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, improvements in 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 accompdate 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

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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 assessment 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	128	B*	ABS
2)	N + SSE	1%	C*	ARS
3)	N + OBE + Envelope (SRV <sub>ASY-TQ</sub> SRV <sub>All-TQ</sub> )	1%	В	ABS
4)	N + Envelope(OBE & SSE) + Envelope (SRV <sub>ASY-TQ</sub> + SRV <sub>Al1-TQ</sub> ) + CHG	2%	С	ABS
5)	N + Envelope (OBE & SSE) + Envelope (SRV <sub>ASY-TQ</sub> + 0.6 SRV <sub>All-TQ</sub> ) + Col	2%	С	ABS
6)	N + Envelope (OBE & SSE) + Envelope (SRV <sub>ASY-TQ</sub> + SRV <sub>All-TQ</sub> ) + CO2	2%	С	ABS
7)	N + SQRT (SSE + AP)	2%	С	ABS

<sup>\*</sup> 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.

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 crosscoupling
- 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 source root of the sum of the squares (SRSS) method was considered. If sufficient load reduction

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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 Impenda...e 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 ('lat 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)	lapisee	480 Volt Reactor Building Motor Control Center 1E
5)	1B33C001B	Reactor Recirculation Pump
6)	1H22PU27	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:

- 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<sub>ALL</sub> and SRV<sub>ASY</sub> in all directions while SRV<sub>ALL</sub> is maximum in the vertical direction while SRV<sub>ASY</sub> 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:

5. N +  $\sqrt{SSE^2 + AP^2}$ 

#### QUALIFICATION:

PREPARED BY:

DATE:

REVIEWED BY:

DATE: PROJECT NO. 4130-15

APPROVED BY:

DATE: EMD FILE NO.



### QUALIFICATION SUMMARY

SEISMIC QUALIFICATION METHOD:

T-QUENCHER REQUALIFICATION METHOD:

Reference: EMD File No. -2-

	QUALIFICATION SUMMARY OF EQUIPMENT
. ]	PLANT NAME: ZIMMER - Unit 1 TYPE:
	1. Utility: Cincinnati Gas & Electric PWR
	2. NSSS: General Electric BWR X
	3. A-E: Sargent & Lundy
	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: Woight.
6	Dimensions: Weight: Elev.:
	. Field Mounting Conditions:
	Bolting: Number: Size:
	Welding: Weld Type:
	Leg: 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:
IS	S EQUIPMENT AVAILABLE FOR INSPECTION IN THE PLANT: Yes
*	
Co	omments:

		UIPMENT QUALIFICATION METHOD: Test
		_ Analysis
		Combination of Test
	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.	VIE	BRATION 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:
V	-	Test Method: Single Frequency
	1.	Multiple Frequency
		Random Motion
		Sine Beat
	2	Input Motion: Single Axis
	-	Multi Axis
	3	
		No. of Qualification Tests: OBE SSE Other Frequency Range:

	5.	For Multiple Frequency Test does	TRS Envel	op RRS?
		No Yes (attach TRS g		
	6.	Input g-level Test at Hl=		V=
		Laboratory Mounting:		
		☐ Bolting: Number S.	ize	
		☐ Welding: Weld Type:		
		LegLengt	- h	- Pitch
	8.		The second secon	Annual Section Control of Control
	9.		□ res □ i	NO   NOT APPLICABL
		portoring		
VII.	IF	QUALIFICATION BY ANALYSIS, THEN CO	MPLETE:	
	1.	Type of Analysis		
		Static Analysis		
		Equivalent Static Analysis		
		☐ Dynamic Analysis: ☐ Respo	nse Spectr	um
		☐ Time	History	
	2.	Model Type:		
		☐ 1-Dimensional ☐ Finit	e Element	
		2-Dimensional Close	d Form Sol	ution
		3-Dimensional		
	3.	Method of Analysis:		
		Computer-Aided Calculation Programs used:		
		Hand Calculations		
	4.	Have equipment supports been adequanalysis? Yes No	lately con	sidered in
	5.	Stress Evaluation at Critical Stru	ctural Ele	ements:
		Element	Calc	Allow
			Stress	Stress

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

Element	Calc Deflec.	Allow Deflec.

VIII. ADDITIONAL COMMENTS:

Reference: EMD File No. \_\_\_\_\_-6-

# 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:



SARGENT & LUNDY FUNCTIONAL DESCRIPTION E C H SSP 10 0 % RAHHOA SUB, -SYS. LOCATION BLDG. I. VALVES COVERED IN THIS SUMMARY: OPER, TYPE SIZE & TYPE VALVE TAG NUMBER

II.	MOUNTING:							
		pe other su		eld Type (describe			ange T	уре
III.	IF QUALIF	CICATION	BY ANA	LYSIS:				
	2. For a addre	nite el osed fo active v essed by miting	ement rm alves, : deflect	Compute Hand compute Other operabilitions to within	ty of	the v	alve w	
		oth	stress	CO WICHIN	desi	gn all	Owabie	
	3. Stres	s in th	e criti	cal eleme	nts:			
E	lement	G-Leve	l in axis	* Calcula	ated			tress (ksi)
		a	b c	Stress	(ksi)	Up	set	Emergency
	4. Defle	ections,	for ac	tive valv	es on	ly:		
F	lement	G-Leve	l in axis	* Calcul	ated	tion	Allov	vable Deflection
	10:110	a	b c			in		in
*Axis	b - Per of	axis 'a	lar to a	run axis 'a' a alve stem	axis		plane	
							SAF	GENT & LUNDY
				-3-				ENGINEERS

2.	Resona) b) c) d) Qual	ratory mounting: al operating loads input by:  nance search test: Input axes: Single Biaxial  Frequency range to Hz.  Sweep rate octaves/min.  Input acceleration: ification test: Input axes: Single Biaxial Pseudo-biaxial
4.	a) b) c) d) Qual a)	Input axes: Single Biaxial  Frequency range to Hz.  Sweep rate octaves/min.  Input acceleration: ification test:
4.	b) c) d) Qual a)	Frequency range to Hz.  Sweep rate octaves/min.  Input acceleration:  ification test:
4.	c) d) Qual a)	Sweep rate octaves/min.  Input acceleration: ification test:
4.	d) Qual a)	Input acceleration: ification test:
4.	d) Qual a)	Input acceleration: ification test:
4.	Qual a)	ification test:
		Input axes: Single Biaxial Pseudo-biaxial
		Frequency range: Hz.
		No. of tests in each crientation:
		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?
	~ \	Other tests performed and comments:
	e)	other tests performed and comments:
		e)

#### V. RESULTS OF QUALIFICATION:

RESON	ANT FREQUE	ENCIES	MAXIMUM A	ALLOWABLE	G' VAL	JE APPLIE	D SIMULTA	ANEXUS
			UPSET			EMERGENCY		
a	b	С	a	b	С	a	b	С
2.0								

#### VI. LOADS FROM PIPING ANALYSIS:

	PIPING	VALVE NOZZLE		ACCI	ELERATION	IN 'G'S'		
VALVE TAG NO.	SUBSYSTEM ANAL.DATE		re en	UPSET		EM	ERGENCY	
	EMD FILE	VALVE ALLOW.	a	b	С	a	b	С

ADDITIONAL CONSIDERATIONS:



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

#### SCENARIO FOR ACCOMPLISHING HOT OR COLD SHUTDO.

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:

- ESS Relay Panel senses loss of off-site power and initiates diesel generators and load sequencing.
- CRD Hydraulic Units insert the control rods and shutdown the core (SCRAM).
- 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

- 04 480-7 MCC's
- d. Dattories
- 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)
- 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:

1E12F006B

See attached table

1E12F008

for valve functions

1E12F009 1E12F053B

1E12F068B

1E12F014B

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)	
1E12F008 )	Suction to RHR(B)
1E12F009 )	From Recirc. Suction Pipe
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 Systom
1B21F022A/D	Inboard MSIV
1B21F028A/D	Outboard MSIV
1WS037A/D	Service Water Dish from D.G. HX
1WS033)	Service Water Essential -
1WS034)	Loop Iso. Valves

TABLE 110.6
SEISMIC QUALIFICATION SUMMARY OF CATEGORY I HECHANICAL 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
*1A1U-+A/C	4,16 KV Switchgear	Test (5)	A, D	Yes	*IDCO1EA	250 V Battery	Test (5)	c, b	Yes
1400410/**	6.9 KV Switchgear	Test (5)	A, E		*IDGITEA/C	125 V Battery	Test (5)	c, b	*
*1AP95E LAP95E	490 V ESS Substation	Test (5)	A, D		*LDC21EA/B	24/48 V Battery	Test (5)	c, b	•
IAPIOF IAPIJE						Nattery Racks	Analysis (7)	C, D, E	
*1ATZOFA/G LATISTA/B LAFIGEA/C	480 V MCC	Test (3)	A, D			Dattery Monitors	Test (5)	c, b	
*11×071A/C	Diesel Dil Day Tank	Analysis (7)	C, D, E		1DC02EA/B	250 V Bettery Charger	Test (5)	A, C, D	
*10c01 <a c<="" td=""><td>Diesel Gen.</td><td>Annlysis (8)</td><td>c, b</td><td></td><td>IDC12EA/C</td><td>125 V Battery Charger</td><td>Test (5)</td><td>A, C, D .</td><td></td></a>	Diesel Gen.	Annlysis (8)	c, b		IDC12EA/C	125 V Battery Charger	Test (5)	A, C, D .	
*1P1.10JA/C	D. G. Control Panel	Test (5)	C, D.		IDG22EA/D	24 V Battery Charger '	Test (5)	A, C, D	
010002AA/D	D. G. Heat Exchanger	· Analysis(8)	C, D, E		*11F01EA/B :1F03E 11F04E	120 V AC Dist. Panels	Test (5)	A, D	
116/14/1/3					*10004EA 10005EA/C	250 V DC Dist. Cubicles	Test (5)	c, b	
*11W/OSKA/C	D. G. Exhaust Silencer	Analysis (8)	C, D, E		*IDC14EA/C	125 V DC Pist. Cubicles	Test (5)	c. D	
*Hellina/C	14 Cylinder Exp. Joint	Analysis (8)	t		*18C2GEA/B *1AP50FA/H 1AP50FJ/N	24/48 V DC Dist. Cubicles Electrical Penetration Assemblies	Test (5) Analysis(7)	c, D, E	
*10020EA/C 10022EA/C 10022EA/C	12 Cylinder Exp. Joint	Analysis (8)	z	*	TAPSOEP TAPSOER				
	750 KYA Transformer	Test (1)	A, D		10-14				3

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

salle 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
*1120.23	i in Control Board Assemblies	Analysis (8)	C, D, E	Yes	IVG03CA/B	SGTS Cooling Fan	- Indicate (n)		
Hermal .					1VC055A/N	SCTS Equip. Trein	Analysis (9)	D	Yes
11:07.3 11:05.1					IVC04AA/B		Analysts (8)	D	
						Serrs Heating Coil	Analysis (8)	D, E	*
	Instruments for Main Control Boards	Test (5)	C, D		IVC02CA/B	SGTS Fan	Analysis (9)	D	
1AFOZ5	Misc. Auto Control Cabinet	Analysis (8)	ε.			SGTS Temperature Transmitter	Test (4)		,
* IFHUILVAND	RECC Vater Pumps and Motors	Analysis (7)	A, D			Deluge Level Controlller	Test (5)		
* 1121-0002 1121-0001	CSCS Water Leg Pumps				I see a	Deluge Valve MDL-370DCY	Test (5)		
1122-0003						Pressure Trans.	. Test (5)		
11:1 ×0.1A/8	Pri. Cont. Sampling System,		D			Deluge Piping	Analysts (7)		
	Ess. Cont. Mon. System				IVCO3YA/B	SCID		2	
* IWSOTEA/D	Service Water Pumps & Motors	Analysis (7)	A. D		IVG04YA		Analysis (9)	D	•
19.2545 A/B	Traveling Water Screens	Analysis (7)	2			Solenoid Valve	Test (2)	D	
18/92FA/N	Service Water Strainers	Analysis (8)	8			Limit Switch	Test (2)		
						Actuator	Analysis (7)		
* IMPRANC	HRCCW Heat Exchanger	Analysts (8)	A, D		*IVHOTCA/D	Vent Pans	Analysis (7)	A, D	
traiss	NZ Cylinder Rack	Analysis (8)	D, E		10000 10000 10000		•		
THAT AMOTATO	Misc. Tanks Section III	Analysis (7)	A, D		IVEOTEA/B				
1821 - APP 1870 1821 - APP 117G 1821 - APP 117G					IVX04CA/P IVX02CA/C IVA03C				
1821-A9044/8						Resilient Isolators	line in head		
Ingl-Abbat							Analysis (7)	E	
1 R 2 ! - A' 1 1 - R						Motors	Analysis (9)	A, D	
1821-A9943					*1VC02CA/8	C.R. Condensing Unit	Analysis (7)	A, D	
					*IVXOICA/F	Switchgear Condensing Unit	Analysis (7)(8)	A, D	

exquipment 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.

TABLE (10.6
SEISHIC QUALIFICATION SUMMARY OF CATEGORY I MECHANICAL AND ELECTRICAL EQUIPMENT

Equipment	Equipment Name	Method of Qualification**	Equipment Function**	Inspection Availability	Equipment Number	Equipment Ne ne	Method of Qualification**	Equipment Function **	Inspection Availability
LERINI Lesini	Control Panels	Test (1)	A, D	Yes	*1VX06AA/F	Filter for Special Cotl	Analysia (7)	A, E	Yes
	HVAC Dampers	Test (4)	t		No.				
1Vf.11XA/8	HVAC Duct Silencers	Analysis (9)	2		100	Refrigeration Specialties		A, D	No
	HVAC Gravity Shutters	Test (2)	60 Yes		+1VC09SA/B	Essential Package Filter	Analysis (8)	A, E	
1VC001A/8 1VC002A/B	Flow Elements		ξ.	No	tvc10s	linits			Yes
191913	HVAC Punels	Analysis (8)	A, D	Yes		Diff. Pressure Indicating Switch MDL289-4859	Test (2)	•	
111.93J 101.14JA/8						bamping Framing	Analysis (?)		
	HVAC Instr.		A, D	No		l'an Motor	Analysis (7)	A, D	
	Armonia Montoring System					Mounting Brackets	Analysis (7)		10.5
						Pressure Transmitter	Test (5)	E	*
						Deluge Valves			No
						Temperature Transmitters			
HIGISTA/C	Cooling Water Reservoir Tank	Analysis (7)	C, D, E	740		Essential Piessure Cauges and Thermometers		A, D	
IIMIATA/F	C. U. F	·			*1PL12JA/C	has. Relay Panels	Test (5)	c, D	Yes
11.12.12.12.12.1	C.W. Expansion Tank	Analysis (7)	C, D, E		1PL67JA/B	Remote Shutdown Panels	Test (1)	0	
HIPOHITA/C	D.O. Storage Tank	Analysts (7)	C, D, E			Fire Extinguishing System	Test (5)	c. D	
A/VILGENT	RDCCW Expansion Tank	Analysis (8)	A, D, E		*10002PA/D	Fuel Oil Transfer Pumps	Analysis (7)	c, D	
ingisa/c	Alr Receiver Tank	Analysis (7)	C. D. E						
	Las. Trans. & Sensors	Analysis (4)	A, D						*
IVEDSSA/B IVEDSAA/D IVEDSSA/F	Special Coil Cabinets .	Analysis (7)	A, D		*IVCO3CA/B	Ventilation Farts	Analysis (7)	A. D	
tyreia tyreia tyreia				N		Concertal Pressure and Comperature Switches	Test (2)	A, D	

A) quipment required for cold shutdown based on scenario attached (1 success path for accomplishing shutdown).

<sup>\*\*</sup> The key to information referenced numerically appears on the last page of this table.

TABLE 110.6

SEISMIC QUALIFICATION SUMMARY OF CATEGORY I HECHANICAL 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)	8	Yes	-	ACTIVE VALVES			
	Freeze Protection Equipment		D, E	No	1E12F008	Gate Valve	Analysis (7)	c	tes
TVCOTYA/B	iss, Isolation Dampers	Analysis (7)	A, D	Yes	1E12F009	Gate Valve	Analysis (7)	c	
ISED/YA/B IVODEYA/B					1E12F048A/n	Angle Valve	Analysis (7)		
IVOOTYA/B IVOOTOYA/B									
	Numper Operators NH90 Series	Test (4)	A, D						
	Misc. Control Panels								
PM17J		:	D, E	:		-yrapasi)			
P1.79J			A, E						
	Switchgear for Recir. LFMG 4160V and 6900V	Test (3)	A, E						
	Pasentiel Control Room Isolation Check Dumpers	Analysis (7)	A, D						
	Limitorque Motor Operatora: NMB-10 5M6-1	Test (4)	A, D	* -					
	5110-2 5110-1					* 1		Sugu.	
	Post Accident Pri. Cont. Atm. Radio-activity Monitors	Test (5)	D						
	System		\	3. thu. 15 PM					
	Main Control Room Radiation Monitors		D	No					
			13.15						
				1 1 2 2 2					
		776	LAD!	1					

TABLE 110.6
SEISMIC QUALIFICATION SUMMARY OF CATEGORY I HECHANICAL 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
18125024A/B 18125040	RHR Globe Valve 10"	Analysis (7)	A, D	Yes	170001A/5 170002A/8 170003A/B	Primary Containment HVAC Butterfly Valve 18"	Analysis (7)	A. D	Yes
18519022	RCIC Globe Valve 4"	Analysis (7)	A, D	* *	1VQ004A/B			10.00	
1W5076A/B	Service Water Globe Valve 3"	Analysts (7)		ж.	1WS008A/B	Service Water Butterfly Valve 24"	Analysis (8)	A, D	
IC41F001A/n	Standby Liquid Control Globe Valve J"	Analysis (7)	A, D		*1W:033A/B				
11.121011A/8 11.121016A/8 11.121027A/8	HIR Cate Velve 4"	Analysis (7)	A, D		*1W:037A/D	Service Water Butterfly Valve 8"	Analysis (8)	A, D	•
1E12F049	" " " 3"	Analysis (7)	A, D		1E12FU51A/B 1E12FU65A/B	RHR Globe Valve 6" 2.5"		A, D	
1E 1F 309	LPCS Gate Valve 12"	Analysis (7)	A, D		11N012	Inst. NZ Supply Globe	Test (5) and	A, D	
1151F010 1F-1F012 1E51F031	RCIC Gate Valve 6"	Analysis (7)	A, D	*	11N013	" " Valve .75" 2.5"	Analysis (7)		
1E51F068	MCIC Gote Valve 8"	Analysis (7)	A, D		IRED48 IRED49	Equip. Drain to Radweata Globe Valve 2.5"	Test (5) and Analysis (7)	A, D	•
1FC029 1FC034	Fuel Pool Cooling and Clean- up Gate Valve 12"		A, 0	•	IRFOOL IRFOOL	Flon: Drain to Radwaste Globe Valve 2.5"	Test (5) and Analysis (7)	A, D	
IN1054 INR055	RECCW Gate-Valve 6"	Analysis (7)	A, D		1WS020 1WS025	Service Water Globe Valve 10" " " 12"	Test (5) and Analysis (7)	A, D	
Iwsn05	Service Water Cate Valve 30"	Analysis (7)	A, D	*	1ws030				
W-012A/B	Service Water Gate Valve 4"	Analysis (7)	A, D		41E12F003A/B 41E12F004A/C 41E12F004A/B	RIR Cate Valve 14" " " 20" 16"	Analysis (7)	A, D	
W5073A/0	Service Water Globe Valve 3"	Analysis (7)	A, D		1E12F015A/B	14"			
1171014A/B	Rilk Butterfly Valve 16"	Analysis (8) Analysis (8)	A, D		1E121F001	14" LPCS Cate Valve 20"			
VHOOTAR VHOOTA/B	Pumphouse Ventilation hutterfly Vaive 12"	Analysis (8)	A, D		1E12F012	LPCS Globe Velve 12"	Anelysis (7)	A, D	
VH003A/8 VH004A/5					1E12F087A/B 1E51F045	RHR Globe Valve 3"	Analysis (7)	A, D'	
N33F019	Recirculation Diaphram		A, D	No	IWS006A/B IWS007A/B	Service Water Butterfly Valve 30"	Analysis (7)	A, D	

<sup>\*</sup>Equipment required for cold shutdown based on scenario attached (1 success path for accomplishing shutdown).

<sup>\*\*</sup>The key to information referenced numerically appears on the last page of this table.

#### NOTES:

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

- Multifrequency random motion biaxial testing with Test Response Spectrum (TRS) enveloping the Required Response Spectrum (RRS).
- Test input to specimen based on single axis and single frequency excitation.
- Test input to specimen based on biaxial and single frequency excitation.
- Test input to specimen based on single axis and multifrequency excitation.
- 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
- P. 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.

#### SARGENT & LUNDY ENGINEERS CHICAGO

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

	April	Мау	June	July	August	Sept.	October
Equipment							
HVAC Dampers							
Valves							
Instrumentation		XXX					

$\bigotimes$	Engineering Eff	Fort		
	Implementation	of	Hardware	Modifications
	Testing			

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# SUMMARY OF EQUIPMENT MODIFICATIONS

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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	
lVG03CB	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	
lVC11XA	Control Room HVAC Return Fan Silencer 1A	Providing Anchorage to Foundation	
lVC11XB	Control Room HVAC Return Fan Silencer 1B	Providing Anchorage to Foundation	

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# SUMMARY OF EQUIPMENT MODIFICATIONS

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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	Vibration Isolators Strengthened
1VY04C	CSCS-HPCS Equipment Room Cooling Fan	Vibration Isolators Strengthened
lvy05A	CSCS-RHR Equipment Room Heat Exchanger	Additional Cabinet Anchorage & Coil Reinforcement
lvy06s	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

## SUMMARY OF EQUIPMENT MODIFICATIONS

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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		

### SUMMARY OF EQUIPMENT MODIFICATIONS

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Equipment Number	Description	Modification Description		
1REO1T	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	Reinforcing Lower Supports		
1FW02AB	High Pressure Feedwater Heater	Reinforcing Lower Supports		

# SUMMARY OF EQUIPMENT MODIFICATIONS

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Equipment Number	Description	Modification Description		
1VC08SA	Control Room HVAC Air Handling Unit 1A	Additional Anchorage Provided		
lVC08SB	Control Room HVAC Air Handling Unit 1B	Additional Anchorage Provided		
lino3DA	Drywell Pneumatic Sys. Dryer 1A Skid (1IN07FA,B; 1IN11FA,B)	Anchorage Reinforcement Provided		
lin03DB	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	4.0V 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		

#### SUMMARY OF EQUIPMENT MODIFICATIONS

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		Modification Description
1AP10E	480V ESS Substation 1B-2	Additional Ancherage 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
lAP14EA	480V ESS Substation 1C-2A	Additional Anchorage Provided
lVG01YB	Essential Recirculation Fan Isolation Damper	Modification of Operator Mounting and/or Hangers
LVQ01Y	Primary Containment Purge Isolation Damper	Modification of Operator Mounting and/or Hangers
LVQ02Y	Primary Containment Purge Isolation Damper	Modification of Operator Mounting and/or Hangers

# SUMMARY OF EQUIPMENT MODIFICATIONS

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Equipment Number	Description	Modification Description
lVPOlYA	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
lVP11YA	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				Page A1 of 57  Rev. 00  Date 4-15-81
Description	S C e 1 i a s s · s	Location	Qualification Method	Results
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
6.9 KV Switch Group	λ	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
	Description  4.16 KV Switch Group	TE Imperial  ner 4130-00  Description  S C e 1 i a s s s s s 4.16 KV Switch Group  A	TE Imperial  Description  Description  A.16 KV Switch Group  EQUIPMENT  S C e 1 i a 3 S S S  Location  A Auxiliary	EQUIPMENT QUALIFICATION  Ber 4130-00  S C 1 1 a 3 S S C 1 a Auxiliary Resonance Search 1-50 Hz  A Auxiliary Resonance Search 1-50 Hz  Random Motion Biaxial Test FB/V and SS/V, 1-50 Hz  Random Motion Biaxial Test FB/V and SS/V, 1-50 Hz  Random Motion Biaxial Test FB/V and SS/V, 1-50 Hz

Page Al of 57 Specification No. H-2157 SUMMARY OF Vendor: ITE Imperial Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment eis Description Location Results Method Number Principal resonant frequen-Aux. Bldg. Random Motion Biaxial Test. 480 V Substation. 1AP05E cies were determined to be: EMD-000606 1APO6E A resonance search test 1APO9E FB/V: 6,8,11,19,23 & 33 Hz. was performed from 0.5 to SS/V: 4.5,13,18,23,30 & 1AP10E 50 Hz. This was followed 43 Hz. TRS envelopes RRS 1AP13E by Random Motion Tests from Functional Operability 0.5 Hz to 50 Hz Verified Aux. Bldg. Random Motion Biaxial Test. Principal Resonant frequen-1AP05E 750 KVA Transformer EMD-001235 cies were determined to be: (Associated with 480V 1AP06E FB/V: 2,7,9,12,15,17.5,21 EMD-001802 Substation). 1APO9E A resonance search test was & 30 Hz. SS/V: 4.4,7,8.5, 1AP10E performed from 2 to 30 Hz. 12,17 & 20 Hz. The TRS 1AP13E This was followed by Random envelopes the RRS Motion Tests from 0.5 to Functional Operability 100 Hz Verified

Specificat: Vendor: T Wm. H. Zim Project No	ner			MMARY OF T QUALIFICATION	Page AB of 57  Rev. 00  Date 4-15-81
Equipment Number	Description	Sei ass	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.
lAP16EA lAP16EB lAP16EC lAP16ED lAP16EE lAP16EF	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.

Specificat Vendor: IN Wm. H. Zim Project No	mer			MMARY OF F QUALIFICATION	Page <u>A4</u> of <u>57</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C 1 a s s s	Location	Qualification Method	Results
IAP20EA IAP20EB IAP20EC	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.

Page N5 of 57 Specification No. H-2159 SUMMARY OF Vendor: Stewart & Stevenson Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment Location Description Results Number Method 1DG01KA Diesel Generator Aux. Bldg. Finite Element Dynamic The lowest frequency A obtained from the program Units Analysis. 1DG01KB is 15 Hz. Element stresses EMD-002581 1DG01KC representing the various EMD-012939 A finite element Dynamic parts of the DG are within Analysis and Static Analyallowable limits as are 1DG02AA Diesel Generator sis were performed using bolt stresses. Deflection 1DG02AB Heat Exchangers the computer program ANSYS. of the generator shaft is 1DG02AC A value of 1% damping was calculated to be 0.005 1DG03AA used. The maximum inch compared to an actual 1DG03AB stresses in the component air gap of 0.392 inch. 1DG04AA parts of the assembly and 1DG04AB bolts are determined. The maximum generator shaft deflection is also computed. Aux. Bldg. Finite Element Dynamic The lowest frequency 1DG05KA DG Exhaust Silencer obtained from the program 1A, 1B, 1C, 1A, 1B, Analysis. 1DG05KB is 30.11 Hz. Stresses EMD-002581 1C 1DG05KC A finite element Dynamic within allowable limits. 1DG06KA Analysis and Static Analy-1DG06KB sis were performed using 1DG06KC ANSYS with 1% damping. Stresses in the equipment were calculated.

Stews Simmer No. 4	Specification No. H-2159 Vendor: Stewart & Stevenson Wm. H. Zimmer Project No. 4130-00		SUM EQUIPMENT	SUMMARY OF EQUIPMENT QUALIFICATION	Rev. 00 Date 4-15-81	
	Description	00-40. 0-4000	Location	Qualification Method .	Results	
Die	Diesel Generator Control Panels 1A, 1B, 1C	4	Auxiliary	Random Motion Biaxial Tests FB/V and SS/V, 1-40 Hz	TRS envelopes RRS. Functional Operability Verified.	
Spi	Diesel Generator Air Compressors	×	Auxiliary			
16	Exhaust Expansion Joints 16 Cylinder D.G.	Δ	Auxiliary			

Page A7 of 57 Rev. 00 Date 4-15-81	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	
SUMI	Location	Auxiliary
	Ω ⊕ · · α · · Ο ⊢ · • α α α	
Stewart & Stevenson Zimmer No. 4130-00	Description	Exhaust Expansion Joints 12 Cylinder D.G.
Specification No. Vendor: Stewart & Wm. H. Zimmer Project No. 4130-	Equipment Number	1DG20EA 1DG20EB 1DG20EC 1DG21EA 1DG21EC 1DG22EA 1DG22EB 1DG22EB

Page A8 of 57 Specification No. H-2163 SUMMARY OF Vendor: Gould Rev. 00 EQUIPMENT QUALIFICATION Date 4-15-81 Wm. H. Zimmer Project No. 4130-00 Oualification Equipment a Location Results Description Method Number Random Motion Biaxial Test TRS envelopes RRS. The Aux. Bldg. 1DC01EA 250V Battery 1A equipment passed the test EMD-003689 125V Battery 1A, 1B, 1C 1DC11EA without compromise of A random motion biaxial 1DC11EB type test was performed structure or electrical 1DC11EC function. from 1 to 40 Hz. 5 OBE 1DC21EA 24/48 V Battery 1A,1B tests were followed by 1 1DC21EB SSE test in each of two orientations. The tests were of 30 second duration each and were all analyzed at 2% damping: Natural frequencies in each Aux. Bldg. Static Analysis. Battery Racks . 1DC01EA direction: h1=48.59 Hz EMD-004697 (equipment number 1DC11EA  $h_2 = 43.43 \text{ Hz}$ Fundamental Natural Fresame as battery). 1DC11EB quencies were determined V=46.60 Hz 1DC11EC in each direction. A (rigid). Stresses within 1DC21EA static analysis was then allowable limits. 1DC21EB performed using ZPA values Structrual Integrity from 1/2% OBE and 1% DTT Demonstrated. curves. Accelerations: OBE / DBE  $h_1 = 0.20/0.32$  $h_2 = 0.18/0.28$ V=0.20/0.30

Page A9 of 57 Specification No. H-2164 SUMMARY OF Vendor: Power Conversion Products Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4/15-81 Project No. 4130-00 Oualification Equipment Description Location Results Method Number Random Motion Biaxial Test TRS envelopes RRS. The Aux. Bldg. 250V Battery Charger 1DC02EA, equipment passed the test EMD-003274 EB 1A A random motion biaxial without compromise of 1DC12EA. 125V Battery Charger structure or electrical type test was performed EB, EC 1A, 1B, 1C 125V Battery Charger from 1 to 33 Hz. 5 OBE function. 1DC13EA tests were followed by 1 Spare SSE test in each of two 24V Battery Charger IDC22EA, 1A, 1B, 1C, 1D orientations. The tests EB, FC, ED were of 30 second duration each and were analyzed at 1/2% OBE and 1% DBE.

Specification No. H-2165 Page All of 57 SUMMARY OF Vendor: ITE Imperial Rev. EQUIPMENT QUALIFICATION Wm. H. Zimmer Date + 18-81 Project No. 4130-00 Equipment Qualification Description Location Results Number 8 8 Method 1IP01EA 120 VAC Distribution Aux.Bldg. A Pseudo-Biaxial Sine Sweep Natural Frequencies: 1IP01EB Panel Resonance Search 1-35 Hz Front to Back: 7-8.75, 35 Hz 120 VAC Distribution 1IP03E W Side to Side: 8-10, 35 Hz 1IPO4E Panel Input Accelerations Pseudo-Biaxial Sine Dwell for 1-26 Hz range, Narrow greater than ZPA and TRS Band Pseudo-Biaxial Random envelopes RRS. Functional Motion Test for 3.94-10.26 operability verified. Hz range. Sine Beat Pseudo-Biaxial Test at 8.75, 10 and 35 Hz.

Specification No. H-2166 Vendor: ITE Imperial

SUMMARY OF EQUIPMENT QUALIFICATION

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Wm. H. Zimmer

50 VDC Main istribution Panel 1A	A	Aux.Bldg,		
			Resonance Search 1-35 Hz	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.
50 VDC Motor Control enters	Α	RX.Bldc.	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 Randor 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 enveloped RRS, function operability verified for original qualification criteria. Requalifications to T-Quencher Criteria not completed.
		0 VDC Motor Control A		Pseudo-Biaxial Test at 8.75,10 and 35 Hz.  Pseudo Biaxial Sine Sweep Resonance Search 1-35 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

Specification No. H-2166 Page All of 07 SUMMARY OF Vendor: ITE Imperial Rev. EQUIPMENT QUALIFICATION Wm. H. Zimmer Date | | | Project No. 4130-00 Equipment Oualification Description Location Results Number Method S Natural Frequencies: 125 VDC Distribution Aux.Bldg. Pseudo-Biaxial Sine Sweep 1DC14EA Front to Back: 7-8.75,35 Hz Resonance Search 1-35 Hz 1DC14EB Panels 1A, 1B, 1C Side To Side: 8-10, 35 Hz 1DC14EC Input Accelerations Pseudo-Biaxial Sine Dwell greater than ZPA and TRS for 1-26 Hz range. Narrow envelopes RRS.Functional Band Pseudo-Biaxial Randon Operability Verified. Motion Test for 3.94-10.26 Hz range. Sine Beat Pseudo-Biaxial Test at 8.75,10 and 35 Hz. Pseudo-Biaxial Sine Sweep Natural Frequencies: Aux.Bldg. 1DC36EA 24/48 VDC Distribution A Frent to Back: 7-8.75, 35 Hz Resonance Search 1-35 Hz Panels 1DC26EB Side to Side: 8-10, 35 Hz Input Accelerations Pseudo-Biaxial Sine Dwell greater than ZPA and TRS for 1-26 Hz range.Narrow envelopes RRS.Functional Band Pseudo-Biaxial Randon Operability Verified. Motion Test for 3.94-10.26 Hz range.Sine Beat Pseudo-Biaxial Test at 8.75,10 and 35 Hz.

Specification No. H-2167 Vendor: Conax Corporation

#### SUMMARY OF EQUIPMENT QUALIFICATION

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Equipment Number	Description	e i ass	Location	Qualification Method	Results
1AP50EA, EM 1AP50EF EJ 1AP50ED, EL, ES, ET, EU 1AP50EB, EE, EG, EK 1AP50EC, EH, EN	Low Voltage Power Elec. Penetration Assembly E-1, E-16 L.V. Control Elec. Penetration Assembly E-8, E-12 L.V. Instrument Service Elec. Penetration Assembly E-5, E-15, E-3, E-11, E-14. L.V. Neutron Monitor Elec. Penetration Assembly E-2, E-6, E-9, E-13 Control Rod Position Indicator L.V. Elec. Penetration E-4, E-10, E-17. Medium Voltage Power Elec. Penetration Assembly E-18, E-19.	P P	Rx. Bldg. Rx. Bldg. Rx. Bldg. Rx. Bldg. Rx. Bldg.	Static Analysis EMD-000599 EMD-019939 Natural frequency calculations were performed to justify a static analysis. The required acceleration in each direction was: (OBE/DBE): h1 = 0.34/0.48 h2 = 0.44/0.50 V = 0.37/0.45.	The natural frequencies calculated vere:  h1 = 143 Hz h2 = 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.

Page A14 of 57 Specification No. H-2175 SUMMARY OF Vendor: United Electric Controls Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment Results Description Location Method Number S Aux. Bldg. Finite Element Dynamic Genetator and Station There were a total of 21 1PM01J Auxiliary Control Analysis. mode considered in the Sad. EMD-004798 analysis. The lowest frequency obtained was 9.59 Ti ne - Condenser EMD-004845 1PM02J Aux. Bldg. Hz. The resulting stresses a - xiliaries Control EMD-018429 at all locations were with-A dynamic analysis was E. rd. performed by the Engineerin allowable limits for Aux. Bldg. 1PM03J Heaters and ing Mechanics Division on both assembly #1 and Auxiliaries Control two "assemblies". Assembly assembly #2. Structural Boare. #1 included panels 1PMOlJ, Integrity Demonstrated. Aux. Bldg. 1PM04J Generator and Trans-02J. and 03J. Assembly former Recorder Pnael #2 included 1PM07J and Station Totalizing P Aux. Bldg. 1PM05J 1PM08J. Remaining Panels Panel. qualified by similarity. Aux. Bldg. 1PM06J Leak Detection Panel P Aux. Bldg. HVAC and SGTS Panel 1PM07J 1PM08J Station Services Panel Aux. Bldg. Aux. Bldg. Fire Protection and PM09J Deluge Valve Control Panel. 1PM13J Excess Flow Check P Aux. Bldg. Valves Status Panel. 1PM16J 345KV Switchyard P Aux. Bldg. Mimic Bus Panel.

Specification No. H-2177 Page AIS of 57 SUMMARY OF Vendor: Fisher Controls Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-8 Project No. 4130-00 Equipment Qualification e Description a Location Results Number Method SS CONTRACTOR - CONTRACTOR SUPERIOR CONTRACTOR MANAGEMENT Aux. Bldg. Finite Element Dynamic 1PA02J Misc. Auto. Control Natural frequencies were Panel. Analysis. found to be: EMD-003796 18.74 Hz EMD-004328 18.87 Hz A finite element dynamic 21.28 Hz analysis was performed 23.73 Hz using the program 28.32 Hz STARDYNE to determine The stresses calculated the natural frequencies by the program are within of the panel. An equivathe allowable limits. lent static analysis was Structural Integrity then done to determine Demon ated. 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 = 1.2/1.75Stresses from each load case were auded using absolute sum method.

Specification No. H-2185 Vendor: Bingham Willamette

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Rev. 00

Date 1-15-8

Wm. H. Zimmer . Project No. 4130-00

Project No.	4130-00			Date 1-15-8		
Equipment Number	Description	Seis.	Location	Qualification Method	Pesults	
lWR01PA lWR01PB lWR01PC lWR01PD	RBCCW Pumps	A	Reactor Building	Static Analysis Lowest f <sub>n</sub> >66 Hz	Acceleration levels used:  H <sub>1</sub> = 0.30g, H <sub>2</sub> = 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.	
lE12C003 lE21C002 lE22C003 lE51C003	CSCS Water Leg Pumps	A	Reactor Building	Static Analysis Pump freq.: 49.7 Hz Driver freq.: 252 Hz	Acceleration levels used: H <sub>1</sub> = 0.2 g, H <sub>2</sub> = 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 SUMMARY OF Page 17 of 57 Vendor: Bingham Willamette (Pumps)
Elec. Mach. Mig. Co. (Motors)
Wm. H. Zimmer Rev. 00 EQUIPMENT QUALIFICATION Date 1-15-8 Project No. 4130-00 S C 1 a s s s Equipment Qualification Description a Location Results Number Method 1WS01PA Service Water Pumps & Service Static Analysis, Pump Acceleration levels used:  $H_1 = H_2 = 0.90g$ , V = 0.65gCritical stress = 24,573 psi 1WS01PB Water Natural frequency: 45.9 Hz Pump Motors 1WS01PC Pump 1WS01PD Structure (allowable = 26,250 psi)Deflection = 0.0067" (Allow. = 0.011")Static Analysis, Motor Acceleration levels used: Natural frequency: 32 Hz  $H_1 = H_2 = 1.10g$ , V = 0.78gCritical stress = 11,250 psi (allowable = 40,000 psi)Deflection = 0.00202" (Allowable = 0.024" max.)

Specification No. H-2237 Page 1116 of 577 SUMMARY OF Vendor: Rex Chainbelt Co. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date | | 0 % Project No. 4130-00 S C 1 1 a Location s s Equipment Qualification Description Results Number Method 1WS03FA Traveling water screens W Service Detailed dynamic analysis Analysis by response spectrum IWS03FB Water Pump Natural freq. 17 Hz Critical stress = 26.26 ksi IWS04FA Structure (Allowable = 38.1 ksi) 1WS04FB

Page of 50. Rev. Date	Results	Analysis by response spectrum Critical stress = 29,147 psi (Allowable = 30,920 psi)	UBC acceleration = 0.05 g Critical stress = 1,230 psi (Allowable = 19,800 psi)
SUMMARY OF ENT QUALIFICATION	Qualification Method	Detailed dynamic analysis Natural frequencies: 33 Hz	Static Analysis UBC, Zone 1
SUMN	Location	Service Water Pump Structure	Cooling
	Ω ⊕ - α α • Ο Η • α α α	Ω4	3
on No. H- 2240 P. Adams er 4130-00	Description	Service water strainers	water strainer
Specification No. Vendor: R. P. Adams Wm. H. Zimmer Project No. 4130-	Equipment Number	IWS02FA IWS02FB	1CW03F

Specification No. H-2245 Page of 57 SUMMARY OF Vendor: Yuba Heat Transfer Co. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 S C e 1 Location s s s . s Equipment Qualification Description Results Number Method 1WRO2AA RBCCW Heat Exchanger P Reactor Simplified Dynamic Analysis Acceleration levels used: 1WR02AB  $H_1 = 0.56g, H_2 = 0.46g,$ Building Natural freq .: IWR02AC  $H_1 = \text{Rigid}, H_2 = V = 29.1, 32.6 Hz.$ V = 1.7 gCritical stress = 29,343 psi (Allowable = 35,000 psi)Structural Integrity Demonstrated for original qualification criteria. Requalification to T-Quencher criteria not completed.

Page <u>Alol</u> of <u>577</u> Rev. <u>33</u> Date <u>41-15-81</u>	Results	Critical stress = 19,293 psi (Allowable = 25,500 psi) Deflections are negligible Structural Integrity Demonstrated.
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	Detailed dynamic analysis Natural freg.:  H <sub>1</sub> = 37.2 Hz, H <sub>2</sub> 37.2 Hz, V = 13.6 Hz (' modes)
SUM EQUIPMENT	Location	Reactor Building
	S P. 6 S	Δ,
Specification No. H-2256 Vendor: Designed by S&L Wm. H. Zimmer Project No. 4130-00	Description	Nitrogen cylinder rack
Specification Vendor: Design Wm. H. Zimmer Project No. 4	Equipment Number	11N12S 11N13S

Specification No. H-2273 Vendor: Graver Tank

SUMMARY OF EQUIPMENT QUALIFICATION Page ADD of 57 Rev. 00

Equipment Number	Description	S C l a a s s	Location	Qualification Method .	Results
1B21-A001A 1B21-A001B 1B21-A001C 1B21-A001D	MSIV Accumulator tank	P	Prim. Cont.	Static analysis Natural freq.: H <sub>1</sub> = H <sub>2</sub> = V = 34.6 Hz	Accel. levels used: H <sub>1</sub> = 0.55g, H <sub>2</sub> = 0.55g, V = 1.20g Critical stress = 16,955 psi (Allowable = 21,600 psi)
				Static analysis Natural freq.: H <sub>1</sub> = 52 Hz, H <sub>2</sub> = 122 Hz, V = 36 Hz	Accel. levels used: H <sub>1</sub> = 2.1 g, H <sub>2</sub> = 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 <sub>1</sub> = H <sub>2</sub> = V = 34.6 Hz	Accel. levels used: H <sub>1</sub> = 0.55g, H <sub>2</sub> = 0.55g, V = 1.20g Critical stress = 16,955 psi (Allowable = 21,600 psi)
				Static analysis Natural freq.: H <sub>1</sub> = 390 Hz, H <sub>2</sub> = 1,725 Hz V = 107 Hz	Accel. levels used: H <sub>1</sub> = 0.36g, H <sub>2</sub> =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		SUMMARY OF EQUIPMENT QUALIFICATION			Page 103 of 57  Rev. 00  Date 11-13-71	
Equipment Number	Description	S C e 1 i a s s	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 <sub>1</sub> = H <sub>2</sub> = V = 35 Hz	Accel. levels used: H <sub>1</sub> = 0.55g, H <sub>2</sub> =0.55g V= 1.20g Critical stress = 16,241 psi (Allowable = 21,600 psi)	
				Equivalent static analysis Natural freq.: H <sub>1</sub> = 19.7 Hz, H <sub>2</sub> = 35 Hz, V= 44.5 Hz	Accel. levels used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 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 <sub>1</sub> = H <sub>2</sub> = V = 34.6 Hz	Accel. levels used: H <sub>1</sub> = 0.55g, H <sub>2</sub> = 0.55g V= 1.20g Critical stress = 14,892 psi (Allowable = 16,440 psi)	
				Equivalent static analysis Natural freq.: H <sub>1</sub> = 854 Hz, H <sub>2</sub> = 398 Hz, V = 76 Hz	Accel. levels used: H <sub>1</sub> = 1.2 g, H <sub>2</sub> = 1.2 g V= 2.3g Critical stress = 29,238 psi (Allowable = 29,520 psi)	

Specification No. H-2288 Page ASY of 57 SUMMARY OF Vendor: Refer to Equip. Status Sheets Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification 1 Location Description Results Number Method SS SGTS equipment trains IVG05SA A Reactor Detailed dynamic analysis Max. stresses well within 1VG05SB Natural freq .: Building allowable limits at critical 14.64 Hz, 31.9 Hz, 40.4 Hz sections. Deflection analysis demonstrates operability of units. SGTS primary supply Fans 1VG02CA Reactor Static analysis (fan-motor-Accel. levels used: 1VG02CB shaft assembly) Puilding  $H_1 = 9.45g, H_2 = V = 9.0g \text{ (Assem.)}$ Natural freq.: 229 Hz  $H_1=1.9g$ ,  $H_2=3.2g$ , V=1.2g (Motor) Min. margin of safety (motor shaft) = 3.16Min. margin of safety (foundation bolts) = 1.1Min. margin of safety (base angle) = 1.0Max. rotor assembly def = 0.002" (Allowable = 0.025")Fan-motor assembly subjected to limiting-load analysis; assembly capable of withstanding 8.10 q's

Specification No. H-2288 Page 100 of 57 SUMMARY OF Vendor: Rerer to equip. status sheets Rev. EQUIPMENT QUALIFICATION Wm. H. Zimmer Date Project No. 4130-00 Sei Equipment Qualification Description a Location Results Number Method SS 1VG03CA SGTS cooling fans A Reactor Static analysis (fan-motor Accel. levels used: 1VG03CB Building  $H_1 = H_2 = 9.45 \text{ g, V} = 9.0 \text{ g (Assem.)}$ assembly) Natural freq.: 182 Hz H<sub>1</sub>=1.9 g, H<sub>2</sub>=3.2g, 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 SGTS heating coils Detailed Dynamic Analysis A Reactor Accel. levels used: 1VG04AB Building  $H_1 = 1.0 \text{ g}, H_2 = 1.2 \text{ g},$ Natural freq .:  $V = 0.9 \, g$  $H_1 = 37.7 \text{ Hz}, H_2 = 11.1 \text{ Hz},$ Critical stress = 18,300 psi V= 14.3 Hz (Allowable = 38,800 psi)(System freq. = 56.6 Hz) Operability demonstrated for original qualification criteria. Requalification to T-Quencher criteria not completed.

Specification No. H-2288
Vendor: Refer to equip. status sheets

SUMMARY OF EQUIPMENT QUALIFICATION

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Project No.		SC			Date 4 15 71
Number	Description	S C e 1 i a s s	Location	Qualification Method	Results
lVGllYA lVGllYB	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.: H1=V= 90.6 g, H2= rigid	Accel. levels used: H <sub>1</sub> = 10 g, H <sub>2</sub> = 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, $V=1.0$ Critical stress = 10,333 psi (Allowable = 20,000 psi)
				nadati freq 90 nz (min.)	Accelerat H (Result Critical

Specification No. H-2288 Page No Tof 57 SUMMA RY OF Vendor: Refer to equip. status sheets EQUIPMENT QUALIFICATION Rev. Wm. H. Zimmer Date Project No. 4130-00 S C l a s s s Equipment Qualification Description a Location Results Number Method 1VG12YA Equivalent static analysis Accel. levels used: 1VG12YB Natural freq. : 70 Hz.  $H_1 = 1.0 g$ ,  $H_2 = 1.0 g$ , (cont'd) V= 1.0 q Critical stress = 12,686 psi (allowable = 21,600 psi)Critical deflection = 0.006" (allowable = 0.021")Hepa filter banks P 1VG05SA Static analysis Accel. levels used: 1VG05SB Natural freq .:  $H_1 = 0.52g$ ,  $H_2 = 0.70 g$ ,  $H_1 = H_2 = 33.3 \text{ Hz}, V = \text{rigid}$ V = 0.90gMin. margin of safety = 2.17 Max. relative displacement = 0.043" which will not cause leakage past gasket interface.

Specification No. H-2288 Page Hos of SUMMARY OF Vendor: American Air Filter EQUIPMENT QUALIFICATION Rev. Wm. H. Zimmer Date | Project No. 4130-00 Equipment Qualification a Location Description Results Number Method Hepa filters Operability (structural Uniaxial sinusoidal test IVG05SA integrity) verified. 1VG05SB 2-8 Hz, 3.0 g input 8-600 Hz, 2.0 g input Natural freq. :  $H_1 = H_2 = 33.3 \text{ Hz V} = \text{rigid}$ Limit-load analysis performed SGTS pre-filters P 1VG05SA Statis analysis Natural freq : 226 Hz and indicates failure at 366 g's 1VG05SB Allowable stress = 22,000 psi Min. deflection margin of safety = 2.62No resonances found 1VG05SA Uniaxial sine sweep Solenoid valve & piping A 1-35 Hz; input: H1=H2= 4.5 g, 1VG05SB V = 3.0 q;Sweep: 15 sec./cycle Require acceleration levels: Pseudo biaxial sine dwell @ 5, 10, 15, 21, 27, 31, 33 Hz  $H_1=H_2=1.12$  g, V=1.28 g Input:  $H_1 = H_2 = 4.5 \text{ g}, V = 3.0 \text{ g}$ Structural integrity and operability demonstrated.

Specification No. H-2288 Page Folof J SUMMARY OF Vendor: American Air Filter EQUIPMENT QUALIFICATION Rev. Wm. H. Zimmer Date Project No. 4130-00 Equipment Oualification e Description a Location Results Number Method SS Solenoid Valve & Piping Uniaxial Sine Sweep 1VG05SA No resonances found IVG05SB 1-35 Hz; Input: H<sub>1</sub>=H<sub>2</sub>= 4.5 g V = 3.0 g; Sweep: 15 sec/cycle Pseudo Biaxial Sine Dwell Require acceleration levels: 0.5, 10, 15, 21, 27, 31, 32 Hz  $H_1 = H_2 = 1.12$  g, V = 1.28 g Inpute: H,=H2= 4.5 g V= 3.0 g Structural integrity and operability demonstrated. Moisture Separator 1VG05SA Uniaxial Sine Sweep Natural frequencies: 26 Hz 2-33 Hz (double sweep); 1VG05SB Input:  $H_1=H_2=0.2g$ , V=0.1gBiaxial Random Motion Horiz. TRS Envelops RRS 1.25 - 31.5 Hz, 1/3 Octave 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.

SUMMARY OF EQUIPMENT QUALIFICATION Page <u>M 30 of 57</u> Rev.

Project No. 4130-00  Date State						
Equipment Number	Description	e 1 i a s s	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 <sub>1</sub> =H <sub>2</sub> = 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 <sub>1</sub> =H <sub>2</sub> = 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: >36 Hz	Acceleration levels used (Peak x 1.5): H <sub>1</sub> =H <sub>2</sub> =3.0g, V = 3.3g Critical stress = 13,560 psi (allowable = 28,800 psi) Critical deflection = 0.00467" (allowable deflection= 0.062"	

131 of 57 Specification No. H- 2290 Page SUMMARY OF Vendor: Buffalo Forge Co. Rev. EQUIPMENT QUALIFICATION Wm. H. Zimmer Date Project No. 4130-00 Qualification Equipment Description Location Results Number Method Equivalent Static Analysis Acceleration levels used: Aux. Bldg. SWGR Heat Removal Fans A 1VX02CA  $H_1 = 3.0 \text{ g}, H_2 = 3.0 \text{ g},$ Natural frequencies: >79 Hz 1VX02CC IVX02cC  $V = 3.2 \, g$ Critical Stress = 5,641 psi (Allowable Stress = 32,400 psi) Critical deflection = 0.0094" (Allowable Deflection= 0.093") Acceleration levels used: Aux. Bldg. Ecuivalent Static Analysis SWGR Heat Removal Fans A 1VX04CA Natural frequencies: >31.4 Hz (Peak x 1.5): 1VX04CB  $H_1=H_2=3.0g$ , V=3.3g1VX04CC 1VX04CD Critical Stress = 19,022 psi 1FX04CE (Allowable = 28,000 psi)IVX04CF Critical deflection = 0.0281" (Allowable deflection = 0.14") Acceleration levels used: Equivalent Static Analysis 1VY01C CSCS Equip. Room Cooling Reactor A Natural frequencies: >36 Hz (Peak x 1.5): 1VY02C Building Fans  $H_1=H_2=3.0q$ , V=3.3q1VY04C Critical stress = 13,560 psi (Allowable = 28,800 psi)Critical deflection = 0.00467" (Allowable deflection = 0.062") Equivalent Static Analysis Acceleration levels used: (Peak x 1.5): Natural frequencies: >36 Hz  $H_1=H_2=3.0q$ , V=3.3qCritical stress = 21,874 psi (Allowable = 28,800 psi)Critical deflection = 0.0047"

(Allowable deflection = 0.015")

Specification No. H- 2290 Vendor: Buffalo Forge Co.

SUMMARY OF EQUIPMENT QUALIFICATION

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ate 4-15-81

Wm. H. Zimmer

Project No	. 4130-00			Date -1-10-81		
Equipment Number	Description	Se 1 1 ass	Location	Qualification Method	Results	
1VY03C	CSCS Equip. Room Cooling Fan	A	Reactor Building	Equivalent Static Analysis Natural frequencies: >75 Hz	Acceleration levels used: (Peak x 1.5): H <sub>1</sub> =H <sub>2</sub> =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: H1=H2=2.2g, V = 2.3g Critical stress = 15,762 psi (Allowable = 28,800 psi) Fans are to be hard mounted	

Specification No. H-2293 SUMMARY OF Page Allof Sof Vendor: Trane Co. EQUIPMENT QUALIFICATION Rev. 00 Wm. H. Zimmer Project No. 4130-00 Date | | | | | Equipment Qualification Description a Location Number Results Method 1VC02CA Control Room Condensing Aux. Bldg. Detailed Dynamic Analysis Critical stress = 3,500 psi IVC02CB Units (Allowable = 3,500 psi) Critical deflection = 0.0039" (Allowable deflection= 0.0352") 1VX01CA SWGR Heat Removal Aux. Bldg. Detailed Dynamic Analysis A Critical stress = 33,986 psi 1VX01CB Condensing Units (Allowable = 34,000 psi)1VX01CC Critical deflection = 0.00198" IVX01CD (Allowable deflection= 0.0317") 1VX01CE 1VX01CF 1PLB3J HVAC Condensing Unit Aux. Bldg. Biaxial Random Motion Test A TRS envelops RRS. Structural 1PLB4J Control Panels for 1-40 Hz integrity and operability 1PLB5J 1VC02CA/F verified. 1PLB6J Fragility Test Min. fragility level (random 1PLB7J wave):  $H_1=5.0g$ ,  $H_2=V=3.0g$ 1PLB8J 1PLB9J 1PLC1J

Specification No. H-2298 Vendor: Refer to Equip. Status Sht's.

### SUMMARY OF EQUIPMENT QUALIFICATION

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Wm. H. Zimmer Project No. 4130-00				. doneti I dal I da	Date 4-18-81	
Equipment Number	Description	S C e 1 i a s s s	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 <sub>1</sub> =5.7g, H <sub>2</sub> =11.4g, V = 4.2g Critical stress = 1,349 psi (Allowable = 1,721 psi) Structural intergrity verified.	
lFEVG001A lFEVG001B	Air Flow Monitors	A	Reactor Building	Simplified Dynamic Analysis Natural frequencies: 117,405 Hz	Acceleration levels used: (Req'd (Required): H1=H2=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): H1=H2=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

### SUMMARY OF EQUIPMENT QUALIFICATION

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Date 4-15-81

	SC			
Description	e 1 i a s s		Qualification Method	Results
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. 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
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 <sub>n</sub> >35Hz.  Structural integrity and oper bility demonstrated by finite element analysis (response spectrum) hand calculations supplemented the analysis (H <sub>1</sub> =H <sub>2</sub> =1.5, V = 2.5g):  Critical stress = 9,800 psi
	Control Room Ionization Detection Relay Panels and Diesel Generator Room	Control Room Vent and Air Cond. Equipment Control Panel  Control Room Ionization Detection Relay Panels and Diesel Generator Room	Control Room Vent and Air Cond. Equipment Control Panel  Control Room Ionization Detection Relay Panels and Diesel Generator Room	Control Room Vent and Air Cond. Equipment Control Panel  Control Room Ionization Detection Relay Panels and Diesel Generator Room  A Aux. Bldg. Simplified Dynamic Analysis/ Uniaxial Sine Dwell Test  Aux. Bldg. Simplified Dynamic Analysis/ Uniaxial Sine Dynamic Analysis/ Uniaxial Sine Sweep Test/ Uniaxial Sine Sweep Test/ Uniaxial Sine Dwell Test

Specification No. H- 2299 Page A36 of 57 SUMMARY OF Vendor: Powers Regulator Co. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification Description Location Results Number Method Service Water Pump Cooling Service Uniaxial Sine Sweep Test Closed-door case: Lowest 1PL6LJA Water Pump 0-35 Hz f,>35 Hz response - 0.03 g's. 1PL61JB Panels Open-door case: Structure 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=0.14gCritical section: factor of safety = 15 (min.), based on ZPA + 10% margin acceleration levels. Operability not effected. Uniaxial Sine Sweep Test No resonant frequencies below 1PT.69.TA SGTS Control Panels A Reactor 0-40 Hz 35 Hz. Building 1PL69JB Static Analysis Acceleration levels used:  $H_1=0.81g$ ,  $H_2=0.74g$ , V=4.5g(Critical stress = 36,000 psi) Structural integrity verified. Aux. Bldg. Uniaxial Sine Sweep Test Panel frequency: >33 Hz 1PL91J SWGR Heat Removal Control (Open or closed door case) Door Frequency: 31.2, 31.9 Hz (Damping: 2.9, 2.5%) Response - 15h's.

Rev. Date	Results	Acceleration levels used:  H <sub>1</sub> =0.32, H <sub>2</sub> =0.34, V = 0.70g Plus 1% margin. Stresses were a factor of 20 to 200 below yield. Operability not effected.
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Static Analysis
	C 1 a Location s	
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Specification No. H-2299 Vendor: Powers Regulator Co. Wm. H. Zimmer Project No. 4130-00	Description	
Specification Vendor: Powers Wm. H. Zimmer Project No. 4	Equipment Number	IPL91J

Specification No. H-2805 Page / 1:8 of 57 SUMMARY OF Vendor: Bishopric Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4 5 8 Project No. 4130-00 Equipment Qualification l Location Description Results Number Method Static Analysis Aux. Bldg. Diesel Oil Day Tanks IDG07TA Natural Freq. H<sub>1</sub>=H<sub>2</sub>=33. Hz V=182. Hz 1A, 1B, 1C OBE/SSE Input: 1DG07TB 1DG07TC  $H_1 = 0.2g/0.41g^{(NS)}$ H<sub>2</sub>=0.17g/0.31g<sup>(EW)</sup> Worst Stresses: V=0.35g/0.55gShell Bending for 1.0g  $\sigma_{\text{calc}}^{-}$  2.65<sup>ksi</sup>  $S_{\text{allow}}^{-}$  22.6<sup>ksi</sup> Damping: 1.0% Nozzles: OBE σ<sub>calc</sub>=S<sub>allow</sub>= 22.6<sup>ksi</sup> 24.7<sup>ksi</sup> Anchor Bolts

or calc 9.99 13.07 1DG12TA Diesel Generator Cooling Aux. Bldg. Static Analysis Natural Freq. SSE Input: H,=0.5g H<sub>1</sub>=87.5<sup>Hz</sup> 1DG12TB Water Reservoir Tanks 1DB12TC  $H_2 = 0.5g$ H2=195. V=0.55g V = 95.3Damping: 1.0% Worst Stresses: OBE Saddle/Shell  $s_{allow} = 10.1^{ksi} = 8.1^{ksi}$   $s_{allow} = 24.0 = 29.1$  Specification No. H-2805 Page / 9 of 57 SUMMARY OF Vendor: Bishopric Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer 4-15-81 Date Project No. 4130-00 Seis. Equipment Qualification a Location Description Results Number Method Anchor Bolts 1DG12TA (Continued from previous SSE 1DG12TB page) OBE 1DG12TC  $\sigma_{\text{calc}}$ 1.8 Sallow 24.9 1.8 τ<sub>calc</sub> Sallow 13.3 Nozzle/Shell  $\sigma_{\rm calc} = 14.1$ 25.2 S<sub>allow</sub>= 22.6 27.4

Page A40 of 517 Specification No. H-2805 SUMMARY OF Vendor: Bishopric Rev. 10 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4 15.81 Project No. 4130-00 S C e 1 i a Location Equipment Qualification Description Results Number Method 1WRO3TA RBCCW Expansion Tanks Rx. Bldg. Static Analysis OBE/SSE Input H<sub>1</sub>=0.36g/0.53g<sup>(NS)</sup> H<sub>1</sub>=14.8 H<sub>2</sub>=67.9 V=65.4<sup>Hz</sup> 1WRO3TB H<sub>2</sub>=1.125g/0.9g<sup>(EW)</sup> Worst Stresses: Anchor Bolts calc = 29.8 V=0.9/0.9gDamping 1.0%  $S_{allow} = 63.0$  $\tau_{\rm calc} = 15.0$  $S_{allow} = 31.5$ Shell/Saddle OBE SSE  $\sigma_{\rm calc} = 20.97 \ 21.8$  $S_{allow} = 22.6 24.7$ 1DG13TA Diesel Generator Cooling Static Analysis Natural Freq. Aux. Bldg. 1DG13TB Water Reservoir Tanks SSE Input:  $H_1=H_2=0.5g$ H<sub>1</sub>=68. Hz H<sub>2</sub>=169. 1DG13TC V = 0.55gV=239. Damping: 1.0% Worst Stresses: OBE SSE Saddle ocalc = 5.67 6.92 S<sub>allow</sub>=24.7 29.1 Nozzle/Shell σ<sub>calc</sub>=11.58 20.7 S<sub>allow</sub>=22.6 27.4

Page A4 of 57 Specification No. H-2805 SUMMARY OF Vendor: Bishopric Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification l Location Description Results Method Number (Continued from previous 1DG13TA 1DG13TB Bolts: ocalc= page) \_\_\_ 1.825 1DG13TC - 1.754 Tcalc= Sallow= - 13.3 1DG14TA Static Analysis Natural Freq. Diesel Generator Cooling P Aux. Bldg.  $H_1 = 28.6$   $H_2 = 227.$  V = 259.1DG14TB SSE Input:  $H_1 = 0.5g$ Water Expansion Tanks 1DG14TC  $H_2 = 0.46g$ 1DG14TD Worst Stresses: Shell Saddle calc= \_\_\_\_ 15.7 1DG14TE V = 0.7g1DG14TF Damping: 1.0% S<sub>allow</sub> = - 20.6 Saddle calc = 9.63 13.67 S<sub>allow</sub> = 12.6 18.9 Anchor Bolts  $\sigma_{\rm calc} = 6.03 \ 9.57$ S<sub>allow</sub> = 12.6 18.9 σ<sub>calc</sub>= — 34.1 Nozzle S<sub>allow</sub> = - 34.1

Specification No. H-2805 Vendor: Bishopric Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page Alloof 57  Rev. 00  Date 4 15 81
Equipment Number	Description	S C l i a s s s	Location	Qualification Method	Results
1DG15TA 1DG15TB 1DG15TC 1DG15TD 1DG15TE 1DG15TF 1DG15TG 1DG15TH 1DG15TI 1DG15TI 1DG15TJ 1DG15TK 1DG15TL	Air Receiver Tanks	P	Aux. Bldg.	Static Analysis Input: H <sub>1</sub> =H <sub>2</sub> =0.41g V=0.55g Damping 1.0%	Natural Freq. $H_1=H_2=81.1^{Hz}$ $V=297.^{Hz}$ Worst Stresses:  Hoop Stress $\sigma_{\rm calc}=8.26^{\rm ksi}$ $S_{\rm allow}=13.70$ Beam Stress $\sigma_{\rm calc}=4.13$ $S_{\rm allow}=13.70$ Skid Bolt (SSE) $\sigma_{\rm calc}=8.71$ $S_{\rm allow}=12.60$
1D001TA 1D001TB 1D001TC	Diesel Oil Storage Tanks	P	Aux. Bldg.	Static Analysis Input: H <sub>1</sub> =H <sub>2</sub> =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 <sup>ksi</sup> Sallow Tank is Buried In Sand

Specification No. H-2812 Page <u>A13</u> of <u>57</u> SUMMARY OF Vendor: C&D Batteries Co. EQUIPMENT QUALIFICATION Re Wm. H. Zimmer Date 4 5 2 Project No. 4130-00 Equipment Jualification Description Location Results Number Method Biaxial Test, Random Motion Resonance Search 1-35Hz TRS Graph envelopes required 125-V Battery Chargers Aux. Bldg. 1DC13EB A response spectra. 1DC13EC Test requirements exceeded specs. Post-Testing functional operability verified.

Specification No. H-2816 Page fin of SUMMARY OF Vendor: Bahnson Co. Rev. EQUIPMENT QUALIFICATION Wm. H. Zimmer Date Project No. 4130-00 Qualification Equipment Description a Location Results Number Method Aux. Bldg. Static Analysis Natural Frequencies: 1VC08SA Control Room HVAC Air Coils:  $f_n = 57.5 Hz$ Finite Element Analysis 1VC08SB Handling Units Input: Coil Support: fn=33. Hz Cabinet & Coils H1=H2=0.62g LVC13AA Control Room HVAC Cooling Coil Fin Crush Press: IVC13AB Coils V = 1.7gGcalc= 3.43psi Damping: 1.0% Sallow 6.5psi Nozzle Bolts ocalc 2.29 ksi Sallow=20. , calc 0.81 Sallow=10.0 Cabinet Nat. Freq.  $f_n=36$ . Cab. Worst Stresses: σ<sub>calc</sub>= 5.02<sup>ksi</sup> Sallow=21.6 τ<sub>calc</sub>\*\* 0.67 Sallow\*10.8 Anchor Bolts: ocalc=17.95ksi Sallow=40.0 Tca1c " 5.24 Salloy = 21.6

Specification No. H-2816 Vendor: Bahnson Wm. H. Zimmer		SUMMARY OF EQUIPMENT QUALIFICATION			Page 1145 of 577  Rev. 00	
Project No.	4130-00				Date 4	
Equipment Number	Description	Seis:	Location	Qualification Method	Results	
1VC13YA 1VC13YB 1VC14YA 1VC14YB 1VC15YA 1VC15YB 1VC16YA 1VC16YA	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 <sub>1</sub> =H <sub>2</sub> =0.62g V=0.68g Test Response/Input: H <sub>1</sub> =H <sub>2</sub> =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 <sub>1</sub> =H <sub>2</sub> =0.2g V=0.14g Damping: 1.0%	Natural Freq. Coil Bank: $f_n=35.4^{\rm Hz}$ Header Assembly: $f_n=33.^{\rm Hz}$ Coil Support: $f_n=43.5^{\rm Hz}$ Worst Stresses: SSE Anchor Bolts: $\begin{array}{ccccccccccccccccccccccccccccccccccc$	

Specification No. H-2816 Vendor: Bahnson

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Wm. H. Zimmer

EQUIPMENT QUALIFICATION

Project No	. 4130-00	-			Date
Equipment Number	Description	S C l a s s s	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: H1=H2=0.46g V=0.95g Damping: 1.0%	Natural Freq. Hz Tube: $f_n=60$ . Hz Coil Support: $f_n=33$ . Hz Worst Stresses Nozzle Bolt: $\sigma_{calc}=2.96$ Sallow=20.0 $\tau_{calc}=1.045$ Sallow=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: H1=H2=0.46g V=0.55g Damping: 1.0%	Natural Freq. Coils: $f_n=51.5^{Hz}$ $f_n=75.7$ Worst Stresses Anchor Bolts $\sigma_{calc}=6.01^{ksi}$ $\sigma_{calc}=40.0$ $\tau_{calc}=2.47$ $\sigma_{calc}=2.47$ $\sigma_{callow}=21.6$
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.

Specification No. H-2816 Page / / of St SUMMARY OF Vendor: Bahnson EQUIPMENT QUALIFICATION Rev. Wm. H. Zimmer Project No. 4130-00 Date Equipment Qualification Descrivtion a Location Results Number Method 1VY05A CSCH-RHR Equip. Room Heat Rx. Bldg. Static Analysis Natural Freg. Coils: fn=35.2Hz 1VY06S Exchanger and Cooling Finite Element Analysis 1VY08A f.=36.0 Coil Reg'd Input: IVY09A  $H_1 = H_2 = 0.67g$ Tube:  $f_n=43.0$ Support:  $f_n = 53.0$ V=1.2g Header Assembly: fn=33. Worst Stresses: ocalc= 6.92ksi Beam Sallow= 21.6 Tca1c= 3.47 Sallow=10.8 Anchor Bolts ocalc= 36.9ksi Sallow= 48.6 τ<sub>calc</sub>= 11.82 Sallow= 24.3 Nozzle Pipe Stress  $\sigma_{calc} = 13.5 \text{ksi}$   $S_{allow} = 35.0$ Structural Integrity Demonstrated for original qualification criteria. Regualification to T-Quencher criteria not completed.

Specification No. H-2816 SUMMARY OF Page A 8 of DI Vendor: Bahnson EQUIPMENT QUALIFICATION Rev. 00 Wm. H. Zimmer Project No. 4130-00 Date Equipment Qualification Description a Location Results Number S Method 1RG10M Angle Line Strainer Aux. Bldg. g-Level Qualification By Uniaxial Sine Sweep & Multi-1RG20M Axis 1\_33Hz Sine Dwell Testing:  $H_1 = 8.8g$  $H_2 = 9.2g$ Octave/Minute Sweep V=6.4g Structural Integrity Required Input: (Peak x 1.5) Demonstrated  $H_1 = H_2 = 4.2g$ V = 2.85g1RG11MA Filter Drier Aux. Bldg. Uniaxial Sine Sweep & g-Level Qualification By 1RG11MB Multi-Axis Sine Dwell Testing: 1-33Hz 1RG21MA  $H_1 = 8.8g$ 1RG21MB  $H_2 = 9.2g$ 1RG21MC Required Input: V=6.4g 1RG21MD (Peak x 1.5) Structural Integrity 1RG21ME  $H_1 = H_2 = 4.2g$ Demonstrated 1RG21MF V=2.85g1RG12M Moisture-Liquid Indicator Pseudo-Biaxial, Sine Dwell and Aux. Bldg. g-Level Qualification By Sine Sweep 1-33<sup>Hz</sup> 1RG22M Testing:  $H_1 = 4.8g$ H2=9.2g Required Input: V=5.0g  $H_1 = H_2 = V = 4.2g$ Structural Integrity Demonstrated

Specification No. H-2817 Page A49 of 57 SUMMARY OF Vendor: CVI Co. Rev. AO EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 1 8 Project No. 4130-00 Equipment Oualification Description Location Number Results Method 1VCO5CA Control Room HVAC Standby Aux. Bldg. Static Analysis Natural Freq. Make-Up Fan 1VC05CB Accelerations OBE/SSE H<sub>1</sub>=8 H<sub>2</sub>=89.Hz Horizontal: .37g/.62g Vertical: 1.95g/2.70g V=115.5 Worst Stresses Motor Hold-Down Bolts: OBE/SSE Calc. Stresses: 0.40ksi/0.73ksi Damping: 1.0% Rigid Support Allow. Stresses: 13.1ksi/21.8ksi Considerations in the model. Foundation Bolts: Calc. Stresses: 0.40<sup>ksi</sup>/0.75<sup>ksi</sup> Allow. Stresses: 20.5ksi/34.2ksi 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. Wm. H. Zimmer

## SUMMARY OF EQUIPMENT QUALIFICATION

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Equipment Number	Description	S C e 1 i a Location s s	Qualification Method	Results
1VC09SA 1VC09SB 1VC10S	Control Room HVAC Filter Packages	A Aux. Bldg.	Static Analysis Accelerations OBE/SSE  H <sub>1</sub> : 0.5g/0.75g  H <sub>2</sub> : 0.34g/0.5g  V : 1.9g/2.2g  Damping: 1%, 2% Rigid Support Conditions	Natural Freq.  H <sub>1</sub> =20.3 Hz H <sub>2</sub> =20.3, 35.5 Hz V=19.3 Hz  Worst Stresses Charcoal Screen: Calc Avg $\sigma$ = 28.0 ksi Peak $\sigma$ = 48.7  Allow S= 60.0  Anchor Bolts: $\sigma_{calc}$ = 11.21 ksi $\tau_{calc}$ = 2.33 Sallow = 32.4  HEPA Mount. Frame $\sigma_{calc}$ = 26.3 ksi Saliow = 28.2  Fan Struct. Anchor Bracket $\sigma_{calc}$ = 31.9 ksi Sallow = 32.4  No critical deflections Structural Integrity Demonstrated

Specification No. H-2817 Page / 01 of 51/ SUMMARY OF Vendor: CVI Co. EQUIPMENT QUALIFICATION Rev. 10 Wm. H. Zimmer Date district Project No. 4130-00 Equipment Oualification Description a Location Number Results Method 1VC12AA Filter Package Heat Coils Aux. Bldg. Uniaxial & Multi-Axis Natural Freg. Weight: 39. Ibs Sine Sweep 2-50Hz 1VC12AB H<sub>1</sub>=10. Hz, 14. Hz Mounted w/6-3/8"0 Bolts H<sub>2</sub>=5., 38. V=4., 13., 22. g-Level Oualification By Testing:  $H_1 = H_2 = V = 0.55g$ Structural Integrity Demonstrated 1VC93Y Filter Package Backflow Aux. Bldg. Equivalent Static Analysis Natural Freq. 1VC94Y f\_=22.2Hz Dampers Rigid Support Conditions Damping: 0.5%, 1% Worst Stresses Blade/Shaft: calc=4.56 sallow=24.0 Accelerations OBE/SSE Horizontal: 7.8g/7.2g τ<sub>calc</sub>= 3.67 Vertical: 2.9g/2.6g Sallow=14.5 Support Angle ocalc = 25.4ksi Sallow = 28.6ksi

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

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Project No. 4130-00				Date
Equipment Number	Description	S C c l Location s S S S S	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 <sub>1</sub> =12.5,12.75,12.8,19.5,20. 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 Page / 3 of 577 SUMMARY OF Vendor: Unit Elect. Control Rev. 00 EQ ! PMENT QUALIFICATION Wm. H. Zimmer Date dele ? Project No. 4130-00 Seis Equipment Qualification a Location Description Results Number Method 1PL67JA Remote Shutdown Panels Aux. Bldg. Biaxial Random Motion Test TRS Graphs 1PL67JB Freq. Range: 1-40Hz Envelope Required Response 1A, 1B Spectra - Functional Operability Verified. Natural Frequencies: Front to Back: 8,40,80 Hz Side to Side: 12.5,40 Hz

Specification No. H-2836 Page ASA of ST SUMMARY OF Vendor: Chemtron Corp. EQUIPMENT QUALIFICATION Rev. Wm. H. Zimmer Date 15 Project No. 4130-00 S C 1 i a s s s Equipment Qualification 1 Location Description Results Number Method CO2 Fire Protection Panels P Aux. Bldg. Biaxial Random Motion Test TRS Graphs 1PLC7JA Freq. Range: 1-40Hz Envelope Required Response 1PLC7JB Spectra - Functional Opera-1PLC7JC bility Verified 1PLC7JD Natural Frequencies: None in 1-100 Hz range

Page 155 of 57 Rev. 00 Date 75 18 81	Results	Natural Freq.  fn = 127.Hz  Worst Stresses SSE  Pump Hold Down Bolts:  Tcalc = 19.7ks1  Sallow = 23.4  ocalc = 39.6  Sallow = 54.6  Shaft:  ocalc = 19.6ks1  Sallow = 26.2  Pump Head to Hous. Bolt.:  Tcalc = 5.87ks1  Sallow = 12.32  ocalc = 36.7  Sallow = 40.0  Rotor/Stator Clear.:  Calc b = 0.00229"  Allow b = 0.012"
SUMMARY OF QUIPMENT QUALIFICATION	Qualification Method	Static Analysis; Finite Element Dynamic Analysis Accelerations: OBE/SSE Horizortal: .5g/1.0g Verti .7g/1.0g
SUM EQUIPMENT	Location	
	Ω ⊕ · · · α · · ∪ ⊢ α α α	<
on No. H-2849 ne Co. er 4130-00	Description	Diesel Fuel Oil Transfer
Specification No. Vendor: Crane Co. Wm. H. Zimmer Project No. 4130-		1D002PA 1D002PB 1D002PC

Specification No. H-2861 Vendor: Joy Manufacturing

# SUMMARY OF EQUIPMENT QUALIFICATION

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Rev.

Date \_\_\_\_

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Proj	ect	No.	4130-00

Equipment Number	Description	S C e 1 i a s s s	Location	Qualification Method	Results
1VC03CA 1VC03CB	Control Room HVAC Fans 1A, 1B WT = 1.96k	A	Aux. Bldg.	Statis Analysis Required Input: H1 = 3.9g H2 = 7.8g V = 2.9g  Damping: 1/2% OBE	Natural Freq. $H_1 = 2775$ . $H_2$ $H_2 = 425$ . $V = 200$ .  Worst Stress Anchor Bolt (Isolator To Fan): $\sigma_{\text{calc}} = 47.4^{\text{ksi}}$ $\sigma_{\text{calc}} = 55.0$ Deflections of Shaft $\Delta_{\text{calc}} = 0.0062^{\circ}$ $\Delta_{\text{allow}} = 0.100^{\circ}$
1VDO1CA 1VDO1CB 1VDO1CC	DG Room Vent. Fan Wt = 2.46 <sup>K</sup>	A	Aux. Bldg.	Static Analysis Required Input: H1 = 1.6g H2 = 2.0g V = 2.2g  Damping: 1/2% OBE	Natural Freq. $H_1 = 1866.Hz$ $H_2 = 379.$ $V = 146.$ Worst Stresses Anchor Boit (Isolator To Fan): $\sigma_{\rm calc} = 23.6^{\rm ksi}$ $\sigma_{\rm allow} = 55.0$ Deflection of Shaft $\Delta_{\rm calc} = 0.0025$ $\Delta_{\rm allow} = 0.160$

PageAST of ST           Rev.         20           Date         4 - S-2	Results	Natural Freq.  H <sub>1</sub> = 19., 20.5, 23. Hz  H <sub>2</sub> = 4.75, 19, 21. Hz  V = 17.5 Hz  TRS Graph Envelopes Required Response Spectra  .
SUMMARY OF . EQUIPMENT QUALIFICATION	Qualification Method .	Biaxial Random Motion Frequency Range: 1-33Hz @ 1/6 Band Width Resonance Survey 1-40Hz
SUM	Location	Aux. Bldg.
	S D T B S S	4
Chemelex Corp. Zimmer No. 4130-00	Description	Heat Trace Control Panel & Transformer
Specification No. H-Vendor: Chemelex Corp. Wm. H. Zimmer Project No. 4130-00	Equipment Number	1PLE7JA 1PLE7JB 1HT01E 1HT02E

Specification No. H-2289 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page <u>B1</u> of <u>53</u> Rev. <u>00</u> Date <u>4-15-81</u>	
Equipment Number	Description	S C 1 a s s s	Location	Qualification Method	Results	
1VG03YA/B	Isolation Dampers (Pacific Power (Damper) Controlmatics (M.Oper) Namco (Limit Switches))		Aux.Bldg.	Equivalent Static Analysis Method	Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 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))		Aux.Bldg.	Equivalent Static Analysis Method	Acceleration Levels Used: $H_1 = H_2 = V = 7.7 \text{ g}$ Critical Stress = 36,251psi (Allowable = 34,200 psi)	
				Simplified Dynamic Analysis	Lowest f = 18 Hz Max. Calc. Acceleration: H <sub>1</sub> = .66g, H <sub>2</sub> = .8g V = 1.7g Therefore, past analysis (Above) by equivalent static analysis method applies.	
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Specification No. H-2298 Vendor: Refer Below

#### SUMMARY OF EQUIPMENT QUALIFICATION

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Date 4-15-81

Wm. H. Zimmer Project No. 4130-00

Description  kdraft Isolation per (AIR Balance,	S e 1 a s s s	Location		alification Method	Results
The state of the s	P	Anviliaru		AND DESCRIPTION OF THE PERSON	THE RESIDENCE OF THE PARTY OF T
el: SND-116)			5-50 Hz,	Sine Sweep Input: H <sub>1</sub> = 25 g, g, V = 2.0 g	Nat. Frequencies: $f_1 = 33 \text{ Hz}$ , $f_2 = 30 \text{ Hz}$ , $f_v = 33 \text{ Hz}$
					Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.
Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P		5-50 Hz,	Input: H, = 25 g,	Nat. Frequencies: f <sub>1</sub> = 33 Hz, f <sub>2</sub> = 30 Hz, f <sub>V</sub> = 33 Hz
					Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.
Fire Damper, Curtain Type (AIR Balance, Model: 319)	P	Auxiliary			Nat. Frequency: 37 Hz Response: 3.50 g.
e1: 319)					Operability (Structural integrity) demonstrated during and after test. No weld defects.
	per (AIR Balance, el: SND-116) e Damper, Curtain e (AIR Balance,	e Damper, Curtain Pe (AIR Balance,	kdraft Isolation per (AIR Balance, el: SND-116)  e Damper, Curtain e (AIR Balance,	kdraft Isolation per (AIR Balance, el: SND-116)  P Auxiliary Uniaxial 5-50 Hz, H <sub>2</sub> = 4.5  Uniaxial Resonant  P Auxiliary Uniaxial F Auxiliary Uniaxial Resonant  Uniaxial Resonant	per (AIR Balance, el: SND-116)  5-50 Hz, Input: H <sub>1</sub> = 25 g, H <sub>2</sub> = 4.5 g, V = 2.0 g  Uniaxial Sine Dwell @ Resonant Freq.  P Auxiliary Uniaxial Sine Sweep 5-60 Hz, Input 0.4 g

Specification No. H-2298 Page 83 of 85 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification a Location Description Results Number Method IVC21YA/B Backdraft Isolation Auxiliary Uniaxial Sine Sweep Nat. Frequencies: f, = 5-50 Hz, Input:  $H_1 = 25 g$ ,  $H_2 = 4.5 g$ , V = 2.0 g. 33 Hz,  $f_2 = 30$  Hz, Damper (AIR Balance, Model: SND-116)  $f_{..} = 33 \text{ fiz.}$ Uniaxial Sine Dwell Response: 25 g, 9.5 g, and 20 g, respectively. @ Resonant Freq. Operability (Structural integrity) Demonstrated. Fire Damper, Curtain 1VC22YA/B Auxiliary Uniaxial Sine Sweep Nat. Frequency: 37 Hz Type (AIR Balance, 5-60 Hz, Input 0.4 q. Response: 3.50 g. Model: 319) Uniaxial Sine Dwell Operability (Structural Dwell at 20 Hz integrity) Demonstrated during & after test. No weld defects. 1VC23YA/B Fire Damper, Curtain Auxiliary Uniaxial Sine Sweep Nat. Frequency: 37 Hz 5-60 Hz, Input 0.4 g. Type (AIR Balance, Response: 3.50 q. Model: 319) Uniaxial Sine Dwell Operability (Structural Dwell at 20 Hz integrity) Demonstrated during & after test. No weld defects. Auxiliary Uniaxial Sine Sweep Nat. Frequencies: f, = 1VC25YA/B Backdraft Isolation 33 Hz,  $f_2 = 30$  Hz, 5-50 Hz, Input: H, = 25 g, Damper (AIR Balance,  $f_{v} = 33 \text{ fiz.}$  $H_2 = 4.5 \text{ g}, V = 2.0 \text{ g}.$ Model: SND-116) Response: 25 g, 9.5 g, Uniaxial Sine Dwell and 20 g, respectively Operability (Structural integrity) Demonstrated @ Resonant Freq.

Specification No. H-2298 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>B4</u> of <u>83</u> Rev. <u>DO</u> Date <u>4-15-8</u> !	
Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results	
1VC28Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f = 24.8 Hz Acceleration Levels Used: H <sub>1</sub> = 1.00 g, H <sub>2</sub> = 1.00 g, V = 1.25 g.	
				Simplified Dynamic, Analysis	Lowest f = 105 Hz Acceleration Levels Used: 5.0 g in all directions critical stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .78 g, H <sub>2</sub> = .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 <sub>1</sub> = 25 g, H <sub>2</sub> = 4.5 g, V = 2.0 g.	Nat. Frequencies: f <sub>1</sub> = 33 Hz, f <sub>2</sub> = 30 Hz, f <sub>y</sub> = 33 Hz.	
				Uniaxial Sine Dwell @ Resonant Freq.	Response: 25 g, 9.5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.	

Specification No. H-2298 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		F		MMARY OF T QUALIFICATION	Page <u>85</u> of <u>83</u> Rev. <u>00</u> Date <u>4-15-81</u>	
Equipment Number	Description	Se 1 ass	Location	Qualification Method	Results	
1VC32YA/B	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H <sub>1</sub> = 25 g, H <sub>2</sub> = 4.5 g, V = 2.0 g. Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: f <sub>1</sub> = 33 Hz, f <sub>2</sub> = 30 Hz, f <sub>y</sub> = 33 Hz.  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 = 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 = 29 Hz Acceleration Levels Used: 5.0 g in all directions critical stress = 26,615 psi(Allow.=32,000psi Max. Calc. Accelerations: H = .48 g, H = 4.82 g, V = 2.36 g.	

Specification No. H-2298 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>86</u> of <u>83</u> Rev. <u>00</u> Date <u>4-15-81</u>	
Equipment Number	Description	S C 1 a s s s	Location	Qualification Method	Results	
1VC33YB	Opposed Blade Balancing Damper (Waldinger)	Р	Auxiliary	Static Analysis	Lowest $f_n = 24.8 \text{ Hz}$ Acceleration Levels Used: $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g},$ $V^1 = 1.25 \text{ g}.$	
				Simplified Dynamic Analysis	Lowest f <sub>n</sub> = 29 Hz Acceleration Levels Used: 5.0 g in all directions Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .48 g, H <sub>2</sub> = 1.96 g, V = .62 g.	
1VC34Y	Fire Damper (AIR Balance, Curtain Type: Model: 319)		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.	

Specification No. H-2298 Page 87 of 83 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification i a Location Description Results Number Method Auxiliary Uniaxial Sine Sweep Nat. Frequency: 37 Hz 1VC38Y Fire Damper, Curtain Type (AIR Balance, 5-60 Hz, Input 0.4 g. Response: 3.50 g. Model: 319) Operability (Structural Uniaxial Sine Dwell Dwell at 20 Hz Integrity) demonstrated during and after test. No weld defects. 1VC39Y Fire Damper, Curtain Auxiliary Uniaxial Sine Sweep Nat. Frequency: 37 Hz 5-60 Hz, Input 0.4 q. Response: 3.50 q. Type (AIR Balance, Model: 319) Operability (Structural Uniaxial Sine Dwell integrity) demonstrated Dwell at 20 Hz. during and after test. No weld defects. Auxiliary Static Analysis 1VC40Y Opposed Blade Lowest f = 24.8 HzAcceleration Levels Used: Balancing Damper  $H_1 = 1.00 g$ ,  $H_2 = 1.00 g$ , (Waldinger)  $V^1 = 1.25 q$ . Simplified Dynamic Lowest f = 62 HzAcceleration Levels Used: Analysis 5.0 g in all directions Critical stress = 26,615 (Allowable = 32,000 psi)Max. Calc. Accelerations:  $H_1 = .77 g, H_2 = .64 g,$  $V^1 = .87 q.$ 

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Description	S C 1 i a s s s	Location	Qualification Method	Results	
Opposed Blade Balanc- ing Damper(Waldinger)	Р	Auxiliary	Static Analysis	Lowest f = 24.8 Hz Acceleration Levels Used: $H_1 = 1.00 \text{ g}$ , $H_2 = 1.00 \text{ g}$ , $V^1 = 1.25 \text{ g}$ .	
			Simplified Dynamic. Analysis	Lowest f = 17 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .70 g, H <sub>2</sub> = .82 g, V = 3.27 g.	
Opposed Blade Balancing Damper (Waldinger)	Р	Auxiliary	Static Analysis	Lowest $f_n = 24.8 \text{ Hz.}$ Acceleration Levels Used: $H_1 = 1.00 \text{ g, } H_2 = 1.00 \text{ g,}$ $V^1 = 1.25 \text{ g.}$	
			Simplified Dynamic Analysis	Lowest f = 17 Hz. 5.0 g in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .70 g, H <sub>2</sub> = .90 g, V = 3.45 g.	
	Description  Opposed Blade Balancing Damper (Waldinger)  Opposed Blade Balancing Damper	Description  Descr	Description  Descr	Description  Descr	

Specification No. H-2298 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00				MMARY OF C QUALIFICATION	Page 810 of 83  Rev. 00  Date 4-15-81
Equipment Number	Description	S C l a s s s	Location	Qualification Method .	Results
1VC46Y	Opposed Blade Balan- cing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f = 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 <sub>n</sub> = 73 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .82 g, H <sub>2</sub> = .79 g, V = .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.

Vendor: Refer Below  Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page <u>B  </u> of <u>83</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C 1 i a s s s	Location	Qualification Method	Results
Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f = 24.8 Hz Acceleration Levels Used: H <sub>1</sub> = 1.00 g, H <sub>2</sub> = 1.00 g, V = 1.25 g.	
				Simplified Dynamic . Analysis	Lowest f = 47 Hz Acceleration Levels Used: 5.0g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = 1.14 g, H <sub>2</sub> = .46 g, V = .58 g.
1VC49Y	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.
1VC50Y	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 Page Bla of 8 SUMMARY OF Vendor: Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification e 1 i a Location Description Results Number Method S S Nat. Frequency: 37 Hz LVC51Y Fire Damper, Curtain Auxiliary Uniaxial Sine Sweep Type (AIR Balance, Response: 3.50 q. 5-60 Hz, Input 0.4 g. Model: 319) Uniaxial Sine Dwell Operability (Structural Dwell at 20 Hz integrity) demonstrated during and after test. No weld defects. Auxiliary Static Analysis 1VC52Y Lowest f = 24.8 HzOpposed Blade Balancing Damper Acceleration Levels Used: (Waldinger)  $H_1 = 1.00 g$ ,  $H_2 = 1.00 g$ ,  $V^1 = 1.25 g$ . Simplified Dynamic Lowest  $f_{-} = 105 \text{ Hz}$ Acceleration Levels Used: Analysis 5.0 q in all directions. Critical stress = 26,615 psi. (Allowable = 32,000 psi)Max. Calc. Accelerations:  $H_1 = .38 \text{ g}, H_2 = .46 \text{ g},$  $V^{1} = .81 \, a.$ Auxiliary Uniaxial Sine Sweep 1VC53Y Fire Damper, Curtain Nat. Frequency: 37 Hz Type (AIR Balance, 5-60 Hz, Input 0.4 g. Response: 3.50 q. Model: 319) Operability (Structural Uniaxial Sine Dwell Dwell at 20 Hz integrity) demonstrated during and after test. No weld defects.

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Equipment Number	Description	S C e 1 a s s s	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	Lowest f = 24.8 Hz Acceleration Levels Used H <sub>1</sub> = 1.00 g, H <sub>2</sub> = 1.00 g V <sup>1</sup> = 1.25 g.
				Simplified Dynamic Analysis	Lowest f = 105 Hz Acceleration Levels Used: 5.0 g in all directions. Critical Stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .38 g, H <sub>2</sub> = .46 g, V = .55 g.

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Vendor: Refer Below  Wm. H. Zimmer Project No. 4130-00			EQUIPMENT	MMARY OF T QUALIFICATION	Page <u>B14</u> of <u>83</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	Sei ass	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	Tire 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.
Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f = 24.8 Hz Acceleration Levels Used H <sub>1</sub> = 1.00 g, H <sub>2</sub> = 1.00 g V = 1.25 g.	
				Simplified Dynamic Analysis	Lowest f = 17 Hz Acceleration Levels Used 5.0 g in all directions Critical stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations H = .49 g, H = .75 g, V = 2.54 g.

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Equipment Number	Description	S C 1 i a s s s	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 $f_n = 24.8 \text{ Hz}$ Acceleration Levels Used $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g}$ $V^1 = 1.25 \text{ g}.$
				Simplified Dynamic Analysis	Lowest f = 47 Hz Acceleration Levels Used 5.0 g in all directions Critical Stress = 26,615 psi. (Allowable = 32,000 psi) Max. Calc. Accelerations H = .32 g, H = .40 g, V = .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	S C l a s s s	Location	Qualification Method	Results
1VC64Y	Opposed Blade Balanc- ing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f = 24.8 Hz Acceleration Levels Used H <sub>1</sub> = 1.00 g, H <sub>2</sub> = 1.00 g $V^{1}$ = 1.25 g.
				Simplified Dynamic Analysis	Lowest f = 47 Hz Acceleration Levels Used 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations H = .36 g, H = .49 g, V = .76 g.
Opposed Blade Balancing Damper (Waldinger)	Balancing Damper	P	Auxiliary	Static Analysis	Lowest f = 24.8 Hz Acceleration Levels Used H <sub>1</sub> = 1.00 g, H <sub>2</sub> = 1.00 g $V^{1}$ = 1.25 g.
				Simplified Dynamic Analysis	Lowest f = 47 Hz Acceleration Levels Used 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations H = .61 g, H = .93 g, V = .58 g.

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Equipment Number	Description	S C 1 a s s s	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 <sub>1</sub> = 25 g, H <sub>2</sub> = 4.5 g, V = 2:0 g. Uniaxial Sine Dwell @ Resonant Freq.	Nat. Frequencies: f <sub>1</sub> = 33Hz, f <sub>2</sub> = 30 Hz, f <sub>3</sub> = 32Hz  Response: 25 g, 9.5 g, and 20 g, respectively.  Operability (Structural integrity) Demonstrated.

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Equipment Number	Description	S C 1 i a s s s	Location	Qualification Method	Results
1VC70Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	Р	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 <sub>1</sub> = 25 g, H <sub>2</sub> = 4.5 g, V = 2.0 g. Uniaxial Sine Dwell @ Resonant Freg.	Nat. Frequencies: H <sub>1</sub> = 33 Hz, H <sub>2</sub> = 30 Hz, V = 33 HZ  Response: 25 g, 9,5 g, and 20 g, respectively. Operability (Structural integrity) Demonstrated.

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

Specification Vendor: Refe Wm. H. Zimmer Project No. 4	Specification No. H-2298 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		SUM EQUIPMENT	SUMMARY OF EQUIPMENT QUALIFICATION	Page 820 of 83 Rev. 00 Date 4-15-81
Equipment Number	Description	∾⊕	Location	Qualification Method .	Results
1VC76Y	Opposed Blade Balancing Damper (Waldinger)	Δ,	Auxiliary	Static Analysis	Lowest f = 24.8 Hz Acceleration Levels Used: H <sub>1</sub> = 1.00 g, H <sub>2</sub> = 1.00 g, V <sub>1</sub> = 1.25 g.
				Simplified Dynamic. Analysis	Lowest f = 130 Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H = .95 g, H <sub>2</sub> = 1.03 g, V = 1.35 g.
1VC77Y	Fire Damper, Curtain Type (AIR Balance, Model: 319)	Д	Auxiliary		Nat. Frequency: 37 Hz Response: 3.50 g
				Dwell at 20 Hz.	operability (structural integrity) Demonstrated during and after test. No weld defects.

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Project No.					Date 4-15-81	
Equipment Number	Description	S C e 1 i a s s	Location	Qualification Method	Results	
1VC79Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest $f_n = 24.8 \text{ Hz}$ Acceleration Levels Used: $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g},$ $V^1 = 1.25 \text{ g}.$	
				Simplified Dynamic Analysis	Lowest f = 130Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H = .48 g, H = .62g, V = .72 g.	
1VC80Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest f = 24.8 Hz Acceleration Levels Used: $H_1 = 1.00 \text{ g}$ , $H_2 = 1.00 \text{ g}$ , $V^1 = 1.25 \text{ g}$ .	
				Simplified Dynamic Analysis	Lowest f = 87 Hz Acceleration Levels Used: 5.0 g in all directions Critical stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H = .66 g, H = .84 g, V = 1.52 g.	

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Equipment Number	Description	S C 1 i a s s	Location	Qualification Method .	Results
1VC83Y	Backdraft Isolation Damper (AIR Balance, Model: SND-116)	P	Auxiliary	Uniaxial Sine Sweep 5-50 Hz, Input: H <sub>1</sub> = 25 g, H <sub>2</sub> = 4.5 g, V = 2.0 g.	Nat. Frequencies: f <sub>1</sub> = 33 Hz, f <sub>2</sub> = 30 Hz, f <sub>3</sub> = 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. 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.	
1VC85Y	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest $f_n = 24.8 \text{ Hz}$ Acceleration Levels Used: $H_1 = 1.00 \text{ g}$ , $H_2 = 1.00 \text{ g}$ ; V = 1.25  g.
				Simplified Dyanmic Analysis	Lowest f = 215 Hz Acceleration Levels Used: 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi) Max. Calc. Accelerations H = .48 g, H = .62 g, V = 1.1 g.

Page Ba3 of 83 Specification No. H-2298 SUMMARY OF Vendor: Refer Below EQUIPMENT QUALIFICATION Rev. 50 Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification a Location Description Results Number Method TRS Envelopes RRS 1VC96Y Fire Damper, Curtain Auxiliary Biaxial Random Motion Type (Ruskin, Model: 1-40 Hz, spaced at 1/3 Structural integrity and operability verified octave. NIBD-23) Structural integrity and Biaxial Sine Beat 1-32 Hz, Input 3.0 g, operability verified. Beats at 1/2 octave. Fire Damper, Curtain 1VC97Y Auxiliary Biaxial Random Motion TRS Envelopes RRS Structural integrity and Type (Ruskin, Model: 1-40 Hz, spaced at 1/3 operability verified. octave. NIBD-23) Biaxial Sine Beat Structural integrity and operability verified 1-32 Hz, Input 3.0 g, beats at 1/2 octave. 1VC98Y Fire Damper, Curtain Auxiliary Biaxial Random Motion TRS Envelopes RRS 1-40 Hz, spaced at 1/3 Structural integrity and Type (Ruskin, Model: operability verified. octave. NIBD-23) Biaxial Sine Beat Structural integrity and 1-32 Hz, Input 3.0 q, operability verified. beats at 1/2 octave. Auxiliary Uniaxial Sine Sweep Nat. Frequency: 37 Hz 1VD04YA/B/ Fire Damper, Curtain 5-60 Hz, Input 0.4 g. Response: 3.50 g. Type (AIR Balance, C Model: 319) Operability (Structural Uniaxial Sine Dwell Dwell at 20 Hz integrity) Demonstrated during and after test. No weld defects.

Specification No. H-2298 Page 824 of 83 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification Description a Location Results Number Method Backdraft Isolation Auxiliary Uniaxial Sine Sweep Nat. Frequencies: 31.7 Hz 1VD05YA/B Damper (AIR Balance, 5-50 Hz, Input 4.0 g, (Horz) 32.0 Hz, 32.7 Hz. 2.0 q. (Vertical) Model: SNB:116 Uniaxial Sine Dwell Response: 20 g, 20 g, 18g, @ Resonant Freq. respectively. Operability (Structural integrity) demonstrated. IVD06YA/B/C Fire Damper, Curtain Auxiliary Uniaxial Sine Sweep Nat. Frequency: 37 Hz Type (AIR Balance, 5-60 Hz, Input 0.4 q. Response: 3.50 g. Model: 319) Operability (Structural Uniaxial Sine Dwell Dwell at 20 Hz integrity) Demonstrated during and aster test. No weld defects. Auxiliary Static Analysis Currently being relocated. 1VD09YA/B/C External Counter Qualification pending. Balance Gravity Shutter (Ruskin, Model:CBS-7)

Specification No. H-2298 Page 825 of 83 SUMMARY OF Vendor: Refer Below EQUIPMENT QUALIFICATION Rev. 00 Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description a Location Number Results Method 1VG05YA/B Backdraft Isolation Auxiliary Uniaxial Sine Sweep Nat. Frequencies: 31.7 Hz Damper (AIR Balance, 5-50 Hz, Input 4.0 g(Horz) 32.0 Hz, 32.7 Hz Model: SND-116) 2.0 q. (Vert.) Uniaxial Sine Dwell Response: 20 g, 20 g, 18 g, @ Resonant Freq. respectively. Operability (Structural integrity) demonstrated. 1VX01YA/B/C Fire Damper, Curtain Auxiliary Uniaxial Sine Sweep Nat. Frequency: 37 Hz Type (AIR Balance, 5-60 Hz, Input 0.4 q. Response: 3.50 g. Model: 319) Uniaxial Sine Dwell Operability (Structural Dwell at 20 Hz integrity) Demonstrated during and after test. No weld defects. 1VX02YA/B/C Backdraft Isolation Auxiliary Uniaxial Sine Sweep Nat. Frequencies: 31.7 Hz. Damper (AIR Balance, 5-50 Hz, Input 4.0 g, (Horz) 32.0 Hz, 32.7 Hz. Model: SND-116) 2.0 g. (Vert.) Uniaxial Sine Dwell Response: 20 g, 20 g, 18g @ Resonant Freg. respectively. Operability (Structural integrity) demonstrated.

Specification No. H-2298 Page 826 of \$3 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification Description a Location Results Number Method 1VX03YA/B Fire Damper, Curtain Auxiliary Uniaxial Sine Sweep Nat. Frequency: 37 Hz. Type (AIR Balance, 5-60 Hz, Input 0.4 q. Response: 3.50 q. Model: 319) Uniaxial Sine Dwell Operability (Structural Dwell at 20 Hz integrity) Demonstrated during and after test. No weld defects. 1VX04YA Opposed Blade Auxiliary Static Analysis Lowest  $f_= 24.8 \text{ Hz}$ . Balancing Damper Acceleration Levels Used:  $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g},$   $V^1 = 1.25 \text{ g}.$ (Waldinger) Simplified Dynamic Lowest  $f_{-} = 215 \text{ Hz}$ Acceleration Levels Used: Analysis 5.0 g in all directions Critical Stress = 26,615 psi (Allowable = 32,000 psi)Max. Calc. Accelerations:  $H_1 = .48 \text{ g}, H_2 = .62 \text{ g}, V_1 = .68 \text{ g}.$ 

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Equipment Number	Description	S C e 1 a s s s	Location	Qualification Method	Results	
1VX04YB	Opposed Blade Balancing Damper (Waldinger)	P	Auxiliary	Static Analysis	Lowest $f_n = 24.8 \text{ Hz.}$ Acceleration Levels Used: $H_1 = 1.00 \text{ g, } H_2 = 1.00 \text{ g,}$ $V^1 = 1.25 \text{ g.}$	
				Simplified Dynamic Analysis	Lowest f = 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 = .37 g, H = .43 g, V = .55 g.	

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Equipment Number	Description	S C l a s s s	Location	Qualification Method .	Results
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.
lVX06YA/B/	Fire Damper, Curtain Type (AIR Balance, Mdl 319)		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)		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.

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Equipment Number	Description	S C e 1 i a s s	Location	Qualification Method .	Results	
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.	

Page 831 of 83 Specification No. H-2868 SUMMARY OF Refer Below Vendor: Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification i a Location Description Results Number Method S S W/S Auxiliary Static Analysis 1VA01Y Opposed Blade Bal-Nat. Freq. > 33 Hz. ancing Damper (AWV Acceleration Levels Used: (Damper), ITT (M.Oper.)  $H_1 = 1.0 g$ ,  $H_2 = 1.0 g$ , Namco (L.Switch))  $V^{\perp} = 3.0 \, \text{g}$ Simplified Dynamic Lowest f = 43 Hz. Analysis Acceleration Levels Used: 5 g's in all directions. Max. Stress = 17.269 psi (Allowable = 19,200 psi) 1VA02Y W/S Auxiliary Static Analysis Opposed Blade Bal-Lowest f = 24.8 Hz. ancing Damper (AWV Acceleration Levels Used: (Damper), ITT (M.Oper.)  $H_1 = 1.00 g$ ,  $H_2 = 1.00 g$ ,  $V^1 = 1.25 \text{ g's}$ Namco (L. Switch)) Lowest f & 40 Hz. Limit Simplified Dynamic Load Analysis performed Analysis with a resulting allow.> 5.0 g as compared to a max. calc. acceleration of 0.95 g. 1VC01YA/B Butterfly Isolation A |Auxiliary Static Analysis Nat. Freq. > 33 Hz. Damper (AWV (Damper), Acc. Levels Used:  $V_1 = 1.0 \text{ g/s}^{H_2} = 1.0 \text{ g},$ ITT (M. Oper.), Namco (L. Switch)) Static Analysis Lowest  $f_{-} = 83.7 \text{ Hz}$ Acc. Levels Used:  $H_1 = 1.0 \text{ g, } H_2 = 1.0 \text{ g,}$   $V_1 = 1.0 \text{ g,}$   $V_2 = 1.0 \text{ g,}$   $V_3 = 1.0 \text{ g,}$   $V_4 =$ 

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Equipment Number	Description	S C 1 a s s	Location	Qualification Method .	Results
1VC02YA	Butterfly Isolation Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 1.25 g.
				Simplified Dynamic Analysis	Lowest f = 111 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 1.25 g. Critical stress = 18,467 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration H <sub>1</sub> = .66 g, H <sub>2</sub> = .52 g, V <sup>1</sup> = .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 <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 1.25 g.
				Simplified Dynamic Analysis	Lowest f > = 111 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V = 1.25 g. Critical stress = 18,467 psi. (Allow. = 19,200 psi Max. Calc. Acceleration: H <sub>1</sub> = .66 g, H <sub>2</sub> = .85 g, V = .67 g.

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Sr. cification No. H-2868 Vendor: Refer Below  Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page <u>834</u> of <u>85</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C e 1 i a s s s	Location	Qualification Method .	Results
1VC08YA	Opposed Blade Balancing Damper (AWV, (Damper), ITT (M.Oper) Namco (L. Switches))		Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.
				Simplified Dynamic. Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = 1.4 g, H <sub>2</sub> = 2.38 g, V <sup>1</sup> = .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 <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.
				Simplified Dynamic Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. accelerations: H <sub>1</sub> = .95 g, H <sub>2</sub> = 1.37 g, V = .68 g.

Specification No. H-2868 Page 835 of \$3 SUMMARY OF Vendor: Refer Below EQUIPMENT QUALIFICATION Rev. 00 Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification a Location Description Results Number Method 1VC09YA/B/ Auxiliary Static Analysis Opposed Blade Lowest f = 24.8 Hz. Balancing Damper (AWV C/D Acceleration Levels Used: (Damper), ITT (M.Oper)  $H_1 = H_2 = 1.00 \text{ g,V} = 1.25 \text{ g.}$ Namco (L.Switches)) Simplified Dynamic Analysis Lowest f = 36 Hz. Acceleration Levels Used: H (Result.) = 3.0 q,V = 5.0 q.Critical Stress = 13,330 (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = .48 \, g$ ,  $H_2 = .85 \, g$ ,  $V^{\perp} = .85 q$ . Auxiliary Static Analysis Lowest  $f_{-} = 24.8 \text{ Hz}$ 1VC10YA Opposed Blade Balancing Damper (AWV Acceleration Levels Used: (Damper), ITT (M.Oper)  $H_1 = H_2 = 1.00 \text{ g, V} = 1.25 \text{ g.}$ Namco (L. Switches) Simplified Dynamic Lowest f = 213 HzAnalysis Acceleration Levels Used: H (Result.) = 3.0 q, V = 5.0 q.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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Equipment Number	Description	S C l i a s s s	Location	Qualification Method	Results	
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 <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.	
				Simplified Dynamic Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = .66 g, H <sub>2</sub> = 1.17 g, V <sup>1</sup> = .69 g.	
1VC10YC	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))	46.	Auxiliary	Static Analysis	Lowest $f_n = 24.8 \text{ Hz.}$ Acceleration Levels Used: $H_1 = H_2 = 1.00 \text{ g, V} = 1.25g$	
	Nameo (B. Switch))			Simplified Dynamic Analysis	Lowest f = 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 = .67 g, H = 1.13 g, V = .85 g.	

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Equipment Number	Description	S C 1 a s s s	Location	Qualification Method	Results
1VC10YD	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper.) Namco (L. Switch))		Auxiliary	Static Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.00 g, V=1.25g
				Simplified Dynamic	Lowest f = 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 = .67 g, H = .85 g, V = .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 <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V = 3.0 g.
				Simplified Dynamic Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = .66 g, H <sub>2</sub> = .84 g, V = .68 g.

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Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results
lVC17YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V = 3.0 g.
				Simplified Dynamic. Analysis	Lowest $f_n = 43 \text{ Hz}$ . Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: $H_1 = 2.93 \text{ g}$ , $H_2 = 1.8 \text{ g}$ , $V = .68 \text{ g}$ .
1VC20YA	Opposed Blade Balancing Damper (AWV ramper) ITT (M.Oper), Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.
				Simplified Dynamic Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g, in all directions Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = .66 g, H <sub>2</sub> = .84 g, V <sup>1</sup> = .66 g.

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Equipment Number	Description	Selass.	Location	Qualification Method	Results
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 <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.
				Simplified Dynamic Analysis	Lowest f = 43 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = 1.54 g, H <sub>2</sub> = .84 g, V = .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 <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V = 3.0 g.
				Simplified Dynamic Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = .64 g, H <sub>2</sub> = .62 g, V <sup>1</sup> = .95 g.

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Description	S C l a s s s	Location	Qualification Method	Results
Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L.Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.
			Simplified Dynamic Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H = 1.54 g, H = .84 g, V = .68 g.
Opposed Blade Balan- cing Damper (AWV, (Damper) ITT (M.Oper.) Namco (L.Switch))		Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V = 3.0 g.
			Simplified Dynamic Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H = .66 g, H = .84 g, V = .66 g.
	Refer Below mer . 4130-00  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L.Switch))  Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper.)	Refer Below mer . 4130-00  Description  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L.Switch))  Opposed Blade Balan- cing Damper (AWV, (Damper) ITT (M.Oper.)	Refer Below mer . 4130-00  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L.Switch))  Opposed Blade Balan- cing Damper (AWV, (Damper) ITT (M.Oper.)	Refer Below mer . 4130-00  Description  Desc

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Equipment Number	Description	Seiass.	Location	Qualification Method	Results
1VC27Y	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis Simplified Dynamic Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.00 g, V=1.25g  Lowest f = 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 <sub>1</sub> = .67 g, H <sub>2</sub> = .85 g, V <sup>1</sup> = .85 g.
1VC29YA/B	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))		Auxiliary	Static Analysis Simplified Dynamic Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.00 g,V=1.25g.  Lowest f = 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 = .67 g, H <sub>2</sub> = .85 g, V = .85 g.

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Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results
1VC31YA	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis Simplified Dynamic Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.00 g, V=1.25g  Lowest f = 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 <sub>1</sub> = .48 g, H <sub>2</sub> = .62 g, V <sup>1</sup> = .85 g.
1VC31YB	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper.) Namco (L. Switch))		Auxiliary	Static Analysis Simplified Dynamic Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.00 g, V=1.25g  Lowest f = 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 <sub>1</sub> = .48 g, H <sub>2</sub> = .62 g, V = .85 g.

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Description	S C l a s s s	Location	Qualification Method	Results
	А	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.
			Simplified Dynamic. Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g, in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = .83 g, H <sub>2</sub> = 1.24 g, V <sup>1</sup> = 1.65 g.
Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	A	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.
			Simplified Dynamic Analysis	Lowest f <sub>n</sub> = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = 1.50 g, H <sub>2</sub> = 1.59 g, V <sup>1</sup> = .75 g.
I	Refer Below  mer . 4130-00  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper)	Refer Below  mer . 4130-00  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper)	Refer Below  mer . 4130-00  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper), Namco (L. Switch))  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper)	Refer Below  mer . 4130-00  Description  A Location  Method  A Auxiliary  Static Analysis  Description  Method  Simplified Dynamic  Analysis  Description  A Auxiliary  Static Analysis  Description  A Auxiliary  Static Analysis  Description  A Auxiliary  Simplified Dynamic  Analysis  Description  A Auxiliary  Simplified Dynamic  Simplified Dynamic  Simplified Dynamic

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Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results
IVD01YA/B/ C/D/E/F	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L. Switch))		Auxiliary	Static Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.00 g, V=1.25g
Namco (L. Switch))				Simplified Dynamic Analysis	Lowest f = 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 = .36 g, H = .48 g, V = .95 g.
1VD02YA/B/ D/E/F	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L. Switch))		Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: $H_1 = 1.0 \text{ g}, H_2 = 1.0 \text{ g},$ $V^1 = 3.0 \text{ g}.$
			Simplified Dynamic Analysis	Lowest f = 43 Hz Acceleration Levels Used: 5.0 g in all directions Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H = .36, H = .46 g, V = .55 g.	

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Equipment Number	Description	Sei ass	Location	Qualification Method	Results
C/D/E/F/G	Opposed Blade Balancing Damper (AWV (Damper), ITT (M.Oper) Namco (L. Switch))		Auxiliary	Static Analysis Simplified Dynamic Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.00 g, V=1.25g  Lowest f = 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 <sub>1</sub> = .36 g, H <sub>2</sub> = .48 g, V = .95 g.
1VD07YA	Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	P	Auxiliary	Static Analysis Simplified Dynamic Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.  Lowest f <sub>1</sub> = 4 .1z. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H <sub>1</sub> = .4 g, H <sub>2</sub> = .46 g, V <sup>1</sup> = .55 g.

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Description	Seiss.	Location	Qualification Method	Results
Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))	P	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.
			Simplified Dynamic Analysis	Lowest f = 43 Hz Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H = .66 g, H = .46 g, V = .55 g.
	P	Auxiliary	Static Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g,
Namco (L. Switch))			Simplified Dynamic Analysis	Lowest f = 43 Hz. Acceleration Levels Used: 5.0 g in all directions. Critical stress = 17,269 psi. (Allowable = 19,200 psi) Max. Calc. Accelerations: H = .36 g, H = .46 g, V = .55 g.
	Refer Below mer . 4130-00  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper),	Refer Below  mer . 4130-00  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper),	Refer Below mer . 4130-00  Description  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper) Namco (L. Switch))  Opposed Blade Balancing Damper (AWV (Damper) ITT (M.Oper)	Refer Below  mer . 4130-00  Description  Des

Specification No. H-2868 Page 650 of 63 SUMMARY OF Refer Below Vendor: Rev. 60 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment Description a Location Results Method Number Lowest f = 24.8 Hz. Auxiliary Static Analysis Opposed Blade 1V005YA Acceleration Levels Used: Balancing Damper (AWV  $H_1 = H_2 = 1.00 \text{ g, V} = 1.25\text{g}$ (Damper) ITT (M.Oper) Namco (L. Switch)) Lowest  $f_{-} = 43 \text{ Hz}$ . Simplified Dynamic Acceleration Levels Used: Analysis H(Result.) = 3.0 qV = 5.0 q.Critical stress = 13,330 (Allowable = 19,200 psi) Max. Calc. Acceleration:  $H_1 = .80 g$ ,  $H_2 = .80 g$ ,  $V^{\perp} = .95 \, \text{g}$ Auxiliary Static Analysis Nat. Freq. > 33 Hz. Opposed Blade 1V005YB Acceleration Levels Used: Balancing Damper (AWV  $H_1 = 1.0 g$ ,  $H_2 = 1.0 g$ . (Damper) ITT (M.Oper)  $V^{\perp} = 3.0 g.$ Namco (L. Switch)) Lowest f = 43 HzSimplified Dynamic Acceleration Levels Used: Analysis 5.0 g in all directions. Critical stress = 17,269 (Allowable = 19,200 psi)Max. Calc. Accelerations:  $H_1 = .56 g$ ,  $H_2 = .79 g$ ,  $V^1 = 1.15 q$ .

Page 351 of 43 Specification No. H- 2868 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment Description a Location Results Number Method 1V006YA Auxiliary Static Analysis Opposed Blade Lowest  $f_{-} = 24.8 \text{ Hz}$ . Balancing Damper (AWV, Acceleration Levels Used:  $H_1 = H_2 = 1.00g$ , V=1.25g. (Damper) ITT (M.Oper) Namco (L. Switch)) Simplified Dynamic Lowest f = 53 Hz. Acceleration Levels Used: Analysis H(Result.) = 3.0g,V = 5.0q.Critical Stress = 13,330 (Allowable = 19,200 psi) Max. Calc. Accelerations:  $H_1 = .34g, H_2 = .70g,$  $V^{1} = .95q.$ Opposed Blade 1V006YB Auxiliary Static Analysis Lowest  $f_{n} = 24.8 \text{ Hz}$ . Acceleration Levels Used: Balancing Damper (AWV, (Damper) ITT (M. Oper),  $H_1 = H_2 = 1.00g$ , V = 1.25g. Namco (L. Switch)) Lowest  $f_{-} = 53 \text{ Hz}$ . Simplified Dynamic Acceleration Levels Used: Analysis H(Result.) = 3.0q, V=5.0qCritical Stress = 13,330 (Allowable = 19,200 psi)Max. Calc. Accelerations:  $H_1 = .70g, H_2 = .45g,$  $V^{1} = .95q$ .

Specification No. H-2868 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00				MMARY OF F QUALIFICATION	Page <u>852</u> of <u>83</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results
1VR01YA	Butterfly Isolation Damper (AWV (Damper) Bettis (Model: 721C- SR, M.Oper.) Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f = 86 Hz. Acceleration Levels Used H <sub>1</sub> = H <sub>2</sub> = V = 1.0g Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H <sub>1</sub> = .48g, H <sub>2</sub> = .62g, V <sup>1</sup> = .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 = 86 Hz. Acceleration Levels Used H <sub>1</sub> = H <sub>2</sub> = V = 1.0g Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H <sub>1</sub> = .51g, H <sub>2</sub> = .62g, V = .70g.

Specification No. H- 2868 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>853 of 83</u> Rev. <u>60</u> Date <u>4-15-8</u>
Equipment Number	Description	S C l a s s s	Location	Qualification Method .	Results
1VR02YA	Butterfly Isolation Damper (AWV, (Damper) Bettis (Model: 721C- SR M.Oper.) Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f <sub>n</sub> = 86 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = V = 1.0g. Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H <sub>1</sub> = .34g, H <sub>2</sub> = .41g, V = .55g.
1VR02YB	Butterfly Isolation Damper (AWV (Damper) Bettis (Model: 721C- SR M.Oper) Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f <sub>n</sub> = 86 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = V = 1.0g Critical stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H <sub>1</sub> = .38g, H <sub>2</sub> = .37g, V = .86g.

Specification No. H- 2868 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00				MMARY OF CQUALIFICATION	Rev. 00 Date 4-15-81
Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results
1VR02YC	Butterfly Isolation Damper (AWV (Damper) Bettis (Model: 721C- SR M.Oper.) Namco (L. Switches))	W/S	Auxiliary	Simplified Dynamic Analysis	Lowest f = 86 Hz. Acceleration Levels Used H <sub>1</sub> = H <sub>2</sub> = V = 1.0g Critical Stress = 9,907 psi (Allowable = 28,700 psi) Max. Calc. Acceleration: H <sub>1</sub> = .47g, H <sub>2</sub> = .41g, V <sup>1</sup> = .55g.
1VR03YA/B	Opposed Blade Balancing Damper (AWV, (Damper) Powers (M.Oper.) Namco (L. Switch))	W/S	Auxiliary	Static Analysis Simplified Dynamic Analysis	Nat. Freq. = 233 Hz. Acceleration Levels Used H <sub>1</sub> = 1.0g, H <sub>2</sub> = 1.0g, V <sup>1</sup> = 3.0g.  Lowest f <sub>1</sub> = 81.5 Hz. Acceleration Levels Used H <sub>1</sub> = 1.0g, H <sub>2</sub> = 1.0g, V <sup>2</sup> = 2.0g. Critical Stress = 12,142 psi (Allowable = 31,600 psi) Max. Calc. Acceleration: H <sub>1</sub> = 0.62g, H <sub>2</sub> = 0.37g, V <sup>2</sup> = 1.7g.

Specification No. H- 2868 Page 255 of 83 SUMMARY OF Vendor: Refer Below EQUIPMENT QUALIFICATION Rev. 00 Wm. H. Zimmer Date 4. 5-81 Project No. 4130-00 Equipment Qualification Description alLocation Results Number Method IVR09Y W/S Auxiliary Static Analysis Opposed Blade Nat. Freq. = 233 Hz. Balancing Damper (AWV, Acceleration Levels Used: (Damper) Powers  $H_1 = 1.0g$ ,  $H_2 = 1.0g$ , (M. Oper.) Namco  $V^{\perp} = 3.0q.$ (L. Switch)) Simplified Dynamic Lowest f > 75 Hz. Acceleration Levels Used: Analysis  $H_1 = 1.0g, H_2 = 1.0g,$  $V^{1} = 3.0g$ Critical Stress = 14,006 (Allowable = 31,600 psi)Max. Calc. Acceleration:  $H_1 = 0.6g$ ,  $H_2 = 0.44g$ ,  $V^{\perp} = 0.98g$ . 1VP01YA/B Opposed Blade W/S Reactor Static Analysis Lowest  $f_{-} = 24.8 \text{ Hz}$ . Balancing Damper (AWV, Acceleration Levels Used: (Damper) ITT (M. Oper.)  $H_1 = 1.00g$ ,  $H_2 = 1.00g$ , Namco (L. Switches))  $V^{1} = 1.25q$ . Simplified Dynamic Lowest  $f_{-} = 40 \text{ Hz}$ . Limit analysis performed Analysis with resulting accelerations found to be above tolerable level. Damper system is subject to modification.

Specification No. H- 2868 Page 856of 48 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification i a Location Description Results Number Method W/S Reactor | Scatic Analysis Lowest  $f_n = 24.8 \text{ Hz}$ . 1VP10YA/B Opposed Blade Acceleration Levels Used: Balancing Damper (AWV,  $H_1 = 1.00g, H_2 = 1.00g,$ (Damper) ITT (M.Oper.) V = 1.25qNamco (L. Switches)) Simplified Dynamic Lowest f = 40 Hz. Limit analysis performed Analysis with resulting accelerations found to be above tolerable level. Damper system is subject to modification. Lowest  $f_{-} = 24.8 \text{ Hz}$ . W/S Reactor Static Analysis lVP11YA/B Opposed Blade Acceleration Levels Used: Balancing Damper (AWV, (Damper) ITT (M. Oper),  $H_1 = 1.00g$ ,  $H_2 = 1.00g$ , Namco (L. Switches)) V' = 1.25qSimplified Dynamic Lowest  $f_n = 40 \text{ Hz}$ . Limit analysis performed Analysis with resulting accelerations found to be above tolerable level. Damper system is subject to modification.

Specification No. H- 2868 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page <u>857</u> of <u>83</u> Rev. <u>00</u> Date <u>1-15-81</u>
Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results
1VQ01Y	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))	and the second	Reactor	Static Analysis	Lowest f <sub>n</sub> = 98.7 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.0g, V = 3.0g Critical Stress = 2,895 psi (Allowable = 23,400 psi)
				Simplified Dynamic Analysis	Lowest f > 40 Hz. Limit load analysis performed which found acceleration levels beyon a tolerable level. Damper system is subject to modification.
Butterfly Isolation Damper (AWV, (Damper) ITT (M.Oper.), Namco (L. Switches))		/S Reactor	Static Analysis	Lowest $f_n \ge 98.7 \text{ Hz.}$ 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 > 40 Hz. Limit load analysis performed which found acceleration levels beyond a tolerable level. Damper system is subject to modification.
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Equipment Number	Description	Selass.	Location	Qualification Method	Results	
1VQ03Y	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))		Reactor	Static Analysis	Lowest f = 98.7 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.0g, V = 3.0g Critical Stress = 2,895 psi (Allowable = 23,400 psi)	
				Simplified Dynamic Analysis	Lowest f > 40 Hz. Limit load analysis performed with Max. Calc. acceleration level of 1.4g as compared to an allowable of 5.4g.	
IVQ11Y	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))		Reactor	Static Analysis	Lowest f = 98.7 Hz. Acceleration Levels Used: H <sub>1</sub> = H <sub>2</sub> = 1.0g, V = 3.0g Critical Stress = 2,895 psi (Allowable = 23,400 psi)	
				Simplified Dynamic Analysis	Lowest $f_n \ge 40$ 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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(L. Switches)) Lowest  $f_{..} = 36 \text{ Hz}$ . Simplified Dynamic Analysis Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 (Allowable = 32,000 psi) Max. Calc. Accelerations:  $H_1 = .48g, H_2 = .37g,$  $V^1 = 1.15q$ . lVQ16YA/B Opposed Blade Reactor Static Analysis Nat. Freq. > 33 Hz. Balancing Dampers Acceleration Levels Used: (AWV, (Damper) Powers  $H_1 = 1.0g$ ,  $H_2 = 1.0g$ , (M. Oper.), Namco  $V^{\perp} = 3.0q.$ (L. Switches)) Simplified Dynamic Lowest  $f_{-} = 50 \text{ Hz}$ . Acceleration Levels Used: Analysis 6.0g's in all directions Critical Stress = 23,412 psi (Allowable = 32,000 psi)Max. Calc. Accelerations:  $H_1 = .94g$ ,  $H_2 = .87g$ ,  $v^{\perp} = 1.03q$ .

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Equipment Number	Description	S C e 1 i a s s	Location	Qualification Method	Results	
1VR10Y	Opposed Blade Balancing Damper (AW (Damper) Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis Simplified Dynamic Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0g, H <sub>2</sub> = 1.0g, V <sup>1</sup> = 3.0g.  Lowest f <sub>n</sub> = 44 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .74g, H <sub>2</sub> = .74g, V <sup>1</sup> = .74g.	
lVR11Y	Opposed Blade Balancing Damper (AW (Damper) Powers (M.Oper.), Namco (L. Switches))	W/S	Reactor	Static Analysis Simplified Dynamic Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0g, H <sub>2</sub> = 1.0g, V = 3.0g.  Lowest f <sub>n</sub> = 44 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .74g, H <sub>2</sub> = .74g, V = .74g.	

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Specification No. H- 2868 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page 864 of 83  Rev. 00  Date 4-15-81
Equipment Number	Description	Sei ass	Location	Qualification Method .	Results
1VR21Y	Opposed Blade Balancing Damper (AWV, (Damper), Powers (M. Oper.), Namco (L. Switches))		Reactor	Simplified Dynamic Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0g, H <sub>2</sub> = 1.0g, V = 3.0g.  Lowest f = 44 Hz. Acceleration Levels Used: 6.0g's in all directions. Critical Stress = 23,412 psi (Allowable = 32,000 psi) Max. Calc. Accelerations: H <sub>1</sub> = .74g, H <sub>2</sub> = .74g, V = .74g.

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Specification No. H-2868 Vendor: Refer Below

## SUMMARY OF FOULPMENT QUALIFICATION

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Equipment Number	Description	S C e 1 i a s s s	Location	Qualification Method	Results
1VR24Y	Opposed Blade Balancing Damper (AWV (Damper), Powers (M.Oper.), Namco (L. Switches))		Reactor	Static Analysis Simplified Dynamic Analysis	Nat. Freq. > 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.  Lowest f <sub>1</sub> = 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 <sub>1</sub> = .74 g, H <sub>2</sub> = .74 g, V <sup>1</sup> = .74 g.
IVR31Y	Opposed Blade Balancing Damper (AWV (Damper), Powers (M. Oper.), Namco (L. Switches))		Reactor	Static Analysis Simplified Dynamic Analysis	Nat. Freq. > 23 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.0 g, H <sub>2</sub> = 1.0 g, V <sup>1</sup> = 3.0 g.  Lowest f <sub>1</sub> = 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 <sub>1</sub> = .74 g, H <sub>2</sub> = .74 g, V <sup>1</sup> = .74 g.

Page 1 57 of 83 Specification No. H-2868 SUMMARY OF Vendor: Refer Below \_\_\_\_ Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 e 1 i a Location Oualification Equipment Description Results Method Number Static Analysis Lowest  $f_{-} = 24.8 \text{ Hz}$ Reactor 1VY01Y Opposed Blade Acceleration Levels Used: Balancing Damper (AWV,  $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g},$ (Damper) ITT (M.Oper.)  $V^1 = 1.25 q$ . Namco (L. Switches)) Simplified Dynamic . Lowest  $f_{-} = 53 \text{ Hz}$ Acceleration Levels Used: Analysis H(Result.) = 3.0 g,V = 5.0 g.Critical stress = 12,467 psi. (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = .83 g$ ,  $H_2 = .78 g$ ,  $V^1 = 2.15 g.$ Lowest  $f_{-} = 24.8 \text{ Hz}$ . Static Analysis Reactor 1VY02Y Opposed Blade Acceleration Levels Used: Balancing Damper (AWV,  $H_1 = 1.00 g$ ,  $H_2 = 1.00 g$ . (Damper), ITT (M.Oper)  $V^1 = 1.25 q$ . Namco (L. Switches)) Lowest  $f_{-} = 39 \text{ Hz}$ . Simplified Dynamic Acceleration Levels Used: Analysis 5.0 g's in all directions. Critical stress = 18,701 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration:  $H_{2} = .30 \text{ g}, H_{2} = .44 \text{ g},$  $V^{1} = .64 \, \text{g}$ 

Page 8 8 of 83 Specification No. H-2868 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification e 1 Location Description Results Number Method 1VY04Y Opposed Blade Reactor Static Analysis Lowest f = 24.8 Hz. Acceleration Levels Used: Balancing Damper (AWV,  $H_1 = 1.00 g$ ,  $H_2 = 1.00 g$ , (Damper), ITT (M.Oper)  $V^1 = 1.25 \text{ g.}$ Namco (L.Switches)) Simplified Dynamic Lowest f = 53 Hz. Acceleration Levels Used: Analysis 5.0 g's in all directions. Critical stress = 18,701 psi. (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = .70 \text{ g}, H_2 = .75 \text{ g},$   $V^1 = .78 \text{ g}.$ A Reactor Static Analysis Lowest f = 24.8 Hz. 1VY06YA/B Opposed Blade Acceleration Levels Used: Balancing Damper (AWV,  $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g},$   $V^1 = 1.25 \text{ g}.$ (Damper), ITT (M.Oper) Namco, (L. Switches)) Simplified Dynamic Analy-Lowest  $f_{-} = 43 \text{ Hz}$ . Acceleration Levels Used: sis H(Result.) = 3.0 g,V = 5.0 g.Critical stress = 12,467 psi. (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = .37 g$ ,  $H_2 = .37 g$ ,  $V^{1} = 1.1 g.$ 

Specification No. H-2868 Page 869 of 93 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification e 1 Location Description Results Number Method SS Lowest f = 24.8 Hz. W/S Reactor Static Analysis 1VY08Y Opposed Blade Acceleration Levels Used: Balancing Damper (AWV,  $H_1 = 1.00 g$ ,  $H_2 = 1.00 g$ , (Damper), ITT (M.Oper)  $V^{\perp} = 1.25 \text{ g.}$ Namco (L. Switches)) Simplified Dynamic Lowest f = 39 Hz. Acceleration Levels Used: Analysis 5.0 g's in all directions Critical stress = 18,701 psi. (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = .30 \text{ g}, H_2 = .44 \text{ g}.$   $V^1 = .64 \text{ g}.$ Static Analysis Lowest  $f_{-} = 24.8 \text{ Hz}$ . Opposed Blade A Reactor 1VY09Y Acceleration Levels Used: Balancing Damper (AWV,  $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g}, V_1 = 1.25 \text{ g}.$ (Damper) ITT (M.Oper), Namco (L. Switches)) Lowest f = 53 Hz. Simplified Dynamic Acceleration Levels Used: Analysis H(Result.) = 3.0 g,V = 5.0q.Critical stress = 12,467 (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = .50 g$ ,  $H_2 = .85 g$ ,  $V^{\perp} = .80 \, \text{g}$ 

Specification No. H-2868 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page <u>870 of 83</u> Rev. <u>00</u> Date <u>4-15-81</u>	
Equipment Number	Description	Seiss.	Location	Qualification Method .	Results	
IVY11Y	Opposed Blade Palancing Damper (AWV, (Damper) ITT (M.Oper) Namco (L. Switches))		Reactor	Static Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g},$ $V^1 = 1.25 \text{ g}.$	
				Simplified Dynamic Analysis	Lowest f = 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 = 1.26 g, H = 1.73 g, V = 2.14 g.	
1VY12Y	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper) Namco (L. Switch))		Reactor	Static Analysis	Lowest f = 24.8 Hz. Acceleration Levels Used: $H_1 = 1.00 \text{ g}, H_2 = 1.00 \text{ g},$ $V^1 = 1.25 \text{ g}.$	
				Simplified Dynamic Analysis	Lowest f = 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, = 1.25 g, H <sub>2</sub> = .43 g, V'= .60 g.	

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Specification No. H- 2868 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>871</u> of <u>93</u> Rev. <u>60</u> Date <u>4-15-81</u>
Equipment Number	Description	S C 1 a s s s	Location	Qualification Method	Results
lVY13YA/B	Opposed Blade Balancing Damper (AWV, (Damper) ITT (M.Oper) Namco (L. Switch))		Reactor	Static Analysis	Lowest $f_n = 24.8 \text{ Hz}$ . Acceleration Levels Used: $H_1 = 1.00 \text{ g}$ , $H_2 = 1.00 \text{ g}$ , $V^1 = 1.25 \text{ g}$ .
				Simplified Dynamic Analysis	Lowest f = 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 = .32 g, H = .38 g, V = .62 g.
1VY14Y	Opposed Blade Balancing Damper (AWV, Damper) ITT (M.Oper.) Namco (L. Switch))	A	Reactor	Static Analysis	Lowest $f_n = 24.8 \text{ Hz.}$ Acceleration Levels Used: $H_1 = 1.00 \text{ g, } H_2 = 1.00 \text{ g,}$ $V^1 = 1.25 \text{ g.}$
				Simplified Dynamic Analysis	Lowest f = 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 = .44 g, H = 1.35 g, V = 1.1 g.

Specification No. H-2868 Page 872 of 83 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-8 Project No. 4130-00 S C e 1 i a Location s s s Equipment Qualification Description Results Number Method A Reactor Lowest f = 24.8 Hz. 1VY15Y Static Analysis Opposed Blade Acceleration Levels Used: Balancing Damper (AWV,  $H_1 = 1.00$  g,  $H_2 = 1.00$  g,  $V_1 = 1.25$  g. (Damper) ITT (M.Oper) Namco (L. Switch)) Simplified Dynamic Lowest f = 53 Hz. Acceleration Levels Used: Analysis H(Result) = 3.0 g, $V = 5.0 \, c$ Critical stress = 12,467 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration:  $H_1 = .75 \text{ g}, H_2 = .58 \text{ g}, V_1 = .80 \text{ g}.$ 

Page 873 of 83 Specification No. H-2874 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 S C e 1 Location Oualification Equipment Description Results Number Method Lowest f = 33 Hz. Static Analysis Butterfly Isolation Reactor 1VG01YA Acceleration Levels Used: Damper (AWV, (Damper),  $H_1 = 0.60 \text{ g}, H_2 = 0.60 \text{ g}, V_1 = 0.65 \text{ g}.$ ITT (M.Oper.), Namco (L. Switches)) Critical stress = 7,002 psi. (Allowable = 36,000 psi)Lowest  $f_{-} = 70.3 \text{ Hz}$ . Simplified Dynamic Acceleration Levels Used: Analysis  $H_1 = 1.07 \text{ g}, H_2 = 1.07 \text{ g}.$   $V^1 = 1.05 \text{ g}.$ Critical stress = 18,771 psi. (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = H_2 = 1.07 g$  $V^1 = 1.65 q$ .

Specification No. H- 2874 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>B74</u> of <u>83</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results
1VG01YB	Butterfly Isolation Damper (AWV (Damper) ITT (M.Oper.) Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f = 33 Hz. Acceleration Levels Used: H <sub>1</sub> = 0.60 g, H <sub>2</sub> = 0.60 g, V = 0.65 g. Critical stress = 7,002 psi. (Allowable = 36,000 psi)
				Simplified Dynamic Analysis	Lowest f = 70.3 Hz. Acceleration Levels Used: H <sub>1</sub> = 1.07 g, H <sub>2</sub> = 1.07 g, V = 1.05 g. Critical stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H <sub>1</sub> = H <sub>2</sub> = 1.07 g, V=1.05c Damper is subject to modifications.
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Specification No. H-2874 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>875</u> of <u>83</u> Rev. <u>00</u> Date <u>4-15.81</u>	
Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results	
lVG06YA/B	Butterfly Isolation Damper (AWV, (Damper), ITT (M.Oper.), Namco (L. Switches))	A	Reactor	Static Analysis	Lowest f = 340 Hz. Acceleration Levels Used $H_1 = 1.5 \text{ g}, H_2 = 1.5 \text{ g},$ $V = 2.0 \text{ g}.$ Critical stress = 6,077 psi. (Allowable = 26,000 psi)	
				Simplified Dynamic Analysis	Lowest f = 340 Hz. Acceleration Levels Used H <sub>1</sub> = 1.5 g, H <sub>2</sub> = 1.5 g, V <sup>1</sup> = 2.0 g. Critical stress = 18,771 psi. (Allowable = 19,200 psi) Max. Calc. Acceleration: H <sub>1</sub> = 0.42 g, H <sub>2</sub> = 0.33 g V <sup>1</sup> = 0.75 g.	

Specification No. H-2874 Vendor: Refer Below Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>876</u> of <u>83</u> Rev. <u>60</u> Date <u>4-15-81</u>
Equipment Number	Description	S C 1 a s s	Location	Qualification Method	Results
	Butterfly Isolation Damper (AWV, (Damper) ITT (M.Oper.), Namco (L. Switches))	A	Reactor	Static Analysis  Simplified Dynamic Analysis	Lowest f = 347 Hz. Acceleration Levels Used H <sub>1</sub> = 1.5 g, H <sub>2</sub> = 1.5 g, V <sup>1</sup> = 2.0 g. Critical stress = 6452ps: (Allowable = 26,000 psi)  Lowest f = 347 Hz. Acceleration Levels Used H <sub>1</sub> = 1.5 g, H <sub>2</sub> = 1.5 g, V <sup>1</sup> = 2.0 g. Crit. stress = 18,771 psi (Allowable = 19,200 psi) Max. Calc. Acceleration: H <sub>1</sub> = 0.34 g, H <sub>2</sub> = 0.36 g, V <sup>1</sup> = 0.75 g.

Specification No. H-2874 Page 877 of 93 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Seis Equipment Qualification Description a Location Results Number Method Static Analysis Butterfly Isolation Reactor Lowest f = 340 Hz. 1VG07YB Acceleration Levels Used: Damper (AWV (Damper)  $H_{2} = 3.91 g$ ,  $H_{2} = 3.91 g$ , ITT (M.Oper.), Namco  $V^{\perp} = 0.66 \, q.$ (L. Switches)) Crit. stress = 6257 psi (Allowable = 26,000 psi) Simplified Dyanmic Lowest f = 340 Hz. Acceleration Levels Used: Analysis  $H_1 = 3.91 g$ ,  $H_2 = 3.91 g$ ,  $V^1 = 0.66 q$ . Critical stress = 18,771 psi. (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = .42 \, \text{g}$ ,  $H_2 = 0.38 \, \text{g}$ ,  $V = 0.25 g.^2$ 

Specification No. H-2874 Page 878 of 83 SUMMARY OF Vendor: Refer Below EQUIPMENT QUALIFICATION Rev. 00 Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description a Location Results Number Method A Reactor Static Analysis Lowest f = 347 Hz. 1VG08YA/B Butterfly Isolation Damper (AWV, (Damper), Acceleration Levels Used: ITT (M.Oper.), Namco  $H_1 = 1.5 g$ ,  $H_2 = 1.5 g$ , (L. Switches))  $V^{\perp} = 1.0 q.$ Critical stress = 6452 psi (Allowable = 26,000 psi)Simplified Dynamic Lowest f = 347 Hz. Acceleration Levels Used: Analysis  $H_1 = 1.5 \text{ g}, H_2 = 1.5 \text{ g},$   $V^1 = 2.0 \text{ g}.$ Critical stress = 18,771 psi. (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = 0.34 \text{ g}, H_2 = 0.36 \text{ g},$  $V^{\perp} = 0.75 \, \text{g}$ 

Page 879 of 83 Specification No. H-2874 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment eis Description a Location Results Method Number S 1VG09YA/B Static Analysis Lowest  $f_{-} = 347 \text{ Hz}$ . Butterfly Isolation Reactor A Acceleration Levels Used: Damper (AWV, (Damper)  $H_1 = 1.5 g. H_2 = 1.5 g.$ ITT (M.Oper), Namco  $V^{\perp} = 2.0 \, \text{g}$ (L. Switches)) Critical stress = 6452 psi (Allowable = 26,000 psi. Simplified Dynamic Lowest f = 347 Hz. Acceleration Levels Used: Analysis  $H_1 = 1.5 g$ ,  $H_2 = 1.5 g$ ,  $V^{\perp} = 2.0 \, \text{g}$ . Critical stress = 18,771psi (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = 0.34 \text{ g}, H_2 = 0.36 \text{ g},$  $V^1 = 0.75 g$ .

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Page 881 of 83 Specification No. H- 3874 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Qualification Equipment a Location Description Results Method Number Static Analysis Lowest f = 193 HzReactor 1V010Y Butterfly Isolation A Acceleration Levels Used: Damper (AWV, (Damper)  $H_1 = 0.35 g$ ,  $H_2 = 0.35 g$ , ITT (M.Oper.), Namco  $V^{1} = 0.65 \, \text{g}$ (L. Switches)) Critical stress = 5216 psi (Allowable = 36,000 psi)Lowest f = 193 Hz. Simplified Dynamic Acceleration Levels Used: Analysis  $H_1 = 0.35 g$ ,  $H_2 = 0.35 g$ ,  $V^{\perp} = 0.65 \text{ g.}$ Critical stress = 10,409psi (Allowable = 19,200 psi)Max. Calc. Acceleration:  $H_1 = 0.32 \text{ g}, H_2 = 0.36 \text{ g}, V_1 = 0.65 \text{ g}.$ 

Page 682 of 83 Specification No. H-2883 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15.81 Project No. 4130-00 Oualification Equipment i a Location Description Results Method Number Auxiliary Simplified Dynamic Analysis Lowest f = 3.21 Hz. Essential Isolation 1VC89Y (Remaining f > 353 Hz)
Acceleration Levels Used Check Damper (Techno Corp (Damper) Miller and Reg'd. per H-2883): (M.Oper.), Namco  $H_{2} = H_{2} = V = 2.0 g$ . (L. Switch)) Critical stress = 37,399 ps (Allowable = 41,990 psi)Simplified Dynamic Max. Calc. Acceleration:  $H_1 = .87 g$ ,  $H_2 = .95 g$ , Analysis  $V^{\perp} = 1.31 \, \text{g}$ . Therefore, past analysis (above) applies. Auxiliary Simplified Dynamic Lowest f = 3.21 Hz. 1VC90Y Essential Isolation P (Remaining fn, > 353 Hz) Analysis Check Damper (Techno Accel. Levels Used (and reg'd Corp (Damper) Miller per H-2883): (M.Oper.), Namco  $H_1 = H_2 = V = 3.0 g.$ (L. Switch)) Crit. Stress = 37,399 psi (Allowable = 41,990 psi)Simplified Dynamic Max.Calc. Acceleration:  $H_1 = .87 g, H_2 = .95 g,$  $V^1 = 1.31 q$ . Therefore, past analysis (above) applies.

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

## SUMMARY OF EQUIPMENT QUALIFICATION

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Equipment Number	Description	Seiss.	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 = 3.21 Hz.  (Remaining f , > 353 Hz.)  Acceleration Levels Used  (And req'd per H-2883):  H = H = V = 3.0 g.  Crit. Stress = 37,399 psi  (Allowable = 41,990 psi)
				Simplified Dynamic Analysis	Max. Calc. Acceleration: H <sub>1</sub> = 1.15 g, H <sub>2</sub> = .78 g, V <sup>1</sup> = .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 Analysi	sLowest f = 3.21 Hz. (Remaining f, > 353 Hz) Acceleration Levels used (and req'd. per H-2883) H <sub>1</sub> = H <sub>2</sub> = V = 3.0 g. Crit. Stress = 37,399 psi (Allowable = 41,990 psi)
				Simplified Dynamic Analysi	sMax. Calc. Acceleration: H = 1.15 g, H = .78 g, V = .88 g. Therefore, past analysis (above) applies.

Specification No. H-2191 SUMMARY OF Page Cl of 45 Vendor: Rockwell International EQUIPMENT QUALIFICATION Rev. oo Wm. H. Zimmer Project No. 4130-00 Date 4-15-81 Equipment Qualification 1 Location Description Number Results Method S 1E51F065 6" Non-Slam Check Reactor No extended part Rigid in all directions Valve Building Stress evaluation for No limiting accelerations operability under nozzle Obtained allowable loads Nozzle loads to assure operability 14" Non-Slam Check 1E22F024 Reactor No extended part Rigid in all directions Valve Building Stress evaluation for No limiting accelerations operability under nozzle Obtained maximum nozzle loads loads for operability 1B21F010A/B 18" Non-Slam Check Primary No extended part Rigid in all directions Valve Stress evaluation for Cont. No limiting accelerations operability under nozzle Obtained maximum nozzle 1B21F032A/B Reactor loads loads for operability Building

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

## SUMMARY OF EQUIPMENT QUALIFICATION

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Project No.	4130-00			Date 1-13-81		
Equipment Number	Description	S C e 1 i a s s s	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'	

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Page (13 of 45 Rev. 00 Date 4-15-81	Results	Rigid No limiting acceleration loads Nozzle loads governed by connected piping.
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	All passive valves Do not have extended structure Valve body shown to be stronger than pipe
SUMI	Location	Reactor Building Primary Contain- ment
	S 9 - 4 S •	
Specification No. H-2198 Vendor: Dragon Check Valves Wm. H. Zimmer Project No. 4130-00	Description	Excess Flow Check
Specification No. Vendor: Dragon Ch. Wm. H. Zimmer Project No. 4130-	Equipment Number	Total

Page C4 of 45  Rev. 00  Date 4-15-81	Results	Spring frequency - 191 Hz Valve body is stronger than pipe Nozzle loads limited by connected piping
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method.	Frequency analysis of spring Static analysis of valve at critical sections Comparison of area and section modulus of valve body to connected piping
SUMNEQUIPMENT	Location	React. Bldc
	∾ ⊕ ⊕ ω ω	Δ
on No. H-2245 Heat Transfer Corp. er	Description	.75 x 1.0" Relief Valve
Specification No. Vendor: Yuba Heat Wm. H. Zimmer Project No. 4130-	Equipment Number	1RE045A, B, C 1RE046A, B, C

Specification No. H-2263 Vendor: Wm. Powell Co. Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>(5</u> of <u>45</u> Rev. <u>00</u> Date <u>4 - 15 - 81</u>
Equipment Number	Description	S C e 1 i a s s	111.77	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. B'dg  Prim. Cont.	with the vendor	
lIN061 lWS076A, B lC41F001A, 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'
lWS117A, B	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	
1WSO40A, B, C, D, E, F, G, H	6", M, Globe Valves	P	Diesel Generator Room	Qualification in progress with vendor	2400 0

CATION   Page (26 of 45   Rev. 00   Date 4-15-81	Qualification Method .	Finite element analysis Natural frequency value Simplified dynamic analysis stresses limited to design allowables  Light frequencies 26.6 Hz  Qualified acceleration levels Upset & Emergency a = 1.57 'g', b = 2.70 'g' c = 2.57 'g'	Oualification in progress with Vendor
SUMMARY OF EQUIPMENT QUALIFICATION	Qual Location	React. Bldg Finite elem Natural fre Simplified analysis st to design	Turb. Bldg Qualificati
EG	ss i Co	A Rea	P Tax
Specification No. H-2263 Vendor: Wm. Powell Co. Wm. H. Zimmer Project No. 4130-00	Description	10", Mo, Globe Valves	3", Mo, Globe Valve
Specification No. H-Vendor: Wm. Powell Co. Wm. H. Zimmer Project No. 4130-00	Equipment Number	1E12F021 1E12F024A, B	1B21F314

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Specificati Vendor: Wm. Wm. H. Zimm Project No.			MARY OF QUALIFICATION	Page <u>C7</u> of <u>45</u> Rev. <u>00</u> Date <u>4-15-81</u>	
Equipment Number	Description	Selaas sess	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	2½", M, Gate Valves	Р	React.Bldg Prim. Cont React.Bldg Aux. Bldg. React.Bldg		
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=2.89b'
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	with vendor	

Specification No. H-2264 Vendor: Wm. H. Powell Co. Wm. H. Zimmer Project No. 4130-00				MARY OF QUALIFICATION	Page <u>28</u> of <u>45</u> Rev. <u>00</u> Date <u>4-15-81</u>	
Equipment Number	Description	S (e ;	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 1E12F308 1E12F308 1E12F308 1E12F308 1E21F004 1E21F004 1E21F004 1E21F008 1E21F008 1E21F008 1E21F008 1E21F008	3", M, Gate Valves	P	React. Bldg React. Bldg Service water pump house React. Bldg Prim. Cont. React. Bldg	with vendor		
lwS011A, 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. Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page <u>C9</u> of <u>45</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C i a s s s	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'
lE12F064A,B,C lE21F011	4"-300#, Mo, Gate Valves	A		Qualification in progress with vendor	
1E51F059 1E21F020 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		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	
lwR042A, B lE12F018A,B,C lE21F302	4", M, Gate Valves	P		Qualification in progress with vendor	
1WR073 1WR074	6", Ao, Gate Valves	A	React. Bldg	Qualification in progress with vendor	

Specification No. H- 2264 Page Clo of 45 SUMMARY OF Vendor: Wm. H. Powell Co. Rev. oo EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description Location Results Number Method 6"-150#, Mo, Gate Valves 1WR054 React, Bldd Finite element method Natural frequencies 55.8 Hz. 1WR055 Natural frequency evaluation 96.8 Hz 1E51F010 Simplified dynamic analysis Qualification acceleration A 1E51F031 Stresses limited to design level, Upset & Emergency a =4.1'g', b =4.1'g' allowables c = 3.05'q'6"-600#. Mo. Gate Valves 1E51F012 Qualification in progress React, Bldo with vendor 1E51F013 6"-900#, Mo, Gate Valves Qualification in progress React. Bldg Prim. Cont. 1G33F001 with vendor A 1G33F004 React. Bldg A 6", M. Gate Valves 1E51-F016 Qualification in progress P React. Bldg with vendor 1E51F068 React. Bldg Natural frequencies 38.1 Hz, 8"-150#, Mo, Gate Valves Finite element analysis Natural frequency evaluation 71.6 Hz Qualification acceleration Simplified dynamic analysis level Upset & Emergency -Stresses limited to design a = 3 'q', b = 3 'q', c = 3.5 'q'allowables 8"-900#, Mc, Gate Valves Finite element analysis Natural frequencies 73.3 Hz, 1E51F063 Prim. Cont. Natural frequency evalulation 1E51F064 React. Eldg 86.6 Hz Static aralysis Qualification acceleration Stresses limited to design level Upset & Emergency a = 5 'g', b = 5 'g', c = 6 'g'allowables Turb. Bldg Qualification in progress 1B21F310A, B | 10"-600#, Mo, Gate Valves | P with vendor

Specification No. H-2264 PageCII of 45 SUMMARY OF Vendor: Wm. H. Powell Co. EQUIPMENT QUALIFICATION Rev. oo Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification a Location Description Results Number Method S 1E12F042AB,C 10"-900#, Mo, Gate Valves React. Bldg Finite element analysis Natural frequencies 74.2 Hz, 1E21F005 Natural frequency evaluation 83.3 Hz Static Analysis Qualification acceleration Stresses limited to design level Upset & Emergency allowables a = 5 'q', b = 5 'q', c = 6 'q' Qualification in progress 1FC029 12"-300#, M, Gate Valves React. Bldg with vendor 1FC034 1FC035 1E12F335 1E21F309 1E22F301 14", M, Gate Valve React. Bldg Qualification in progress with vendor 18"-900#, Mo, Gate Valves Natural frequencies 59.1 Hz, 1B21F065A, B React. Bldg Finite element method Natural frequency evaluation 1E12F008 81.9 Hz IE12F009 Prim. Cont. Static analysis Qualification acceleration Stresses limited to design level Upset & Emergency allowables a = 5 'q', b = 5 'q', c = 3.5 'q'18"-900#, M, Gate Valves Qualification in progress 1B21F011A, B Prim. Cont. with vendor 1E12F306 Natural frequencies 20.2 Hz, Finite element method 1WS005 30"-150#, Mo, Gate Valves Service Natural frequency evaluation 33.3 Hz Water Pump Equivalent dynamic analysis House Qualification acceleration level Upset & Emergency a = 5 'g', b = 5 'g', c = 4.5 'g'

Rev. 00 45 Date 4-15-81	Results	Minimum natural frequency = 46.9 Hz Qualification acceleration level Upset & Emergency a=3.75'g', b=4.0'g', c=4.0'g'
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Finite element analysis Natural frequency evaluation Equivalent dynamic analysis Stresses limited to design allowables to assure operability
SUM EQUIPMENT	Location	React. Bldg
	. s +.es	4
Specification No. H-2264 Vendor: Wm. H. Powell Co. Wm. H. Zimmer Project No. 4130-00	Description	4", Mo, Gate Valves
Specification No. Vendor: Wm. H. Powe Wm. H. Zimmer Project No. 4130-(	Equipment Number	1E12F011A, B 1E12F027A, B 1WS013A, B

Specification No. H-2265 Page C13 of 45 SUMMARY OF Vendor: Jamesbury Corp. Rev. 00 EQU MENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification a Location Description Results Number Method S 1WS036A to H 6", M, Butterfly Valve Diesel Gen. Finite element analysis Minimum natural frequency Natural frequency evaluation = 118 HzRoom Static analysis Qualification acceleration level. Upset - a=3'q', b=3'q', c=4'q' Emerg. - a=5'g', b=5'g', c=6'g' Finite element analysis 1WS037A to D 8", Mo, Butterfly Valve Diesel Gen. Minimum natural frequency Natural frequency evalulation = 41.6 HzRoom Qualification acceleration Static analysis level Upset - a=3'g', b=3'g', c=4'g' Emerg. - a=5'g', b=5'g', c=6'g' Minimum natural frequency Dynamic analysis using finite lVH00lA, B 12", Ao, Butterfly Valves Service 1VH002A, B element model = 24.1 HzWater Pump Qualified to the response 1VH003A, B House Frequency evaluation Response spectra analysis spectra 1VH004A, B 14", Mo, Butterfly Valve 1E12F068A, B React. Bldg In progress 14", M, Butterfly Valve 1WS017 React. Bldg In progress 1WS018 1WS019 1WS021 1E12F014A, B 16", Mo, Butterfly Valve React. Bldg. In progress 16", M, Butterfly Valve React. Bldg. In progress 1WS027 1WS032

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Specification No. H- 2265 Vendor: Jamesbury Corp. Wm. H. Zimmer Project No. 4130-00				MARY OF QUALIFICATION	Page <u>014</u> of <u>45</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C 1 i a s s s	Location	Qualification Method .	Results
1VQ001A, B 1VQ002A, B 1VQ003A, B 1VQ004A, B	18", Ao, Butterfly Valve	Р	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'
1СУ008А, В	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 Ups st - a=3'g', b=3'g', c=4'g' Emerg a=5'g', b=5'g', c=6'g'

	Page 215 of 45 Rev. 00 Date 4-15-81	Results						
	SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	In progress	In progress	In progress			
	SUMN EQUIPMENT	Location	Prim. Cont.	Prim. Cont.	React. Bldg			
		S ⊕ -1 S •	AAA	4	Q.			
	Specification No. H-2267 Vendor: Rockwell International Wm. H. Zimmer Project No. 4130-00	Description	10", Check Valves	4", Check Valves	12", M, Butterfly Valve			
-	Specification Vendor: Rockwe Wm. H. Zimmer Project No. 4	Equipment Number	1E12F041A,B,C 1E12F050A,B 1E21F006 1E22F005	1E51F066	1wS022			

			-	MARY OF QUALIFICATION	Page C16 of 45  Rev. 00  Date 4-15-81	
Equipment Number	Description	S C c i a s s s	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 accelera- tions obtained from piping analysis	
1E51F025 1E51F026	1", Ao, Globe Valve	A	React, Bldg		Minimum natural frequency = 35.19 Hz Qualified to actual accelera- tions 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	Peact. Bldg		Minimum natural frequency = 35.48 Hz Qualification acceleration level Upset & Emergency a=3.25'g', b=3.25'g', c=3.25'g	

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Page C17 of 45 Specification No. H-2266 SUMMARY OF Vendor: Fischer Controls Corp. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4 - 15 - 81 Project No. 4130-00 Qualification Equipment Results a Location Description Method Number SS Minimum natural frequency React. Bldg Finite element method 25", Ao, Globe Valve 1E12F065A,B = 34.77 HzNatural frequency evaluation Qualification acceleration Equivalent dynamic analysis level Upset & Emergency Stresses limited to design a=2.5'g', b=2.5'g', c=2.5'g' allowables to assure operability Minimum natural frequency 6", Ao, Globe Valve A 1E12F051A.B = 31.7 HzQualified to accelerations obtained from piping analysis Minimum natural frequency 10", Ao, Globe Valve A 1WS020 -=27.1 Hz Qualified to accelerations obtained from piping analysis Minimum natural frequency 12", Ao, Globe Valve A 1WS025 = 28.45 HzQualified to accelerations obtained from piping analysis Minimum natural frequency 12", Ao, Globe Valve A 1WS030 = 28.3 HzQualified to accelerations obtained from piping analysis

Vendor: J. Wm. H. Zimm	Specification No. H- 2268 Vendor: J. E. Lonergan Wm. H. Zımmer Project No. 4130-00			MMARY OF QUALIFICATION	Page C18 of 45.  Rev. 00  Date 4-15-81	
Equipment Number	Description	S C 1 a s s	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 con- nected 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 con- nected piping	
1C41F029Á, B	l" x l", Relief Valves	P	React. Bldg		Spring frequency - 47 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by con- nected piping	
linoosa, B	l" x lኒ", Relief Valves	P	React, Bldg		Spring frequency - 191 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by co.c- nected piping	
1E12F005	l" x lኒ", Relief Valve	P	React. Bldg		Spring frequency - 191 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by con- nected piping	

Specification No. H-2268 Page C19 of 45 SUMMARY OF Vendor: J. E. Lonergan EQUIPMENT QUALIFICATION Rev. oo Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification Description a Location Results Number Method 1" x 2", Relief Valves 1E12F030 React. Bldg Spring frequency P Spring frequency - 151 Hz 1E21F031 Static analysis Valve body is stronger than pipe 1E51F017 Comparison of area and section No limitation on accelerations modulus of valves to connected Nozzle loads limited by conpiping nected piping 1D0005B,D,F 15" x 2", Relief Valves Spring frequency evaluation D. G. Spring frequency - 181 Hz 1WR077 React. Bldg Static analysis for stresses Valve body is stronger than pipe 1E12F025A, B,C React. Bldg and deflections No limitation on accelerations 1E22F035 Comparison of area and section Nozzle loads limited by piping React. Bldg modulus of valves to connected piping 15" x 3", Relief Valve 1E51F018 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 React. Bldg P Spring frequency - 196 Hz Valve body is tronger than pipe No limitation accelerations Nozzle loads limited by piping 3" x 4", Relief Valve 1E12F036 P React. Bldg Spring frequency - 191 Hz Valve body is stronger than pipe No limitation on accelerations Nozzle loads limited by piping

Vendor: Dre	Specification No. H-2804 Vendor: Dresser Industries, Inc. Wm. H. Zimmer Project No. 4130-00			MARY OF QUALIFICATION	Page C.20 of 45  Rev. 00  Date 4-15-81	
Equipment Number	Description	S C c l i a s s s	Locatic.	Qualification Method	Results	
All	날", 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	날", M, Globe Valves	P				
A11	3/4", M, Gate Valve	P				
All	3/4", M, Globe Valve	P	1			
1B33F013A/B 1B33F017A/B 1E32F010 1E32F011	3/4", Check Valves	A	Prim. Cont. React. Bldg	Valves shown to be stronger	Rigid in all directions No limitation on accelerations Allowable nozzle loads obtained to assure operability	
All Other	3/4", Check Valves	Р	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				
A11	1½", M, Gate Valves	P			24.510	
All	1½", M, Globe Valves	P				

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Equipment Number	Description	Description S C e 1 i a s s		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 Blägs.	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				
A11	2", M, Globe Valves	P			<b>↓</b>	
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 extern part Valves shown to be stronger than pipe	Rigid in all directions No limitation on accelerations Nozzle loads limited by piping	
					relight	

Rev. 00 Date 4-15-81	Results				
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Qualification in progress	React. Bldc Qualification in progress Service Water Pump House	Qualification in progress	Qualification in progress
SUMN EQUIPMENT	Location	Service Water Pump House	React. Bldg Service Water Pump House	React. Bldg C.W.P.HS React. Bldg React. Bldg C.W.P.HS	S.W.P.H.
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Lunkenheimer Limmer No. 4130-00	Description	12", Mo, Gate Valve	to D 12", M, Gate Valves	14", M, Gate Valves	24", Mo, Gate Valve
Specification No. Vendor: Lunkenheime Wm. H. Zimmer Project No. 4130-	Equipment Number	1WR009 1WR010 1WR011 1WR012 1WR019 1WR020 1WR021 1WR022	IWR02A to D IWR026A to D	1WR003A,B,C 1WR005 1WR006 1WR007 1WR008	1wS080

Specification No. H-2811 Vendor: Anchor Darling Valve Co. Wm. H. Zimmer Project No. 4130-00				QUALIFICATION	Page C23 of 45  Rev. 00  Date 4-15-81	
Equipment Number	Description	S C 1 a s s	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		<b>→</b>	
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'	
lWRl34	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'	
lWR133A,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'	

				MARY OF QUALIFICATION	Page <u>C24</u> of <u>45</u> Rev. <u>00</u> Date <u>4-15-81</u>	
Equipment Number	Description	S C e 1 i a 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'	
lE12F003A,B lE12F016A,B lE12F017A,B lE12F047A,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'	
1EJ2F006A,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 struc- tural 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				MARY OF QUALIFICATION	Page (25 of 45 Rev. 00 Date 4-15-81
Equipment Number	Description	S C e 1 i a s s s	Location	Qualification Method	Results
1E12F067 1E12F302A, B,C	16", M, Gate Valve	Р	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'
lE2lF00l	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	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				MARY OF QUALIFICATION	Page C 26 of 45  Rev. 00  Date 4-15-81	
Equipment Number	Description	S C l i a s s s	Location	Qualification Method	Results	
LRG071A to F	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'	
lRG041A,B lRG047A,B lRG051A,B,D, E,F lRG057A 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	1				
lRG046A to H J to N, P lRG056A to F, H,J,N,P	1-1/8", M, Expansion Valve	A	1			

Page C27 of 45 Specification No. H- 2816 SUMMARY OF Vendor: Bannson Rev. oo EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Qualification Equipment a Location Description Results Method Number Resonances 26.5 Hz, 27.5 Hz All valves tested at same 1-1/8", M, Relief Valve Aux. Bldg 1RG048A Qualification acceleration time Pseudo-biaxial Test level Upset & Emergency Resonance Search 1-33 Hz a=4.0'g', b=4.8'g', c=4.0'g' 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) 1-3/8", Solenoid A 1RG055A to H. Operated Globe Valve J to N.P 1RG059A to H 1-3/8", Solenoid Operated Bypass Valve 1RG045A to H 1-5/8", Solenoid Operated Globe Valve 1-5/8", Solenoid 1RG049A to D Operated Bypass Valve 1-5/8", M, Globe Valve 1RG052A to F 1RG053A to F 1RG054A to F

Page C28 of 45 Specification No. H-2816 SUMMARY OF Vendor: Bahnson Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment Results Description a Location Method Number Resonances 26.5 Hz, 27.5 Hz All valves tested at same 2-1/8", M, Globe Valve Aux. Bldg. 1RG080A, B Qualification acceleration time. Pseudo-biaxial Test 1RG082A, B level Upset & Emergency Resonance Search 1-33 Hz a=4.0'g', b=4.8'g', c=4.0'g' Sine Sweep-Input 1 to 10'g' Horizontal, 0.5 to 5'q' Vertical Sine dwell at each resonant frequency Four orientations of 0°, 90°, 180° and 270° Duration of dwell in each orientation 240 sec. (min) 2-5/8", M, Globe Valve 1RG042A, B 1RG043A, B 1RG044A, B 1RG060A,B

Vendor: And Wm. H. Zim	Specification No. H-2819 Vendor: Anchor Darling Valve Co. Wm. H. Zimmer Project No. 4130-00			MARY OF QUALIFICATION	Page <u>C29</u> of <u>45</u> Rev. <u>00</u> Date <u>4-15-81</u>	
Equipment Number	Description		Location	Qualification Method	Results	
1DG005A,B,C 1DG006A,B,C 1SA079 1SA081	2½", M, Globe Valves	P	Aux. 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	
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'	

Page 230 of 45 Specification No. H-2820 SUMMARY OF Vendor: Rockwell International Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment is Description Location Results Method Number 1E12F087A,B 3", Mo, globe valve A Reactor Natural frequency evaluation Minimum natural frequencies Building Static analysis for stresses are 69.4 Hz & 179 Hz. Oualification Acceleration and deflections level upset & emergency a-5'g', b-5'g', c-5'g' 4", Mo, globe valve Reactor Natural frequency evaluation 1E51F045 A Minimum natural frequencies Building simplified dynamic analysis 46 Hz, 61 Hz Oualification acceleration level Upset: a-1.86'g', b-1.86'g', c-1.86'q' Emergency: a-2.0'g', b-2.0'g', c-2.0'g' 6", Mo, globe valve Reactor 1E12F023 In progress Building 1G33F102 6", Mo, globe valve P In progress Prim. Cont. 8", Mo, glove valve 1E12F052A,B A Reactor In progress Building 1E12F053A,B 10", Mo, globe valve la progress A Reactor Building 1E12F048A,B 14, Mo, globe valve In progress A Reactor Building

Specification No. H-282) Page (3) of 45 SUMMARY OF Vendor: Mission Manufacturing Co. Rev. oo EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment Location Description Results Method Number S 25", check valve Reactor In progress 1CY046 P Building 1SA080 In progress 3", check valve P Reactor 1IN063 Building CW.P.HS 1WS074A,B Reactor IWS077A,B Building 1E21F303 4", check valve In progress P Reactor Building In progress 6", check valve P Prim. 1WR136 Cont. Reactor 1E51F011 Building 1E51F030 6", check valve Reactor A Building 1VP046A,B 8", check valve P Prim. In progress Cont. In progress 8", check valve Reactor 1E51F040 A Building.

Page 32 of 45 Rev. 00 Date 4-15-81	Results						
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	In progress					
SUM EQUIPMENT	Location	Reactor	Reactor	Reactor	Service Water Pump House		
	∾	Б	ď	A	Д		
Specification No. H-2821 Vendor: Mission Manufacturing Co. Wm. H. Zimmer Project No. 4130-00	Description	IWR001A,B,C, 12", check valve D	16", check valve	20", check valve	IWS003A,B,C, 24", check valve		
Specification Vendor: Mission Wm. H. Zimmer Project No. 41	Equipment Number	IWR001A,B,C,	1E22F002	1E22F016	lwS003A,B,C,		

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Page (33 of 45 Specification No. H-2822 SUMMARY OF Vendor: Anchor Darling Valve Co. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 e 1 i a Location s s Qualification Equipment Description Results Method Number Rigid Reac. Bldg. No extended part 12", Non-Slam Check Valve A 1E21F003 No limitation on accelerations Valve body analysis for maximum nozzle loads to Allowable nozzle loads obtained to assure operability 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		SUMMARY OF EQUIPMENT QUALIFICATION			Page (34 of 45 Rev. 00 Date 4-15-81
Equipment Number	Description	S C e 1 i a s s	Location	Qualification Method .	Results
lE12F039A,B C,D lE12F304 lE12F305 lE12F306	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
lE12F054A,B lE51F023	4", Check Valves	₽			
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

Page 235 of 45  Rev. 00  Date 4-15-81	Results	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'
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Frequency evaluation Static analysis for stresses Comparison of valve body area and section modulus to con- nected piping
SUMNEQUIPMENT	Location	Turb. Bld,  Service Water Pump House
1	α φ. α α . Ο μ φ α α α	ρ, ρ,
on No. H-2839 y Pratt Co.	Description	30", M, Butterfly Valves 30", M, Butterfly Valves
Specification No. Vendor: Henry Pratt Wm. H. Zimmer Project No. 4130-	Equipment Number	1wS001A, B, C, D 1wS002A, B, C, D 1wS006A, B 1wS007A, B

Specification No. H-2852 Page 236 of 45 SUMMARY OF Vendor: Kerotest Manufacturing Corp. EQUIPMENT QUALIFICATION Rev. oo Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification a Location Description Results Number Method 5", Ao, Globe Valves React. Bldg Qualification in progress 1CM005 with Vendor 1CM006 1CM012 1CM014 1CM025 1CM026 Rigid ½", M, T-Type, Globe All Bldgs. No considerable valve 91 Valves extended part No limitation on accelerations Valves Valve body shown to be Nozzle loads limited by connected pipe stronger than pipe 5", M, Y-Type, Globe P 25 Valves Valves React. Bldg Qualification in progress 1CM003 3/4", Ao, Globe Valves with Vendor 1CM004 1B33F019 Prim. Cont. 1B33F020 React. Bldg 1E12F060A,B 1E12F075A,B Prim. Cont. 1E12F338A,B,Q 3/4", Mo, Globe Valves 1E21F330 1E22F314 1E51F317

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

## SUMMARY OF EQUIPMENT QUALIFICATION

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Wm. H. Zimmer

Project No.	4130-00				Date 4-15-81
Equipment Number	Description	S C e 1 i a s s s	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 1E12F099A,B 1E51F076	1", Mo, Globe Valves	P A A		Qualification in progress with Vendor	
1VQ016A to H, J to N, P 1WR152 1WR153 1C41F015 1C41F018 1C41F019 1C41F020 1C41F024 1C41F025 1E12F076A, B 1E12F077A, 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

1WR160A,B 1B21F067A,B, C,C 1E12F073A,B 1E12F074A,B 1E32F001A,B	Description	S C l i a a s s s s	React. Bldg		Results
1WR158A,B 1WR160A,B 1B21F067A,B, C,C 1E12F073A,B 1E12F074A,B 1E32F001A,B	½", Mo, Glob∽ Valves	A	React. Bldg		
C,D 1E32F002A,B C,D 1E32F003A,B C,D		+	Aux. Bldg. React. Bldg	with Vendor	
1WS160 1WS161 1WS162 1WS163 1C41F008 1C41F008 1C41F016 1C41F017 1E12F080A, B 1E12F081A, B	ነ", M, Globe Valves	P	All Bldgs.	No considerable valve Extended part Valve body shown to be stronger than pipe	Rigid No limitation on acceleration Nozzle loads limited by connected pipe

Specification No. H- 2852 Page (39 of 45 SUMMARY OF Vendor: kerotest Manufacturing Corp. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification a Location Description Results Number Method 1WS014A, B 2", Mo, Globe Valves React. Bldg Qualification in progress A 1B21F001 Prim. Cont with Vendor 1B21F002 Prim. Cont 1B21F005 Prim. Cont 1E32F006 React. Bldg 1E32F007 1E32F008 1E32F009 1E51F019 1E51F046 1E51F069 1E51F080 1E51F086 IVC008A,B 2", M, Globe Valves All Bldgs. No considerable valve Rigid 1VC009A, B Extended part No limitation on accelerations IVC010A,B Valve body shown to be Nozzle loads limited by 1VC011A, B stronger than pipe connected pipe 1VC012A, B 1VC013A,B 1VC014A,B 1VC015A, B 1VC016A, B 1V0021 1VQ024 1WR161 1B21F077A,B C,D 1B33F029 1B33F030 TOUR SET

Page 240 of 45 Rev. 00 Date 4-15-81	Results	Rigid No limitation on accelerations Nozzle loads limited by connected pipe
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	No considerable valve Extended part Valve body shown to be stronger than pipe
SUM	Location	All Bldgs
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Action No. H-2852 Kerotest Manufacturing Corp. immer No. 4130-00	Description	2", M, Globe Valves
Specification No. Vendor: Kerotest Me Wm. H. Zimmer Project No. 4130-	Equipment Number	1B33F051A, B 1B33F052A, B 1C41F014 1E12F102 1E21F032 1E21F049 1E51F060 1E51F060 1E51F333 1T49F003 1T49F001

Specification No. H- 2853 Vendor: Anderson, Greenwood & Co. Wm. H. Zimmer Project No. 4130-00				MMARY OF QUALIFICATION	Page <u>C41</u> of <u>45</u> Rev. <u>oo</u> Date <u>4-15-81</u>		
Equipment Number	Description	S C e 1 i a s s	Location	Qualification Method	Results		
11A155A,B 1B21F036A to H, K, L, P, R, S	½", Check Valves	Р	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	⅓", Check Valves	A		No valve extended part Valve body stresses limited to design allowables	Rigid No limitation on accelerations Allowable nozzle loads pro- vided to assure operability		
1B21F024A,B, C,D 1B21F029A,B C,D	3/4", Check Valves	A	1				
linoo6A,B	l", 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		

Page 242 of 45 Rev. 00 Date 4-15-81	Results						
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	In progress					
SUMMEDIPMENT	Location	Prim, Cont.					
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Specification No. H-2854 Vendor: Rockwell International Wm. H. Zimmer Project No. 4130-00	Description	1", M, Globe Valve 2", Stop Check Valve					
Specification No. H. Vendor: Rockwell Inte	Equipment Number	1G33F103 1E12F085A, B,	C 1B21F034 1E22F006				

Specification No. I	on No. H- 2856 ronatics		SUM	SUMMARY OF	Page (43 of 45
Wm. H. Zimmer Project No. 4	4130-00				
Equipment Number	Description	Ω α μα α α	Locati	Qualification Method .	Results
ICM176 to ICM211	½", M, Ball Valves	Д	React. Bldg.	No extended part Valve body analysis for maximum nozzle loads	Rigid Obtained maximum allowable for Upset and Emergency
10M212 10M213 10M214 10M215	3/4", M, Ball Valves	Ω.	React. Bldg		

Specification No. H- 2862 Page 244 of 45 SUMMARY OF Vendor: Target Rock Corp. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description a Location Results Number Method S React. Bldq Minimum natural frequency = 5", Solenoid Operated Frequency evaluation 1CM019 Static analysis for stresses 158 Hz 1CM020 Globe Valves Qualification acceleration level and deflections 1CM021 Upset & Emergency 1CM022 a=5'g', b=5'g', c=5'g' 1B33F355B,C 1B33F356B,C 3/4", Solenoid Operated React. Bldg 1CM007 1CM008 Globe Valves 1CM009 1CM10 1CM11 1CM13 1CM23 1CM24 1B33F355A,D 1B33F3567...t. 1T49F305A, 3 15", Solenoid Operated 1IN170 Globe Valves 1IN171 2", Solenoid Operated 1V0005A, B Globe Valve IV0008A, B 1", Pressure Reg. Valves lIN004A,B 1E51F015 2", Pressure Reg. Valves

00 45 of 45 60 45 60 4-15-81	ts		
Page(45 Rev. 00 Date 4-	Results		
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	In Progress	
SUM EQUIPMENT	Location	React. Bldg	
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Specification No. H-2872 Vendor: Arderson, Greenwood & Co. Wm. H. Zimmer Project No. 4130-00	Description	2", Vacuum Relief Valves	
Specificati Vendor: Arde Wm. H. Zimm Project No.	Equipment Number	1E12F104A,B	

## 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 Page DI of 56 SUMMARY OF Vendor: ITE Imperial Corp. EQUIPMENT QUALIFICATION Rev. 00 Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description Location Results Number Method Aux.Bldg. Instruments were qualified All'essential instruments Potential Transformer 1APO4EA with switchgear unit. See were monitored. There Model: JVM-3-643-93 1APO4EB equipment qualification were no structural or 1AP04EC for details. functional abnormalities AG detected. Time Delay Relay Model: 7012-PB Motor Differential Relay Model: GRD-202D0541 Ammeter/Voltmeter Model: KA-241 Auxiliary Relay Model: J13 P3012 Lockout Relay Model: 12HEA61C233 Test Switch Model: DPDT-DB-RH2 GE Indicating Light Model: ET-16

Specification No. H-2156 Vendor: ITE Imperial Corp. Wm. H. Zimmer Project No. 4130-00					MMARY OF T QUALIFICATION	Page D2 of 56  Rev. 00  Date 4-15-81		
Equipment Number	Description	Se is.	Class	Location	Qualification Method	Results		
	IS Ground Relay Model: GR-5 202D6141  IS Ground Sensor Model: GS-05  IS Current Transformer Models:	A		Aux. Bldg lAP04EA lAP04EB lAP04EC	Instruments were qualified with switchgear unit. See equipment qualification for details.	All essential instruments were monitored. There were no structural or functional atnormalities detected.		

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Page D3 of 56 Rev. 00 Date 4-15-8/	Results	All essential instruments were monitored. There were no structural or functional abnormalities detected.
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	Instruments were qualified with switchgear unit. See equipment qualification for details.
	1 1 S S S	Aux.Bl. 1AP04E 1AP04E
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Specification No. H-2156 Vendor: ITE Imperial Corp. Wm. H. Zimmer Project No. 4130-00	Description	GE Overcurrent Relay Models: 12IAC66B4A 12IAC51B808 12IAC51A802 12IAC51A801A JVM-3-643-94
Specificati Vendor: ITE Wm. H. Zimm Project No.	Equipment Number	

Page D4 of 56 Specification No. H-2157 SUMMARY OF Vendor: ITE Impreial Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment a Location Description Results Method Number Aux. Bldg. GE All essential instruments Instruments were qualified Indicating Lamp 1AP05E with sub-station unit. See were monitored. There were 1APO6E Model: ET-16 1AP07EA/B equipment qualification no structural or functional 1AP08EA/B for details. abnormalities detected. TR Neutral Sensor 1AP09E 1AP10E Model: 609301-K1 1AP11EA/B 1AP12EA/B IR Neutral Sensor 1AP13E 1AP14EA/B Model: 609301-K2 II. 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

Specification No. H-2157 Vendor: ITE Imperial Wm. H. Zimmer Project No. 4130-00					MMARY OF T QUALIFICATION	Page D5 of 56  Rev. 00  Date 4-15-81		
Equipment Number	Description	Seis.				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		1AP06E 1AP07EA/B		All essential instruments were monitored. There were no structural or functional abnormalities detected.		

Specification No. H-2159 Page D6 of 56 SUMMARY OF Vendor: Stewart & Stevenson Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification a Location Description Results Number Method Square D Pressure Aux. Bldg. Oualification Tests Essential equipment is switch 1DG10CD Biaxial random motion monitored. No abnormali-Model: 9012 ACW-22 1DG10CA frequency range: 1-40 Hz ties were deducted during 1DG10DE TRS enveloped RRS and after the test. 1DG10CB Model: 9012-ACW-21 GE Control Switch 1PL10JA Model: CR2940 1PL10JB 1PL10JC EMD Temp. Switch Qualification in Progress Model: 8447100 EMD Temp. Switch Model: 7447102 H.O. TRERICE 1DG15TA Pressure Gauge 1DG15TL Marshaltown Pressure 1PLG6JA,B Gauge 1PLG7JA,B 1PLG8JA,B

Page D7 of 56 Rev. 00 Date 4-15-81	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Qualification in Progress
SUM EQUIPMENT	Location	Aux. Bldg. IDG10CF IDG10CC
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wart & Stevenson ler 4130-00	Description	Barton Pressure Switch Model: 288A  Square D Temp. Switch Model: 9025-BCW-42 9025-BCW-45
Specification No. Vendor: Stewart & Wm. H. Zimmer Project No. 4130-	Equipment Number	

Specification No. H-2175 Page D8 of 56 SUMMARY OF Vendor: Unit Electric Controls, INc. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description Location Results Number Method Aux. Bldg. GE Electrical Indicator Resonance Search Tests All essential equipment were Type 180. Vertical Edge-1PM07J Pseudo Biaxial Sine Sweep monitored. No abnormalities wise DC/AC. 1PM08J Freq. range: 1-33 Hz were deducted during and after 1PM06J Oualification Test the test. Pseudo Biaxial Sine Beat Tests Natural frequencies: at one-half octave freq.inter- 1st SS/V: 23 Hz vals between 1-33 Hz. 2nd FB/V: 28 Hz Resulting max. acc.: 4.97 g 2nd SS/V: 30 Hz in all directions. GE Indicating Light 1PM07J No Natural Frequency in the Type ET-16 1PM08J the testing Range GE Control Switches 1PM01J Model SB-1 1PM07J 1PM08J GE Aux. Relays 1PM08J P Model: 12NG A15AS1 Natural Frequency: Automatic Timing & Control P 1PM08J Inc. Auxiliary Relay 1st SS/V: 22,26,30 Hz Model: 305D007L20P 1st FB/V: 31 Hz 2nd SS/V: 26 Hz

Specification No. H-2175 Page D9 of 56 SUMMARY OF Vendor: Unit Electric Controls, Inc. EQUIPMENT QUALIFICATION Rev. 60 Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Sei Equipment Qualification a Location Description Results Number Method S Resonance Search: Uniaxial Sine Sweep Aux. Bldg. Resonance frequency are found Transmation Signal Conin the horizontal direction verters Frequency Range .5 to 35 Hz at 8 and 19 Hz, 3.5 and 17 Hz. Model: 600 1PM08J Qualification Test: 610TS 1PM07J All essential equipment were Uniaxial Sine Dwell 650TS 1PM06J monitored. No abnormalities Frequency Range .5 to 35 Hz were detected during and after Input acceleration = 3.0g in the test. all directions. Leeds & Northrup Pen 1HP13-P601 Oualification Tests All essential equipment were Recorder Type: Speedomax 1PM06J Biaxial Random Motion monitored throughout the test. M Mark III 1PM07J Frequency Range 1-40 Hz. No abnormalities were detected Model: 831 TRS enveloped RRS during and after the test. 832 833 Electro Switch Corp. 1PM07J Seismic Qualification Report Control Switch Type 1PM08J is presently being evaluated. Series 40 1PM06J

if 56.		
Rev. 00 of Date 4-15	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method.	Equipment and instruments are being replaced.
SUM EQUIPMENT	Location	Aux.Bldg. 1PL40JB 1PL40JB
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Specification No. H-2188 Vendor: Delphi Wm. H. Zimmer Project No. 4130-00	Description	Hydrogen and Oxygen Monitors and Trans- mitters
	Equipment Number	

Page D11 of 56  Rev. 00  Date 4-15-81	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Seismic qualification of instrument in progress
SUM	Location	SWPH 1WS02FB 1WS02FB
1	രെ പ ര • റ• + എവര	$a \rightarrow$
Specification No. H-2240 Vendor: R. P. Adams Wm. H. Zimmer Project No. 4130-00	Description	Mercoid Pressure Regulator Model: BB-221-3
	Equipment Number	

Specification No. H-2265 Page D12 of 56 SUMMARY OF Vendor: Jamesbury Corp. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Qualification Equipment Description a Location Results Number Method Static Analysis Bettis Air Operator Rx.Bldg. Natural frequency= 37.2 Hz Air Or rator 1VQ001A,B Input: x=5q; y=5q; x=5q Stress T312B-SR3-12 1VQ002A, B Max. Max. 1VQ003A, B Spring Cartridge Cala. Allow 1VQ004A, B Connection 19.1 105 Tensile stress ksi 19.1 105. Piston assembly tie bar 33.6 105. Rx. Bldg. NAMCO 1VH001A, B Qualification Test No abnormalties or struc-Limit Switch 1VH002A, B Pseudo Biaxial sine sweep tural failure were EA-170 1VH003A, B Frequency range: 1-35 Hz detected after the test. 1VH004A, B Input: from 3-7g in all directions ASCO 1VH001A, B Qualification Test Operability was demon-Solenoid Valve 1VH002A, B Uniaxial Sine Sweep strated. No abnormalities Model: 831655 1VH003A, B Frequency Range 10-40 Hz were detected. Structural 1VH004A, B Max. input acceleration integrity satisfied.  $= 7.5 \, \text{g}$ Model: HTX8321 1VQ001A,B Qualification Test 1VQ002A,B Uniaxial Sine Sweep 1VQ003A,B Frequency Range 10-40 Hz 1VQ004A,B Max. input acceleration = 12.2 q

Page D13 of 56 Rev. 00 Date 4-15-81	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Qualification Report is being evaluated at present
SUM EQUIPMENT	Location	RX. Bldg. lvH002A,B lvH001A,B
	∾ α α α α α α α α α α α α α α α α α α α	<→
on No. H-2265 esbury Corp.	Description	Jamesbury Corp. Quadra Power Actuator F50S
Specification No. Vendor: Jamesbury Wm. H. Zimmer Project No. 4130-	Equipment Number	

Specification No. H-2288 Page D14 of 56 SUMMARY OF Vendor: American Air Filter Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Qualification Equipment e 11 a Location Description Results Number Method Mercoid Temperature Reactor Resonance Search No resonances found in Switch DAW Blda . Uniaxial Sine Sweep the frequency range. All DAW-7038-804-S2 1VG05SA/B Frequency range: 1-35 Hz essential equipment were Oualification Test detected during and after Uniaxial Sine Dwell the test. Frequency range: 1-35 Hz Input: horiz. = 3.0g vert. = 2.0qBarton Differential Resonance Search Natural Frequencies Pressure Transmittal determined Uniaxial Sine Sweep Model: 385 Frequency Range: 1-35 Hz Horiz. (1) 4, 12, 17, 21, 28, 33 Qualification Test Uniaxial Horiz. (2) 9, 15, 18, 22, 30 Sine Dwell at resonant Vert. = 8, 13, 29frequencies. Input Acceleration: Instrument was monitored Horiz. 2.0q throughout the test. No abnormalities were Vert. 1.5g recorded. ITT Motor Operator A Oualification Test All essential equipment Model: NH-95 Biaxial Random Motion were actuated. No ab-Frequency range: 1-33 Hz normalities were detected TRS enveloped RRS up during and after the test. to 100 Hz

Specification No. H-2288 Page D 15 of 56 SUMMARY OF Vendor: American Air Filter Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification a Location Description Results Method Number Reactor Dwyer Magnehelic Diff. Resonance Search No natural frequencies Bldg. Press. Gage Uniaxial Sine Sweep found in the test fre-Model #2002 1VG05SA Frequency range: 1-40 Hz quency range. All 2003 1VG05SB Qualification Test essential equipment were 2010 Biaxial Random Motion inspected. No abnormalities were detected during Frequency Range: 1-40 Hz and after the test. TRS enveloped RRS Mercoid Lig. Level A Resonance Search Test No resonances found in Switch 201WT-9806-S2 Uniaxial Sine Sweep the frequency range. Frequency range: 2-33 Hz All essential equipment Qualification Test were monitored. No ab-Uniaxial Sine Dwell normalities were detected Frequency Range 2-33 Hz during and after test. Input accel. 2g in all directions. ATkomatic Deluge Valve A Resonance Search No resonances found. Model: 5700GX Pseudo Biaxial Sine Sweep All essential equipment Frequency Range 2-33 Hz were monitored. No ab-Oualification Test Pseudo normaities were detected during and after the test. Biaxial Sine Dwell Input: 4.5g Horizontal 3.0g Vertical Frequency range: 2-33 Hz

Specification No. H- 2288 Page DIG of 56 SUMMARY OF Vendor: American Air Filter Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 S C e 1 Location Oualification Equipment Description Results Number Method RX.Bldq. Alison Temp. Sensor Resonance Search No resonances found in the 1VG05SA/B Uniaxial Sine Sweep frequency range. All Model: 1052 Frequency range: 2-35 Hz essential parts were Input acceleration = 5 q detected during and after in all directions. the test. Qualification Test Uniaxial Sine Sweep Frequency Range: 2-35 Hz Input acceleration = 5g in all directions.

Page 017 of 56 Rev. 00 Date 4-15-81	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	Seismic Qualification in progress
SUM		Reactor Bldg. 1VG05SA Reactor Bldg.
	S ⊕ -4 S •	а а
ion No. H-2288 erican Air Filter mer . 4130-00	Description	Ashcroft Thermowells Model #T-38875T060 Ashcroft Thermometers Jodel #30B160L-060
Specification No. Vendor: American Wm. H. Zimmer Project No. 4130-	Equipment Number	

Specifica ion No. H-2289 Page 018 of 56 SUMMARY OF Vendor: Pacific Air Products Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-51 Project No. 4130-00 Equipment Oualification Description Location Results Number Method Contromatics Damper Aux. Bldg. Static Analysis No natural frequency below 1VG03YA, Operator Model:500-SP Input resultant accelera-33 Hz. Operability was tion = 4.5qdemonstrated by showing YB lVG04YA, that the operating forces YB are higher than the seismic forces.

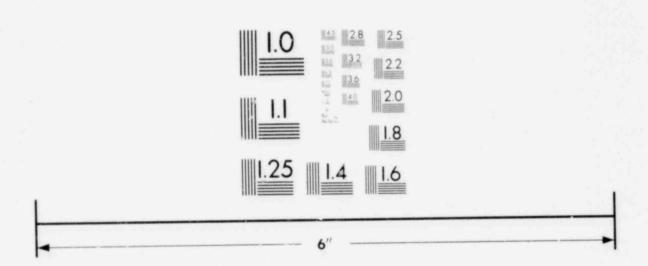
Specification No. H-2289 Page D19 of 56 SUMMARY OF Vendor: Pacific Air Products Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Seis Equipment Qualification l a Location Description Results Method Number Seismic qualification of Asco Solenoid Valve Reactor Model HT-8302-B-25-RF Bldq. instruments are in progress 1VG05SA 1VG05SB Aux.Bldg. 1VG03YA IVG03 YB 1VG04YA 1VG04 YB Namco Limit Switches Aux.Bldg. Model: D-1200-6 1VG03YA 1VG03YB 1VG04YA 1VG04YB

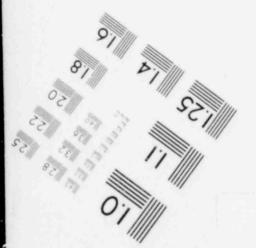
Specification No. H-2293 Page D20 of 56 SUMMARY OF Vendor: Trane Company Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-51 Project No. 4130-00 Equipment Qualification 1 Location Description Results Number Method GE Control Relay CR-2810-414C2 Aux.Bldg. Qualitication Tests All essential equipment 1PLB4J Biaxial Random Motion were monitored. No ab-1PLB5J Frequency range: 1-40 Hz normalities were detected TRS enveloped RRS 1PLB6J during and after the test. 1PLB7J 1PLB8J 1PLB9J GE Control Switch 1PLC1J CR-2940 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 Page 021 of 56 SUMMARY OF Vendor: MCC Powers Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification 1 Location Description Results Number Method Transmation Current Auxiliary All essential equipments Resonance Search: & Reactor were monitored. No Relav Uniaxial Sine Sweep Model: 210A Building Frequency Range .5 to 35 Hz abnormalities were detected. Resonance found only in Qualification Test: the horizontal direction at Uniaxial Sine Dwell 8 and 19 Hz. Frequency Range .5 to 35 Hz Input acceleration = 3.0g in all directions 1PM07J Resonance Search Tests All essential equipment were GE Indicating Lights monitored. No abnormalities 1PM08J Pseudo Biaxial Sine Sweep ET-16 Freq. Range: 1-33 Hz were deducted during and after the test. Oualification Test No Natural Frequency in the Pseudo Biaxial Sine Beat Tests testing range. at one-half octave freg. intervals between 1-33 Hz. Resulting Max. Acc.: 4.97g in all directions.

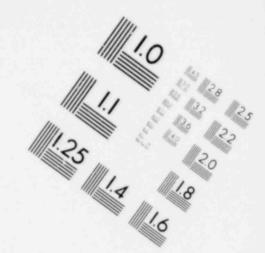
|| 1.0 || 1.1 || 1.25 || 1.4 || 1.8

## IMAGE EVALUATION TEST TARGET (MT-3)

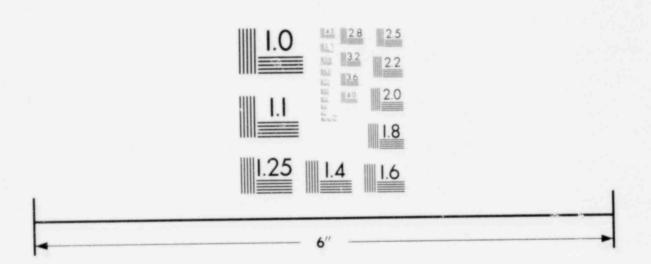




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## IMAGE EVALUATION TEST TARGET (MT-3)



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Specification No. H-2299 Vendor: MCC Powers Wm. H. Zimmer Project No. 4130-00		SUMMARY OF EQUIPMENT QUALIFICATION			Page <u>D22</u> of <u>56</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C e 1 i a s s s	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 nge 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 Page D23 of 56 SUMMARY OF Vendor: MCC Powers Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification e-i s Location Description Results Number Method Resonance Search: Love Controls Current Reactor & No resonance found in the Aux .Bldg. Relay Uniaxial Sine Sweep test frequency range. All Model: 54 1PL14JA,B Frequency Range 1-40 Hz essential equipments were 56 1PL60JA,B monitored. No abnormalities 48 1PL61JA,B were deducted during and Oualification Test: 1PL69JA,B Biaxial Random Motion after the test. GE Transfer Switch A 1PL91J Frequency range 1-40 Hz 1PL92J Model: SB-1 TRS enveloped RRS except 1PL93J below 4-6 Hz GE Relay HMA 11B11 1PM07J A Input acceleration up to 1PM19JA,B 12q. GE Relay 12HFA 51A49H A 12HFA 51A42H Agastat TDR A Model: 7022 7012 7000 7032 Kepco Power Supply P PCX72-0.3 ASCO 3-way Solenoid Valve | A HBX8320-A1

Specificat Vendor: MC Wm. H. Zimu Project No	mer			MMARY OF T QUALIFICATION	Page 024 of 56 Rev. 00 Date 4-15-81
Equipment Number	Description	S C 1 a s s	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 W&T Chloring Detector	A			Resonance found at 18 Hz in the horizontal sweep Resonance found:
	50-125D				horizontal 27, 30 vertical 33, 37

Specificat: Vendor: MC Wm. H. Zimu Project No	mer			MMARY OF T QUALIFICATION	Page D25 of 56  Rev. 00  Date 4-15-81
Equipment Number	Description	S C e 1 i a s s s	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 Pyrotronics DIS3/5A DIA-11 CTZ-2 DIA-10 ESC-1	A A A A P			

Specification No. H-2299 Page D 26 of 56 SUMMARY OF Vendor: MCC Powers Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description Location Results Number Method Hays Flow Transmitter Aux. Bldg. Seismic Qualification in 252:A1252:0 1VG05SA progress 1VG05SB 1VC82Y Eagle Timer P 1PL14JA HK410A6 1PL14JB MDA Scientific Ammonia A 1PL14JA Detector 7060-Fan Hoffman Smoke Detector P A-42N3609 Penn Transformer 1PL60JA Y64AL-2 1PL60JB Moore Signal Converter 1VC10S Model: GC-65, 7800 series shcroit Thermometer 1PL93J 6435-DG 1PL92J 1PL91J Powers Reg. Co. Metal 1VY065 Thermometer 894-2780 1VY05A 1VY09A 1VY08A Ashcroft Pressure Gauge 1PL143JA 1009AXPR-X46 1PL14JB

Page D27 of 56 Rev. 00 Date 4-15-81	Results				
SUMMARY OF QUIPMENT QUALIFICATION	Qualification Method	Seismic Qualification in progress			→
SUM	Location	Reactor Bldg.	Aux. Bldg. Rx. Bldg. 1PL69JA 1PL69JB 1PL14JA 1PL14JB 1PL19JJ 1PL92J 1PL93J	<b>→</b>	1PL14JA 1PL14JB
	დ ტ.⊣ ფ • ე — ო თ თ	д	·	д	Δ.
MCC Powers Zimmer No. 4130-00	Description	Pressure Indicator	Beta Annunciators 1211B	Air Monitor Pressure Transmitter exactor, Series 300	Power Reg. Co. Receiver Controller 185-0124
Specification No. Vendor: MCC Powers Wm. H. Zimmer Project No. 4130-	Equipment Number				

Page D28 of 56.  Rev. 00  Date 4-15-8/	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	Seismic Qualification of the instruments are in progress.
SUM EQUIPMENT	Location	Aux.Bldg. 1DG07TA/F 1DG14TA/F
	N υ-αν Ω-αναν	
on No. H-2805 hopric Products, Inc. er 4130-00	Description	Liquid Level Switches
Specification No. Vendor: Bishopric Wm. H. Zimmer Project No. 4130-0	Equipment Number	

The state of the s				MMARY OF T QUALIFICATION	Page D29 of 56  Rev. 00  Date 4-15-81
Equipment Number	Description	S Cliass	Location	Qualification Method	Results
	Rosemount Diff. Pressure Transmitter Model: 1152DP7A22PB		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.

Specificat Vendor: Ro Wm. H. Zim Project No				MMARY OF F QUALIFICATION	Page <u>D30</u> of <u>56</u> Rev. <u>00</u> Date <u>4-15-81</u>
Equipment Number	Description	S C 1 ass	Location	Qualification Method	Results
	Rosemount Temperature Detector Assembly Model: 88-14 Model: 183-108-1 Model: 183-105-1	P	Peactor Bldg. Wall Mounted	Resonance Search: Biaxial Sine Sweep Frequency Range: 1-35 Hz	Natural Frequencies FB/V = 7.4, 24 Hz FB/V = 7.6, 11, 25 Hz SS/V = 7.7, 24, Hz
	Model: 183-106-1			Qualification Test: Biaxial Sine Sweep at resonant frequencies Input: 3.0g in all directions	No abnormalities detected after the test.

Specification No. H-2816 Page D31 of 56 SUMMARY OF Vendor: Powers Regulator Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 S C e 1 Location s s s s Equipment Qualification Description Results Number Method Resonance detected at 42, Aux.Bldg. ITT Damper Operator Resonance Search 48 Hz. Model: NH-91 1VC15YA Uniaxial Sine Sweep 1VC15YB Frequency Range 1-50 Hz 1VC14YA Qual. Test Biaxial Random Operators were actuated 1VC13YB Motion. Frequency Range during the test. No abnormalities were detec-1VC16YA 1-50 Hz TRS enveloped RRS 1VC14YB ted during and after test. 1VC13YA 1VC16YB

Specificat: Vendor: C				MMARY OF T QUALIFICATION	Page D32 of 56  Rev. 00  Date 4-15-81
Project No					Date 4-15-8/
Equipment Number	Description	S C l a s s s	Location	Qualification Method	Results
	Dwyer Differential Pressure Indicator, Model: 2000	P		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		Resonance Search Uniaxial Sine Sweep.Freeuency Range 1-35 Hz. Qualification Test Uniaxial Sine Dwell Frequency 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. Instrument was monitored
				Input acceleration Horiz.= 4.0g Vert. = 2.67g	during the test.No abnor- malities were recorded.
	Rosemount Differential Pressure Transmitter 1151DP-3-A-22.	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 ab- cormalities were recorded during and after the test.

Specification No. H-2817 Page D 33 of 56 SUMMARY OF Vendor: CVI Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description a Location Results Number Method Resonance Search Uniaxial Resonance detected at 42, ITT Damper Motor Aux.Blda. Sine Sweep Frequency Range 48 Hz Operator NH-95 P 1VC12YA A 1VC212YC 1-50 Hz. IVC81YA A Qualification Test Biaxia! 1VC81YB Operators were actuated A during the test. No ab-1VC82Y Random Motion A normalities were detected Frequency Range 1-50 Hz TRS enveloped RRS during and after the test Aux. Bldg. Resonance Search No resonance found in the ASCO Solenoid Valve test frequency range. Al Model: HB8320A-1 Uniaxial Sine Sweep Freq. Range 1-40 Hz. essential instruments were monitored. No abnormalities Oualification Test were detected during and Biaxial Random Motion after the test. Frequency Range 1-40 Hz TRS enveloped RRS except below 4-6 Hz Input accel. up to 12g.

Rev. 00 Date 4-15-51	Results						
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Seismic Qualification of instruments are in progress.		>			
SUM	Location	Aux.Bldg. 1VC29YA, YB	1VC09SA 1VC12YA	1VC10S			
	ທ∜ ຫ • ດ ຊ ຫ ຫ	<	Д	۵			
on No. H-2817 I er 4130-00	Description	Namco Limit Switch EA750-20100	Ashcraft Bi-Metal Thermometer Model: 50A16OR-S12	Rosemont Temp. Transmitter Model: 442A-RP-A-01			
Specification No. Vendor: CVI Wm. H. Zimmer Project No. 4130-0	Equipment Number						

Fage D35 of 56.  Rev. 00  Date 4-15-81	Results	No resonance found in the test frequency Structural Integrity satisfied
SUMMARY OF QUIPMENT QUALIFICATION	Qualification Method	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.
SUMI	Location	Reactor Bldg. Local Panel
	രോപര∙ റെപയയെ	Δ4
Cation No. H-2826  Dayton T. Brown Zimmer No. 4130-00	Description	Aschcroft Pressure Indicator Model: 2462ASXMN
Specification Vendor: Dayton Wm. H. Zimmer Project No. 41	Equipment Number	

Specification No. H-2835 Page D36 of 56 SUMMARY OF Vendor: Unit Electric Controls, Inc. Rev. 00 EQUIPMENT QUALIFICATION Date 4-15-81 Wm. H. Zimmer Project No. 4130-00 Qualification Equipment 1 Location Results Description Method Number S Aux. Bldq. All essential equipment were Instruments were qualified A 1PL67JA GE Control Switches monitored. No abnormalities with equipment. See equipment 1PL67JB CR2940 Selector qualification for details. were detected during and after the test. 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

Page D37 of 56  Rev. 00  Date 4-15-81	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification	Seismic qualification of instruments are in progress.
SUM EQUIPMENT	Location	Bldg.
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Specification No. H-2866 Vendor: ITT Barton Wm. H. Zimmer Project No. 4130-00	Description	Barton Pressure Switches Model: 288A
Specification Vendor: ITT NMM. H. Zimmer Project No. 4	Equipment Number	

			EQU		MMARY OF C QUALIFICATION	Page 038 of 56  Rev. 00  Date 4-15-81
Equipment Number	Description		Loca	ation	Qualification Method	Results
	ITT Damper Operator Model #NH-95 NH-91 NH-95-3		RX.	Bldg. ele-	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	Α		.Bldg. 14JA	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	Α	RX.I		Seismic qualification is in progress.	

Specification No. H-2874 Vendor: American Warming & Vent.Co. Page D39 of 56 SUMMARY OF Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification Description Location Results Number Method Aux. Bldg. Seismic Qualification is Namco Limit Siwtch Model: EA-740-70100 1VG06YA/ in progress A YB 1VG07YA/ YB 1VG09YA/ YB 1VG10YA/ YB 1VG01YA/ YB IVG08YA/ YB Aux. Bldg ITT Motor Operators 1VG06YA/B Model: NH.-95,91 1VG07YA/B 1VG08YA/A 1VG09YA/B 1VG10YA/B 1VG01YA/B 1VQ10Y

Specification No. H-2881 Page D400f 56 SUMMARY OF Vendor: Reliance Electric Co. EQUIPMENT QUALIFICATION Rev. 00 Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 S C e 1 Location Equipment Oualification Description Results Number Method GE Indicating Light Aux.Bldg. Resonance Search Tests A All essential equipment ET-16 RX.Bldq. Pseudo Biaxial Sine Sweep were monitored. No abnorm-1PL79.T Freq. range: 1-33 Hz alities were deducted 1PM18J Oualification Test during and after the test. Pseudo Biaxial Sine Beat No natural frequency in Tests at one-half octave the testing range. freq. intervals between 1-33 Hz Resulting max.acc. 4.97g in all directions. GE Test Switch Aux.Bldg. Qualification Test All essential equipment CR2940 1PM18J Biaxial Random Motion. were monitored. No abnorm-Frequency range 1-40 Hz aliites were detected TRS enveloped RRS. during and after the test.

Specification No. H-2881 Page D41 of 56 SUMMARY OF Vendor: Reliance Electric Co. Rev. 00 EQUIPMENT QUALIFICATION Date 4-15-81 Wm. H. Zimmer Project No. 4130-00 Equipment Oualification Description a Location Results Method Number No resonance found in the Aux.Bldg. Resonance Search GE Auxiliary Relay test frequency range. Uniaxial Sine Sweep Model: 12HFA51A49H, RX. Bldg. All essential equipment Frequency range 1-40 Hz 1PM18J 12HMA11B11 were monitored. No abnor-1PL79J Qualification Test: malities were deducte Biaxial Random Motion Frequency range 1-40 Hz during and after the test TRS enveloped RRS except below 4-6 Hz Input acceleration up to 12q. No resonances found below Aux. Bldg. See seismic qualification WE Test Switches of siwtch gear unit under the test frequency. 1PM18J Type FT-1 All essential instruments Specification H-2156 for were monitored. No abnordetails. malities were detected.

	SUMMARY OF EQUIPMENT QUALIFICATION	NY OF JALIFICATION	Page D420f 56 Rev. 00 Date 4-15-8/
	C Location	Qualification Method .	Results
<	Aux. Bldg. LM Duct	Seismic qualification in progress	
<	LM-Wall 1PM17J	<b>→</b>	

Specification No. C-135 Vendor: Electro Switch Corp. Wm. H. Zimmer Project No. 4130-00			SUN	Page D43 of 56  Rev. 00  Date 4-15-81	
Equipment Number	Description	S C C i a s s	Location	Qualification Method	Results
	Electro Switch Hand switch Series 40	A	The state of the s	Seismic qualification are being presently evaluated	

Specification No. C-442 Vendor: Electro Switch Corp. Wm. H. Zimmer Project No. 4130-00				MMARY OF T QUALIFICATION	Page D44 of 56  Rev. 00  Date 4-15-81	
Equipment Number	Description	Sei ass	Location	Qualification Method	Results	
	GE Hand Switch SB-1	Λ	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.	

Page D45 of 56  Rev. 00  Date 4-15-81	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Seismic qualification are being presently evaluated
SUMI	Location	WO.
	Ω Η φανα	
on No. C-443 ectro Switch Corp. ler 4130-00	Description	Electro Switch Corp. Control Switches Type Series 40
Specification No. Vendor: Electro Wm. H. Zimmer Project No. 4130-	Equipment Number	

Specification No. C-444 Page D46 of 56 SUMMARY OF Vendor: General Electro Co. Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Oualification Equipment Description Location Results Method Number GE Aux.Bldg. Qualification Tests All essential equipment Selector Switch 1H13-P601 Biaxial Random Motion were monitored. No CR2940 Frequency range: 1-40 Hz abnormalities were TRS enveloped RRS detected during and after the test.

Specification No. C-445 Page D47 of 56 SUMMARY OF Vendor: General Electric Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Oualification Location Description Results Number Method No resonance found in the GE Control Switch A Aux. Bldg. Resonance Search: 1H12-P601 Uniaxial Sine Sweep test frequency range. All Model: SBM Freq. Range 1-40 Hz essential equipments were Qualification Test: monitored. No abnormali-Biaxial Random Motion ties were deducted during Frequency Range 1-4 Hz and after the test. TRS enveloped RRS except below 4-6 Hz. Input acceleration up to 12g.

Page D48 of 56 Rev. 00 Date 4-15-8/	Results	It was demonstrated that after the test the instruments exhibited no malfunction.
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Qualification Test Biaxial Random Motion Frequency Range 1-40 Hz TRS enveloped RRS
SUM EQUIPMENT	Location	Aux.Bldg.
	Se-ra. O∟eas	
II 0	Description	Victoreen Radiation Monitors Models: 847-2 846-1
Specification No. Vendor: Victoreen Wm. H. Zimmer Project No. 4130-0	Eduipment Number	

Specification No. P02720 Vendor: Elma Engineering Wm. H. Zimmer Project No. 4130-00				MMARY OF QUALIFICATION	Page D 49 of 56  Rev. 00  Date 4-15-81	
Equipment Number	Description	S C e 1 i a s s · s	Location	Qualification Mechod	Results	
	Elma Engineering 24VDC Power Supply Model: 164C5261-1	P	Aux. Bldg 1PM08J	Seismic qualification in progress		

Specification No. PO-2876 Page 050 of 56 SUMMARY OF Vendor: Transmation Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Sei Equipment Qualification Description a Location Results Number Method Transmation Thermo-Aux. Bldg. Resonance Search Resonance frequency couple Al ams 1PM08J Uniaxial Sine Sweep are found in the Model: 610A-E(A-X-5)-1PM07J Frequency Range .5-35 Hz horizontal direction 1PM06J 235 at 8,16,19 Hz Qualification Test 1T49-P865 Uniaxial Sine Dwell Transmation Signal A All essential were Converter 1T49-P866 Frequency range .5-35 Hz monitored. No abnormali-Model: S520A-243, 1PL67J Input acceleration= 3.0g ties were detected during 1H13-P628 in all direction. 610IT-T-XS and after the test.

Specification No. PO-2876 Page 051 of 56 SUMMARY OF Transmation Vendor: Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification a Location Description Results Number Method Transmation Thermo-Aux.Bldg. Resonance Search Resonance frequency are Couple Alarms 1PM08J Uniaxial Sine Sweep found in the horizontal Model: 610A-E(A-X-5)-Frequency .. nge .5-35 Hz direction at 8,16,19Hz. Qualification Test 235 All essential instruments Uniaxial Sine Lwell were monitored. No abnorm-Transmation Signal Aux. Bldgt Frequency Range .5 to alities were detected 1T49-P865 Converter 35 Hz. Input acceleration during and after the test Model: S520A-243, = 3.0g in all directions. 1T49-P866 610IT-T-XS 1PL67JA 1H13-P628

Page 052 of 56 Rev. 00 Date 4-, 5-81	Results	
SUMMARY OF ENT QUALIFICATION	Qualification Method,	Seismic qualification in progress
SUMP EQUIPMENT	Location	Aux.Bldg. 1H13-P642 1H13-P642
	S ⊕ - H S + C − H S S S	A .
Zimmer No. PO-3322	Description	Riley Co. Signal Converters Model: 86PTGF-EGB 86VTFF-EGB
Specification Vendor: Wm. H. Zimmer Project No. 41	Equipment Number	

Page D53 of 56. Rev. 00 Date 4-15-51	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method	Seismic qualification in progress
SUM EQUIPMENT	Location	Aux. Bldg 1413-P601
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Specification No. PO-3255 Vendor: Leeds & Northrup Wm. H. Zimmer Project No. 4130-00	Description	Leeds & Northrup Pen Recorder Model: Speedomax 250
Specification Vendor: Leeds Wm. H. Zimmer Project No. 4	Equipment Number	

Specification No. PO 2949 Page D54 of 56 SUMMARY OF Vendor: C.S. Gordon Rev. 00 Date 4-15-81 EQUIPMENT QUALIFICATION Wm. H. Zimmer Project No. 4130-00 Equipment Qualification Description a Location Results Number Method Qualification Method Based on the analysis and CS Gordon Thermocauples A Reactor the design of the thermo-Model: 404-3107-050 Bldg. Static Analysis Maximum acceleration used: couple supports the maximum combined stress is 7.5g horiz. 9,479 psi (max. allowable) 2.25g vert. = 30,000 psi)

Specification No. B/M Page D55 of 56 SUMMARY OF Vendor: Refer Below Rev. 00 EQUIPMENT QUALIFICATION Wm. H. Zimmer Date 4-15-81 Project No. 4130-00 Equipment Qualification a Location Description Results Number Method All essential equipment GE Electrical Indica-Aux. Bldg Resonance Search Tests tor Type 180 Vertical 1H13-P601 Pseudo Biaxial Sine Sweep were monitored. No ab-Frequency range: 1-33 Hz normalities were deducted Edgewise 1PL67JA during and after the test 1PL67JB Qualification Test Natural frequencies: Pseudo Biaxial Sine Beat Test at on-half octave 1st SS/V:123Hz 2nd FB/V:28Hz freg. intervals between 1-33 Hz. Resulting mat. 2nd SS/V:30Hz acc.: 4.97g in all directions. All essential equipment Aux. Bldg. Qualification Tests: Leeds & Northrup Pen 1H13-P601 Biaxial Random Motion were monitored throughout Recorder the test. No abnormalities Freq. range 1-40 Hz Type: Speedomax TRS enveloped RRS were detected during and Mar: III after the test. Model: 832,833

Page D56 of 56  Rev. 00  Date 4-15-8/	Results	
SUMMARY OF EQUIPMENT QUALIFICATION	Qualification Method .	Seismic qualification in progress
SUM EQUIPMENT	Location	Aux.Bldg 1PL67J
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on No. B/M fer below ler 4130-00	Description	Bailey Process Controller Model: 701
Specification No. B Vendor: Refer below Wm. H. Zimmer Project No. 4130-00	Equipment Number	

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