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 AUTH. NAME: SORENSEN, G.C. AUTHOR AFFILIATION: Washington Public Power Supply System
 RECIP. NAME: SCHWENCER, A. RECIPIENT AFFILIATION: Licensing Branch 2

SUBJECT: Forwards response to specific issues raised in SSER & (NUREG-0892) addressing seismic qualification of safety-related electrical & mechanical equipment.

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NOTES:

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| INTERNAL: | ELD/HDS2 | 12 | 1 | 1 | | GC | 13 | 1 | 1 |
| | IE FILE | 09 | 1 | 1 | | NRR CALVO, J | | 1 | 1 |
| | NRR/DE/EOB | 07 | 2 | 2 | | NRR/DL DIR | 14 | 1 | 1 |
| | NRR/DE/GRAB | 06 | 1 | 1 | | NRR/DSI/AEB | | 1 | 1 |
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| | NRC PDR | 02 | 1 | 1 | | NSIC | 05 | 1 | 1 |
| | NTIS | 31 | 1 | 1 | | | | | |

Washington Public Power Supply System

P.O. Box 968 3000 George Washington Way Richland, Washington 99352 (509)372-5000

September 19, 1983
G02-83-844

Docket No. 50-397

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Schwencer:

Subject: NUCLEAR PROJECT 2
EQUIPMENT SEISMIC QUALIFICATION
INTERIM REPORT

The NRC Safety Evaluation Report Supplement (NUREG-0892, Supplement 3) (SSER) addressed, among other things, seismic qualification of safety-related electrical and mechanical equipment. This letter transmits our responses to the following specific issues raised in the SSER: SSER Section 3.10.1.1, Adequacy of Interim Criteria; SSER Section 3.10.1.2, Pressure Switch - SQRT Audit Item BOP-14; SAR Q 110.032, Similarity of Valves to Tested Prototypes; SAR Q 271.04, Equipment Affected by Fatigue; and, SAR Q 271.05, Results of In-Plant Tests.

It is submitted at this time to aid the Staff's review of our program prior to the time when we can provide a final fuel load status.

We are available to discuss these matters with you if it will aid your review.

Very truly yours, .



G. C. Sorensen, Acting Manager
Nuclear Safety and Regulatory Programs

KRW/sms

cc: R Auluck - NRC
WS Chin - BPA
A Toth - NRC Site
R Wright - NRC EQ Branch

8309290309 830919
PDR ADOCK 05000397
E PDR

A048
1/1

WNP-2

SAFETY EVALUATION REPORT SUPPLEMENT
NUREG-0892, SUPPLEMENT 3

Response to Specific Issues:

1. SSER Section 3.10.1.1 - Adequacy of Interim
Criteria
2. SSER Section 3.10.1.2 - Pressure Switch - SQRT
Audit Item BOP-14
3. SAR Q 110.032 - Similarity of Valves to Tested
Prototypes
4. SAR Q 271.04 - Equipment Affected by Fatigue
5. SAR Q 271.05 - Results of In-Plant Tests

SSER SECTION 3.10.1.1

NRC Concern:

"The applicant is to confirm the adequacy of all assumed "g" values and inform the NRC in writing of the results when this confirmation is completed."

Response:

All pipeline mounted items were evaluated against an assumed "g" load. The next step was to refine our evaluation by use of "statused" as-built pipeline isometrics. (Statused as-built refers to the plant configuration of WNP-2 piping isometrics as of 1980-1982.) If the "statused" as-built loads were less than or equal to the assumed "g" level, no further analysis is performed pending verification of the "final" as-built loads being equal to or less than the statused as-built loads.

If the statused as-built loads are greater than the assumed interim "g" value, a reevaluation is performed.

The final step is to confirm that the final as-built piping analysis resulted in loads equal to or below the statused as-built or assumed "g" value (whichever was greater). This is accomplished as each anchor group is closed out.

We have presently accepted 72% of 700 pipeline mounted items against statused isometric pipeline loads. This completion percentage includes most all of the active valves. The 28% remainder consists predominantly of passive items in isometric runs which have lower loads.

The program will be in place through 100% completion and has been made a part of the ASME Code piping anchor group close-out process. Therefore, closure of the ASME Code piping anchor group stress analysis includes verification that pipeline mounted components are qualified to final as-built loads. You will be informed when the ASME Code activity is completed.

SSER Section 3.10.1.2

NRC Concern:

"Pressure Switch (BOP-14)

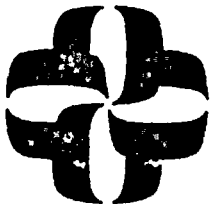
The panel on which this item is mounted was qualified by test. The test consisted of multifrequency, multi-axis, random inputs. Test Response Spectra (TRS) from these tests enveloped the initial Required Response Spectra (RRS). Subsequently, based on further investigation, the RRS was changed, with the result that the TRS did not envelope the RRS in different regions. An effort was made to analyze this apparent inadequacy based on the natural frequency of the system. From this analysis, the lowest natural frequency of the system is estimated as 7.5 Hz. One unenveloped region is around 6.5 Hz, which is too close to the system frequency. As a result, the adequacy of the qualification test is in doubt. The applicant is to justify his present qualification or requalify the equipment."

Supply System Response:

The Supply System does not agree with audit conclusion that a system frequency of 7.5 Hz exists in the panels. The conclusion was based on a comparison of Response Spectra Data between the control accelerometer and a response accelerometer located inside the control panel that houses the subject pressure switches. In order to provide conclusive data, an in-situ natural frequency test was performed on the control panel and internal component mounting points to determine a more accurate natural frequency behavior of the panel.

The attached test report, "Frequency Test for Hydrogen Recombiner Panel (0740-024-1351)" demonstrates that the lowest natural frequency (Structural or local) is 28.3 Hz, which is well above the nonenveloped portion of Required Response Spectra.

CALCULATION/PROBLEM COVER SHEET



Calculation/Problem No: 0740-024-FT-PI
 Title: FREQUENCY TEST FOR HYDROGEN RECOMBINE PH:
 Client: WPPSS Project: WNP-2
 Job No: 0740-024-1351

Design Input/References:

SEE SECTION 6.0

Assumptions:

Method:

SEE SECTION 2.0


Remarks:

| REV. NO. | REVISION | APPROVED | DATE |
|----------|--|----------------------|---------|
| 0 | ORIGINAL | <i>W. J. Hahn</i> | 6/9/83 |
| 1 | REVISED PURPOSE TO ADDRESS CONCERNS OF SAFETY EVALUATION REPORT NUREG-0892 | <i>Craig D. Hill</i> | 7/21/83 |
| 2 | REASSIGNED UNITS DESIGNATION TO PROVIDE MORE CLARITY | <i>Craig D. Hill</i> | 8/10/83 |
| | | | |
| | | | |
| | | | |

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| 4.0 SUMMARY OF RESULTS | 15 |
| 5.0 CONCLUSION | 18 |
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APPENDIX A TEST PROCEDURE


| | | | | | | | | |
|-----|-----|--------|---------|---------|---|--|---------|--|
| | | | | | WPPSS - WNP-2 | | | |
| | | | | | FECURION TEST - HYDROGEN RELEASE TEST | | | |
| 0 | EHD | 4.6.83 | CDS | 4/11/83 | JOB NO 0740-000 | | PAGE 12 | |
| REV | BY | DATE | CHECKED | DATE | CALC NO | | OF 19 | |
| | | | | |  An Impell Corporation Company | | | |

1.0 PURPOSE:

THE PURPOSE OF THIS FILE IS TO DETERMINE THE STRUCTURAL RESONANT FREQUENCIES OF THE PANEL, SO THAT IT CAN BE SHOWN THAT NO RESONANCES OCCUR IN THE FREQUENCY RANGE THAT WAS NOT ADEQUATELY ENVELOPED DURING DYNAMIC TESTING.

IF ALL RESONANCES OF THE PANEL CAN BE SHOWN TO OCCUR AT FREQUENCIES WHERE THE TEST RESPONSE SPECTRA ENVELOPS THE REQUIRED RESPONSE SPECTRA THEN THE EQUIPMENT CAN BE QUALIFIED FOR SEISMIC LOADING BASED ON THIS PREVIOUS TEST.

THE FREQUENCIES AT WHICH THE TEST RESPONSE SPECTRA DO IN FACT ENVELOP THE REQUIRED RESPONSE SPECTRA ARE THE FREQUENCIES THAT ARE GREATER THAN 7.0 HZ. [3], ADDING MARGIN FOR SAFETY, IF NO RESONANCES ARE FOUND BELOW 10 HZ, THE PANEL WILL BE CONSIDERED SEISMICALLY QUALIFIED. BASED ON THE PREVIOUS TYPE TEST.

| | | | | | | | | |
|-----|-----|---------|---------|---------|--|--|--------|--|
| | | | | | WPT-5 - WNP-2 | | | |
| | | | | | FRI GRIFFIN TEST - WPT-5 GRIFFIN TEST | | | |
| 1 | RHD | 7-20-83 | MJL | 7/20/83 | JOB NO 0745-003 | | PAGE 3 | |
| C | ERL | 4-11-82 | CJS | 4-11-82 | CALC NO | | OF 11 | |
| REV | BY | DATE | CHECKED | DATE | eidis  nuclear An Impell Corporation Company | | | |

2.0 PROCEDURE

THE HYDROGEN RECOMBINER CONTROL INSTRUMENT PANEL WILL BE TESTED AS OUTLINED IN APPENDIX A.-TEST PROCEDURE.

AFTER THE TEST DATA IS ACQUIRED, DATA REDUCTION WILL BE DONE TO DETERMINE ACTUAL STRUCTURAL FREQUENCIES.

THE PEAKS ON THE SPECTRAL SHAPES WILL REPRESENT THE STRUCTURAL RESONANT FREQUENCIES.

TESTING WILL BE DONE TO CHECK FOR BOTH THE STRUCTURAL MODES OF THE PANEL ITSELF AND, THE LOCAL MODES OF PLATE STEEL USED TO SUPPORT EQUIPMENT WITHIN THE PANEL.

| | | | | | | | |
|-----|-----|---------|---------|---------|---|--|------|
| | | | | | WPPSS - UNIT 2 | | |
| | | | | | EXPERIMENTAL TEST - HYDROGEN RECOMBINER CONTROL | | |
| 1 | RHD | 7-20-83 | MJL | 7/20/83 | JOB NO 0720-001 | | PAGE |
| 2 | PLD | 4-11-82 | CLS | 4-11-82 | CALC NO | | OF |
| REV | BY | DATE | CHECKED | DATE | eids nuclear An Impell Corporation Company | | 12 |

3.0 TEST DATA

Frequency Test Report

Test Equipment and Test Sequence Document

Test Subject: CAC - HR - 1A

Analyzer:

☒ Gen Rad 2512

☐ _____

Accelerometer:

☐ PCB 302A02

☒ PCB 308B09

☐ _____

Accel. Sensitivity:

☐ 10mv/g

☒ 100 mv/g

☐ _____

Amplifier Gain:

☒ 1

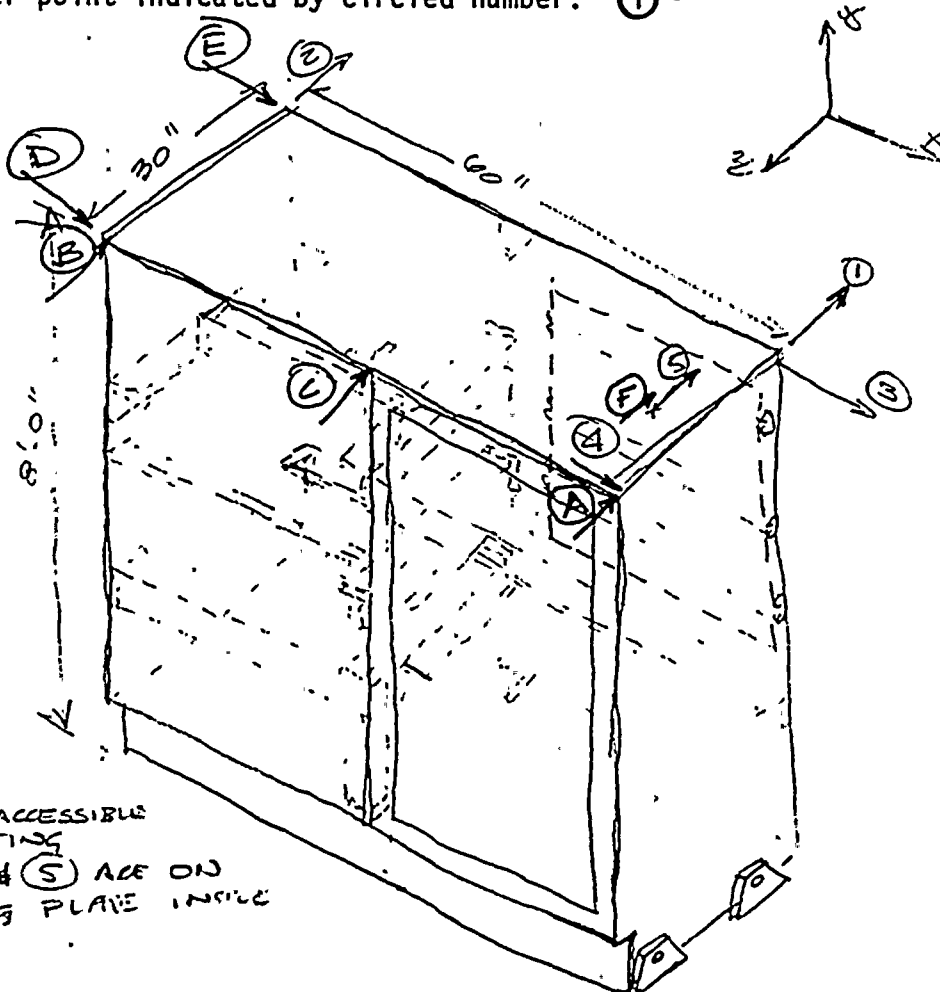
☐ 10

☐ 100

Model of Impulse Points and Accelerometer Locations

Impulse point indicated by circled letter: A

Accelerometer point indicated by circled number: 1



NOTES

- 1) POINT (D) INACCESSIBLE FOR IMPACTING
- 2) POINTS (F) & (S) ARE ON RELAY MOUNTING PLATE INSIDE PANEL

| | | | | | | | |
|-----|-----|---------|---------|---------|------------------------------|-----------------|--------|
| | | | | | WPPEC - WNP-12 | | |
| | | | | | FREQUENCY TEST - HYDROPLANET | | |
| 0 | RHD | 3-29-83 | CLS | 3/27/83 | eidis nuclear | JOB NO 0740-004 | PAGE 5 |
| REV | BY | DATE | CHECKED | DATE | | CALC NO FT-PI | OF 19 |



Frequency Test Report Impulse Data Document

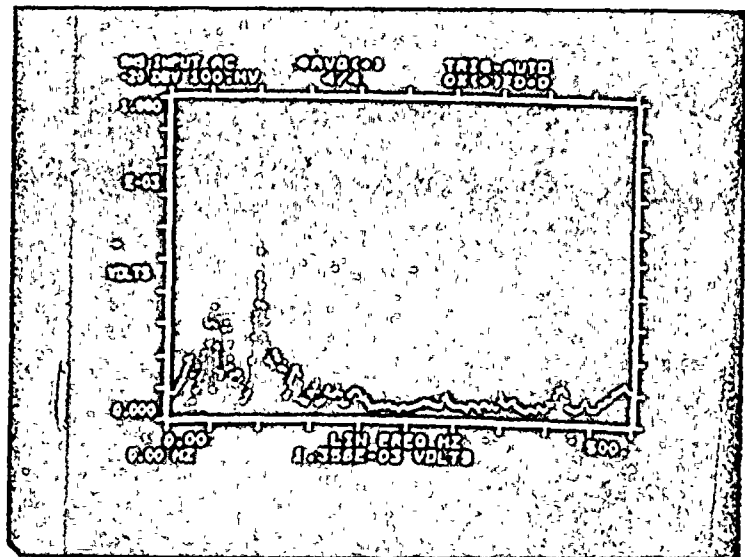
Equipment: CAC-HR-1A

Impact Point: A

Test Point: 1

Spectral Peaks

| Frequency | Amplitude |
|-----------|-----------|
| 23.75 | 212.1 |
| 52.5 | 348.1 |
| 98.75 | 541.5 |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

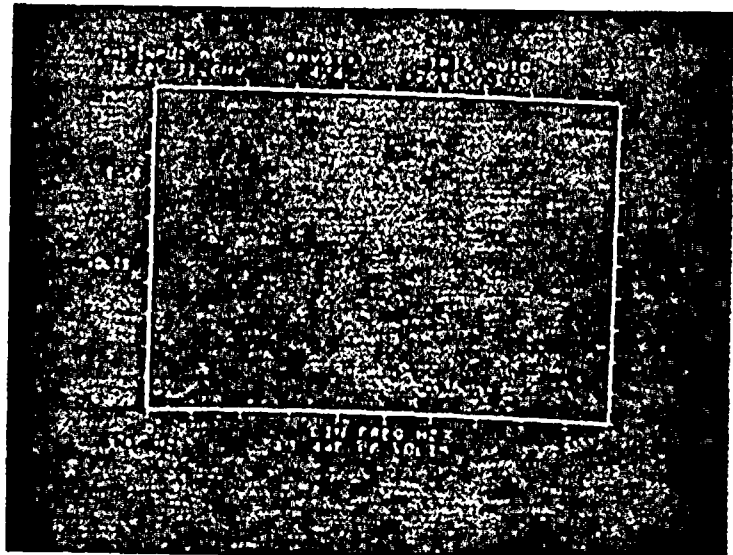


Frequency Test Report Impulse Data Document

Equipment: CAC- H12- 1A
Impact Point: E
Test Point: 1


Spectral Peaks

| Frequency | Amplitude $\times 10^6$ |
|-----------|-------------------------|
| 29.0 | 87.1 |
| 35.5 | 98.57 |
| 42.0 | 159.0 |
| 46.5 | 203.2 |
| | |
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Spectral Shape

NOTES: NONE

| | | | | | | | | |
|-----|----|------|---------|------|--|--|-----------------|--------|
| | | | | | WPPSS - WNP-2 | | | |
| | | | | | FREQUENCY TEST - HYDROGEN RECONC. PHASE 2 | | | |
| | | | | | eids  nuclear | | JOB NO 0740-024 | PAGE 7 |
| | | | | | | | CALC NO | OF 19 |
| REV | BY | DATE | CHECKED | DATE | | | FT-P1 | |

Frequency Test Report Impulse Data Document

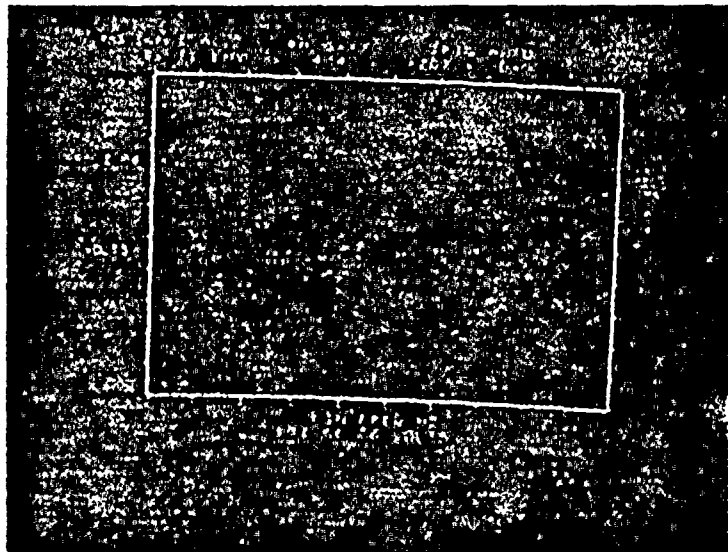
Equipment: CAC-HR-1A

Impact Point: A

Test Point: Z

Spectral Peaks

| Frequency | Amplitude $\times 10^6$ |
|-----------|-------------------------|
| 28.0 | 75.45 |
| 36.5 | 94.81 |
| 43.0 | 150.5 |
| 48.5 | 202.3 |
| | |
| | |
| | |
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Spectral Shape

NOTES: NONE

| | | | | | | |
|-----|-----|---------|---------|---------|---|--|
| | | | | | WPPSS - WNP-2 | |
| | | | | | FREQUENCY TEST - HYDROGEN RECUMF. PANEL | |
| | | | | | JOB NO 0740-024 | |
| | | | | | CALC NO | |
| 12 | C/S | 3/29/03 | RHD | 3-29-03 | FT-P1 | |
| REV | BY | DATE | CHECKED | DATE | | |

eidis  nuclear

PAGE
3
OF
19

Frequency Test Report Impulse Data Document

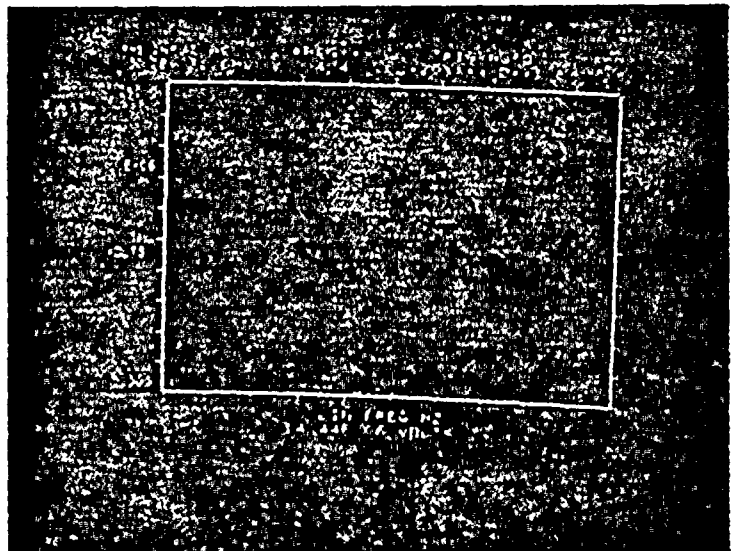
Equipment: CAC-HR-1A

Impact Point: B

Test Point: 2


Spectral Peaks

| Frequency | Amplitude $\times 10^6$ |
|-----------|-------------------------|
| 28.0 | 14.4 |
| 27.5 | 57.3 |
| 44.0 | 91.47 |
| 48.5 | 80.62 |
| | |
| | |
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Spectral Shape

NOTES: NONE

| | | | | | | | | | |
|---|--|----|--|---------|---|-----------------|--|---------|--|
| | | | | | WPPSS - WNP-2 | | | | |
| | | | | | FREQUENCY TEST - HYDROGEN RECOMB. PANEL | | | | |
| REV | | BY | | DATE | | CHECKED | | DATE | |
| 0 | | CD | | 2/25/82 | | KHD | | 3-29-82 | |
| eidis  nuclear | | | | | | JOB NO 0740-024 | | PAGE 9 | |
| | | | | | | CALC NO FT-P1 | | OF 19 | |

Frequency Test Report Impulse Data Document

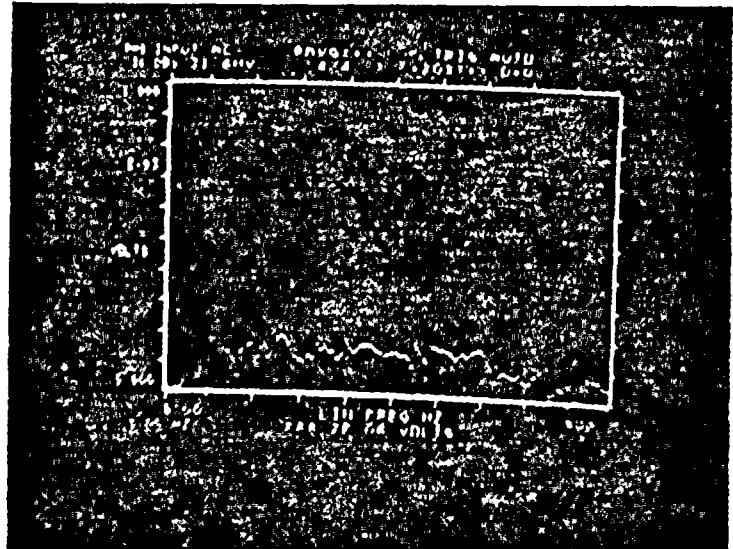
Equipment: CAC-HE-4A

Impact Point: D

Test Point: 3

Spectral Peaks

| (Hz) Frequency | Amplitude x 10 ⁶ |
|-------------------|-----------------------------|
| 35.0 | 187.2 |
| 60.0 | 298.4 |
| | |
| | |
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Spectral Shape

NOTES: TWO LARGE FLEXIBLE CONDUITS ENTERED PANEL CAC-HR-4A BETWEEN IMPACT POINT D AND RESPONSE POINT 3. THESE CONDUITS INDUCED SIGNIFICANT STRUCTURAL DAMPING REQUIRING US TO SHORTEN THE TIME WINDOW. THIS RESULTED IN A LARGE FREQUENCY RANGE AND COMPRESSED RESULTS. THE FREQUENCY RESOLUTION BELOW 100 HZ IS QUESTIONABLE. THIS SHOULD BE CONSIDERED IN THE DATA REDUCTION PROCESS.

| | | | | | | | | |
|-----|-----|---------|---------|---------|-----------------|--|--------------------------|--|
| | | | | | WPPSS - WNP-2 | | | |
| | | | | | FREQUENCY TEST | | HYDROGEN FRACTION, PANEL | |
| | | | | | JOB NO 0740-C24 | | PAGE 10 | |
| | | | | | CALC NO | | OF 19 | |
| 0 | RHD | 3.29.83 | CLS | 3/29/83 | eids + nuclear | | FT-P1 | |
| REV | BY | DATE | CHECKED | DATE | | | | |

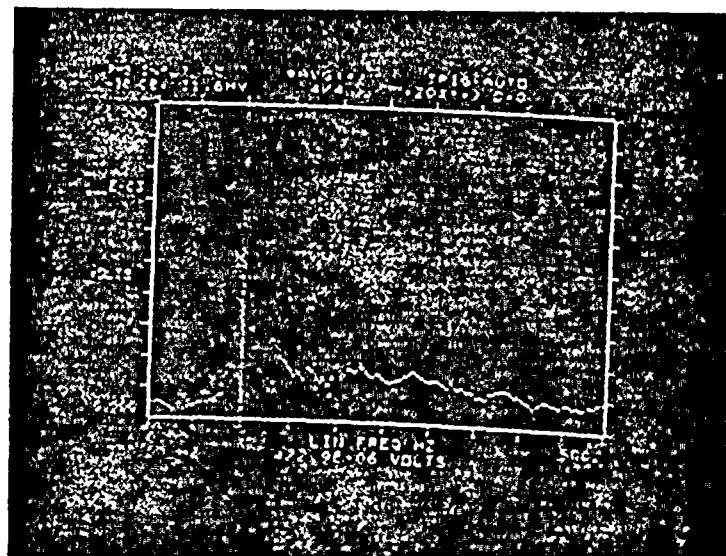
Frequency Test Report Impulse Data Document

Equipment: CAC-HF-1A

Impact Point: E

Test Point: 3

| Spectral Peaks | |
|-------------------|--------------------------------|
| (Hz) Frequency | ($\times 10^6$) Amplitude |
| 36.25 | 94.21 |
| 63.75 | 91.50 |
| 100.00 | 422.90 |
| | |
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Spectral Shape

NOTES: TWO LARGE FLEXIBLE CONDUITS ENTERED PANEL CAC-HF-1A BETWEEN IMPACT POINT E AND RESPONSE POINT 3. THESE CONDUITS INDUCED SIGNIFICANT STRUCTURAL DAMPING REQUIRING US TO SHORTEN THE TIME WINDOW. THIS RESULTED IN A LARGE FREQUENCY RANGE AND COMPRESSED RESULTS. THE FREQUENCY RESOLUTION BELOW 100 HZ IS QUESTIONABLE. THIS SHOULD BE CONSIDERED IN THE DATA REDUCTION PROCESS.

| | | | | | | | |
|-----|-----|---------|---------|---------|--|-----------------|---------|
| | | | | | WPPSE - WNP-2 | | |
| | | | | | FREQUENCY TEST-HYDROGEN RELEASE. PANEL | | |
| 0 | RHD | 3.29.83 | CDS | 3/29/83 | eidis nuclear | JOB NO 0740-024 | PAGE 11 |
| REV | BY | DATE | CHECKED | DATE | | CALC NO | OF 19 |
| | | | | | | FT-PI | |

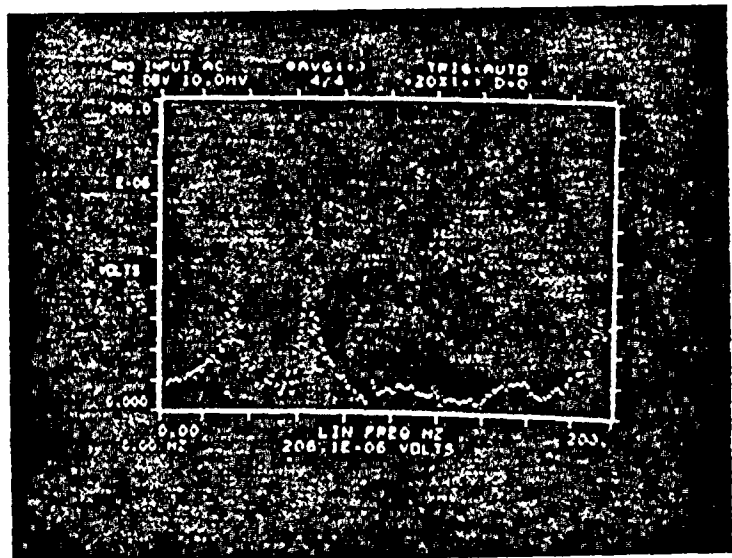
Frequency Test Report Impulse Data Document

Equipment: CAC-HR-1A

Impact Point: D

Test Point: 4

| Spectral Peaks | |
|----------------|-------------------|
| (Hz) | ($\times 10^6$) |
| Frequency | Amplitude |
| 34.50 | 122.3 / |
| 66.50 | 117.0 / |
| | |
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Spectral Shape

NOTES:

| | | | | | | | |
|--|-----|---------|---------|---------|-----------------|--|------------------------|
| WPPES - WNP - 2 | | | | | JOB NO 0740-024 | | PAGE 12 OF 19 |
| FREQUENCY TEST - HYDROGEN BECOME. CHILL. | | | | | CALC NO | | |
| 0 | RHD | 3-28-83 | CO5 | 2/29/83 | FT-P1 | | |
| REV | BY | DATE | CHECKED | DATE | | | |

eidis  nuclear

| | | | | | WPPSE - WNP - 2 | JOB NO 0740-02A | PAGE 13 |
|-----|-----|---------|---------|---------|---|-----------------|------------|
| | | | | | FREQUENCY TEST - HYDROGEN RECOMBINATION | CALC NO | OF 19 |
| O | RHD | 3-29-83 | CCS | 3:27:57 | eids + nuclear | FT-P1 | |
| REV | BY | DATE | CHECKED | DATE | | | |

Frequency Test Report Impulse Data Document

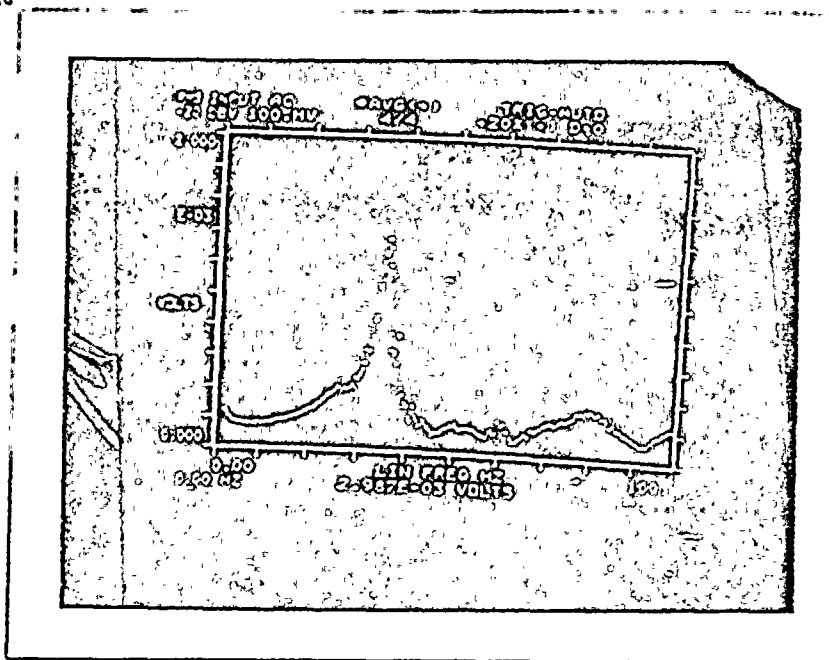
Equipment: CAC-HR-1A

Impact Point: F

Test Point: 5

Spectral Peaks

| Frequency | Amplitude $\times 10^6$ |
|-----------|-------------------------|
| 35.5 | 1391. |
| | |
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Spectral Shape

NOTES: POINTS (P) & (S) ARE LOCATED ON A DELAY MOUNTING PLATE INSIDE PANEL CAC-HR-1A. THIS FREQUENCY SPECTRUM IS OF THE PLATE AND NOT A PANEL STRUCTURAL RESPONSE.

| | | | | | | | |
|--|--|--|--|--|---|-----------------|------|
| | | | | | WPPSS - WNP-2 | | |
| | | | | | FREQUENCY TEST - HYDROGEN RELONG. PANEL | | |
| | | | | | | JOB NO 0740-024 | PAGE |
| | | | | | | CALC NO | 14 |
| | | | | | | FT-P1 | OF |
| | | | | | | | 19 |

| | | | | |
|-----|-----|---------|---------|---------|
| 0 | 100 | 1/24/93 | RHD | 3-29-93 |
| REV | BY | DATE | CHECKED | DATE |

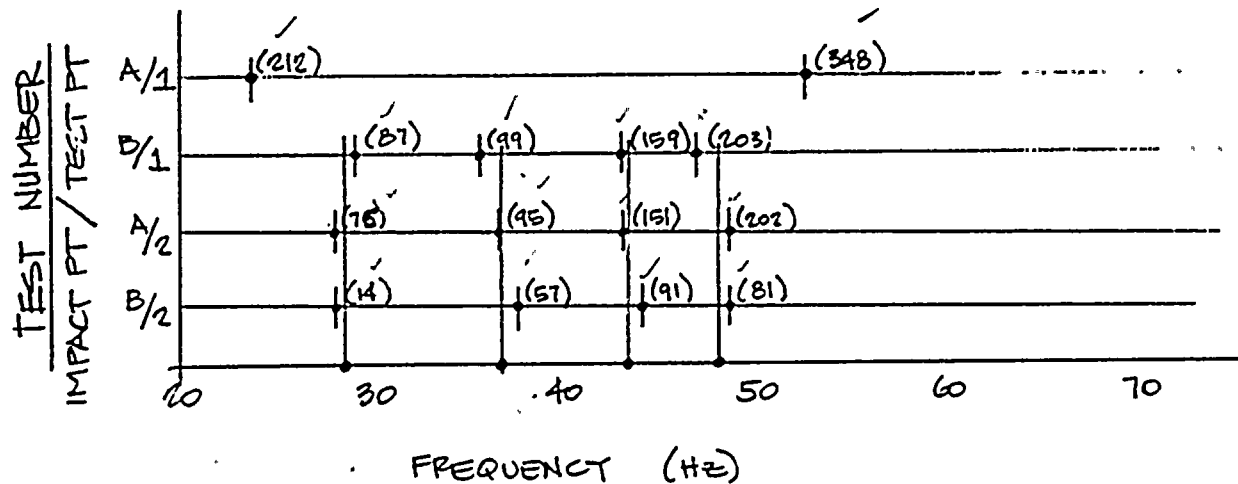
eidis  nuclear

SUMMARY OF RESULTS:

FRONT TO BACK:

(AMPLITUDE $\times 10^6$ VOLTS
SHOWN IN PARENTHESIS)

[Z DIRECTION]



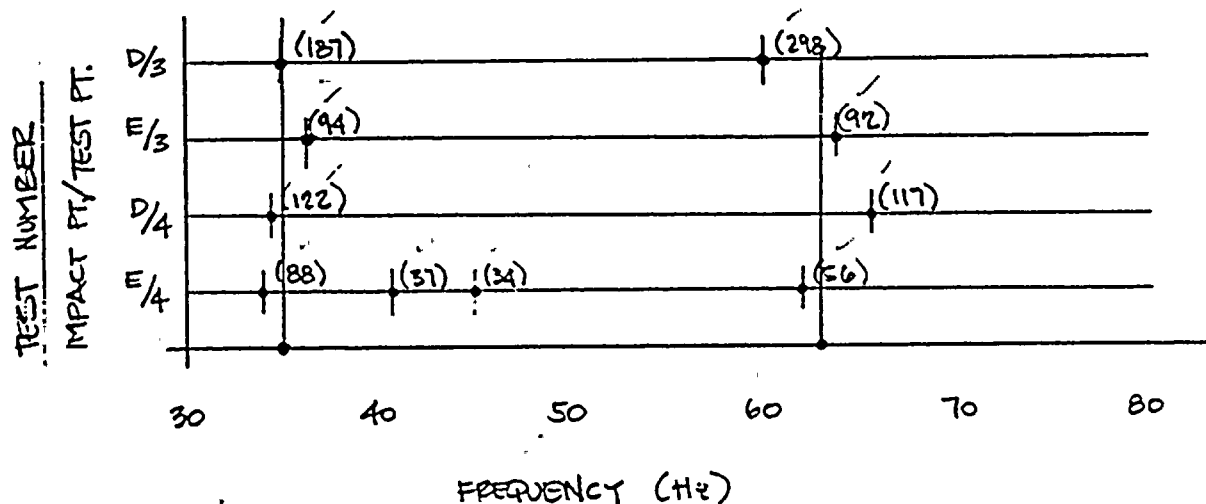
NOTE: DUE TO A FLEXIBLE CONDUIT CONNECTED TO THE TOP OF THE PANEL BETWEEN POINTS A#1, RESULTS ACQUIRED DURING TEST A/1 WERE BEING SIGNIFICANTLY DAMPED. IN AN EFFORT TO OVERCOME THIS EFFECT THE FREQUENCY RANGE WAS INCREASED TO 500 HZ TO REDUCE THE TIME WINDOW. THIS INCREASE IN RANGE CAUSED THE DATA TO BE COMPRESSED RESULTING IN UNRELIABLE DATA. SINCE DATA ACQUIRED DURING TEST A/1 IS INCONSISTANT WITH THE DATA OF THE OTHER 3 TESTS IT IS NOT CONSIDERED IN THE FINAL ANALYSIS OF THE PANEL. ✓

FINAL ANALYSIS OF NATURAL FREQUENCIES:

| MODE | FREQUENCY (HZ) | STANDARD DEVIATION |
|------|----------------|--------------------|
| 1 | 28.3 ✓ | ±.58 ✓ |
| 2 | 36.5 ✓ | ±1.0 ✓ |
| 3 | 43.3 ✓ | ±.55 ✓ |
| 4 | 47.8 ✓ | ±1.15 ✓ |

| | | | | |
|--|-----|-----------------|---------|---------|
| WPPSS - WNP-2 | | | | |
| FREQUENCY TEST - HYDROGEN RECOMBINER PANEL | | | | |
| 0 | RHD | 4-8-83 | CS | 4-11-83 |
| REV | BY | DATE | CHECKED | DATE |
| eids nuclear An Impell Corporation Company | | | | |
| | | JOB NO 0740-004 | | PAGE 15 |
| | | CALC NO | | OF 19 |
| | | F7. P1 | | |

SIDE TO SIDE: (AMPLITUDE $\times 10^6$ VOLTS [X DIRECTION]
SHOWN IN PARENTHESIS)



NOTE: SPECTRAL PEAKS AT 40.75 HZ & 45.0 HZ THAT WERE NOTED DURING TEST E/4 ARE NOT CONSIDERED AS STRUCTURAL MODES SINCE THEIR AMPLITUDES ARE NOT SUBSTANTIALLY ABOVE NOISE LEVEL AND SINCE NO APPARENT SPECTRAL PEAK OCCURRED DURING THE OTHER 3 TESTS. SINCE DATA TAKEN DURING TESTS D/3 AND E/3 IS CONSISTANT WITH THE DATA OF THE OTHER TWO TESTS, THE FREQUENCY RESOLUTION IS CONSIDERED ADEQUATE. (SEE NOTES PG 10 & 11) ✓

FINAL ANALYSIS OF NATURAL FREQUENCIES:

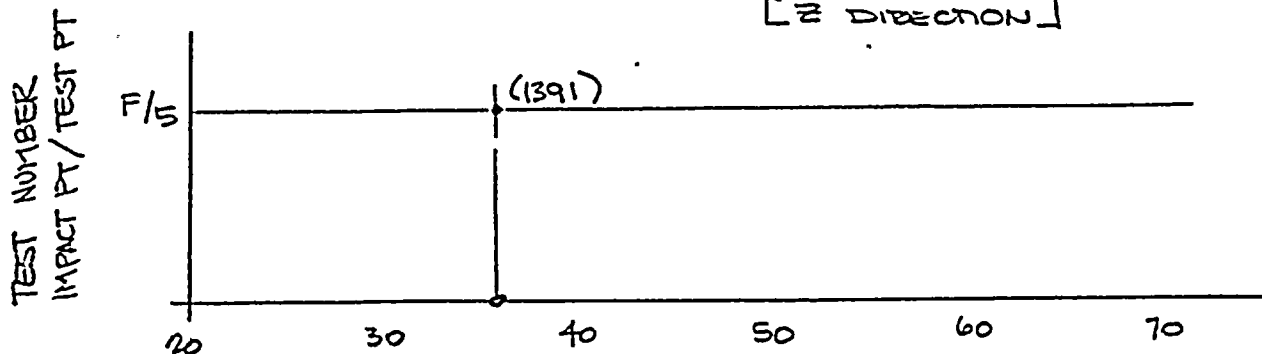
| MODE | FREQUENCY (Hz) | STANDARD DEVIATION |
|------|----------------|--------------------|
| 1 | 34.9 ✓ | ± 1.97 ✓ |
| 2 | 62.8 ✓ | ± 2.36 ✓ |

| | | | | | | |
|-----|-----|--------|---------|---------|---|-----------------|
| | | | | | WPPCS - WNP - 2 | |
| | | | | | FREQUENCY TEST - HYDROGEN BECCOME PANEL | |
| 0 | RHD | 4-8-83 | CCS | 4-11-83 | edison nuclear | JOB NO 0740-024 |
| REV | BY | DATE | CHECKED | DATE | An Impell Corporation Company | CALC NO |
| | | | | | | FT-P1 |
| | | | | | | PAGE 16 OF 19 |

RELAY MOUNTING PLATE:

(AMPLITUDE $\times 10^6$ VOLTS
SHOWN IN PARENTHESES)

[Z DIRECTION]



NOTE: THE FIRST STRUCTURAL MODE OF THE RELAY MOUNTING PLATE WAS FOUND TO BE AT 35.5 Hz. ONLY ONE TEST WAS PERFORMED SINCE THE DATA WAS SO CONCLUSIVE.

FINAL ANALYSIS OF NATURAL FREQUENCY:

| MODE | FREQUENCY (Hz.) | STAND. DEVIATION |
|------|-----------------|------------------|
| 1 | 35.5 | N/A |

NOTE: THE STANDARD DEVIATION SHOWN ON PAGE 15 TO 17 DEMONSTRATES THE ACCURACY WITH WHICH DATA OBTAINED FROM THE SPECTRAL ANALYZER SHOULD BE CONSIDERED. AS WITH ANY SAMPLE SET OF DATA, THE GREATER THE NUMBER OF SAMPLES TAKEN THE GREATER THE CONFIDENCE IN THE RESULTS, THESE DEVIATIONS ARE A FUNCTION OF THE LIMITED NUMBER OF SAMPLES TAKEN, BUT DO NOT AFFECT THE CALC. CONCLUSION.

| | | | | | | |
|-----|-----|--------|---------|---------|---|---------|
| | | | | | WPPSS - WNP-2 | |
| | | | | | FREQUENCY TEST - HYDROGEN RECOMB. PHASE | |
| 2 | RHD | 8/9/83 | MJL | 8/10/83 | JOB NO 0740-024 | PAGE 17 |
| 0 | RHD | 4-8-83 | CCS | 4-11-83 | CALC NO | OF 19 |
| REV | BY | DATE | CHECKED | DATE | FT-PI | |


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CONCLUSION:

THE FIRST STRUCTURAL RESONANCE WAS FOUND TO BE AT: 28.3 HZ. IN THE FRONT TO BACK DIRECTION. NO OTHER STRUCTURAL MODES WERE FOUND BELOW THE 33 HZ RIGID BOUNDARY. ✓

| MODE | FREQUENCY | DESCRIPTION |
|------|-----------|-------------------|
| 1 | 28.3 HZ ✓ | FRONT TO BACK |
| 2 | 34.9 HZ ✓ | SIDE TO SIDE |
| 3 | 35.5 HZ ✓ | RELAY MOUNTING PL |
| 4 | 36.5 HZ | FRONT TO BACK |
| 5 | 43.3 HZ | FRONT TO BACK |
| 6 | 47.8 HZ | FRONT TO BACK |
| 7 | 62.8 HZ ✓ | SIDE TO SIDE |

SINCE NO RESONANCES WERE FOUND IN THE PANEL BELOW 10 HZ., THEN THE PREVIOUS TESTING ADEQUATELY ENVELOPED THE REQUIRED RESPONSE SPECTRA AND THE PANEL IS SEISMICALLY QUALIFIED BASED ON THE PREVIOUS TEST [3].

| | | | | | | | |
|-----|-----|---------|---------|---------|--|--|---------|
| | | | | | WPPES - WNP - 2 | | |
| | | | | | FREQUENCY TEST - HYDROGEN REACTIVE PANEL | | |
| 1 | RHD | 7-20-83 | MJL | 7/20/83 | JOB NO 0740-CF6 | | PAGE 18 |
| 0 | RHD | 4-8-83 | CDS | 4-11-83 | CALC NO | | OF 19 |
| REV | BY | DATE | CHECKED | DATE | FT - P1 | | |
| | | | | |  edis nuclear An Impell Corporation Company | | |

6.0 REFERENCES:

1. OPERATING MANUAL FOR GEN RAD 2512 SPECTRUM ANALYZER.
2. US ATOMIC ENERGY COMMISSION REGULATORY GUIDE 1.60
3. QID # 050106

| | | | | | | | |
|-----|-----|---------|---------|---------|--|--|---------|
| | | | | | WPPSS - WNP-2 | | |
| | | | | | FREQUENCY TEST - HYDROGEN RECOMBINER PANEL | | |
| 1 | RHD | 7-20-83 | MJL | 7/20/83 | JOB NO 0740-024 | | PAGE 19 |
| 0 | RHD | 4-8-83 | CE | 4-11-93 | CALC NO | | OF 19 |
| REV | BY | DATE | CHECKED | DATE | FT- P1 | | |

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Question:

"...provide a discussion of how you establish the similarity of valves to a tested prototype. This discussion should include, but not be limited to, those characteristics such as valve type, size, geometry, pressure rating, stress level, manufacturer, actuator type, and actuator load rating."

Response:

The following information was made available to the NRC Seismic Qualification Review Team (SQRT) during their audit.

The safety-related valve operability static deflection test program was implemented to demonstrate valve operability by applying a static test load representing the most adverse dynamic and operating loads to a candidate test unit. The test procedure calls for stroking the valve open and closed using the minimum design specification actuator power supply. Acceptable performance was defined as smooth operation within the test unit specification operating time limits.

The test candidates were chosen from "families" of valves (see attached flow chart). All safety-related active valves were first segregated by valve supplier, then actuator type (i.e., electrical AC, electrical DC, air, hydraulic). These groups were then further categorized by type (i.e., gate, globe, butterfly), pressure class, body material (i.e., carbon steel, stainless steel), yoke leg configuration, and pipeline size.

Test candidates were chosen from these resulting "families" based on the highest dynamic and operating loads compared to the lowest available actuating force (i.e., motor operator - available torque output). The use of an operability test to establish qualification was limited to its "family" and to additional similar "families" different only in connecting pipe size and only within the size ranges defined in Table 3.9.3.2-1 (attached).

VALVE OPERABILITY

IN-SITU TEST CANDIDATE SELECTION PROCESS

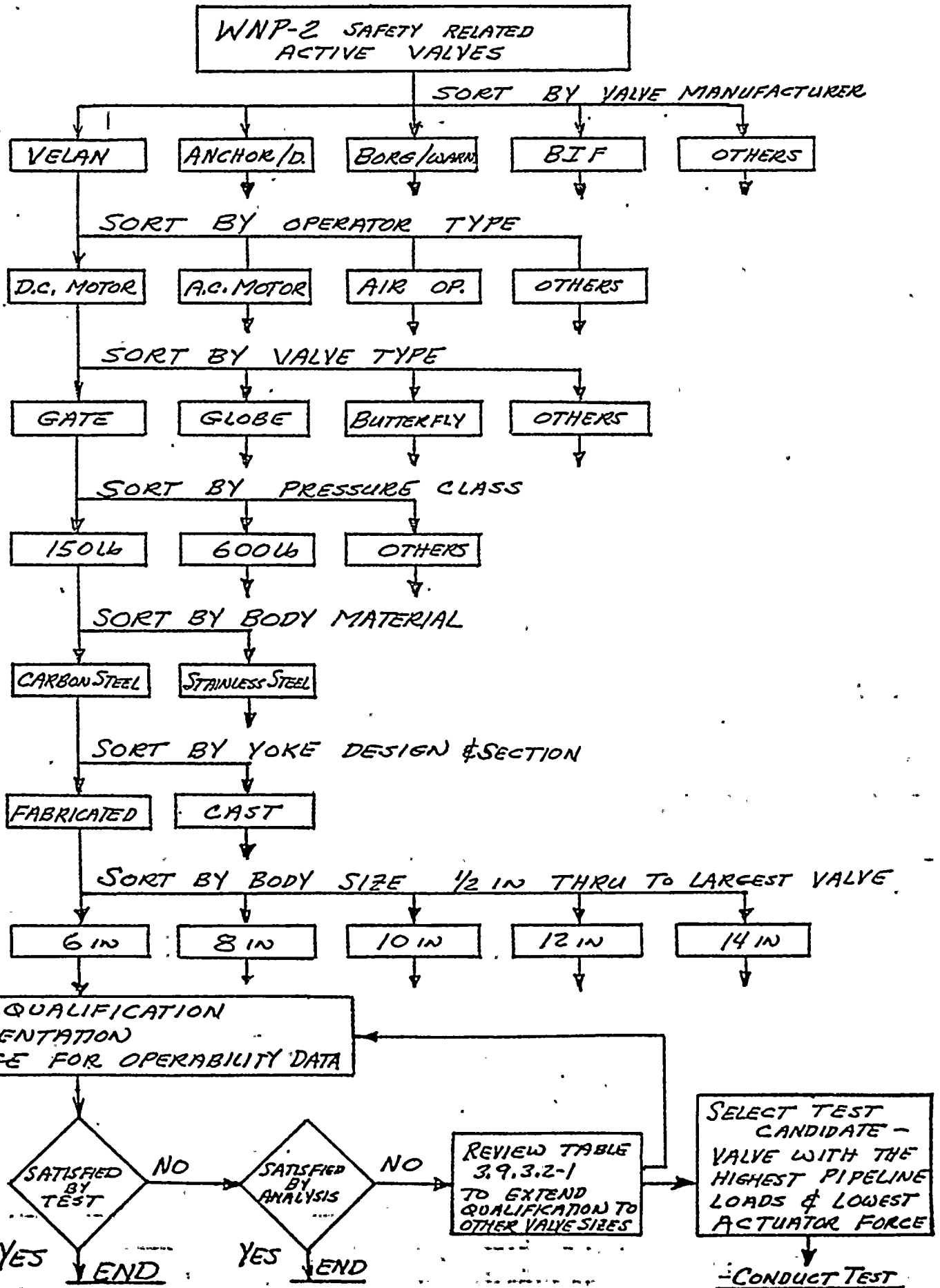


TABLE 3.9.3.2-1

Valve Qualification Limits

| Size of Qualified Valve | | Qualification extends to: | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--|---------------------------|---|-------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|--|
| | | 1/2 | 1 | 1-1/2 | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 36 | |
| V | | | | | | | | | | | | | | | | | | | | | | |
| 1/2 | | X | X | | | | | | | | | | | | | | | | | | | |
| 1 | | X | X | X | | | | | | | | | | | | | | | | | | |
| 1-1/2 | | | X | X | X | | | | | | | | | | | | | | | | | |
| 2 | | | | X | X | X | | | | | | | | | | | | | | | | |
| 3 | | | | | X | X | X | | | | | | | | | | | | | | | |
| 4 | | | | | | X | X | X | | | | | | | | | | | | | | |
| 6 | | | | | | | X | X | X | | | | | | | | | | | | | |
| 8 | | | | | | | | X | X | X | X | | | | | | | | | | | |
| 10 | | | | | | | | | X | X | X | X | | | | | | | | | | |
| 12 | | | | | | | | | X | X | X | X | X | | | | | | | | | |
| 14 | | | | | | | | | | X | X | X | X | X | X | | | | | | | |
| 16 | | | | | | | | | | | X | X | X | X | X | X | | | | | | |
| 18 | | | | | | | | | | | | X | X | X | X | X | X | | | | | |
| 20 | | | | | | | | | | | | | X | X | X | X | X | X | X | | | |
| 22 | | | | | | | | | | | | | | X | X | X | X | X | X | X | | |
| 24 | | | | | | | | | | | | | | | X | X | X | X | X | X | | |
| 26 | | | | | | | | | | | | | | | | X | X | X | X | X | X | |
| 28 | | | | | | | | | | | | | | | | | X | X | X | X | X | |
| 30 | | | | | | | | | | | | | | | | | | X | X | X | X | |
| 36 | | | | | | | | | | | | | | | | | | | X | X | X | |

SAR Q 271.04

Question:

"Identify all equipment which may be affected by fatigue due to vibration and describe your methods and criteria to qualify this equipment for such loading conditions."

Response:

A list of all equipment affected by the hydrodynamic load associated fatigue as well as the analytical criteria used to qualify this equipment is defined in Sections 3.0 and 5.0 of the WNP-2 "Dynamic Qualification Report", October 1982, transmitted to the NRC by our letter G02-82-827, dated October 5, 1982.

Question:

"Describe the results of any in-plant tests, such as in situ impedance tests, and any operational tests you have planned to confirm the qualification of any item of equipment."

Response:

Completed In-Plant Tests

Miscellaneous equipment items such as pipeline mounted solenoid valves, panels (see separate Question SER 3.10.1.2) HPCS diesel generator, switchgear, etc. have been tested to verify equipment response characteristics. The results of these supplemental in-plant tests are available in our qualification files. These results were used in conjunction with other data (analysis and tests) to confirm and strengthen the qualification documentation. No in-plant testing was used solely as the only documentation of the equipment's seismic capability.

Planned In-Plant Tests

A total of 18 in-situ valve operability static deflection tests have presently been defined. Nine valve static deflection tests have been successful, i.e. the valves have operated, under load, smoothly and within the defined valve operational time limits. The remaining valve static deflection tests are to be completed as the equipment becomes available, as part of the pre-operational testing program.

Natural frequency and model response tests on air handling units are planned to verify analysis and establish similarity to the tested units.

It is the Supply System position that this response provides adequate description of the planned tests and identification of past tests. If additional detail on any specific past or planned test is required, it will be made available upon request.

