TO MITIGATE EFFECTS OF FLUID TRANSIENTS

Safety: SAME AS ABOVE

2. The components normal state is: (X) Operating ( ) Standby

3. Safety function:

a. (X) Emergency reactor shutdown
b. (X) Containment heat removal
c. ( ) Containment isolation
d. (X) Reactor heat removal
e. ( ) Reactor core cooling
f. ( ) Prevent significant release of radio-active material to environment
g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X) Yes ( ) No
(X) LOCA (X) HELB (X) MSLB
( ) Other ______

4. Safety requirements:

( ) Intermittent Operation
(X) During postulated event
(X) Continuous Operation
(X) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.
100 DAYS (e.g., hours, days, etc.)

5. For VALVES: N/A

does the component ( ) Fail open ( ) Fail closed ( ) Fail as is

Is this the fail safe position? ( ) Yes ( ) No

Is the valve used for throttling purposes? ( ) Yes ( ) No

What is the maximum acceptable internal and external leakrate?

______ ______

SPEC. No NMP2-P222X
REVISION 0
PVORT #7

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME III, DIVISION 1, 1974 EDITION THROUGH WINTER 1976 ADDENDA - SUBSECTION NC

2. Reference those qualification standards, used as a guide to qualify the component: IEEE-334-1974, IEEE-117-1974, IEEE-344-1975, IEEE-323-1974
REGULATORY GUIDES 1.48, 1.84, 1.85, 1.89, 1.61 & 1.100

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
(X) Yes(1) ( ) No

4. Are the margins* identified in the qualification documentation? (X) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) BY SUB-ASSEMBLIES (ie, PUMP, MOTOR)

6. List all component tests performed or to be performed that demonstrate qualification:

PUMP HYDROSTATIC TEST
PUMP PERFORMANCE TEST
MOTOR ROUTINE TESTS
COLD HYDRO TEST
VIBRATION & BEARING TEMPERATURE TEST
MOTORETTE ENVIRONMENTAL QUALIFICATION

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

(1) MAINTAINED AT VENDOR'S SHOP

7. List all component analyses performed that demonstate qualification:

1) PUMP ASSEMBLY SEISMIC STRESS ANALYSIS

2) MOTOR SEISMIC STRESS ANALYSIS

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ( ) Yes (X) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? ( ) Yes (X) No.* If "No"*, is installed component ( ) oversized or ( ) undersized?

* MOTORETTE USED IN ENVIRONMENTAL TESTS ARE IDENTICAL

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

SEE ATTACHMENT "A"

SPEC. No NMP2-P222X
REVISION 0
PVORT #7

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

(X) Yes ( ) No If "Yes" identify: ____________

INBOARD/OUTBOARD "BUNA N" OIL SEALS
AND BEARING HOUSING SEALS

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YEARS

13. Which of the components normal maintenance items requires the most frequent replacement? MOTOR - CHEVRON SRI-2 GEASE; PUMP - LUBE OIL What is the normal time interval between replacements of this item?

MOTOR - 2 YEARS; PUMP - SURVIELLANCE/PERIODIC SAMPLING OR PER LUB. OIL MANUFACTURER RECOMMENDATION

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

		NORMAL	ACCIDENT
TEMPERATURE °F		85	175
PRESSURE (PSIG)		-.25 IN. WATER	2.8 PSIG
HUMIDITY (% R.H.)		50	100
RADIATION (RADS)	GAMMA —	3.3×10^5	4.1×10^7
	BETA —	N/A	1.3×10^7

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
SPECIFICATIONS				
SPEC. P222X THRU ADD. 11	SAFETY RELATED HORIZONTAL CENTRIFUGAL PUMPS	8-8-73 TO 5-5-83	SWEC	SWEC
E&DCR P02,455A	REVISED NOZZLE ALLOWABLES	1-3-85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
DRAWINGS				
2.170-050-009A	PRESSURE MAINTENANCE PUMPS CROSS-SECTION DRAWING	2-28-78	GOULD'S PUMPS	SWEC
2.170-050-035A	SYS. PRESSURE PUMPS BEDPLATE DRAWING	6-8-78	GOULD'S PUMPS	SWEC
16.300-050.002E	PRESSURE PUMPS OUTLINE DRAWING	7-22-80	GOULD'S PUMPS	SWEC
2.170-050-027A	SYS. PRESSURE PUMPS MOTOR OUTLINE DRAWING	4-6-78	GOULD'S PUMPS	SWEC
16.300 050-001B	MECHANICAL SEAL SYS. PRESSURE PUMPS	11-17-78	GOULD'S PUMPS	SWEC
12177 EM-2A REV. 18	REACTOR BLDG MACHINE LOCATION	11-5-84	SWEC	SWEC
12177 EC-30AB REV. 7	PAD LOCATIONS REACTOR BLDG. & AUX. BAY	5-3-84	SWEC	SWEC
12177 EC-30AC REV. 6	REACTOR BLDG. PAD DETAILS	7-9-82	SWEC	SWEC
12177 EM-2N REV. 12	MACHINE LOCATION REACTOR BLDG & AUX. BAY	10-8-84	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
FSK 27-7G	FLOW DIAGRAM	10-31-84	SWEC	SWEC
FSAR FIGURE 5.4-13 SHEET 1 OF 2	PIPING + INSTRUMENTATION DRAWING	—	GE	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QUALIFICATION DOCUMENTS				
ME-563 REV. 0 WITH ADD. #1	SEISMIC ANALYSIS OF PRESSURE PUMPS	4-23-84	GOULD'S PUMPS	SWEC
STRS 02.260-5007A	SEISMIC ANALYSIS OF PRESSURE PUMP MOTOR	6-12-79	WESTINGHOUSE / GOULD	SWEC
STRS 02.260-5005A	GOULD LETTER NO. 80-BCA-5 (SUPPLEMENT TO MOTOR SEISMIC ANALYSIS	1-25-80	GOULD'S PUMPS	SWEC
ME-563 REV. 0 & ADD. #1	SEISMIC CERTIFICATE OF COMPLIANCE	4-23-84	GOULD'S PUMPS	SWEC
QCP-122	HYDROSTATIC TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS
QCP-132	HYDRAULIC TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS
QCP-130A	VIBRATION AND BEARING TEMP. TEST PROCEDURE	—	GOULD'S PUMPS	GOULD'S PUMPS

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
NMP. GENE. 001	GENERIC ASME III PRESSURE TEST PROCEDURE, REV. 3	11-12-84	SWEC / NMPC	SWEC / NMPC
16.300 050-003B	SYS. PRESSURE PUMPS MOTOR SPEED VS. TORQUE CURVE	2-12-79	GOULD'S PUMPS	SWEC
16.300 050-004B	SYS. PRESS. PUMPS SPEED VS. TORQUE CURRENT - 75%	7-26-79	GOULD'S PUMPS	SWEC
16.300 050-005B	SYS. PRESS. PUMPS SPEED VS. TORQUE CURRENT - 80%	7-26-79	GOULD'S PUMPS	SWEC
16.300 050-006B	SYS. PRESS. PUMPS SPEED VS. TORQUE CURRENT - 100%	7-31-79	GOULD'S PUMPS	SWEC
16.300 050-007A	SYS. PRESS. PUMPS TYP. NOISE DATA	2-12-79	GOULD'S PUMPS	SWEC
—	HYDROSTATIC TEST RESULTS	8-14-79	GOULD'S PUMPS	SWEC
QA-110	VIBRATION AND BEARING TEMP. TEST LOG	—	GOULD'S PUMPS	SWEC
2.170-050-028A	SYS. PRESS. PUMPS MOTOR SPEED VS. TORQUE DATA	4-6-78	GOULD'S PUMPS	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
A26436 REV. A	PUMP PERFORMANCE TEST LOGS AND CURVES	11-2-79	GOULD'S PUMPS	SWEC
MAC-A-2 REV. 2	REPORT OF COMPLETE TEST FOR INDUCTION MOTORS - JOCKEY PUMP MOTORS	8-24-78	GOULD'S PUMPS	SWEC
MAC-A-1 REV. 1	ROUTINE TESTS ON INDUCTION MOTORS - JOCKEY PUMP MOTORS	8-24-78	GOULD'S PUMPS	SWEC
MM-9112	WESTINGHOUSE ENVIRONMENTAL QUALIFICATION OF CLASS 1E MOTORS	9-1-81	WESTINGHOUSE / GOULD	SWEC
—	PRESSURE PUMP DOCUMENTATION PACKAGE	6-22-82	GOULD'S PUMPS	SWEC
—	DOCUMENT CHECKLIST - REV. 1 - SYS. PRESSURE PUMPS	12-29-78	GOULD'S PUMPS	SWEC
INST. 2.170-5002 H	INSTRUCTION BOOK FOR NMPC/NMP2 P.O. # NMP2-P222X	8-11-82	GOULD'S PUMPS	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
EQEDC-1	EQUIPMENT QUALIFICATION ENVIRONMENTAL DESIGN CRITERIA	5/2/84	SWEC	SWEC
MEQ-P222X, REV. 1	ENVIRONMENTAL QUALIFICATION OF MECHANICAL EQUIPMENT	3-27-85	SWEC	SWEC

ATTACHMENT "A"

LOADS USED IN ANALYSES

1) NOZZLE LOADS

	SUCTION	DISCHARGE
F_{AXIAL} (LBS)	300	245
F_{SHEAR} (LBS)	180	147
$M_{BENDING}$ (IN-LBS)	1619	914
$M_{TORSION}$ (IN-LBS)	1943	1097

2) SEISMIC LOADS (PUMP ASSEMBLY)

	SSE	OBE
HORIZONTAL (X & Z)	1.0g	0.75g
VERTICAL (Y)	1.5g	1.25g

3) INTERNAL PRESSURE

THE INTERNAL PRESSURE DESIGN CONDITIONS ARE; 185 PSIG AT 212°F

4) SHAFT TORSIONAL LOADING

FOR 10 Hp. MOTOR AT 3500 RPM, SHAFT TORQUE = (63,000 x Hp)/RPM

S.T. = 63,000 x 10/3500

S.T. = 180 IN-LBS

5) IMPELLER LOADS

IMPELLER LOADS ARE 60 LBS RADIAL AND 500 LBS AXIAL

LOAD COMBINATIONS

THE ANALYSIS WAS MADE FOR THE FOLLOWING LOAD CASES (BASED ON ALL THE LOADS PROVIDED ABOVE)

1) 1.0g LATERAL "X" LOAD
2) 1.0g LATERAL "Z" LOAD
3) 1.0g VERTICAL "Y" LOAD
4) NOZZLE LOADS + IMPELLER LOADS IN "Z" DIRECTION
5) NOZZLE LOADS + IMPELLER LOADS IN "X" DIRECTION

LOADS FOR THE "X", "Y" AND "Z" ARE ADDED DIRECTLY

ENVIRONMENTAL

		NORMAL	ACCIDENT
APPLIED IN COMBINATION	TEMPERATURE (°F)	85	175
	PRESSURE	ATMOSPHERIC	2.8 PSIG
	RELATIVE HUMIDITY (%)	50	100
	RADIATION	2.0×10^8 RADS	

8P

SPEC. NO. P121A

PVORT # 8

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: MOTOR OPERATED ROTARY GATE VALVE

MARK NUMBERS: 2SWP * MOV 30A

STONE & WEBSTER

SPEC. NO. P121A
Revision ______

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74 ______

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP
2. Location: a. Building/Room TURBINE BLDG (SCREENWELL)
   b. Elevation 285' (FLOORSTAND & OPERATOR)
   c. System SERVICE WATER
3. Component I.D. No. on P&ID dwg. $\boxed{\text{2SWP * MOV 30A}}$
4. If component is a ( ) Pump complete II.5.
   If component is a (X) Valve complete II.6.
5. General Pump Data N/A

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (Continued)

Overall Dimensions ____________

Weight ____________

Mounting Method ____________

Required B.H.P. ____________

Parameter	Component Design	System Normal/Accident
Press	______	______/______
Temp	______	______/______
Flow	______	______/______
Head	______	______/______
Media	______	______/______

Required NPSH at maximum flow ____________

Available NPSH ____________

Operating Speed ____________

Critical Speed ____________

List functional accessories:* ____________

____

____

____

____

b. Prime-mover (Continued)

Overall Dimensions ____________

Weight ____________

Mounting Method ____________

H.P. ____________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor(Voltage) ____________

____

____

Turbine (pressure) ____________

____

If MOTOR list:

Duty cycle ____________

Stall current ____________

Class of insulation ____________

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

6. General Valve Data

a. Valve

Name RECTANGULAR VALVE

Mfg. HENRY PRATT CO

Model RECTANGULAR BV

S/N D-022467-1-1

Type MOTOR-OPERATED ROTARY GATE

Size 48" W x 72" H.

Weight 3470 (EXCLUDING WT. OF OPERATOR)

Mounting Method FRAMES EMBEDDED IN CONCRETE, SECURED WITH JACKBOLTS

Max. Required Torque 153,600 in-lb

b. Actuator (if not an integal unit)

Name MOTOR OPERATOR WITH ROTARY GEAR

Mfg. LIMITORQUE

Model SMB-0-15/H4BC

S/N 341652

Type ELECTRIC

Size SMB-0-15

Weight 765 lbs

Mounting Method BOLTED ON TORQUE TUBE EXTENSION

Max. Delivered Torque (STALL) 201,660 in-lb

Parameter	Component Design	System Normal/Accident
Press, psig	20	9 / 9
Temp, °F	33-90	32-78 / 32-78
Flow, gpm	50,000	28,300 / 26,000
Media	WATER	WATER / WATER

Max P across valve 46 ft. WATER

Closing time @ max P 60 sec / 55 sec, test

Opening time @ max P 60 sec / 55 sec, test

Power Requirements: (include normal, maximum and minimum).

Electrical AC

VOLTAGE: 575 V, -20%, +10% RANGE

3-PHASE, 60 HZ.

TEMP, °F: 60 - 104 (AMBIENT)

Other: ( )Pneumatic ( )Hydraulic

List functional accessories:*

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

III. **FUNCTION**

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: OPEN

Safety: ISOLATES NORTH INTAKE SHAFT UPON FAILURE OF DISCHARGE TUNNEL

2. The components normal state is: ( )Operating (X)Standby

3. Safety function:

a. ( ) Emergency reactor shutdown

b. (X) Containment heat removal

c. ( ) Containment isolation

d. (X) Reactor heat removal

e. ( ) Reactor core cooling

f. (X) Prevent significant release of radioactive material to environment

g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X)Yes ( ) No
(X) LOCA (X) HELB (X) MSLB
( ) Other

4. Safety requirements:

(X) Intermittent Operation (X) During postulated event

( ) Continuous Operation (X) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational. 100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

does the component ( )Fail open ( )Fail closed (X)Fail as is

Is this the fail safe position? (X) Yes ( ) No (VALVE 2SWP*MOV30B IS BACKUP)

Is the valve used for throttling purposes? ( ) Yes (X) No

What is the maximum acceptable internal and external leakrate?

20GPM (INTERNAL) - NO EXTERNAL REQUIREMENT

7. List all component analyses performed that demonstate qualification:

1) ASME CLASS 1 STRESS REPORT ON VALVE BODY

2) COMBINATION DYNAMIC (RESPONSE SPECTRUM) AND STATIC ANALYSIS FOR MSIV ROLLER BEARING LOAD ON MSIV ACTUATOR

3) VALVE BODY - DEPRESSURIZATION STRESS ANALYSIS

CONT'D ATTACHED SHEET:

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? (✓) Yes ( ) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

ACTUATOR DYNAMIC TESTING: THE ORIGINAL ROLLER BEARING FAILED DURING SEISMIC TESTING. FURTHER INVESTIGATION REVEALED A DESIGN DEFICIENCY. RESOLUTION OF ROLLER BEARING ADEQUACY IS IN PROGRESS.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? (✓) Yes ( ) No. If "No", is installed component ( ) oversized or ( ) undersized?

10. Is component orientation sensitive? (✓) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (✓) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

1) HYDROSTATIC SHELL TEST: PRESSURE = 2900 PSIG
2) HYDROSTATIC CLOSURE: PRESSURE = 1403 PSIG
3) SEAT LEAKAGE (WATER): PRESSURE = 1403 PSIG
4) SEAT LEAKAGE (AIR): PRESSURE = 45 PSIG
5) STEM LEAKAGE: PRESSURE = 1403 PSIG
6) VALVE TORQUE TEST: FULL OPEN TO 10% CLOSED; 1403 PSIG
7) LOCA TEST: TEST TO LOCA ENVT. (SUBASSEMBLIES HAVE VARYING LEVELS) - IN PROGRESS
8) SEISMIC TEST OF ACTUATOR (RANDOM MULTFREQUENCY): SRV RRS PEAK 0.95 → 2.65 g, ZPA 0.13 → 33 g; LEVEL B RRS (UPSET) PEAK 2.7 → 5.2 g, ZPA 0.32 → 0.56 g LEVEL C/D (EMERGENCY / FAULTED) PEAK 4.6 → 9.0 g, ZPA 0.7 → 1.2 g; LOCA PEAK 1.2 → 5.0 g

CONT'D ATTACHED SHT.

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME CLASS 1 7/1/74 AND
ADDENDA THROUGH 12/31/76; NB-3500;
NA-3250

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 382-1972, IEEE 344-1975
IEEE 323-1974; REG. GUIDE 1.48, 1.61,
1.75, 1.92, AND 1.100

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
(✓) Yes ( ) No

4. Are the margins* identified in the qualification documentation? (✓) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? ________. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) PERFORMANCE TESTS FOR SUBASSEMBLIES QUALIFIED IEEE: LIMIT SWITCH, SOLENOID VALVE, ETC./DYNAMIC TEST FOR SUBASSEMBLY (ACTUATOR)

6. List all component tests performed or to be performed that demonstrate qualification:

VALVE: HYDROSTATIC SHELL TEST
HYDROSTATIC CLOSURE
SEAT LEAKAGE (AIR) & (WATER)
STEM LEAKAGE
VALVE TORQUE TEST

ACTUATOR: SEISMIC/DYNAMIC TESTS - OPERABILITY TESTS
ENVIRONMENTAL LOCA TEST (IN-PROGRESS)
LIFE CYCLE TEST (TO BE PERFORMED)
ROLLER BEARING STATIC LOAD TEST (TO BE PERFORMED)

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: STANDBY: VALVE OPEN TO PERMIT PASSAGE OF STEAM TURBINE FROM REACTOR

Safety: REACTOR CONTAINMENT ISOLATION DURING ACCIDENT TRIP SIGNALS (1) MANUAL (2) HIGH STEAM FLOW (3) LOW LEVEL-VESSEL (4) LOW VACUUM-CONDENSER (5) HIGH RADIATION IN STEAM TUNNEL (6) LOW STEAM PRESSURE-RUN MODE (7) HIGH TEMP-STEAM TUNNEL (8) HIGH DIFFERENTIAL TEMP.-STEAM TUNNEL

2. The components normal state is: (✓) Operating ( ) Standby

3. Safety function:

a. ( ) Emergency reactor shutdown
b. ( ) Containment heat removal
c. (✓) Containment isolation
d. ( ) Reactor heat removal
e. ( ) Reactor core cooling
f. (✓) Prevent significant release of radioactive material to environment
g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (✓) Yes ( ) No
(✓) LOCA (✓) HELB (✓) MSLB
( ) Other ______

4. Safety requirements:

( ) Intermittent Operation (✓) During postulated event

(✓) Continuous Operation (AVAILABLE FOR OPERATION AT ALL TIMES) (✓) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.
6 HRS (e.g., hours, days, etc.)

5. For VALVES:

does the component ( ) Fail open (✓) Fail closed ( ) Fail as is

Is this the fail safe position? (✓) Yes ( ) No

Is the valve used for throttling purposes? ( ) Yes (✓) No

What is the maximum acceptable internal and external leakrate?

INTERNAL 4.42 SCFH NO EXTERNAL (PER MSS SP61)

6. General Valve Data

a. Valve

Name MAIN STEAM ISOLATION VALVE

Mfg. CROSBY VALVE AND GAGE CO.

Model BALL VALVE

S/N 6427

Type DOUBLE TRUNION BALL VALVE

Size 24"

Weight 12,900 LBS

Mounting Method WELDED IN LINE

Max. Required Torque 150,000 IN-LBS.

Parameter	Component Design	System Normal/Accident
Press (PSIG)	1375	964 / 1015
Temp (°F)	586	540 / 550
Flow (LBS/HR)	4.25×10^6	3.57×10^6 / 7.08×10^6
Media	STEAM	STEAM / STEAM

Max P across valve 1250

Closing time @ max P 3-5 SEC.

Opening time @ max P 5-7 MIN.

b. Actuator (if not an integal unit)

Name MAIN STEAM ISOLATION VALVE

Mfg. CROSBY VALVE AND GAGE CO.

Model SERIES 600

S/N 5

Type STORED ENERGY (SPRING)

Size L=100 7/8", HT=73", ≈W=50"

Weight 12,500 lbs

Mounting Method BOLTED TO VALVE (ON TOP)

Max. Delivered Torque 1,054,560 IN-LBS

Power Requirements: (include normal, maximum and minimum).

Electrical 575/3/60

Other: ( )Pneumatic ( )Hydraulic

HYDRAULIC TO OPEN/SPRING TO CLOSE

List functional accessories:*

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

a. Pump (Continued) N/A

Overall Dimensions ______

Weight ______

Mounting Method ______

Required B.H.P. ______

Parameter	Component Design	System Normal/Accident
Press	____	____/____
Temp	____	____/____
Flow	____	____/____
Head	____	____/____
Media	____	____/____

Required NPSH at maximum

flow ______

Available NPSH ______

Operating Speed ______

Critical Speed ______

b. Prime-mover (Continued)

Overall Dimensions ______

Weight ______

Mounting Method ______

H.P. ______

Prime Mover Requirements: (include normal, maximum and minimum)

Motor (Voltage) ______

______

______

Turbine (pressure) ______

______

If MOTOR list:

Duty cycle ______

Stall current ______

Class of insulation ______

______

List functional accessories:* ______

______

______

______

______

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

SPEC. NO. P303D
Revision 0

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74 ______

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (✓) BOP
2. Location: a. Building/Room PRIMARY CONTAINMENT
   b. Elevation 251'
   c. System MAIN STEAM
3. Component I.D. No. on P&ID dwg. 2MSS*HYV6A
4. If component is a ( ) Pump complete II.5.
   If component is a (✓) Valve complete II.6.
5. General Pump Data N/A

a. Pump	b. Prime-mover
Name ______	Name ______
Mfg. ______	Mfg. ______
Model ______	Model ______
S/N ______	S/N ______
Type ______	Type ______

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* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

BOP #9 PVORT

SPEC. NO. P303D

PVORT #9

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: MAIN STEAM ISOLATION VALVE

MARK NUMBERS: 2MSS*HYV6A

STONE & WEBSTER

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
ED. GENE014	ELECTRICAL TEST PROCEDURE	—	SWEC	SWEC
—	I.O.M. J. VENTRE TO M. FACHADA LIMITORQUE BOLT TORQUES AND GAP ADJUSTMENT	5/30/85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
FSK-9 -10AC	SWP FLOW DIA. Rev 7	11/19/84	SWEC	SWEC
PID -11H	SWP P&ID Rev 1	7/31/84	SWEC	SWEC
C03370	E&DCR: ACCESS TO LIMITORQUE	4/18/85	SWEC	SWEC
P01,321	E&DCR: DELETE MANUFACTURING PLAN	8/3/82	SWEC	SWEC
P02,261	E&DCR: ENVIRONMENTAL CONDITIONS	7/5/84	SWEC	SWEC
P50,286	E&DCR: SHIPPING RELEASE	11/3/81	SWEC	SWEC
P50,292	E&DCR: HANDWHEEL RETAINING NUT	4/6/82	SWEC	SWEC
P50,621	E&DCR: PROTOTYPE TEST DATA	1/11/84	SWEC	SWEC
P50,829	E&DCR: EXCLUDED EQUIPMENT LIST	11/2/84	SWEC	SWEC
L026	N&D: SANDBLAST & PAINT	7/1/82	SWEC	SWEC
C02826	E&DCR: ELECTRICAL GROUND	8/15/84	SWEC	SWEC
C52,652	E&DCR: USE OF STUDBOLTS	4/30/84	SWEC	SWEC
P01,828	E&DCR: PQA DOCUMENTATION	9/2/83	SWEC	SWEC
G-046	N&D: PQA INSPECTION	3/22/82	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
P121A	SPECIFICATION FOR ROTARY GATE VALVES, REV. 1 ADDENDA 1-3	3/2/79	SWEC	SWEC
—	RECTANGULAR BUTTERFLY VALVE-SEISMIC ANALYSIS	8/20/80	HENRY PRATT CO.	SWEC
—	RESPONSE TO SEISMIC ANALYSIS REVIEW	11/19/80	HENRY. PRATT CO.	SWEC
IEEE 05.360 -5015A	LIMITORQE VALVE ACTUATOR QUALIFICATION REPT. B0058	6/18/85	LIMITORQUE CORP	SWEC
5.360-171 -155 RevC	GEN. ARRGMT. C-6491-3 M.O. ROTARY GATES	10/1/81	HENRY PRATT CO	SWEC
INST 5.360 -5026	INSTALLATION & SERVICE MANUAL: HPCO 3.0 D-22467	5/20/82	HENRY PRATT CO.	SWEC
A&T 8 Rev 1 Add 2	ASSEMBLY, TEST AND ACCEPTANCE PROC.	8/23/79	HENRY PRATT CO.	SWEC
—	MOTOR OPERATOR TORQUE TEST PLAN	—	HENRY PRATT CO.	SWEC
	LIMITORQUE TEST DATA, D-22467	6/29/82	LIMITORQUE CORP	SWEC
EM-8E Rev 10	MACHINERY LOCATION DWG.	11/19/84	SWEC	SWEC

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

( ) Yes ( ) No If "Yes" identify: ____________

N/A

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YRS

13. Which of the components normal maintenance items requires the most frequent replacement? N/A

What is the normal time interval between replacements of this item?

N/A

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

MILD ENVIRONMENT

TEMP: 104 °F

PRESS: ATMOS.

RH: 20-70%

RADIATION: $<1 \times 10^4$ RADS GAMMA

(CONT'D)

10.

SEAT & STEM LEAKAGE : 20 PSI, 5 MINS

3 CYCLES OPEN & CLOSE, 56 SECS; (60 SECS. SPECIFIED)

OPERATOR LOCKED ROTOR : 12.5 A (1.8 A NO LOAD)

(CLOSE) STALL TORQUE AT 110% VOLTAGE : 23,800 ft. lbs (25,600 LIMIT)

(OPEN) " " " " " : 17,600 " " (")

7. List all component analyses performed that demonstrate qualification:
"RECTANGULAR BUTTERFLY VALVE – SEISMIC ANALYSIS", 8/20/80, HENRY PRATT; "RESPONSE TO SEISMIC ANALYSIS REVIEW", 11/19/80, HENRY PRATT;

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? (X) Yes ( ) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

DUE TO LIMITORQUE ACTUATOR TESTING, LIMIT SWITCH SCREWS & BOLT TORQUES TO BE ADJUSTED & LIMIT SWITCH FINGER ASSEMBLY GAPS TO BE ADJUSTED

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? (X) Yes – with one exception – see footnote * ( ) No. If "No", is installed component ( ) oversized or ( ) undersized?

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

VALVE ANALYSIS: SEISMIC ACCEL. LEVELS OF 0.41g IN BOTH HOR. AXES, 0.24g VERT + 1g. GRAVITY, IN COMBINATION WITH DESIGN PRESSURE – 20 psi AND MAX. OPERATING TORQUE – 201,660 in. lbs.
OPERATOR TEST: 7.9–8.4g. SINE DWELL INPUT AT 33 HZ FOR 30 SEC. EACH AXIS.
(CON'T)

* Seismic fragility test of valve operator was for Model SMB-1-25/H4BC. Referenced Limitorque report justifies similarity of parent unit to plant equipment operator (SMB-0-15/H4BC)

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ANSI B31.1-77 (Sect. 102.3); AWWA C504, 1974 (sect. 9,12)
   AWS D1.1 Rev. 2 - 1977 (VISUAL INSPECTION SECT.)

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 323-1974; IEEE 344-1975; IEEE 382-1972.
   RG's 1.48/1.61/1.89/1.100

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
   (X) Yes ( ) No

4. Are the margins* identified in the qualification documentation? (X) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) ASSEMBLY FOR SHOP TESTS; SUB-ASSEMBLY FOR OPERATOR

6. List all component tests performed or to be performed that demonstrate qualification:

   OPERATOR - RESONANCE SEARCH/FRAGILITY TEST
   ASSEMBLY - LEAKAGE, OPEN/CLOSE TESTS
   MOTOR - LOCKED ROTOR, DIELECTRIC TESTS
   OPERATOR - TORQUE AT MAX/MIN VOLTAGE, STALLED TORQUE TEST.

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

IV. QUALIFICATION
4. ANALYSES (CONT'D):

5) ACTUATOR ANALYSES:

a) ACTUATOR BLOCKING LEVER STRESS ANALYSIS
b) ACTUATOR FATIGUE ANALYSIS (DYNAMIC)
c) ACTUATOR DYNAMIC ANALYSIS (FREQUENCY/MODES)
d) TRIP SOLENOID SUPPORT: FREQUENCY (DYNAMIC) & STRESS ANALYSIS (STATIC LOAD)
e) TOP PIVOT ACTUATOR DESIGN REPORT (EQUIVALENT STATIC ANALYSIS)
f) THRUST TRACK BUCKLING ANALYSIS (STATIC LOAD)
g) STATIC ANALYSIS - PIPING (HYDRAULIC SYSTEM)

IV. QUALIFICATION

10. CONTINUED

9) CLASS 1 STRESS REPORT: DESIGN PRESSURE 1375 PSI, OPERATING PRESSURE 1050 PSI, MAX. DIFFERENTIAL PRESSURE 1220 PSI, DESIGN TEMP 586°F
TEMP. RANGE 65°F TO 568°F, SEISMIC LOAD 4.5g + 1.0g DWT

10) STRESS ANALYSIS DEPRESSURIZATION VALVE BODY, PHASE I: PRESS. 50PSIA, TEMP. 500°F / PHASE II: PRESS. (OUTSIDE) 14.7 PSIA, PRESS. (INSIDE) 13.8 PSIA

11) ACTUATOR ANALYSES:
   a) BLOCKING LEVER STRESS ANALYSIS
      FORCE = 1328.5 lb
   b) TRIP SOLENOID VALVE STRESS ANALYSIS
      SEISMIC/HYDRO. LD. = 4.5g + DWT
   c) TOP PIVOT ACTUATOR ANALYSIS
      SUPPORTED LD. 100,050 lbs
      DYNAMIC LD. FACTOR = 1.15, EQUIVALENT STATIC LD = 116,000 lbs
   d) ROLLER BEARING DYNAMIC PORTION OF ANALSIS RRS ZPA = 1.1g

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

(✓) Yes ( ) No If "Yes" identify: ACTUATOR IS A ONE OF A KIND COMPONENT

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YEARS (IN PROGRESS)

13. Which of the components normal maintenance items requires the most frequent replacement? "O" RINGS What is the normal time interval between replacements of this item?

5 YEARS

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

TEMP. 340°F

PRESSURE 45 PSIG

REL. HUMIDITY ALL STEAM

RADIATION 5.0 E7 RADS GAMMA (40 YRS.+ ACCIDENT)

6.3 E8 RADS BETA (40 YRS.+ ACCIDENT)

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
CALC. 83-01	MSIV SPECIAL CONDITIONS - DEPRESSURIZATION	2-7-83	G+W FLUID SYSTEMS	SWEC (STRS 05.360-5003A)
ER-81-28 REV. 0	MSIV ACTUATOR DYN. ANAL. MODE / FREQ.	10-29-81	G+W FLUID SYSTEMS	SWEC
ER-81-33 REV. 1 REV. 3	FREQ. & STRESS ANAL. TRIP SOLENOID	12-29-81 7-26-82	G+W FLUID SYSTEMS	SWEC (STRS 05.360-5001A)
EC-1068	DESIGN REPORT TOP PIVOT ACTUATOR	5-29-84	G+W FLUID SYSTEMS	SWEC (STRS 05.360-5016A)
EH-3166N	THRUST TRACK CALC.	3-1-84	G+W FLUID SYSTEMS	SWEC (STRS 05.360-5007A)
CALC. 83-06	CALC. OF SOLENOID VALVE VS. PIPE	3-1-84	G+W FLUID SYSTEMS	SWEC (MISC 05.360-5006A)
22A2887 4L	NUCLEAR BOILER SYSTEM	6-18-84	GE - NEG	GE-NEG

P.10

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
DWG. A-1789 REV. A	IDENT. TAG STAMPING	3-25-79	G+W FLUID SYSTEMS	SWEC (DWG. 0005.360-180-123B)
DWG. E24-900-14 REV. J	24" 900# MSIV W EFCO 600 ACTUATOR	4-14-83 (APP. SWEC)	EPG FLUID SYSTEMS	SWEC (DWG. 0005.360-180-172J)
DWG. D-1234315 REV. B	24" 900# MSIV BODY CROSS SECTION	12-4-80	EPG FLUID SYSTEMS	SWEC (DWG. 0005.360-180-024C)
12177-FSK-3-1A REV. 12	FLOW DIAGRAM MAIN STEAM	3-28-85	SWEC	SWEC
12177-EP-2A-11 REV. 10	MAIN STEAM PIPING REACTOR BLDG.	10-6-82	SWEC	SWEC
12177-EP-2B-9 REV. 8	MAIN STEAM PIPING REACTOR BLDG.	8-30-82	SWEC	SWEC
FIG. FSAR 10.1-30	P&ID MAIN STEAM SYSTEM	— (NO DATE SHOWN)	SWEC	SWEC
SPEC NMP2-P303D REV. 1 & E&DCR P12,333	MAIN STEAM ISOLATION VALVES	11-17-82 6-1-83	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
PTR: 2538-1	PERFORMANCE TEST REPORT	12-30-80	G+W FLUID SYSTEMS DIVISION	SWEC
46912-2	WYLE SEISMIC SIMULATION TEST REPORT	11-14-83	WYLE LABORATORIES FOR G+W FLUID SYSTEMS	G+W FLUID SYSTEMS/ SWEC (STRS 05.360-5013A)
ER-81-3 REV. 1	ASME CLASS 1 STRESS REPORT (INCLUDING AMENDMENT)	2-23-81	G+W - FLUID SYSTEMS	SWEC STRESS RPT. #12177-N-SR-823-0
MEQ-P303D REV. 1	MEQ QUAL. REPORT	3-27-85	SWEC	SWEC
12177-NM(C)-MS-1956 REV.0	ESTIMATION OF ROLLER BEARING LOAD FOR MSIV ACTUATOR	IN-PROCESS	SWEC	SWEC
CALC 81-27 REV. 1	BLOCKING LEVER STRESS ANALYSIS	3-30-82	G+W FLUID SYSTEMS	SWEC
CALC. 81-21 REV. 2	ACTUATOR FATIGUE ANALYSIS	4-16-82	G+W FLUID SYSTEMS	SWEC
G+W FSD 1798N	DYNAMIC EVALUATION TESTS OF AN EFCO 600 ACTUATOR	SEPT. '79	G+W FLUID SYSTEMS	SWEC

9P9

10P

SPEC. NO. P303W

PVORT #10

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: SWING CHECK VALVE

MARK NUMBERS: 2RHS * AOV 16A

STONE & WEBSTER

SPEC. NO. P303W
Revision ____________

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410

3. Utility: Niagara Mohawk Power Corporation

4. NSSS: General Electric Co. ( ) PWR (X) BWR

5. A/E: Stone & Webster Engineering Corporation

6. C.P. and/or O. L. SER date 6/24/74 ____________

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP

2. Location:
   a. Building/Room PRIMARY CONTAINMENT
   b. Elevation 316'
   c. System RESIDUAL HEAT REMOVAL - RHS

3. Component I.D. No. on P&ID dwg. $\boxed{\text{2RHS*AOV16A}}$

4. If component is a ( ) Pump complete II.5.

   If component is a (X) Valve complete II.6.

5. General Pump Data N/A

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (Continued)

Overall
Dimensions____________________

Weight____________________

Mounting
Method____________________

Required B.H.P.________________

Parameter	Component Design	System Normal/Accident
Press	____	____/____
Temp	____	____/____
Flow	____	____/____
Head	____	____/____
Media	____	____/____

Required NPSH at maximum

flow____________________

Available NPSH________________

Operating Speed________________

Critical Speed________________

b. Prime-mover (Continued)

Overall
Dimensions____________________

Weight____________________

Mounting
Method____________________

H.P.____________________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor(Voltage)________________

____

____

Turbine (pressure)________________

____

If MOTOR list:

Duty cycle________________

Stall current________________

Class of insulation________________

____

List functional accessories:*________________________________

____

____

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

6. General Valve Data

a. Valve

Name 2RHS * AOV 16A

Mfg. ANCHOR DARLING

Model 4412-3

S/N 6308-13

Type TESTABLE SWING CHECK VALVE

Size 12 in.

Weight 1470 lb.

Mounting Method BUTT WELD ENDS

Max. Required Torque N/A

Parameter	Component Design	System Normal/Accident
Press, psig	1250	1000 / 1350**
Temp, °F	575	552 / 575
Flow, gpm	8400	0 / 7450
Media	WATER	WATER / WATER

Max P across valve 1350 psig **

Closing time @ max P N/A

Opening time @ max P N/A

b. Actuator (if not an integral unit)

Name

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Max. Delivered Torque

Power Requirements: (include normal, maximum and minimum).

Electrical 120 VAC ± 10%

Other: (X) Pneumatic ( ) Hydraulic

90-120 psig

List functional accessories:*

ASCO SOLENOID VALVE, MODEL HKX8320A89V

NAMCO LIMIT SWITCH, MODEL EA180

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

** Valve presently being revised to 1500 psi Accident and differential pressure

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: CONTAINMENT ISOLATION, PREVENTS BACKFLOW FROM RPV TO RHR SYSTEM

Safety: CONTAINMENT ISOLATION & INJECTION FLOWPATH.

2. The components normal state is: ( )Operating (X)Standby

3. Safety function:

a. ( ) Emergency reactor shutdown
b. ( ) Containment heat removal
c. (X) Containment isolation
d. ( ) Reactor heat removal
e. ( ) Reactor core cooling
f. ( ) Prevent significant release of radioactive material to environment
g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X)Yes ( ) No
(X) LOCA (X) HELB (X) MSLB
( ) Other ______

4. Safety requirements:

( ) Intermittent Operation (X) During postulated event

(X) Continuous Operation (X) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.
100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

does the component ( )Fail open ( )Fail closed ( )Fail as is N/A

Is this the fail safe position? ( ) Yes ( ) No N/A (CHECK VALVE)

Is the valve used for throttling purposes? ( ) Yes (X) No

What is the maximum acceptable internal and external leakrate?

1.2 SCFH AIR AT 45 PSIG ΔP (INTERNAL)
NONE (EXTERNAL)

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME B&PV CODE, SECTION III, DIV. 1, 1977;

   SECT. NB; CODE CASE N-181.

   MSS. SP-61, 1961

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 323-1974

   IEEE 382-1972; IEEE 344-1975

   REG. GUIDES 1.48/1.61/1.89/1.100/1.82/1.35

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
   (X) Yes ( ) No

4. Are the margins* identified in the qualification documentation? (X) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) ASSEMBLY (S[illegible]).
   SUB-ASSEMBLY FOR ASCO SOLENOID VALVE AND NAMCO LIMIT SWITCH

6. List all component tests performed or to be performed that demonstrate qualification:

   HYDROSTATIC SHELL & SEAT TESTS

   PNEUMATIC SEAT LEAKAGE TESTS

   PERFORMANCE TESTS - ASSEMBLY

   RADIATION AND THERMAL AGING, LOCA TESTS

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

7. List all component analyses performed that demonstrate qualification:

- ASCO S.O.V. - QUALIFIED LIFE AND ACCIDENT LEVELS
- NAMCO LIMIT SWITCH - CALC. OF TOTAL INTEGRATED DOSE
- NAMCO " " - EXTENSION OF POST-ACCIDENT OPERABILITY PERIOD
- ASME CODE - STRESS/SEISMIC REPORT & SUPPLEMENTARY CALC. FOR HYDRODYNAMIC LOADS
- NAMCO LIMIT SWITCH - SUPPLEMENTARY CALC. FOR DYNAMIC QUAL. OF NAMCO LIMIT SWITCH, MODEL EA180 & ER740
- ASCO SOV - SUPPLEMENTARY CALC. FOR DYNAMIC QUAL. OF ASCO SOLENOID VALVES

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ( ) Yes (X) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? (X) Yes ( ) No. If "No", is installed component ( ) oversized or ( ) undersized?

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

SHOP TEST:
- HYDRO SHELL TEST - 3375 PSIG
- DISC & SEAT LEAKAGE TEST - 2250 PSIG
- PNEUMATIC SEAT LEAKAGE TEST - 45 PSIG

ENVIRONMENTAL TESTS:
- TEMP: 150°F - NORMAL; 448°F - ACCIDENT
- PRESS: ATMOS. NORMAL; 68 PSIG - ACCIDENT
- R.H.: 100% NORMAL; STEAM - ACCIDENT

APPLIED IN COMBINATION.

- RADIATION: 2.05 x 10⁸ RADS GAMMA

APPLIED INDIVIDUALLY

DYNAMIC LOAD ANALYSIS: SSE - 3G IN THREE DIRECTIONS, COMBINED WITH NORMAL OPERATING LOADS

DYNAMIC TEST (LIMIT SW. & S.O.V.): OBE + SRV + NORMAL OPERATING LOADS - 6g, 6000 cycles.

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

( ) Yes (X) No If "Yes" identify:____________

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

9.1 YRS, ASCO SOLENOID VALVE

QUAL. IN PROGRESS FOR SELF-LUBE BEARINGS ON VALVE INDICATOR SHAFT

13. Which of the components normal maintenance items requires the most frequent replacement? EPDM GASKET - ASCO VALVE What is the normal time interval between replacements of this item?

UPON DISASSEMBLY OR AS REQUIRED

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

TEMP: 135°F NORMAL (AVERAGE); 340°F ACCIDENT

PRESS: 0.5-1.0 PSIG-NORMAL; 45 PSIG ACC.

RH: 90% NORMAL; 100% ACCIDENT

RADIATION. 1.24×10^8 RADS - COMBINED RADIATION FOR GAMMA, BETA AND NEUTRON FOR 40 YRS PLUS ACCIDENT (INCLUDES BETA REDUCTION AND NEUTRON CONVERSION)

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
P303W	SPECIFICATION FOR SPECIAL CHECK VALVES ASME III, Classes 1 and 2. Rev 1, and Addenda 1,2,3	4/22/80 thru 6/15/83	SWEC	SWEC
P02387	E&DCR -EXCLUDED EQMT.	9/27/84	SWEC	SWEC
P02,447A	E&DCR - ENVIRON. QUAL. REQMTS	3/28/85	SWEC	SWEC
P02,552	E&DCR - PRESS. RETAINING PARTS	2/13/85	SWEC	SWEC
P12,794	E&DCR - ADDITION OF NEW VALVE	3/30/85	SWEC	SWEC
P13,267	E&DCR - INCORRECT VALVE MK. NO	2/12/85	SWEC	SWEC
Z099	N&D: NONCOMPLIANCE WITH ASME	8/7/84	SWEC	SWEC
Z100	N&D: NONCOMPLIANCE WITH ASME	8/13/84	SWEC	SWEC
Z066	N&D: DESSICANT APPROVAL	7/8/81	SWEC	SWEC
1G-5891	N&D: ARC STRIKE	1/14/85	SWEC	SWEC
10,351	N&D: INCORRECT MK. No. DOCUMENTATION	11/19/84	SWEC	SWEC
IEEE 5.320 -5001A	QUALIFICATION REPT. QTR-105 Prod. (NAMCO LIMIT SW.)	1/9/84	NAMCO	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
—	QA PACKAGE -SHOP TESTS	—	VARIOUS	SWEC
P02, 61BA	E&DCR-HYDRODYNAMIC LOADS	6/18/85	SWEC	SWEC
MS-1904	SUPP. CALC - DYNAMIC QUAL. OF ASCO SOV'S	6/17/85	SWEC	SWEC
MS-1903	SUPP. CALC - DYNAMIC QUAL. OF NAMCO LIMIT SWITCHES	6/17/85	SWEC	SWEC
IEEE 05.320 -5000B	ENVIRONMENTAL QUAL. OF ASCO SOV'S	6/28/85	ASCO/SWEC	SWEC
12177 EQS-016	ASCO SOV - QUAL. LIFE & ACCIDENT LEVELS	5/1/85	SWEC	SWEC
12177 EQS-021	CALC. OF T.I.D. FOR NAMCO LIMIT SWITCH	6/26/85	SWEC	SWEC
12177 EQS-022	EXTENSION OF POST-ACCIDENT OPERABILITY PERIOD FROM 30 TO 180 DAYS + MARGIN - NAMCO LIMIT SW.	6/26/85	SWEC	SWEC
V-5970	ASCO INSTALLATION AND MAINTENANCE INSTRUCTION FORM	—	ASCO	SWEC
MEQ-P303W	MECH. EQUIPMENT ENVIRON. QUAL., Rev 1	3/27/85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
INST. 5.320 -5009A	INSTRUCTION AND MAINTENANCE MAN. REPT. 2242.1	12/20/79	ANCHOR DARLING	SWEC
—	PERFORMANCE TEST PROCEDURE REPT. 2160.1 Rev C	8/14/79	ANCHOR DARLING	SWEC
5.360-170-232A	VALVE DWG. BILL OF MATL., 4412-3 SHT.1	5/14/81	ANCHOR DARLING	SWEC
5.360-170-233A	VALVE DWG.	5/14/81	ANCHOR DARLING	SWEC
—	DESIGN & SEISMIC REPORT-LAB 79.195 12177-N-SR821-0	11/24/80	ANAMET LABS FOR ANCHOR DARLING	SWEC
EQEDC -1	EQUIPMENT QUAL. ENVIRONMENTAL DESIGN CRITERIA	5/2/84	SWEC	SWEC
EP-71K Rev 11	RHS PIPING DWG -REACTOR BLDG	10/31/84	SWEC	SWEC
FSK 27-7A	RHS-FLOW DIA.	10/31/84	SWEC	SWEC
5.4-13	RHS-P&ID SHT. 2 OF 2	—	GE	SWEC
MS-1884 Rev. 2	SUPPLEMENTARY CALC-SEISMIC & HYDRODYNAMIC SUMMARY -SPEC P303W	6/18/85	SWEC	SWEC
—	OWNERS CERTIFICATION STRESS REPT.12177-N-SR-821-0	11/24/80	SWEC	SWEC

11P

SPEC. NO. P304A

PVORT #11

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: BALL VALVE

MARK NUMBERS: 2SWP*MOV1A

STONE & WEBSTER

SPEC. NO. P304A
Revision

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP
2. Location: a. Building/Room SCREENWELL
   b. Elevation 257'
   c. System SERVICE WATER
3. Component I.D. No. on P&ID dwg. 2SWP*MOV1A
4. If component is a ( ) Pump complete II.5.
   If component is a (X) Valve complete II.6.
5. General Pump Data N/A

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

---

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (Continued)

Overall Dimensions__________

Weight__________

Mounting Method__________

Required B.H.P.__________

Parameter	Component Design	System Normal/Accident
Press		/
Temp		/
Flow		/
Head		/
Media		/

Required NPSH at maximum flow__________

Available NPSH__________

Operating Speed__________

Critical Speed__________

List functional accessories:*__________

b. Prime-mover (Continued)

Overall Dimensions__________

Weight__________

Mounting Method__________

H.P.__________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor (Voltage)__________

Turbine (pressure)__________

If MOTOR list:

Duty cycle__________

Stall current__________

Class of insulation__________

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

6. General Valve Data

a. Valve

Name 4 in. TOP ENTRY BALL VALVE

Mfg. CONTROMATICS

Model U-2533-BC

S/N 86397-17-1

Type BALL VALVE - ASME Cl. 3

Size 4"

Weight 150 lbs.

Mounting Method BUTT WELD

Max. Required Torque 276 FT. LBS

Parameter	Component Design	System Normal/Accident
Press, psig	150	65 / 90
Temp, °F	130	32-77/ 32-77
Flow, gpm	500	400/ 400
Media	WATER	WATER/ WATER

Max P across valve 100 psig

Closing time @ max P **

Opening time @ max P **

b. Actuator (if not an integal unit)

Name ACTUATOR

Mfg. LIMITORQUE

Model SMB-000-2/H1BC

S/N 340735 – 340741

Type ELECTRO-MECHANICAL

Size SMB-00

Weight 405 lb (INCLUDES MTG. BRACKET)

Mounting Method BOLTED TO VALVE

Max. Delivered Torque 2,288 FT. LBS

Power Requirements: (include normal, maximum and minimum).

Electrical 575V/3PH/60 HZ.

Other: ( )Pneumatic ( )Hydraulic

List functional accessories:*

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

** CONTROMATICS TO RETROFIT ACTUATOR & VALVE STEM DUE TO SPEC. VIOLATION OF MAX. ACTUATOR TORQUE OUTPUT.

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: VALVE TO OPEN WHEN STRAINER CLOGGED TO ALLOW SELF CLEANING BACKWASH

Safety: (SAME)

2. The components normal state is: (X) Operating (X) Standby
CYCLES ON BACKWASH

3. Safety function:

a. ( ) Emergency reactor shutdown
b. (X) Containment heat removal
c. ( ) Containment isolation
d. (X) Reactor heat removal
e. ( ) Reactor core cooling
f. ( ) Prevent significant release of radioactive material to environment
g. (X) Does the component function to mitigate the consequences of one or more of the following events? (X) Yes ( ) No
(X) LOCA (X) HELB (X) MSLB
( ) Other

4. Safety requirements:

(X) Intermittent Operation ( ) During postulated event

( ) Continuous Operation (X) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.
100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

does the component ( )Fail open ( )Fail closed (X)Fail as is

Is this the fail safe position? ( ) Yes (X) No

Is the valve used for throttling purposes? ( ) Yes (X) No

What is the maximum acceptable internal and external leakrate?
1cc/HR/INCH STEM DIA

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME B&PV CODE, SECT. III, DIV. 1, 1977 THRU. SUMMER '78 ADDENDA: MSS-SP-72, 1970.

2. Reference those qualification standards, used as a guide to qualify the component: IEEE Std. 344-75; IEEE Std 382-72; IEEE Std. 323-1974 REG. GUIDES 1.48/1.61/1.89/1.100

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
(X) Yes ( ) No

4. Are the margins* identified in the qualification documentation? (X) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) ASSEMBLY FOR SHOP TESTS ; SUB-ASSEMBLY FOR OPERATOR

6. List all component tests performed or to be performed that demonstrate qualification:

a) ASSEMBLY : OPERABILITY (STATIC LOAD TESTS)
b) SHOP TESTS : SHELL, SEAT & PACKING HYDROSTATIC LEAK TESTS
OPERATOR MOTOR - LOCKED ROTOR, DIELECTRIC TESTS
OPERATOR : TORQUE AT MAX (+10%) & MIN (-20%) VOLTAGE
: STALL TORQUE (WITH TORQUE LIMIT DEVICES NEGATED)
ASSEMBLY : PERFORMANCE TESTS (3 CYCLES OPEN/CLOSE AGAINST MAX ΔP, AT MIN. VOLTAGE, WITHIN SPEC. OPENING TIME)
c) OPERATOR : DYNAMIC LOAD-SINE DWELLS

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

7. List all component analyses performed that demonstrate qualification:

STRS 05.340-5004D - SEISMIC ANALYSIS

STRS 05.340-5004E - RESPONSE TO SEISMIC ANALYSIS REVIEW COMMENTS

NS-1949 Rev O - SUPP. CALC. FOR SEISMIC QUAL.

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? (X) Yes ( ) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

a) LIMITORQUE ACTUATOR TORQUE WAS FOUND TO BE IN EXCESS OF SPECIFIED MAXIMUM. OPERATOR GEARING BEING CHANGED TO REDUCE TORQUE: STEM MATERIAL CHANGE TO HIGHER STRENGTH TO PREVENT TORQUE DAMAGE. (SEE ATTACHED LETTERS). *

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? (X) Yes, with one exception** (✓) No. If "No", is installed component (✓) oversized or ( ) undersized?

10. Is component orientation sensitive? ( ) Yes (X) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? ( ) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

STATIC OPERABILITY TEST: 4G. IN 3 ORTHOGONAL DIRECTIONS SIMULTANEOUSLY WITH DESIGN PRESSURE, AND STROKED WITH SPEC. TIME AT 80% RATED VOLTAGE.

HYDRO: SHELL - 450 psig for 10 mins.; DISC - 315 psig for 1 min; SEAT - 315 psig for $\frac{1}{2}$ min.

ASSY. PERFORMANCE - CYCLE IN SPEC. TIME AGAINST MAX. ΔP

MOTOR ROUTINE: 0.3A NO LOAD; 2.3A LOCKED ROTOR

* 8)(CONT) b) DUE TO LIMITORQUE ACTUATOR TESTING, LIMIT SWITCH SCREWS & BOLT TORQUES TO BE ADJUSTED & LIMIT SWITCH FINGER ASSY. GAPS TO BE ADJUSTED

** 9) DYNAMIC TEST OF LIMITORQUE WAS PERFORMED ON SMB-000-5/H0BC COMPARED TO SMB-000-2/H1BC

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

( ) Yes (X) No If "Yes" identify: ____________

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YEARS

13. Which of the components normal maintenance items requires the most frequent replacement? GASKETS, GREASE AND PACKING RINGS What is the normal time interval between replacements of this item? UPON DISASSEMBLY OR AS REQUIRED PER ISI & MAINTENANCE PROGRAM WHICH WILL BE ESTABLISHED 6 MONTHS PRIOR TO COMMERCIAL OPERATION

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

MILD ENVIRONMENT —
TEMP: 92°F
PRESS: ATMOS.
REL. HUM: 90%

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
P304A	SPEC: "BALL VALVES - ALL SIZES" ADDENDA 1 & 2	11-8-79 THRU 2/9/81	SWEC	SWEC
P00,994	E&DCR: SHOP PAINT EXCEPTION	1/7/82	SWEC	SWEC
P01,071	E&DCR: IDENTITY PLATE MARKING	1/28/82	SWEC	SWEC
P01,138	E&DCR: DOCUMENT SHIPPING RELEASE	11/3/81	SWEC	SWEC
P01,310	E&DCR: SHIPPING RELEASE	7/28/82	SWEC	SWEC
P21,373	E&DCR: MILD ENVIRON. REQMTS	6/27/84	SWEC	SWEC
P01,309	E&DCR: SUPPLY DOCS. AFTER SHIPPING	7/27/72	SWEC	SWEC
12177-ER66B-7	DWG: MISC. PIPING SCREENWELL BLDG.	—	SWEC	SWEC
12177 FSK-9-10A	FLOW DIAG. - SERVICE WATER	2/14/85	SWEC	SWEC
P&ID -11A	PIPING & INST. DWG. - SERVICE WATER SYST.	7/31/84	SWEC	SWEC
0005.340-952-045B	DWG. - LIMITORQUE OPERATOR	1/22/82	LIMITORQUE	SWEC
0005.540-952-033G	DWG - 4" MOTOR OPER. BALL VALVE	3/19/85	CONTROMATICS	SWEC
STRS. 5.340-5000B	SEISMIC QUAL. REPORT 4" TOP ENTRY BUTTWELD VALVE MOUNTED TO AN ACTUATOR - 16985-82N (OPERABILY TEST)	6/16/82	CONTROMATICS	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
TEST. 5.340 -5000B	TEST PROCEDURE FOR CONTROMATICS FOR STATIC LOAD TESTING (OPERABILITY)	2/8/82	ACTON TEST CORP.	SWEC
STRS 05.340 -5004E	SEISMIC ANALYSIS RESPONSE TO COMMENTS	5/29/85	CONTROMATICS	SWEC
STRS 05.340 -5004D	SEISMIC ANALYSIS	6/25/85	ACTON TEST CORP	SWEC
IEEE 5.340 -5009A	LIMITORQUE REPT B0058, APP. 10 OF APP. F.	3/13/79	ACTON TEST CORP	SWEC
—	QA. PACKAGE: SPEC COMPLIANCE DOCS.	—	VARIOUS	SWEC
EQEDC -1	EQUIP. QUAL. ENVIRON. DESIGN CRITERIA	5/2/84	SWEC	SWEC
MS-1949 Rev O	SUPP. CALC. FOR SEISMIC QUAL. OF CONTROMATICS 4" VALVE	5/31/85	SWEC	SWEC
TEST 5.340 -5001A	MOTOR OPERATOR TEST PROCEDURE	4/6/85	CONTROMATICS	SWEC
TEST 5.340 -5002A	MOTOR OPERATOR TEST DATA	4/6/85	CONTROMATICS	SWEC
86397-1	VALVE TEST PROCEDURE	1/18/82	CONTROMATICS	SWEC
PT-86397	PERFORMANCE TEST	1/4/82	CONTROMATICS	SWEC
ED-GENE.014	ELECTRICAL TEST PROCEDURE	—	SWEC	SWEC

NOTED JAN 31 1985 R. SUP

CONTROMATICS Division of Quamco, Inc.

'ow Control Products

222 Roberts Street, East Hartford, Connecticut 06108
General 203 528-9935
Sales 203 528-9903

063288

85 JA 31 P 11:47

January 28, 1985

Stone & Webster Engineering Corp
P.O. Box 5200
Cherry Hill, NJ 08034

Attn: T.B. Madden
Lead Power Engineer

J. Sullivan
LYL T.B. Madden
DIVISION: 46

Ref: P.O. No. NMP2-P304A
Ball Valves
Section III, Class 2 & 3
Nine Mile Point Unit 2
Niagara Mohawk Power Corp
Our S.O. NP 86397
Your letter of 11-10-84 (9M2-17-406)

Gentlemen,

In order to correct the installed motor uperated valves, 2 SWP *MOV 1A, 1B, 1C, 1D, 1E and 1F we are proceeding with the following;

1. New gears will be installed in the motor operators to reduce torque out put to 1200 inch lbs. This will change the operating time to approximately 5 seconds.

2. Contromatics will manufacture six new stems from 17-4 ph, which requires 1500 inch lbs before it starts to twist.

It will take approximately 10-12 weeks to manufacture the new stems. We are contacting Limitorque to determine when they will be ready to install the new gears.

Would you identify a individual, either in New Jersey or New York with whom I can coordinate the timing of this repair.

If you have any questions please contact me.

Very truly yours,
CONTROMATICS
Division of Quamco, Inc.

L Bosh

Len Bosh
Manager, Sales Administration

RECEIVED
STONE & WEBSTER
JAN 31 1985
DOCUMENT CONTROL

LB/jmf
cc: W. Concannon
J. Sullivan
B. Bodnar (2)

STONE & WEBSTER ENGINEERING CORPORATION

COPY

Copy to:
JPThomas
RWHaddix
JTNiezabytowski

TBMadden
PDVisalli
CFOrdille
Doc. Control/CHOC
Doc. Control/Site
Job Book P304A
C3/12177/101/5YLWPC/41
JTSullivan 56
WConcannon

NOTED MAR 25 1985 W. MUIR

Contromatics
Attention Mr. Len Bosh
222 Roberts Street
East Hartford, CT 06108

March 25,1985

J.O.No. 12177
9M2-17,813
Responds to: NA
Response Required by: April 5, 1985

PURCHASE ORDER NO. NMP2-P304A
BALL VALVES ALL SIZES CATEGORY I
NINE MILE POINT NUCLEAR STATION - UNIT 2
NIAGARA MOHAWK POWER CORPORATION

In accordance with your letter dated January 28, 1985, the gear ratio and valve stems for 2SWP*MOV1A through F will be changed to comply with specification requirements.

Please complete the enclosed valve data sheet, Motor-Operated Ball Valve Data Sheet by Seller. In addition to the above-referenced change, please also complete items identified as Approx. or Later. Your prompt response in this matter is appreciated.

T. B. Madden
Lead Power Engineer

Enclosure

JTS:SG

SPEC. NO. P304D

PVORT 12

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: 18" - 300# BUTTERFLY VALVE WITH SMB-00-10/H3BC ACTUATOR

MARK NUMBERS: 2 RHS * MOV 9A

STONE & WEBSTER

SPEC. NO. P304D
Revision 0

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP
2. Location: a. Building/Room ABN - (AUXILIARY BAY-NORTH)
   b. Elevation 201' COL. 46.00 LINE W
   c. System RESIDUAL HEAT REMOVAL (RHS/RHR)
3. Component I.D. No. on P&ID dwg. E12*F047A (2RHS*MOV9A)
4. If component is a ( ) Pump complete II.5.
   If component is a (X) Valve complete II.6.
5. General Pump Data (NOT APPLICABLE)

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

---

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (Continued)

Overall Dimensions ____________________

Weight ____________________

Mounting Method ____________________

Required B.H.P. ____________________

Parameter	Component Design	System Normal/Accident
Press	______	______/______
Temp	______	______/______
Flow	______	______/______
Head	______	______/______
Media	______	______/______

Required NPSH at maximum flow ____________________

Available NPSH ____________________

Operating Speed ____________________

Critical Speed ____________________

b. Prime-mover (Continued)

Overall Dimensions ____________________

Weight ____________________

Mounting Method ____________________

H.P. ____________________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor(Voltage) ____________________

____

____

Turbine (pressure) ____________________

____

If MOTOR list:

Duty cycle ____________________

Stall current ____________________

Class of insulation ____________________

____

List functional accessories:* ____

____

____

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

6. General Valve Data

a. Valve

Name 18"-300# MOTOR OPERATED BUTTERFLY VALVE

Mfg. POSI SEAL INC.

Model (NOT APPLICABLE)

S/N 34077-1A

Type MOTOR OPERATED BUTTERFLY VALVE

Size 18"

Weight 1414# (TOTAL) 886# VALVE 528# ACT/BRK

Mounting Method FLG. BOLTED TO PIPE

*Max. Required Torque 33192 in-lb @ 500 PSI

b. Actuator (if not an integal unit)

Name MOTOR OPERATED ACTUATOR

Mfg. LIMITORQUE

Model SMB-00-10/H3BC

S/N MOTOR - B77Q6926M-ZK-1 ACTUATOR - L 375489 H3BC - L 375485

Type MOTOR OPERATED

Size SMB-00-10

Weight 528# ACT/BRK

Mounting Method BOLTED TO MTG. BRK.

**Max. Delivered Torque 33840 IN-LBS @ 460V (NORMAL SETTING) 42720 IN-LBS @ 460V (MAXIMUM SETTING) 126720 IN-LBS @ 632V (STALL VOLTAGE)☆

Parameter	*Component Design	System Normal/Accident
Press (PSIG)	500	425 / 350
Temp (°F)	358	40-358 / 212
Flow (GPM)	8400	7450 / 7450
Media	WATER	WATER / WATER

Max ΔP across valve 500 PSIG

***Closing time @ max P 47 SEC *15 SEC MIN *80 SEC MAX

***Opening time @ max P 47 SEC *15 SEC MIN *80 SEC MAX

Power Requirements: (include normal, maximum and minimum).

Electrical

NORMAL 575 V / 3Ø / 60 Hz

MAX. 633 V / 3Ø / 60 Hz

MIN. 460 V / 3Ø / 60 Hz

Other: ( )Pneumatic ( )Hydraulic

List functional accessories:* (NOT APPLICABLE)

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

* E+DCR P13248 -

** LIMITORQUE TEST DATA - DOCUMENTATION PACKAGE - TORQUE SWITCH FOR OPEN POSITION

*** STRS 05.312.5008B

☆(133680 IN-LBS - CLOSE)

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: VALVE IS NORMALLY OPEN, IT PROVIDES A FLOWPATH TO HEAT EXCHANGER 2RHS*E1A(E12-B001A) FOR SHUTDOWN & SUPPRESSION POOL COOLING

Safety: VALVE IS NORMALLY OPEN, IT PROVIDES A FLOWPATH TO HEAT EXCHANGER 2RHS*E1A (E12-B001A) FOR SUPPRESSION POOL COOLING & CONTAINMENT SPRAY

2. The components normal state is: ( )Operating (X)Standby

3. Safety function:

a. ( ) Emergency reactor shutdown
b. (X) Containment heat removal
c. ( ) Containment isolation
d. (X) Reactor heat removal
e. ( ) Reactor core cooling
f. ( ) Prevent significant release of radioactive material to environment
g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X)Yes ( ) No
(X) LOCA ( ) HELB (X) MSLB
( ) Other

4. Safety requirements:

(X) Intermittent Operation (X) During postulated event

( ) Continuous Operation (X) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.
100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

does the component ( )Fail open ( )Fail closed (X)Fail as is

Is this the fail safe position? (X) Yes ( ) No

Is the valve used for throttling purposes? ( ) Yes (X) No

What is the maximum acceptable internal and external leakrate?

2.5 GPH* NON-PREFERRED DIRECT. 0 **
3.0 cc/MIN PREFERRED DIRECT.

*E+DCR P13248
**STRS 05.312-5003A

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME SECT III, SUBSECTION NC-1977 EDITION & Addenda up to & including 7-30-77, CODE CASE N-142-1 (1774-1)

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 323-1974, 344-1975, 382-1972, NRC REG. GUIDE 1.48, 1.61, 1.73, 1.89, 1.100, 1.148

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
   (X) Yes ( ) No

4. Are the margins* identified in the qualification documentation? ( ) Yes (X) No

5. Was the component that was qualified a model or an actual assembly? ACTUAL ASSY (1). If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) SEISMIC ANALYSIS & STATIC DEFLECTION TEST ~ VALVE ASSEMBLY LIMITORQUE TEST ~ TYPE TEST ACTUATOR ONLY

   (1) FOR STATIC DEFLECTION TEST.

6. List all component tests performed or to be performed that demonstrate qualification:

   1) STATIC DEFLECTION TEST - VALVE ASSEMBLY
   2) SEISMIC TYPE TEST - LIMITORQUE ACTUATOR
   3) HYDROSTATIC SHELL TEST - VALVE ASSEMBLY
   4) MAIN SEAT LEAKAGE TEST - VALVE ASSEMBLY
   5) HYDROSTATIC DISC TEST - VALVE ASSEMBLY
   6.) MOTOR TEST. LIMITORQUE MOTOR
       a) LOCKED ROTOR TEST
       b) DIELECTRIC TEST
   7) MOTOR OPERATOR/ACTUATOR PRODUCTION TEST - LIMITORQUE ACTUATOR
       a) TORQUE TEST
       b) STALLED TORQUE TEST
   8.) PERFORMANCE/CYCLE TESTS - VALVE ASSEMBLY
   9.) ENVIRONMENTAL TESTS - LIMITORQUE ACTUATOR
       a) RADIATION AGING
       b) THERMAL AGING
       c) LOCA TEST

7. List all component analyses performed that demonstrate qualification:

a) STATIC SEISMIC ANALYSIS ~ VALVE ASSEMBLY ①

b) ARRHENIUS TECHNIQUES - TO CALCULATE QUALIFIED LIFE + EXTENDED PAOP

① SWEC CALC. 12177-EQS-025 (4-29-85)

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? (X) Yes ( ) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

DUE TO LIMITORQUE ACTUATOR TESTING - LIMIT SWITCH SCREWS + BOLT TORQUES WERE ADJUSTED + LIMIT SWITCH FINGER ASSEMBLY GAPS WERE ADJUSTED

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? ( ) Yes (X) No. If "No", is installed component (X) oversized or ( ) undersized?

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

1) STATIC SEISMIC ANALYSIS - SEISMIC LOAD, STATIC EQUIVALENT OF 3.0g's IN 2 OF THE ORTHOGONAL AXES + 4.0g's IN THE OTHER TO ACCOUNT FOR DEADWEIGHT ADDED TO THE VALVE OPERATING TORQUES - (PACKING 1134 in-lbs, SEAL 9906 in-lbs, HYDROSTATIC 18440 in-lbs)

2) SEISMIC TYPE TEST ~ LIMITORQUE ACTUATOR, SINGLE FREQUENCY SINE DWELL TESTS 5-30 SEC. DWELLS WITH 2.2g INPUT @ 35 hz + 1-30 SEC. DWELL WITH 4.4g INPUT @ 35 hz.

PVORT

3. STATIC DEFLECTION TEST - EQUIVALENT STATIC FORCE OF 7.5 g's (3636 Lbs) + LINE PRESSURE OF 500 PSI.
4. Hydrostatic Shell Test - DISC IN OPEN POSITION WITH 1125 PSIG APPLIED + held FOR 12 MINUTES
5. MAIN SEAT LEAKAGE TEST ~ IN PREFERRED FLOW DIRECTION WITH 815 PSIG APPLIED + held FOR 2 MINUTES, IN NON-PREFERRED FLOW DIRECTION WITH 500 PSIG APPLIED + held FOR 2 MINUTES
6. HYDROSTATIC DISC TEST ~ IN PREFERRED FLOW DIRECTION 815 PSIG APPLIED FOR 1 MINUTE
7. MOTOR OPERATOR / ACTUATOR PRODUCTION TEST
   a) TORQUE TEST - 33840 IN lbs @ 460 VOLTS, NORMAL SETTING TORQUE SWITCH IN OPEN POSITION
   - 42720 IN lbs @ 460 VOLTS, MAXIMUM SETTING TORQUE SWITCH IN OPEN POSITION
   b) STALLED TORQUE TEST - 126720 IN lbs @ 632 VOLTS IN OPEN POSITION
   133680 IN lbs @ 632 VOLTS IN CLOSED POSITION
8. MOTOR TEST
   @ LOCKED ROTOR - 8.2 AMPS
   b DIELECTRIC TEST - L.R. AMPS 10.0, 15 MINUTES
9. PERFORMANCE / CYCLE TEST - CYCLED, OPEN/CLOSED 2 TIMES WITH ACTUATOR AT 460 VOLTS, ONCE WITH HANDWHEEL & ONCE WITH 500 PSIG
   Response times ~ Open 37 To 49 seconds
   ~ Close 46 to 49 seconds

10. ENVIRONMENTAL TESTS ~

a. RADIATION AGING - 1.66×10^{8} RADS GAMMA - APPLIED INDIVIDUALLY

* b. THERMAL AGING - NORMAL 122°F ACCIDENT 250°F @ 25 PSIG - APPLIED TOGETHER

* c) RH ~ NORMAL/ACCIDENT 100% - APPLIED WITH b

* IEEE 05 312.5000B, .5000C

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

( ) Yes (X) No If "Yes" identify:______________

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

36 YEARS (Actuator) (A)

13. Which of the components normal maintenance items requires the most frequent replacement? LIMIT SWITCH GASKETS & LUBRICANTS What is the normal time interval between replacements of this item?

EVERY 18 MONTHS (B)

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.) (C)

TEMP - 175 °F

PRESSURE - 2.8 PSIG

HUMIDITY - 100% R.H.

GAMMA (ACCIDENT) - 4.5×10^7

BETA (ACCIDENT) - 1.3×10^7

SPRAY/SUBMERGENCE - NOT APPLICABLE

(A) SWEC CALC 12177-EQS-025

(B) IEEE 05.312.5000B, ... APPENDIX A, LUBRICATION & MAINTENANCE DATA

(C) EQ-EDC-1 (5-2-84)

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
SPEC. P304D REV. 1	Specification for Motor Operated, Air Operated, & Manual Butterfly Valves	11-30-83	SWEC	SWEC
E+DCR's P13057 13078A 13090 13185 13248 C91957 P13248A	 ADDED MOV'S TO SPEC REVISED HANDWHEEL ORIENT UPDATED ENVT DATA ADDED CODE CASE 1774 (N-142) REVISED VALVE DATA SHEETS REVISED VALVE INFO. REVISED VALVE DATA SHT	 10-9-84 1-29-85 10-30-85 1-11-85 2-6-85 3-29-85 (IN-PROGRESS)	SWEC	SWEC
DWGS 05.332. 054.038F	18" Class 300 Single Flange Valve Assy. Dwg No 34017-01 Rev. E	4-22-85	Posi Seal	SWEC
05.312 054.020A	Limitorque Valve Control SMB/HBC Dwg No. 02-441-0154-	2-14-85	Limitorque	SWEC
12177-FSK-27-7F	Flow Diagram Residual Heat Removal Rev. 8	10-31-84	SWEC	SWEC
12177-EP-71B-10 -71D-10	Piping Drawings Residual Heat Removal	2-27-85 2-27-85	SWEC	SWEC
	P&ID Fig. 5.4.13 SHEET 2/2 GE Dwg 731E961AF		GE	GE & SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
061584	INSTALL., OPER., & MAINTENANCE MANUAL	6-15-84	POSI-SEAL INTERNATIONAL. INC.	SWEC (FILE NO. 05.332-5000A)
061584	INSTALL., OPER., & MAINTENANCE MANUAL	11-07-84	POSI-SEAL INTERNATIONAL INC.	SWEC (FILE NO. 05.332-5000B)
34077-OTO1/0	OP. TEST PROC.	1-16-85	POSI-SEAL INTERNATIONAL INC.	SWEC (STRS 05.312-5008A)
14077-OT-01	OP. TEST RESULTS (IN CONJUNCTION WITH STRS. 05.312-5008A)	4-25-85	POSI-SEAL INTERNATIONAL INC	SWEC (STRS 05.312-5008B)
34077TP-02	CYCLE/PERFORMANCE TEST	1-27-84	POSI-SEAL INTERNATIONAL INC.	SWEC (PROC. 05.312-5000A)
34077TP-01	HYDRO SEAT TEST PROCEDURE	10-01-84	POSI-SEAL INTERNATIONAL INC.	SWEC (TEST 05.312-5001B)
N/A	PERFORMANCE TEST REPORT	4-26-85	POSI-SEAL INTERNATIONAL INC.	SWEC (TEST 05.312-5003A)
CALC. 12177-EQS-025 REV. 0	QUAL. LIFE DETERMINATION OF LIMITORQUE ACTUATORS @ AC CLASS RH. INSULATED MOTORS OUTSIDE PRIMARY CNMT.	4-29-85	SWEC.	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
B0058	LIMITORQUE VALVE ACTUATOR QUALIFICATION	1-11-80	LIMITORQUE INC.	SWEC (IEEE 05.312-5000B 5000C
	GE PHASE III PRETEST DOCUMENTS PRODUCT ANALYSIS REPORT (PAR)	6-6-84	GENERAL ELECTRIC	SWEC IEEE 016.820-5007C
MEQ P304Y REV. 1	MECHANICAL EQUIP ENV. QUAL.	1-30-85	SWEC	SWEC
EQEDC-1	EQUIP. QUAL. ENV. DESIGN CRITERIA	5-2-84	SWEC	SWEC
ED. GENE. 014	ELECTRICAL TEST PROCEDURE, MOTOR OPERATED VALVES	–	SWEC	SWEC

2

SPEC. NO. NMP2- P304K
PVORT #13

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: 2 INCH, 150 Lb. AIR OPERATED PLUG VALVE

MARK NUMBERS: 2CCP* AOV37B

STONE & WEBSTER

SPEC. NO. NMP2-P304K
Revision 0
PVORT #13

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

1. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410

3. Utility: Niagara Mohawk Power Corporation

4. NSSS: General Electric Co. ( ) PWR (X) BWR

5. A/E: Stone & Webster Engineering Corporation

6. C.P. and/or O. L. SER date 6/24/74

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP

2. Location: a. Building/Room AUXILIARY BAY SOUTH

b. Elevation 176'-6"

c. System REACTOR BUILDING CLOSED-LOOP COOLING WATER (CCP)

3. Component I.D. No. on P&ID dwg. 2CCP*AOV37B

4. If component is a ( ) Pump complete II.5.

If component is a (X) Valve complete II.6.

5. General Pump Data N/A

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

---

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

SPEC. No. NMP2-P304K
REVISION 0
PVORT #13

a. Pump (Continued)

Overall Dimensions ____________________

Weight ____________________

Mounting Method ____________________

Required B.H.P. ____________________

Parameter	Component Design	System Normal/Accident
Press	______	______/______
Temp	______	______/______
Flow	______	______/______
Head	______	______/______
Media	______	______/______

Required NPSH at maximum flow ____________________

Available NPSH ____________________

Operating Speed ____________________

Critical Speed ____________________

b. Prime-mover (Continued)

Overall Dimensions ____________________

Weight ____________________

Mounting Method ____________________

H.P. ____________________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor (Voltage) ____________________

____

____

Turbine (pressure) ____________________

____

If MOTOR list:

Duty cycle ____________________

Stall current ____________________

Class of insulation ____________________

____

List functional accessories:* ____________________

____

____

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

SPEC. No. NMP2-P304K
REVISION 0
PVORT # 13

6. General Valve Data

a. Valve

Name 2 INCH, 150 # PLUG VALVE

Mfg. ATWOOD & MORRILL

Model 166 SW

S/N 1-18038-27

Type PLUG VALVE

Size 2 INCH, 150 #

Weight 20 LBS (1)

Mounting Method LINE MOUNTED/SOCKET WELD

Max. Required Torque 2200 IN-LB

b. Actuator (if not an integal unit)

Name ROBOTARM AIR ACTUATOR

Mfg. BETTIS

Model NCB-725-SR80

S/N 83-9054

Type PISTON/SPRING

Size SERIES CB-725

Weight 101 LBS (1)

Mounting Method BOLTED

Max. Delivered Torque 3800 IN-LB

Parameter	Component Design	System Normal/Accident
Press (PSIG)	225	100 / 125
Temp (°F)	150	95 / 150
Flow (GPM)	50	50 / 50
Media	DEMIN WATER	DEMIN WATER / DEMIN WATER

Max P across valve 100 PSI

Closing time @ max P 8 SEC

Opening time @ max P 16 SEC

Power Requirements: (include normal, maximum and minimum).

Electrical

120 VOLTS AC, ±10%

(SOLENOID VALVE)

Other: (X) Pneumatic ( ) Hydraulic

70 PSIG - MINIMUM
80 PSIG - NORMAL
125 PSIG - MAXIMUM

List functional accessories:* N/A

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

(1) NOTE: TOTAL VALVE ASSEMBLY WEIGHT IS 188 LBS (VALVE 20 LBS, ACTUATOR 101 LBS, BRACKET & ACCESSORIES 67 LBS)

SPEC. No. NMP2-P304K
REVISION 0
PVORT # 13

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: THE VALVE IS NORMALLY OPEN TO ALLOW CCP SYSTEM FLOW THROUGH THE RESIDUAL HEAT REMOVAL PUMP (2RHS*P1B,C) SEAL COOLERS.

Safety: IF CCP SYSTEM FLOW IS NOT AVAILABLE AFTER AN ACCIDENT THE VALVE WILL ISOLATE THE CCP SYSTEM FROM SAFETY RELATED SERVICE WATER SYSTEM INTER-TIES

2. The components normal state is: (X) Operating ( ) Standby

3. Safety function:

a. ( ) Emergency reactor shutdown
b. (X) Containment heat removal
c. ( ) Containment isolation
d. (X) Reactor heat removal
e. ( ) Reactor core cooling
f. ( ) Prevent significant release of radio-active material to environment
g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X) Yes ( ) No
(X) LOCA (X) HELB (X) MSLB
( ) Other ______

4. Safety requirements:

( ) Intermittent Operation ( ) During postulated event

(X) Continuous Operation (X) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.
100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

does the component ( ) Fail open (X) Fail closed ( ) Fail as is

Is this the fail safe position? (X) Yes ( ) No

Is the valve used for throttling purposes? ( ) Yes (X) No

What is the maximum acceptable internal and external leakrate?

INTERNAL; 4cc PER HOUR EXTERNAL: NONE

SPEC No. NMP2-P304K
REVISION 0
PVORT #13

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME III, DIVISION 1, 1980 EDITION - SUBSECTION · ND

2. Reference those qualification standards, used as a guide to qualify the component:

   IEEE 323-1974, IEEE-344-1975, IEEE-382-1972

   REGULATORY GUIDES 1.48, 1.84, 1.85, 1.100

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
   (X) Yes ( ) No

4. Are the margins* identified in the qualification documentation? (X) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) SUB-ASSEMBLIES; (VALVE OPERATOR, LIMIT SWITCHES, SOLENOID VALVE, VALVE BODY)

6. List all component tests performed or to be performed that demonstrate qualification:

   · HYDROSTATIC SHELL

   · HYDROSTATIC SEAT

   · VALVE ASSEMBLY STATIC DEFLECTION

   · AIR-OPERATOR SEISMIC TESTS

   · ASCO SOLENOID VALVE QUALIFICATION TESTS(1)

   · NAMCO LIMIT SWITCH QUALIFICATION TESTS(1)

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

(1) NOTE: TEST PROGRAMS INCLUDE SEISMIC AND ENVIRONMENTAL TESTING

SPEC. No NMP2-P304K
REVISION 0
PVQRT #13

7. List all component analyses performed that demonstate qualification:

1) VALVE ASSEMBLY SEISMIC ANALYSIS

2) ENVIRONMENTAL QUALIFIED LIFE CALCULATION

3) MECHANICAL QUALIFICATION CALCULATION

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ( ) Yes (X) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? ( ) Yes (X)*No. If "No", is installed component (X) oversized or ( ) undersized?

* OPERATOR (OVERSIZED), LIMIT SWITCH BOLT MOUNTING PATTERN DIFFERENT

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

SEE ATTACHMENT "A"

NOTE: LOADS PRESENTED ON ATTACHMENT 'A' WERE APPLIED SEPERATLY (EXCEPT AS NOTED OTHERWISE)

SPEC. No. NMP2-P304K
REVISION 0
PVORT #13

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

(X) Yes ( ) No If "Yes" identify:

POLYETHYLENE LINER AND SEALS IN VALVE BODY

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YEARS - NAMCO LIMIT SWITCH

11.3 YEARS - ASCO SOLENOID VALVE

40 YEARS - POLYETHYLENE LINER AND SEALS

13. Which of the components normal maintenance items requires the most frequent replacement? SOLENOID VALVE COIL & ELASTOMERIC COMPONENTS What is the normal time interval between replacements of this item?

RECOMMENDED REPLACEMENT SCHEDULE IS 4 YEARS

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

	NORMAL (1)	ACCIDENT (1)
TEMPERATURE (°F)	85°F-	175°F
PRESSURE	$-0.25"$ H_2O (GAGE)	2.8 PSIG
RELATIVE HUMIDITY (%)	50	100
RADIATION - GAMMA (RADS)	8.4×10^5	4.6×10^7
BATA (RADS)	N/A	1.3×10^7

(1) NOTE. VALUES ARE EQUIPMENT SPECIFIC

ATTACHMENT A

VALVE BODY — SHELL HYDROSTATIC- 450 psig
SEAT LEAKAGE- 315 psig

VALVE ASSEMBLY

1) SEISMIC LOADS FOR STATIC ANALYSIS AND STATIC DEFLECTION TEST

	HORIZONTAL	VERTICAL
SSE	3.0g	3.0g

(note: loads combined to give a resultant of 5.83g)

2) LOW LEVEL IMPACT TESTING ("BUMP") TO ESTABLISH NATURAL FREQUENCIES

VALVE OPERATOR (BETTIS AIR CYLINDER)

RANDOM MULTIFREQUENCY TESTS WITH ZERO PERIOD ACCELERATIONS (ZPA) IN EXCESS OF 3.0g FOR OBE AND SSE TESTS

LIMIT SWITCHES

1) SINE DWELLS IN EACH ORTHOGONAL AXIS ("X", "Y", "Z") APPLIED AT 16 FREQUENCIES FOR THE FOLLOWING ACCELERATION LEVELS:

1 TO 4 Hz 0.6 to 10g's
4 TO 32 Hz 10g

2) ENVIRONMENTAL LOADS

		NORMAL	ACCIDENT
(1)	TEMPERATURE (°F)	194	380
(1)	PRESSURE (PSIG)	0	100
(1)	REL. HUMIDITY (%)	100	STEAM
	RADIATION (GAMMA) — TOTAL DOSE		2.04×10^8 RADS

SOLENOID VALVE

1) OBE TEST: 2 SINUSOIDAL SWEEPS, FROM 1 TO 35 TO 1 Hz, AT A RATE OF 1 OCTAVE/MIN AT 3.0g ABOVE 9Hz IN EACH AXIS. (TABLE LIMITS BELOW 9Hz)

SSE TEST: SINE BEATS AT 17 FREQUENCIES, BETWEEN 1 AND 35 Hz IN EACH AXIS, WITH PEAK ACCELERATIONS OF AT LEAST 3g ABOVE 6.0 Hz. (TABLE LIMITS BELOW 6Hz)

2) ENVIRONMENTAL LOADS

	NORMAL	ACCIDENT
TEMPERATURE (°F)	140	346
PRESSURE (PSIG)	0	110
REL. HUMIDITY (%)	100	STEAM
RADIATION (GAMMA) - TOTAL DOSE		2.0×10^8 RADS

(1) NOTE: APPLIED IN COMBINATION

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
SPECIFICATIONS				
SPEC. No NMP2-P304K ADDENDA 1 THROUGH 5	MANUAL PLUG VALVES	8-6-81 TO 3-12-85	SWEC	SWEC/NMPC
E&DCR P13,336	REVISED DATA SHEETS	4-2-85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
DRAWINGS				
5.340-144-374A	VALVE AND OPERATOR ASSEMBLY DRAWING	4/9/85	ATWOOD & MORRILL/SWEC	ATWOOD & MORRILL/SWEC
5.340-144-346D	LIMIT SWITCH BRACKET ASSEMBLY DRAWING	4/26/84	ATWOOD & MORRILL	SWEC
12177-DP372-BF-5	REACTOR BUILDING CLOSED LOOP COOLING PIPING ISOMETRIC	4/20/84	SWEC	SWEC
FSAR FIGURE 9.2-3E	PIPING & INSTRUMENTATION DRAWING	—	SWEC	SWEC
12177-FSK-9-1C-8	FLOW DIAGRAM	5/22/85	SWEC	SWEC
12177-EP-72C-7	PIPING LOCATION DRAWING	6/29/84	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
QUALIFICATION DOCUMENTS				
STRS-5.340-5028A	SEISMIC ANALYSIS, STATIC OPERABILITY TEST & LOW LEVEL IMPACT (NATURAL FREQUENCY) TEST REPORTS	5/16/84	ATWOOD & MORRILL	SWEC
IEEE-5.340-5006	AIR-OPERATOR QUALIFICATION REPORT	—	SOUTHWEST RESEARCH INST., BETTIS CORPORATION	SWEC
IEEE-5.340-5002	AIR-OPERATOR CERTIFICATE OF COMPLIANCE	—	BETTIS CORPORATION, ATWOOD & MORRILL	SWEC
IEEE-5.340-5004B	ASCO SOLENOID VALVE QUALIFICATION REPORT	1/23/85	AUTOMATIC SWITCH CO (ASCO)	SWEC
IEEE-5.340-5001	ASCO SOLENOID CERTIFICATE OF COMPLIANCE	—	AUTOMATIC SWITCH CO. (ASCO), ATWOOD & MORRILL	SWEC
IEEE-5.312-5002B	NAMCO LIMIT SWITCH QUALIFICATION REPORT	2/11/85	NAMCO CONTROLS	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
IEEE-5.340-5000	NAMCO LIMIT SWITCH CERTIFICATE OF COMPLIANCE	—	NAMCO CONTROLS, ATWOOD & MORRILL	SWEC
TEST-5.500-5000A	HYDROSTATIC SHELL AND SEAT LEAKAGE TEST PROCEDURE	7/22/82	ATWOOD & MORRILL	SWEC
—	HYDROSTATIC SHELL AND SEAT LEAKAGE TEST RESULTS	2/29/84	ATWOOD & MORRILL	SWEC
INST. 05.340-5008A	MAINTENANCE AND REPAIR INSTRUCTION MANUAL	12/20/84	ATWOOD & MORRILL	SWEC
MEQ-P304K REV. 1	MECHANICAL EQUIPMENT ENVIRONMENTAL QUALIFICATION	3/27/85	SWEC	SWEC
12177-EQS-016	ENVIRONMENTAL QUALIFICATION CALCULATION	5/1/85	SWEC	SWEC
EQ EDC-1	EQUIPMENT QUALIFICATION ENVIRONMENTAL DESIGN CRITERIA	5/2/84	SWEC	SWEC
—	DOCUMENTATION PACKAGE	5/30/84	ATWOOD & MORRILL	SWEC

14P

SPEC. NO. P304R

PVORT # 14

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: SHUT-OFF VALVE

MARK NUMBERS: 2MSS*MOV112

STONE & WEBSTER

SPEC. NO. P304R
Revision O

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74 ____

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (✓) BOP
2. Location:
   a. Building/Room STEAM TUNNEL
   b. Elevation 250'
   c. System MAIN STEAM
3. Component I.D. No. on P&ID dwg. 2MSS*MOV112
4. If component is a ( ) Pump complete II.5.
   If component is a (✓) Valve complete II.6.
5. General Pump Data N/A

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

---

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (Continued)

Overall Dimensions ____________________

Weight ____________________

Mounting Method ____________________

Required B.H.P. ____________________

Parameter	Component Design	System Normal/Accident
Press	______	______/______
Temp	______	______/______
Flow	______	______/______
Head	______	______/______
Media	______	______/______

Required NPSH at maximum flow ____________________

Available NPSH ____________________

Operating Speed ____________________

Critical Speed ____________________

b. Prime-mover (Continued)

Overall Dimensions ____________________

Weight ____________________

Mounting Method ____________________

H.P. ____________________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor (Voltage) ____________________

____

____

Turbine (pressure) ____________________

____

If MOTOR list:

Duty cycle ____________________

Stall current ____________________

Class of insulation ____________________

____

List functional accessories:* ____________________

____

____

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

6. General Valve Data

a. Valve

Name SHUT-OFF VALVE

Mfg. VELAN ENGINEERING LTD.

Model VOWOGO-B-IMQE

S/N 1326

Type GLOBE, 600LBS, BOLTED BONNET

Size 6"

Weight 900#

Mounting Method WELDED TO PIPE.

Max. Required Torque 666 Ft-lb

Parameter	Component Design	System Normal/Accident
Press PSIG	1250	964/1250
Temp °F	575	540/575
Flow #/HR.	6355	6276/0
Media	H_2O/STM	H_2O/STM

Max P across valve 1250

Closing time @ max P 39.0 SEC.

Opening time @ max P 38.6 SEC.

b. Actuator (if not an integal unit)

Name MOTOR OPERATED ACTUATOR

Mfg. LIMITORQUE CORP.

Model SMB-2-25

S/N 336511

Type MOTOR OPERATED.

Size SMB-2-25

Weight 603#

Mounting Method BOLTED TO YOKE

Max. Delivered Torque 1331 FT-lb at 110% VOLTAGE

Power Requirements: (include normal, maximum and minimum).

Electrical AC,

NORMAL: 575 VOLTS

MAX.: 632 VOLTS

MIN.: 460 VOLTS

3 PHAZE, 60 Hz

Other: ( )Pneumatic ( )Hydraulic

List functional accessories:* NONE

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: DRAINS THE MAIN STEAM LINE DURING START-UP AND SHUT-DOWN.

Safety: MAIN STEAM OUTSIDE CONTAINMENT ISOLATION VALVE.

2. The components normal state is: ( )Operating ( )Standby N/A

3. Safety function:

a. ( ) Emergency reactor shutdown

b. ( ) Containment heat removal

c. (✓) Containment isolation

d. ( ) Reactor heat removal

e. ( ) Reactor core cooling

f. ( ) Prevent significant release of radioactive material to environment

g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (✓)Yes ( ) No
(✓) LOCA (✓) HELB (✓) MSLB
( ) Other ____________

4. Safety requirements:

( ) Intermittent Operation ( ) During postulated event

( ) Continuous Operation ( ) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational.
6 HRS (e.g., hours, days, etc.)

5. For VALVES:

does the component ( )Fail open ( )Fail closed (✓)Fail as is

Is this the fail safe position? ( ) Yes ( ) No N/A

Is the valve used for throttling purposes? ( ) Yes (✓) No

What is the maximum acceptable internal and external leakrate?

0.6 $FT.^3$/HR. OF AIR ____ 0

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME B & PV CODE, SEC. III, '74 SUB-SECTIONS NA-3250 AND NC 3500 INCLUDING ADDENDA THRU 12/75.

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 344-1975, IEEE 323-74, IEEE 382-1972, REG. GUIDES 1.48, 1.61, 1.92 & 1.100.

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
(✓) Yes ( ) No

4. Are the margins* identified in the qualification documentation? ( ) Yes (✓) No

5. Was the component that was qualified a model or an actual assembly? ACTUAL ASSEMBLY If a model, what was its scale? ______. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) THE VALVE IS QUALIFIED BY PERFORMANCE TEST AND OPERABILITY.

6. List all component tests performed or to be performed that demonstrate qualification:

HYDROSTATIC TEST, STATIC DEFLECTION (OPERABILITY) TEST, SEAT LEAKAGE TEST, ACTUATOR DYNAMIC TEST, RADIATION THERMAL AGING AND LOCA TEST, DIELECTRIC TEST, LOCKED ROTOR TEST, PERFORMANCE TEST, THRUST/TORQUE TEST, STALLED THRUST/TORQUE TEST.

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

7. List all component analyses performed that demonstate qualification:

a) SEISMIC ANALYSIS OF THE VALVE ASSEMBLY.

b) ANALYSIS USING ARHENIUS TECHNIQUE TO CALCULATE QUALIFIED LIFE AND EXTEND POST ACCIDENT OPERABILITY PERIOD (PAOP).

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? (✓) Yes ( ) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

LIMIT SWITCH SCREWS & BOLTS TORQUED. LIMIT SWITCH FINGER ASSEMBLY GAPS ADJUSTED.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? (✓) Yes * EXCEPTION ( ) No. If "No", is installed component ( ) oversized or ( ) undersized?

* FOR ENVIRONMENTAL TEST, INSTALLED COMPONENT IS OVERSIZED.

10. Is component orientation sensitive? (✓) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (✓) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

a) ASSEMBLY STATIC ANALYSIS:
SEISMIC LOAD = 5.0 g's (SSE)
PRESSURE = 1500 PSIG
OPERATING THRUST = 39814 #.
APPLIED IN COMBINATION.

b) OPERATOR DYNAMIC TEST: ACCELERATION = 10.0 g's

c) STATIC DEFLECTION TEST:
SEISMIC LOAD = 7.4 g's
DIFF. PRESS = 1220 PSI
APPLIED IN COMBINATION

d) ENVIRONMENTAL TESTS; LIMITORQUE OPERATOR:
TEMP. = 122°F (NORMAL), 340°F (ACCIDENT)
PRESSURE = 0 PSIG (NORMAL), 30 PSIG (ACCIDENT)
RH = 100% (NORMAL), STEAM (ACCIDENT)
RADIATION = 1.66×10^8 RADS GAMMA - ACCIDENT

e) HYDROSTATIC SHELL TEST: PRESSURE = 2250 PSI

f) SEAT LEAKAGE TEST: PRESSURE = 1220 PSI

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

(✓) Yes ( ) No If "Yes" identify: CLASS RH MOTOR, OUTSIDE CONTAINMENT SERVICE MATERIAL.

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

20 YEARS FOR THE LIMITORQUE ACTUATOR.

13. Which of the components normal maintenance items requires the most frequent replacement? LIMIT SWITCH GASKET LUBRICANT What is the normal time interval between replacements of this item? AS PER MAINTENANCE INSTRUCTION, EVERY 18 MONTHS WHEN LIMIT SWITCH COMPARTMENT IS OPENED FOR INSPECTION.

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

TEMPERATURE = 340°F

PRESSURE = 27.4 PSIG

REL. HUMIDITY = ALL STEAM

RADIATION = 2.4 E07 GAMMA, 40 YRS. + ACCIDENT

1.3 E07 BETA, 40 YRS. + ACCIDENT

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
STRS 05-321-5013A SR-6520 REV. 0	SEISMIC REPORT ITEM 5	5-2-85	VELAN ENGINEERING LTD.	SWEC
TEST 05. 321-5003B and 5005B P9-7020-M53B and 82B	OPERABILITY TESTS ITEM 5	7-26-83	VELAN ENGINEERING LTD.	SWEC
W850128	HYDROSTATIC TEST REPORT	1-24-85	VELAN ENGINEERING LTD.	SWEC
MS-1887 REV. 1	QUALIFICATION OF MOTOR OPERATED VALVES FOR SPEC. P304R	6-13-85	SWEC	SWEC
TEST 05. 321-5013A B-0115	HYDRODYNAMIC VIBRATION TESTING	5-31-85	LIMITORQUE CORP.	SWEC
MS-1942	SIMILARITY ANALYSIS FOR DYNAMIC QUAL. OF LIMITORQUE MOTOR OPERATORS	5-31-85	SWEC	SWEC
EQEDC-1	EQUIPMENT QUAL. ENVIRONMENTAL DESIGN CRITERIA	5-2-84	SWEC	SWEC
DWG. 12177-EP-139A-5	MAIN STEAM DRAIN PIPING REACTOR	3-8-84	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
DWG. 12177 EP-139B-5	MAIN STEAM DRAIN PIPING REACTOR BLDG.	3-8-84	SWEC	SWEC
SWEC FILE # 0005.321-122-320E DWG. P3-7026-N23	6"-600 # BB GLOBE VALVE M/O	3-7-84	LIMITORQUE VALVE CONTROL	SWEC
SWEC FILE # 0005.321-122-191A DWG. 02-408-0009-4	LIMITORQUE VALVE CONTROL	12-31-80	LIMITORQUE CORPORATION	SWEC
DWG. 12177 FSK-3-1A	FLOW DIAGRAM MAIN STEAM	3-28-85	SWEC	SWEC
VEL-FBBM	MAINTENANCE MANUAL FOR 2½"-24" FORGED B-B GATE and GLOBE VALVES	—	YELAN	SWEC
—	FIGURE FSAR 10.1-3F MAIN STEAM-P&ID	—	NMP2	NMP2
12177 P304R	SPEC. THRU REV. 2 ADDENDA MOTOR OPERATED CARBON STEEL VALVES	11-30-83	SWEC	SWEC
E & DCR P13377A	HYDRODYNAMIC LOADS REVISED	6-13-85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
STRS 05. 321-5025F DR-1195/5	DESIGN REPORT ITEM 5, 5A	1-12-85	VELAN ENGINEERING LTD.	SWEC
STRS 05. 321-5025G	MFRS. DESIGN C OF C ITEMS 5, 5A	3-6-85	VELAN ENGINEERING LTD.	SWEC
MEQ-P304R	MECHANICAL EQUIPMENT ENVIRONMENTAL QUALIFICATION	3-27-85	SWEC	SWEC
CALC. 12177-A10.2-0	MAIN STEAM PIPING DRAIN LINES	1-9-79	SWEC	SWEC
SWEC FILE SDDF IEEE 05.321-5001C/D Report B0058	QUALIFICATION REPORT	1-11-80	LIMITORQUE CORP.	SWEC
SWEC FILE SDDF IEEE-016-820-5007C REPORT 126-57-84	PRODUCT ANALYSIS REPORT	9-17-84	GENERAL ELECTRIC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
SWEC FILE # TEST 05. 321-5012B	OPERABILITY TEST PROCEDURE	4-1-85	VELAN	SWEC
ED.GENE 014	ELECTRICAL TEST PROCEDURE, MOTOR OPERATED VALVES	—	SWEC	SWEC

SPEC. NO. P304X

PVORT #15

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: Solenoid Valve

MARK NUMBERS: 2HVK * SOV 36A

STONE & WEBSTER

SPEC. NO. P304X
Revision 0

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP
2. Location: a. Building/Room Control Bldg/HVAC Equipt. Room
   b. Elevation 290'-6"
   c. System Control Bldg. Chilled Water (HVK)
3. Component I.D. No. on P&ID dwg. 2HVK*SOV36A
4. If component is a ( ) Pump complete II.5.
   If component is a (X) Valve complete II.6.
5. General Pump Data N/A

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (Continued)

Overall
Dimensions____________________

Weight____________________

Mounting
Method____________________

Required B.H.P.____________________

Parameter	Component Design	System Normal/Accident
Press	______	______/______
Temp	______	______/______
Flow	______	______/______
Head	______	______/______
Media	______	______/______

Required NPSH at maximum

flow____________________

Available NPSH____________________

Operating Speed____________________

Critical Speed____________________

b. Prime-mover (Continued)

Overall
Dimensions____________________

Weight____________________

Mounting
Method____________________

H.P.____________________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor(Voltage)____________________

____

____

Turbine (pressure)____________________

____

If MOTOR list:

Duty cycle____________________

Stall current____________________

Class of insulation____________________

____

List functional accessories:*____________________

____

____

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

6. General Valve Data

a. Valve

Name 2HVK * SOV 36A

Mfg. TARGET ROCK CORP.

Model 76P-034

S/N 1

Type Solenoid operated Globe

Size 3"

Weight 505 lb

Mounting Method Butt Welds ends

Max. Required Torque N/A

Parameter	Component Design	System Normal/Accident
Press **	50 PSIG	37 / 37
Temp	120°F	32-104°F 32-104°F
Flow	48 gpm	48gpm 48gpm
Media	Water	Water / Water

Max P across valve 50 PSIG

Closing time @ max P N/A

Opening time @ max P N/A

b. Actuator (if not an integal unit)

Name

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Max. Delivered Torque

Power Requirements: (include normal, maximum and minimum).

Electrical 120 VAC +10% -20%

0.8 AMPS

Other: ( )Pneumatic ( )Hydraulic

List functional accessories:* N/A

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

** This data is being changed to 100 - Work in Progress.

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: 2HVK*SOV36A IS NORMALLY OPEN, SERVES AS AN ISOLATION BOUNDARY BETWEEN CAT I & CAT II PORTIONS OF THE CHILLED WATER SYSTEM.

Safety: IN THE EVENT CHILLED WATER EXPANSION TANK LEVEL BECOMES LOWER THAN NORMAL, 2HVK*SOV36A CLOSES TO ISOLATE CAT II SYSTEM.

2. The components normal state is: (X)Operating ( )Standby

3. Safety function:

a. ( ) Emergency reactor shutdown
b. ( ) Containment heat removal
c. ( ) Containment isolation
d. ( ) Reactor heat removal
e. ( ) Reactor core cooling
f. ( ) Prevent significant release of radioactive material to environment
g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X)Yes ( ) No

( ) LOCA ( ) HELB ( ) MSLB

(X) Other IN THE EVENT CHILLED WATER EXPANSION TANK LEVEL BECOMES LOWER THAN NORMAL, 2HVK*SOV36A VALVE CLOSES TO ISOLATE CAT II SYSTEM

4. Safety requirements:

( ) Intermittent Operation ( ) During postulated event

(X) Continuous Operation ( ) Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational. ________________ (e.g., hours, days, etc.)

5. For VALVES:

does the component ( )Fail open (X)Fail closed ( )Fail as is

Is this the fail safe position? (X) Yes ( ) No

Is the valve used for throttling purposes? ( ) Yes (X) No

What is the maximum acceptable internal and external leakrate?

30 CC PER HR. AT 3600 PSIG.

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME B&PV Code Sec III Subsection NC -1974, with addenda thru Winter 75. Class 2

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 323-1974, 344-1975, IEEE 382-1972, NRC R.G. 1.48, 1.61, 1.92 and 1.100

3. Have acceptance criteria been established and documented in the test plan(s) for the component?
(X) Yes ( ) No

4. Are the margins* identified in the qualification documentation? ( ) Yes (X) No

5. Was the component that was qualified a model or an actual assembly? ASSEMBLY. If a model, what was its scale? N/A. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) AS AN ASSEMBLY

6. List all component tests performed or to be performed that demonstrate qualification:

Hydrostatic Shell Test
Hydrostatic Seat Leakage test
Functional tests
Operability test (seismic)

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

7. List all component analyses performed that demonstate qualification:

Valve assembly seismic analysis.

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ( ) Yes (X) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? ( ) Yes (X) No. If "No", is installed component (X) oversized or ( ) undersized?

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

a) HYDROSTATIC SHELL TEST - 5400 PSIG.

b) HYDROSTATIC SEAT LEAKAGE TEST - 3600 PSIG.

c) ANALYSIS : STATIC SEISMIC OF 4.5 g AND MAXM. OPERATING PRESSURE OF 50 PSIG. APPLIED IN COMBINATION

d) DYNAMIC TEST: ACCELERATION = 4.5 g; PRESSURE = 2485 PSIG. PIPING END LOAD = 285 FT.LB MOMENT. APPLIED IN COMBINATION

e) MAX. TEMP. = 350°F. RH = 55% PR=2485 PSIG.

f) TEMP. TRANSIENT OF 385°F/MIN, PR. TRANSIENT OF 66 PSIG/MIN.

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

(X) Yes ( ) No If "Yes" identify: SILICONE RUBBER GASKET, 'O' RING, PILOT DISC ASSEMBLY AND MAIN DISC ASSEMBLY.

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YEARS

13. Which of the components normal maintenance items requires the most frequent replacement? GASKET, 'O' RING / ELECTRICAL ASSY What is the normal time interval between replacements of this item?

5/20 YEARS.

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

MILD ENVIRONMENT 8

TEMPERATURE = 85°F

PRESSURE = ATMOS.

HUMIDITY = 50%

SUBMERGENCE = NO

RADIATION = $< 1 \times 10^4$ RAD.

Information Concerning Qualification Documents for the Component

Report Number	Report Title / SWEC FILE NO.	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
4239	Qualification Report IEEE 05·324-5001 B	2-6-85	Target Rock Corp (TRC)	Swec
2252B + letter dated 4-4-85	Design Report & Seismic Analysis STRS 05·324-5000C	4-18-85		
3575C	Production test Procedure. PROC 05·324-5016 F	4-3-84		
76P-034	Project Control Drawings. 5·322-902-072 B	4-13-84		
1071240-1 Sht. 1 Rev. K	Valve DWG. Bill of Material 5·324-902-062A	12-10-82		
1071240-1 Sht. 2 Rev. K	Valve Drawing 5·324-902-063A	12-10-82		
3579	Instruction manual INST 5·324-5000D	1-25-83		
12177-DB-381T	Iso DWG — Control Bldg. Cond. & Chilled Water PP-(2HVK) El.[illegible]'-6"	—	SWEC	

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
203006	Wiring Schematic 5-322-902-058	10-2-81	TRC	SWEC
IR# N2P304X 0097	QA inspection Report - type B	8-30-82	VARIOUS	SWEC
FSK-22-12C Rev. 2	Flow Diagram Control Bldg Chilled Water	–	SWEC	SWEC
12177-ESK-7HVK02	AC Elem. Diagram - Misc. AC CKTS. CB Chilled Water	–	SWEC	SWEC
Fig. 9.4-1A	FSAR	–	SWEC	SWEC

BOP #16 PVORT

SPEC. NO. P305B

PVORT #16

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: MAIN STEAM SAFETY RELIEF VALVE

MARK NUMBERS: 2SVV * RVV101

STONE & WEBSTER

SPEC. NO. P305B
Revision 0

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (✓) BOP
2. Location:
   a. Building/Room PRIMARY CONTAINMENT
   b. Elevation 254'
   c. System MAIN STEAM SAFETY/RELIEF VALVES VENTS & DRAINS
3. Component I.D. No. on P&ID dwg. 2SVV*RVV101
4. If component is a ( ) Pump complete II.5.

   If component is a (✓) Valve complete II.6.
5. General Pump Data N/A

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (Continued) N/A

Overall Dimensions ________

Weight ________

Mounting Method ________

Required B.H.P. ________

Parameter	Component Design	System Normal/Accident
Press	____	____/____
Temp	____	____/____
Flow	____	____/____
Head	____	____/____
Media	____	____/____

Required NPSH at maximum flow ________

Available NPSH ________

Operating Speed ________

Critical Speed ________

b. Prime-mover (Continued)

Overall Dimensions ________

Weight ________

Mounting Method ________

H.P. ________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor(Voltage) ________

____

____

Turbine (pressure) ________

____

If MOTOR list:

Duty cycle ________

Stall current ________

Class of insulation ________

____

List functional accessories:* ________

____

____

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

6. General Valve Data

a. Valve

MAIN STEAM SYSTEM/RELIEF VALVE DISCHARGE (SVV) — Name VACUUM BREAKER

Mfg. GPE CONTROLS

Model LD244-17

S/N 8211-0289-1

Type 5"/10" DYNAMIC LOAD VACUUM RELIEF VALVE

Size 6"

Weight 185 lbs

Mounting Method BUTT WELDED TO 10" HORIZ. SECTION OF TEE

Max. Required Torque N/A

Parameter	Component Design	System Normal/Accident
Press (PSIG)	570	14.7/570
Temp (°F)	485	135/485
Flow (SCFM) @ 0.5 PSID	1152	0/1152
Media	AIR & STEAM	AIR/AIR & STEAM

Max P across valve @ RATED FLOW 0.5 PSID

Closing time @ max P N/A

Opening time @ max P 0.2 SEC.

b. Actuator (if not an integal unit) N/A

Name

Mfg.

Model

S/N

Type

Size

Weight

Mounting Method

Max. Delivered Torque

Power Requirements: (include normal, maximum and minimum).

Electrical

Other: ( )Pneumatic ( )Hydraulic

List functional accessories:* N/A

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: NONE

Safety: PREVENT DRAWING WATER UP INTO THE SRV DISCHARGE LINE DUE TO STEAM CONDENSATION AFTER SRV OPERATION.

2. The components normal state is: ( )Operating (✓)Standby

3. Safety function:

a. (✓) Emergency reactor shutdown
b. ( ) Containment heat removal
c. ( ) Containment isolation
d. ( ) Reactor heat removal
e. ( ) Reactor core cooling
f. ( ) Prevent significant release of radioactive material to environment
g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (✓)Yes ( ) No
( ) LOCA ( ) HELB ( ) MSLB
(✓) Other CLOSURE OF MSIV'S & TURBINE/GENERATOR TRIP WITH COINCIDENT CLOSURE OF TURBINE STEAM BY PASS SYSTEM VALVES.

4. Safety requirements:

(✓) Intermittent Operation ( ) During postulated event

( ) Continuous Operation (✓)Following postulated event

If component operation is required following an event, give approximate length of time component must remain operational. 100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

(N/A: NOT APPLICABLE TO CHECK VACUUM BREAKER)
does the component ( )Fail open ( )Fail closed ( )Fail as is N/A

Is this the fail safe position? ( ) Yes ( ) No N/A

Is the valve used for throttling purposes? ( ) Yes (✓) No

What is the maximum acceptable internal and external leakrate?

1 SCFM (INTERNAL) 0 (EXTERNAL)

16p
p.5

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME CODE SECTION III

SUBSECTION NCA-3250, NCA-8000

2. Reference those qualification standards, used as a guide to qualify the component:

REG. GUIDES 1.48, 1.61, 1.92

3. Have acceptance criteria been established and documented in the test plan(s) for the component? (✓) Yes ( ) No

4. Are the margins* identified in the qualification documentation? (✓) Yes ( ) No

5. Was the component that was qualified a model or an actual assembly? ACT. ASSEMBLY. If a model, what was its scale? ______. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver)

6. List all component tests performed or to be performed that demonstrate qualification:

HYDROSTATIC TEST

SEAT CLOSURE TEST

SETTING & FUNCTION TEST

FLOW TEST

* Margin is the difference between design basis parameters and the test parameters used for equipment qualification.

16 p
p. 6

7. List all component analyses performed that demonstate qualification:

STATIC ANALYSIS OF VACUUM RELIEF VALVE (SEISMIC/HYDRODYNAMIC + OPERATING LDS.)

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? ( ) Yes (✓) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? (✓) Yes ( ) No. If "No", is installed component ( ) oversized or ( ) undersized?

10. Is component orientation sensitive? (✓) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (✓) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

1) ANALYSIS: RESULTANT SEISMIC ACCEL. $=[16.0^2+16.0^2+(14.0+1.0)^2]^{1/2}=27.15g$; PRESSURE = 570 PSI

2) HYDROSTATIC TEST: PRESSURE = 855 PSI

3) SEAT CLOSURE TEST: PRESSURE = 570 PSI

4) SETTING & FUNCTION TEST: FORCE = 4.4 LBS

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

(✓) Yes ( ) No If "Yes" identify:

HI TEMP POLY PACK SEAL OF EPDM

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

40 YR

13. Which of the components normal maintenance items requires the most frequent replacement?

SEALS What is the normal time interval between replacements of this item?

5 YR (MANUFACTURER RECOMMENDATION)

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.)

ZONE PC250620

NORMAL RADIATION: 4.3×10^7 RADS - GAMMA
2.9×10^5 RADS - BETA
1.4×10^{13} NTN/CM^2 NEUTRONS

ACCIDENT RADIATION: 5.1×10^7 RADS GAMMA
6.3×10^8 RADS BETA

TEMP: NORMAL 150°F MAX
ACCIDENT 340°F MAX

RELATIVE HUMIDITY: ALL STEAM

Information Concernin; Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
LA241-471 REV. A	DESIGN ANALYSIS FOR 5"/10" VACUUM RELIEF VALVE	4-19-84	GPE CONTROLS	SWEC (SDDF STRS 05.360-5010C) (SDDF STRS 05.360-5010D)
DWG. LD244-17 REV. AB (AS-BUILT)	5"/10" DYNAMIC LOAD VACUUM RELIEF VALVE	7-11-84	GPE CONTROLS	SWEC FILE NO. 05.360-802-300E
LA-241474	INSTRUCTION MANUAL OPERATION & MAINTENANCE INSTRUCTIONS	12-13-83	GPE CONTROLS	SWEC (SDDF INST 05.360-5013D) STATUS AAR
LA 241-466/A	SEAT TEST PROC. & REPORT (10"/5")	12-02-83	GPE CONTROLS	SWEC (SDDF TEST 05.360-505B)
LA241-468/0	WALL THICKNESS EVALUATION PROC. AND RECORDS	12-06-83	GPE CONTROLS	SWEC (SDDF TEST 05.360-5019A)
LA241-467/0	SETTING AND FUNCTION TEST PROCEDURE AND TEST REPORT	10-17-83	GPE CONTROLS	SWEC (SDDF PROC 05.360-5022A)
LA 249-35	FLOW TEST PROCEDURE & SUPPLEMENTS (10"/5")	12-20-83	GPE CONTROLS	SWEC (SDDF TEST 05.360-5013B)
12177-EP-11C-7	MAIN STEAM SAFETY & RELIEF VALVES VENTS & DRAINS	1-17-85	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
12177-EP-11F-7	MAIN STEAM SAFETY & RELIEF VALVES VENTS & DRAINS	1-17-85	SWEC	SWEC
12177-FSK-32-8A REV. 2	FLOW DIAGRAM - MAIN STEAM SAFETY/RELIEF VALVES VENTS AND DRAINS	9-21-84	SWEC	SWEC
FIGURE FSAR 10.1-3a	MAIN STEAM SYSTEM P&ID	— (NONE SHOWN)	SWEC	SWEC
MEQ P305B REV. 1	MECHANICAL EQUIP. QUAL. - MAIN STEAM SRV VACUUM BREAKER	3-27-85	SWEC	SWEC
EQEDC-1	EQUIPMENT QUALIFICATION ENVIRONMENTAL DESIGN CRITERIA	5-2-84	SWEC	SWEC
IR NO. N2P305B 3004	QUALITY ASSURANCE INSPECTION REPORT TYPE B	2-25-84	SWEC	SWEC
SPEC. NMP2-P305B	SPECIFICATION FOR VACUUM BREAKERS ASME III CODE CLASS 3 (INCUDING ADDENDA 1 & 2)	5-3-83 4-26-83	SWEC	SWEC

1628

SPEC. NO. P304Y
PVORT #17

NINE MILE POINT NUCLEAR STATION UNIT 2

EQUIPMENT DYNAMIC QUALIFICATION

COMPONENT NAME: 18"- DOUBLE FLANGE STOP VALVE WITH SMB-0-25/H4BC

MARK NUMBERS: 2 RHS * MOV 2A

STONE & WEBSTER

SPEC. NO. P304Y
Revision 0

PUMP AND VALVE

OPERABILITY ASSURANCE REVIEW

I. PLANT INFORMATION

1. Name: Nine Mile Point Unit No. 2 2. Docket No.: 50-410
3. Utility: Niagara Mohawk Power Corporation
4. NSSS: General Electric Co. ( ) PWR (X) BWR
5. A/E: Stone & Webster Engineering Corporation
6. C.P. and/or O. L. SER date 6/24/74 ________

II. GENERAL COMPONENT* INFORMATION

1. Supplier: ( ) NSSS (X) BOP
2. Location: a. Building/Room ABN (AUXILIARY BAY NORTH)
   b. Elevation 183'-0" Col. 11.00 Line E
   c. System RESIDUAL HEAT REMOVAL (RHS/RHR)
3. Component I.D. No. on P&ID dwg. E12*F006A (2RHS*MOV2A)
4. If component is a ( ) Pump complete II.5.
   If component is a (X) Valve complete II.6.
5. General Pump Data (NOT APPLICABLE)

a. Pump		b. Prime-mover	
Name		Name	
Mfg.		Mfg.	
Model		Model	
S/N		S/N	
Type		Type	

* The component, whether pump or valve, is considered to be an assembly composed of the body, internals, prime-mover (or actuator) and functional accessories.

a. Pump (Continued)

Overall Dimensions__________

Weight__________

Mounting Method__________

Required B.H.P.__________

Parameter	Component Design	System Normal/Accident
Press	____	____/____
Temp	____	____/____
Flow	____	____/____
Head	____	____/____
Media	____	____/____

Required NPSH at maximum

flow__________

Available NPSH__________

Operating Speed__________

Critical Speed__________

b. Prime-mover (Continued)

Overall Dimensions__________

Weight__________

Mounting Method__________

H.P.__________

Prime Mover Requirements: (include normal, maximum and minimum)

Motor(Voltage)__________

____

____

Turbine (pressure)__________

____

If MOTOR list:

Duty cycle__________

Stall current__________

Class of insulation__________

____

List functional accessories:*__________

____

____

____

____

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the pump assembly operational, (e.g., coupling, lubricating oil system, speed control sys., feedback, etc.)

6. General Valve Data

a. Valve

Name 18" DOUBLE FLANGED STOP VALVE WITH SMB-0-25/H4BC

Mfg. CLOW

Model TRICENTRIC

S/N 76-1460 (N)-01

Type MOTOR OPERATED STOP VALVE

Size 18"

Weight 1215 VALVE ONLY

Mounting Method FLG BOLTED

Max. Required Torque 2400 ft-lbs

Parameter	Component Design	System Normal/Accident
Press (PSIG)	220	110 / 40
Temp (°F) MEDIA	358	70-358 / 212
Flow (GPM)	7450	7450 / 0
Media	WATER	WATER / WATER

Max ΔP across valve 150 PSIG

Closing time @ max ΔP 90 SEC @ 150 PSIG

Opening time @ max ΔP 90 SEC @ 150 PSIG

b. Actuator (if not an integal unit)

Name MOTOR OPERATED ACTUATOR

Mfg. LIMITORQUE

Model SMB-0-25/H4BC

S/N MOTOR - 3C5537A1
ACTUATOR - 309999
H4BC - 310000

Type MOTOR OPERATED

Size SMB-0-25

Weight 880 lbs (APPROX)

Mounting Method BOLTED TO ADAPTER HOUSING

Max. Delivered Torque 19200 ft-lbs

Power Requirements: (include normal, maximum and minimum).

Electrical

NORMAL 575V/3Ø/60hz

MAX. 633V/3Ø/60hz

MIN. 460V/3Ø/60hz

Other: ( )Pneumatic ( )Hydraulic

List functional accessories:* (NOT APPLICABLE)

* Functional accessories are those sub-components not supplied by the manufacturer that are required to make the valve assembly operational, (e.g., limit switches, solenoid valves, accumulators, etc.)

III. FUNCTION

1. Briefly describe components' normal and safety functions (include accident initiating signals.)

Normal: PROVIDES FLOW PATH FOR SHUTDOWN COOLING. VALVE NORMALLY CLOSED.

Safety: ISOLATES SHUTDOWN COOLING FLOW PATH REQUIRES TO OPERATE IF ACCIDENT OCCURS DURING SHUTDOWN

2. The components normal state is: ( )Operating ( )Standby

3. Safety function:

   a. ( ) Emergency reactor shutdown
   b. ( ) Containment heat removal
   c. ( ) Containment isolation
   d. (X) Reactor heat removal
   e. (X) Reactor core cooling
   f. ( ) Prevent significant release of radio-active material to environment
   g. ( ) Does the component function to mitigate the consequences of one or more of the following events? (X)Yes ( ) No
      (X) LOCA (X) HELB (X) MSLB
      ( ) Other

4. Safety requirements:

   (X) Intermittent Operation (X) During postulated event

   ( ) Continuous Operation (X) Following postulated event

   If component operation is required following an event, give approximate length of time component must remain operational. 100 DAYS (e.g., hours, days, etc.)

5. For VALVES:

   does the component ( )Fail open ( )Fail closed (X)Fail as is

   Is this the fail safe position? (X) Yes ( ) No

   Is the valve used for throttling purposes? ( ) Yes (X) No

   What is the maximum acceptable internal and external leakrate?

   3 CC/MIN. 0

IV. QUALIFICATION

1. Reference by specific number those applicable sections of the design codes and standards applicable to the component: ASME SECT. III, SECTION NC; 1974 Edition, and ADDENDA Through & Including Winter 1976

2. Reference those qualification standards, used as a guide to qualify the component: IEEE 323-1974, 344-1975, 382-1972. NRC REG. GUIDE 1.48, 1.61, 1.73, 1.89, 1.100, 1.148

3. Have acceptance criteria been established and documented in the test plan(s) for the component? (X) Yes ( ) No

4. Are the margins* identified in the qualification documentation? ( ) Yes (X) No

5. Was the component that was qualified a model or an actual assembly? Assembly. If a model, what was its scale? ________. If an actual assembly, was it qualified as an assembly or by sub-assemblies? (i.e., valve, actuator, pump, driver) Assembly for shop tests, static deflection test, Sub-assembly for operator dynamic test.

6. List all component tests performed or to be performed that demonstrate qualification:

   1.) STATIC DEFLECTION TEST - VALVE ASSEMBLY
   2) SEISMIC TYPE TEST - LIMITORQUE ACTUATOR
   3) HYDROSTATIC SHELL & SEAT TEST - VALVE ASSEMBLY
   4) MOTOR TEST - LIMITORQUE MOTOR
      a) LOCKED ROTOR
      b) DIELECTRIC TEST
   5) MOTOR OPERATOR/ACTUATOR PRODUCTION TEST - LIMITORQUE ACTUATOR
      a) TORQUE TEST
      b) STALLED TORQUE TEST
   6) PERFORMANCE/CYCLE TESTS - VALVE ASSEMBLY
   7) ENVIRONMENTAL TESTS - LIMITORQUE ACTUATOR
      a) RADIATION AGING
      b) THERMAL AGING
      c) LOCA TEST

7. List all component analyses performed that demonstate qualification:

STATIC SEISMIC ANALYSIS - VALVE ASSEMBLY

ARRHENIUS TECHNIQUES - TO CALCULATE QUALIFIED LIFE & EXTENDED PAOP (A)

8. As a result of any of the tests (or analysis), were any deviations from design requirements identified? (X) Yes ( ) No If "Yes", briefly describe any changes made in tests (or analyses) or to the component to correct the deviation.

DUE TO LIMITORQUE ACTUATOR TESTING LIMIT SWITCH SCREWS & BOLT TORQUES TO BE ADJUSTED & LIMIT SWITCH FINGER ASSEMBLY GAPS TO BE ADJUSTED.

9. Was the tested component precisely identical (as to model, size, etc.) to the in-plant component? ( ) Yes (X) No. If "No", is installed component (X) oversized or ( ) undersized?

10. Is component orientation sensitive? (X) Yes ( ) No ( ) Unknown If "Yes", does installed orientation coincide with test/analysis orientation? (X) Yes ( ) No

List all loads and numerical values used during tests or analysis and indicate whether applied individually or in combination:

1) STATIC SEISMIC ANALYSIS - DYNAMIC LOAD,

2) SEISMIC TYPE TEST - LIMITORQUE ACTUATOR (B)

(A) SWEC CALC 12177-EQS-025

(B) IEEE 016.820.5003C,

3. STATIC DEFLECTION TEST -

4. HYDROSTATIC SHELL TEST - DISC IN OPEN POSITION WITH 1125 PSI APPLIED & held FOR 10 MINUTES.

5. HYDROSTATIC SEAT TEST - VALVE CLOSED & PRESSURE OF 170 PSI APPLIED TO SHAFT SIDE OF DISC & held FOR 1 MINUTE

6. MOTOR OPERATOR / ACTUATOR PRODUCTION TESTS
   a) TORQUE TEST - 75600 IN-LBS @ 460 VOLTS, NORMAL SETTING TORQUE SWITCH IN OPEN POSITION
   - 84000 IN-LBS @ 460 VOLTS, MAXIMUM SETTING TORQUE SWITCH IN OPEN POSITION
   b) STALLED TORQUE TEST - 230400 IN-LBS @ 628V in open position
   - 257280 IN-LBS @ 628V in closed position

7. MOTOR TEST
   a) LOCKED ROTOR - 9.0 AMPS
   b) DIELECTRIC TEST - 15 MINUTES

8. PERFORMANCE / CYCLE TEST - OPEN / CLOSE 3 TIMES 1 Cycle at 150 PSI at 460 VOLTS

9. ENVIRONMENTAL TESTS
   a) Radiation Aging - 1.66×10^8 RADS GAMMA - APPLIED INDIVIDUALLY
   * b) Thermal Aging - NORMAL 122°F ACCIDENT 250°F & 25 PSIG - APPLIED TOGETHER
   * c) RH - NORMAL / ACCIDENT 100% - APPLIED WITH b

* IEEE 05.360.5012A

11. Does the component have a unique design or utilize unique materials in its construction? (Examples are special gaskets or packings, one of a kind components, limitations on nonferrous materials, special coatings or surfaces, etc.)

( ) Yes (X) No If "Yes" identify:__________

12. What is the design (qualified) life of the component, exclusive of normal maintenance items such as packings, bearings, seals, diaphragms, gaskets, and other elastomers?

36 YEARS (FOR THE ACTUATOR A)

13. Which of the components normal maintenance items requires the most frequent replacement? LIMIT SWITCH GASKETS & LUBRICANTS What is the normal time interval between replacements of this item?

EVERY 18 MONTHS B

14. What is the harshest (accident/post-accident) external environment that the component could be exposed to during its qualified life? (e.g., temp., press., humidity, submergence, radiation type and dose, etc.) C

TEMP - 175°F

PRESSURE - 2.8 PSIG

HUMIDITY - 100% RH

GAMMA (ACCIDENT) - 6.3×10^7

BETA (ACCIDENT) - 1.3×10^7

SPRAY / SUBMERGENCE - NOT APPLICABLE

A SWEC CALC. 12177. EQS-025

B L-TORQUE RPT. B0058, APPENDIX A, LUBRICATION & MAINTENANCE DATA (IEEE 05.360.5012A)

C EQ EDC-1

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
SPEC. P304Y Rev. 3	Specification for Manual & Motor-Operated Rotary, Torque Closure Carbon Steel Valves	5-17-85	SWEC	SWEC
E+DCRS: P13259 P02621		2-13-85 6-18-85		
D0220C REV. C	18" STOP VALVE R.H.	4-17-80	CLOW	SWEC
02-442 0355-4 REV. B	LIMITORQUE VALVE CONTROL	11-14-77	LIMITORQUE CORP.	SWEC
12177-EP-71A-10	RESIDUAL HEAT REMOVAL PIPING - REACTOR BLDG.	2-27-85	SWEC	SWEC
12177-EP-71D-10	RESIDUAL HEAT REMOVAL PIPING - REACTOR BLDG.	2-27-85	SWEC	SWEC
FIG. 5.4-13 (2 OF 2)	RESIDUAL HEAT REMOVAL SYSTEM P & ID		SWEC	SWEC
12177-FSK-27-7F REV. 8	FLOW DIAGRAM RESIDUAL HEAT REMOVAL	10-31-84	SWEC	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
PEI-TR-852300-1	SEIS. QUAL. ANAL. OF CLOW 18" DOUBLE FLANGED STOP VALVES GROUP 1	5-7-85	PATEL ENGINEERS / CLOW	SWEC (STRS 05.360-5041A)
B0058	LIMITORQUE VALVE ACTUATOR QUALIF. FOR NUCLEAR POWER STATION SERVICE	1-11-80	LIMITORQUE CORP. —	SWEC (IEEE 05.360-5012A)
B-0115	HYDRODYNAMIC VIBRATION TESTING (NEW LOADS)	6-24-82	LIMITORQUE CORP.	SWEC (TEST 05.360-5039A)
16573-81N REV. 3	REPORT OF TEST FOR DYNAMIC TESTING OF TWO(2) VALVE ASSEMBLIES, 2MSI*MOV1A AND 2CCP*MOV14B, AND TWO ACTUATORS SMB-000-5 AND SMB-0-25	8-04-82	ACTON ENV. TESTING CORP.	SWEC (STRS 05.312-5000B)
548-9291 REV. 2	DYNAMIC TESTING OF LIMITORQUE OPERATORS AND MODIFIED LIMIT SWITCHES	5-25-82	NATIONAL TECHNICAL SYSTEMS	SWEC (NMP2-P801H 6-10-82 T47, L22)

6E YH)
IMAGE NO. 57823-5
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Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
58941 REV. A	NUCLEAR ENV. QUAL. TEST REPORT ON LIMITORQUE SMB-0-25 /H4BC (AC) MOTOR ACTUATOR L371036	1-11-85	WYLE/GE	SWEC (IEEE 016.820-5003C)
	TORQUING OF SCREWS LIMITORQUE ACTUATORS (IOM)	5-30-85	SWEC	SWEC
12177-NM(C)-MS-1942 REV. 0	SIMILARITY ANALYSIS FOR DYN. QUAL. OF LIMITORUE MOTOR OPERATORS	5-31-85	SWEC	SWEC
12177-NM(C)-MS-1939 REV. 0	REPORT FOR THE DYN. QUAL. OF GATE & GLOBE VALVE ASSEMBLIES AND LIMITORQUE OPERATORS (SMB-000-5 AND SMB-0-25)	2-21-85	SWEC	SWEC
4-21-81-01 AND 4-21-81-02 REV. A	FUNCTIONAL QUALIFICATION PROGRAM FOR POWER OPERATED SAFETY RELATED CLOW-TRICENTRIC NUCLEAR VALVES (WYLE NO. 44852-2 REV. A)	11-18-82	CLOW/WYLE	SWEC

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
N/A	FUNCTIONAL QUALIFICATION PROGRAM FOR POWER OPERATED SAFETY RELATED CLOW-TRICENTRIC NUCLEAR VALVES	4-21-81	CLOW	SWEC
N/A	ACTUATOR SIZING CALC.		CLOW	SWEC
REV. A	OPERATION INSTRUCT. FOR CLOW TRICENTRIC ELECTRIC STOP VALVE	8-26-80	CLOW	SWEC (INST 05.360-5028A)
D0796G	30" CHECK VALVE ASSEMBLY	10-31-84	CLOW	SWEC (INST 05.360-5019B)
PA89381	90° ROTARY ACTUATOR SYSTEM INSTALL., OP., AND MAINT. MANUAL FOR NMP2	8-84	CLOW	SWEC (INST 05.360-5022A)
REV. A	OPERATION INSTR. FOR CLOW TRICENTRIC CHECK VALVE	8-26-80	CLOW/LIMITORQUE	SWEC (INST 05.360-5027A)
84-2896-01 (N)	OPERATION AND MAINTENANCE MANUAL	12-17-84	CLOW	SWEC (INST. 05.360-5019A)
83-2063-01 (N)	OPERATION AND MAINTENANCE MANUAL CLOW TRICENTRIC STOP VALVE	1-7-85	CLOW	SWEC (INST. 05.360-5018A)

Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
83-2063-02(N)	OPERATION & MAINTENANCE MANUAL FOR CLOW	3-21-85	CLOW CORP.	SWEC (INST 05.360-5021A)
REV. A	OPERATION INSTRUCTIONS FOR CLOW TRICENTRIC ELEC. STOP VALVE	8-26-80	CLOW CORP.	SWEC
REV. B	OPER. INSTR. FOR CLOW TRICENTRIC MANUAL STOP VALVE	8-17-82	CLOW CORP.	SWEC (INST 05.360-5002A)
REV. A	OPER. INSTR. FOR CLOW TRICENTRIC STOP VALVE	6-2-83	CLOW CORP.	SWEC (INST 05.360-5004A)
REV. A	OPER. INTR. FOR CLOW TRICENTRIC CHECK VALVE	8-26-80	CLOW CORP.	SWEC
REV. F	DOCUMENTATION CHECKLIST	12-12-80	CLOW CORP.	SWEC
EPS 30-49-720 REV. C	PERFORMANCE TEST PROCEDURE	3-28-84	CLOW CORP.	SWEC (TEST 05.360-5032A)
EPS 30-49-721	HYDROSTATIC SEAT TEST	3-21-83	CLOW CORP.	SWEC (TEST 05.360-5025A)
EPS 30-49-733 REV. 0	HYDROSTATIC SHELL TEST	1-6-83	CLOW CORP.	SWEC (TEST 05.360-5024A)

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Information Concerning Qualification Documents for the Component

Report Number	Report Title	Date	Company/Organization Preparing Report	Company/Organization Reviewing Report
85432 REV. A	ELECTRO-HYDRAULIC ROTARY OPERATOR ACCEPTANCE TEST PROCEDURE	8-2-83	BORG-WARNER / CLOW	SWEC (TEST 05.360-5023A)
N2P304Y 0023	QA INSPECTION REPORT	6-26-80	SWEC	SWEC
EQEDC -1	EQUIP. QUAL. ENV. DESIGN CRITERIA	5-2-84	SWEC	SWEC
MEQ P304Y REV. 1	ENVT. EVALUATION OF NON-METALLICS	3-27-85	SWEC	SWEC
12177-NM(C)-MS-1975 REV. 0	FATIGUE EVALUATION AND GEAR BOX ATTACHMENT CALC. FOR CLOW VALVES 18 INS. GROUP 1	6-18-85	SWEC	SWEC
ED. GENE. 014	ELECTRICAL TEST PROCEDURE, MOTOR OPERATED VALVES	—	SWEC	SWEC

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