WM. H. ZIMMER - UNIT 1

4130-00

SUMMARY OF EQUIPMENT QUALIFICATION

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Introduction

The purpose of this report is to briefly summarize the philosophy, methodology, and procedures used in the dynamic qualification of the Zimmer balance of plant safety-related equipment. A more detailed presentation may be found in the Zimmer Formal Safety Analysis Report (FSAR) and in the Zimmer Design Assessment Report (DAR).

Background

The present Zimmer equipment qualification program has evolved through a period of eight years. The evolution has involved advancements in dynamic analysis and test methods, identification and refinement of additional dynamic loads to be considered, improvementsin industry standards, and increased regulatory requirements. The definition of the dynamic loads, having the greatest impact on equipment qualification, has evolved through four stages to its present level.

Initially the dynamic load definition included only seismic loads, however in late 1974 the existence of additional dynamic loads began to be recognized. These new loads were associated with extended SRV discharge into the suppression pool. In late 1975, as a result of the efforts of the Mark II owners group and the NRC staff,the loads associated with a postulated SRV discharge event were defined, and subsequently the Zimmer equipment qualification program was revised to incorporate these new loads.

The next development occurred as a result of changing the type of SRV discharge device used from the ramshead to the T-quencher. This change was made in order to accomplish better heat transfer and thermal mixing in the suppression pool,butalso resulted in changing the structural response of the Containment. In order to accomodate this change, the dynamic load definition for the Zimmer equipment qualification program was again revised to include this new SRV load definition. Also at this time the dynamic loads associated with a Loss Of Coolant Accident (LOCA) were incorporated into the load definition.

The final state in the evolution of the dynamic load definition occurred in mid 1980 when the spectra defining the dynamic loads were regenerated to incorporate refinements made by General Electric in their definition of the Mark II hydrodynamic loads.

As each new generation dynamic load definition was incorporated into the Zimmer equipment qualification program , an assessment

was made of the equipment previously qualified. Where the assessment determined there were inadequacies the equipment was requalified and hardware modifications were made as required. For new equipment or equipment where the qualification had not been completed, the qualification was performed using the latest load definition. In addition, each stage of this asessment and qualification effort was performed using the latest industry standards and regulatory requirements.

Design Load Combinations

Itemized below are the load combinations used in the Zimmer equipment qualification program. Also identified are the appropriate damping values, service levels and the method used to combine the individual loads.

Load Combination	Damping Value	Service Level	Combination Method
1) N + OBE	½%	B*	ABS
2) N + SSE	1%	C*	ABS
3) N + OBE + Envelope (SRV_{ASY-TQ} SRV_{All-TQ})	1%	B	ABS
4) N + Envelope(OBE & SSE) + Envelope (SRV_{ASY-TQ} + SRV_{All-TQ}) + CHG	2%	C	ABS
5) N + Envelope(OBE & SSE) + Envelope (SRV_{ASY-TQ} + 0.6 SRV_{All-TQ}) + CO1	2%	C	ABS
6) N + Envelope(OBE & SSE) + Envelope (SRV_{ASY-TQ} + SRV_{All-TQ}) + CO2	2%	C	ABS
7) N + SQRT (SSE^2 + AP^2)	2%	C	ABS

* these service levels reflect that combinations 1 and 2 are used for equipment not affected by the SRV and LOCA loads (equipment located outside of reactor building). Combinations 3 through 7 are used for equipment located in the primary containment and reactor building.

Assessment and Requalification Procedures

1) General Approach

The procedure used to assess the existing qualification documentation to determine the equipment adequacy for the additional hydrodynamic loads, consists of three steps.

Step 1: Check the original qualification method to insure that all important issues have been addressed and that the original qualification is still in accordance with the latest applicable codes and standards.

Step 2: Determine if the input used in the original qualification is sufficient to properly include the additional hydrodynamic loads. This includes both the increased frequency content and amplitude.

Step 3: If the frequency range considered in the original qualification is less than the frequency content of the additional hydrodynamic loads, determine if there is sufficient margin in the input acceleration to account for the effect of the higher frequencies.

If the assessment demonstrated that the equipment is adequate for the additional hydrodynamic loads and that the qualification documentation is in proper order, then the component was considered qualified. If the assessment determined deficiencies or that further investigation was required, then the component was requalified. The method of requalification was generally dictated by the original qualification method. In most cases this involved simply supplementing the original qualification. However, a significant number of cases required complete re-analysis or retesting.

2) Procedure for Equipment Originally Qualified by Test

Basically there were four major concerns involving qualification by testing that have been addressed by the Zimmer equipment qualification program. These concerns are:

a) the increased frequency content and

b) increased acceleration levels associated with the hydrodynamic loads

c) the effect of cross-coupling and

d) multimode response when the original qualification was single axis or single frequency.

A brief summary describing how these concerns have been addressed is provided below.

a) For multiple frequency tests the increased frequency content was addressed by first determining whether the test response spectra (TRS) enveloped the required response spectra (RRS). In cases where the TRS did not envelope the RRS, the natural frequencies were compared against the exceedances. If no natural frequencies were found in the areas not enveloped, the component was considered qualified. However, in some cases the TRS was not plotted after 33 Hz or natural frequencies greater than 33 Hz were not deterimined. For these cases, the criterion for determining adequacy was: did the test input include sufficiently high acceleration levels to account for possible high frequency effects, or, based upon qualification of similar equipment, is this component sensitive to high frequencies. This criterion is to be verified by the Zimmer verification test program.

   For single frequency tests the increased frequency content concern was addressed by determining if the test input included sufficiently high acceleration levels to account for possible high frequency effects, or by determining the sensitivity of the equipment to high frequencies. This determination was generally based upon the qualification results of similar equipment. The basis for making these determinations will be confirmed by the Zimmer verification test program.

b) The increased acceleration levels associated with the hydrodynamic loads were addressed by determining if the test input acceleration bounded the increased acceleration levels.

c) The cross-coupling concern for equipment qualified by single axis testing was addressed by determining whether the test input included sufficient margin to account for cross-coupling effects. The amount of margin required was based upon previous testing

experience and found to be dependent upon:

- the relative rigidity of the equipment

- eccentricity of the center of gravity from the centroid of the mounting. This includes the eccentricity of locally mounted devices in the equipment as well as overall equipment eccentricity

- the sensitivity of mechanical linkages to cross-coupling

d) The effects of multi-mode response for single frequency testing was addressed by determining if there was sufficient margin in the test input acceleration to account for the participation of multiple modes. The amount of margin required was determined by examining the modal participation factors of similar equipment.

) Procedure for Equipment Originally Qualified by Analysis

For equipment originally qualified by analysis there were two major concerns, the increased frequency content and the increased acceleration levels associated with the hydrodynamic loads. These concerns were addressed by extending the analysis to include the effect of the higher frequencies, and when the additional hydrodynamic loads resulted in combined loads exceeding the design basis loads, the analysis was repeated using the new combined loads.

4) Use of SRSS

The above discussion summarizes the supplemental qualification efforts implemented on equipment identified by the assessment as either having qualification deficiencies or as requiring further investigation. As a result of these efforts one of the following actions has been or will be implemented:

a) equipment classified as qualified

b) equipment retested or reanaly zed

c) hardware modifications made

d) equipment replaced

However before hardware modifications were made or replacement was initiated the combining of the seismic and hydrodynamic loads by the square root of the sum of the squares (SRSS) method was considered. If sufficient load reduction

was obtained, then modifications or replacement were not necessary. If the load reduction was not sufficient then the modifications made were based upon loads combined by the absolute sum (ABS) method.

VERIFICATION TEST PROGRAMS

I. In-situ Test Programs

A. In-situ Impendance Test Program

The purpose of this test program is to obtain the equipment natural frequencies in the range of 1-100 Hz, associated mode shapes and modal participation factors as well as damping and cross coupling parameters. It is intended to use these results to verify analytical techniques used for the equipment qualification and to supplement existing test qualification as needed. Nine pieces of equipment were chosen for the test program with the concurrence of the NRC-SQRT. These nine pieces comprise a representative sample of the types of equipment used in the Zimmer plant.

These pieces of equipment are:

1)	1E51C001	Reactor Core Isolation Cooling Pump
2)	1E51C002	Reactor Core Isolation Cooling Steam Turbine Assembly
3)	1H22P017	Reactor Core Isolation Cooling Instrument Panel
4)	1E51F010	6" Motor Operated Reactor Core Isolation Cooling Gate Valve
5)	1E12B001	Residual Heat Removal Heat Exchanger
6)	1E12F014A	16" Motor Operated Residual Heat Removal Butterfly Valve
7)	1VG05SA	Standby Gas Treatment System Equipment Train
8)	1AP15EA	480 volt Reactor Building Motor Control Center 1A
9)	1WR01PA	Reactor Building Closed Cooling Water Pump

The test was completed using different methods of excitations such as a hydraulic shaker, electromagnetic shaker

and calibrated hammers. The dynamic input was in the form of white noise (flat spectra), shaped spectra and impact. The points of measuring response were selected to construct a test model capable of detecting global and local modes.

B. In-Plant SRV Test Program

The purpose of this test program is to verify the predicted forcing function, structural response, the nature of the input to equipment and the accuracy of predicted equipment response during a safety relief valve discharge event.

Seven pieces of equipment have been chosen to be monitored during the test. They are:

1)	1E22C001	High Pressure Core Spray Pump
2)	1H22P017	Reactor Core Isolation Cooling Instrument Rack
3)	1E22F015	20" Motor Operated High Pressure Core Spray Gate Valve
4)	1AP1SEE	480 Volt Reactor Building Motor Control Center 1E
5)	1B33C001B	Reactor Recirculation Pump
6)	1H22P027	Reactor Vessel Level and Pressure Instrument Rack
7)	1C41F001	3" Motor Operated Standby Liquid Control Globe Valve

II. Fatigue Evaluation

The impact of the extended duration of the hydrodynamic SRV and LOCA loads is assessed by analytical and testing techniques.

A. Analytical Approach

Two pieces of mechanical equipment which have been qualified by analysis will be selected and a detailed

fatigue analysis will be performed to calculate the cumulative usage factor.

B. Testing Approach

Selected pieces of equipment and instrumentation which are scheduled to be requalified by test are to be fatigue tested. This test will be conducted after the completion of qualification testing and will consist of extended duration segments designed to represent the hydrodynamic loads associated with the S/R valve actuation and LOCA events. The test duration is conservatively estimated from the equivalent number of cycles for each event, and the test input is taken as the envelope of the combined loads associated with each postulated loading combination. These tests are being performed by Southwest Research, and when completed the results will be summarized and presented to the NRC. It is intended to use these results to draw generic conclusions about the impact of the extended nature of the hydrodynamic loads on equipment and instrumentation.

III. Sensitivity Testing of Relays

The purpose of this testing program is to determine the sensitivity of relays and similar electrical devices and instrumentation to the input frequency of the dynamic loads. The test will be conducted in three phases using four relays. In the phase one the relays will be tested using a dynamic input consisting of frequencies from 51 to 100 Hz only, and amplitude which shall be incrementally increased until failure occurs. Phase two will be identical to phase one except the dynamic input will consist of frequencies from 1 to 50 Hz. Finally, in phase three the dynamic input will consist of frequencies from 1 to 100 Hz. The results will be used to draw generic conclusions about the effect of frequency upon performance of relays and similar type devices.

Conservatisms

The following conservatisms have been incorporated into the Zimmer equipment qualification programs:

1) Lower damping values than those recommended in Regulatory Guide 1.61 were used.

2) The loads were combined by the absolute sum (ABS) method rather then the square root of the sum of the squares, (SRSS) method.

3) The response spectrum method was used rather than the time history method.

4) Peaks of the hydrodynamic load response spectra have been widened by 20%.

5) The primary containment and reactor building response spectra consist of a resultant (radial) horizontal and a vertical curve. However, this resultant horizontal was applied in each individual (N-S and E-W) horizontal direction simultaneously with the vertical direction.

6) The load combinations use the envelope of SRV_{ALL} and SRV_{ASY} in all directions while SRV_{ALL} is maximum in the vertical direction while SRV_{ASY} is maximum in the horizontal direction.

ZIMMER NUCLEAR STATION

UNIT 1

BOP EQUIPMENT QUALIFICATION SUMMARY
USING T-QUENCHER HYDRODYNAMIC LOADS

EQUIPMENT NAME:

EQUIPMENT NO.: SPEC. NO.:

LOCATION:

EQUIPMENT CLASSIFICATION: ☐ ACTIVE ☐ PASSIVE

QUALIFICATION METHOD:

QUALIFICATION DOCUMENT REFERENCES:

LOAD COMBINATIONS CONSIDERED IN QUALIFICATION:

1. $N + OBE + ENV \left[SRV_{ASY\text{-}TQ} + SRV_{ALL\text{-}TQ}\right]$
2. $N + ENV\ (OBE\ \&\ SSE) + ENV \left[SRV_{ASY\text{-}TQ}\ \&\ SRV_{ADS\text{-}TQ}\right] + CHG$
3. $N + ENV\ (OBE\ \&\ SSE) + ENV \left[SRV_{ASY\text{-}TQ}\ \&\ 0.6\ SRV_{ADS\text{-}TQ}\right] + CO1$
4. $N + ENV\ (OBE + SSE) + ENV \left[SRV_{ASY\text{-}TQ}\ \&\ SRV_{ADS\text{-}TQ}\right] + CO2$
5. $N + \sqrt{SSE^2 + AP^2}$

QUALIFICATION:

PREPARED BY: DATE:

REVIEWED BY: DATE: PROJECT NO. 4130-15

APPROVED BY: DATE: EMD FILE NO.

SARGENT & LUNDY ENGINEERS CHICAGO

QUALIFICATION SUMMARY

SEISMIC QUALIFICATION METHOD:

T-QUENCHER REQUALIFICATION METHOD:

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QUALIFICATION SUMMARY OF EQUIPMENT

I. PLANT NAME: ZIMMER - Unit 1 TYPE:

1. Utility: Cincinnati Gas & Electric PWR ☐
2. NSSS: General Electric BWR ☒
3. A-E: Sargent & Lundy

II. COMPONENT NAME:

1. Scope: ☐ NSSS ☐ BOP
2. Model Number: _____ Quantity: _____
3. Vendor: _____
4. If the component is a cabinet or panel, name and model No. of the devices included: _____
5. Physical Description Appearance: _____

   Dimensions: _____ Weight: _____
6. Location: Building: _____ Elev.: _____
7. Field Mounting Conditions:

   ☐ Bolting: Number: _____ Size: _____

   ☐ Welding: Weld Type: _____

   Leg: _____ Length: _____ Pitch: _____
8. Natural Frequencies in Each Direction:

   H1: _____

   H2: _____

   V : _____
9. (a) Functional Description _____

   (b) Equipment required for:

   ☐ Hot Standby ☐ Cold Shutdown ☐ Both
10. Pertinent Reference Design Specifications: _____

III. IS EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT: ☐ Yes ☐ No

Comments: _____

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IV. EQUIPMENT QUALIFICATION METHOD: ☐ Test
☐ Analysis
☐ Combination of Test and Analysis

1. Test and/or Analysis by _____
(Name of Company or Laboratory & Report No.)

2. If Qualification by combination of test and analysis state which components were tested and which were analyzed: _____

_____

_____

V. VIBRATION INPUT:

1. Loads considered: ☐ Seismic
☐ Hydrodynamic
☐ Explosive
☐ Other (Specify): _____

_____

2. Required Response Spectra (attach the graphs):

_____

3. Method of combining Requiring Response Spectra:
☐ Absolute Sum
☐ SRSS
☐ _____

4. Required Acceleration in Each Direction (if Required):
H1_____ H2_____ V_____

5. Damping OBE:_____ Basis for damping:_____
SSE:_____ _____

VI. IF QUALIFICATION BY TEST, THEN COMPLETE:

1. Test Method: ☐ Single Frequency
☐ Multiple Frequency
☐ Random Motion
☐ Sine Beat
☐ _____

2. Input Motion: ☐ Single Axis
☐ Multi Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other_____

4. Frequency Range: _____

5. For Multiple Frequency Test does TRS Envelop RRS?

☐ No ☐ Yes (attach TRS graphs)

6. Input g-level Test at H1=_____ H2=_____ V=_____

7. Laboratory Mounting:

☐ Bolting: Number_____ Size_____

☐ Welding: Weld Type:_____

Leg_____ Length_____ Pitch_____

8. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable

9. Other tests performed_____

_____

VII. IF QUALIFICATION BY ANALYSIS, THEN COMPLETE:

1. Type of Analysis

☐ Static Analysis

☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Response Spectrum

☐ Time History

2. Model Type:

☐ 1-Dimensional ☐ Finite Element

☐ 2-Dimensional ☐ Closed Form Solution

☐ 3-Dimensional ☐ _____

3. Method of Analysis:

☐ Computer-Aided Calculation Programs used:_____

☐ Hand Calculations

☐ _____

4. Have equipment supports been adequately considered in analysis? ☐ Yes ☐ No

5. Stress Evaluation at Critical Structural Elements:

Element	Calc Stress	Allow Stress

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6. Deflection Evaluation at Critical Structural Elements (Active Equipment Only)

Element	Calc Deflec.	Allow Deflec.

VIII. ADDITIONAL COMMENTS:

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ZIMMER NUCLEAR STATION
UNIT-1
4130-00/4130-15

BOP VALVE QUALIFICATION SUMMARY

UTILITY : CINCINNATI GAS & ELECTRIC CO.

NSSS : GENERAL ELECTRIC CO. TYPE: BWR

AE : SARGENT & LUNDY

SPEC NO.:

VALVE MANUFACTURER:

VALVE SIZE(S) & RATING(S):

VALVE QUAL. METHOD:

QUALIFICATION DOCUMENT REFERENCES:

1.

2.

3.

4.

5.

PREPARED BY: DATE:

REVIEWED BY: DATE:

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I. VALVES COVERED IN THIS SUMMARY:

VALVE TAG NUMBER	SIZE & TYPE	OPER. TYPE	LOCATION		ACTIVE OR PASSIVE	FUNCTIONAL DESCRIPTION
			BLDG.	SUB.-SYS.		

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II. MOUNTING:

On pipe ☐ Weld Type ☐ Flange Type

Any other support? (describe briefly)_____

III. IF QUALIFICATION BY ANALYSIS:

1. Method of analysis:

☐ Finite element ☐ Computer aided_____(Program)

☐ Closed form ☐ Hand calculations

☐ Other_____

2. For active valves, operability of the valve was addressed by:

☐ Limiting deflections

☐ Limiting stress to within design allowables

☐ Both

3. Stress in the critical elements:

Element	G-Level in axis*			Calculated Stress (ksi)	Allowable stress (ksi)	
	a	b	c		Upset	Emergency

4. Deflections, for active valves only:

Element	G-Level in axis*			Calculated Deflection in	Allowable Deflection in
	a	b	c		

*Axis a - Along outlet pipe run

b - Perpendicular to axis 'a' and in the plane of axis 'a' and valve stem axis

c - Perpendicular to both 'a' and 'b'

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IV. IF THE QUALIFICATION IS BY TEST:

1. Laboratory mounting: _____

2. Normal operating loads input by: _____

_____

3. Resonance search test:

   a) Input axes: ☐ Single ☐ Biaxial

   b) Frequency range _____ to _____ Hz.

   c) Sweep rate _____ octaves/min.

   d) Input acceleration: _____

4. Qualification test:

   a) Input axes: ☐ Single ☐ Biaxial ☐ Pseudo-biaxial

   b) Frequency range: _____ Hz.

   c) No. of tests in each orientation:

      Upset: _____ Emergency: _____

   d) Test method

      ☐ Sine beat (single frequency):

      No. of beats _____, No. of cycles/beat _____

      Beats at _____

      Input acceleration Upset: a_____,b_____,c_____

      Emergency: a_____,b_____,c_____

      ☐ Sine Dwell (single frequency): Duration: _____

      Dwells at _____

      Input acceleration Upset: a_____,b_____,c_____

      Emergency: a_____,b_____,c_____

      ☐ Random motion (multi frequency): Duration: _____

      Damping: Upset: _____ Emergency: _____

      TRS envelop RRS? _____

   e) Other tests performed and comments: _____

_____

_____

_____

_____

V. RESULTS OF QUALIFICATION:

RESONANT FREQUENCIES			MAXIMUM ALLOWABLE 'G' VALUE APPLIED SIMULTANEOUSLY					
			UPSET			EMERGENCY		
a	b	c	a	b	c	a	b	c

VI. LOADS FROM PIPING ANALYSIS:

VALVE TAG NO.	PIPING SUBSYSTEM ANAL. DATE & EMD FILE	VALVE NOZZLE LOADS WITHIN VALVE ALLOW.	ACCELERATION IN 'G'S'					
			UPSET			EMERGENCY		
			a	b	c	a	b	c

ADDITIONAL CONSIDERATIONS:

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THE CINCINNATI GAS & ELECTRIC COMPANY
WM. H. ZIMMER NUCLEAR POWER STATION - UNIT 1

SCENARIO FOR ACCOMPLISHING HOT OR COLD SHUTDOWN

Several success paths are available for safely shutting the reactor to a cold shutdown condition or maintaining an interim condition, assuming the following initiating events:

1) Safe Shutdown Earthquake (SSE)
2) Loss of Off-Site Power
3) Single Failure

For purposes of selecting one success path for accomplishing cold shutdown, RHR 1A pump, 1E12C002A, is assumed as the single failure. The following seismic Category I equipment are available for reactor scram, RPV depressurization and decay heat removal:

1. ESS Relay Panel senses loss of off-site power and initiates diesel generators and load sequencing.
2. CRD Hydraulic Units insert the control rods and shutdown the core (SCRAM).
3. Diesel Generators are started and reach rated speed and accept auxiliary load.
4. RHR 1B and 1C pumps are started and operate on minimum flow recirculation.
5. The following electrical equipment is energized during and following load sequencing:
   a. 4.16 kV Switchgear
   b. 480-V ESS Substation

c. 480-V MCC's

d. Batteries

e. 24-V, 125-V, 250-V DC Distribution Panels/Cubicles

f. 120-V AC Distribution Panels

g. Electrical Penetration Assemblies

6. The following equipment is automatically started during load sequencing:

a. RBCCW Pumps (1WR System)

b. Service Water Pumps (1WS System)

c. Control Room Air Conditioning (1VC System)

d. Switchgear Heat Removal (1VX System)

e. CSCS Room Coolers (1VY System)

f. SW Pump Structure Room Coolers (1VH System)

g. CSCS Water Leg Pumps

7. Cooling Water becomes available for the following heat exchangers:

a. DG Hx

b. RBCCW Hx

c. RHR Hx (GE Furnished)

8. RBCCW Expansion Tank provides suction head on RBCCW pumps.

9. Safety Relief Valves provide RPV pressure control for depressurizing RPV to permit RHR initiation. Once the RHR System begins operation (below 135 psig vessel pressure), the reactor can be maintained at any desired temperature or pressure, or cooldown may be continued.

10. Miscellaneous Section III tanks provide high pressure air for closing the MSIV's and opening the SRV's from the main control room.

11. The following valves are cycled to line up piping to permit DG cooling and decay heat removal:

1E12F003B
1E12F004B
1E12F047B
1E12F048B
1E12F006B
1E12F008
1E12F009
1E12F053B
1E12F068B
1E12F014B
1WS037A/D
1WS033
1E12F042C

See attached table for valve functions

1B21F013A-D, E-H, K, L, P, R, S (GE Furnished)
1B21F022A/D (GE Furnished)
1B21F028A/D (GE Furnished

The above equipment therefore provides on-site power, instrumentation, decay heat removal, auxiliary equipment cooling and main control room habitability to safely shut down the reactor from power operation to cold shutdown.

The attached list of BOP and NSSS equipment noted by an asterick denotes in detail the equipment required for accomplishing the above success path.

RJPruski/mw

VALVE DESCRIPTION & FUNCTION

1E12F003B	RHR HX(B) Disch. to RPV
1E12F047B	Inlet to RHR HX(B)
1E12F048B	Bypass RHR HX(B)
1E12F006B)	Suction to RHR(B) From Recirc. Suction Pipe
1E12F008)	
1E12F009)	
1E12F053B	Return to RPV from RHR HX(B)
1E12F068B	Service Water Discharge from RHR HX(B)
1E12F014B	Service Water Inlet to RHR HX(B)
1E12F004B	Suction to RHR Pump (B) from Suppression Pool
1E12F042C	Discharge from RHR Pump (C) to RPV
1E12F004C	Suction to RHR Pump (C) from Suppression Pool (Not required to stroke - normally open)
1B21F013A-D,E-H, K,L,P,R,S	Safety Valve Main Steam System
1B21F022A/D	Inboard MSIV
1B21F028A/D	Outboard MSIV
1WS037A/D	Service Water Dish from D.G. HX
1WS033)	Service Water Essential - Loop Iso. Valves
1WS034)	

TABLE 110.6

SEISMIC QUALIFICATION SUMMARY OF CATEGORY I MECHANICAL AND ELECTRICAL EQUIPMENT

Equipment Number	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability	Equipment Number	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability
*1A104A/C	4.16 KV Switchgear	Test (5)	A, D	Yes	*1DC01EA	250 V Battery	Test (5)	C, D	Yes
1AP04ED/E*	6.9 KV Switchgear	Test (5)	A, E	"	*1DC11EA/C	125 V Battery	Test (5)	C, D	"
*1AP05E 1AP06E 1AP09E 1AP10E 1AP11E	480 V ESS Substation	Test (5)	A, B	"	*1DC21EA/B	24/48 V Battery	Test (5)	C, D	"
					*	Battery Racks	Analysis(7)	C, D, E	"
*1AP20EA/C 1AP15EA/B 1AP16EA/C	480 V MCC	Test (3)	A, D	"		Battery Monitors	Test (5)	C, D	"
*1DG07EA/C	Diesel Oil Day Tank	Analysis(7)	C, D, E	"	1DC02EA/B	250 V Battery Charger	Test (5)	A, C, D	"
*1DG01EA/C	Diesel Gen.	Analysis(8)	C, D	"	1DC12EA/C	125 V Battery Charger	Test (5)	A, C, D	"
					1DC22EA/D	24 V Battery Charger	Test (5)	A, C, D	"
*1PL10JA/C	D. G. Control Panel	Test (5)	C, D	"	*1IP01EA/B 1IP03E 1IP04E	120 V AC Dist. Panels	Test (5)	A, D	"
*1DG02AA/D 1DG03AA/B 1DG04AA/B	D. G. Heat Exchanger	Analysis(8)	C, D, E	"	*1DC04EA 1DC05EA/C	250 V DC Dist. Cubicles	Test (5)	C, D	"
*1DG05EA/C 1DG06EA/C	D. G. Exhaust Silencer	Analysis(8)	C, D, E	"	*1DC14EA/C	125 V DC Dist. Cubicles	Test (5)	C, D	"
					*1DC24EA/B	24/48 V DC Dist. Cubicles	Test (5)	C, D	"
*1DG17EA/C 1DG18EA/C	14 Cylinder Exp. Joint	Analysis(8)	E	"	*1AP50EA/H 1AP50EJ/N 1AP50EP 1AP50ER	Electrical Penetration Assemblies	Analysis(7)	C, D, E	"
*1DG20EA/C 1DG21EA/C 1DG22EA/C	12 Cylinder Exp. Joint	Analysis(8)	E	"					
	750 KVA Transformer	Test (1)	A, D	"					

*Equipment required for cold shutdown based on scenario attached (1 success path for accomplishing shutdown).

**The key to information referenced numerically appears on the last page of this table.

MJB/ck

TABLE 110.6

SEISMIC QUALIFICATION SUMMARY OF CATEGORY I MECHANICAL AND ELECTRICAL EQUIPMENT

Equipment Number	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability	Equipment Number	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability
*[illegible]	[illegible] Control Board Assemblies	Analysis (8)	C, D, E	Yes	IVC03CA/B	SGTS Cooling Fan	Analysis (9)	D	Yes
[illegible]					IVC05SA/B	SGTS Equip. Train	Analysis (8)	D	"
[illegible]					IVC04AA/B	SGTS Heating Coil	Analysis (8)	D, E	"
	Instruments for Main Control Boards	Test (5)	C, D	"	IVC02CA/B	SGTS Fan	Analysis (9)	D	"
IAP023	Misc. Auto Control Cabinet	Analysis (8)	E	"		SGTS Temperature Transmitter	Test (4)	E	"
*IWP01PA/D	RBCC Water Pumps and Motors	Analysis (7)	A, D	"		Deluge Level Controller	Test (5)	E	"
*[illegible]	CSCS Water Leg Pumps	-	A	"		Deluge Valve MDL-370DGY	Test (5)	E	"
[illegible]						Pressure Trans.	Test (5)	E	"
IPI40JA/B	Pri. Cont. Sampling System, Ess. Cont. Mon. System	-	D	"		Deluge Piping	Analysis (7)	E	"
* IWS01PA/D	Service Water Pumps & Motors	Analysis (7)	A, D	"	IVC03YA/B IVC04YA	SCIB	Analysis (9)	D	"
IW[illegible]A/B	Traveling Water Screens	Analysis (7)	E	"		Solenoid Valve	Test (2)	D	"
IWS02EA/B	Service Water Strainers	Analysis (8)	E	"		Limit Switch	Test (2)	E	"
						Actuator	Analysis (7)	D	"
* IWP02AA/C	NRCCW Heat Exchanger	Analysis (8)	A, D	"	*IVH01CA/D IVY01C IVY02C IVY03C IVY04C IVC04CA/B IVG01CA/B IVX04CA/F IVX02CA/C IVA03C	Vent Fans	Analysis (7)	A, D	"
* [illegible]	N2 Cylinder Rack	Analysis (8)	D, E	"					
[illegible]	Misc. Tanks Section III	Analysis (7)	A, D	"					
						Resilient Isolators	Analysis (7)	E	"
						Motors	Analysis (9)	A, D	
					*IVC02CA/B	C.R. Condensing Unit	Analysis (7)	A, D	"
					*IVX01CA/F	Switchgear Condensing Unit	Analysis (7)(8)	A, D	"

*Equipment required for cold shutdown based on scenario attached (1 success path for accomplishing shutdown).

**The key to information referenced numerically appears on the last page of this table.

MJB/kk

TABLE 10.6

SEISMIC QUALIFICATION SUMMARY OF CATEGORY I MECHANICAL AND ELECTRICAL EQUIPMENT

Equipment Number	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability	Equipment Number	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability
1PL81J 1PL84J	Control Panels	Test (1)	A, D	Yes	*1VX06AA/F	Filter for Special Coil Cabinets	Analysis (7)	A, E	Yes
	HVAC Dampers	Test (4)	E	"					
1VC11XA/B	HVAC Duct Silencers	Analysis (9)	E	"		Refrigeration Specialties Filter Dryer	-	A, D	No
	HVAC Gravity Shutters	Test (2)		"					
1VC09IA/B 1VC09ZA/B	Flow Elements	-	E	No	*1VC09SA/B 1VC10S	Essential Package Filter Units	Analysis (8)	A, E	Yes
1PL91J 1PL92J 1PL93J 1PL14JA/B	HVAC Panels	Analysis (8)	A, D	Yes		Diff. Pressure Indicating Switch MDL289-4859	Test (2)	E	"
						Damping Framing	Analysis (7)	E	"
						Fan Motor	Analysis (7)	A, D	"
	HVAC Instr.	-	A, D	No		Mounting Brackets	Analysis (7)	E	"
	Ammonia Monitoring System	-	A	"		Pressure Transmitter	Test (5)	E	"
						Deluge Valves	-	E	No
						Temperature Transmitters	-	E	"
*1WC12TA/C 1WC13TA/C	Cooling Water Reservoir Tank	Analysis (7)	C, D, E	Yes		Essential Pressure Gauges and Thermometers	-	A, D	"
*1WC14TA/F	C.W. Expansion Tank	Analysis (7)	C, D, E	"	*1PL12JA/C	Ess. Relay Panels	Test (5)	C, D	Yes
*1DD01TA/C	D.O. Storage Tank	Analysis (7)	C, D, E	"	1PL67JA/B	Remote Shutdown Panels	Test (1)	D	"
*1WC03TA/F	RBCCW Expansion Tank	Analysis (8)	A, D, E	"		Fire Extinguishing System	Test (5)	C, D	"
*1WC15A/C	Air Receiver Tank	Analysis (7)	C, D, E	"	*1DD02PA/D	Fuel Oil Transfer Pumps	Analysis (7)	C, D	"
	Ess. Trans. & Sensors	Analysis (4)	A, D	"					
*1VC08SA/B 1VC01AA/D 1VX03SA/F 1VC05A 1VC05S 1VC08S 1VC02A	Special Coil Cabinets	Analysis (7)	A, D	"	*1VC03CA/B 1VD01CA/C	Ventilation Fans	Analysis (7)	A, D	"
						Essential Pressure and Temperature Switches	Test (2)	A, D	"

*Equipment required for cold shutdown based on scenario attached (1 success path for accomplishing shutdown).

MJR/kk

**The key to information referenced numerically appears on the last page of this table.

TABLE 110.6

SEISMIC QUALIFICATION SUMMARY OF CATEGORY I MECHANICAL AND ELECTRICAL EQUIPMENT

Equipment Number	Equipment Name	Method of Qualification*	Equipment Function*	Inspection Availability	Equipment Number	Equipment Name	Method of Qualification*	Equipment Function*	Inspection Availability
	HVAC Control Dampers	Analysis (7)	E	Yes		ACTIVE VALVES			
	Freeze Protection Equipment	-	D, E	No	1E12F008	Gate Valve	Analysis (7)	C	Yes
1VC01YA/B	Ess. Isolation Dampers	Analysis (7)	A, D	Yes	1E12F009	Gate Valve	Analysis (7)	C	"
12[illegible]YA/B									
1E[illegible]YA/B					1E12F048A/B	Angle Valve	Analysis (7)	A	"
1V[illegible]YA/B									
1V[illegible]YA/B									
1V[illegible]YA/B									
1V010Y									
	Damper Operators NH90 Series Actuator	Test (4)	A, D	"					
	Misc. Control Panels								
1PM17J		-	D, E	"					
1PM15J		-	A, D, E	"					
1PL79J		-	A, E	"					
	Switchgear for Recir. LFMG 4160V and 6900V	Test (3)	A, E	"					
	Essential Control Room Isolation Check Dampers	Analysis (7)	A, D	"					
	Limitorque Motor Operators: SMB-10 SMB-1 SMB-2 SMB-3	Test (4)	A, D	"					
	Post Accident Pri. Cont. Atm. Radio-activity Monitors System	Test (5)	D	"					
	Main Control Room Radiation Monitors	-	D	No					

MJB/kk

*The key to information referenced numerically appears on the last page of this table.

TABLE 110.6

SEISMIC QUALIFICATION SUMMARY OF CATEGORY I MECHANICAL AND ELECTRICAL EQUIPMENT

Equipment Number	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability	Equipment Number	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability
1E12F021 1E12F024A/B 1E12F040	RHR Globe Valve 10"	Analysis (7)	A, D	Yes	1VQ001A/B 1VQ002A/B 1VQ003A/B 1VQ004A/B	Primary Containment HVAC Butterfly Valve 18"	Analysis (7)	A, D	Yes
1E51F022	RCIC Globe Valve 4"	Analysis (7)	A, D	"					
1WS076A/B	Service Water Globe Valve 3"	Analysis (7)		"	1WS004A/B 1WS008A/B *1WS033A/B *1WS034A/B	Service Water Butterfly Valve 24"	Analysis (8)	A, D	"
1G41F001A/B	Standby Liquid Control Globe Valve 3"	Analysis (7)	A, D	"					
1E12F011A/B 1E12F076A/B 1E12F027A/B	RHR Gate Valve 4"	Analysis (7)	A, D	"	*1WS037A/B	Service Water Butterfly Valve 8"	Analysis (8)	A, D	"
1E12F049	" " " 3"	Analysis (7)	A, D	"	1E12F051A/B 1E12F065A/B	RHR Globe Valve 6" " " " 2.5"		A, D	"
1E11F309	LPCS Gate Valve 12"	Analysis (7)	A, D	"	1IN012	Inst. N2 Supply Globe Valve .75"	Test (5) and Analysis (7)	A, D	"
1E51F010 1E51F012 1E51F031	RCIC Gate Valve 6"	Analysis (7)	A, D	"	1IN013	" " " " 2.5"			
1E51F065	RCIC Gate Valve 8"	Analysis (7)	A, D	"	1RE048 1RE049	Equip. Drain to Radwaste Globe Valve 2.5"	Test (5) and Analysis (7)	A, D	"
1E12F029 1E12F034	Fuel Pool Cooling and Clean-up Gate Valve 12"		A, D	"	1RF001 1RF002	Floor Drain to Radwaste Globe Valve 2.5"	Test (5) and Analysis (7)	A, D	"
1WS054 1WS055	RBCCW Gate Valve 6"	Analysis (7)	A, D	"	1WS020	Service Water Globe Valve 10"	Test (5) and Analysis (7)	A, D	"
					1WS025 1WS030	" " " 12"			
1WS005	Service Water Gate Valve 30"	Analysis (7)	A, D	"					
1WS012A/B 1WS013A/B	Service Water Gate Valve 4"	Analysis (7)	A, D	"	*1E12F003A/B *1E12F004A/C *1E12F006A/B 1E12F016A/B 1E12F017A/B *1E12F047A/B	RHR Gate Valve 14" " " " 20" 16" 14" 14" 14"	Analysis (7)	A, D	"
1WS073A/B	Service Water Globe Valve 3"	Analysis (7)	A, D	"					
*1E12F016A/B *1E12F063A/B	RHR Butterfly Valve 16" " " " 14"	Analysis (8) Analysis (8)	A, D	"	1E12F001	LPCS Gate Valve 20"		A, D	"
1VH001A/B 1VH002A/B 1VH003A/B 1VH004A/B	Pumphouse Ventilation Butterfly Valve 12"	Analysis (8)	A, D	"	1E12F012	LPCS Globe Valve 12"	Analysis (7)	A, D	"
					1E12F087A/B 1E51F045	RHR Globe Valve 3" RCIC " " 4"	Analysis (7)	A, D	"
1B33F019	Recirculation Diaphram Operated Globe Valve .75"	-	A, D	No	1WS006A/B 1WS007A/B	Service Water Butterfly Valve 30"	Analysis (7)	A, D	"

*Equipment required for cold shutdown based on scenario attached (1 success path for accomplishing shutdown).

**The key to information referenced numerically appears on the last page of this table.

MJB/kk

NOTES:

The following referenced numerical key applies to the Method of Qualification column:

1. Multifrequency random motion biaxial testing with Test Response Spectrum (TRS) enveloping the Required Response Spectrum (RRS).

2. Test input to specimen based on single axis and single frequency excitation.

3. Test input to specimen based on biaxial and single frequency excitation.

4. Test input to specimen based on single axis and multi-frequency excitation.

5. Test input to specimen based on biaxial and multifrequency excitation.

6. Test input to specimen based on fragility level excitation.

7. Analysis of specimen based on static analysis.

8. Analysis of specimen based on dynamic analysis.

9. Analysis of specimen based on static coefficient analysis.

The following referenced alphabetical key applies to the Equipment Function column.

A. Hot Standby and Cold Shutdown

B. Hot Standby

C. Cold Shutdown

D. Post LOCA

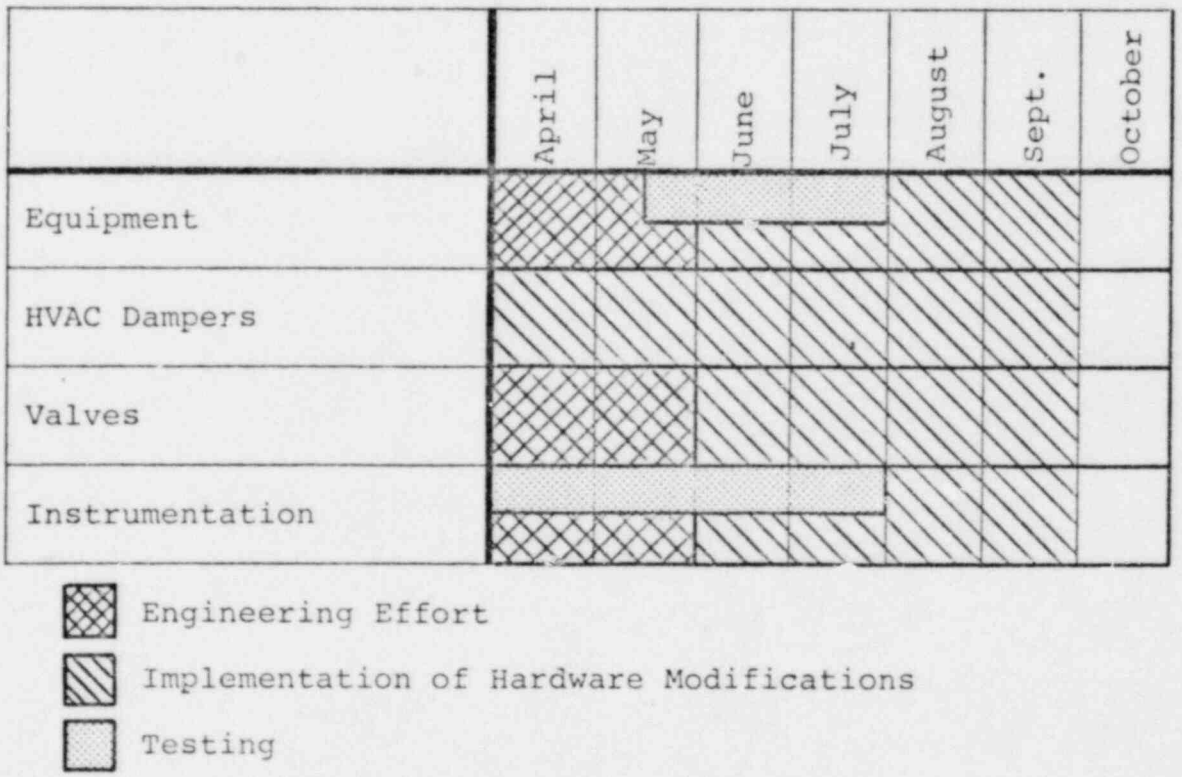
E. Passive

The list of all the active valves and the method of qualification is included in table 110.6. There are approximately 1400 passive valves which are not listed in the above table but were qualified to the same requirements.

Balance of Plant Equipment Qualification Progress

	Assessment % Complete	Requali-fication % Complete
Equipment	100.	85.
HVAC Dampers	100.	100.
Valves	100.	80.
Instrumentation	100.	50.

Balance of Plant Equipment Qualification Schedule



Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT MODIFICATIONS

Rev. 00
Date 4-15-81

Equipment Number	Description	Modification Description
1VG02CA	Standby Gas Treatment System Fan 1A	Vibration Isolators & Mounting Bolts Strengthened
1VG02CB	Standby Gas Treatment System Fan 1B	Vibration Isolators & Mounting Bolts Strengthened
1VG03CA	Standby Gas Treatment System Cooling Fan 1A	Vibration Isolators Strengthened
1VG03CB	Standby Gas Treatment System Cooling Fan 1B	Vibration Isolators Strengthened
1VG04AA	Standby Gas Treatment System Heating Coil 1A	Reinforcement of Coil Support
1VG04AB	Standby Gas Treatment System Heating Coil 1B	Reinforcement of Coil Support
1VC11XA	Control Room HVAC Return Fan Silencer 1A	Providing Anchorage to Foundation
1VC11XB	Control Room HVAC Return Fan Silencer 1B	Providing Anchorage to Foundation

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT MODIFICATIONS

Rev. 00
Date 4-15-81

Equipment Number	Description	Modification Description
1VY01C	CSCS-RHR Equipment Room Cooling Fan	Vibration Isolators Strengthened
1VY02C	CSCS-LPCS/RHR Equipment Room Cooling Fan	Vibration Isolators Strengthened
1VY03C	CSCS-RCIC Equipment Room Cooling Fan	Vibration Isolators Strengthened
1VY04C	CSCS-HPCS Equipment Room Cooling Fan	Vibration Isolators Strengthened
1VY05A	CSCS-RHR Equipment Room Heat Exchanger	Additional Cabinet Anchorage & Coil Reinforcement
1VY06S	CSCS-LPCS/RHR Equipment Room Coil Cabinet (1VY07AA, 1VY07AB)	Additional Cabinet Anchorage & Coil Reinforcement
1VY08A	CSCS-RCIC Equipment Room Heat Exchanger	Additional Cabinet Anchorage & Coil Reinforcement
1VY09A	CSCS-HPCS Equipment Room Heat Exchanger	Additional Cabinet Anchorage & Coil Reinforcement

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT MODIFICATIONS

Rev. 00
Date 4-15-81

Equipment Number	Description	Modification Description
1PL30JB	Off-Gas Instrument Panel 1B	Mounting Welds Provided
1PL65JB	Station Ventilation Purge and Prim. Cont. HVAC Panel	Additional Anchorage Provided
1C41-A002	Standby Liquid Control Test Tank	Providing Nozzle Reinforcing Pads
1WR02AA	Reactor Bldg. Closed Cooling Water Heat Exchanger 1A	Saddle Supports Modified and Additional Anchorage Provided
1WR02AB	Reactor Bldg. Closed Cooling Water Heat Exchanger 1B	Saddle Supports Modified and Additional Anchorage Provided
1WR02AC	Reactor Bldg. Closed Cooling Water Heat Exchanger 1C	Saddle Supports Modified and Additional Anchorage Provided
Detail AA	(1) Rack For Locally Mounted Instruments	Additional Anchorage Provided
Detail DD	(3) Racks For Locally Mounted Instruments	Additional Anchorage Provided
Detail JJ	(2) Racks For Locally Mounted Instruments	Additional Anchorage Provided

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT MODIFICATIONS

Rev. 00
Date 4-15-81

Equipment Number	Description	Modification Description
1RE01T	Reactor Bldg. Equip. Drain Tank	Additional Mounting Provided
1PS10S	Sample Station 1PL50J Chiller	Anchorage Grouting Provided
1H13-P659	Rod Sequence Control System	Mounting Welding Provided
1FC02AA	Fuel Pool Heat Exchanger 1A	Additional Bracing Provided, Reinforcing Saddle Supports, and Additional Anchorage Provided
1FC02AB	Fuel Pool Heat Exchanger 1B	Additional Bracing Provided, Reinforcing Saddle Supports, and Additional Anchorage Provided
1FW02AA	High Pressure Feedwater Heater 1A-6	Reinforcing Lower Supports
1FW02AB	High Pressure Feedwater Heater 1B-6	Reinforcing Lower Supports

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT MODIFICATIONS

Rev. 00
Date 4-15-81

Equipment Number	Description	Modification Description
1VC08SA	Control Room HVAC Air Handling Unit 1A	Additional Anchorage Provided
1VC08SB	Control Room HVAC Air Handling Unit 1B	Additional Anchorage Provided
1IN03DA	Drywell Pneumatic Sys. Dryer 1A Skid (1IN07FA,B; 1IN11FA,B)	Anchorage Reinforcement Provided
1IN03DB	Drywell Pneumatic Sys. Dryer 1B Skid (1IN07FC,D; 1IN11FC,D)	Anchorage Reinforcement Provided
1AP05E	480V ESS Substation 1A-1	Additional Anchorage Provided
1AP06E	480V ESS Substati 1A-2	Additional Anchorage Provided
1AP07EA	480V ESS Substation 1A-3A	Additional Anchorage Provided
1AP08EA	480V ESS Substation 1A-4A	Additional Anchorage Provided
1AP09E	480V ESS Substation 1B-1	Additional Anchorage Provided

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT MODIFICATIONS

Equipment Number	Description	Modification Description
1AP10E	480V ESS Substation 1B-2	Additional Anchorage Provided
1AP11EA	480V ESS Substation 1B-3A	Additional Anchorage Provided
1AP12EA	480V ESS Substation 1B-4A	Additional Anchorage Provided
1AP13E	480V ESS Substation 1C-1	Additional Anchorage Provided
1AP14EA	480V ESS Substation 1C-2A	Additional Anchorage Provided
1VG01YB	Essential Recirculation Fan Isolation Damper	Modification of Operator Mounting and/or Hangers
1VQ01Y	Primary Containment Purge Isolation Damper	Modification of Operator Mounting and/or Hangers
1VQ02Y	Primary Containment Purge Isolation Damper	Modification of Operator Mounting and/or Hangers

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT MODIFICATIONS

Rev. 00
Date 4-15-81

Equipment Number	Description	Modification Description
1VP01YA	Primary Containment HVAC Isolation Damper	Modification of Operator Mounting and/or Hangers
1VP01YB	Primary Containment HVAC Isolation Damper	Modification of Operator Mounting and/or Hangers
1VP10YA	Primary Containment HVAC Isolation Damper	Modification of Operator Mounting and/or Hangers
1VP11YA	Primary Containment HVAC Isolation Damper	Modification of Operator Mounting and/or Hangers
1VP11YB	Primary Containment HVAC Isolation Damper	Modification of Operator Mounting and/or Hangers

ANALYTICAL METHODS

Static Analysis: an analysis procedure used for equipment which has been demonstrated to be rigid (i.e. equipment has no natural frequencies in the frequency range of concern). This procedure evaluates the stresses and deflections resulting from steady forces acting through the center of gravity. These steady forces are the maximum forces input at the equipment base.

They are determined from the zero period acceleration (ZPA) of the appropriate response spectra.

Equivalent Static Analysis: an analysis procedure used for equipment whose dynamic characteristics have not been completely defined. This procedure evaluates the stresses and deflections resulting from steady forces acting through the center of gravity. The steady forces are the maximum forces associated with the peak response of any single degree of freedom system. They are determined from the peak acceleration of the appropriate response spectra multiplied by an appropriate amplification factor to account for the possibility of multi-mode response.

Simplified Dynamic Analysis: an analysis procedure used for equipment which can easily be modeled and whose dynamic characteristics are known. This procedure evaluates the stresses and deflections resulting from steady forces acting through the center of gravity. These steady forces are the maximum forces associated with equipment resonance. They are determined from the acceleration associated with the equipment's natural frequency multiplied by an appropriate amplification factor to account for the possible participation of higher modes.

Detail Dynamic Analysis: a finite element analysis procedure for multi-degree-of-freedom systems where the responses are determined for each mode and then combined to determine the true response and associated stresses and deflections resulting from any forcing function.

Specification No. H-2156
Vendor: ITE Imperial
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1AP04EA 1AP04EB 1AP04EC	4.16 KV Switch Group	A	Auxiliary	Resonance Search 1-50 Hz	Natural Frequencies: Front to Back: 18 Hz Side to Side: 27 Hz
				Random Motion Biaxial Test FB/V and SS/V, 1-50 Hz	TRS envelopes RRS Functional Operability Verified
1AP04ED 1AP04FE	6.9 KV Switch Group	A	Auxiliary	Resonance Search 1-50 Hz	Natural Frequencies: Front to Back: 10, 14, 18, 21 Hz Side to Side: 10, 19, 24, 30 Hz
				Random Motion Biaxial Tests FB/V and SS/V, 1-50 Hz	TRS envelopes RRS Functional Operability Verified

Specification No. H-2157
Vendor: ITE Imperial
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1AP05E 1AP06E 1AP09E 1AP10E 1AP13E	480 V Substation.		A	Aux. Bldg.	Random Motion Biaxial Test. EMD-000606 A resonance search test was performed from 0.5 to 50 Hz. This was followed by Random Motion Tests from 0.5 Hz to 50 Hz	Principal resonant frequencies were determined to be: FB/V: 6,8,11,19,23 & 33 Hz. SS/V: 4.5,13,18,23,30 & 43 Hz. TRS envelopes RRS Functional Operability Verified
1AP05E 1AP06E 1AP09E 1AP10E 1AP13E	750 KVA Transformer (Associated with 480V Substation).		A	Aux. Bldg.	Random Motion Biaxial Test. EMD-001235 EMD-001802 A resonance search test was performed from 2 to 30 Hz. This was followed by Random Motion Tests from 0.5 to 100 Hz	Principal Resonant frequencies were determined to be: FB/V: 2,7,9,12,15,17.5,21 & 30 Hz. SS/V: 4.4,7,8.5, 12,17 & 20 Hz. The TRS envelopes the RRS Functional Operability Verified

Specification No. H- 2158
Vendor: ITE Imperial
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1AP15EA 1AP15EB	480 V Motor Control Center	A	Reactor	Pseudo-Biaxial Sine Sweep Resonance Search 1-35 Hz Pseudo-Biaxial Sine Dwell for 1-26 Hz range. Narrow Band Pseudo-Biaxial Random Motion Test for 3.94-10.26 Hz range. Sine Beat Pseudo-Biaxial Tests at 8.75, 10 and 35 Hz.	Natural Frequencies: Front to Back: 7-8 ,75, 35 Hz Side to Side: 8-10, 35 Hz Input Accelerations greater than ZPA and TRS envelopes RRS, Functional Operability Verified for Original Qualification Criteria. Requalification to T-Quencher Criteria Not Completed.
1AP16EA 1AP16EB 1AP16EC 1AP16ED 1AP16EE 1AP16EF	480 V Motor Control Center	A	Auxiliary	Pseudo-Biaxial Sine Sweep Resonance Search 1-35 Hz Pseudo-Biaxial Sine Dwell for 1-26 Hz range. Narrow Band Pseudo-Biaxial Random Motion Test for 3.94-10.26 Hz range. Sine Beat Pseudo-Biaxial Test at 8.75, 10 and 35 Hz.	Natural Frequencies: Front to Back: 7-8.75, 35 Hz Side to Side: 8-10, 35 Hz Input Accelerations greater than ZPA and TRS envelopes RRS. Functional Operability Verified.

Specification No. H- 2158
Vendor: ITE Imperial
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1AP20EA 1AP20EB 1AP20EC	480 V Motor Control Center	A	WS Bldg.	Pseudo-Biaxial Sine Sweep Resonance Search 1-35 Hz Pseudo-Biaxial Sine Dwell for 1-26 Hz range. Narrow Band Pseudo-Biaxial Random Motion Test for 3.94-10.26 Hz range. Sine Beat Pseudo-Biaxial Test at 8.75, 10 and 35 Hz.	Natural Frequencies: Front to Back: 7-8.75, 35 Hz Side to Side: 8-10, 35 Hz Input Accelerations greater than ZPA and TRS envelopes RRS. Functional Operability Verified.

Specification No. H-2159
Vendor: Stewart & Stevenson
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1DG01KA 1DG01KB 1DG01KC	Diesel Generator Units	A	Aux. Bldg.	Finite Element Dynamic Analysis. EMD-002581 EMD-012939 A finite element Dynamic Analysis and Static Analysis were performed using the computer program ANSYS. A value of 1% damping was used. The maximum stresses in the component parts of the assembly and bolts are determined. The maximum generator shaft deflection is also computed.	The lowest frequency obtained from the program is 15 Hz. Element stresses representing the various parts of the DG are within allowable limits as are bolt stresses. Deflection of the generator shaft is calculated to be 0.005 inch compared to an actual air gap of 0.392 inch.
1DG02AA 1DG02AB 1DG02AC 1DG03AA 1DG03AB 1DG04AA 1DG04AB	Diesel Generator Heat Exchangers				
1DG05KA 1DG05KB 1DG05KC 1DG06KA 1DG06KB 1DG06KC	DG Exhaust Silencer 1A, 1B, 1C, 1A, 1B, 1C	P	Aux. Bldg.	Finite Element Dynamic Analysis. EMD-002581 A finite element Dynamic Analysis and Static Analysis were performed using ANSYS with 1% damping. Stresses in the equipment were calculated.	The lowest frequency obtained from the program is 30.11 Hz. Stresses within allowable limits.

Specification No. H-2159
Vendor: Stewart & Stevenson

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1PL10JA 1PL10JB 1PL10JC	Diesel Generator Control Panels 1A, 1B, 1C	A	Auxiliary	Random Motion Biaxial Tests FB/V and SS/V, 1-40 Hz	TRS envelopes RRS. Functional Operability Verified.
1DG10CA 1DG10CB 1DG10CC 1DG10CD 1DG10CE 1DG10CF	Diesel Generator Air Compressors	W	Auxiliary		
1DG17EA 1DG17EB 1DG17EC 1DG18EA 1DG18EB 1DG18EC	Exhaust Expansion Joints 16 Cylinder D.G.	P	Auxiliary		

Specification No. H- 2159
Vendor: Stewart & Stevenson

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1DG20EA 1DG20EB 1DG20EC 1DG21EA 1DG21EB 1DG21EC 1DG22EA 1DG22EB 1DG22EC	Exhaust Expansion Joints 12 Cylinder D.G.	P		Auxiliary		

Specification No. H-2163
Vendor: Gould

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1DC01EA 1DC11EA 1DC11EB 1DC11EC 1DC21EA 1DC21EB	250V Battery 1A 125V Battery 1A,1B,1C 24/48 V Battery 1A,1B	A		Aux. Bldg.	Random Motion Biaxial Test EMD-003689 A random motion biaxial type test was performed from 1 to 40 Hz. 5 OBE tests were followed by 1 SSE test in each of two orientations. The tests were of 30 second duration each and were all analyzed at 2% damping.	TRS envelopes RRS. The equipment passed the test without compromise of structure or electrical function.
1DC01EA 1DC11EA 1DC11EB 1DC11EC 1DC21EA 1DC21EB	Battery Racks (equipment number same as battery).	P		Aux. Bldg.	Static Analysis. EMD-004697 Fundamental Natural Frequencies were determined in each direction. A static analysis was then performed using ZPA values from 1/2% OBE and 1% DBE curves. Accelerations: OBE / DBE h_1=0.20/0.32 h_2=0.18/0.28 V=0.20/0.30	Natural frequencies in each direction: h_1=48.59 Hz h_2=43.43 Hz V=46.60 Hz (rigid). Stresses within allowable limits. Structrual Integrity Demonstrated.

Specification No. H-2164
Vendor: Power Conversion Products

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1DC02EA, EB 1DC12EA, EB, EC 1DC13EA 1DC22EA, EB,EC,ED	250V Battery Charger 1A 125V Battery Charger 1A, 1B, 1C 125V Battery Charger Spare 24V Battery Charger 1A, 1B, 1C, 1D	A	Aux. Bldg.	Random Motion Biaxial Test EMD-003274 A random motion biaxial type test was performed from 1 to 33 Hz. 5 OBE tests were followed by 1 SSE test in each of two orientations. The tests were of 30 second duration each and were analyzed at 1/2% OBE and 1% DBE.	TRS envelopes RRS. The equipment passed the test without compromise of structure or electrical function.

Specification No. H-2165
Vendor: ITE Imperial
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1IP01EA 1IP01EB 1IP03E 1IP04E	120 VAC Distribution Panel 120 VAC Distribution Panel	A W	Aux.Bldg.	Pseudo-Biaxial Sine Sweep Resonance Search 1-35 Hz Pseudo-Biaxial Sine Dwell for 1-26 Hz range, Narrow Band Pseudo-Biaxial Random Motion Test for 3.94-10.26 Hz range. Sine Beat Pseudo-Biaxial Test at 8.75, 10 and 35 Hz.	Natural Frequencies: Front to Back: 7-8.75, 35 Hz Side to Side: 8-10, 35 Hz Input Accelerations greater than ZPA and TRS envelopes RRS. Functional operability verified.

Specification No. H-2166
Vendor: ITE Imperial
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1DC04EA	250 VDC Main Distribution Panel 1A	A	Aux.Bldg.	Pseudo-Biaxial Sine Sweep Resonance Search 1-35 Hz	Natural Frequencies: Front to Back: 7-8.75, 35 Hz Side to Side: 8-10, 35 Hz.
				Pseudo-Biaxial Sine Dwell for 1-26 Hz range. Narrow Band Pseudo-Biaxial Random Motion Test for 3.94-10.26 Hz range. Sine Beat Pseudo-Biaxial Test at 8.75,10 and 35 Hz.	Input Accelerations greater than ZPA and TRS envelopes RRS.Functional operability verified.
1DC05EB 1DC05EC	250 VDC Motor Control Centers	A	RX.Bldg.	Pseudo Biaxial Sine Sweep Resonance Search 1-35 Hz	Natural Frequencies Front to Back: 7-8.75,35 Hz Side to Side: 8-10, 35 Hz
				Psuedo-Biaxial Sine Dwell for 1-26 Hz range.Narrow Band Pseudo-Biaxial Random Motion Test for 3.94-10.26 Hz range. Sine Beat Psuedo-Biaxial Test at 8.75,10 and 35 Hz.	Input Accelerations greater than ZPA and TRS envelopes RRS, function operability verified for original qualification criteria. Requalifications to T-Quencher Criteria not completed.

Specification No. H-2166
Vendor: ITE Imperial
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1DC14EA 1DC14EB 1DC14EC	125 VDC Distribution Panels 1A,1B,1C	A	Aux.Bldg.	Pseudo-Biaxial Sine Sweep Resonance Search 1-35 Hz Pseudo-Biaxial Sine Dwell for 1-26 Hz range. Narrow Band Pseudo-Biaxial Random Motion Test for 3.94-10.26 Hz range. Sine Beat Pseudo-Biaxial Test at 8.75,10 and 35 Hz.	Natural Frequencies: Front to Back: 7-8.75,35 Hz Side To Side: 8-10, 35 Hz Input Accelerations greater than ZPA and TRS envelopes RRS.Functional Operability Verified.
1DC26EA 1DC26EB	24/48 VDC Distribution Panels	A	Aux.Bldg.	Pseudo-Biaxial Sine Sweep Resonance Search 1-35 Hz Pseudo-Biaxial Sine Dwell for 1-26 Hz range.Narrow Band Pseudo-Biaxial Random Motion Test for 3.94-10.26 Hz range.Sine Beat Pseudo-Biaxial Test at 8.75,10 and 35 Hz.	Natural Frequencies: Front to Back: 7-8.75, 35 Hz Side to Side: 8-10, 35 Hz Input Accelerations greater than ZPA and TRS envelopes RRS.Functional Operability Verified.

Specification No. H-2167
Vendor: Conax Corporation

Wm. H. Zimmer
Project No. 4130-00

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EQUIPMENT QUALIFICATION

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1AP50EA, EM	Low Voltage Power Elec. Penetration Assembly E-1, E-16	P	Rx. Bldg.	Static Analysis EMD-000599 EMD-01[illegible]	The natural frequencies calculated were: h_1 = 143 Hz h_2 = 900 Hz V = 143 Hz Stresses were within the allowable limits. Functional Integrity Verified for original qualification criteria. Requalification to T-Quencher criteria not completed.
1AP50EF EJ	L.V. Control Elec. Penetration Assembly E-8, E-12	P	Rx. Bldg.	Natural frequency calculations were performed to justify a static analysis. The required acceleration in each direction was: (OBE/DBE): h_1 = 0.34/0.48 h_2 = 0.44/0.50 V = 0.37/0.45.	
1AP50ED, EL, ES, ET, EU	L.V. Instrument Service Elec. Penetration Assembly E-5, E-15, E-3, E-11, E-14.	P	Rx. Bldg.		
1AP50EB, EE, EG, EK	L.V. Neutron Monitor Elec. Penetration Assembly E-2, E-6, E-9, E-13	P	Rx. Bldg.		
1AP50EC, EH, EN	Control Rod Position Indicator L.V. Elec. Penetration E-4, E-10, E-17.	P	Rx. Bldg.		
1AP50EP ER	Medium Voltage Power Elec. Penetration Assembly E-18, E-19.	P	Rx. Bldg.		

Specification No. H-2175
Vendor: United Electric Controls

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1PM01J	Genetator and Station Auxiliary Control Board.	A		Aux. Bldg.	Finite Element Dynamic Analysis. EMD-004798 EMD-004845 EMD-018429 A dynamic analysis was performed by the Engineering Mechanics Division on two "assemblies". Assembly #1 included panels 1PM01J, 02J, and 03J. Assembly #2 included 1PM07J and 1PM08J. Remaining Panels qualified by similarity.	There were a total of 21 modes considered in the analysis. The lowest frequency obtained was 9.59 Hz. The resulting stresses at all locations were within allowable limits for both assembly #1 and assembly #2. Structural Integrity Demonstrated.
1PM02J	Turbine - Condenser and Auxiliaries Control Board.	P		Aux. Bldg.		
1PM03J	Feedwater Heaters and Auxiliaries Control Board.	P		Aux. Bldg.		
1PM04J	Generator and Transformer Recorder Pnael	P		Aux. Bldg.		
1PM05J	Station Totalizing Panel.	P		Aux. Bldg.		
1PM06J	Leak Detection Panel	P		Aux. Bldg.		
1PM07J	HVAC and SGTS Panel	P		Aux. Bldg.		
1PM08J	Station Services Panel	P		Aux. Bldg.		
1PM09J	Fire Protection and Deluge Valve Control Panel.	P		Aux. Bldg.		
1PM13J	Excess Flow Check Valves Status Panel.	P		Aux. Bldg.		
1PM16J	345KV Switchyard Mimic Bus Panel.	P		Aux. Bldg.		

Specification No. H-2177
Vendor: Fisher Controls
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1PA02J	Misc. Auto. Control Panel.	P	Aux. Bldg.	Finite Element Dynamic Analysis. EMD-003796 EMD-004328 A finite element dynamic analysis was performed using the program STARDYNE to determine the natural frequencies of the panel. An equivalent static analysis was then done to determine stresses in the panel. The peak value of the response spectrum curves at 2% damping was applied in each direction. OBE/DBE values of acceleration were: h_1 = 1.0/1.5 h_2 = 1.0/1.5 V = 1.2/1.75 Stresses from each load case were added using absolute sum method.	Natural frequencies were found to be: 18.74 Hz 18.87 Hz 21.28 Hz 23.73 Hz 28.32 Hz The stresses calculated by the program are within the allowable limits. Structural Integrity Demonstrated.

Specification No. H-2185
Vendor: Bingham Willamette
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WR01PA 1WR01PB 1WR01PC 1WR01PD	RBCCW Pumps	A	Reactor Building	Static Analysis Lowest $f_n \geq 66$ Hz	Acceleration levels used: $H_1 = 0.30g$, $H_2 = 0.36g$, $V = 0.70g$ Critical stress = 17,380 psi (allowable = 17,500 psi) Critical deflection= 0.0075" (allowable = 0.011")
				Analysis	Vendor requalification not completed.
1E12C003 1E21C002 1E22C003 1E51C003	CSCS Water Leg Pumps	A	Reactor Building	Static Analysis Pump freq.: 49.7 Hz Driver freq.: 252 Hz	Acceleration levels used: $H_1 = 0.2$ g, $H_2 = 0.28$ g, $V = 0.14g$ Critical stress = 31,975 psi (allowable = 70,000 psi) Operability stated to be not effected even should contact occur on rotating parts.
				Analysis	Vendor requal. not completed.

Specification No. H-2233B
Vendor: Bingham Willamette (Pumps)
Elec. Mach. Mfg. Co. (Motors)
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WS01PA 1WS01PB 1WS01PC 1WS01PD	Service Water Pumps & Pump Motors	A	Service Water Pump Structure	Static Analysis, Pump Natural frequency: 45.9 Hz	Acceleration levels used: $H_1 = H_2 =$ 0.90g, V = 0.65g Critical stress = 24,573 psi (allowable = 26,250 psi) Deflection = 0.0067" (Allow. = 0.011")
				Static Analysis, Motor Natural frequency: 32 Hz	Acceleration levels used: $H_1 = H_2$ = 1.10g, V = 0.78g Critical stress = 11,250 psi (allowable = 40,000 psi) Deflection = 0.00202" (Allowable = 0.024" max.)

Specification No. H-2237
Vendor: Rex Chainbelt Co,
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WS03FA 1WS03FB 1WS04FA 1WS04FB	Traveling water screens	W	Service Water Pump Structure	Detailed dynamic analysis Natural freq. 17 Hz	Analysis by response spectrum Critical stress = 26.26 ksi (Allowable = 38.1 ksi)

Specification No. H- 2240
Vendor: R. P. Adams

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1WS02FA 1WS02FB	Service water strainers	P		Service Water Pump Structure	Detailed dynamic analysis Natural frequencies: 33 Hz	Analysis by response spectrum Critical stress = 29,147 psi (Allowable = 30,920 psi)
1CW03F	Cooling tower make-up water strainer	W		Cooling Tower	Static Analysis UBC, Zone 1	UBC acceleration = 0.05 g Critical stress = 1,230 psi (Allowable = 19,800 psi)

Specification No. H-2245
Vendor: Yuba Heat Transfer Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WR02AA 1WR02AB 1WR02AC	RBCCW Heat Exchanger	P	Reactor Building	Simplified Dynamic Analysis Natural freq.: H_1= Rigid, H_2=V=29.1, 32.6 Hz.	Acceleration levels used: H_1 = 0.56g, H_2 = 0.46g, V = 1.7 g Critical stress = 29,343 psi (Allowable = 35,000 psi) Structural Integrity Demonstrated for original qualification criteria. Requalification to T-Quencher criteria not completed.

Specification No. H-2256
Vendor: Designed by S&L

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1IN12S 1IN13S	Nitrogen cylinder rack	P		Reactor Building	Detailed dynamic analysis Natural freq.: H_1 = 37.2 Hz, H_2 37.2 Hz, V = 13.6 Hz (^ modes)	Critical stress = 19,293 psi (Allowable = 25,500 psi) Deflections are negligible Structural Integrity Demonstrated.

Specification No. H-2273
Vendor: Graver Tank

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1B21-A001A 1B21-A001B 1B21-A001C 1B21-A001D	MSIV Accumulator tank	P		Prim. Cont.	Static analysis Natural freq.: $H_1 = H_2 = V = 34.6$ Hz	Accel. levels used: $H_1 = 0.55g$, $H_2 = 0.55g$, $V = 1.20g$ Critical stress = 16,955 psi (Allowable = 21,600 psi)
					Static analysis Natural freq.: $H_1 = 52$ Hz, $H_2 = 122$ Hz, $V = 36$ Hz	Accel. levels used: $H_1 = 2.1$ g, $H_2 = 0.6$ g, $V = 2.8$ g Critical stress = 7,977 psi (Allowable = 9,020 psi)
1B21-A002A 1B21-A002B 1B21-A002C 1B21-A002D	MSIV Accumulator tanks	P		Prim. Cont.	Static analysis Natural freq.: $H_1 = H_2 = V = 34.6$ Hz	Accel. levels used: $H_1 = 0.55g$, $H_2 = 0.55g$, $V = 1.20g$ Critical stress = 16,955 psi (Allowable = 21,600 psi)
					Static analysis Natural freq.: $H_1 = 390$ Hz, $H_2 = 1,725$ Hz $V = 107$ Hz	Accel. levels used: $H_1 = 0.36g$, $H_2 = 0.30$ g $V = 0.50g$ Critical stress = 5366 psi (Allowable = 9020 psi)

Specification No. H-2273
Vendor: Graver Tank

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1B21-A003B 1B21-A003C 1B21-A003F 1B21-A003G 1B21-A003K 1B21-A003L	MSRV Accumulator tanks	P	Prim. Cont.	Static analysis Natural freq.: $H_1 = H_2 = V = 35$ Hz	Accel. levels used: $H_1 = 0.55g$, $H_2 = 0.55g$ $V = 1.20g$ Critical stress = 16,241 psi (Allowable = 21,600 psi)
				Equivalent static analysis Natural freq.: $H_1 = 19.7$ Hz, $H_2 = 35$ Hz, $V = 44.5$ Hz	Accel. levels used: $H_1 = 1.0$ g, $H_2 = 1.0g$ $V = 1.0g$ Critical stress = 22,800 psi (Allowable = 29,500 psi)
1B21-A004A/H 1B21-A004K 1B21-A004L 1B21-A004P 1B21-A004R 1B21-A004S	MSRV accumulator tanks	P	Prim. Cont.	Static analysis Natural freq.: $H_1 = H_2 = V = 34.6$ Hz	Accel. levels used: $H_1 = 0.55g$, $H_2 = 0.55g$ $V = 1.20g$ Critical stress = 14,892 psi (Allowable = 16,440 psi)
				Equivalent static analysis Natural freq.: $H_1 = 854$ Hz, $H_2 = 398$ Hz, $V = 76$ Hz	Accel. levels used: $H_1 = 1.2$ g, $H_2 = 1.2$ g $V = 2.3g$ Critical stress = 29,238 psi (Allowable = 29,520 psi)

Specification No. H-2288
Vendor: Refer to Equip. Status Sheets

Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VG05SA 1VG05SB	SGTS equipment trains	A	Reactor Building	Detailed dynamic analysis Natural freq.: 14.64 Hz, 31.9 Hz, 40.4 Hz	Max. stresses well within allowable limits at critical sections. Deflection analysis demonstrates operability of units.
1VG02CA 1VG02CB	SGTS primary supply Fans	A	Reactor Building	Static analysis (fan-motor-shaft assembly) Natural freq.: 229 Hz	Accel. levels used: H_1=9.45g, H_2=V=9.0g (Assem.) H_1=1.9g, H_2=3.2g, V=1.2g (Motor) Min. margin of safety (motor shaft) = 3.16 Min. margin of safety (foundation bolts) = 1.1 Min. margin of safety (base angle) = 1.0 Max. rotor assembly def.= 0.002" (Allowable = 0.025") Fan-motor assembly subjected to limiting-load analysis; assembly capable of withstanding 8.10 g's

Specification No. H-2288
Vendor: Rerer to equip. status sheets
Wm. H. Zimmer
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SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VG03CA 1VG03CB	SGTS cooling fans	A	Reactor Building	Static analysis (fan-motor assembly) Natural freq.: 182 Hz	Accel. levels used: $H_1=H_2=9.45$ g, V=9.0 g (Assem.) $H_1=1.9$ g, $H_2=3.2$g, V=1.2g (Motor) Min. margin of safety = 1.3 Max. rotor deflection = 0.00243" (Allowable = 0.013") Fan-motor assembly subjected to limiting-load analysis; Assembly capable of withstanding 39 g's
1VG04AA 1VG04AB	SGTS heating coils	A	Reactor Building	Detailed Dynamic Analysis Natural freq.: H_1= 37.7 Hz, H_2= 11.1 Hz, V= 14.3 Hz (System freq. = 56.6 Hz)	Accel. levels used: H_1= 1.0 g, H_2=1.2 g, V= 0.9 g Critical stress = 18,300 psi (Allowable = 38,800 psi) Operability demonstrated for original qualification criteria. Requalification to T-Quencher criteria not completed.

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Vendor: Refer to equip. status sheets
Wm. H. Zimmer
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VG11YA 1VG11YB	Backdraft dampers	A		Reactor Building	Equivalent static analysis Natural freq.: 90 Hz (min.)	Required acceleration levels: $H_1=H_2=$ 1.12 g, V = 1.28 g Acceleration levels used: $H_1=H_2=V=$ 10.0 g Critical stress = 1,570 psi (Allowable = 20,000 psi)
					Equivalent static analysis Natural freq.: $H_1=V=$ 90.6 g, $H_2=$ rigid	Accel. levels used: $H_1=$ 10 g, $H_2=$ 10 g, V= 10 g Critical stress = 17,985 psi (Allowable = 18,000 psi) Critical deflection= 0.0025" (Allowable = 0.03")
1VG12YA 1VG12YB	Backdraft Dampers	A		Reactor Building	Static analysis Natural freq.: 90 Hz (min.)	Required acceleration levels: $H_1=H_2=$ 0.42 g, V = 0.65 g Acceleration levels used: H (Result.) = 1.0 g, V = 1.0 g Critical stress = 10,333 psi (Allowable = 20,000 psi)

Specification No. H-2288
Vendor: Refer to equip.status sheets
Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VG12YA 1VG12YB (cont'd)				Equivalent static analysis Natural freq. : 70 Hz.	Accel. levels used: H_1= 1.0 g, H_2= 1.0 g, V= 1.0 g Critical stress = 12,686 psi (allowable = 21,600 psi) Critical deflection = 0.006" (allowable = 0.021")
	Hepa filter banks	P	1VG05SA 1VG05SB	Static analysis Natural freq.: H_1=H_2= 33.3 Hz, V = rigid	Accel. levels used: H_1= 0.52g, H_2=0.70 g, V= 0.90g Min. margin of safety = 2.17 Max. relative displacement = 0.043" which will not cause leakage past gasket interface.

Specification No. H-2288
Vendor: American Air Filter

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Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Hepa filters	P	1VG05SA 1VG05SB	Uniaxial sinusoidal test 2-8 Hz, 3.0 g input 8-600 Hz, 2.0 g input Natural freq. : $H_1=H_2$ = 33.3 Hz V = rigid	Operability (structural integrity) verified.
	SGTS pre-filters	P	1VG05SA 1VG05SB	Statis analysis Natural freq.: 226 Hz	Limit-load analysis performed and indicates failure at 366 g's Allowable stress = 22,000 psi Min. deflection margin of safety = 2.62
	Solenoid valve & piping	A	1VG05SA 1VG05SB	Uniaxial sine sweep 1-35 Hz; input: $H_1=H_2$= 4.5 g, V = 3.0 g; Sweep: 15 sec./cycle	No resonances found
				Pseudo biaxial sine dwell @ 5, 10, 15, 21, 27, 31, 33 Hz Input: $H_1=H_2$=4.5 g, V = 3.0 g	Require acceleration levels: $H_1=H_2$=1.12 g, V = 1.28 g Structural integrity and operability demonstrated.

Specification No. H-2288
Vendor: American Air Filter
Wm. H. Zimmer
Project No. 4130-00

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EQUIPMENT QUALIFICATION

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Solenoid Valve & Piping	A	1VG05SA 1VG05SB	Uniaxial Sine Sweep 1-35 Hz; Input: $H_1=H_2=$ 4.5 g V = 3.0 g; Sweep: 15 sec/cycle	No resonances found.
				Pseudo Biaxial Sine Dwell @ 5, 10, 15, 21, 27, 31, 32 Hz Inpute: $H_1=H_2=$ 4.5 g V= 3.0 g	Require acceleration levels: $H_1=H_2=$ 1.12 g, V = 1.28 g Structural integrity and operability demonstrated.
	Moisture Separator	P	1VG05SA 1VG05SB	Uniaxial Sine Sweep 2-33 Hz (double sweep); Input: $H_1=H_2=$ 0.2g, V = 0.1g	Natural frequencies: 26 Hz
				Biaxial Random Motion 1.25 - 31.5 Hz, 1/3 Octave	Horiz. TRS Envelops RRS Vert. TRS does not. Conservative analysis at critical locations showed stresses to be within allowables: Critical stress = 10,560 psi (allowable = 22,000 psi) Based on equivalent static analysis. Structural integrity verified.

Specification No. H-2290
Vendor: Buffalo Forge Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC04CA 1VC04CB	Control Room HVAC Return Fans	A	Aux.Bldg.	Equivalent Statis Analysis	Accelerations levels used: (Peak x 1.5): $H_1=H_2$= 11.6 g, V= 4.4 g Critical stress = 43,440 psi (allowable = 45,000 psi) Critical deflection = 0.0044" (allowable deflection= 0.0184")
1VG01CA 1VG01CB	Reactor Building Recirculation Fans	A	Aux. Bldg.	Simplified Dynamic Analysis	Required acceleration levels: $H_1=H_2$= 5.0 g, V= 2.0 g Critical stress = 31,537 psi (allowable = 45,000 psi Critical deflection= 0.01752" (allowable deflection= 0.0288")
1VH01CA 1VH01CB 1VH01CC 1VH01CD	Service Water Pump Cooling Fan	A	Service Water Pump Structure	Equivalent Static Analysis Natural frequencies: $\geq$36 Hz	Acceleration levels used (Peak x 1.5): $H_1=H_2$=3.0g, V = 3.3g Critical stress = 13,560 psi (allowable = 28,800 psi) Critical deflection = 0.00467" (allowable deflection= 0.062"

Specification No. H-2290
Vendor: Buffalo Forge Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VX02CA 1VX02CC 1VX02CC	SWGR Heat Removal Fans	A	Aux. Bldg.	Equivalent Static Analysis Natural frequencies: ≥79 Hz	Acceleration levels used: H_1= 3.0 g, H_2= 3.0 g, V= 3.2 g Critical Stress = 5,641 psi (Allowable Stress = 32,400 psi) Critical deflection = 0.0094" (Allowable Deflection= 0.093")
1VX04CA 1VX04CB 1VX04CC 1VX04CD 1FX04CE 1VX04CF	SWGR Heat Removal Fans	A	Aux. Bldg.	Equivalent Static Analysis Natural frequencies: ≥31.4 Hz	Acceleration levels used: (Peak x 1.5): H_1=H_2=3.0g, V= 3.3g Critical Stress = 19,022 psi (Allowable = 28,000 psi) Critical deflection = 0.0281" (Allowable deflection = 0.14")
1VY01C 1VY02C 1VY04C	CSCS Equip. Room Cooling Fans	A	Reactor Building	Equivalent Static Analysis Natural frequencies: ≥36 Hz	Acceleration levels used: (Peak x 1.5): H_1=H_2=3.0g, V = 3.3g Critical stress = 13,560 psi (Allowable = 28,800 psi) Critical deflection = 0.00467" (Allowable deflection = 0.062")
				Equivalent Static Analysis Natural frequencies: ≥36 Hz	Acceleration levels used: (Peak x 1.5): H_1=H_2=3.0g, V = 3.3g Critical stress = 21,874 psi (Allowable = 28,800 psi) Critical deflection = 0.0047" (Allowable deflection = 0.015")

Specification No. H-2290
Vendor: Buffalo Forge Co.
Wm. H. Zimmer
Project No. 4130-00

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1VY03C	CSCS Equip. Room Cooling Fan	A	Reactor Building	Equivalent Static Analysis Natural frequencies: $\geq$75 Hz	Acceleration levels used: (Peak x 1.5): $H_1=H_2=3.0g$, V = 3.3g Critical stress = 11,417 psi (Allowable = 28,800 psi) Critical deflection = 0.0044" (Allowable deflection = 0.038")
	Vibration Isolators	A	Fans (H-2290)	Equivalent Static Analysis	Acceleration levels used: $H_1=H_2=2.2g$, V = 2.3g Critical stress = 15,762 psi (Allowable = 28,800 psi) Fans are to be hard mounted

Specification No. H-2293
Vendor: Trane Co.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC02CA 1VC02CB	Control Room Condensing Units	A	Aux. Bldg.	Detailed Dynamic Analysis	Critical stress = 3,500 psi (Allowable = 3,500 psi) Critical deflection = 0.0039" (Allowable deflection= 0.0352")
1VX01CA 1VX01CB 1VX01CC 1VX01CD 1VX01CE 1VX01CF	SWGR Heat Removal Condensing Units	A	Aux. Bldg.	Detailed Dynamic Analysis	Critical stress = 33,986 psi (Allowable = 34,000 psi) Critical deflection = 0.00198" (Allowable deflection= 0.0317")
1PLB3J 1PLB4J 1PLB5J 1PLB6J 1PLB7J 1PLB8J 1PLB9J 1PLC1J	HVAC Condensing Unit Control Panels for 1VC02CA/F	A	Aux. Bldg.	Biaxial Random Motion Test 1-40 Hz Fragility Test	TRS envelops RRS. Structural integrity and operability verified. Min. fragility level (random wave): H_1=5.0g, H_2=V=3.0g

Specification No. H-2298
Vendor: Refer to Equip. Status Sht's.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC11XA 1VC11XB	Control Room HVAC Return Fan Silencers	A	Aux. Bldg.	Equivalent Static Analysis	Acceleration levels used: (Peak x 1.5): H_1=5.7g, H_2=11.4g, V = 4.2g Critical stress = 1,349 psi (Allowable = 1,721 psi) Structural intergrity verified.
1FEVG001A 1FEVG001B	Air Flow Monitors	A	Reactor Building	Simplified Dynamic Analysis Natural frequencies: 117,405 Hz	Acceleration levels used: (Req'd) (Required): H_1=H_2=1.0g, V = 1.5g Critical stress = 3,113 psi (Allowable = 22,500 psi) No critical deflections.
1FEVG002A 1FEVG002B	Air Flow Monitors	A	Aux. Bldg.	Simplified Dynamic Analysis Natural frequencies: 15,75.3, 438 Hz	Acceleration levels used: (required): H_1=H_2=1.0g, V = 1.5g Critical stress = 13,444 psi (Allowable = 26,400 psi) Critical deflection = 0.0831" No effect on operability.

Specification No. H- 2299
Vendor: Powers Regulator Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1PL14JA 1PL14JB	Control Room Vent and Air Cond. Equipment Control Panel	A	Aux. Blgd.	Simplified Dynamic Analysis/ Detailed Dynamic Analysis/ Uniaxial Sine Sweep Test/ Uniaxial Sine Dwell Test	Vibration test to determine resonant freq: 8.7, 122, 15.7, 16.2 Hz. (Sweep: 0-35 Hz, 3 modes), cross-coupling noted. Structural integrity and operability demonstrated by finite element analysis (response spectrum). Hand calculations supplemented the analysis: Critical stress = 12,920 psi (Allowable = 21,600 psi deflections were insignificant.
1PM19JA 1PM19JB 1PL60JA 1PL60JB 1PL60JC	Control Room Ionization Detection Relay Panels and Diesel Generator Room HVAC Control Panels	A	Aux. Bldg.	Simplified Dynamic Analysis/ Detailed Dynamic Analysis/ Uniaxial Sine Sweep Test/ Uniaxial Sine Dwell Test	Vibration test for resonance search: f_n>35Hz. Structural integrity and operability demonstrated by finite element analysis (response spectrum) hand calculations supplemented the analysis (H_1=H_2=1.5, V = 2.5g): Critical stress = 9,800 psi (Allowable = 25,200 psi) No critical deflections.

Specification No. H-2299
Vendor: Powers Regulator Co.
Wm. H. Zimmer
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1PL61JA 1PL61JB	Service Water Pump Cooling Panels	A		Service Water Pump Structure	Uniaxial Sine Sweep Test 0-35 Hz	Closed-door case: Lowest f_n>35 Hz response - 0.03 g's. Open-door case: frequency = 12.2 and 17.9 Hz (Damping of 2.9 & 2.5) Response - 0.10 and 0.23g's.
					Static Analysis	Acceleration levels used: H_1=0.20g, H_2=0.20g, V = 0.14g Critical section: factor of safety = 15 (min.), based on ZPA + 10% margin acceleration levels. Operability not effected.
1PL69JA 1PL69JB	SGTS Control Panels	A		Reactor Building	Uniaxial Sine Sweep Test 0-40 Hz	No resonant frequencies below 35 Hz.
					Static Analysis	Acceleration levels used: H_1=0.81g, H_2=0.74g, V = 4.5g (Critical stress = 36,000 psi) Structural integrity verified.
1PL91J	SWGR Heat Removal Control	A		Aux. Bldg.	Uniaxial Sine Sweep Test	Panel frequency: >33 Hz (Open or closed door case) Door Frequency: 31.2, 31.9 Hz (Damping: 2.9, 2.5%) Response - 15h's.

Specification No. H-2299
Vendor: Powers Regulator Co.
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1PL91J				Static Analysis	Acceleration levels used: H_1=0.32, H_2=0.34, V = 0.70g Plus 1% margin. Stresses were a factor of 20 to 200 below yield. Operability not effected.

Specification No. H-2805
Vendor: Bishopric
Wm. H. Zimmer
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1DG07TA 1DG07TB 1DG07TC	Diesel Oil Day Tanks 1A, 1B, 1C	P		Aux. Bldg.	Static Analysis OBE/SSE Input: H_1=0.2g/0.41g (NS) H_2=0.17g/0.31g (EW) V=0.35g/0.55g Damping: 1.0%	Natural Freq. $H_1=H_2$=33. Hz V=182. Hz Worst Stresses: Shell Bending for 1.0g σ_{calc} = 2.65 ksi S_{allow} = 22.6 ksi Nozzles: OBE SSE $\sigma_{calc}=S_{allow}$ = 22.6 ksi 24.7 ksi Anchor Bolts σ_{calc} = 9.99 13.07 S_{allow} = 63. 84.
1DG12TA 1DG12TB 1DB12TC	Diesel Generator Cooling Water Reservoir Tanks	P		Aux. Bldg.	Static Analysis SSE Input: H_1=0.5g H_2=0.5g V=0.55g Damping: 1.0%	Natural Freq. H_1=87.5 Hz H_2=195. V=95.3 Worst Stresses: OBE SSE Saddle/Shell σ_{calc} = 10.1 ksi 8.1 ksi S_{allow} = 24.0 29.1

Specification No. H-2805
Vendor: Bishopric

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1DG12TA 1DG12TB 1DG12TC	(Continued from previous page)				Anchor Bolts OBE SSE σ_{calc} = — 1.8 S_{allow} = — 24.9 τ_{calc} = — 1.8 S_{allow} = — 13.3 Nozzle/Shell σ_{calc} = 14.1 25.2 S_{allow} = 22.6 27.4

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Vendor: Bishopric
Wm. H. Zimmer
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1WR03TA 1WR03TB	RBCCW Expansion Tanks	P		Rx. Bldg.	Static Analysis OBE/SSE Input H_1=0.36g/0.53g (NS) H_2=1.125g/0.9g (EW) V=0.9/0.9g Damping 1.0%	Natural Freq. H_1=14.8 H_2=67.9 V=65.4 Hz Worst Stresses: Anchor Bolts (OBE) σ_{calc} = 29.8 S_{allow} = 63.0 τ_{calc} = 15.0 S_{allow} = 31.5 Shell/Saddle (OBE / SSE) σ_{calc} = 20.97 / 21.8 S_{allow} = 22.6 / 24.7
1DG13TA 1DG13TB 1DG13TC	Diesel Generator Cooling Water Reservoir Tanks	P		Aux. Bldg.	Static Analysis SSE Input: H_1=H_2=0.5g V=0.55g Damping: 1.0%	Natural Freq. H_1=68. Hz H_2=169. V=239. Worst Stresses: (OBE / SSE) Saddle σ_{calc} = 5.67 / 6.92 S_{allow} = 24.7 / 29.1 Nozzle/Shell σ_{calc} = 11.58 / 20.7 S_{allow} = 22.6 / 27.4

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Vendor: Bishopric

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1DG13TA 1DG13TB 1DG13TC	(Continued from previous page)					OBE SSE Bolts: σ_{calc} = — 1.825 S_{allow} = — 24.9 τ_{calc} = — 1.754 S_{allow} = — 13.3
1DG14TA 1DG14TB 1DG14TC 1DG14TD 1DG14TE 1DG14TF	Diesel Generator Cooling Water Expansion Tanks	P	Aux. Bldg.	Static Analysis SSE Input: H_1 = 0.5g H_2 = 0.46g V = 0.7g Damping: 1.0%	Natural Freq. H_1=28.6 H_2=227. V=259. Worst Stresses: OBE SSE Shell Saddle σ_{calc}= — 15.7 S_{allow}= — 20.6 Saddle σ_{calc}= 9.63 13.67 S_{allow}= 12.6 18.9 Anchor Bolts σ_{calc}= 6.03 9.57 S_{allow}= 12.6 18.9 Nozzle σ_{calc}= — 34.1 S_{allow}= — 34.1

Specification No. H-2805
Vendor: Bishopric
Wm. H. Zimmer
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1DG15TA 1DG15TB 1DG15TC 1DG15TD 1DG15TE 1DG15TF 1DG15TG 1DG15TH 1DG15TI 1DG15TJ 1DG15TK 1DG15TL	Air Receiver Tanks	P		Aux. Bldg.	Static Analysis Input: $H_1=H_2=0.41g$ $V=0.55g$ Damping 1.0%	Natural Freq. $H_1=H_2=81.1^{Hz}$ $V=297.^{Hz}$ Worst Stresses: Hoop Stress $\sigma_{calc}=8.26^{ksi}$ $S_{allow}=13.70$ Beam Stress $\sigma_{calc}=4.13$ $S_{allow}=13.70$ Skid Bolt (SSE) $\sigma_{calc}=8.71$ $S_{allow}=12.60$
1DO01TA 1DO01TB 1DO01TC	Diesel Oil Storage Tanks	P		Aux. Bldg.	Static Analysis Input: $H_1=H_2=0.30g$ $V=0.70g$ Damping 1.0%	Natural Freq. H=49.3 V=49.3 Worst Stresses: SSE At Support $\tau_{calc}=13.20^{ksi}$ $S_{allow}=15.00$ Tank is Buried In Sand

Specification No. H-2812
Vendor: C&D Batteries Co.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1DC13EB 1DC13EC	125-V Battery Chargers	A		Aux. Bldg.	Biaxial Test, Random Motion Resonance Search 1-35Hz	TRS Graph envelopes required response spectra. Test requirements exceeded specs. Post-Testing functional operability verified.

Specification No. H-2816
Vendor: Bahnson Co.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC08SA 1VC08SB 1VC13AA 1VC13AB	Control Room HVAC Air Handling Units Control Room HVAC Cooling Coils	A	Aux. Bldg.	Static Analysis Finite Element Analysis Input: Cabinet & Coils $H_1=H_2=0.62g$ $V=1.7g$ Damping: 1.0%	Natural Frequencies: Coils: $f_n = 57.5^{Hz}$ Coil Support: $f_n=33.^{Hz}$ Coil Fin Crush Press: $\sigma_{calc}= 3.43^{psi}$ $S_{allow}= 6.5^{psi}$ Nozzle Bolts $\sigma_{calc}= 2.29^{ksi}$ $S_{allow}=20.$ $\tau_{calc}= 0.81$ $S_{allow}=10.0$ Cabinet Nat. Freq. $f_n=36.^{Hz}$ Cab. Worst Stresses: $\sigma_{calc}= 5.02^{ksi}$ $S_{allow}=21.6$ $\tau_{calc}= 0.67$ $S_{allow}=10.8$ Anchor Bolts: $\sigma_{calc}=17.95^{ksi}$ $S_{allow}=40.0$ $\tau_{calc}= 5.24$ $S_{allow}=21.6$

Specification No. H-2816
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1VC13YA 1VC13YB 1VC14YA 1VC14YB 1VC15YA 1VC15YB 1VC16YA 1VC16YB	Air Foil Dampers	A		Aux. Bldg. In Equipm't No. 1VC08SA,B	Biaxial Test, Random Motion Freq. Range 1-40. Hz Req'd Input: $H_1=H_2=0.62g$ $V=0.68g$ Test Response/Input: $H_1=H_2=20g/5g$ $V=15g/5g$	Natural Freq. Damper Blade $f_n=11.$ Hz Multi-Zone Damper Blade $f_n=13.$ Hz $f_n=14.$ Hz Functionally Operable
1VH03AA 1VH03AB 1VH03AC 1VH03AD	Service Water Pump Cooling System Heat Exchangers & Cooling Coils	A		Service Water Pump Structure	Static Analysis Finite Element Analysis Req'd Input: $H_1=H_2=0.2g$ $V=0.14g$ Damping: 1.0%	Natural Freq. Coil Bank: $f_n=35.4$ Hz Header Assembly: $f_n=33.$ Hz Coil Support: $f_n=43.5$ Hz Worst Stresses: SSE Anchor Bolts: $\sigma_{calc}=$ 9.29 ksi $S_{allow}=$ 40. ksi $\tau_{calc}=$ 3.89 ksi $S_{allow}=$ 21.6 ksi Nozzle Pipe: $\sigma_{calc}=$ 13.15 ksi $S_{allow}=$ 32.4 Coil Perimeter Bolts: $\sigma_{calc}=$ 7.42 ksi $S_{allow}=$ 20.0 ksi $\tau_{calc}=$ 5.64 ksi $S_{allow}=$ 10.0 ksi

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VX03SA 1VX03SB 1VX03SC 1VX03SD 1VX03SE 1VX03SF	SWGR Heat Removal Air Handling Units	A	Aux. Bldg.	Static Analysis Finite Element Analysis Req'd Input: $H_1=H_2=0.46g$ V=0.95g Damping: 1.0%	Natural Freq. Tube: $f_n=60.^{Hz}$ Coil Support: $f_n=33.^{Hz}$ Worst Stresses Nozzle Bolt: $\sigma_{calc}=2.96^{ksi}$ $S_{allow}=20.0$ $\tau_{calc}=1.045$ $S_{allow}=10.0$
1VX05AA 1VX05AB 1VX05AC 1VX05AD 1VX05AE 1VX05AF	SWGR Heat Removal Cooling Coils	A	1VX03SA 1VX03SB 1VX03SC 1VX03SD 1VX03SE 1VX03SF	Static Analysis Req'd Input: $H_1=H_2=0.46g$ V=0.55g Damping: 1.0%	Natural Freq. Coils: $f_n=51.5^{Hz}$ $f_n=75.7$ Worst Stresses Anchor Bolts $\sigma_{calc}=6.01^{ksi}$ $S_{allow}=40.0$ $\tau_{calc}=2.47$ $S_{allow}=21.6$
1VX06FA 1VX06FB 1VX06FC 1VX06FD 1VX06FE 1VX06FF	Air Handling Unit Filters	A	1VX03SA 1VX03SB 1VX03SC 1VX03SD 1VX03SE 1VX03SF	Plant Usage Experience and Engineering Judgement	The frame and keeper slot are adequate to hold the light weight filter elements at pressures much higher than an anticipated seismic event in combination with normal operation.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VY05A 1VY06S 1VY08A 1VY09A	CSCH-RHR Equip. Room Heat Exchanger and Cooling Coil	A	Rx. Bldg.	Static Analysis Finite Element Analysis Req'd Input: $H_1=H_2=0.67g$ $V=1.2g$	Natural Freq. Coils: $f_n=35.2^{Hz}$ $f_n=36.0$ Tube: $f_n=43.0$ Support: $f_n=53.0$ Header Assembly: $f_n=33.$ Worst Stresses: Beam $\sigma_{calc}=6.92^{ksi}$ $S_{allow}=21.6$ $\tau_{calc}=3.47$ $S_{allow}=10.8$ Anchor Bolts $\sigma_{calc}=36.9^{ksi}$ $S_{allow}=48.6$ $\tau_{calc}=11.82$ $S_{allow}=24.3$ Nozzle Pipe Stress $\sigma_{calc}=13.5^{ksi}$ $S_{allow}=35.0$ Structural Integrity Demonstrated for original qualification criteria. Requalification to T-Quencher criteria not completed.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1RG10M 1RG20M	Angle Line Strainer	P	Aux. Bldg.	Uniaxial Sine Sweep & Multi-Axis 1-33 Hz Sine Dwell 1/2 Octave/Minute Sweep Required Input: (Peak x 1.5) $H_1=H_2=4.2g$ $V=2.85g$	g-Level Qualification By Testing: $H_1=8.8g$ $H_2=9.2g$ $V=6.4g$ Structural Integrity Demonstrated
1RG11MA 1RG11MB 1RG21MA 1RG21MB 1RG21MC 1RG21MD 1RG21ME 1RG21MF	Filter Drier	P	Aux. Bldg.	Uniaxial Sine Sweep & Multi-Axis 1-33 Hz Sine Dwell Required Input: (Peak x 1.5) $H_1=H_2=4.2g$ $V=2.85g$	g-Level Qualification By Testing: $H_1=8.8g$ $H_2=9.2g$ $V=6.4g$ Structural Integrity Demonstrated
1RG12M 1RG22M	Moisture-Liquid Indicator	P	Aux. Bldg.	Pseudo-Biaxial, Sine Dwell and Sine Sweep 1-33 Hz Required Input: $H_1=H_2=V=4.2g$	g-Level Qualification By Testing: $H_1=4.8g$ $H_2=9.2g$ $V=5.0g$ Structural Integrity Demonstrated

Specification No. H-2817
Vendor: CVI Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC05CA 1VC05CB	Control Room HVAC Standby Make-Up Fan	A		Aux. Bldg.	Static Analysis Accelerations OBE/SSE Horizontal: .37g/.62g Vertical: 1.95g/2.70g Damping: 1.0% Rigid Support Considerations in the model.	Natural Freq. H_1=8 H_2=89. Hz V=115.5 Worst Stresses Motor Hold-Down Bolts: OBE/SSE Calc. Stresses: $0.40^{ksi}/_{0.73^{ksi}}$ Allow. Stresses: $13.1^{ksi}/_{21.8^{ksi}}$ Foundation Bolts: Calc. Stresses: $0.40^{ksi}/_{0.75^{ksi}}$ Allow. Stresses: $20.5^{ksi}/_{34.2^{ksi}}$ Deflection: $5.5(10)^{-3}$ in. No effect on functional operation. Fan Shaft: OBE/SSE Shear Stress: 618/838 psi Allowable: 9660/13110 psi Tensile Stress: 1207/1655 psi Allowable: 16100/21850 psi

Specification No. H-2817
Vendor: CVI Co.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC09SA 1VC09SB 1VC10S	Control Room HVAC Filter Packages	A	Aux. Bldg.	Static Analysis Accelerations OBE/SSE H_1: 0.5g/0.75g H_2: 0.34g/0.5g V : 1.9g/2.2g Damping: 1%, 2% Rigid Support Conditions	Natural Freq. H_1=20.3 Hz H_2=20.3, 35.5 Hz V=19.3 Hz Worst Stresses Charcoal Screen: Calc Avg σ = 28.0 ksi Peak σ= 48.7 Allow S= 60.0 Anchor Bolts: σ_{calc}= 11.21 ksi τ_{calc}= 2.33 S_{allow}= 32.4 HEPA Mount. Frame σ_{calc}= 26.3 ksi S_{allow}= 28.2 Fan Struct. Anchor Brackets σ_{calc}= 31.9 ksi S_{allow}= 32.4 No critical deflections Structural Integrity Demonstrated

Specification No. H-2817
Vendor: CVI Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC12AA 1VC12AB	Filter Package Heat Coils Weight: 39. lbs Mounted w/6-3/8"Ø Bolts	A		Aux. Bldg.	Uniaxial & Multi-Axis Sine Sweep 2-50 Hz	Natural Freq. H_1=10. Hz, 14. Hz H_2=5., 38. V=4., 13., 22. g-Level Qualification By Testing: $H_1=H_2=V=0.55g$ Structural Integrity Demonstrated
1VC93Y 1VC94Y	Filter Package Backflow Dampers	A		Aux. Bldg.	Equivalent Static Analysis Rigid Support Conditions Damping: 0.5%, 1% Accelerations OBE/SSE Horizontal: 7.8g/7.2g Vertical: 2.9g/2.6g	Natural Freq. f_n=22.2 Hz Worst Stresses Blade/Shaft: σ_{calc}= 4.56 ksi S_{allow}=24.0 τ_{calc}= 3.67 S_{allow}=14.5 Support Angle σ_{calc}= 25.4 ksi S_{allow}= 28.6 ksi

Specification No. H-2834
Vendor: Automation Industries, Vitro Labs Div.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1PL12JA 1PL12JB 1PL12JC	Essential Relay Panels 1A, 1B, 1C	A	Aux. Bldg.	Biaxial Random Motion; Freq. Range: 1-35. Hz	Natural Freq. H_1=12.5,12.75,12.8,19.5,20. Hz H_2=4.9,5.0,5.1 Hz V=20.5,23.0,25.0 Hz TRS Graphs Envelope Required Response Spectra - Functional Operability Verified

Specification No. H-2835
Vendor: Unit Elect. Control
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1PL67JA 1PL67JB	Remote Shutdown Panels 1A, 1B	A	Aux. Bldg.	Biaxial Random Motion Test Freq. Range: 1-40Hz	TRS Graphs Envelope Required Response Spectra - Functional Operability Verified. Natural Frequencies: Front to Back: 8,40,80 Hz Side to Side: 12.5,40 Hz

Specification No. H-2836
Vendor: Chemtron Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1PLC7JA 1PLC7JB 1PLC7JC 1PLC7JD	CO_2 Fire Protection Panels	P		Aux. Bldg.	Biaxial Random Motion Test Freq. Range: 1-40 Hz	TRS Graphs Envelope Required Response Spectra - Functional Operability Verified Natural Frequencies: None in 1-100 Hz range

Specification No. H-2849
Vendor: Crane Co.

Wm. H. Zimmer
Project No. 4130-00

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Rev. 00
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1D002PA 1D002PB 1D002PC	Diesel Fuel Oil Transfer Pumps	A		Aux. Bldg.	Static Analysis; Finite Element Dynamic Analysis Accelerations: OBE/SSE Horizontal: .5g/1.0g Verti .7g/1.0g	Natural Freq. $f_n = 127.^{Hz}$ Worst Stresses SSE Pump Hold Down Bolts: $\tau_{calc} = 19.7^{ksi}$ $S_{allow} = 23.4$ $\sigma_{calc} = 39.6$ $S_{allow} = 54.6$ Shaft: $\sigma_{calc} = 19.6^{ksi}$ $S_{allow} = 26.2$ Pump Head to Hous. Bolt.: $\tau_{calc} = 5.87^{ksi}$ $S_{allow} = 12.32$ $\sigma_{calc} = 36.7$ $S_{allow} = 40.0$ Rotor/Stator Clear.: Calc Δ = 0.00229" Allow Δ = 0.012"

Specification No. H-2861
Vendor: Joy Manufacturing
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC03CA 1VC03CB	Control Room HVAC Fans 1A, 1B WT = 1.96^{k}	A	Aux. Bldg.	Statis Analysis Required Input: H_1 = 3.9g H_2 = 7.8g V = 2.9g Damping: 1/2% OBE	Natural Freq. H_1 = 2775.^{Hz} H_2 = 425. V = 200. Worst Stress Anchor Bolt (Isolator To Fan): σ_{calc} = 47.4^{ksi} S_{allow} = 55.0 Deflections of Shaft Δ_{calc} = 0.0062" Δ_{allow} = 0.100"
1VD01CA 1VD01CB 1VD01CC	DG Room Vent. Fan Wt = 2.46^{K}	A	Aux. Bldg.	Static Analysis Required Input: H_1 = 1.6g H_2 = 2.0g V = 2.2g Damping: 1/2% OBE	Natural Freq. H_1 = 1866.^{Hz} H_2 = 379. V = 146. Worst Stresses Anchor Bolt (Isolator To Fan): σ_{calc} = 23.6^{ksi} S_{allow} = 55.0 Deflection of Shaft Δ_{calc} = 0.0025 Δ_{allow} = 0.160

Specification No. H-2870
Vendor: Chemelex Corp.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1PLE7JA 1PLE7JB 1HT01E 1HT02E	Heat Trace Control Panel & Transformer	A	Aux. Bldg.	Biaxial Random Motion Frequency Range: 1-33 Hz @ 1/6 Band Width Resonance Survey 1-40 Hz	Natural Freq. H_1 = 19., 20.5, 23. Hz H_2 = 4.75, 19, 21. Hz V = 17.5 Hz TRS Graph Envelopes Required Response Spectra

Specification No. H-2289
Vendor: Refer Below

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class.	Location	Qualification Method	Results
1VG03YA/B	Isolation Dampers (Pacific Power (Damper) Controlmatics (M.Oper) Namco (Limit Switches))	A	Aux.Bldg.	Equivalent Static Analysis Method	Acceleration Levels Used: $H_1 = H_2 = V = 7.7$ g critical stress = 30,251psi (Allowable = 34,200 psi)
				Simplified Dynamic Analysis	Lowest f_n = 18 Hz Max. Calc. Acceleration: H_1 = .48g, H_2 = .61g V = 2.4g Therefore, past analysis (Above) by equivalent static analysis method applies.
1VG04YA/B	Isolation Dampers (Pacific Power (Damper) Controlmatics (M.Oper) Namco (Limit Switches))	A	Aux.Bldg.	Equivalent Static Analysis Method	Acceleration Levels Used: $H_1 = H_2 = V = 7.7$ g Critical Stress = 30,251psi (Allowable = 34,200 psi)
				Simplified Dynamic Analysis	Lowest f_n = 18 Hz Max. Calc. Acceleration: H_1 = .66g, H_2 = .8g V = 1.7g Therefore, past analysis (Above) by equivalent static analysis method applies.

Specification No. H-2298
Vendor: Refer Below

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC07Y	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H_1 = 2.5 g, H_2 = 4.5 g, V = 2.0 g Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: f_1 = 33 Hz, f_2 = 30 Hz, f_v = 33 Hz Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.
1VC18YA/B	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H_1 = 2.5 g, H_2 = 4.5 g, V = 2.0 g Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: f_1 = 33 Hz, f_2 = 30 Hz, f_v = 33 Hz Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.
1VC19YA/B	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) demonstrated during and after test. No weld defects.

Specification No. H-2298
Vendor: Refer Below

Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC21YA/B	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H_1 = 25 g, H_2 = 4.5 g, V = 2.0 g. Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: f_1 = 33 Hz, f_2 = 30 Hz, f_v = 33 Hz. Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.
1VC22YA/B	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during & after test. No weld defects.
1VC23YA/B	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during & after test. No weld defects.
1VC25YA/B	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H_1 = 25 g, H_2 = 4.5 g, V = 2.0 g. Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: f_1 = 33 Hz, f_2 = 30 Hz, f_v = 33 Hz. Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.

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Vendor: Refer Below
Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC28Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 105 Hz Acceleration Levels Used: 5.0 g in all directions critical stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .78 g, H_2 = .76 g, V = .68 g.
1VC30YA/B	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H_1 = 2.5 g, H_2 = 4.5 g, V = 2.0 g.	Nat. Frequencies: f_1 = 33 Hz, f_2 = 30 Hz, f_v = 33 Hz.
				Uniaxial Sine Dwell @ Resonant Freq.	Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC32YA/B	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H_1 = 25 g, H_2 = 4.5 g, V = 2.0 g.	Nat. Frequencies: f_1 = 33 Hz, f_2 = 30 Hz, f_v = 33 Hz.
				Uniaxial Sine Dwell @ Resonant Freq.	Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.
1VC33YA	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 29 Hz Acceleration Levels Used: 5.0 g in all directions critical stress = 26,615 psi (Allow.=32,000psi) Max. Calc. Accelerations: H_1 = .48 g, H_2 = 4.82 g, V^1 = 2.36 g.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC33YB	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 29 Hz Acceleration Levels Used: 5.0 g in all directions Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .48 g, H_2 = 1.96 g, V^1 = .62 g.
1VC34Y	Fire Damper (AIR Balance, Curtain Type: Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during & after Test. No weld defects.
1VC35Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz.	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during & after test. No weld defects.

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC38Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P		Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g.	Nat. Frequency: 37 Hz Response: 3.50 g.
					Uniaxial Sine Dwell Dwell at 20 Hz	Operability (Structural Integrity) demonstrated during and after test. No weld defects.
1VC39Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P		Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g.	Nat. Frequency: 37 Hz Response: 3.50 g.
					Uniaxial Sine Dwell Dwell at 20 Hz.	Operability (Structural integrity) demonstrated during and after test. No weld defects.
1VC40Y	Opposed Blade Balancing Damper (Waldinger)	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1= 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 62 Hz Acceleration Levels Used: 5.0 g in all directions Critical stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .77 g, H_2 = .64 g, V^1= .87 g.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC41Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 73 Hz Acceleration Levels Used: 5.0g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .51 g, H_2 = .62 g, V^1 = .68 g.
1VC42Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural Integrity) demonstrated during and after test. No weld defects.
1VC43Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) demonstrated during and after test. No weld defects.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC44Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 17 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .70 g, H_2 = .82 g, V^1 = 3.27 g.
1VC45Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 17 Hz. 5.0 g in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .70 g, H_2 = .90 g, V^1 = 3.45 g.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC46Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 73 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .82 g, H_2 = .79 g, V^1 = .95 g.
1VC47Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) demonstrated during and after test. No weld defects.

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Vendor: Refer Below

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC48Y	Opposed Blade Balancing Damper (Waldinger)	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 47 Hz Acceleration Levels Used: 5.0g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = 1.14 g, H_2 = .46 g, V^1 = .58 g.
1VC49Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P		Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g.	Nat. Frequency: 37 Hz Response: 3.50 g.
					Uniaxial Sine Dwell Dwell at 20 Hz	Operability (Structural integrity) demonstrated during and after test. No weld defects.
1VC50Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P		Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g.	Nat. Frequency: 37 Hz Response: 3.50 g.
					Uniaxial Sine Dwell Dwell at 20 Hz	Operability (Structural integrity) demonstrated during and after test. No weld defects.

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Vendor: Refer Below
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC51Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) demonstrated during and after test. No weld defects.
1VC52Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 105 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .38 g, H_2 = .46 g, V^1 = .81 g.
1VC53Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) demonstrated during and after test. No weld defects.

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Vendor: Refer Below

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC54Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P		Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC55Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P		Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz. Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC56Y	Opposed Blade Balancing Damper (Waldinger)	P		Auxiliary	Static Analysis Simplified Dynamic Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g. Lowest f_n = 105 Hz Acceleration Levels Used: 5.0 g in all directions. Critical Stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .38 g, H_2 = .46 g, V^1 = .55 g.

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Vendor: Refer Below

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC57Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz.	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC58Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz.	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC59Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis Simplified Dynamic Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g. Lowest f_n = 17 Hz Acceleration Levels Used: 5.0 g in all directions Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .49 g, H_2 = .75 g, V^1 = 2.54 g.

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC61Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)		P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC62Y	Opposed Blade Balancing Damper (Waldinger)		P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 47 Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .32 g, H_2 = .40 g, V^1 = .58 g.
1VC63Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)		P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz.	Nat. Frequency: 37 Hz. Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC64Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 47 Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .36 g, H_2 = .49 g, V^1 = .76 g.
1VC65Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 47 Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .61 g, H_2 = .93 g, V^1 = .58 g.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC66Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC67Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC68Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz. Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC69Y	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H_1 = 25 g, H_2 = 4.5 g, V = 20 g. Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: f_1 = 33Hz, f_2 = 30 Hz, f_v = 33Hz Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.

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1VC70Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC71Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC72Y	Backdraft Isolation Damper (AIR Balance, Model: SND-116	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input H_1 = 2.5 g, H_2 = 4.5 g, V = 2.0 g. Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: H_1 = 33 Hz, H_2 = 30 Hz, V = 33 Hz Response: 25 g, 9,5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.

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1VC73Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dyanmic Analysis	Lowest f_n = 87 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .48 g, H_2 = .62 g, V^1 = .68 g.
1VC74Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC75Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.

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1VC76Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 130 Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .95 g, H_2 = 1.03 g, V^1 = 1.35 g.
1VC77Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz.	Nat. Frequency: 37 Hz Response: 3.50 g Operability (Structural integrity) Demonstrated during and after test. No weld defects.

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1VC79Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 130Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .48 g, H_2 = .62g, V^1 = .72 g.
1VC80Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 87 Hz Acceleration Levels Used: 5.0 g in all directions Critical stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .66 g, H_2 = .84 g, V^1 = 1.52 g.

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC83Y	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P		Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H_1 = 2.5 g, H_2 = 4.5 g, V = 2.0 g.	Nat. Frequencies: f_1 = 33 Hz, f_2 = 30 Hz, f_v = 33 Hz.
					Uniaxial Sine Dwell @ Resonant Freq.	Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) demonstrated.
1VC84Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P		Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g.	Nat. Frequency: 37 Hz Response: 3.50 g.
					Uniaxial Sine Dwell Dwell at 20 Hz	Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VC85Y	Opposed Blade Balancing Damper (Waldinger)	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
					Simplified Dyanmic Analysis	Lowest f_n = 215 Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .48 g, H_2 = .62 g, V^1 = 1.1 g.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VC96Y	Fire Damper, Curtain Type (Ruskin, Model: NIBD-23)	P	Auxiliary	Biaxial Random Motion 1-40 Hz, spaced at 1/3 octave. Biaxial Sine Beat 1-32 Hz, Input 3.0 g, Beats at 1/2 octave.	TRS Envelopes RRS Structural integrity and operability verified Structural integrity and operability verified.
1VC97Y	Fire Damper, Curtain Type (Ruskin, Model: NIBD-23)	P	Auxiliary	Biaxial Random Motion 1-40 Hz, spaced at 1/3 octave. Biaxial Sine Beat 1-32 Hz, Input 3.0 g, beats at 1/2 octave.	TRS Envelopes RRS Structural integrity and operability verified. Structural integrity and operability verified
1VC98Y	Fire Damper, Curtain Type (Ruskin, Model: NIBD-23)	P	Auxiliary	Biaxial Random Motion 1-40 Hz, spaced at 1/3 octave. Biaxial Sine Beat 1-32 Hz, Input 3.0 g, beats at 1/2 octave.	TRS Envelopes RRS Structural integrity and operability verified. Structural integrity and operability verified.
1VD04YA/B/C	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.

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1VD05YA/B	Backdraft Isolation Damper (AIR Balance, Model: SNB:116	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input 4.0 g,(Horz) 2.0 g. (Vertical)	Nat. Frequencies: 31.7 Hz 32.0 Hz, 32.7 Hz.
				Uniaxial Sine Dwell @ Resonant Freq.	Response: 20 g, 20 g, 18g, respectively. Operability (Structural integrity) demonstrated.
1VD06YA/B/C	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g.	Nat. Frequency: 37 Hz Response: 3.50 g.
				Uniaxial Sine Dwell Dwell at 20 Hz	Operability (Structural integrity) Demonstrated during and aster test. No weld defects.
1VD09YA/B/C	External Counter Balance Gravity Shutter (Ruskin, Model:CBS-7)	P	Auxiliary	Static Analysis	Currently being relocated. Qualification pending.

Specification No. H-2293
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1VG05YA/B	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input 4.0 g.(Horz) 2.0 g. (Vert.) Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: 31.7 Hz 32.0 Hz, 32.7 Hz Response: 20 g, 20 g,18 g, respectively. Operability (Structural integrity) demonstrated.
1VX01YA/B/C	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz,Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VX02YA/B/C	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input 4.0 g,(Horz) 2.0 g. (Vert.) Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: 31.7 Hz 32.0 Hz, 32.7 Hz. Response: 20 g, 20 g, 18g, respectively. Operability (Structural integrity) demonstrated.

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1VX03YA/B	Fire Damper, Curtain Type (AIR Balance, Model: 319)		P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz. Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VX04YA	Opposed Blade Balancing Damper (Waldinger)		P	Auxiliary	Static Analysis Simplified Dynamic Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g. Lowest f_n = 215 Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .48 g, H_2 = .62 g, V^1 = .68 g.

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1VX04YB	Opposed Blade Balancing Damper (Waldinger)	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 215 Hz. Acceleration Levels Used: 5.0 g's, in all directions Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .37 g, H_2 = .43 g, V^1 = .55 g.

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1VX05YA/B	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VX06YA/B/C	Fire Damper, Curtain Type (AIR Balance, Mdl 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz. Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VX07Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 37 Hz Response: 3.50 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VX09Y	Fire Damper, Curtain Type (AIR Balance, Mdl 319)	P	Auxiliary	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 27 Hz. Response: 3.50 g. Operability(Structural integrity) Demonstrated during and after test. No weld defects.

Specification No. H- 2298
Vendor: Refer Below
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VX11Y	Fire Damper (Ruskin, Curtain Type, Model: NIBD-23)		P	Auxiliary	Biaxial Random Motion 1-40 Hz, spaced at 1/3 octave. Biaxial Sine Beat 1-32 Hz, Input 3.0 g, beats at 1/2 octave.	TRS Envelopes RRS Structural integrity and operability verified Structural integrity and operability verified.
1VX12Y	Fire Damper (Ruskin, Curtain Type, Model: NIBD-23)		P	Auxiliary	Biaxial Random Motion 1-40 Hz, spaced at 1/3 octave. Biaxial Sine Beat 1-32 Hz, Input 3.0 g. beats at 1/2 octave.	TRS Envelopes RRS Structural integrity and operability verified. Structural integrity and operability verified.
1VY03Y	Opposed Blade Balancing Damper (Waldinger)		P	Reactor	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz.	Nat. Frequency: 36 Hz. Response: 2.78 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VY05Y	Opposed Blade Balancing Damper (Waldinger)		P	Reactor	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz	Nat. Frequency: 26 Hz. Response: 2.78 g. Operability (Structural integrity) demonstrated during and after test. No weld defects.

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1VY07Y	Opposed Blade Balancing Damper (Waldinger)	P	Reactor	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz.	Nat. Frequency: 36 Hz. Response: 2.78 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.
1VY10Y	Opposed Blade Balancing Damper (Waldinger)	P	Reactor	Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g. Uniaxial Sine Dwell Dwell at 20 Hz.	Nat. Frequency: 36 Hz. Response: 2.78 g. Operability (Structural integrity) Demonstrated during and after test. No weld defects.

Specification No. H-2868
Vendor: Refer Below
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VA01Y	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper.) Namco (L.Switch))	W/S	Auxiliary	Static Analysis	Nat. Freq.> 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5 g's in all directions. Max. Stress = 17.269 psi (Allowable = 19,200 psi)
1VA02Y	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper.) Namco (L. Switch))	W/S	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1= 1.25 g's
				Simplified Dynamic Analysis	Lowest $f_n \geq$ 40 Hz. Limit Load Analysis performed with a resulting allow.> 5.0 g as compared to a max. calc. acceleration of 0.95 g.
1VC01YA/B	Butterfly Isolation Damper (AWV (Damper), ITT (M. Oper.), Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acc. Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 1.25 g's.
				Static Analysis	Lowest f_n = 83.7 Hz Acc. Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 1.25 g's. Max. stress = 18.5 ksi. (Allow. = 19.2 ksi)

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1VC02YA	Butterfly Isolation Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 111 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 1.25 g. Critical stress = 18,467 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration H_1 = .66 g, H_2 = .52 g, V^1 = .67 g.
1VC02YB	Butterfly Isolation Damper (AWV (Damper) ITT (M.Oper.), Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n > = 111 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 1.25 g. Critical stress = 18,467 psi. (Allow. = 19,200 psi) Max. Calc. Acceleration: H_1 = .66 g, H_2 = .85 g, V^1 = .67 g.

Specification No. H-2968
Vendor: Refer Below
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1VC05Y	Butterfly Isolation Damper (AWV (Damper) ITT (M. Oper), Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 58 Hz Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 1.25 g. Critical stress = 18,467 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .50 g, H_2 = .42 g, V^1 = .47 g.
1VC06Y	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L. Switches))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allow. = 19,200 psi) Max. Calc. Accelerations: H_1 = 2.3 g, H_2 = 1.49 g, V^1 = .75 g.

Specification No. H-2868
Vendor: Refer Below

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1VC08YA	Opposed Blade Balancing Damper (AWV, (Damper), ITT (M.Oper) Namco (L. Switches))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = 1.4 g, H_2 = 2.38 g, V^1= .68 g.
1VC08YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M. Oper) Namco (L. Switches))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. accelerations: H_1 = .95 g, H_2 = 1.37 g, V^1= .68 g.

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1VC09YA/B/C/D	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L.Switches))	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V = 1.25 g
					Simplified Dynamic Analysis	Lowest f_n = 36 Hz. Acceleration Levels Used: H (Result.) = 3.0 g, V = 5.0 g. Critical Stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .48 g, H_2 = .85 g, V = .85 g.
1VC10YA	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L. Switches)	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V = 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 213 Hz Acceleration Levels Used: H (Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .67 g, H_2 = .85 g, V = .85 g.

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1VC10YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L.Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .66 g, H_2 = 1.17 g, V^1= .69 g.
1VC10YC	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = H_2 = 1.00 g, V = 1.25g
				Simplified Dynamic Analysis	Lowest f_n = 213 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical Stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .67 g, H_2 = 1.13 g, V^1= .85 g.

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1VC10YD	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper.) Namco (L. Switch))	P	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g.
				Simplified Dynamic	Lowest f_n = 213 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .67 g, H_2 = .85 g, V^1 = .85 g.
1VC11YA	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L.Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .66 g, H_2 = .84 g, V^1 = .68 g.

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1VC11YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L.Switch)		A	Auxiliary	Static Analysis	Nat. Freq.> 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
					Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = 1.5 g, H_2 = 2.09 g, V^1= 1.17 g.
1VC17YA	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L.Switch))		A	Auxiliary El. 591'-7"	Static Analysis	Nat. freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
					Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = 2.93 g, H_2 = 1.8 g, V^1= 1.2 g.

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1VC17YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = 2.93 g, H_2 = 1.8 g, V^1 = .68 g.
1VC20YA	Opposed Blade Balancing Damper (AWV Damper) ITT (M.Oper), Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq.> 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g, in all directions Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .66 g, H_2 = .84 g, V^1 = .66 g.

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1VC24YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper.) Namco (L.Switch)	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = 1.54 g, H_2 = .84 g, V^1 = .68 g.
1VC26Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L.Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .64 g, H_2 = .62 g, V^1 = .95 g.

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1VC20YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L.Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = 1.54 g, H_2 = .84 g, V^1 = .68 g.
1VC24YA	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper.) Namco (L.Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .66 g, H_2 = .84 g, V^1 = .66 g.

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1VC27Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g
				Simplified Dynamic Analysis	Lowest f_n = 173 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .67 g, H_2 = .85 g, V_1 = .85 g.
1VC29YA/B	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))	A	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g,V=1.25g.
				Simplified Dynamic Analysis	Lowest f_n = 173 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .67 g, H_2 = .85 g, V_1 = .85 g.

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1VC31YA	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g.
				Simplified Dynamic Analysis	Lowest f_n = 173 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .48 g, H_2 = .62 g, V^1 = .85 g.
1VC31YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper.) Namco (L. Switch))	A	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g.
				Simplified Dynamic Analysis	Lowest f_n = 48 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .48 g, H_2 = .62 g, V^1 = .85 g.

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1VC36Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g
				Simplified Dynamic Analysis	Lowest f_n = 39 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .67 g, H_2 = .85 g, V^1 = .85 g.
1VC37Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch)	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .86 g, H_2 = 1.83 g, V^1 = 1.12 g.

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1VC82Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g, in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .83 g, H_2 = 1.24 g, V^1= 1.65 g.
1VC86Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = 1.50 g, H_2 = 1.59 g, V^1= .75 g.

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1VC87Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper.) Namco (L. Switch))	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g.
					Simplified Dynamic Analysis	Lowest f_n = 119 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .43 g, H_2 = .41 g, V^1 = .95 g.
1VC88Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))	P		Auxiliary El.525'-7"	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g.
					Simplified Dynamic Analysis	Lowest f_n = 172 Hz. Acceleration Levels Used: H(Result) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .42 g, H_2 = .41 g, V^1 = .95 g.

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1VD01YA/B/C/D/E/F	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g
				Simplified Dynamic Analysis	Lowest f_n = 41 Hz Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical Stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .36 g, H_2 = .48 g, V^1 = .95 g.
1VD02YA/B/D/E/F	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1 = 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz Acceleration Levels Used: 5.0 g in all directions Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .36, H_2 = .46 g, V^1 = .55 g.

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1VD03YA/B/C/D/E/F/G/H/J/K/L/M	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g.
				Simplified Dynamic Analysis	Lowest f_n = 39 Hz. Acceleration Levels Used: H(Result.) = 3.0 g. V = 5.0 g. Critical Stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .36 g, H_2 = .48 g, V^1= .95 g.
1VD07YA	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	P	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 4 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .4 g, H_2 = .46 g, V^1= .55 g.

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1VD07YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	P	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .66 g, H_2 = .46 g, V^1= .55 g.
1VD07YC	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))	P	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g,
				Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .36 g, H_2 = .46 g, V^1= .55 g.

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1VQ05YA	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00 g, V=1.25g
					Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 13,330 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .80 g, H_2 = .80 g, V^1 = .95 g.
1VQ05YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	P		Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g. V^1 = 3.0 g.
					Simplified Dynamic Analysis	Lowest f_n = 43 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .56 g, H_2 = .79 g, V^1 = 1.15 g.

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1VQ06YA	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper) Namco (L. Switch))	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00g, V=1.25g.
					Simplified Dynamic Analysis	Lowest f_n = 53 Hz. Acceleration Levels Used: H(Result.) = 3.0g, V = 5.0g. Critical Stress = 13,330 psi (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .34g, H_2 = .70g, V^1 = .95g.
1VQ06YB	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper), Namco (L. Switch))	P		Auxiliary	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.00g, V = 1.25g.
					Simplified Dynamic Analysis	Lowest f_n = 53 Hz. Acceleration Levels Used: H(Result.) = 3.0g, V=5.0g Critical Stress = 13,330 psi (Allowable = 19,200 psi) Max. Calc. Accelerations: H_1 = .70g, H_2 = .45g, V^1 = .95g.

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1VR01YA	Butterfly Isolation Damper (AWV (Damper) Bettis (Model: 721C-SR, M.Oper.) Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 86 Hz. Acceleration Levels Used: $H_1 = H_2 = V = 1.0g$ Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H_1 = .48g, H_2 = .62g, V^1 = .70g.
1VR01YB/C	Butterfly Isolation Damper (AWV (Damper) Bettis (Model: 721C-SR, M.Oper), Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 86 Hz. Acceleration Levels Used: $H_1 = H_2 = V = 1.0g$ Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H_1 = .51g, H_2 = .62g, V^1 = .70g.

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1VR02YA	Butterfly Isolation Damper (AWV, (Damper) Bettis (Model: 721C-SR M.Oper.) Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 86 Hz. Acceleration Levels Used: $H_1 = H_2 = V = 1.0g$. Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H_1 = .34g, H_2 = .41g, V^1 = .55g.
1VR02YB	Butterfly Isolation Damper (AWV (Damper) Bettis (Model: 721C-SR M.Oper) Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 86 Hz. Acceleration Levels Used: $H_1 = H_2 = V = 1.0g$ Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H_1 = .38g, H_2 = .37g, V^1 = .86g.

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1VR02YC	Butterfly Isolation Damper (AWV (Damper) Bettis (Model: 721C-SR M.Oper.) Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 86 Hz. Acceleration Levels Used: $H_1 = H_2 = V = 1.0g$ Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H_1 = .47g, H_2 = .41g, V^1= .55g.
1VR03YA/B	Opposed Blade Balancing Damper (AWV, (Damper) Powers (M.Oper.) Namco (L. Switch))	W/S	Auxiliary	Static Analysis	Nat. Freq. = 233 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 81.5 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 2.0g. Critical Stress = 12,142 psi (Allowable = 31,600 psi) Max. Calc. Acceleration: H_1 = 0.62g, H_2 = 0.37g, V^1= 1.7g.

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1VR09Y	Opposed Blade Balancing Damper (AWV, (Damper) Powers (M.Oper.) Namco (L. Switch))	W/S	Auxiliary	Static Analysis	Nat. Freq. = 233 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n > 75 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g Critical Stress = 14,006 psi (Allowable = 31,600 psi) Max. Calc. Acceleration: H_1 = 0.6g, H_2 = 0.44g, V^1= 0.98g.
1VP01YA/B	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper.) Namco (L. Switches))	W/S	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00g, H_2 = 1.00g, V^1= 1.25g.
				Simplified Dynamic Analysis	Lowest f_n = 40 Hz. Limit analysis performed with resulting accelerations found to be above tolerable level. Damper system is subject to modification.

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1VP10YA/B	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper.) Namco (L. Switches))	W/S	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00g, H_2 = 1.00g, V = 1.25g
				Simplified Dynamic Analysis	Lowest f_n = 40 Hz. Limit analysis performed with resulting accelerations found to be above tolerable level. Damper system is subject to modification.
1VP11YA/B	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper), Namco (L. Switches))	W/S	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00g, H_2 = 1.00g, V = 1.25g
				Simplified Dynamic Analysis	Lowest f_n = 40 Hz. Limit analysis performed with resulting accelerations found to be above tolerable level. Damper system is subject to modification.

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1VQ01Y	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))	W/S		Reactor	Static Analysis	Lowest f_n = 98.7 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.0g, V = 3.0g Critical Stress = 2,895 psi (Allowable = 23,400 psi)
					Simplified Dynamic Analysis	Lowest $f_n \geq$ 40 Hz. Limit load analysis performed which found acceleration levels beyond a tolerable level. Damper system is subject to modification.
1VQ02Y	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))	W/S		Reactor	Static Analysis	Lowest $f_n \geq$ 98.7 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.0g, V = 3.0g Critical Stress = 2,895 psi (Allowable = 23,400 psi)
					Simplified Dynamic Analysis	Lowest $f_n \geq$ 40 Hz. Limit load analysis performed which found acceleration levels beyond a tolerable level. Damper system is subject to modification.

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1VQ03Y	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))	W/S		Reactor	Static Analysis	Lowest f_n = 98.7 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.0g, V = 3.0g Critical Stress = 2,895 psi (Allowable = 23,400 psi)
					Simplified Dynamic Analysis	Lowest $f_n \geq$ 40 Hz. Limit load analysis performed with Max. Calc. acceleration level of 1.4g as compared to an allowable of 5.4g.
1VQ11Y	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))	W/S		Reactor	Static Analysis	Lowest f_n = 98.7 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.0g, V = 3.0g Critical Stress = 2,895 psi (Allowable = 23,400 psi)
					Simplified Dynamic Analysis	Lowest $f_n \geq$ 40 Hz. Limit load analysis performed with Max. Calc. acceleration level of 1.4g as compared to an allowable of 5.4g.

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1VQ13Y	Butterfly Isolation Damper (AWV, (Damper), Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Lowest f_n = 233 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.0g, V = 3.0g Critical Stress = 22,410 psi (Allowable = 32,400 psi)
				Simplified Dynamic Analysis	Lowest $f_n \geq$ 75 Hz. Acceleration Levels Used: $H_1 = H_2 = V$ = 1.4g Critical Stress = 319 psi (Allowable = 18,000 psi) Max. Calc. Acceleration: $H_1 = H_2 = V$ = 1.4g
1VQ14Y	Opposed Blade Balancing Dampers (AWV, (Damper) Powers (M.Oper.), Namco (L. Switches))	P	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1 = 3.0g
				Simplified Dynamic Analysis	Lowest f_n = 283 Hz. Acceleration Levels Used: 6.0g's in all directions Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = 1.05g, H_2 = .60g, V^1 = .81g

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1VQ15Y	Opposed Blade Balancing Dampers (AWV, (Damper) Powers (M.Oper.), Namco (L. Switches))	P	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 36 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .48g, H_2 = .37g, V^1= 1.15g.
1VQ16YA/B	Opposed Blade Balancing Dampers (AWV, (Damper) Powers (M.Oper.), Namco (L. Switches))	P	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 50 Hz. Acceleration Levels Used: 6.0g's in all directions Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .94g, H_2 = .87g, V^1= 1.03g.

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1VQ17Y	Butterfly Isolation Damper (AWV, (Damper) Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Lowest f_n = 233 Hz. Acceleration Levels Used: $H_1 = H_2$ = 1.0g, V = 3.0g. Critical Stress = 22,410 psi (Allowable = 32,400 psi)
				Simplified Dynamic Analysis	Lowest f_n > 75 Hz. Acceleration Levels Used: $H_1 = H_2 = V$ = 1.4g. Critical Stress = 319 psi (Allowable = 18,000 psi) Max. Calc. Acceleration: $H_1 = H_2 = V$ = 1.4g.
1VQ18Y	Opposed Blade Balancing Damper (AWV, (Damper), Powers (M.Oper.), Namco (L. Switches))	P	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1 = 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 76 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = 5.78g, H_2 = 5.78g, V^1 = 3.04g.

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1VR10Y	Opposed Blade Balancing Damper (AWV, (Damper) Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74g, H_2 = .74g, V^1= .74g.
1VR11Y	Opposed Blade Balancing Damper (AWV, (Damper) Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74g, H_2 = .74g, V^1= .74g.

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1VR15Y	Opposed Blade Balancing Damper (AWV, (Damper) Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74g, H_2 = .74g, V^1= .74g.
1VR16Y	Opposed Blade Balancing Damper (AWV, (Damper) Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0g's in all directions Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74g, H_2 = .74g, V^1= .74g.

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1VR21Y	Opposed Blade Balancing Damper (AWV, (Damper), Powers (M. Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0g, H_2 = 1.0g, V^1= 3.0g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74g, H_2 = .74g, V^1= .74g.

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1VR22Y	Opposed Blade Balancing Damper (AWV, (Damper) Powers (M. Oper), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0 g's in all directions. Critical stress = 23,412 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74 g, H_2 = .74 g, V^1= .74 g.
1VR23Y	Opposed Blade Balancing Damper (AWV, (Damper), Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0 g's in all directions. Critical stress = 23,412 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74 g, H_2 = .74 g, V^1= .74 g.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VR24Y	Opposed Blade Balancing Damper (AWV, (Damper), Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0 g's in all directions. Critical stress = 23,412 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74 g, H_2 = .74 g, V^1= .74 g.
1VR31Y	Opposed Blade Balancing Damper (AWV, (Damper), Powers (M. Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 3.0 g.
				Simplified Dynamic Analysis	Lowest f_n = 44 Hz. Acceleration Levels Used: 6.0 g's in all directions. Critical stress = 23,412 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H_1 = .74 g, H_2 = .74 g, V^1= .74 g.

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1VY01Y	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper.) Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f_n = 24.8 Hz Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 53 Hz Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 12,467 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .83 g, H_2 = .78 g, V^1 = 2.15 g.
1VY02Y	Opposed Blade Balancing Damper (AWV, (Damper), ITT (M.Oper) Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g. V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 39 Hz. Acceleration Levels Used: 5.0 g's in all directions. Critical stress = 18,701 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .30 g, H_2 = .44 g, V^1 = .64 g.

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1VY04Y	Opposed Blade Balancing Damper (AWV, (Damper), ITT (M.Oper) Namco (L.Switches))		A	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1= 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 53 Hz. Acceleration Levels Used: 5.0 g's in all directions. Critical stress = 18,701 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .70 g, H_2 = .75 g, V^1= .78 g.
1VY06YA/B	Opposed Blade Balancing Damper (AWV, (Damper), ITT (M.Oper) Namco, (L. Switches))		A	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1= 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 43 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0 g. Critical stress = 12,467 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .37 g, H_2 = .37 g, V^1= 1.1 g.

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1VY08Y	Opposed Blade Balancing Damper (AWV, (Damper), ITT (M.Oper) Namco (L. Switches))	W/S		Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1= 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 39 Hz. Acceleration Levels Used: 5.0 g's in all directions Critical stress = 18,701 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .30 g, H_2 = .44 g. V^1= .64 g.
1VY09Y	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper), Namco (L. Switches))	A		Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1= 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 53 Hz. Acceleration Levels Used: H(Result.) = 3.0 g, V = 5.0g. Critical stress = 12,467 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .50 g, H_2 = .85 g, V^1= .80 g.

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1VY11Y	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper) Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 76 Hz. Acceleration Levels Used: 5.0 g's in all directions. Critical stress = 18.701 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = 1.26 g, H_2 = 1.73 g, V^1 = 2.14 g.
1VY12Y	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper) Namco (L. Switch))	A	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 53 Hz. Acceleration Levels Used: 5.0 g's in all directions. Critical stress = 18.701 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = 1.25 g, H_2 = .43 g, V^1 = .60 g.

Specification No. M-2868
Vendor: Refer Below

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1VY13YA/B	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper) Namco (L. Switch))	A	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 53 Hz. Acceleration Levels Used: 5.0 g's in all directions. Critical stress = 18,701 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .32 g, H_2 = .38 g, V^1 = .62 g.
1VY14Y	Opposed Blade Balancing Damper (AWV, Damper) ITT (M.Oper.) Namco (L. Switch))	A	Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 =1.00 g, V^1 = 1.25 g.
				Simplified Dynamic Analysis	Lowest f_n = 39 Hz. Acceleration Levels Used: 5.0 g's in all directions. Critical stress = 18,701 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .44 g, H_2 = 1.35 g, V^1 = 1.1 g.

Specification No. H-2868
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1VY15Y	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper) Namco (L. Switch))	A		Reactor	Static Analysis	Lowest f_n = 24.8 Hz. Acceleration Levels Used: H_1 = 1.00 g, H_2 = 1.00 g, V^1 = 1.25 g.
					Simplified Dynamic Analysis	Lowest f_n = 53 Hz. Acceleration Levels Used: H (Result.) = 3.0 g, V = 5.0 g. Critical stress = 12,467 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = .75 g, H_2 = .58 g, V^1 = .80 g.

Specification No. H-2874
Vendor: Refer Below

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1VG01YA	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))		A	Reactor	Static Analysis	Lowest f_n = 33 Hz. Acceleration Levels Used: H_1 = 0.60 g, H_2 = 0.60 g, V^1 = 0.65 g. Critical stress = 7,002 psi. (Allowable = 36,000 psi)
					Simplified Dynamic Analysis	Lowest f_n = 70.3 Hz. Acceleration Levels Used: H_1 = 1.07 g, H_2 = 1.07 g. V^1 = 1.05 g. Critical stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: $H_1 = H_2$ = 1.07 g, V^1 = 1.05 g.

Specification No. H- 2874
Vendor: Refer Below

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1VG01YB	Butterfly Isolation Damper (AWV (Damper) ITT (M.Oper.) Namco (L. Switches))	A		Reactor	Static Analysis	Lowest f_n = 33 Hz. Acceleration Levels Used: H_1 = 0.60 g, H_2 = 0.60 g, V^1 = 0.65 g. Critical stress = 7,002 psi. (Allowable = 36,000 psi)
					Simplified Dynamic Analysis	Lowest f_n = 70.3 Hz. Acceleration Levels Used: H_1 = 1.07 g, H_2 = 1.07 g, V^1 = 1.05 g. Critical stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = H_2 = 1.07 g, V=1.05g. Damper is subject to modifications.

Specification No. H-2874
Vendor: Refer Below

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1VG06YA/B	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))		A	Reactor	Static Analysis	Lowest f_n = 340 Hz. Acceleration Levels Used: H_1 = 1.5 g, H_2 = 1.5 g, V^1= 2.0 g. Critical stress = 6,077 psi. (Allowable = 26,000 psi)
					Simplified Dynamic Analysis	Lowest f_n = 340 Hz. Acceleration Levels Used: H_1 = 1.5 g, H_2 = 1.5 g, V^1= 2.0 g. Critical stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = 0.42 g, H_2 = 0.33 g, V^1= 0.75 g.

Specification No. H-2874
Vendor: Refer Below

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Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VG07YA	Butterfly Isolation Damper (AWV, (Damper) ITT (M.Oper.), Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f_n = 347 Hz. Acceleration Levels Used: H_1 = 1.5 g, H_2 = 1.5 g, V^1= 2.0 g. Critical stress = 6452psi. (Allowable = 26,000 psi)
				Simplified Dynamic Analysis	Lowest f_n = 347 Hz. Acceleration Levels Used: H_1 = 1.5 g, H_2 = 1.5 g, V^1= 2.0 g. Crit. stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = 0.34 g, H_2 = 0.36 g, V^1= 0.75 g.

Specification No. H-2874
Vendor: Refer Below
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VG07YB	Butterfly Isolation Damper (AWV (Damper) ITT (M.Oper.), Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f_n = 340 Hz. Acceleration Levels Used: H_1 = 3.91 g, H_2 = 3.91 g, V^1= 0.66 g. Crit. stress = 6257 psi (Allowable = 26,000 psi)
				Simplified Dyanmic Analysis	Lowest f_n = 340 Hz. Acceleration Levels Used: H_1 = 3.91 g, H_2 = 3.91 g, V^1= 0.66 g. Critical stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1=.42 g, H_2 = 0.38 g, V^1= 0.25 g.

Specification No. H-2874
Vendor: Refer Below

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VG08YA/B	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f_n = 347 Hz. Acceleration Levels Used: H_1 = 1.5 g, H_2 = 1.5 g, V^1= 1.0 g. Critical stress = 6452 psi (Allowable = 26,000 psi)
				Simplified Dynamic Analysis	Lowest f_n = 347 Hz. Acceleration Levels Used: H_1 = 1.5 g, H_2 = 1.5 g, V^1= 2.0 g. Critical stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = 0.34 g, H_2 = 0.36 g, V^1= 0.75 g.

Specification No. H-2874
Vendor: Refer Below

Wm. H. Zimmer
Project No. 4130-00

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Rev. 00
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VG09YA/B	Butterfly Isolation Damper (AWV, (Damper) ITT (M.Oper), Namco (L. Switches))	A		Reactor	Static Analysis	Lowest f_n = 347 Hz. Acceleration Levels Used: H_1 = 1.5 g. H_2 = 1.5 g, V^1 = 2.0 g. Critical stress = 6452 psi (Allowable = 26,000 psi.
					Simplified Dynamic Analysis	Lowest f_n = 347 Hz. Acceleration Levels Used: H_1 = 1.5 g, H_2 = 1.5 g, V^1 = 2.0 g. Critical stress = 18,771psi (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = 0.34 g, H_2 = 0.36 g, V^1 = 0.75 g.

Specification No. H-2874
Vendor: Refer Below
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VG10YA/B	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))	A		Reactor	Static Analysis	Lowest f_n = 1859 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 0.63 g. Critical stress = 696 psi (Allowable = 36,000 psi)
					Simplified Dynamic Analysis	Lowest f_n = 1859 Hz. Acceleration Levels Used: H_1 = 1.0 g, H_2 = 1.0 g, V^1= 0.63 g. Critical stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc.acceleration H_1 = 0.42 g, H_2 = 0.38 g, V^1= 0.75 g.

Specification No. H- 3874
Vendor: Refer Below
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1VQ10Y	Butterfly Isolation Damper (AWV, (Damper) ITT (M.Oper.), Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f_n = 193 Hz Acceleration Levels Used: H_1 = 0.35 g, H_2 = 0.35 g, V^1 = 0.65 g. Critical stress = 5216 psi (Allowable = 36,000 psi)
				Simplified Dynamic Analysis	Lowest f_n = 193 Hz. Acceleration Levels Used: H_1 = 0.35 g, H_2 = 0.35 g, V^1 = 0.65 g. Critical stress = 10,409psi (Allowable = 19,200 psi) Max. Calc. Acceleration: H_1 = 0.32 g, H_2 = 0.36 g, V^1 = 0.65 g.

Specification No. H-2883
Vendor: Refer Below
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC89Y	Essential Isolation Check Damper (Techno Corp (Damper) Miller (M.Oper.), Namco (L. Switch))	P		Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 3.21 Hz. (Remaining f_n's > 353 Hz) Acceleration Levels Used and Req'd. per H-2883): $H_1 = H_2 = V = 2.0$ g. Critical stress = 37,399 psi (Allowable = 41,990 psi)
					Simplified Dynamic Analysis	Max. Calc. Acceleration: H_1 = .87 g, H_2 = .95 g, V^1 = 1.31 g. Therefore, past analysis (above) applies.
1VC90Y	Essential Isolation Check Damper (Techno Corp (Damper) Miller (M.Oper.), Namco (L. Switch))	P		Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 3.21 Hz. (Remaining f_n's > 353 Hz) Accel. Levels Used(and req'd per H-2883): $H_1 = H_2 = V = 3.0$ g. Crit. Stress = 37,399 psi (Allowable = 41,990 psi)
					Simplified Dynamic	Max.Calc. Acceleration: H_1 = .87 g, H_2 = .95 g, V^1 = 1.31 g. Therefore, past analysis (above) applies.

Specification No. H-2883
Vendor: Refer Below
Wm. H. Zimmer
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VC91Y	Essential Isolation Check Damper (Techno Corp (Damper) Miller (M.Oper.), Namco (L. Switch))	P		Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 3.21 Hz. (Remaining f_n's > 353 Hz.) Acceleration Levels Used (And req'd per H-2883): $H_1 = H_2 = V = 3.0$ g. Crit. Stress = 37,399 psi (Allowable = 41,990 psi)
					Simplified Dynamic Analysis	Max. Calc. Acceleration: H_1 = 1.15 g, H_2 = .78 g, V^1 = .88 g. Therefore, past analysis (above) applies.
1VC92Y	Essential Isolation Check Damper (Techno Corp (Damper) Miller (M.Oper), Namco (L. Switch))	P		Auxiliary	Simplified Dynamic Analysis	Lowest f_n = 3.21 Hz. (Remaining f_n's > 353 Hz) Acceleration Levels used (and req'd. per H-2883) $H_1 = H_2 = V = 3.0$ g. Crit. Stress = 37,399 psi (Allowable = 41,990 psi)
					Simplified Dynamic Analysis	Max. Calc. Acceleration: H_1 = 1.15 g, H_2 = .78 g, V^1 = .88 g. Therefore, past analysis (above) applies.

Specification No. H-2191
Vendor: Rockwell International
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1E51F065	6" Non-Slam Check Valve	A		Reactor Building	No extended part Stress evaluation for operability under nozzle loads	Rigid in all directions No limiting accelerations Obtained allowable Nozzle loads to assure operability
1E22F024	14" Non-Slam Check Valve	A		Reactor Building	No extended part Stress evaluation for operability under nozzle loads	Rigid in all directions No limiting accelerations Obtained maximum nozzle loads for operability
1B21F010A/B	18" Non-Slam Check Valve	A		Primary Cont.	No extended part Stress evaluation for operability under nozzle loads	Rigid in all directions No limiting accelerations Obtained maximum nozzle loads for operability
1B21F032A/B				Reactor Building		

Specification No. H- 2194
Vendor: GPE Controls
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1E12F103A/B	1.5" Vacuum Relief Valve		A	Reactor Building	Natural Frequency Estimate Static Analysis of all critical components. Stresses limited to design allowables	Minimum Natural Frequency = 8045 Hz Qualified for Upset 3 'g' Emergency 5 'g'
1E51F082 1E51F084	2" Vacuum Relief Valve		P	Reactor Building	Natural Frequency Estimate Static Analysis	Minimum Natural Frequency = 7985 Hz Qualified for Upset 3 'g' Emergency 5 'g'
1PC005A, B, C, D 1PC006A, B, C, D	20" Vacuum Relief Valve		A	Reactor Buildi	Natural Frequency Analysis Static Analysis of all critical components. Stresses limited to design allowables	Minimum Natural Frequency = 967 Hz Qualified for Upset 3 'g' Emergency 5 'g'

Specification No. H-2198
Vendor: Dragon Check Valves

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
Total 139 Valves	Excess Flow Check	P	Reactor Building Primary Containment	All passive valves Do not have extended structure Valve body shown to be stronger than pipe	Rigid No limiting acceleration loads Nozzle loads governed by connected piping.

Specification No. H-2245
Vendor: Yuba Heat Transfer Corp.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1RE045A,B,C 1RE046A,B,C	.75 x 1.0" Relief Valve	P	React. Bldg	Frequency analysis of spring Static analysis of valve at critical sections Comparison of area and section modulus of valve body to connected piping	Spring frequency - 191 Hz Valve body is stronger than pipe Nozzle loads limited by connected piping

Specification No. H-2263
Vendor: Wm. Powell Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WR018 1WR029 1WR035A, B 1WR037A, B 1WR047A, B 1WR067A, B	2½", M, Globe Valve	P	React. Bldg Aux. Bldg. React. Bldg React. Bldg Prim. Cont.	Qualification in progress with the vendor	
1IN061 1WS076A, B 1C41F001A, B	3"-150#, MØ Globe Valves	A P P	React. Bldg	Qualification in progress with vendor	
1E12F040	3"-400# Mo, Globe Valves	A		Finite element method Natural frequencies Simplified dynamic analysis. Stresses limited to design allowables	Natural frequencies 40Hz, 77 Hz Qualified acceleration level Upset & Emergency a = 5.0 'g', b = 5.0 'g', c = 3.5 'g'
1WS117A, B C, D	3", M, Globe Valves	P	Service Water Pump house	Qualification in progress with vendor	
1E51F022	4", Mo, Globe Valves	A	React. Bldg	Qualification in progress with vendor	
1WR038A, B	4", M, Globe Valves	P	Aux. Bldg.	Qualification in progress with vendor	
1WS040A, B, C, D, E, F, G, H	6", M, Globe Valves	P	Diesel Generator Room	Qualification in progress with vendor	

Specification No. H-2263
Vendor: Wm. Powell Co.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1E12F021 1E12F024A, B	10", Mo, Globe Valves	A	React. Bldg	Finite element analysis Natural frequency value Simplified dynamic analysis stresses limited to design allowables	Natural frequencies 26.6 Hz 44.6 Hz Qualified acceleration levels Upset & Emergency a = 1.57 'g', b = 2.70 'g' c = 2.57 'g'
1B21F314	3", Mo, Globe Valve	P	Turb. Bldg	Qualification in progress with Vendor	

Specification No. H-2264
Vendor: Wm. H. Powell Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1B21F501A, B	2½", Mo Gate Valves	P	Turbine Bldg.	Qualification in progress with vendor	
1CY045 1CY047 1WR017 1WR027 1WR040A, B 1WR041A, B 1WR045A, B 1WR066A,B	2½", M, Gate Valves	P	React.Bldg Prim. Cont React.Bldg " Aux. Bldg. " React.Bldg "	Qualification in progress with vendor	
1WS073A, B	3"-150#, Mo, Gate Valves	A	React.Bldg	Finite element analysis Natural frequency evaluation Static analysis	Minimum natural frequencies 74.5 Hz, 61.6 Hz Qualified acceleration level Upset & Emergency a=4.82'g', b=4.82'g', c=5.82'g'
1E12F049	3"-300#, Mo, Gate Valves	A	React.Bldg	Finite element analysis Natural frequency evaluation Simplified dynamic analysis Stresses limited to design allowables	Minimum natural frequencies 46.8 Hz, 79.4 Hz Qualified acceleration level a =3.78'g', b=3.78'g', c=2.89'g'
1B21F326	3"-600# Mo, Gate Valves	P	Aux. Bldg	Qualification in progress with vendor	
1B21F016 1B21F019 1C11F082	3"-900# Mo, Gate Valves	A	Prim. Cont React.Bldg React.Bldg	Qualification in progress with vendor	

Specification No. H-2264
Vendor: Wm. H. Powell Co.
Wm. H. Zimmer
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1RE047A, B 1WR025A, B 1WS118A, B C, D 1WS122A, B 1C11F087 1C41F002A, B 1C41F031 1E12F007 1E12F063A,B,C 1E12F071A, B 1E12F072A, B 1E12F082 1E12F086 1E12F303 1E12F308 1E12F314 1E21F004 1E21F008 1E21F025 1E22F003 1E22F019 1E22F026 1E22F031	3", M, Gate Valves	P		React. Bldg React. Bldg Service water pump house React. Bldg Prim. Cont. React. Bldg	Qualification in progress with vendor	
1WS011A, B	4"-150 lbs., Mo, Gate Valve	A		Service water pump house	Finite element analysis Natural frequency evaluation Static analysis	Natural frequencies 55.6 Hz, 80.4 Hz Qualified acceleration level Upset & Emergency - a=4.4'g', b=4.4'g', c=6.72'g'

Specification No. H-2264
Vendor: Wm. H. Powell Co.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WS012A, B	4"-150#, Mo, Gate Valves	A	React. Bldg	Finite element analysis Natural frequency evaluation Simplified dynamic analysis Stresses limited to design allowables	Natural frequencies 55.6 Hz, 80.4 Hz Qualified acceleration level Upset & Emergency a = 5 'g', b = 5 'g', c = 4.25 'g'
1E12F064A,B,C 1E21F011	4"-300#, Mo, Gate Valves	A A	React. Bldg React. Bldg	Qualification in progress with vendor	
1E51F059 1B21F020 1B21F500A, B	4"-600#, Mo, Gate Valves	A P P	React Bldg Turb. Bldg.	Qualification in progress with vendor	
1E51F008 1G33F100 1G33F101 1G33F106	4"-900#, Mo, Gate Valves	A P P P	React. Bldg Prim. Cont.	Finite element method Natural frequency evaluation Simplified dynamic analysis. Stresses limited to design allowables	Natural frequencies 49.6 Hz, 81.1 Hz Qualification acceleration level Upset & Emergency - a=2.31'g', b=4.62'g', c=5.62'g'
1G33F040	4"-1500#, Mo, Gate Valves	A	React. Bldg	Qualification in progress with vendor	
1WR042A, B 1E12F018A,B,C 1E21F302	4", M, Gate Valves	P	Aux. Bldg. React. Bldg	Qualification in progress with vendor	
1WR073 1WR074	6", Ao, Gate Valves	A	React. Bldg	Qualification in progress with vendor	

Specification No. H- 2264
Vendor: Wm. H. Powell Co.

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Equipment Number	Description	Class.	Location	Qualification Method	Results
1WR054 1WR055 1E51F010 1E51F031	6"-150#, Mo, Gate Valves	P P A P	React. Bldg ↓	Finite element method Natural frequency evaluation Simplified dynamic analysis Stresses limited to design allowables	Natural frequencies 55.8 Hz, 96.8 Hz Qualification acceleration level, Upset & Emergency a =4.1'g', b =4.1'g' c =3.05'g'
1E51F012	6"-600#, Mo, Gate Valves	P	React. Bldg	Qualification in progress with vendor	
1E51F013 1G33F001 1G33F004	6"-900#, Mo, Gate Valves	A A A	React. Bldg Prim. Cont. React. Bldg	Qualification in progress with vendor	
1E51-F016	6", M, Gate Valves	P	React. Bldg	Qualification in progress with vendor	
1E51F068	8"-150#, Mo, Gate Valves	A	React. Bldg	Finite element analysis Natural frequency evaluation Simplified dynamic analysis Stresses limited to design allowables	Natural frequencies 38.1 Hz, 71.6 Hz Qualification acceleration level Upset & Emergency - a = 3 'g', b = 3 'g', c= 3.5 'g'
1E51F063 1E51F064	8"-900#, Mo, Gate Valves	A	Prim. Cont. React. Bldg	Finite element analysis Natural frequency evalulation Static analysis Stresses limited to design allowables	Natural frequencies 73.3 Hz, 86.6 Hz Qualification acceleration level Upset & Emergency - a = 5 'g', b = 5 'g', c = 6 'g'
1B21F310A, B	10"-600#, Mo, Gate Valves	P	Turb. Bldg	Qualification in progress with vendor	

Specification No. H-2264
Vendor: Wm. H. Powell Co.

Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1E12F042A,B,C 1E21F005	10"-900#, Mo, Gate Valves	A	React. Bldg	Finite element analysis Natural frequency evaluation Static Analysis Stresses limited to design allowables	Natural frequencies 74.2 Hz, 83.3 Hz Qualification acceleration level Upset & Emergency - a = 5 'g', b = 5 'g', c = 6 'g'
1FC029 1FC034 1FC035 1E12F335 1E21F309	12"-300#, M, Gate Valves	P	React. Bldg ↓	Qualification in progress with vendor	
1E22F301	14", M, Gate Valve	P	React. Bldg	Qualification in progress with vendor	
1B21F065A, B 1E12F008 1E12F009	18"-900#, Mo, Gate Valves	A	React. Bldg Prim. Cont.	Finite element method Natural frequency evaluation Static analysis Stresses limited to design allowables	Natural frequencies 59.1 Hz, 81.9 Hz Qualification acceleration level Upset & Emergency a =5 'g', b = 5 'g' , c = 3.5 'g'
1B21F011A, B 1E12F306	18"-900#, M, Gate Valves	P	Prim. Cont.	Qualification in progress with vendor	
1WS005	30"-150#, Mo, Gate Valves	P	Service Water Pump House	Finite element method Natural frequency evaluation Equivalent dynamic analysis	Natural frequencies 20.2 Hz, 33.3 Hz Qualification acceleration level Upset & Emergency a = 5 'g', b= 5 'g', c = 4.5 'g'

Specification No. H-2264
Vendor: Wm. H. Powell Co.
Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1E12F011A,B 1E12F026A,B 1E12F027A,B 1WS013A,B	4", Mo, Gate Valves	A	React. Bldg	Finite element analysis Natural frequency evaluation Equivalent dynamic analysis Stresses limited to design allowables to assure operability	Minimum natural frequency = 46.9 Hz Qualification acceleration level Upset & Emergency a=3.75'g', b=4.0'g', c=4.0'g'

Specification No. H-2265
Vendor: Jamesbury Corp.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WS036A to H	6", M, Butterfly Valve	P	Diesel Gen. Room	Finite element analysis Natural frequency evaluation Static analysis	Minimum natural frequency = 118 Hz Qualification acceleration level Upset - a=3'g', b=3'g', c=4'g' Emerg.- a=5'g', b=5'g', c=6'g'
1WS037A to D	8", Mo, Butterfly Valve	P	Diesel Gen. Room	Finite element analysis Natural frequency evalulation Static analysis	Minimum natural frequency = 41.6 Hz Qualification acceleration level Upset - a=3'g', b=3'g', c=4'g' Emerg.- a=5'g', b=5'g', c=6'g'
1VH001A, B 1VH002A, B 1VH003A, B 1VH004A, B	12", Ao, Butterfly Valves	P	Service Water Pump House	Dynamic analysis using finite element model Frequency evaluation Response spectra analysis	Minimum natural frequency = 24.1 Hz Qualified to the response spectra
1E12F068A, B	14", Mo, Butterfly Valve	P	React. Bldg	In progress	
1WS017 1WS018 1WS019 1WS021	14", M, Butterfly Valve	P	React. Bldg	In progress	
1E12F014A, B	16", Mo, Butterfly Valve	P	React. Bldg	In progress	
1WS027 1WS032	16", M, Butterfly Valve	P	React. Bldg	In progress	

Specification No. H- 2265
Vendor: Jamesbury Corp.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1VQ001A, B 1VQ002A, B 1VQ003A, B 1VQ004A, B	18", Ao, Butterfly Valve	P		React. Bldg	In progress	
1WS016 1WS023 1WS024 1WS028 1WS029 1WS031 1WS026	18", M, Butterfly Valve	P		React. Bldg	In progesss	
1WS004A,B,C,D 1WS008A,B, 1WS033A, B 1WS034A, B	24", Mo, Butterfly Valve	A		ServiceWater Pump Hous Aux. Bldg. Aux. Bldg.	Finite element analysis Natural frequency evaluation Static analysis	Minimum natural frequency = 49.8 Hz Qualification acceleration level Upset - a=3'g', b=3'g', c=4'g' Emerg.- a=5'g', b=5'g', c=6'g'
1CY008A, B	16", M, Butterfly Valve	P		Outside	Finite element analysis Natural frequency evaluation Static analysis	Minimum natural frequency = 82.2 Hz Qualification acceleration level Upset - a=3'g', b=3'g', c=4'g' Emerg.- a=5'g', b=5'g', c=6'g'
1WS070	18", M, Butterfly Valve	P		Service Water Pump House	Finite element analysis Natural frequency evaluation Static analysis	Minimum natural frequency = 38 Hz Qualification acceleration level Upset - a=3'g', b=3'g', c=4'g' Emerg.- a=5'g', b=5'g', c=6'g'

Specification No. H-2267
Vendor: Rockwell International

Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1E12F041A,B,C 1E12F050A,B 1E21F006 1E22F005	10", Check Valves	A A A	Prim. Cont.	In progress	
1E51F066	4", Check Valves	A	Prim. Cont.	In progress	
1WS022	12", M, Butterfly Valve	P	React. Bldg	In progress	

Specification No. H-2266
Vendor: Fischer Controls Corp.
Wm. H. Zimmer
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1E51F004 1E51F005	1", Ao, Globe Valve	P		React. Bldg	Finite Element Method Natural frequency evaluation Equivalent dynamic analysis	Minimum natural frequency = 35.05 Hz Qualified to actual accelerations obtained from piping analysis
1E51F025 1E51F026	1", Ao, Globe Valve	A		React. Bldg		Minimum natural frequency = 35.19 Hz Qualified to actual accelerations obtained from piping analysis
1B33F076A,B	2", M, 3-Way Valve	P		Prim. Cont.	Finite Element Method Natural frequency evaluation Static analysis	Minimum natural frequency = 89.7 Hz Qualification accelerations level for Upset & Emergency a=5'g', b=5'g', c=5'g'
1IN012 1IN013	2½", Ao, Globe Valve	A		React. Bldg	Finite element method Natural frequency evaluation Equivalent dynamic analysis Stresses limited to design Allowables to assure operability	Minimum natural frequency = 34.63 Hz Qualification acceleration level Upset & Emergency a=2.5'g', b=2.5'g', c=2.5'g'
1RE048 1RE049 1RF001 1RF002	2½", Ao, Globe Valve	A A P P		React. Bldg		Minimum natural frequency = 35.48 Hz Qualification acceleration level Upset & Emergency a=3.25'g', b=3.25'g', c=3.25'g'

Specification No. H-2266
Vendor: Fischer Controls Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1E12F065A,B	2½", Ao, Globe Valve	A	React. Bldg	Finite element method Natural frequency evaluation Equivalent dynamic analysis Stresses limited to design allowables to assure operability	Minimum natural frequency = 34.77 Hz Qualification acceleration level Upset & Emergency a=2.5'g', b=2.5'g', c=2.5'g'
1E12F051A,B	6", Ao, Globe Valve	A			Minimum natural frequency = 31.7 Hz Qualified to accelerations obtained from piping analysis
1WS020	10", Ao, Globe Valve	A			Minimum natural frequency =27.1 Hz Qualified to accelerations obtained from piping analysis
1WS025	12", Ao, Globe Valve	A			Minimum natural frequency = 28.45 Hz Qualified to accelerations obtained from piping analysis
1WS030	12", Ao, Globe Valve	A			Minimum natural frequency = 28.3 Hz Qualified to accelerations obtained from piping analysis

Specification No. H- 2268
Vendor: J. E. Lonergan
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Equipment Number	Description	Seismic Class	Location	Qualification Method	Results
1DG017A to L 1DG018A to F	3/4" x 1", Relief Valve	P	Aux. Bldg. D.G.	Spring frequency Static analysis Comparison of area and section modulus of valves to connected piping	Spring frequency - 191 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by connected piping
1E22F014	3/4" x 1", Relief Valve	P	React. Bldg		Spring frequency - 47 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by connected piping
1C41F029A, B	1" x 1", Relief Valves	P	React. Bldg		Spring frequency - 47 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by connected piping
1IN005A, B	1" x 1½", Relief Valves	P	React. Bldg		Spring frequency - 191 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by connected piping
1E12F005	1" x 1½", Relief Valve	P	React. Bldg		Spring frequency - 191 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by connected piping

Specification No. H-2268
Vendor: J. E. Lonergan
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1E12F030 1E21F031 1E51F017	1" x 2", Relief Valves	P		React. Bldg	Spring frequency Static analysis Comparison of area and section modulus of valves to connected piping	Spring frequency - 151 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by connected piping
1DO005B,D,F 1WR077 1E12F025A,B,C 1E22F035	1½" x 2", Relief Valves	P		D. G. React. Bldg React. Bldg React. Bldg	Spring frequency evaluation Static analysis for stresses and deflections Comparison of area and section modulus of valves to connected piping	Spring frequency - 181 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by piping
1E51F018	1½" x 3", Relief Valve	P		React. Bldg		Spring frequency - 178 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by piping
1E21F018	2" x 3", Relief Valve	P		React. Bldg		Spring frequency - 196 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by piping
1E12F036	3" x 4", Relief Valve	P		React. Bldg		Spring frequency - 191 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by piping

Specification No. H-2804
Vendor: Dresser Industries, Inc.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
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Equipment Number	Description	Seis.	Class	Locatic.	Qualification Method	Results
All	½", M, Gate Valves	P		All Bldgs.	No extended part Valves shown to be stronger than pipe	Rigid in all directions No limitation on accelerations Nozzle loads limited by piping
All	½", M, Globe Valves	P		↓	↓	↓
All	3/4", M, Gate Valve	P				
All	3/4", M, Globe Valve	P				
1B33F013A/B 1B33F017A/B 1E32F010 1E32F011	3/4", Check Valves	A		Prim. Cont. " React. Bldg "	No extended part Valves shown to be stronger than pipe Valve stresses limited to design allowables	Rigid in all directions No limitation on accelerations Allowable nozzle loads obtained to assure operability
All Other	3/4", Check Valves	P		All Bldgs.	No extended part Valves shown to be stronger than pipe	Rigid in all directions No limitation on accelerations Nozzle loads limited by piping
All	1", M, Gate Valve	P		↓	↓	↓
All	1", M, Globe Valve	P				
All	1", Check Valve	P				
All	1½", M, Gate Valves	P				
All	1½", M, Globe Valves	P				

Specification No. H-2804
Vendor: Dresser Industries, Inc.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1C41F006 1C41F007 1C41F033A/B	1½", Check Valves	A		React. Bldg " Prim. Cont.	No extended part Valves shown to be stronger pipe Valve stresses limited to design allowables	Rigid in all directions No limitation on accelerations Allowable nozzle loads obtained to assure operability
All Other	1½", Check Valves	P		All Bldgs.	No extended part Valves shown to be stronger than connected pipe	Rigid in all directions No limitation on accelerations Nozzle loads limited by piping
All	2", M, Gate Valves	P				
All	2", M, Globe Valves	P				
1E12F084A,B,C 1E21F033A,B,C 1E51F021 1E51F028 1E51F061 1E22F007	2", Check Valves	A		React. Bldg	No extended part Valves shown to be stronger than pipe Valve stresses limited to design allowables	Rigid in all directions No limitation on accelerations Allowable nozzle loads obtained to assure operability
All Other	2", Check Valves	P		All Bldgs.	No extended part Valves shown to be stronger than pipe	Rigid in all directions No limitation on accelerations Nozzle loads limited by piping

Specification No. H-2810
Vendor: Lunkenheimer

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WR009 1WR010 1WR011 1WR012 1WR019 1WR020 1WR021 1WR022 1WS081	12", Mo, Gate Valve	A	Service Water Pump House	Qualification in progress	
1WR002A to D 1WR026A to D	12", M, Gate Valves	P	React. Bldg Service Water Pump House	Qualification in progress	
1WR003A,B,C 1WR004A,B,C 1WR005 1WR006 1WR007 1WR008	14", M, Gate Valves		React. Bldg C.W.P.HS React. Bldg React. Bldg C.W.P.HS C.W.P.HS	Qualification in progress	
1WS080	24", Mo, Gate Valve		S.W.P.H.	Qualification in progress	

Specification No. H-2811
Vendor: Anchor Darling Valve Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

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Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1DG003A,B,C 1DG004A,B,C 1DG007A,B,C 1DG008A,B,C	2½", M, Gate Valves	P		Diesel Gen. Room	Effect of extended portion negligible on frequencies Static analysis	Rigid in all directions Qualification acceleration level Upset & Emergency a=11'g', b=10'g', c=10'g'
1T49F304	4", M, Gate Valve	P		React. Bldg		
1B21F527	6", Mo, Gate Valve	P		Turbine Bldg.	Natural frequency evaluation Static analysis	Minimum natural frequencies are 160 Hz, 178 Hz. Qualification acceleration level Upset & Emergency a=6'g', b=5'g', c=5'g'
1WR134	6", M, Gate Valve	P		React. Bldg	Effect of valve extended Portion is negligible on frequencies Static analysis	Rigid in all directions Qualification acceleration level Upset & Emergency a=11'g', b=10'g', c=10'g'
1VP006A,B 1VP012A,B 1VP045A,B	8", Mo, Gate Valves	A		React. Bldg " Prim. Cont.	Natural frequency evaluation Static analysis	Minimum natural frequencies are 73.3 Hz & 161 Hz Qualification acceleration level Upset & Emergency a=6'g', b=5'g', c=5'g'
1WR133A,B	8" M, Gate Valve	P		React. Bldg	Effect of extended part is negligible on frequencies Static analysis	Rigid in all directions Qualification acceleration level Upset & Emergency a=11'g', b=10'g', c=10'g'

Specification No. H- 2811
Vendor: Anchor Darling Valve Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1E12F391	12", M, Gate Valve	P		React. Bldg	Natural frequency evaluation Static analysis	Minimum natural frequencies are 160 Hz and 179 Hz Qualification acceleration level Upset & Emergency a=6'g', b=5'g', c=5'g'
1E12F003A,B 1E12F016A,B 1E12F017A,B 1E12F047A,B	14", Mo, Gate Valves	A		React. Bldg		Minimum natural frequencies are 71.9 Hz and 126 Hz Qualification acceleration level Upset & Emergency a=6'g', b=5'g', c=5'g'
1E12F307	14", M, Gate Valve	P		React. Bldg	Effect of valve extended portion on frequencies negligible Static analysis Comparison of valve area and section modulus with pipe	Rigid in all directions Valve body stronger than pipe Qualification acceleration level Upset & Emergency a=5'g', b=5'g', c=5'g'
1E12F006A,B	16", Mo, Gate Valve	A		React. Bldg	Natural frequency evaluation simplified dynamic analysis for stresses and deflections of all critical components to assure operability and structural integrity	Minimum natural frequencies 54.4 Hz and 80.5 Hz Qualification acceleration level Upset & Emergency a=6'g', b=5'g', c=5'g'

Specification No. H-2811
Vendor: Anchor/Darling Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1E12F067 1E12F302A, B,C	16", M, Gate Valve	P	React. Bldg	Natural frequency evaluation Static analysis Comparison of valve area and section modulus with pipe	Minimum natural frequency = 158 Hz Valve body straonger than pipe Qualification acceleration level Upset & Emergency a=5'g', b=5'g', c=5'g'
1E21F001	20", 150#, Mo, Gate Valve	A		Natural frequency evaluation Simplified dynamic analysis	Minimum natural frequencies are 28.5 Hz and 35.1 Hz Qualification acceleration level Upset & Emergency a=.83'g', b=2.3'g', c=2.17'g'
1E12F004A,B C	20", 300#, Mo, Gate Valve	A		Hand prepared static analysis Natural frequency evaluation Simplified dynamic analysis	Minimum natural frequencies 37.2 Hz and 63.9 Hz Qualification acceleration level Upset: a=4.0'g', b=3.0'g', c=3.0'g' Emergency: a=4.5'g', b=3.5'g', c=3.5'g'

Specification No. H-2816
Vendor: Bahnson

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1RG071A to F 1RG081A,B	3/8", M, Globe Valve	P	Aux. Bldg	All valves tested at same time Pseudo-biaxial Test Resonance Search 1-33 Hz Sine Sweep Input 1 to 10'g' Horizontal 0.5 to 5'g' Vertical Sine dwell at each restraint frequency Four orientations of 0°, 90°, 180° and 270° Duration of dwell in each orientation 240 sec. (min)	Resonances 26.5 Hz, 27.5 Hz Qualification acceleration level Upset & Emergency a=4.0'g', o=4.8'g', c=4.0'g'
1RG041A,B 1RG047A,B 1RG051A,B,D,E,F 1RG057A to F	3/8", M, Angle Globe Valve				
1RG050A to G	1", M, Relief Valve				
1RG070A to F 1RG072A to F	1-1/8", M, Globe Valve				
1RG046A to H J to N, P 1RG056A to F, H,J,N,P	1-1/8", M, Expansion Valve	A			

Specification No. H-2816
Vendor: Bannson

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1RG048A	1-1/8", M, Relief Valve	P		Aux. Bldg	All valves tested at same time Pseudo-biaxial Test Resonance Search 1-33 Hz Sine Sweep Input 1 to 10'g' Horizontal 0.5 to 5'g' Vertical Sine dwell at each restraint frequency Four orientations of 0°, 90°, 180° and 270° Duration of dwell in each orientation 240 sec. (min)	Resonances 26.5 Hz, 27.5 Hz Qualification acceleration level Upset & Emergency a=4.0'g', b=4.8'g', c=4.0'g'
1RG055A to H, J to N,P	1-3/8", Solenoid Operated Globe Valve	A				
1RG059A to H	1-3/8", Solenoid Operated Bypass Valve					
1RG045A to H	1-5/8", Solenoid Operated Globe Valve					
1RG049A to D	1-5/8", Solenoid Operated Bypass Valve					
1RG052A to F 1RG053A to F 1RG054A to F	1-5/8", M, Globe Valve	P				

Specification No. H-2816
Vendor: Bahnson

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1RG080A,B 1RG082A,B	2-1/8", M, Globe Valve	P	Aux. Bldg.	All valves tested at same time, Pseudo-biaxial Test Resonance Search 1-33 Hz Sine Sweep-Input 1 to 10'g' Horizontal, 0.5 to 5'g' Vertical Sine dwell at each resonant frequency Four orientations of 0°, 90°, 180° and 270° Duration of dwell in each orientation 240 sec. (min)	Resonances 26.5 Hz, 27.5 Hz Qualification acceleration level Upset & Emergency a=4.0'g', b=4.8'g', c=4.0'g'
1RG042A,B 1RG043A,B 1RG044A,B 1RG060A,B	2-5/8", M, Globe Valve				

Specification No. H-2819
Vendor: Anchor Darling Valve Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1DG005A,B,C 1DG006A,B,C 1SA079 1SA081	2½", M, Globe Valves	P	Aux. Bldg. Aux. Bldg. React. Bldg React. Bldg	Effect of valve extended portion on frequencies negligible Static analysis	Rigid in all directions Qualification acceleration level Upset & Emerg. a=11'g', b=10'g', c=10'g'
1E32F012	3", M, Globe Valve	P	React. Bldg	↓	↓
1E32F013	4", M, Globe Valve	P	React. Bldg		
1E21F012	12", Mo, Globe Valve	P	React. Bldg	Natural frequencies evaluation Equivalent dynamic analysis	Minimum natural frequencies are 42.1 Hz & 51.0 Hz Qualification acceleration level Upset - a=1.35'g', b=1.35'g', c=1.35'g' Emerg = a=1.5'g', b=1.5'g', c=1.5'g'

Specification No. H-2820
Vendor: Rockwell International

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1E12F087A,B	3", Mo, globe valve	A	Reactor Building	Natural frequency evaluation Static analysis for stresses and deflections	Minimum natural frequencies are 69.4 Hz & 179 Hz. Qualification Acceleration level upset & emergency a-5'g', b-5'g', c-5'g'
1E51F045	4", Mo, globe valve	A	Reactor Building	Natural frequency evaluation simplified dynamic analysis	Minimum natural frequencies 46 Hz, 61 Hz Qualification acceleration level Upset: a-1.86'g', b-1.86'g', c-1.86'g' Emergency: a-2.0'g', b-2.0'g', c-2.0'g'
1E12F023	6", Mo, globe valve	P	Reactor Building	In progress	
1G33F102	6", Mo, globe valve	P	Prim. Cont.	In progress	
1E12F052A,B	8", Mo, glove valve	A	Reactor Building	In progress	
1E12F053A,B	10", Mo, globe valve	A	Reactor Building	In progress	
1E12F048A,B	14, Mo, globe valve	A	Reactor Building	In progress	

Specification No. H-2821
Vendor: Mission Manufacturing Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1CY046	2½", check valve	P	Reactor Building	In progress	
1SA080					
1IN063	3", check valve	P	Reactor Building	In progress	
1WS074A,B			CW.P.HS		
1WS077A,B			Reactor Building		
1E21F303	4", check valve	P	Reactor Building	In progress	
1WR136	6", check valve	P	Prim. Cont.	In progress	
1E51F011			Reactor Building		
1E51F030	6", check valve	A	Reactor Building		
1VP046A,B	8", check valve	P	Prim. Cont.	In progress	
1E51F040	8", check valve	A	Reactor Building	In progress	

Specification No. H-2821
Vendor: Mission Manufacturing Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Rev. 00
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1WR001A,B,C,D	12", check valve		P	Reactor Building	In progress	
1E22F002	16", check valve		P	Reactor Building		
1E22F016	20", check valve		A	Reactor Building		
1WS003A,B,C,D	24", check valve		P	Service Water Pump House		

Specification No. H-2822
Vendor: Anchor Darling Valve Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

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Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1E21F003	12", Non-Slam Check Valve	A		Reac. Bldg.	No extended part Valve body analysis for maximum nozzle loads to assure operability	Rigid No limitation on accelerations Allowable nozzle loads obtained to assure operability
1E12F031A,B,	14", Non-Slam Check Valve	A		Reac. Bldg.	↓	↓

Specification No. H- 2823
Vendor: Wm. H. Powell Co.
Wm. H. Zimmer
Project No. 4130-00

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Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1E12F039A,B C,D 1E12F304 1E12F305 1E12F306	3", Check Valves	P		React. Bldg.	No extended part Comparison of Valve body Area and section modulus	Rigid Valve body shown to be stronger than connected piping Nozzle loads limited by piping
1E12F054A,B 1E51F023	4", Check Valves	P				
1E12F046A,B, C 1E12F089	4", Check Valves	A			No extended part Static analysis for maximum nozzle loads to assure operability	Rigid No limitation on accelerations Allowable nozzle loads obtained to assure operability

Specification No. H-2839
Vendor: Henry Pratt Co.
Wm. H. Zimmer
Project No. 4130-00

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EQUIPMENT QUALIFICATION

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
1WS001A,B, C,D	30", M, Butterfly Valve	P		Turb. Bldg.	Frequency evaluation Static analysis for stresses Comparison of valve body area and section modulus to connected piping	Natural frequencies 296 Hz 323 Hz and 573 Hz Qualification acceleration level Upset & Emergency a=5.0'g', b=5.0'g', c=5.0'g'
1WS002A,B, C,D				"		
1WS006A,B 1WS007A,B	30", M, Butterfly Valves	P		Service Water Pump House		

Specification No. H-2852
Vendor: Kerotest Manufacturing Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1CM005 1CM006 1CM012 1CM014 1CM025 1CM026	½", Ao, Globe Valves	A	React. Bldg	Qualification in progress with Vendor	
91 Valves	½", M, T-Type, Globe Valves	P	All Bldgs.	No considerable valve extended part Valve body shown to be stronger than pipe	Rigid No limitation on accelerations Nozzle loads limited by connected pipe
25 Valves	½", M, Y-Type, Globe Valves	P			
1CM003 1CM004	3/4", Ao, Globe Valves	A	React. Bldg	Qualification in progress with Vendor	
1B33F019 1B33F020			Prim. Cont.		
1E12F060A,B 1E12F075A,B			React. Bldg "		
1E12F338A,B,C 1E21F330 1E22F314 1E51F317	3/4", Mo, Globe Valves	P	Prim. Cont.		

Specification No. H-2852
Vendor: Kerotest Manufacturing Corp.

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
574 Valves	3/4", M, Globe Valves	P	All Bldgs.	No considerable valve Extended part Valve body shown to be stronger than connected pipe	Rigid No limitation on accelerations Nozzle loads limited by connected pipe
1IN008A,B	1", Mo, Globe Valves	P	React. Bldg	Qualification in progress with Vendor	
1E12F099A,B		A	Prim. Cont.		
1E51F076		A	Prim. Cont.		
1VQ016A to H, J to N, P 1WR152 1WR153 1C41F015 1C41F018 1C41F019 1C41F020 1C41F024 1C41F025 1E12F076A,B 1E12F077A,B 1E12F078A,B 1E12F079A,B 1E12F326A,B 1E12F327A,B 1E51F334 1E51F335	1", M, Globe Valves	P	All Bldgs.	No considerable valve Excended position Valve body shown to be stronger than pipe	Rigid No limitation on accelerations Nozzle loads limited by pipe

Specification No. H-2852
Vendor: Kerotest Manufacturing Corp.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WR158A,B 1WR160A,B 1B21F067A,B,C,D 1E12F073A,B 1E12F074A,B 1E32F001A,B C,D 1E32F002A,B C,D 1E32F003A,B C,D	1½", Mo, Globe Valves	A	React. Bldg React. Bldg Aux. Bldg. React. Bldg	Qualification in progress with Vendor	
1WS160 1WS161 1WS162 1WS163 1C41F003A,B 1C41F008 1C41F016 1C41F017 1E12F080A,B 1E12F081A,B	1½", M, Globe Valves	P	All Bldgs.	No considerable valve Extended part Valve body shown to be stronger than pipe	Rigid No limitation on accelerations Nozzle loads limited by connected pipe

Specification No. H- 2852
Vendor: kerotest Manufacturing Corp.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1WS014A,B	2", Mo, Globe Valves	A	React. Bldg	Qualification in progress with Vendor	
1B21F001		P	Prim. Cont		
1B21F002		P	Prim. Cont		
1B21F005		P	Prim. Cont		
1E32F006		A	React. Bldg		
1E32F007					
1E32F008					
1E32F009					
1E51F019					
1E51F046					
1E51F069					
1E51F080					
1E51F086		P			
1VC008A,B	2", M, Globe Valves	P	All Bldgs.	No considerable valve Extended part Valve body shown to be stronger than pipe	Rigid No limitation on accelerations Nozzle loads limited by connected pipe
1VC009A,B					
1VC010A,B					
1VC011A,B					
1VC012A,B					
1VC013A,B					
1VC014A,B					
1VC015A,B					
1VC016A,B					
1VQ021					
1VQ024					
1WR161					
1B21F077A,B C,D					
1B33F029					
1B33F030					

Specification No. H-2852
Vendor: Kerotest Manufacturing Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1B33F051A,B 1B33F052A,B 1C41F014 1E12F102 1E21F032 1E22F034 1E51F049 1E51F060 1E51F062 1E51F333 1T49F003 1T49F001	2", M, Globe Valves	P	All Bldgs	No considerable valve Extended part Valve body shown to be stronger than pipe	Rigid No limitation on accelerations Nozzle loads limited by connected pipe

Specification No. H- 2853
Vendor: Anderson, Greenwood & Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1IA155A,B 1B21F036A to H, K, L, P, R, S	½", Check Valves	P	Prim. Cont.	No valve extended part Valve body shown to be stronger than pipe	Rigid No limitation on accelerations Nozzle loads limited by piping
1B21F040B, C,F,G,K,L	½", Check Valves	A	↓	No valve extended part Valve body stresses limited to design allowables	Rigid No limitation on accelerations Allowable nozzle loads provided to assure operability
1B21F024A,B, C,D 1B21F029A,B C,D	3/4", Check Valves	A	↓	↓	↓
1IN006A,B	1", Check Valves	P	React. Bldg	No valve extended part Valve body shown to be stronger than pipe	Rigid No limit on accelerations Nozzle loads limited by piping

Specification No. H-2854
Vendor: Rockwell International

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1G33F103	1", M, Globe Valve	P	Prim. Cont.	In progress	
1E12F085A,B,C 1B21F034 1E22F006	2", Stop Check Valve	A ↓	React. Bldg	In progress	

Specification No. H- 2856
Vendor: Contromatics

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1CM176 to 1CM211	½", M, Ball Valves	P	React. Bldg.	No extended part Valve body analysis for maximum nozzle loads	Rigid Obtained maximum allowable for Upset and Emergency
1CM212 1CM213 1CM214 1CM215	3/4", M, Ball Valves	P	React. Bldg	↓	↓

Specification No. H-2862
Vendor: Target Rock Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1CM019 1CM020 1CM021 1CM022 1B33F355B,C 1B33F356B,C	½", Solenoid Operated Globe Valves	A	React. Bldg	Frequency evaluation Static analysis for stresses and deflections	Minimum natural frequency = 158 Hz Qualification acceleration level Upset & Emergency a=5'g', b=5'g', c=5'g'
1CM007 1CM008 1CM009 1CM10 1CM11 1CM13 1CM23 1CM24 1B33F355A,D 1B33F356A,D	3/4", Solenoid Operated Globe Valves	A	React. Bldg		
1T49F305A,B		P			
1IN170 1IN171	1½", Solenoid Operated Globe Valves				
1VQ005A,B 1VQ008A,B	2", Solenoid Operated Globe Valve				
1IN004A,B	1", Pressure Reg. Valves				
1E51F015	2", Pressure Reg. Valves	A			

Specification No. H-2872
Vendor: Anderson, Greenwood & Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
1E12F104A,B	2", Vacuum Relief Valves	P	React. Bldg	In Progress	

INSTRUMENTATION

FOR CLARITY INSTRUMENT TAG NUMBERS ARE NOT PROVIDED IN THIS SECTION, HOWEVER, THE INSTRUMENT TAG NUMBERS HAVE BEEN IDENTIFIED IN THE QUALIFICATION STATUS REPORT.

Specification No. H-2156
Vendor: ITE Imperial Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	GE Potential Transformer Model: JVM-3-643-93 AC Time Delay Relay Model: 7012-PB IR Motor Differential Relay Model: GRD-202D0541 WE Ammeter/Voltmeter Model: KA-241 ID Auxiliary Relay Model: J13 P3012 GE Lockout Relay Model: 12HEA61C233 MS Test Switch Model: DPDT-DB-RH2 GE Indicating Light Model: ET-16	A		Aux.Bldg. 1AP04EA 1AP04EB 1AP04EC	Instruments were qualified with switchgear unit. See equipment qualification for details.	All essential instruments were monitored. There were no structural or functional abnormalities detected.

Specification No. H-2156
Vendor: ITE Imperial Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	IS Ground Relay Model: GR-5 202D6141 IS Ground Sensor Model: GS-05 IS Current Transformer Models: MCS-21-401153-T2 MCS-21-401153-T3 MCS-21-401153-T4 MCB-5A-401024-T5 MCS-21-401153-T5 MCS-21-401153-T6 MCS-21-401156-T6 MCS-21-401153-T7 MCB-5A-401024-T7 MC/B-5A-401024-T7 MC-5-400862-T8 MC-5-400862-T11 MC-5-400862-T13 MC/5-A1-401160-T14 MC-5S-400898-T20	A		Aux. Bldg 1AP04EA 1AP04EB 1AP04EC	Instruments were qualified with switchgear unit. See equipment qualification for details.	All essential instruments were monitored. There were no structural or functional abnormalities detected.

Specification No. H-2156
Vendor: ITE Imperial Corp.

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Overcurrent Relay Models: 12IAC66B4A 12IAC66M1A 12IAC51B808 12IAC51A802 12IAC51A801A JVM-3-643-94	A	Aux.Bldg. 1AP04EA 1AP04EB 1AP04EC	Instruments were qualified with switchgear unit. See equipment qualification for details.	All essential instruments were monitored. There were no structural or functional abnormalities detected.

Specification No. H-2157
Vendor: ITE Impreial

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Indicating Lamp Model: ET-16 IR Neutral Sensor Model: 609301-K1 IR Neutral Sensor Model: 609301-K2 IL Potential Transformer Model: PT-6 400765-K3 IL Potential Transformer Model: PT-16 400765-K3 IL Control Switch Model: C77 1001 1CC1 0002 IL Current Sensor Model: TKM-1 4C1181-T24	A	Aux. Bldg. 1AP05E 1AP06E 1AP07EA/B 1AP08EA/B 1AP09E 1AP10E 1AP11EA/B 1AP12EA/B 1AP13E 1AP14EA/B	Instruments were qualified with sub-station unit. See equipment qualification for details.	All essential instruments were monitored. There were no structural or functional abnormalities detected.

Specification No. H-2157
Vendor: ITE Imperial

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	IL Current Transformer Model: TKM-1 401181-T21 IL Current Transformer Model: TKM-1 401181-T22 IL Current Transformer Model: TKM-1 4C1181-T23 IL Ground Sensor TL-2 Model: 400 799 K6 ID Auxiliary Relay Model: J13P3012 IR Neutral Sensor Model: 609301-K2 IL Control Power Transformer Model: CP-6 401566-K1 GE Ground Relay Model: 12IAC53A803	A	Aux. Bldg. 1AP05E 1AP06E 1AP07EA/B 1AP08EA/B 1AP09E 1AP10E 1AP11EA/B 1AP12EA/B 1AP13E 1AP14EA/B	Instruments were qualified with sub-station unit. See equipment qualification for details.	All essential instruments were monitored. There were no structural or functional abnormalities detected.

Specification No. H-2159
Vendor: Stewart & Stevenson

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Square D Pressure switch Model: 9012 ACW-22 Model: 9012-ACW-21	P	Aux.Bldg. 1DG10CD 1DG10CA 1DG10DE 1DG10CB	Qualification Tests Biaxial random motion frequency range: 1-40 Hz TRS enveloped RRS	Essential equipment is monitored. No abnormalities were deducted during and after the test.
	GE Control Switch Model: CR2940		1PL10JA 1PL10JB 1PL10JC		
	EMD Temp. Switch Model: 8447100 EMD Temp. Switch Model: 7447102			Qualification in Progress	
	H.O. TRERICE Pressure Gauge		1DG15TA ↓ 1DG15TL		
	Marshaltown Pressure Gauge		1PLG6JA,B 1PLG7JA,B 1PLG8JA,B		

Specification No. H-2159
Vendor: Stewart & Stevenson

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Barton Pressure Switch Model: 288A	P		Aux. Bldg. 1DG10CF 1DG10CC	Qualification in Progress	
	Square D Temp. Switch Model: 9025-BCW-42 9025-BCW-45	P		↓	↓	

Specification No. H-2175
Vendor: Unit Electric Controls, INc.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Electrical Indicator Type 180. Vertical Edge-wise DC/AC.	A	Aux. Bldg. 1PM07J 1PM08J 1PM06J	Resonance Search Tests Pseudo Biaxial Sine Sweep Freq. range: 1-33 Hz Qualification Test Pseudo Biaxial Sine Beat Tests at one-half octave freq.inter-vals between 1-33 Hz. Resulting max. acc.: 4.97 g in all directions.	All essential equipment were monitored. No abnormalities were deducted during and after the test. Natural frequencies: 1st SS/V: 23 Hz 2nd FB/V: 28 Hz 2nd SS/V: 30 Hz
	GE Indicating Light Type ET-16	↓	1PM07J 1PM08J	↓	No Natural Frequency in the the testing Range
	GE Control Switches Model SB-1	A	1PM01J 1PM07J 1PM08J		↓
	GE Aux. Relays Model: 12NG A15AS1	P	1PM08J		
	Automatic Timing & Control Inc. Auxiliary Relay Model: 305D007L20P	P	1PM08J		Natural Frequency: 1st SS/V: 22,26,30 Hz 1st FB/V: 31 Hz 2nd SS/V: 26 Hz

Specification No. H-2175
Vendor: Unit Electric Controls, Inc.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Transmation Signal Converters Model: 600 610TS 650TS	A	Aux. Bldg. 1PM08J 1PM07J 1PM06J	Resonance Search: Uniaxial Sine Sweep Frequency Range .5 to 35 Hz Qualification Test: Uniaxial Sine Dwell Frequency Range .5 to 35 Hz Input acceleration = 3.0g in all directions.	Resonance frequency are found in the horizontal direction at 8 and 19 Hz, 3.5 and 17 Hz. All essential equipment were monitored. No abnormalities were detected during and after the test.
	Leeds & Northrup Pen Recorder Type: Speedomax M Mark III Model: 831 832 833		1HP13-P601 1PM06J 1PM07J	Qualification Tests Biaxial Random Motion Frequency Range 1-40 Hz. TRS enveloped RRS	All essential equipment were monitored throughout the test. No abnormalities were detected during and after the test.
	Electro Switch Corp. Control Switch Type Series 40		1PM07J 1PM08J 1PM06J	Seismic Qualification Report is presently being evaluated.	

Specification No. H-2188
Vendor: Delphi

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Hydrogen and Oxygen Monitors and Transmitters	A	Aux.Bldg. 1PL40JA 1PL40JB	Equipment and instruments are being replaced.	

Specification No. H-2240
Vendor: R. P. Adams

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Mercoid Pressure Regulator Model: BB-221-3	P ↓	SWPH 1WS02FA 1WS02FB	Seismic qualification of instrument in progress	

Specification No. H-2265
Vendor: Jamesbury Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Bettis Air Operator Air Operator T312B-SR3-12	P		Rx.Bldg. 1VQ001A,B 1VQ002A,B 1VQ003A,B 1VQ004A,B	Static Analysis Input: x=5g; y=5g;x=5g	Natural frequency= 37.2 Hz Stress Max. Max. Spring Cartridge Calc. Allow Connection 19.1 105 Tensile stress ksi 19.1 105. Piston assembly tie bar 33.6 105.
	NAMCO Limit Switch EA-170	P		Rx. Bldg. 1VH001A,B 1VH002A,B 1VH003A,B 1VH004A,B	Qualification Test Pseudo Biaxial sine sweep Frequency range: 1-35 Hz Input: from 3-7g in all directions	No abnormalties or structural failure were detected after the test.
	ASCO Solenoid Valve Model: 831655	A		1VH001A,B 1VH002A,B 1VH003A,B 1VH004A,B	Qualification Test Uniaxial Sine Sweep Frequency Range 10-40 Hz Max. input acceleration = 7.5 g	Operability was demonstrated. No abnormalities were detected. Structural integrity satisfied.
	Model: HTX8321	A		1VQ001A,B 1VQ002A,B 1VQ003A,B 1VQ004A,B	Qualification Test Uniaxial Sine Sweep Frequency Range 10-40 Hz Max. input acceleration = 12.2 g	

Specification No. H-2265
Vendor: Jamesbury Corp.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Jamesbury Corp. Quadra Power Actuator F50S	A ↓	RX. Bldg. 1VH002A,B 1VH001A,B	Qualification Report is being evaluated at present	

Specification No. H-2288
Vendor: American Air Filter

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Mercoid Temperature Switch DAW DAW-7038-804-S2	A	Reactor Bldg 1VG05SA/B	Resonance Search Uniaxial Sine Sweep Frequency range: 1-35 Hz Qualification Test Uniaxial Sine Dwell Frequency range: 1-35 Hz Input: horiz. = 3.0g vert. = 2.0g	No resonances found in the frequency range. All essential equipment were detected during and after the test.
	Barton Differential Pressure Transmittal Model: 385	P		Resonance Search Uniaxial Sine Sweep Frequency Range: 1-35 Hz Qualification Test Uniaxial Sine Dwell at resonant frequencies. Input Acceleration: Horiz. 2.0g Vert. 1.5g	Natural Frequencies determined Horiz.(1) 4, 12, 17, 21, 28, 33 Horiz.(2) 9, 15, 18, 22, 30 Vert. = 8, 13, 29 Instrument was monitored throughout the test. No abnormalities were recorded.
	ITT Motor Operator Model: NH-95	A		Qualification Test Biaxial Random Motion Frequency range: 1-33 Hz TRS enveloped RRS up to 100 Hz	All essential equipment were actuated. No abnormalities were detected during and after the test.

Specification No. H-2288
Vendor: American Air Filter
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Dwyer Magnehelic Diff. Press. Gage Model #2002 2003 2010	P	Reactor Bldg. 1VG05SA 1VG05SB	Resonance Search Uniaxial Sine Sweep Frequency range: 1-40 Hz Qualification Test Biaxial Random Motion Frequency Range: 1-40 Hz TRS enveloped RRS	No natural frequencies found in the test frequency range. All essential equipment were inspected. No abnormalities were detected during and after the test.
	Mercoid Liq. Level Switch 201WT-9806-S2	A		Resonance Search Test Uniaxial Sine Sweep Frequency range: 2-33 Hz Qualification Test Uniaxial Sine Dwell Frequency Range 2-33 Hz Input accel. 2g in all directions.	No resonances found in the frequency range. All essential equipment were monitored. No abnormalities were detected during and after test.
	ATkomatic Deluge Valve Model: 5700GX	A		Resonance Search Pseudo Biaxial Sine Sweep Frequency Range 2-33 Hz Qualification Test Pseudo Biaxial Sine Dwell Input: 4.5g Horizontal 3.0g Vertical Frequency range: 2-33 Hz	No resonances found. All essential equipment were monitored. No abnormaities were detected during and after the test.

Specification No. H- 2288
Vendor: American Air Filter

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Alison Temp. Sensor Model: 1052	P	RX.Bldg. 1VG05SA/B	Resonance Search Uniaxial Sine Sweep Frequency range: 2-35 Hz Input acceleration = 5 g in all directions. Qualification Test Uniaxial Sine Sweep Frequency Range: 2-35 Hz Input acceleration = 5g in all directions.	No resonances found in the frequency range. All essential parts were detected during and after the test.

Specification No. H-2288
Vendor: American Air Filter

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Ashcroft Thermowells Model #T-38S75T060	P	Reactor Bldg. 1VG05SA	Seismic Qualification in progress ↓	
	Ashcroft Thermometers Model #30BI60L-060	P	Reactor Bldg. 1VG05SA		

Specification No. H-2289
Vendor: Pacific Air Products
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Contromatics Damper Operator Model:500-SP	A ↓	Aux.Bldg. 1VG03YA, YB 1VG04YA, YB	Static Analysis Input resultant acceleration = 4.5g	No natural frequency below 33 Hz. Operability was demonstrated by showing that the operating forces are higher than the seismic forces.

Specification No. H-2289
Vendor: Pacific Air Products

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Asco Solenoid Valve Model HT-8302-B-25-RF	A	Reactor Bldg. 1VG05SA 1VG05SB Aux.Bldg. 1VG03YA 1VG03YB 1VG04YA 1VG04YB	Seismic qualification of instruments are in progress	
	Namco Limit Switches Model: D-1200-6	P	Aux.Bldg. 1VG03YA 1VG03YB 1VG04YA 1VG04YB		

Specification No. H-2293
Vendor: Trane Company

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Control Relay CR-2810-414C2	A	Aux.Bldg. 1PLB4J 1PLB5J 1PLB6J 1PLB7J 1PLB8J 1PLB9J	Qualitication Tests Biaxial Random Motion Frequency range: 1-40 Hz TRS enveloped RRS	All essential equipment were monitored. No abnormalities were detected during and after the test.
	GE Control Switch CR-2940		1PLC1J 1PLB3J		
	AGASTAT Time Delay Relay 7012				
	GE Time Delay Relay CR-2820-B11744-2				
	PENN-Pressure Switch P-45NC4-43 P-45NC4-20 P-70MA-20				

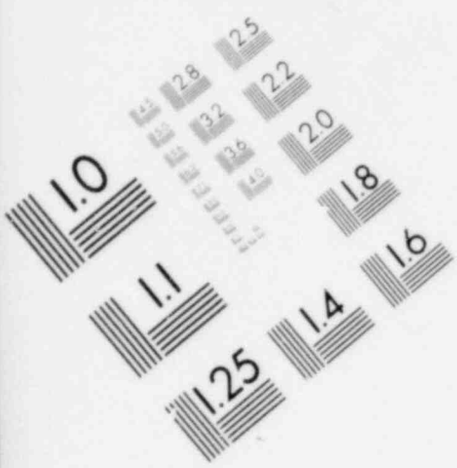
Specification No. H-2299
Vendor: MCC Powers

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Transmation Current Relay Model: 210A	P		Auxiliary & Reactor Building	Resonance Search: Uniaxial Sine Sweep Frequency Range .5 to 35 Hz Qualification Test: Uniaxial Sine Dwell Frequency Range .5 to 35 Hz Input acceleration = 3.0g in all directions	All essential equipments were monitored. No abnormalities were detected. Resonance found only in the horizontal direction at 8 and 19 Hz.
	GE Indicating Lights ET-16	P ↓		1PM07J 1PM08J	Resonance Search Tests Pseudo Biaxial Sine Sweep Freq. Range: 1-33 Hz Qualification Test Pseudo Biaxial Sine Beat Tests at one-half octave freq. intervals between 1-33 Hz. Resulting Max. Acc.: 4.97g in all directions.	All essential equipment were monitored. No abnormalities were deducted during and after the test. No Natural Frequency in the testing range.



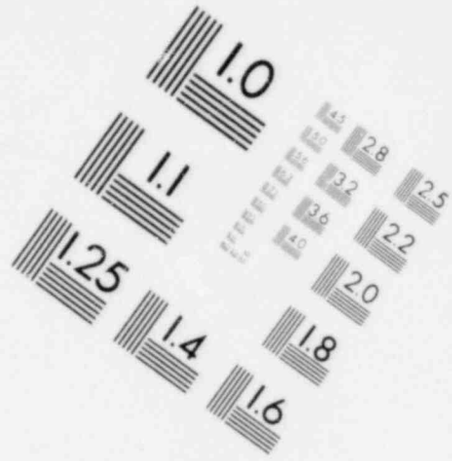
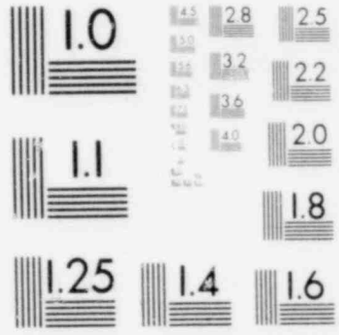
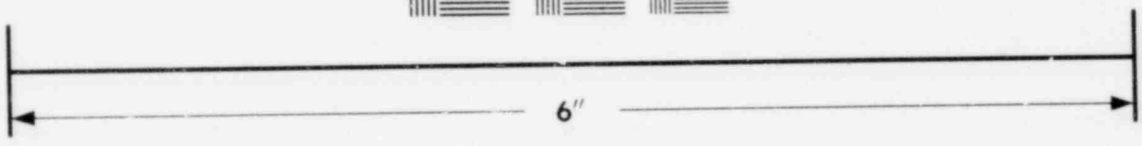
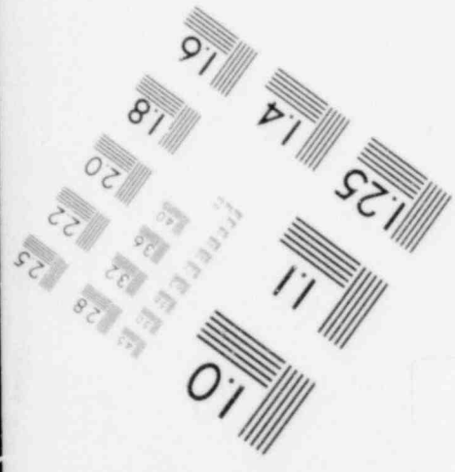
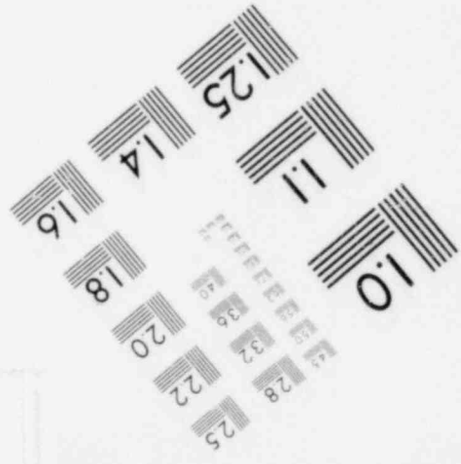


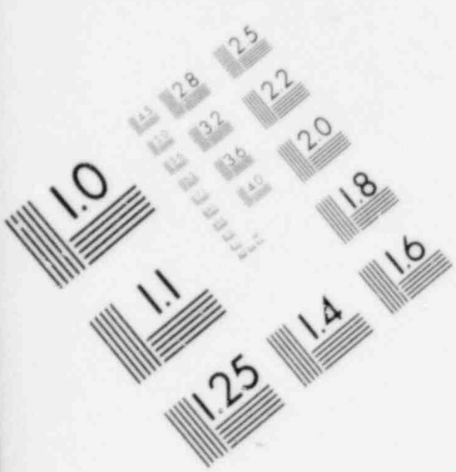
IMAGE EVALUATION TEST TARGET (MT-3)











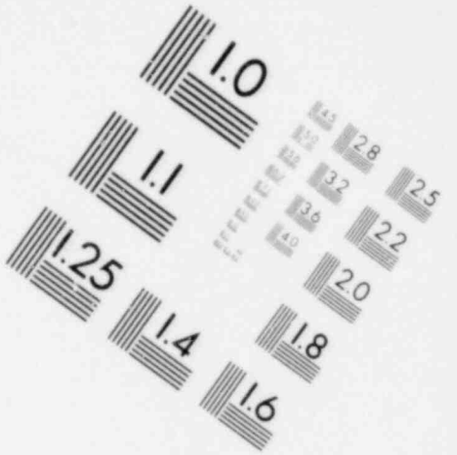
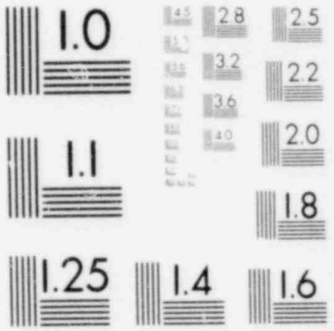
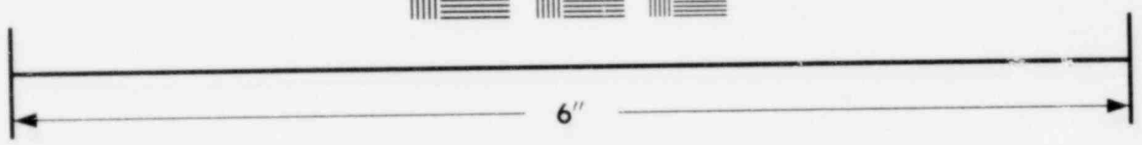
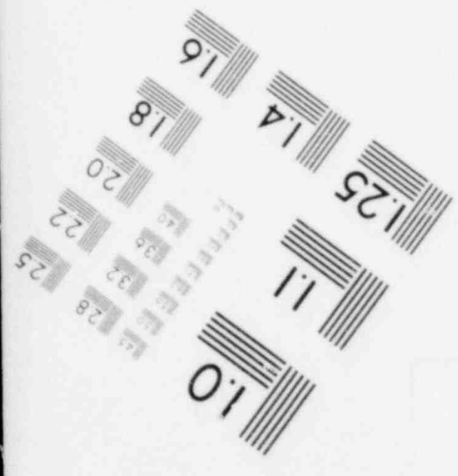
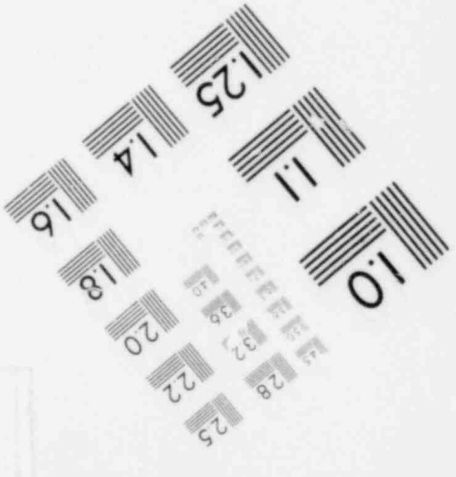


IMAGE EVALUATION
TEST TARGET (MT-3)









Specification No. H-2299
Vendor: MCC Powers

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Dwyer Differential Pressure Indicator Model: 2010 2003 2005 2001 2015	P	Aux. Bldg. 1VY01C 1VY02C 1VY03C 1VY04C 1VY05A 1VY07AA 1VY08A 1VY09A	Resonance Search: Uniaxial Sine Sweep Frequency Range 1-40 Hz Qualification Test: Biaxial Random Motion Frequency Range 1-40 Hz TRS enveloped RRS	No resonances found below 40 Hz All essential instruments were monitored. No abnormalities were detected during and after the test.
	UE Temperature Switch Series 300 F303D-5AS F302D-5AS F300-6AS	A	1VC08SA 1VC08SB 1VX01CA 1VX01CB 1VX01CC 1VX01CD 1VX01CE 1VX01CF	Resonance Search: Uniaxial Sine Sweep Frequency Range 1-40 Hz Qualification Test: Biaxial Random Motion Frequency Range 1-40 Hz TRS enveloped RRS except below 4-6 Hz Input acceleration up to 12g.	Resonance was determined in the horizontal direction at 38 Hz All essential instruments were monitored. No abnormalities were detected during and after the test.

Specification No. H-2299
Vendor: MCC Powers

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Love Controls Current Relay Model: 54 56 48	A	Reactor & Aux. Bldg. 1PL14JA,B 1PL60JA,B 1PL61JA,B 1PL69JA,B	Resonance Search: Uniaxial Sine Sweep Frequency Range 1-40 Hz Qualification Test: Biaxial Random Motion	No resonance found in the test frequency range. All essential equipments were monitored. No abnormalities were deducted during and after the test.
	GE Transfer Switch Model: SB-1	A	1PL91J 1PL92J 1PL93J	Frequency range 1-40 Hz TRS enveloped RRS except below 4-6 Hz	
	GE Relay HMA 11B11	A	1PM07J 1PM19JA,B	Input acceleration up to 12g.	
	GE Relay 12HFA 51A49H 12HFA 51A42H	A			
	Agastat TDR Model: 7022 7012 7000 7032	A			
	Kepco Power Supply PCX72-0.3	P			
	ASCO 3-way Solenoid Valve HBX8320-A1	A			

Specification No. H-2299
Vendor: MCC Powers

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Solon Pressure Switch 7P11ADW, 5PS11BAEW	A	Reactor & Auxiliary Building	Resonance Search: Uniaxial Sine Sweep Frequency Range 1-40 Hz Qualification Test: Biaxial Random Motion Frequency Range 1-40 Hz TRS enveloped RRS except below 4-6 Hz Input acceleration up to 12g.	Resonance was found during a vertical sweep at 21 Hz only on 5PS11BAEW. All essential instruments were monitored. No abnormalities were detected during and after the test.
	W&T Chlorine Detector 50-125	A	↓	↓	Resonance found at 18 Hz in the horizontal sweep
	W&T Chloring Detector 50-125D	A	↓	↓	Resonance found: horizontal 27, 30 vertical 33, 37

Specification No. H-2299
Vendor: MCC Powers
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Delaval Level Switch 36497	A		Reactor & Auxiliary Building	Resonance Search: Uniaxial Sine Sweep Frequency Range 1-40 Hz Qualification Test: Biaxial Random Motion Frequency Range 1-40 Hz TRS enveloped RRS except below 4-6 Hz Input acceleration up to 12g.	All essential instruments were monitored. No abnormalities were detected during and after the test.
	Dwyer DP Switch 1638-0	A				
	Pyrotronics DIS3/5A	A				
	DIA-11	A				
	CTZ-2	A				
	DIA-10	A				
	ESC-1	P				

Specification No. H-2299
Vendor: MCC Powers

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Hays Flow Transmitter 252:A1252:0	A	Aux. Bldg. 1VG05SA 1VG05SB 1VC82Y	Seismic Qualification in progress	
	Eagle Timer HK410A6	P	1PL14JA 1PL14JB		
	MDA Scientific Ammonia Detector 7060-Fan	A	1PL14JA		
	Hoffman Smoke Detector A-42N3609	P			
	Penn Transformer Y64AL-2	P	1PL60JA 1PL60JB		
	Moore Signal Converter Model: GC-65, 7800 series		1VC10S		
	shcroft Thermometer 6435-DG	P	1PL93J 1PL92J 1PL91J		
	Powers Reg. Co. Metal Thermometer 894-2780	P	1VY065 1VY05A 1VY09A 1VY08A		
	Ashcroft Pressure Gauge 1009AXPR-X46	P	1PL143JA 1PL14JB		

Specification No. H-2299
Vendor: MCC Powers

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Pressure Indicator	P		Reactor Bldg.	Seismic Qualification in progress	
	Beta Annunciators 1211B	P		Aux. Bldg. Rx. Bldg. 1PL69JA 1PL69JB 1PL14JA 1PL14JB 1PL91J 1PL92J 1PL93J		
	Air Monitor Pressure Transmitter exactor, Series 300	P				
	Power Reg. Co. Receiver Controller 185-0124	P		1PL14JA 1PL14JB		

Specification No. H-2805
Vendor: Bishopric Products, Inc.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Liquid Level Switches		Aux.Bldg. 1DG07TA/C 1DG14TA/F	Seismic Qualification of the instruments are in progress.	

Specification No. H-2809
Vendor: Rosemount, Inc.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Rosemount Diff. Pressure Transmitter Model: 1152DP7A22PB 1152GP7A22PB 1152GP4A22PB 1152DP4A22PB 1152DP6A22PB 1152GP9A22PB 1152GP6A22PB		Reactor Bldg.	Resonance Search Uniaxial Sine Sweep Frequency Range 1-100 Hz Qualification Test Uniaxial Sine Dwell Frequency Range 1-100 Hz Input acceleration: 3.0 g in all direction.	Resonance was found at Horiz. = 22,24,61, 69,78 Hz Vert. = 68 Hz Instrument was monitored throughout the test. No abnormalities were detected.

Specification No. H- 2809
Vendor: Rosemount Inc.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Rosemount Temperature Detector Assembly Model: 88-14 Model: 183-108-1 Model: 183-105-1 Model: 183-106-1	P	Reactor Bldg. Wall Mounted	Resonance Search: Biaxial Sine Sweep Frequency Range: 1-35 Hz Qualification Test: Biaxial Sine Sweep at resonant frequencies Input: 3.0g in all directions	Natural Frequencies FB/V = 7.4, 24 Hz FB/V = 7.6, 11, 25 Hz SS/V = 7.7, 24, Hz No abnormalities detected after the test.

Specification No. H-2816
Vendor: Powers Regulator
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	ITT Damper Operator Model: NH-91	A ↓	Aux.Bldg. 1VC15YA 1VC15YB 1VC14YA 1VC13YB 1VC16YA 1VC14YB 1VC13YA 1VC16YB	Resonance Search Uniaxial Sine Sweep Frequency Range 1-50 Hz Qual. Test Biaxial Random Motion.Frequency Range 1-50 Hz TRS enveloped RRS	Resonance detected at 42, 48 Hz. Operators were actuated during the test. No abnormalities were detected during and after test.

Specification No. H-2817
Vendor: CV
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Dwyer Differential Pressure Indicator, Model: 2000	P		Aux.Bldg. 1VC09SA/B 1VC10S	Resonance Search Uniaxial Sine Sweep Frequency Range 1-40 Hz	No resonances below 40 Hz
					Qualification Test Biaxial Random Motion Frequency Range 1-40 Hz TRS enveloped RRS	All essential instruments were monitored. No abnormalities were detected during and after the test.
	Namco Limit Switch Model: EA170-11302	P		Aux. Bldg 1VC12YA 1VC12YC 1VC81YA, YB	Qualification Test Psuedo-Biaxial Sine Sweep Frequency Range 1-35 Hz Input from 3-7g in all directions.	No abnormalities or structural failure were detected after the test.
	ITT Barton Differential Pressure indicating switch Model: 289A	P		Aux.Bldg. 1VC09SA,B	Resonance Search Uniaxial Sine Sweep.Freeuency Range 1-35 Hz.	Resonant frequencies found: FB = 1, 12, 18, 32,35Hz SS = 5,7,11,17,22,25, 30 Hz. Vert.= 5,7,11,34,35 Hz.
					Qualification Test Uniaxial Sine Dwell Frequency Range 1-35 Hz Input acceleration Horiz.= 4.0g Vert. = 2.67g	Instrument was monitored during the test.No abnormalities were recorded.
	Rosemount Differential Pressure Transmitter 1151DP-3-A-22.	P P P		Aux.Bldg. 1VC09SA 1VC09SB 1VC10S	Qualification Test Biaxial Random Motion Frequency range: 1-35 Hz. TRS enveloped RRS	Instrument was monitored during the test. No abnormalities were recorded during and after the test.

Specification No. H-2817
Vendor: CVI

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	ITT Damper Motor Operator NH-95		Aux.Bldg.	Resonance Search Uniaxial	Resonance detected at 42, 48 Hz
		P	1VC12YA	Sine Sweep Frequency Range	
		A	1VC212YC	1-50 Hz.	
		A	1VC81YA		
		A	1VC81YB	Qualification Test Biaxial	Operators were actuated
		A	1VC82Y	Random Motion	during the test. No ab-
				Frequency Range 1-50 Hz	normalities were detected
				TRS enveloped RRS	during and after the test
	ASCO Solenoid Valve Model: HB8320A-1	A	Aux.Bldg.	Resonance Search Uniaxial Sine Sweep Freq. Range 1-40 Hz.	No resonance found in the test frequency range. Al essential instruments were monitored. No abnormalities
				Qualification Test Biaxial Random Motion Frequency Range 1-40 Hz TRS enveloped RRS except below 4-6 Hz Input accel. up to 12g.	were detected during and after the test.

Specification No. H-2817
Vendor: CVI
Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Namco Limit Switch EA750-20100	A	Aux.Bldg. 1VC29YA, YB	Seismic Qualification of instruments are in progress.	
	Ashcraft Bi-Metal Thermometer Model: 50A160R-S12	P	1VC09SA 1VC12YA		
	Rosemont Temp. Transmitter Model: 442A-RP-A-01	P	1VC10S		

Specification No. H-2826
Vendor: Dayton T. Brown
Wm. H. Zimmer
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Aschcroft Pressure Indicator Model: 2462ASXMN	P	Reactor Bldg. Local Panel	Resonance Search: Uniaxial Sine Sweep Frequency Range: 1-35 Hz Qualification Test: Uniaxial Sine Dwell Frequency Range: 1-35 Hz Input: 3.0g to 7.5g in all directions.	No resonance found in the test frequency Structural Integrity satisfied

Specification No. H-2835
Vendor: Unit Electric Controls, Inc.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	GE Control Switches CR2940 Selector Cuttler Hammer Push button switches 10250T Electro Switch Control switches Series 40 GE Electrical Indicators 180 Vertical Edgewise DC Transmation Signal Converters Model: 610TS GE Control Switches SBM GE Control Switches SB-1	A		Aux. Bldg. 1PL67JA 1PL67JB	Instruments were qualified with equipment. See equipment qualification for details.	All essential equipment were monitored. No abnormalities were detected during and after the test.

Specification No. H-2866
Vendor: ITT Barton

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Barton Pressure Switches Model: 288A	A	Reactor Bldg.	Seismic qualification of instruments are in progress.	

Specification No. H-2868
Vendor: Powers Regulator

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	ITT Damper Operator Model #NH-95 NH-91 NH-95-3		Aux.Bldg. RX. Bldg. All elevation	Resonance Search Test Uniaxial Sine Sweep Freq. Range 1-50 Hz. Qualification Test Biaxial Random Motion Frequency Range 1-50 Hz TRS enveloped RRS	Resonance detected at 42 and 48 Hz. Operators were actuated during the test. No abnormalities were detected during and after the test.
	GE Control Relay Model #12HFA51A49	A	Aux.Bldg. 1PL14JA	Resonance Search Test Uniaxial Sine Sweep Frequency Range 1-40 Hz Qual. Test Biaxial Random Motion . Frequency Range 1-40 Hz. TRS enveloped RRS except below 4-6 Hz. Input accel.up to 12g.	No resonance found in the test frequency range. All essential instruments were monitored. No abnormalities were detected during and after the test.
	Namco Limit Switch Model: EA-750-20100	A	Aux.Bldg. RX.Bl . All Elevations	Seismic qualification is in progress.	

Specification No. H-2874
Vendor: American Warming & Vent.Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Namco Limit Siwtch Model: EA-740-70100	A	Aux.Bldg. 1VG06YA/ YB 1VG07YA/ YB 1VG09YA/ YB 1VG10YA/ YB 1VG01YA/ YB 1VG08YA/ YB	Seismic Qualification is in progress	
	ITT Motor Operators Model: NH.-95,91	A	Aux. Bldg. 1VG06YA/B 1VG07YA/B 1VG08YA/A 1VG09YA/B 1VG10YA/B 1VG01YA/B 1VQ10Y		

Specification No. H-2881
Vendor: Reliance Electric Co.
Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Indicating Light ET-16	A	Aux.Bldg. RX.Bldg. 1PL79J 1PM18J	Resonance Search Tests Pseudo Biaxial Sine Sweep Freq. range: 1-33 Hz Qualification Test Pseudo Biaxial Sine Beat Tests at one-half octave freq. intervals between 1-33 Hz Resulting max.acc. 4.97g in all directions.	All essential equipment were monitored. No abnormalities were deducted during and after the test. No natural frequency in the testing range.
	GE Test Switch CR2940	A	Aux.Bldg. 1PM18J	Qualification Test Biaxial Random Motion. Frequency range 1-40 Hz TRS enveloped RRS.	All essential equipment were monitored. No abnormaliites were detected during and after the test.

Specification No. H-2881
Vendor: Reliance Electric Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Auxiliary Relay Model: 12HFA51A49H, 12HMA11B11	A	Aux.Bldg. RX. Bldg. 1PM18J 1PL79J	Resonance Search Uniaxial Sine Sweep Frequency range 1-40 Hz Qualification Test: Biaxial Random Motion Frequency range 1-40 Hz TRS enveloped RRS except below 4-6 Hz Input acceleration up to 12g.	No resonance found in the test frequency range. All essential equipment were monitored. No abnormalities were deducte during and after the test.
	WE Test Switches Type FT-1	A	Aux.Bldg. 1PM18J	See seismic qualification of siwtch gear unit under Specification H-2156 for details.	No resonances found below the test frequency. All essential instruments were monitored. No abnormalities were detected.

Specification No. H-2898
Vendor: Eberline

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Eberline Radiation Detectors DA1-6HTC	A	Aux. Bldg. LM Duct	Seismic qualification in progress	
	Eberline Radiation Monitor DAM-1	A	LM-Wall 1PM17J		

Specification No. C-135
Vendor: Electro Switch Corp.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Electro Switch Hand switch Series 40	A	Aux. Bldg 1PM08J	Seismic qualification are being presently evaluated	

Specification No. C-442
Vendor: Electro Switch Corp.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Hand Switch SB-1	A	Aux.Bldg. 1PM065	Resonance Search. Uniaxial Sine Sweep Frequency Range 1-40 Hz Qualification Test: Biaxial Random Motion Frequency range 1-40 Hz TRS enveloped RRS except below 4-6 Hz Input acceleration up to 12g.	No resonance found in the test frequency range. All essential equipments were monitored. No abnormalities were deducted during and after the test.

Specification No. C-443
Vendor: Electro Switch Corp.

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Electro Switch Corp. Control Switches Type Series 40	A	Aux. Bldg 1PM07J	Seismic qualification are being presently evaluated	

Specification No. C-444
Vendor: General Electro Co.
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	GE Selector Switch CR2940	A		Aux.Bldg. 1H13-P601	Qualification Tests Biaxial Random Motion Frequency range: 1-40 Hz TRS enveloped RRS	All essential equipment were monitored. No abnormalities were detected during and after the test.

Specification No. C-445
Vendor: General Electric
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Control Switch Model: SBM	A	Aux.Bldg. 1H12-P601	Resonance Search: Uniaxial Sine Sweep Freq. Range 1-40 Hz Qualification Test: Biaxial Random Motion Frequency Range 1-4 Hz TRS enveloped RRS except below 4-6 Hz. Input acceleration up to 12g.	No resonance found in the test frequency range. All essential equipments were monitored. No abnormalities were deducted during and after the test.

Specification No. PO-2371
Vendor: Victoreen Inst.Div.

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Victoreen Radiation Monitors Models: 847-2 846-1	P		Aux.Bldg. 1PM17J	Qualification Test Biaxial Random Motion Frequency Range 1-40 Hz TRS enveloped RRS	It was demonstrated that after the test the instruments exhibited no malfunction.

Specification No. P02720
Vendor: Elma Engineering
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Elma Engineering 24VDC Power Supply Model: 164C5261-1	P		Aux. Bldg 1PM08J	Seismic qualification in progress	

Specification No. PO-2876
Vendor: Transmation

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Transmation Thermocouple Alarms Model: 610A-E(A-X-5)-235	A	Aux.Bldg. 1PM08J 1PM07J 1PM06J	Resonance Search Uniaxial Sine Sweep Frequency Range .5-35 Hz	Resonance frequency are found in the horizontal direction at 8,16,19 Hz
	Transmation Signal Converter Model: S520A-243, 610IT-T-XS	A	1T49-P865 1T49-P866 1PL67J 1H13-P628	Qualification Test Uniaxial Sine Dwell Frequency range .5-35 Hz Input acceleration= 3.0g in all direction.	All essential were monitored. No abnormalities were detected during and after the test.

Specification No. PO-2876
Vendor: Transmation

Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis.	Class	Location	Qualification Method	Results
	Transmation Thermo-Couple Alarms Model: 610A-E(A-X-5)-235	A		Aux.Bldg. 1PM08J	Resonance Search Uniaxial Sine Sweep Frequency Range .5-35 Hz Qualification Test Uniaxial Sine Dwell	Resonance frequency are found in the horizontal direction at 8,16,19Hz. All essential instruments were monitored. No abnormalities were detected during and after the test.
	Transmation Signal Converter Model: S520A-243, 610IT-T-XS	A		Aux. Bldg 1T49-P865 1T49-P866 1PL67JA 1H13-P628	Frequency Range .5 to 35 Hz. Input acceleration = 3.0g in all directions.	

Specification No. PO-3322
Vendor: _____
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Riley Co. Signal Converters Model: 86PTGF-EGB 86VTFF-EGB	A	Aux.Bldg. 1H13-P632 1H13-P642	Seismic qualification in progress	

Specification No. PO-3255
Vendor: Leeds & Northrup
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Leeds & Northrup Pen Recorder Model: Speedomax 250	A	Aux. Bldg 1H13-P601	Seismic qualification in progress	

Specification No. PO 2949
Vendor: C.S. Gordon
Wm. H. Zimmer
Project No. 4130-00

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Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	CS Gordon Thermocouples Model: 404-3107-050	A	Reactor Bldg.	Qualification Method Static Analysis Maximum acceleration used: 7.5g horiz. 2.25g vert.	Based on the analysis and the design of the thermocouple supports the maximum combined stress is 9,479 psi (max. allowable = 30,000 psi)

Specification No. B/M
Vendor: Refer Below

Wm. H. Zimmer
Project No. 4130-00

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Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	GE Electrical Indicator Type 180 Vertical Edgewise	A	Aux. Bldg. 1H13-P601 1PL67JA 1PL67JB	Resonance Search Tests Pseudo Biaxial Sine Sweep Frequency range: 1-33 Hz Qualification Test Pseudo Biaxial Sine Beat Test at on-half octave freq. intervals between 1-33 Hz. Resulting mat. acc.: 4.97g in all directions.	All essential equipment were monitored. No abnormalities were deducted during and after the test Natural frequencies: 1st SS/V:123Hz 2nd FB/V:28Hz 2nd SS/V:30Hz
	Leeds & Northrup Pen Recorder Type: Speedomax Mark III Model: 832,833	A	Aux.Bldg. 1H13-P601	Qualification Tests: Biaxial Random Motion Freq. range 1-40 Hz TRS enveloped RRS	All essential equipment were monitored throughout the test. No abnormalities were detected during and after the test.

Specification No. B/M
Vendor: Refer below

Wm. H. Zimmer
Project No. 4130-00

SUMMARY OF
EQUIPMENT QUALIFICATION

Rev. 00
Date 4-15-81

Equipment Number	Description	Seis. Class	Location	Qualification Method	Results
	Bailey Process Controller Model: 701	A	Aux.Bldg 1PL67J	Seismic qualification in progress	