SOUTH CAROLINA ELECTRIC & GAS COMPANY
POST OFFICE BOX 764
COLUMBIA, SOUTH CAROLINA 29218

T. C. NICHOLS, JR.
VICE PRESIDENT AND GROUP EXECUTIVE
NUCLEAR OPERATIONS

November 20, 1980

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Virgil C. Summer Nuclear Station
Docket No. 50/395
Seismic Qualification Review Team
Followup Information

Dear Mr. Denton:

On October 14-17, 1980, the NRC Seismic Qualification Review Team (SQRT) visited the Virgil C. Summer Nuclear Station to audit the seismic equipment qualification program. At this meeting South Carolina Electric and Gas Company (SCE&G) committed to provide followup information on various subjects. This letter provides forty-five (45) copies of that information.

Certain information regarding Barton transmitters model numbers and accumulator tank test and analysis is proprietary. This information is being submitted under separate cover letter.

1. SQRT Information Sheets - Updates of all SQRT Information sheets are provided by this letter. (See attachment #1)

2. Seismic Reports Remaining to be Accepted - The following is a list of seismic reports of which the review and acceptance remains to be completed.

BOP Supplied

(a) Fire dampers
(b) Limit switches for HVAC ductwork dampers
(c) Electric motor actuators for dampers
(d) Roof ventilators
(e) Reactor building cooling unit damper actuators
(f) Reactor building cooling unit solenoid valves
(g) Filter plenums
(h) Solenoid valves and limit switches on purge isolation valves
(i) Solenoid valves for air handling units

(j) Heat tracing panels
(k) NAMCO switches on Anchor Darling
(l) Solenoid valve panel for main steam isolation valves
(m) Terry Turbine for EFW pumps
(n) Solenoids for Rockwell International valves
(o) 1" ball valve actuator - Anchor Darling
(p) Sodium hydroxide tank
(q) Fuel oil storage tank
(r) 2" motor operated valve - Rockwell
(s) Radiation monitoring panel
(t) Local control panels

NSSS Supplied

(a) Reactor trip switchgear
(b) International instrument PAM indicators
(c) Core subcooling cooling
(d) Critical systems leak monitoring equipment

3. FSAR Tables - FSAR tables in Chapter 3 are in the process of being reviewed and are being revised as necessary to include updated information.

4. Seismic Reports

	Item	Status
(a)	Reactor Building Cooling Unit Bypass Damper Actuators	Will be submitted at a later date
(b)	Main Steam Isolation Valves	Given to NRC at meeting
(c)	480 Volt Substation	Given to NRC at meeting
(d)	H_2 Analyzer Panel	Will be submitted at a later date
(e)	Radiation Monitor System Panel	Will be submitted at a later date
(f)	PAM Indicators	Will be submitted at a later date
(g)	Diesel Generator - Electric and Air Starting Controls	1 copy to be hand carried to NRC on 11/17/80. 1 copy sent directly to Brookhaven Laboratory.

4. Seismic Reports (con't)

Item	Status
(h) Accumulator Tanks	The attached SQRT Information sheets summarizes information in the seismic report. If the Staff desires to physically see the report, Westinghouse will bring the report to Bethesda for your review.
(i) Electrical Containment Penetrations and Miscellaneous Connectors	1 copy to be hand carried to NRC on 11/17/80. 1 copy sent directly to Brookhaven Laboratory.

5. Revised SQRT Table - A copy of the revised SQRT Table is provided by this letter. (See attachment #2)

6. Specific Items

   (a) Component Cooling Pump Motor - This is to confirm that the seismic analysis of the service water pump motor conduit box applies to the component cooling water pump motor conduit box.

   (b) Terry Turbine Appurtenances - Both Terry Turbine Corporation and Wyle Laboratories have confirmed that the first evidence of loosening of bolting did occur after nine (9) OBE tests and one (1) SSE test, not prior to 5 OBE's. Therefore, the number of tests is considered to be more than adequate to meet design requirements. In addition, SCE&G Nuclear Operations will periodically inspect and tighten these bolts, if required, as part of their plant surveillance activities.

   (c) BOP Supplied Valves - GAI uses "Design Verification Standard" DS-8 for both in-house and out-of-house 'as-built' analyses. The standard requires that the originator and the verifier compare the analytical results against valve accelerations dictated by the various design specifications. Refer to attached sheets from that Standard. The Westinghouse Class 1 valve accelerators are sent to GAI via formal letters and is incorporated into the subsystem work package of DS-8. (See attachment #3)

In summary, valve accelerations are checked as a part of the design verification program to ensure design acceleration values are not exceeded.

(d) BOP Valves - Information regarding acceleration values from final as-built piping analysis for the main feedwater isolation valves, the main steam isolation valves, the main steam safety valves and control valve MS-1F-2030 will be provided at a later date. The design verification will be completed by mid-December, 1980.

(e) Charging Pump - The natural frequency of the charging pump was determined to be greater than 33 hertz based on sine sweep tests performed by the vendor. Test results are documented in a priority test report prepared by the vendor. If it is necessary for the NRC to review this report, Westinghouse will bring this report to Bethesda for your review.

(f) RHR Pumps - In the copy of the seismic report, several pages, including the title page were missing. These pages have been found. The entire report is on microfilm at Westinghouse. In making a copy for the October 14-17, 1980 meeting, they were mistakenly omitted. The fact that the Watts Bar spectra applies to Summer Station has been verified. In fact, it was so stated on the missing title sheet. Also, the information regarding nozzle loads, dimensions and forces is included on the updated SQRT information sheet. Finally, Westinghouse did verify that the accelerations used to quality the RHR pumps did envelope the ZPA for Summer Station. The ZPA was used because the pump is rigid. These results indicate a factor of 10 in conservation.

(g) Battery Chargers - Attached to this letter is a copy of GAI procedure for the design of electrical and instrumentation equipment bases and attachments along with a copy of the design analysis for the battery chargers. This analysis demonstrates the adequacy of the existing welds.

(h) Pressure and Differential Transmitters - A list of transmitters in safety related applications, including location, model number (model numbers are given as Lot numbers which were tested by Barton) and applicable test reports are provided as an attachment to this letter. SCE&G has verified that the acceleration values of the equipment are greater than the acceleration values of the areas where the equipment is located. (See attachment #5)

SCE&G will notify the NRC when all seismic reports have been reviewed and accepted and a summary of any problems if they occur. In addition, as soon as the seismic reports listed in item 4 and the missing information on the SQRT information sheets for the Reactor Building cooling unit damper actuator, PAM indicators and the H_2 analyzer panel are received, the NRC and Brookhaven Laboratories will be sent a copy. If you have any questions, please let us know.

Very truly yours,

T. C. Nichols, Jr.

T. C. Nichols, Jr.

RBC:TCN:rh

cc: V. C. Summer
G. H. Fischer
T. C. Nichols, Jr.
E. H. Crews, Jr.
D. A. Nauman
O. S. Bradham
O. W. Dixon, Jr.
R. B. Clary
W. A. Williams, Jr.
J. B. Knotts, Jr.
J. L. Skolds
B. A. Bursey
A. R. Koon
Dr. Morris Reich
NPCF/Whitaker
File

ATTACHMENT #1

EQUIPMENT LIST FOR
SORT PLANT SITE REVIEW

I. BOP Mechanical Equipment

1. Reactor Building Cooling Unit (AH, XAA-1A, B), Assembly

2. Reactor Building Cooling Unit (AH, XAA-1A, B), Damper Actuator

3. Component Cooling Water Pump (CC, XPP-1A, B, C) Pump and Motor

4. A. Turbine Driven Emergency Feedwater Pump (XPP-8-EF) Appurtenances
   B. Turbine Driven EFW Pump Turbine (TPP-008-EF) Appurtenances

5. Main Feedwater Isolation Valves (FW, XVG-1611A), Valve and Actuator

6. Control Valve (MS-1F-2030)

7. Main Steam Isolation Valve (MS, XVM-2801A)

8. Main Steam Safety Valve (MS, XVS-2806A)

9. Refueling Water Storage Tank (SF, XTK-25)

II. NSS Mechanical Equipment

1. Charging Pump (CS, XPP-43A)

2. Residual Heat Removal Pump (RH, XPP-31)

III. BOP Category I Instruments, Electrical Equipment and Supports

1. 480 Volt Unit Substations

2. Battery Chargers

3. Transfer Switches (7200 Volt)

4. Control Board Switch Modules

5. Reactor Protection Under-frequency and Voltage Relay Panels

6. Main Control Board

7. Hydrogen Analyzer Panels

8. Control Room Evacuation Panels (XPN 7200 A/B)

9. Radiation Monitoring System Panel (XCP-6200)

IV. NSSS Category I Instrument, Electrical Equipment and Supports

1. Pressure Transmitters and Differential-Pressure Transmitters

2. Post Accident Monitors (Indicators)

V. BOP and NSSS Additional Equipment

1. Accumulator

2. Diesel Generator Electrical and Starting Equipment

3. Low Voltage Electrical Penetrations and Miscellaneous Connectors

Qualification Summary of Equipment

I. Plant Name: V. C. Summer

Type:

1. Utility: SCE&G — PWR X

2. NSSS: Westinghouse 3. A/E: GAI — BWR

II. Component Name: Reactor Building Cooling Unit Damper Actuator

1. Scope: [ ] NSSS [X] BOP

2. Model Number: NT 312B-SR4-12 Quantity:

3. Vendor: Bettis

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Pneumatic Actuator

b. Dimensions 72 in. long X 15 in. Max. Diam.

c. Weight 393 lb.

6. Location: Building: Reactor Building

Elevation: 543 Ft.

7. Field Mounting Conditions [ ] Bolt (No. 4, Size 3/4")
[ ] Weld (Length)
[ ]

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

S/S: F/B: V:

9. a. Functional Description: Open and Close HEPA Filter Bypass Damper

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both

10. Pertinent Reference Design Specifications: SP-534-044461-000

Expecting to receive final report by 12-25-80

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete: N/A

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection	Location	Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name Reactor Building Cooling Unit Assembly

1. Scope: [ ] NSSS [X] BOP

2. Model Number: N/A Quantity: 4

3. Vendor: American Air Filter

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Air Handling Unit

b. Dimensions 25.5 ft. long X 12 ft. wide X 29.1 ft. high

c. Weight 100,000 lbs.

6. Location: Building: Reactor Building

Elevation: 514 ft.

7. Field Mounting Conditions [X] Bolt (No. 34, Size 5/8")
[ ] Weld (Length)
[X] Seal Welds Between Sections

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

S/S: F/B: V:

9. a. Functional Description: Reactor Building Air Cooling Unit

b. Is the equipment required for [X] Hot Standby [ ] Cold Shutdow
[ ] Both

10. Pertinent Reference Design Specifications:

SP-534-044461-000 DSP 534-044461-000

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: X _____

Combination of Test and Analysis: _____

Test and/or Analysis by American Air Filter Company
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[ ] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only
4.[ ] Other (Specify) Seismic + Deadweight + LOCA induced 5.[X] Combination of diff. pressure load

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [X] _____ (other, specify)

2. Required Response Spectra (attach the graphs): Fig. 11 (X,Y&V) & 12 (X,Y&V)

3. Required Acceleration in Each Direction: ZPA

S/S = .397 or .399g F/B = .397 or .399g V = .288g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ] _____

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other _____ (specify)

4. Frequency Range: _____

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at S/S = _____ F/B = _____ V = ____

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ] _____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: _____

_____

10. Other tests performed (such as fragility test, including results): _____

_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [x] 3D [ ] 2D [ ] 1D

[x] Finite Element [ ] Beam [ ] Closed Form Solution

4. [x] Computer Codes: Strudl/Dynal

Frequency Range and No. of modes considered: up to 30Hz, 9 modes

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [x] Absolute Sum [x] SRSS
[ ] Other: _____ (specify)

6. Damping: 2% OBE / 5% DBE Basis for the damping used: R.G.1.61

7. Support Considerations in the model: Anchor Bolts (Fixed Translationally, Released Rotationally)

8. Critical Structural Elements:

A. Identification — Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab
Member 242 (Vertical Structural Member in the middle of left wall)	SSE + LOCA ΔP + Dead Weight		32.5ksi	41.4ksi

B. Max. Deflection	Location	Effect Upon Functional Operability
.162 in.	Joint No. 88 (Member 224) near to Member 242 (in Lateral direction)	Negligible

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Plant Type:

1. Utility: SCE&G PWR X

2. NSSS: ____ 3. A/E: X BWR ____

II. Component Name Component Cooling Water Pump and Motor

1. Scope: [ ] NSSS [X] BOP

2. Model Number: CS PAM TEWAC (Motor) 18X20X24 HSA (Pump) Quantity: 3

3. Vendor: Bingham-Willamette Co. and Westinghouse Electric Corp.

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Double Suction-Double Volute w/Motor

b. Dimensions Pump 6F"X68"X63"/Motor 82"X83"X74"

c. Weight Pump 6500, Motor 14500, Base 4000

6. Location: Building: Intermediate Building

Elevation: 412

7. Field Mounting Conditions [X] Bolt (No. 14, Size 1/4")
[ ] Weld (Length ____)
[ ] ____

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

S/S: 34.3Hz (motor) 36.5Hz overall F/B: 43.4 (motor) V: 38.7 (motor)

9. a. Functional Description: Supply Water to Cool Various Components

b. Is the equipment required for [X] Hot Standby [X] Cold Shutdown
[ ] Both ____

10. Pertinent Reference Design Specifications: ASME B&PV Code Section III, Subsection ND, SP-502

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: X (Motor is included in the model)

Combination of Test and Analysis: _____

Test and/or Analysis by Bingham Willamette Co. Basic Technology, Inc. (Pump) (name of Company or Laboratory & Report No.) Westinghouse/LME 77007 (Motor)

V. Vibration Input:

1. Loads considered: 1.[ ] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only

4.[ ] Other (Specify) _____ 5.[X] Combination of Seismic + Deadweight + Nozzle Loads + motor torque

6. Method of combining RRS: [ ] Absolute Sum [X] SRSS [ ] _____ (other, specify)

2. Required Response Spectra (attach the graphs): 61X, 61Y, 61V (Rev. 3)

3. Required Acceleration in Each Direction: ZPA

S/S = OBE = .308 or .180g / DBE = .477 or .289g F/B = OBE = .308 or .180g / DBE = .477 or .289g V = OBE = .209g / DBE = .324g

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

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ] _____

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other _____ (specify)

4. Frequency Range: _____

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at S/S = _____ F/B = _____ V = ____

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ] _____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: _____

_____

10. Other tests performed (such as fragility test, including results): _____

_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[X] Static Analysis [ ] Equivalent Static Analysis

[X] Dynamic Analysis: [ ] Time-History
(Pump only) [X] Response Spectrum

3. Model Type: [X] 3D (Pump) [ ] 2D [X] 1D (Motor)

[X] Finite Element- (Pump) [ ] Beam [X] Closed Form Solution- (Motor)

4. [X] Computer Codes: ANSYS (Pump), Custom program for motor

Frequency Range and No. of modes considered: Fund. Freq=36.5H; 10 modes (Pump)
34.3 to > 500Hz, 4 modes (motor)

[X] Hand Calculations (For motor stress analysis)

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [X] SRSS
[ ]Other: _____ (specify)

6. Damping: N/A Basis for the damping used: _____

7. Support Considerations in the model: Bolts

8. Critical Structural Elements:

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab
EL. 16 (Pump Pedestal Plate)	Seismic Static Flange Motor Torque		1.65ksi	10.ksi	21.6ksi
Motor Soleplate	Bottom of motor	Seismic plus operating torque	-	18.5ksi	26ksi

B.

Max. Deflection	Location	Effect Upon Functional Operability
.0116"	Node 674 (Shaft)	Negligible

I - 4A

Qualification Summary of Equipment

I. Plant Name: V. C. Summer

Type:

1. Utility: SCE&G — PWR X

2. NSSS: Westinghouse 3. A/E: GAI — BWR

II. Component Name: Turbine Driven EFW Pump, XPP-8-EF, Appurtenances

1. Scope: [ ] NSSS [X] BOP

2. Model Number: 3X6X9c MSD 7-Stage Quantity: 1

3. Vendor: Bingham-Willamette Co.

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Piping of Various Sizes

b. Dimensions Various

c. Weight Various

6. Location: Building: Intermediate Building

Elevation: 412'

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[ ] Weld (Length____)
[X] Piping Welded to Pump

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

S/S: > 53Hz F/B: > 46 V: > 53

9. a. Functional Description: Pump provides emergency feedwater to steam generators

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[X] Both

10. Pertinent Reference Design Specifications:

DSP-508B-044461-000

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Bingham-Willamette Co./ Basic Technology, Inc.
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of_____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)

2. Required Response Spectra (attach the graphs): 61X, 61Y & 61V

3. Required Acceleration in Each Direction: OBE

S/S = .36 or .308g F/B = .36 or .308g V = .209g

VI. If Qualification by Test, then Complete:

1. [X] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ]_____

2. [X] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other 1.5 Min
(specify)

4. Frequency Range: @ 30 Hz

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs [ ] No

6. Input g-level Test at S/S = .48 F/B = .48 V = .4

7. Laboratory Mounting: *As installed at the plant

1. [ ] Bolt (No.____, Size____) [*X] Weld (Length____) [ ]_____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: Satisfactory

10. Other tests performed (such as fragility test, including results): No

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis: N/A

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

N/A [ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection Location Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer

Type:

1. Utility: SCE&G — PWR X

2. NSSS: Westinghouse 3. A/E: GAI — BWR

II. Component Name: Turbine Driven EFW Pump Turbine, TPP-008-EF, Appurtenances

1. Scope: [ ] NSSS [X] BOP

2. Model Number: GS Type Quantity: 1

3. Vendor: Terry

4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance Piping of various sizes

b. Dimensions Various

c. Weight Various

6. Location: Building: Intermediate

Elevation: 412'

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[ ] Weld (Length____)
[X] Piping clamped to supports which are welded to the turbine base

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

S/S: > 33Hz F/B: > 33Hz V: > 33Hz

9. a. Functional Description: Drives EF Pump to supply emergency feedwater to steam generators

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both

10. Pertinent Reference Design Specifications:

DSP-508B-044461-000

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: _____

Combination of Test and Analysis: X

Test and/or Analysis by Terry Corp./Bingham-Willamette Co.
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of_____
6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)
2. Required Response Spectra (attach the graphs): 61X, Y & V
3. Required Acceleration in Each Direction: OBE
S/S = .36 or .308g F/B = .36 or .308g V = .209g

VI. If Qualification by Test, then Complete:

1. [X] Single Frequency [X] Multi-Frequency: [ ] random [ ] sine beat [X] Random with Sine beat
2. [X] Single Axis [X] Multi-Axis
3. No. of Qualification Tests: OBE 7 SSE 1 Other 1.5 min
(specify)
4. Frequency Range: @ 30Hz
5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs [ ] No
6. Input g-level Test at S/S = .5g F/B = .5g V = .4
7. Laboratory Mounting:
1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [X] As installed at the site
8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made: Satisfactory

10. Other tests performed (such as fragility test, including results):_____
No

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: Based on Bingham-Willamette Basic Technology Inc. test results on Turbine Driven EFW Pump XPP-8-EF Appurtenances, Terry developed the Span criteria which was utilized in the subject qualification.

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection	Location	Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer

Type:

1. Utility: SCE&G — PWR X

2. NSSS: Westinghouse 3. A/E: GAI — BWR

II. Component Name: Main Feedwater Isolation Valve, XVG-1611A-FW

1. Scope: [ ] NSSS [X] BOP

2. Model Number: 18" x 14" x 18" - 900 FWIV Quantity: 3

3. Vendor: Anchor/Darling Valve Co.

4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance Pneumatic/Hydraulic Operated Gate Valve

b. Dimensions 18" O.D., 40" long, 125" High

c. Weight 10,000 lb.

6. Location: Building: West Penetration Room

Elevation: 436'

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[ ] Weld (Length____)
[X] 18" OD weld to FW Pipe

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
40.33Hz Overall
S/S: F/B: V:

9. a. Functional Description: Isolate Steam Generators

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdow
[X] Both

10. Pertinent Reference Design Specifications:

DSP-589A-044461-000

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: X

Combination of Test and Analysis: _____

Test and/or Analysis by Anchor/Darling Valve Co./ Anamet Lab., Inc.
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[ ] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of Static + Operational + Seismic Loads

6. Method of combining RRS: [ ] Absolute Sum [x] SRSS [ ] _____
(other, specify)

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

3. Required Acceleration in Each Direction:

S/S = 3g F/B = 3g V = 3g

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

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ] _____

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other_____
(specify)

4. Frequency Range: _____

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at S/S = _____ F/B = _____ V = ____

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ] _____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: _____

_____

10. Other tests performed (such as fragility test, including results): _____

_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[X] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [X] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: Single Freq. > 33Hz

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [X] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: Welded to Pipe Line

8. Critical Structural Elements:

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab
Bonnet		Seismic + Operational Load		21.63ksi	30ksi

B.

Max. Deflection	Location	Effect Upon Functional Operability
.006"	Operator C. G. with respect to valve body	No Interference

Qualification Summary of Equipment

I. Plant Name: V. C. Summer

Type:

1. Utility: SCE&G — PWR X

2. NSSS: Westinghouse 3. A/E: GAI — BWR

II. Component Name: Control Valve IFV-2030-MS

1. Scope: [ ] NSSS [X] BOP

2. Model Number: Valve - 657-ES
Actuator - 80 Quantity: 1

3. Vendor: Fisher Controls

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance 4" Globe Valve

b. Dimensions 4" Body/Overall Dimen. 21" L X 68" H X 25" W

c. Weight 835 lbs. to 10%

6. Location: Building: Intermediate Bldg.

Elevation: 414'-4-1/4"

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[X] Weld (Length Buttweld Ends)
[ ] _____

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

S/S: 23.5 F/B: 25 V: 29.5

9. a. Functional Description: Control Valve for Main Steam Supply to the Turbine Driven Emergency Feedwater Pump Turbine

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [X] Both

10. Pertinent Reference Design Specifications:

SP-519-4461-00

DSP-519-044461-000
SP-702-4461-00
SP-325-4461-00

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Fisher Controls/Wyle Lab.
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of_____
6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [X] _____ (other, specify)
2. Required Response Spectra (attach the graphs): N/A
3. Required Acceleration in Each Direction:

S/S = 1.5g F/B = 1.5g V = 1g

VI. If Qualification by Test, then Complete:

1. [X] Single Frequency [ ] Multi-Frequency: [ ] random [X] sine beat [ ] _____
2. [ ] Single Axis [X] Multi-Axis
3. No. of Qualification Tests: OBE_____ SSE_____ Other 150 Sec. W/SSE (specify)
4. Frequency Range: F/B & V: 25, 29, 33.5 & 40Hz S/S & V: 23.5, 26, 29, 33.5 & 40Hz
5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs [ ] No N/A
6. Input g-level Test at S/S = 1.5g F/B = 1.5g V = 1.g
7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [X] Weld (Length____) [ ]_____

8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made: Satisfactory

_____

10. Other tests performed (such as fragility test, including results): No

_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection	Location	Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer

Type:

1. Utility: SCE&G — PWR X

2. NSSS: Westinghouse 3. A/E: GAI — BWR

II. Component Name: Main Steam Isolation Valve XVM-2801A-MS

1. Scope: [X] NSSS [ ] BOP

2. Model Number: N/A Quantity:

3. Vendor: Atwood and Morrill

4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance 32" Articulated Poppet Wye Type

b. Dimensions 32" O.D. 78" long, 102" high

c. Weight 27,250 lb.

6. Location: Building: West Penetration Room

Elevation: 436'

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[ ] Weld (Length____)
[X] 32" O.D. weld to MS line

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

S/S: > 33Hz F/B: > 33Hz V: > 33Hz

9. a. Functional Description: Isolate Steam Generators

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[X] Both

10. Pertinent Reference Design Specifications:

DSP-505-044461-000

III. Is Equipment Available for Inspection in the Plant: [x] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Atwood & Morrill Co., Inc. Brewer Engineering Lab.
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[ ] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only
4.[ ] Other (Specify) _____ 5.[x] Combination of Seismic + Pipe Rupture

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [x] _____ (other, specify)

2. Required Response Spectra (attach the graphs): 62 X, 61Y & 62V

3. Required Acceleration in Each Direction: OBE

S/S = .274 or .461g F/B = .274 or .461g V = .222g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [x] Static

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other N/A (specify)

4. Frequency Range: N/A

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at S/S = 3g F/B = 3g V = 3g

7. Laboratory Mounting:

1. [ ] Bolt (No. ____, Size ____) [x] Weld (Length ____) [ ] _____

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

9. Test Results including modifications made: Satisfactory

10. Other tests performed (such as fragility test, including results): No

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete: N/A

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection Location Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name Main Steam Safety Valve XVS-2806A - MS

1. Scope: [ ] NSSS [X] BOP

2. Model Number: Consolidated Type 3707RA Quantity: 1

3. Vendor: Dresser Industrial Valve & Instrument Div.

4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance Safety Valve

b. Dimensions 6" Inlet X 10" Outlet

c. Weight 1400 lbs.

6. Location: Building: West Penetration Room

Elevation: 436'

7. Field Mounting Conditions [X] Bolt (No. 12, Size 13/8")
[ ] Weld (Length)
[ ]

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

S/S: 37Hz F/B: 37Hz V: > 75Hz

9. a. Functional Description: Provides overpressure protection to the main steam and feedwater piping and the secondary side of the steam generator.

b. Is the equipment required for [X] Hot Standby [ ] Cold Shutdown

[ ] Both

10. Pertinent Reference Design Specifications:

DSP-533-044461-000

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Dresser Industries
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of_____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ] N/A
(other, specify)

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

3. Required Acceleration in Each Direction:

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

VI. If Qualification by Test, then Complete:

1. [X] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [X] Sine

2. [X] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other NA
(specify)

4. Frequency Range: 10, 15, 25Hz

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [X] No

6. Input g-level Test at S/S = 6g F/B = _____ V = 6g

7. Laboratory Mounting:

1. [X] Bolt (No. 12, Size 1-3/8") [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: Satisfactory

_____

10. Other tests performed (such as fragility test, including results): No

_____

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Type:

1. Utility: SCE&G PWR X

2. NSSS: 3. A/E: X BWR

II. Component Name Refueling Water Storage Tank

1. Scope: [ ] NSSS [X] BOP

2. Model Number: N/A Quantity: 1

3. Vendor: Pittsburgh-Des Moines Steel Co.

4. If the component is a cabinet or panel, name and model No. of the devices included:

N/A

5. Physical Description a. Appearance Tank

b. Dimensions 68 Feet High, 40' Inside Diameter

c. Weight $4.58' \times 10^6$ Pounds water.

6. Location: Building: Outside on lower roof, Aux. Bldg.

Elevation: 413'

7. Field Mounting Conditions [X] Bolt (No. 90, Size 2-1/2")
[ ] Weld (Length)
[ ]

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

S/S: > 33Hz F/B: > 33Hz V: > 33Hz

9. a. Functional Description: Storage of Refueling water, Spray cooling water for Post LOCA Safety Injection water supply, Post LOCA Cooling

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[X] Both Safe Shutdown

10. Pertinent Reference Design Specifications: ASME B&PVC, Section III, Subsection NC

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: X

Combination of Test and Analysis: _____

Test and/or Analysis by Pittsburgh-Des Moines Steel Co.
(name of Company or Laboratory & Report No.

V. Vibration Input:

1. Loads considered: 1.[ ] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only

4.[ ] Other (Specify)_____ 5.[X] Combination of Static,press & Seismi

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)

2. Required Response Spectra (attach the graphs): 54X, 54Y, 54V

3. Required Acceleration in Each Direction: OBE

S/S = .232 or .268g F/B = .232 or .268g V = .106g

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

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ]_____

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other_____
(specify)

4. Frequency Range:_____

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs [ ] No

6. Input g-level Test at S/S = _____ F/B = _____ V = ____

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results, including modifications made:_____

_____

10. Other tests performed (such as fragility test, including results):_____

_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [X] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: Rigid > 33Hz

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: N/A (specify)

6. Damping: N/A Basis for the damping used: _____

7. Support Considerations in the model: Bolted

8. Critical Structural Elements: Stresses & deflections are not given explicit. However, the thickness of shell was determined.

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

B. Max. Deflection Location Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

PWR X

BWR

1. Utility: South Carolina Electric & Gas Co.
2. NSSS: W PWR 3. A/E: Gilbert Assoc.

II. Component Name: Charging/Safety Injection Pump

1. Scope: [X] NSSS [ ] BOP
2. Model Number: 2 1/2" RL-IJ Quantity: 3
3. Vendor: Pacific Pumps Div., Dresser Industries
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description a. Appearance Motor, Gear & Pump Mounted on a Base
   b. Dimensions L = 236", W = 52 3/4", H = 55"
   c. Weight 22,300 lbs.
6. Location: Building: Auxiliary Building
   Elevation: 388' - 0"
7. Field Mounting Conditions [X] Bolt (No. 16, Size 1 1/8")
   [ ] Weld (Length)
   [ ]
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical
   S/S: > 35 Hz F/B: > 35 Hz V: > 35 Hz
9. a. ~~Functional Description~~: Provide flow during Charging and Safety Injection System operations.
   b. ~~Is the equipment~~ required for [ ] Hot Standby [ ] Cold Shutdown
   [X] Both
10. ~~Pertinent~~ Reference Design Specifications: W E Spec 678815 Rev. 2 and Addendum E Spec 952274 Rev. 2.

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: _____

Combination of Test and Analysis: X

Test and/or Analysis by Pacific Pumps (pump) & WMD Buffalo (motor & Gear
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of seismic plus normal operation

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____ (other, specify)

2. Required Response Spectra (attach the graphs): Attachment 1

3. Required Acceleration in Each Direction:

S/S = 3G F/B = 3G V = 2G

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

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ]_____

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other_____ (specify)

4. Frequency Range:_____

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at S/S = _____ F/B = _____ V = ___

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made:_____

_____

10. Other tests performed (such as fragility test, including results):_____

_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: A sine-sweep test was conducted to determine natural frequencies. Natural frequencies determined were 40.16 Hz (Transverse) and 50.80 Hz (Axial)

2. Method of Analysis:

[X] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [X] Closed Form Solution

4. [ ] Computer Codes: N/A

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

[X] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS N/A
[ ] Other: _____ (specify)

6. Damping: N/A Basis for the damping used: _____

7. Support Considerations in the model: N/A

8. Critical Structural Elements:

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
Motor Support Feet	Motor	Normal plus Seismic	10469 psi	10711 psi	20291 ps
Suction Nozzle	Pump	Normal plus Seismic	--	14815 psi	16600 ps
Discharge Nozzle	Pump	Normal plus Seismic	--	13700 psi	16600 ps

B.

Max. Deflection	Location	Effect Upon Functional Operability
0.0064 in. allowable 0.030 in.	Motor Rotor	No adverse affect on operability

Attachment 1

Charging Pump

Sine-sweep frequency search tests demonstrated that the pump, gearbox and motor assembly was rigid and static analysis was used for seismic qualification. The seismic analysis levels were compared with the plant ZPA level at the appropriate auxiliary building floor level to verify that the analysis was conservative.

Direction	Analysis Level	Plant DBE Level
X Horizontal	3.0 g	0.29 g
Y Horizontal	3.0 g	0.24 g
Vertical	2.0 g	0.19 g

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

PWR - X

BWR

1. Utility: South Carolina Electric & Gas Co.
2. NSSS: Westinghouse 3. A/E: Gilbert Assoc.

II. Component Name: Residual Heat Removal Pump & Motor

1. Scope: [X] NSSS [ ] BOP
2. Model Number: 8X20 WDF Quantity: 2
3. Vendor: Ingersoll Rand
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description a. Appearance: Vertical Single Stage Centrifugal Pump
   b. Dimensions: 79" high 39" diameter
   c. Weight: 8000 lbs.
6. Location: Building: Auxiliary Building
   Elevation: 374' - 0"
7. Field Mounting Conditions [X] Bolt (No. 3, Size 2")
   [ ] Weld (Length)
   [ ]
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
   S/S: 40.6 Cps F/B: 46.5 Cps V: N/A
9. a. ~~Functional Description~~: Residual Heat Removal
   b. ~~Is the equipment~~ required for [ ] Hot Standby [X] Cold Shutdown
   [ ] Both
10. ~~Pertinent~~ Reference Design Specifications:
    W Gen. E Spec 678815 Rev. 2

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: X

Combination of Test and Analysis: _____

Test and/or Analysis by McDonald Engineering Anal. Report # ME-174
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[ ] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only
4.[ ] Other (Specify) _____ 5.[ ] Combination of Seismic, deadweight, thermal expansion & nozzle load

6. Method of combining RRS: [X] Absolute Sum [ ] SRSS [ ] _____ (other, specify)

2. Required Response Spectra (attach the graphs): see Attachment

3. Required Acceleration in Each Direction:

S/S = 2g F/B = 2g V = 1.5 g

VI. If Qualification by Test, then Complete: This section is not applicable

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ] _____

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE _____ SSE _____ Other _____ (specify)

4. Frequency Range: _____

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at S/S = _____ F/B = _____ V = ____

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ] _____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: _____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: N/A

2. Method of Analysis:

[X] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [X] 3D [ ] 2D [ ] 1D

[X] Finite Element [ ] Beam [ ] Closed Form Solution

4. [X] Computer Codes: NASTRAN; ICES-STRUDL

Frequency Range and No. of modes considered: 2 Modes; 2 Lowest Frequencies
40.6 cps, 46.5 g

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [X] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

6. Damping: N/A Basis for the damping used: _____

7. Support Considerations in the model: 3 Pump Hold Down Bolts

8. Critical Structural Elements: See attached summary

A.

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

B.

Max. Deflection	Location	Effect Upon Functional Operability

Attachment 1

Residual Heat Removal Pump

A three dimension finite element analysis demonstrated that the pump motor assembly was rigid. As a result, static analysis methods were used for qualification purposes. The seismic qualification level was compared with the applicable seismic ZPA's for the plant at the pump location.

Direction	Analysis Level	Plant DBE Level
X Horizontal	2.0	0.21
Y Horizontal	1.5	0.31
Vertical	1.5	0.17

2. SUMMARY OF RESULTS

A summary of the results of the detailed calculations is presented for both the OBE and SSE loads.

2.1 Normal + SSE + Maximum Nozzle Loads

	ACTUAL	ALLOWABLE
Pump Hold Down Bolts (tensile)	22,671 psi	38,940 psi
(shear)	10,969 psi	17,556 psi
Support Bracket Stress	26,343 psi	29,160
Support Weld Stress	20,651 psi	28,800
Casing Stress at Support	24,059 psi	48,600
Cooler Bracket Stress	9,875	24,960
Cooler Bracket Bolt (tensile)	3,043	24,000
Supporting Head Channels	6,164	24,960
Motor Hold Down Bolts (tensile)	16,816	22,838
(shear)	5,605	12,000
Pump Flange Bolts (tensile)	21,518	24,360
Pump Casing Stress	20,067	29,160
Rotor-Stator Clearance	.008 in.	.051 in.
Motor Bearing (upper)	1850 lbs.	9000 lbs.
(lower)	3265	13900
Impeller Contact Stress	818 psi	19,440 psi
Shaft Stress	10,534 psi	18,000

2.2 Normal + OBE + Maximum Nozzle Loads

	ACTUAL	ALLOWABLE
Pump Hold Down Bolts (tensile)	16,477 psi	35,784 psi
(shear)	8,885	14,630
Support Bracket Stress	20,100	24,300
Support Weld Stress	15,808	24,000
Casing Stress at Support	24,059	48,600
Cooler Bracket Stress	6,419	20,800
Cooler Bracket Bolts (tensile)	1,522	20,000
Supporting Head Channels	3,150	20,800
Motor Hold Down Bolts (tensile)	8,408	20,000
(shear)	2,802	10,000
Pump Flange Bolts (tensile)	20,095	20,300
Pump Casing Stress	18,741	24,300
Rotor-Stator Clearance	.004 in.	.051 in.
Motor Bearing (upper)	922 lbs.	9,000 lbs
(lower)	1868	13,900 lbs.
Impeller Contact Stress	432 psi	16,200 psi
Shaft Stress	10,228 psi	15,000 psi

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name 480 Volt Unit Substation

1. Scope: [ ] NSSS [X] BOP

2. Model Number: N/A Quantity: 6

3. Vendor: Gould-Brown Boveri (ITE)

4. If the component is a cabinet or panel, name and model No. of the devices included: HPL-C primary switch, type VUG transformer, and 480 volt switchgear with K-line breakers

5. Physical Description a. Appearance Large floor mounted structure

b. Dimensions Largest 23' L X 5'-8" DX7'-6" H Smallest 12' L X 4'-10" D X 7"-6" H

c. Weight 15,980 lbs. 6,790 lbs.

6. Location:

Building:	IB	IB	IB	AB	SW	SW
Elevation:	463'	463'	463'	463'	425'	441'

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[X] Weld (Length Vanes)
[ ] _____

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

S/S: F/B: V:

9. a. Functional Description: Transformers electrical power from 7200 Volts to 480 Volts and distributes power to Class IE loads.

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[X] Both

10. Pertinent Reference Design Specifications: SP-552-4461

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Wyle Lab; 437901 and 43827-1
(name of Company or Laboratory & Report No.

V. Vibration Input: SCE&G Ref: IMS-92-2836- (CGSG-16813, 10/18/78)
IMS-92-3001-1 (CCSG-16807, 10/17/78 and CGSG-16952, 10/31/78)

1. Loads considered: 1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of_____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)

2. Required Response Spectra (attach the graphs): See Figures 56,62,64,72 & 74

3. Required Acceleration in Each Direction: (Max. ZPA for SSE)

S/S = 0.890g F/B = 0.715g V = 0.415g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [ ] random [ ] sine beat [X] Combination of multi-freq. & sine beat

2. [ ] Single Axis [X] Multi-Axis

3. No. of Qualification Tests: OBE See attached SSE_____ Other_____
(specify)

4. Frequency Range:_____

5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs [ ] No

6. Input g-level Test at Lowest ZPA for SSE S/S = 2.7g F/B = 2.7g V = 0.95g

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [X] Weld (Length varies) [ ]_____

8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: Satisfactory performance with no damage or degradation

10. Other tests performed (such as fragility test, including results):_____
Prior to final qualification test switchgear was tested and found to require the diagonal stiffeners used in the qualified equipment.

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name Battery Chargers

1. Scope: [ ] NSSS [X] BOP

2. Model Number: BCS12300 Quantity: 3

3. Vendor: Solidstate Controls, Inc.

4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance Single bay cabinet

b. Dimensions 2'-5" W X 6' D X 6'-11" H

c. Weight 1650 lbs.

6. Location: Building: Intermediate Building

Elevation: 412'

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[X] Weld (Length Plus)
[ ] _____

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

S/S: 10.2, 11 6, 22.3,24.5 F/B: 12.2, 14, 18 V: None

9. a. Functional Description: Converts 480 Volt a-c power to 125 Volt (Normal) d-c power

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[X] Both

10. Pertinent Reference Design Specifications: SP-561-4461

III. Is Equipment Available for Inspection in the Plant: [x] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Batelle-Columbus; 8856 JS
(name of Company or Laboratory & Report No.)

SCE&G Ref: 1MS-92-2275-0 (CGGS-17571, 1/3/79 and CGGS-19204, 10/8/79)

V. Vibration Input:

1. Loads considered: 1.[x] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only

4.[ ] Other (Specify) _____ 5.[ ] Combination of _____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [x] RRSX cross coupling (other, specify)

2. Required Response Spectra (attach the graphs): Figure 61

3. Required Acceleration in Each Direction: (ZPA for SSE)

S/S = 0.477g F/B = 0.477g V = 0.324g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [x] Multi-Frequency: [x] random [ ] sine beat [ ] _____

2. [x] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE 230sec SSE 20sec Other Sine sweep (specify)

4. Frequency Range: _____

5. TRS enveloping RRS using Multi-Frequency Test [x] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at ZPA for SSE S/S = 3.5g F/B = 3.5g V = 3.5g

7. Laboratory Mounting:

1. [ ] Bolt (No. Not Known, Size Not Known) [ ] Weld (Length ____) [ ] _____

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

9. Test Results including modifications made: Operated satisfactorily without degradation or damage.

10. Other tests performed (such as fragility test, including results): _____

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name Transfer Switches - 7200 Volt

1. Scope: [ ] NSSS [x] BOP

2. Model Number: N/A Quantity: 3

3. Vendor: Gould-Brown Boveri (Terac Controls, Inc.)

4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance Multi-bay floor mounted cabinet

b. Dimensions 6'W x 5'D X 7'-6"H

c. Weight 4800 lbs.

6. Location: Building:	Intermediate Bldg.	Auxiliary Bldg.	Service Water PP House
Elevation:	436'	388'	425'

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[x] Weld (Length Plug)
[ ]

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

S/S: F/B: V:

9. a. Functional Description: Select source of 7200 volt power for "swing" pumps.

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[x] Both

10. Pertinent Reference Design Specifications: SP-613-4461-00

III. Is Equipment Available for Inspection in the Plant: [x] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Gould Rept. 37-01280-SS Wyle Lab. 43972-1.
(name of Company or Laboratory & Report No.

V. Vibration Input: SCE&G Ref: 1MS-92 3298-0 (CGGS-17191, 11/29/78)

1. Loads considered: 1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of_____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)

2. Required Response Spectra (attach the graphs): Figures 52, 62, 72

3. Required Acceleration in Each Direction: (Maximum ZPA for SSE)

S/S = 0.425g F/B = 0.715g V = 0.416g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [X] random [ ] sine beat [ ]_____

2. [ ] Single Axis [X] Multi-Axis

3. No. of Qualification Tests: OBE 5FB/V,5ss/v SSE 1FB/V, 1 ss/v Other 1 FB/V < SSE Sine Sweep (specify)

4. Frequency Range:_____

5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at (ZPA)S/S = 5.4g F/B = 5.5g V = 2.8g

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: Minor and acceptable Structural damage; auxiliary contact chatter within acceptable limits.

10. Other tests performed (such as fragility test, including results):_____

Qualification Summary of Equipment

I. Plant Name: Virgil C. Summer Nuclear Station - Unit 1 Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: G/C BWR

II. Component Name Representative Main Control Board Control Devices Mounted on a Test Panel

1. Scope: [ ] NSSS [XX] BOP

2. Model Number: N/A Quantity: 1 Test Panel

3. Vendor: Reliance Electric Company

4. If the component is a cabinet or panel, name and model No. of the devices included: See Attached List

5. Physical Description a. Appearance See Attached

b. Dimensions See Attached

c. Weight See Attached

6. Location: Building: The Devices are Mounted on the Main Control Board Located in the Control Building

Elevation: Elevation 463

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[ ] Weld (Length____)
[X] Panel Mounting

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

S/S: Unknown F/B: Unknown V: Unknown

9. a. Functional Description: Control Devices are Representative of Main Control Board Mounted Device Required to Control and Monitor Safety Related Plant auxiliaries and conditions.

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[X] Both

10. Pertinent Reference Design Specifications: Main Control Board SP568 and Seismic Spec. SP702

III. Is Equipment Available for Inspection in the Plant: [ ] Yes [X] No

IV. Equipment Qualification Method: Test: Seismic Test

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Wyle Laboratories Report 43703-1
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered:1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only
   4.[ ] Other (Specify)_____5.[ ] Combination of_____
   6. Method of combining RRS: [X] Absolute Sum [ ] SRSS [ ]_____ (other, specify)
2. Required Response Spectra (attach the graphs):_____
3. Required Acceleration in Each Direction:
   S/S = 1.3 g's ZPA F/B = 1.3 g's ZPA V = .48 g's ZPA

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [X] random [ ] sine beat [ ]_____
2. [ ] Single Axis [X] Multi-Axis
3. No. of Qualification Tests: OBE 5 SSE 3 Other_____ (specify)
4. Frequency Range: 1.0Hz to 40Hz
5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs) [ ] No
6. Input g-level Test at S/S = 2.7 g's ZPA F/B = 2.5 g's ZPA V = 1 g ZPA
7. Laboratory Mounting:
   1. [ ] Bolt (No.____, Size____) [ ] Weld (Length Unknown) [ ]_____
8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made: The capability to withstand Seismic loading without compromise of structure or electrical function was demonstrated.
10. Other tests performed (such as fragility test, including results):_____
    Not performed

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection	Location	Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name: Reactor Protection UF&UV Trans. and Relay Panels

1. Scope: [ ] NSSS [X] BOP

2. Model Number: N/A Quantity: 1

3. Vendor: General Electric Company

4. If the component is a cabinet or panel, name and model No. of the devices included: 12NGV13A11A & 12SFF21A1A relays

5. Physical Description a. Appearance 3 bay floor mounted cabinet

b. Dimensions 9'W X 6'-7 1/2'D X 7'-6"H

c. Weight 9000 lbs.

6. Location: Building: Intermediate Building

Elevation: 436'

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[X] Weld (Length 4")
[ ] _____

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

S/S: _____ F/B: _____ V: _____

9. a. Functional Description: Senses voltage and frequency of Reactor Coolant Pump supply to provide reactor protection system input signals

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
Used for reactor trip on under voltage or under frequency [ ] Both

10. Pertinent Reference Design Specifications: SP-626-4461-00

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by General Electric 349-18403 Wyle Lab. 43105-1
(name of Company or Laboratory & Report No.

V. Vibration Input: SCE&G Ref: 1MS-94B-92-2857- (CGGS-14800, 3/3/78 and CGGS-16952, 10/31/78)

1. Loads considered: 1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of_____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)

2. Required Response Spectra (attach the graphs): Figure 62

3. Required Acceleration in Each Direction: (ZPA for SSE)

S/S = 0.715g F/B = 0.425g V = 0.344g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [ ] random [ ] sine beat [X] Sine beats Random with Super impos

2. [ ] Single Axis [X] Multi-Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other 117 total test run
(specify)

4. Frequency Range:_____

5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at S/S = 1.7g F/B = 3.4g V = 1.95g

7. Laboratory Mounting:

1. [X] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made:_____

_____

10. Other tests performed (such as fragility test, including results):_____

_____

Qualification Summary of Equipment

I. Plant Name: V.C. Summer Nuclear Station Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name: Main Control Board

1. Scope: [ ] NSSS [X] BOP

2. Model Number: Custom designed equipment without type or model number Quantity: 1

3. Vendor: Reliance

4. If the component is a cabinet or panel, name and model No. of the devices included: See attached sheet 1

5. Physical Description a. Appearance "L" shaped control board with Bench Board & angled Annunciator

b. Dimensions See attached sheet 2

c. Weight See attached sheet 2

6. Location: Building: Control Building

Elevation: 463'-0"

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[X] Weld (Length 6" on 12" Centers
[ ] _____

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

S/S: 20 F/B: 20 V: 19.8

9. a. Functional Description: Main Control Board for display & control of plant conditions

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[X] Both

10. Pertinent Reference Design Specifications: SPEC-SP568, SP-702

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: _____

Combination of Test and Analysis: X

Test and/or Analysis by Reliance Electric Col./Wyle Lab.
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered:1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only
4.[ ] Other (Specify)_____5.[ ] Combination of_____
6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [X] _____ (other, specify)
2. Required Response Spectra (attach the graphs): 26X, 26Y, 26V
3. Required Acceleration in Each Direction:

S/S = .328 or .365g F/B = .328 or .365g V = .13g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [X] random [ ] sine beat [ ] _____
2. [ ] Single Axis [X] Multi-Axis
3. No. of Qualification Tests: OBE 5 SSE 1 Other _____ (specify)
4. Frequency Range: 1 - 40 Hz
5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs) [ ] No
6. Input g-level Test at S/S = _____ F/B = _____ V = _____
7. Laboratory Mounting:

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

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made: Satisfactory for the test, but test was performed for the isolated Section II only.
10. Other tests performed (such as fragility test, including results): _____
Model search was performed for the assembly as installed (in-stu)

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: Model search was performed to obtain modes and model shapes which are utilized for analysis

2. Method of Analysis:

[X] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [X] 3D [ ] 2D [ ] 1D

[X] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: Stardyne

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [X] SRSS
[ ] Other: _____ (specify)

6. Damping: N/A Basis for the damping used: _____

7. Support Considerations in the model: Yes

8. Critical Structural Elements:

A. Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowat
Beam Element 21 See III		Gravity + DBE		8.37ksi	45ksi

B. Max. Deflection	Location	Effect Upon Functional Operability
0.0417"	Node 72 Sec. IV	Negligible

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: SCE&G — PWR X

2. NSSS: Westinghouse 3. A/E: GAI — BWR

II. Component Name: H2 Analizer Panels XPN721 A&XPN721 B

1. Scope: [ ] NSSS [x] BOP

2. Model Number: KILL — Quantity: 2

3. Vendor: Comsip, Inc. - Delphi Systems Div.

4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance (Vertical panel & control Panel insert)

b. Dimensions Vert panel - 30" L X 30" W X 72" H
Control Panel Insert - 19" W X 17" H X 20" D

c. Weight Unknown

6. Location: Building: XPN7215A - Auxiliary Bldg.
XPN7215B - Fuel Handling Bldg.

Elevation: XPN7215A - 463'-0"
XPN7215B - 463'-0"

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[ ] Weld (Length____)
[ ] _____

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

S/S: F/B: V:

9. a. Functional Description: Continuously monitor reactor bldg. atmosphere for H2 concentration

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown [ ] Both

10. Pertinent Reference Design Specifications: Post Accident SP-636-044461-000
SP-702-4461-00

Seismic Qual. Report not received

III. Is Equipment Available for Inspection in the Plant: [ ] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: _____

Combination of Test and Analysis: _____

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

V. Vibration Input:

1. Loads considered: 1.[ ]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of_____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)

2. Required Response Spectra (attach the graphs):_____

3. Required Acceleration in Each Direction:

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

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ]_____

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other_____
(specify)

4. Frequency Range:_____

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [ ] No

6. Input g-level Test at S/S = _____ F/B = _____ V = ____

7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made:_____

_____

10. Other tests performed (such as fragility test, including results):_____

_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection	Location	Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: Virgil C. Summer Nuclear Station Unit 1 Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: G/C BWR

II. Component Name Control Room Evacuation Panels (XPN7200A & XPN7200B)

1. Scope: [ ] NSSS [X] BOP

2. Model Number: N/A Quantity: 2

3. Vendor: Reliance

4. If the component is a cabinet or panel, name and model No. of the devices included: Panel mounted devices qualified by Reliance for Main Control Board

5. Physical Description a. Appearance Rectangular Control Panel

b. Dimensions .42" W X 72" H X 36" D

c. Weight

6. Location: Building: Intermediate Building

Elevation: 436'-0"

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[X] Weld (Length 6" on) 12" Centers
[ ] _____

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
Overall 21.45Hz, 26.72Hz, 35.83Hz
S/S: F/B: V:

9. a. Functional Description: Provide cold shutdown & hot Standby capability from outside the Control Room

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[ ] Both

10. Pertinent Reference Design Specifications:

SP-610-044461-000
SP-702-4461-000

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: X

Combination of Test and Analysis: _____

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

V. Vibration Input:

1. Loads considered: 1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of_____
6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [x] _____
(other, specify)
2. Required Response Spectra (attach the graphs): Fig. 62 X, Y & V
3. Required Acceleration in Each Direction: ZPA for OBE

S/S = .481g F/B = .481g V = .222g

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

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ] _____
2. [ ] Single Axis [ ] Multi-Axis
3. No. of Qualification Tests: OBE_____ SSE_____ Other_____
(specify)
4. Frequency Range: _____
5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) [ ] No
6. Input g-level Test at S/S = _____ F/B = _____ V = ____
7. Laboratory Mounting:

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made: _____

_____

10. Other tests performed (such as fragility test, including results): _____

_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: N/A

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [X] 3D [ ] 2D [ ] 1D

[X] Finite Element [ ] Beam [ ] Closed Form Solution

4. [X] Computer Codes: Stardyne

Frequency Range and No. of modes considered: Complete range/15 modes

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [X] SRSS
[ ]Other: (specify)

6. Damping: 2% for OBE, 5% for SSE Basis for the damping used: SP-702

7. Support Considerations in the model: Fixed translationally & rotationally

8. Critical Structural Elements:

A. Identification — Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowat
Beam No. 115	Static + Seismic		2.3k	32.4k

B. Max. Deflection	Location	Effect Upon Functional Operability
.0314"	Node 63	Negligible

Qualification Summary of Equipment

I. Plant Name: Virgil C. Summer Nuclear Station Unit 1 Type:

1. Utility: SCE&G PWR X

2. NSSS: Westinghouse 3. A/E: G/C BWR

II. Component Name Radiation Monitoring System Panel (XCP6200)

1. Scope: [ ] NSSS [X] BOP

2. Model Number: N/A Quantity: 1

3. Vendor: Nuclear Measurement Corp.

4. If the component is a cabinet or panel, name and model No. of the devices included: Ratemeters CRM-71 - CRM-74 & GA-3M, Beta Annunciator 1221AH, Relays B&B KUP14A15 & KUP14D15, Recorders Westronics MHE and Westinghouse Optimac 17450 Series, Miscellaneous Switches.

5. Physical Description a. Appearance Self-standing panel

b. Dimensions Length 110,5", Height 90,68", Deep 30"

c. Weight 3600 lbs. (approx.)

6. Location: Building: Control Building

Elevation: 463'-0"

7. Field Mounting Conditions [ ] Bolt (No.____, Size____)
[X] Weld (Length 2")
[ ] _____

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

S/S: 8Hz F/B: 9Hz V: None

9. a. Functional Description: Panel containing radiation monitoring instruments

b. Is the equipment required for [X] Hot Standby [ ] Cold Shutdown

[ ] Both

10. Pertinent Reference Design Specifications:

SP-618-044461-000

SP-702-4461-00

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: Test

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Wyle Lab. Report 44073-1
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[x]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of_____
6. Method of combining RRS: [X] Absolute Sum [ ] SRSS [ ]_____
(other, specify)
2. Required Response Spectra (attach the graphs): 26X, 26Y & 26V
3. Required Acceleration in Each Direction:
S/S = .508 of ZPA F/B = .566 of ZPA V = .262 of ZPA

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [x] Multi-Frequency: [x] random [ ] sine beat [ ]_____
2. [ ] Single Axis [x] Multi-Axis
3. No. of Qualification Tests: OBE 5 SSE 1 Other_____
(specify)
4. Frequency Range: 1 to 35Hz
5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs) [ ] No
6. Input g-level Test at S/S = 2.3 g ZPA F/B = 2.5 g ZPA V = 1.1 g ZPA
7. Laboratory Mounting:
1. [ ] Bolt (No.____, Size____) [X] Weld (Length 2") [ ]_____
8. Functional operability verified: [x] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made: The test demonstrated the functional operability of the instrumentation.
10. Other tests performed (such as fragility test, including results): None

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection	Location	Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: South Carolina Electric & Gas Co. PWR - X
2. NSSS: W 3. A/E: Gilbert Assoc. BWR

II. Component Name: Class 1E Pressure & Differential Pressure Transmitters

1. Scope: [X] NSSS [ ] BOP
2. Model Number: Propriartary Information. To be provided under separate letter. cover Quantity: Many
3. Vendor: ITT/Barton
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description a. Appearance rectangular/cylindrical shaped transmitter
   b. Dimensions 7 1/2" x 7 13/16" x 6.1/2"
   c. Weight 21 lbs.
6. Location: Building: [*]
   Elevation: [*]
7. Field Mounting Conditions [X] Bolt* (No. 4, Size 5/16")
   [ ] Weld (Length)
   [ ]
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertica
   S/S: N/A F/B: N/A V: N/A
9. a. ~~Functional Description~~: Measures process conditions
   b. ~~Is the equipment~~ required for [ ] Hot Standby [ ] Cold Shutd
   NOTE: Used for a variety of functions [ ] Both
10. ~~Pertinent~~ Reference Design Specifications:
    P. O. # 54-274770

[*] Defined in Table 3.11-0 of FSAR. Note that in this Table the model number is proprietary and must be furnished to the NRC under proprietary information agreement by SCE&G.

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by NS-TMA-2184, 12/21/79, Westinghouse to U.S. NRC
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered: 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of_____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ] N/A
(other, specify)

2. Required Response Spectra (attach the graphs): ★

3. Required Acceleration in Each Direction:

S/S = ★ F/B = ★ V = ★

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [X] random [ ] sine beat [ ]_____

2. [ ] Single Axis [X] Multi-Axis

3. No. of Qualification Tests: OBE 5 SSE 12 Other_____
(specify)

4. Frequency Range: 1 - 35 Hz

5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs [ ] No

6. Input g-level Test at S/S = N/A F/B = N/A V = N/A

7. Laboratory Mounting:

1. [ ] Bolt (No. 4, Size 5/16") [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: Acceptable - see report ★

10. Other tests performed (such as fragility test, including results): _____

76N-31730

★ Letter NS-TMA-2184 dated December 21, 1979 to USNRC.

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete: This section is not applicable.

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

A.

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

B.

Max. Deflection	Location	Effect Upon Functional Operability

Qualification Summary of Equipment

Plant Name: V. C. Summer Nuclear Station

Type:
PWR - X
BWR

1. Utility: South Carolina Electric & Gas Co.
2. NSSS: W 3. A/E: Gilbert Assoc.

Component Name: Pressure & Differential Pressure Transmitters

1. Scope: [X] NSSS [ ] BOP
2. Model Number: Propriatary Information. To be provided under separate cover letter. Quantity: Many
3. Vendor: ITT/Barton
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description a. Appearance rectangular/cylindrical shaped transmitters
   b. Dimensions 5 11/16" x 12 5/16" x 7 3/4"
   c. Weight 14 lbs.
6. Location: Building: [*]
   Elevation: [*]
7. Field Mounting Conditions [X] Bolt (No. 4, Size 5/16")
   [ ] Weld (Length)
   [ ]
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical)
   S/S: N/A F/B: N/A V: N/A
9. a. ~~Functional Description~~: Measures Process Conditions
   b. ~~Is the equipment~~ required for [ ] Hot Standby [ ] Cold Shutdown
   NOTE: Used for a variety of functions [ ] Both
10. ~~Pertinent~~ Reference Design Specifications:
    P.O. # 54-285481

[*] Defined in Table 3.11-0 of FSAR. Note that on this Table the model number is proprietary and must be furnished to the NRC under a proprietary information agreement.

II. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

V. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by NS - WCAP-8687 Supp. 2
(name of Company or Laboratory & Report No.)

. Vibration Input:

1. Loads considered: 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of_____
6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ] N/A (other, specify)
2. Required Response Spectra (attach the graphs): [*]
3. Required Acceleration in Each Direction:
S/S = [*] F/B = [*] V = [*]

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [ ] random [ ] sine beat [ ]_____
2. [ ] Single Axis [X] Multi-Axis
3. No. of Qualification Tests: OBE 5 SSE 12 Other_____ (specify)
4. Frequency Range: 1 - 35 Hz
5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs) [ ] No
6. Input g-level Test at S/S = N/A F/B = N/A V = N/A
7. Laboratory Mounting:
1. [X] Bolt (No. 4, Size 5/16") [ ] Weld (Length____) [ ]_____
8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made: [*]

_____

. . . . . such as fragility test, including results): _____
None

[*] SEE WCAP-8687 Supplement 2

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete: This section is not applicable.

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

A.

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

B.

Max. Deflection	Location	Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: SCE&G — PWR X
2. NSSS: Westinghouse 3. A/E: GAI — BWR

II. Component Name: PAM Indicators

1. Scope: [X] NSSS [ ] BOP
2. Model Number: 1151 - 1152 Quantity: 31
3. Vendor: International Instrument
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description a. Appearance later
   b. Dimensions later
   c. Weight later
6. Location: Building: Control Building
   Elevation: 463'
7. Field Mounting Conditions [X] Bolt (No. later, Size later)
   [ ] Weld (Length)
   [ ]
8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertic
   S/S: later F/B: later V: later
9. a. Functional Description: Display process conditions on main control board for post accident conditions.
   b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutd
   [ ] Both Used for a variety of functions
10. Pertinent Reference Design Specifications: later

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Westinghouse
(name of Company or Laboratory & Report No

V. Vibration Input: Later

1. Loads considered: 1.[ ]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of_____
6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)
2. Required Response Spectra (attach the graphs):_____
3. Required Acceleration in Each Direction:
S/S =_____ F/B =_____ V =_____

VI. If Qualification by Test, then Complete: Later

1. [ ] Single Frequency [ ] Multi-Frequency: [ ] random [ ] sine beat [ ]_____
2. [ ] Single Axis [ ] Multi-Axis
3. No. of Qualification Tests: OBE_____ SSE_____ Other_____
(specify)
4. Frequency Range:_____
5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs
[ ] No
6. Input g-level Test at S/S = _____ F/B = _____ V = ____
7. Laboratory Mounting:
1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____
8. Functional operability verified: [ ] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made:_____
_____
10. Other tests performed (such as fragility test, including results):_____
_____

VII. If Qualification by Analysis or by the Combination of Test and Analysis, ther Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Soluti

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ]Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Deflection Location Effect Upon Functional Operability

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

PWR X

BWR

1. Utility: South Carolina Electric & Gas Co.

2. NSSS: W 3. A/E: Gilbert Assoc.

II. Component Name: 1450 Ft^3 Accumulator Tank

1. Scope: [X] NSSS [ ] BOP

2. Model Number: --- Quantity: 3

3. Vendor: Delta Southern

4. If the component is a cabinet or panel, name and model No. of the devices included: N/A

5. Physical Description a. Appearance Vertical Tank on Skirt Support

b. Dimensions 138" O.D.

c. Weight 152k (flooded); 54k (empty). Full flooded weight is used in stress calculations for conservatism.

6. Location: Building: Reactor Building

Elevation: 412 ft.

7. Field Mounting Conditions [X] Bolt (No. 28, Size 2 1/4") [*]
[ ] Weld (Length)
[ ]

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical

S/S: 20.3 Hz F/B: 20.3 Hz V: 67. Hz

9. a. ~~Functional Description~~: Provides emergency core cooling water in case of primary system depressurization.

b. ~~Is the equipment~~ required for [X] Hot Standby [ ] Cold Shutd
[ ] Both

10. ~~Pertinent~~ Reference Design Specifications: E-Spec 679065 Rev. 3

[*] Assumed based on supplied bolt hold diameter of 2 1/2". Anchor bolts are supplied by A/E. This item should be verified by Gilbert.

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: Performed by W (see note)

Note: Original analysis performed by vendor. Subsequently, frequency testing was performed on similar accumulator at Diablo Canyon site to verify mathematical modeling techniques.

Analysis: Prepared by Delta Southern (see note)

Combination of Test and Analysis: X

Summary of Results is attached.

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

V. Vibration Input:

1. Loads considered: 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only

4.[ ] Other (Specify)_____ 5.[ ] Combination of_____

*6. Method of combining RRS: [X] Absolute Sum [ ] SRSS [ ]_____
(other, specify)

2. Required Response Spectra (attach the graphs): Gilbert letter #CGGS-1174

3. Required Acceleration in Each Direction: (for DBE)

S/S = 0.45 'g' F/B = 0.45 'g' V = 0.45 'g'

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [ ] random [ ] sine beat [ ]_____

2. [X] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE_____ SSE_____ Other (1) low amplitude
(specify)

4. Frequency Range: 10 Hz - 40 Hz

5. TRS enveloping RRS using Multi-Frequency Test [ ] Yes (Plot TRS on RRS graphs) N/A [ ] No

6. Input g-level Test at S/S = .02 'g' F/B = N/A V = ____

7. Laboratory Mounting: insitu test

1. [ ] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [ ] Yes [ ] No [X] Not Applicable

9. Test Results including modifications made: verification of modeling techniques

10. Other tests performed (such as fragility test, including results):_____

*Absolute sum method was used for original 2-D qualification. For subsequent 3-D qualification, responses from 3 direction accelerations were combined by the SRSS method.

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: Frequency test on SIS accumulator concluded that modeling techniques used by Westinghouse accurately predict equipment dynamic response.

2. Method of Analysis:

[ ] Static Analysis [X] Equivalent Static Analysis

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

3. Model Type: [X] 3D [ ] 2D [ ] 1D

[X] Finite Element [ ] Beam [ ] Closed Form Solution

see Attachment for clarifying explanations

4. [X] Computer Codes: WECAN

Frequency Range and No. of modes considered: all

[X] Hand Calculations

5. Method of Combining Dynamic Responses: [X] Absolute Sum [ ] SRSS
[ ] Other: (specify)

6. Damping: 1% - 2% Basis for the damping used: Reg. Guide 1.6. (Consistant wi CGE FSAR)

7. Support Considerations in the model: skirt rigidly attached to concrete foundation with anchor bolts

8. Critical Structural Elements: skirt support, vessel shell, bolts, base plate

A.

Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowabl
	Vessel skirt at junction with base plate	seismic (DBE)	not avail.	5.816K	12.20 K
	Concrete			357 psi	750 psi
	Baseplate			23.1 ksi	28.8 k
	Anchor bolts tension;			11.0 ksi	27.3 k
	shear;			4.7 ksi	14.4 k

B.

Max. Deflection	Location	Effect Upon Functional Operability
0.045"	top of vessel	none

TITLE CGE				PAGE
PROJECT	AUTHOR DATE	CHK'D. BY DATE	CHK'D. BY DATE	
S.O.	CALC. NO.	FILE NO.	GROUP	

Clarifications

VII

2. 2-D Static analysis was performed by vendor using umbrella 'g' loads of 1.5 'g' horizontal and 1.0 'g' vertical, for DBE.
   Subsequently, modal analysis was performed by W to obtain equipment frequencies and actual plant 'g' loads from the FRS. These are given in V.3.

   Later, CGE was changed to a 3-D plant. The actual plant 'g' loads remain the same.

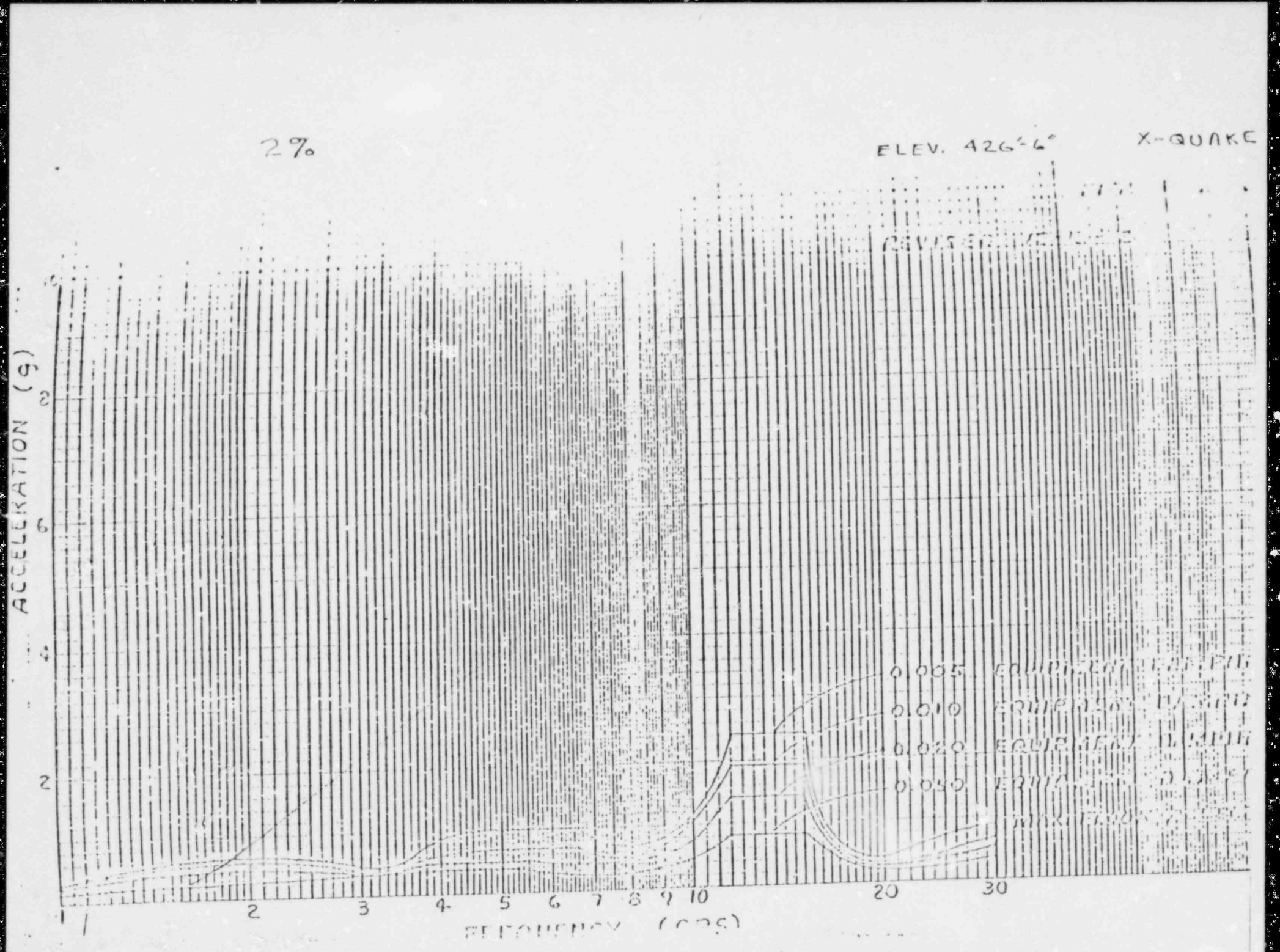
3. W modal analysis model is a 3-D, finite element model composed of beams, masses and pipe elements.

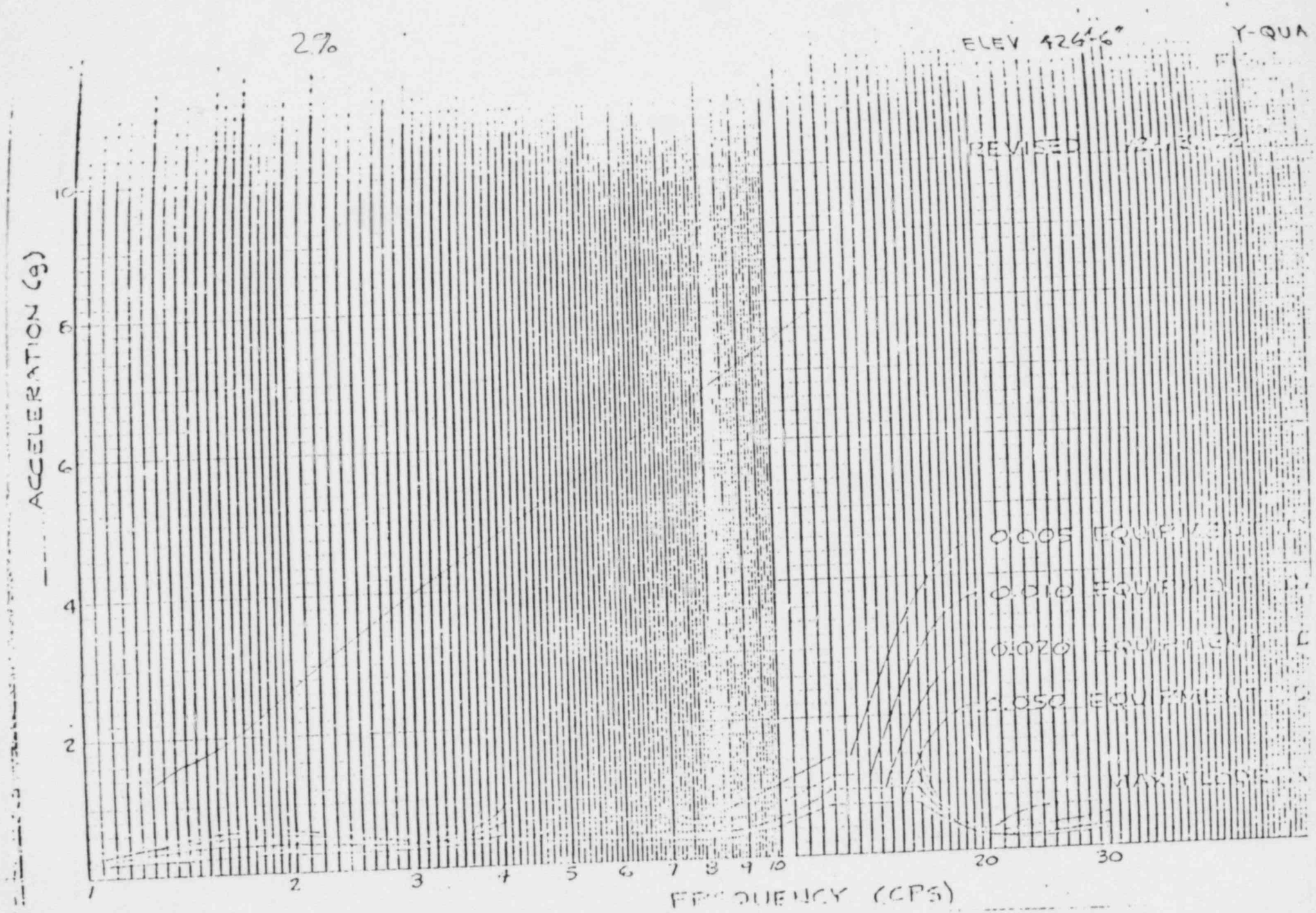
4. W modal analysis utilized the WECAN computer code. All modes are calculated however only the first mode is used to obtain g's from the FRS, because accumulator response is dominated by 1st mode. Vendor calculations (static analysis) are hand calculations.

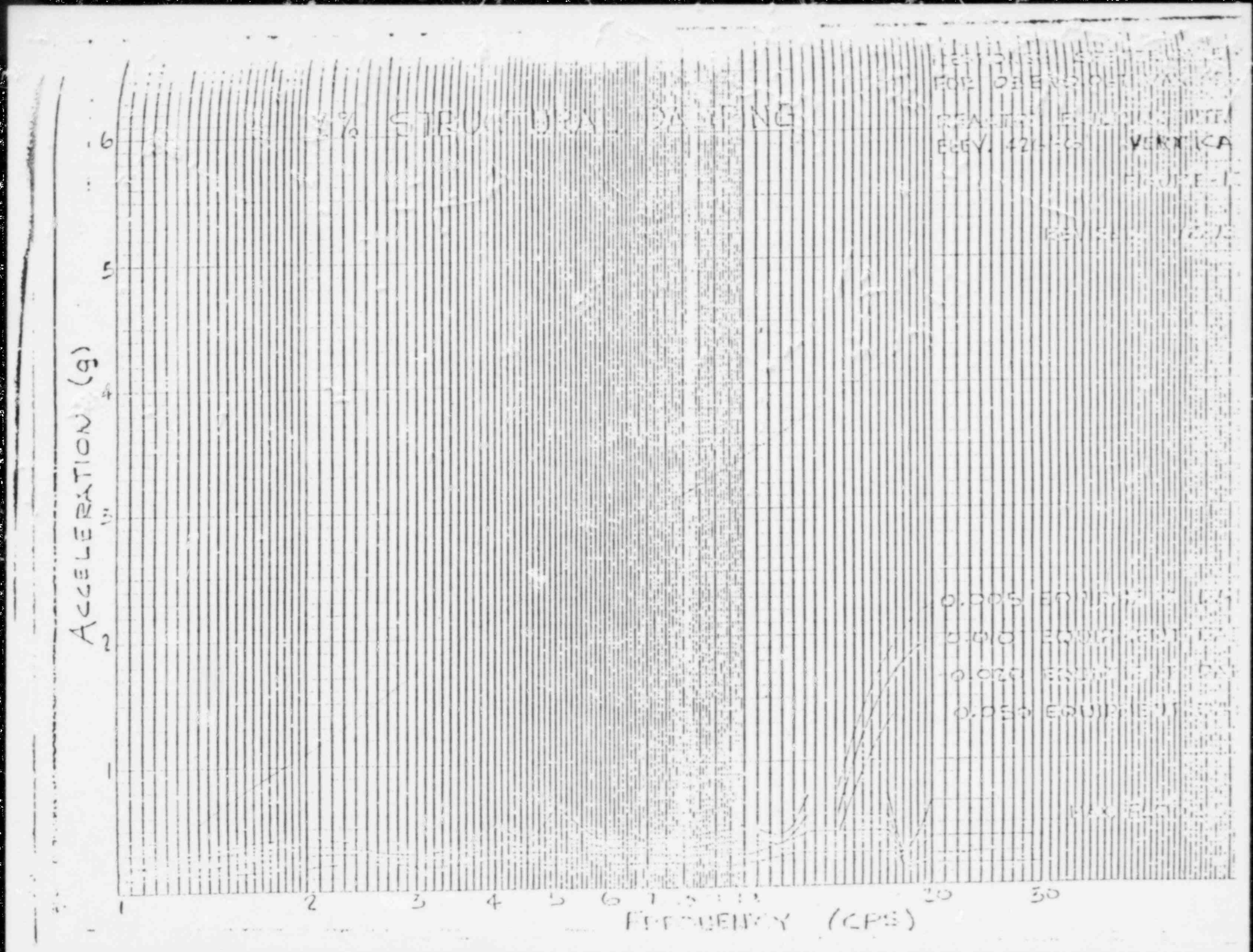
5. Supplementary dynamic seismic analysis performed by W (not a requirement) used the absolute sum method

B. Stresses from vendor calculations. Deflection from supplementary W analysis.

REV. NO.	REV. DATE	AUTHOR DATE	CHK'D. BY DATE	CHK'D. BY DATE


2%
ELEV. 426'-6"
X-QUAKE
ACCELERATION (g)
2
5
4
2
1
2
3
4
5
6
7
8
9
10
20
30
0.005
0.010
0.020
0.050


2%
ELEV 424'-6"
Y-QUA
REVISED
0.005
0.010
0.020
0.050
ACCELERATION (g)
FREQUENCY (CPS)
1
2
3
4
5
6
7
8
9
10
20
30


ACCELERATION (g)
FREQUENCY (CPS)
1
2
3
4
5
6
10
20
30

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station

Type:

1. Utility: SCE&G

PWR X

2. NSSS: Westinghouse 3. A/E: GAI

BWR

II. Component Name Diesel Generator Electrical and Air Starting Controls

1. Scope: [ ] NSSS [x] BOP

2. Model Number: N/A Quantity: 2 sets

3. Vendor: Colt Industries

4. If the component is a cabinet or panel, name and model No. of the devices included: Gen. Neutral Trans. Box, Cont. Relay and Term. Box, Ckt. Bkr. Box, Mtr. Str. Box, DC Aux. Fuel Pump Starter, Main Air Valve Air Start Solenoid Valve, Air Start Distributor, Bearing Gear Int. Valve, Main Governor

5. Physical Description a. Appearance Several Panels & Misc. Components

b. Dimensions Varies

c. Weight Varies

6. Location: Building: Diesel Generator

Elevation: 436'

7. Field Mounting Conditions [x] Bolt (No. Varies, Size Varies)
[ ] Weld (Length)
[ ]

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

S/S: Not Determined F/B: V:

9. a. Functional Description: Controls starting and running of Engine for diesel generator set

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutdown
[x] Both

10. Pertinent Reference Design Specifications: SP-546

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: X

Analysis: _____

Combination of Test and Analysis: _____

Test and/or Analysis by Wyle Laboratories, 43501-1
(name of Company or Laboratory & Report No.)

V. Vibration Input:

1. Loads considered:1.[X]Seismic only 2.[ ]Hydrodynamic only 3.[ ]Explosive only

4.[ ] Other (Specify)_____5.[ ] Combination of_____

6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____
(other, specify)

2. Required Response Spectra (attach the graphs): 3IX, Y, V

3. Required Acceleration in Each Direction: (SSE ZPA)

S/S = 0.775 g F/B = 0.775 g V = 0.180 g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [X] random [ ] sine beat [ ]_____

2. [ ] Single Axis [ ] Multi-Axis

3. No. of Qualification Tests: OBE 5 S/S 5 F/B SSE 1 S/S 1 F/B Other 2 <OBE; 1 <DBE
(specify)

4. Frequency Range:_____

5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graphs [ ] No

6. Input g-level Test at(ZPA) S/S = 2.1 g F/B = 2.0 g V = 0.5 g

7. Laboratory Mounting:

1. [X] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable

9. Test Results including modifications made: Components operated properly and no degredation or damage occurred.

10. Other tests performed (such as fragility test, including results): None

VII. If Qualification by Analysis or by the Combination of Test and Analysis, then Complete:

1. Description of Test including Results: _____

_____

_____

2. Method of Analysis:

[ ] Static Analysis [ ] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [ ] Closed Form Solution

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[ ] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
[ ] Other: _____ (specify)

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

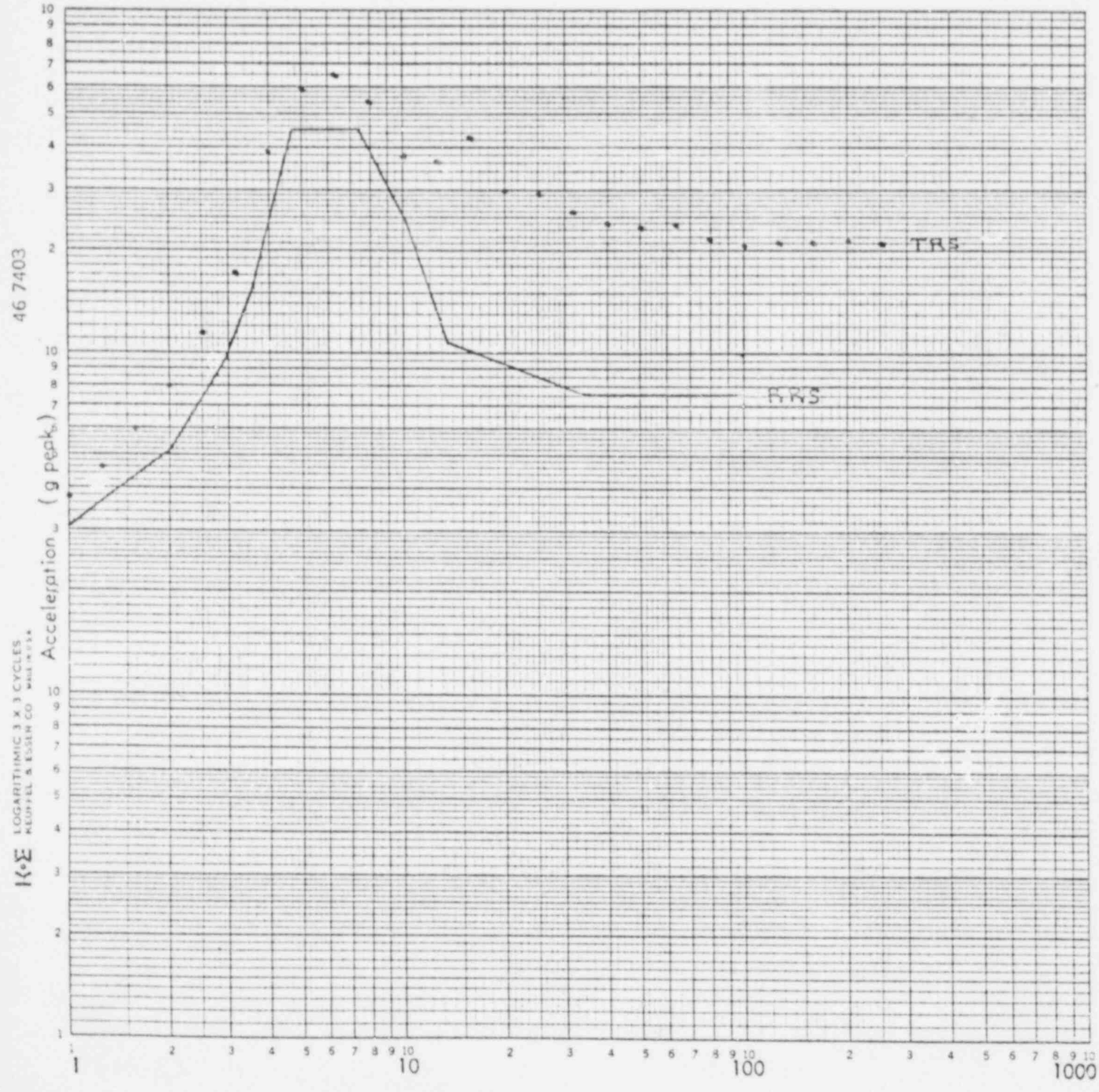
A. Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowab

B. Max. Deflection	Location	Effect Upon Functional Operability

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☒ 100 ☐ 1000 ☐

DAMPING 5%



AXIS No. 1

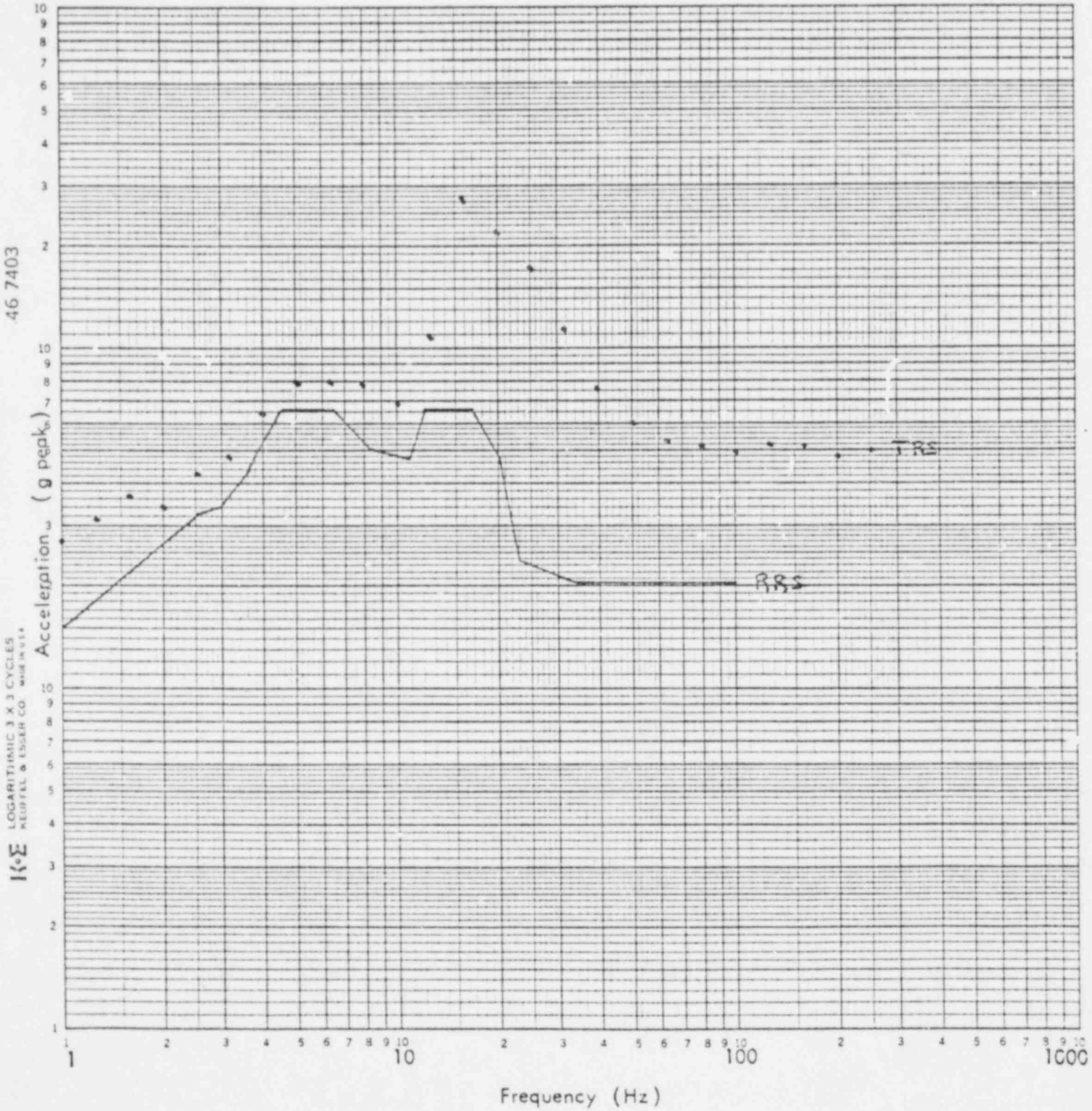
LOCATION NO. HCA

TEST RUN NO. 9

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☑ 100 ☐ 1000 ☐

DAMPING [5 %]



AXIS No. 1

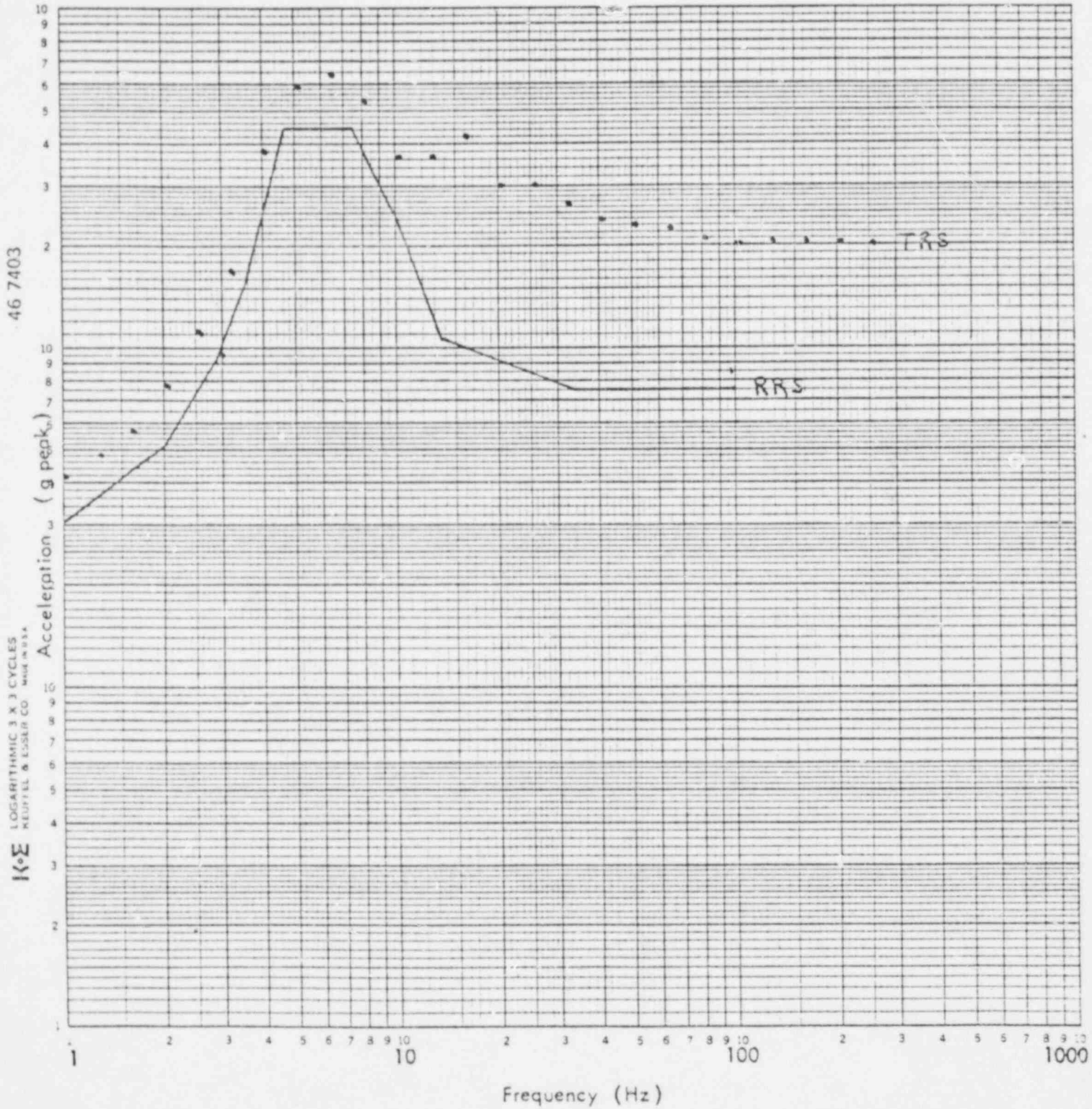
LOCATION NO. VCP

TEST RUN NO. 9

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☒ 100 ☐ 1000 ☐

DAMPING [5 %]



AXIS No. 2

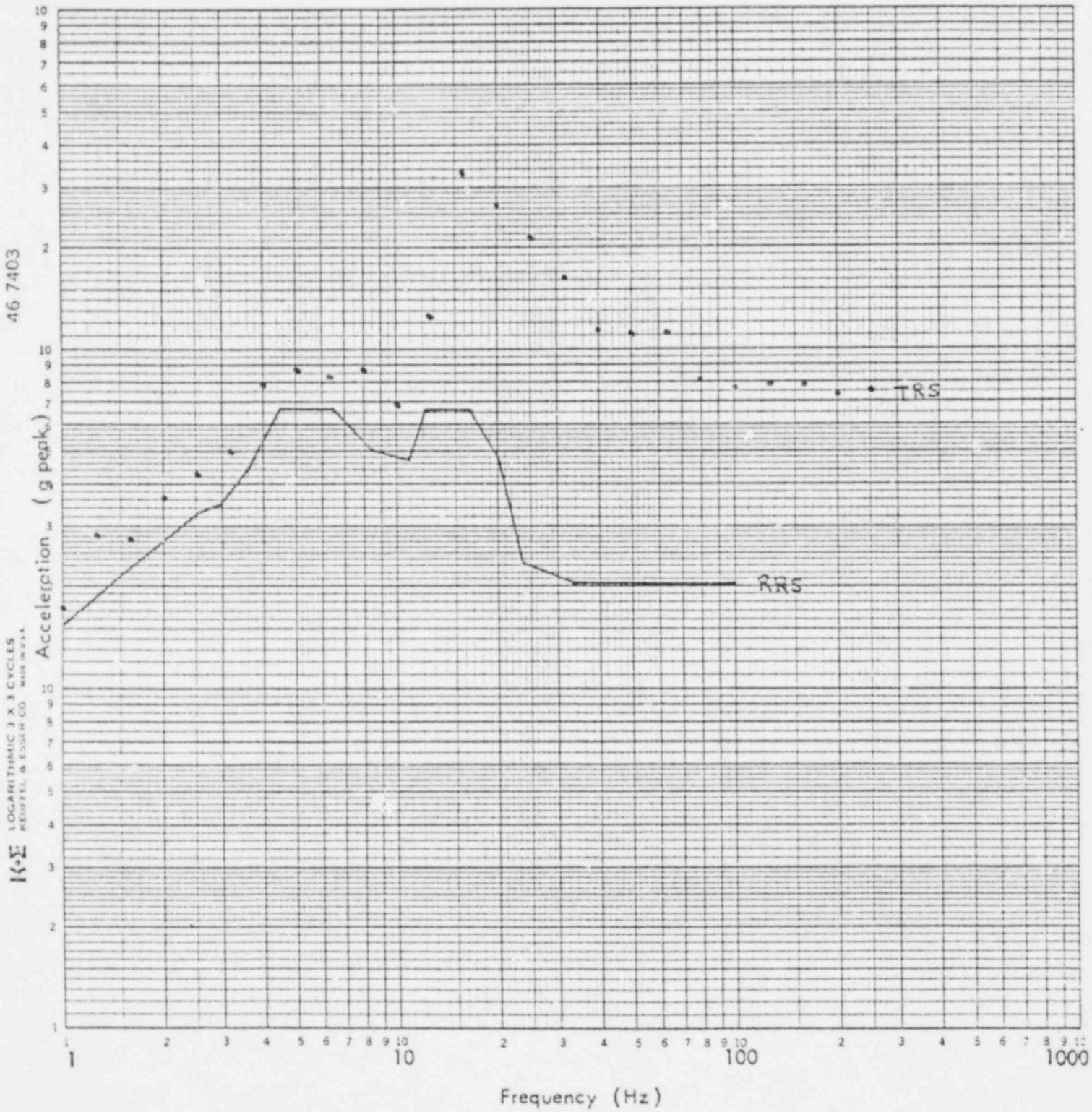
LOCATION NO. HCA

TEST RUN NO. 16

FULL SCALE SHOCK SPECTRUM (g Peak)

1.0 ☐ 10 ☒ 100 ☐ 1000 ☐

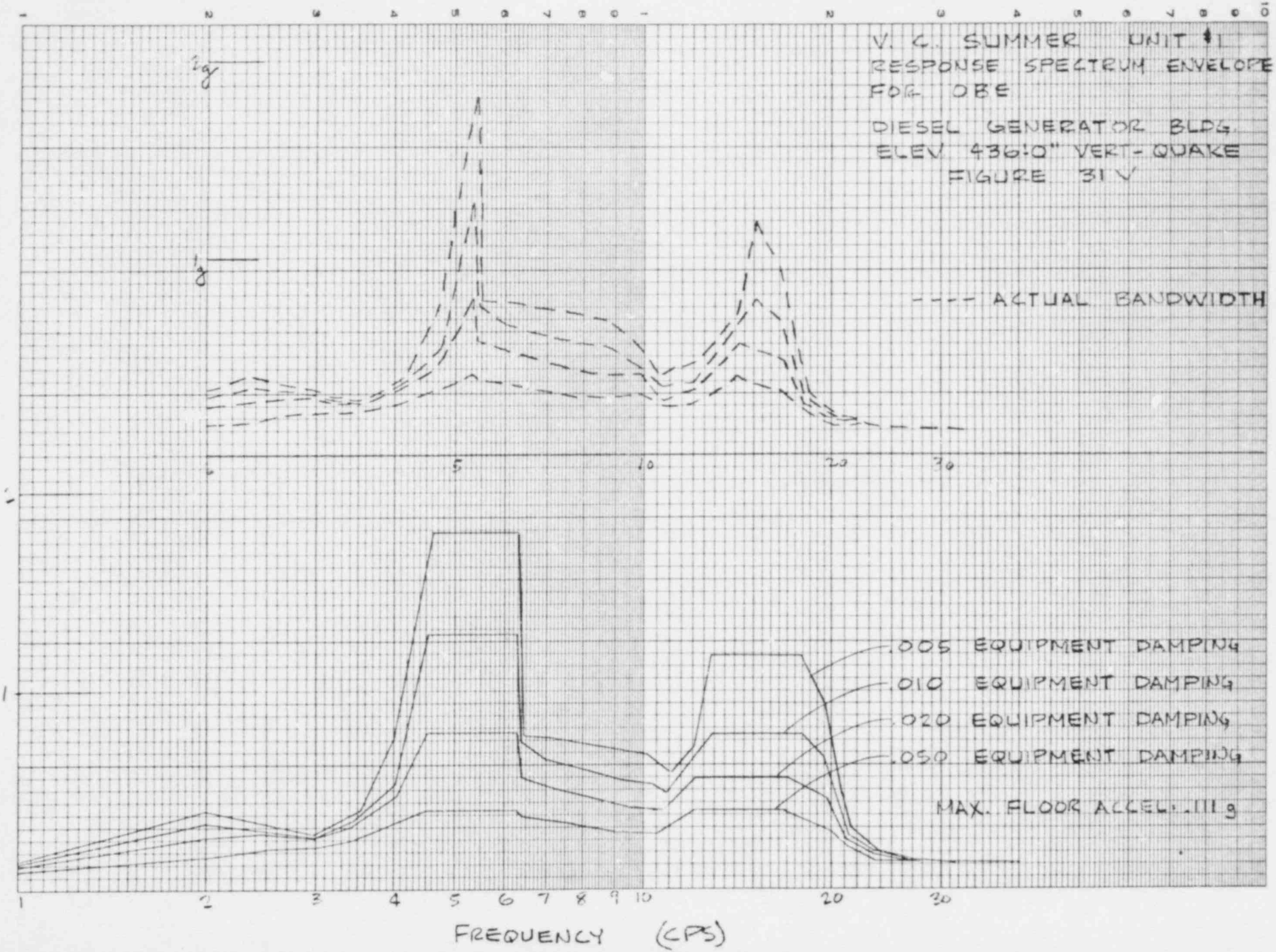
DAMPING [5 %]

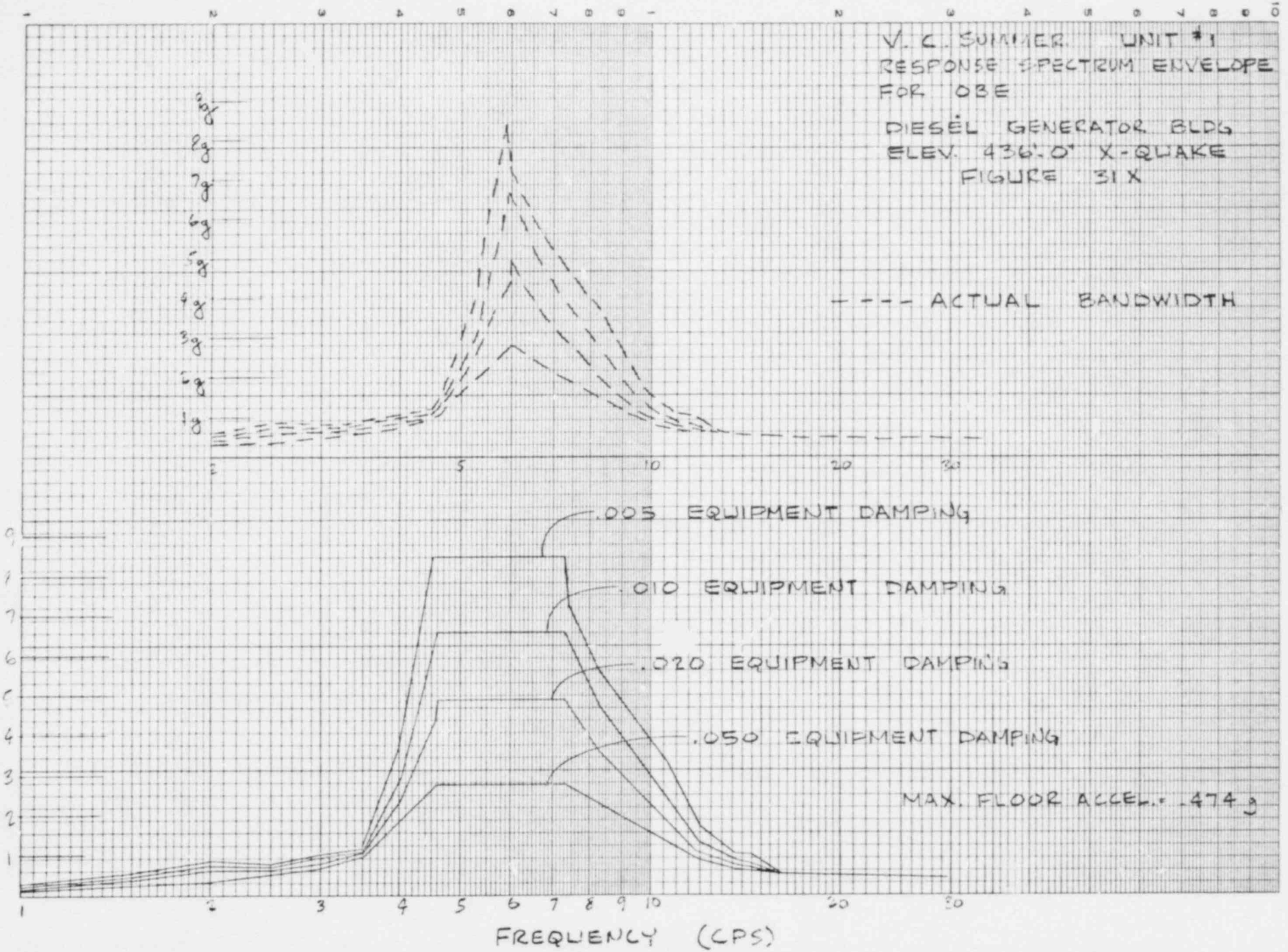


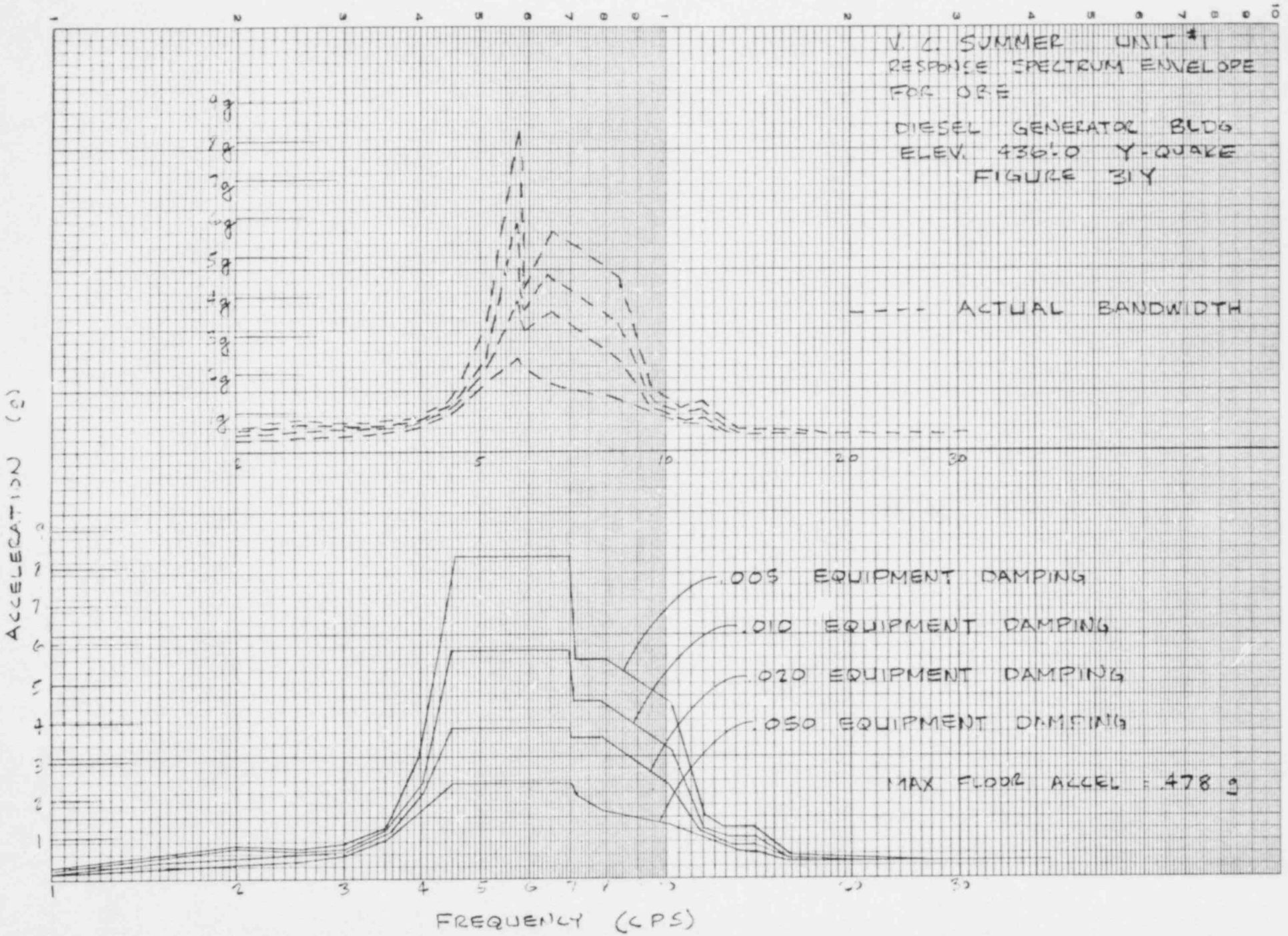
AXIS No. 2

LOCATION NO. VCA

TEST RUN NO. 16


V. C. SUMMER UNIT #1
RESPONSE SPECTRUM ENVELOPE
FOR OBE
DIESEL GENERATOR BLDG.
ELEV. 436'-0" VERT. QUAKE
FIGURE 31 V
2g
1g
---- ACTUAL BANDWIDTH
.005 EQUIPMENT DAMPING
.010 EQUIPMENT DAMPING
.020 EQUIPMENT DAMPING
.050 EQUIPMENT DAMPING
MAX. FLOOR ACCEL. .111 g
ACCELERATION (g)
FREQUENCY (CPS)


V. C. SUMMER UNIT #1
RESPONSE SPECTRUM ENVELOPE
FOR OBE
DIESEL GENERATOR BLDG
ELEV. 436.0' X-QUAKE
FIGURE 3.7-X
---- ACTUAL BANDWIDTH
.005 EQUIPMENT DAMPING
.010 EQUIPMENT DAMPING
.020 EQUIPMENT DAMPING
.050 EQUIPMENT DAMPING
MAX. FLOOR ACCEL. = .474 g
ACCELERATION (g)
FREQUENCY (CPS)


V. C. SUMMER UNIT #1
RESPONSE SPECTRUM ENVELOPE
FOR OBE
DIESEL GENERATOR BLDG
ELEV. 436'-0" Y-QUAKE
FIGURE 3.7-Y
ACTUAL BANDWIDTH
.005 EQUIPMENT DAMPING
.010 EQUIPMENT DAMPING
.020 EQUIPMENT DAMPING
.050 EQUIPMENT DAMPING
MAX FLOOR ACCEL = .478 g
ACCELERATION (g)
FREQUENCY (CPS)

Qualification Summary of Equipment

I. Plant Name: V. C. Summer Nuclear Station Type:

1. Utility: SCE&G PWR - X

2. NSSS: Westinghouse 3. A/E: GAI BWR

II. Component Name Low Voltage Power - Control- Inst. Electrical Penetrations and Misc. Connections

1. Scope: [ ] NSSS [X] BOP

2. Model Number: R31C5004G (LVP.)M01 (LVC.)M09 Module Type: (Insc.) M10 Quantity: 40

3. Vendor: D. G. O'Brien, Inc.

4. If the component is a cabinet or panel, name and model No. of the devices included:

N/A

5. Physical Description a. Appearance Cylindrical - Modular

b. Dimensions 18" Length, 19" Diameter

c. Weight 265 Lbs.

6. Location: Building: Reactor Building

Elevation: 473', 469", 441', 425'

7. Field Mounting Conditions [X] Bolt (No.____, Size____)
[ ] Weld (Length____)
[ ] _____

8. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertic

S/S: 7.25HZ. F/B: 20.5HZ. V: 25HZ.

9. a. Functional Description: Allow passage of one or more electrical circuits through a single opening of the containment pressure barrier, while maintianing the integrity of the barrier.

b. Is the equipment required for [ ] Hot Standby [ ] Cold Shutd

[X] Both

10. Pertinent Reference Design Specifications: GAI Spec. 559,

D.G.O. Report ER-252 App.K, GAI Spec. - 702.

III. Is Equipment Available for Inspection in the Plant: [X] Yes [ ] No

IV. Equipment Qualification Method: Test: _____

Analysis: _____

Combination of Test and Analysis: X

Test and/or Analysis by Action Environmental Testing Corp. Supplemental Report No. 11180
(name of Company or Laboratory & Report N

V. Vibration Input:

1. Loads considered: 1.[X] Seismic only 2.[ ] Hydrodynamic only 3.[ ] Explosive only
4.[ ] Other (Specify)_____ 5.[ ] Combination of_____
6. Method of combining RRS: [ ] Absolute Sum [ ] SRSS [ ]_____ (other, specify)
2. Required Response Spectra (attach the graphs): GAI Spec. 702 Fig. 9x, 9y, 9v
3. Required Acceleration in Each Direction: (SSE ZPA) 1.50X08E

S/S = 1.5X.243=.364g F/B = 1.5X.242=.363g V = 1.5X.220=.330g

VI. If Qualification by Test, then Complete:

1. [ ] Single Frequency [X] Multi-Frequency: [X] random [ ] sine beat [ ]_____
2. [ ] Single Axis [X] Multi-Axis
3. No. of Qualification Tests: OBE_____ SSE 10 each direction Other_____ (specify)
4. Frequency Range: 0.5 - 55HZ
5. TRS enveloping RRS using Multi-Frequency Test [X] Yes (Plot TRS on RRS graph [ ] No
6. Input g-level Test at S/S = _____ F/B = _____ V = _____
7. Laboratory Mounting:

1. [X] Bolt (No.____, Size____) [ ] Weld (Length____) [ ]_____

8. Functional operability verified: [X] Yes [ ] No [ ] Not Applicable
9. Test Results including modifications made: There was no evidence of mechanical damage or deterioration of the tested units as a result of the sine or random Seismic vibration tests performed.
10. Other tests performed (such as fragility test, including results): N/A

VII. If Qualification by Analysis or by the Combination of Test and Analysis, the Complete:

1. Description of Test including Results: Seismic tests were completed for Duke Powere Co. as part of D.G.O. Report ER-252 App. (K). An analysis to correlate the required respone spectra to the V. C. Summer penetration is included and will be formally presented in the final report. (D.G.O. Report ER-255) currently in process.

2. Method of Analysis:

[ ] Static Analysis [X] Equivalent Static Analysis

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

3. Model Type: [ ] 3D [ ] 2D [ ] 1D

[ ] Finite Element [ ] Beam [X] Closed Form Soluti

4. [ ] Computer Codes: _____

Frequency Range and No. of modes considered: _____

[X] Hand Calculations

5. Method of Combining Dynamic Responses: [ ] Absolute Sum [ ] SRSS
N/A [ ] Other: _____ (specify)

6. Damping: N/A Basis for the damping used: _____

7. Support Considerations in the model: N/A

8. Critical Structural Elements: N/A

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

B. Max. Deflection	Location	Effect Upon Functional Operability

ATTACHMENT #2

TABLE 1

SEISMIC QUALIFICATION OF BALANCE OF PLANT
MECHANICAL EQUIPMENT REQUIRED FOR SAFE SHUTDOWN

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualification	Description of Seismic Qualification[4]	Location	Installation Status % Completion
AH	XAA-1A,B; XAA-2A,B	Reactor Building Cooling Unit (4 Units)	a	1. Assembly - analysis	1. Lowest natural frequency determined to be 12.75 Hz. Dynamic multi-axis analysis, response spectrum input.	Reactor Building Above Elev. 463'-0"	100
				2. Damper - analysis	2. Natural frequency determined to be 25.32 Hz. Static multi-axis analysis.		
				3. Fan and motor - analysis	3. Natural frequency determined to be 57.47 Hz. Static multi-axis analysis.		
				4. Damper actuator - type test	4. Multiple frequency, multi-axes seismic test.		
				5. Limit switch - test	5. Single frequency, single axis test. (1 to 35 Hz no reasonance frequency determined in test range).		
AH	XAH-12A,B	Control Room Normal Supply Cooling Unit (2 Units)	a	1. Cabinet - analysis	1. Natural frequency determined to be 31 Hz. Dynamic multi-axis analysis.	Control Building Elev. 482'-0"	100
				2. Dampers - test	2. Multiple frequency, multi-axis test (1 to 40 Hz).		
				3. Cooling coil - analysis	3. Natural frequency determined to be 31.5 Hz. Static multi-axis analysis.		

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualification	Description of Seismic Qualification[4]	Location	Installation Status % Completion
				4. Fan - analysis	4. Natural frequency determined. Static multi-axis analysis. 5. Certificate of conformance with IEEE-344 furnished by motor vendor. Qualification report on file at vendor's office for audit. Vendor considers qualification report as proprietary.		
AH	XAH-13A,B	Relay Room Air Handling Unit (2 Units)	a	(5)	(5)	Control Building Elev. 482'-0"	100
AH	XFN-30A,B	Control Room Emergency Fan (2 Fans)	a	Analysis	Natural frequency determined to be 61.1 Hz. Static mutli-axis analysis.	Control Building Elev. 482-0"	100
AH	XFN-39A,B	Battery Room Exhaust Fan (2 Fans)	a	Analysis	Natural frequency determined to be 50.8 Hz. Static multi-axis analysis.	Intermediate Bldg. Elev. 423'-0"	100
AH	XFN-80A,B	Service Water Pumphouse Supply Fan (2 Fans)	a	Analysis	Natural frequency determined to be 56.8 Hz. Static multi-axis analysis.	Service Water Pumphouse Elev. 441'-0"	100
AH	XDP-12A,B; 13A,B;18A, B;19A,B;21A, B;22A,B;23A, B;24A,B;35A, B;39A,B;45; 72A,B;73A,B; 74A,B;88A,B; 89A,B;96,99A, B;100A,B;103A, B;106;112A,B; 113A,B;133A,B; 129	Pneumatic Actuated Dampers	a	Type test	Biaxial, multifrequency test, response spectrum input. Type tests included damper, actuator and limit switches and solenoid valves.	Auxiliary Building Elev. 412'-0" XDP-12 & 13 Control Building Elev. 482'-0" XDP-18,19,21,22,23,24 35,39,45,96,99,100 103,106,112,113, 129 & 133 Service Water Pumphouse Elev. 441'0" XDP-72,73 & 74 Intermediate Bldg. Elev. 412'-0" XDP-88 Intermediate Bldg. Elev. 412'-0" XDP-89	100 100 100 100

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualification	Description of Seismic Qualification[5]	Location	Installation Status % Completion
AH	XDP-152,153 & 155	Electric Motor Actuated Dampers for Battery Rooms A and B (4 Units)	a	Type test	Multiple frequency, multi-axis seismic test.	Intermediate Bldg. Elev. 412'-0"	100
BR	XTK-6A,B	Recycle Holdup Tanks	d	Analysis	Static, multi-axis analysis	Auxiliary Bldg. Above Elev. 412'-0"	100
CC	XPP-1A,B,C	Component Cooling Water Pump (3 pumps)	a	1. Pump and motor analyses	1. Natural frequency determined to be 36.5 Hz. Static multi-axis analysis.	Intermediate Bldg. Elev. 412'-0"	100
				2. Pump piping - test	2. Single sinusoidal test frequency, single axis input. Natural frequency is greater than 30 Hz.		
CC	XPP-58A,B,C	Component Cooling Booster Pumps	d	Analysis	Lowest natural frequency determined to be 54.1 Hz. Static multi-axis analysis.	Intermedite Bldg. Above Elev. 412'-0"	100
CC	XHE-2A,B	Component Cooling Water Heat Exchanger (2 heat exchangers)	a	Analysis	Lowest natural frequency determined to be 31.5 Hz. Static multi-axis analysis.	Intermediate Bldg. Elev. 412'-0"	100
CC	XTK-3	Component Cooling Water Surge Tank	d	Analysis	Lowest natural frequency determined to be 69.6 Hz. Static multi-axis analysis.	Auxiliary Bldg. Above Elev. 463'-0"	100
CO	XTK-8	Condensate Storage Tank	b	Analysis	Hydrodynamic frequency determined to be 0.252 Hz. Dynamic mult-axis analysis (TID-25021). Response spectrum input.	Adjacent to Water Treating Building at Grade	100
CS	XTK-12A,B	Boric Acid Tank (2 tanks)	a	Analysis	Hydrodynamic frequency determined to be 0.464 Hz. Dynamic multi-axis analysis (TID-25021) Response spectrum input.	Auxiliary Building Elev. 463'-0"	100

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualification	Description of Seismic Qualification[5]	Location	Installation Status % Completion
DG	XPP-4A,B; XPP-141A,B	Diesel Generator Fuel Oil Transfer Pump (4 pumps)	a	Analysis	Natural frequency determined to be 486 Hz. Static multi-axis analysis.	Diesel Generator Bldg. Elev. 427'-0"	100
DG	XTK-9A,B C,D	Diesel Generator Starting Air Skid (2 skids)	a	Analysis	Lowest skid natural frequency determined to be 20.7 Hz. Dynamic multi-axis analysis of starting air equipment.	Diesel Generator Bldg. Elev. 436'-0"	100
DG	XTK-20A,B	Diesel Generator Fuel Oil Day Tank (2 tanks)	a	Analysis	Hydrodynamic frequency determined to be 1.47 Hz. Dynamic multi-axis analysis (TID-7024). Static multi-axis analysis.	Diesel Generator Bldg. Elev. 436'-0"	100
DG	XTK-53A,B	Diesel Generator Fuel Oil Storage Tank (2 tanks)	a	Analysis	Static multi-axis analysis.	Adjacent to Diesel Generator Building Below Grade	100
DG	XEG-1A,B	Diesel Generators and Associated Equipment (2 units)	a	1. Diesel engine and mechanical equipment - analysis 2. Electrical and air starting controls - test	1. Dynamic multi-axis analysis. 2. Multiple frequency, multi-axis testing.	Diesel Generator Bldg. Elev. 436'-0" and 427'-0"	100
DG	XHD-13A,B C,D	Diesel Generator Air Intake Filter Silencer (4 Units)	a	Analysis	Natural frequency determined to be 67.1 Hz. Dynamic multi-axis analysis.	Diesel Generator Building Elev. 463'-0"	100
DG	XNA-7A,B	Diesel Generator Exhaust Muffler (2 mufflers)	a	Analysis	1. Lowest shell natural frequency determined to be 30 Hz. Static multi-axis analysis. 2. Internals lowest frequency determined to be 4.4 Hz. Dynamic multi-axis analysis.	Diesel Generator Bldg. Elev. 463'-0"	100

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualification	Description of Seismic Qualification[4]	Location	Installation Status % Completion
EF	XPP-8	Turbine Driven Emergency Feedwater Pump	b	1. Pump and Turbine - analysis	1. Natural frequency determined to be 64.7 Hz. Static multi-axis analysis.	Intermediate Building Elev. 412'-0"	100
				2. Pump and Turbine piping appurtenances - test	2. Single sinusoidal test frequency, single axis input. Natural frequency is greater than 30 Hz.		
EF	XPP-21A,B	Motor Driven Emergency Feedwater Pump (2 Pumps)	b	1. Pump - analysis	1. Natural frequency determined to be 47.6 Hz. Static multi-axis analysis.	Intermediate Building Elev. 412'-0"	100
				2. Pump piping appurtenances - test	2. Single sinusoidal test frequency, single axis input, natural frequency is greater than 30 Hz.		
EF	IFV-3531 IFV-3536 IFV-3541 IFV-3546 IFV-3551 IFV-3556	Control Valve (6 valves)	b	Analysis/Test	Static test of unbraced extended structure (valve bonnet, actuator, snubbers and appurtenances) resulted in natural frequency of 20 Hz (x-axis) and 21 Hz (y-axis). Multifrequency sweep resulted in choosing 19, 24, 26 and 30 Hz (x-z axis) and 19, 22 and 30 Hz (y-z axis) for sine beat test. Seismic test was biaxial. See also, Note 2.	Intermediate Building Elev. 423'-6"	100
FH	XCR-3	Fuel Handling Building Crane	d	Analysis	Dynamic multi-axis analysis.	Fuel Handling Bldg. Top of Crane Rail Elev. 494'-6"	100
FH	XCR-4	Reactor Building Crane	d	Analysis	Dynamic multi-axis analysis.	Reactor Building, Top of Crane Rail Elev. 552'-0"	100

TABLE 1 (Cont'd)

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualification	Description of Seismic Qualification[4]	Location	Installation Status % Completion
		Fuel Transfer Canal Gates					
FH	XNF-42	Spent Fuel Pool Gate	d	Analysis	Lowest natural frequency determined to be 160 Hz. Static multi-axis analysis.	Fuel Handling Bldg. Below Elev. 463'-0"	100
	XNF-43	Cask Loading Pit Gate	d				
FW	XVG-1611A, B,C	Main Feedwater Isolation Valves (3 Valves)	b	1. Valve and actuator - analysis	1. Natural frequency determined to be 57.48 Hz. Static seismic analysis. Natural frequencies in horizontal directions were 22 and 24 Hertz, no resonant frequencies found below 33 Hertz in vertical direction. Multifrequency and sine beat tests performed. Sine beat test performed at 22, 24, and 33 Hz.	Penetration Access Area Elev. 436'-0"	100
				2. Actuator-test	2. Multiple frequency, biaxial seismic test.		
MS	IPV-2000 IPV-2010 IPV-2020	Control Valve (3 Valves)	b	Analysis/Test	Static test of unbalanced extended structure (valve bonnet, actuator, snubbers and appurtenances) resulted in natural frequency of 23 Hz (x-axis) and 21 Hz (y-axis). Multifrequency sweep resulted in choosing 23, 27.5 and 29 Hz (x-z axis) and 21, 25 and 29 Hz (y-z axis) for sine beat test. Seismic test was biaxial. See also, Note 2.	Intermediate Building & Penetration Access Area Elev. 436'-0"	100

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualification	Description of Seismic Qualification[4]	Location	Installation Status % Completion
MS	IF-2030	Control Valve	b	Analysis/Test	Static test of unbalanced extended structure (valve bonnet, actuator, snubbers and appurtenances) resulted in natural frequency of 26 Hz (x-axis) and 25 Hz (y-axis). Multifrequency sweep resulted in choosing 23.5, 26, 29, 33.5 and 40 Hz (x-z axis) and 25,29, 33.5, and 40 Hz (y-z axis) for sine beat test. Seismic test was biaxial. See also Note 2.	Intermediate Building Elev. 412'-0"	100
MS	XVM-2801A B,C (3 valves)	Main Steam Isolation Valve	b	Analysis/Test	Natural frequency determined to be 58.2 Hz. Static multi-axis analysis. Static seismic load test.	Intermediate Building Elev. 436'-0"	100
MS	XVS-2806A through XVS-2806N & XVS-2806P (15 valves)	Main Steam Safety Valves	b	Test	Single frequency, single axis seismic test. Natural frequency determined to be 37-38 Hz.	Intermediate Building Elev. 436'-0"	100
MU	XPP-40A,B	Reactor Makeup Water Pumps	d	Analysis	Lowest natural frequency determined to be 31 Hz. Static multi-axis analysis.	Auxiliary Building Above Elev. 374'-0"	100
MU	XTK-39	Reactor Makeup Water Storage Tank	d	Analysis	Static multi-axis analysis.	Auxiliary Bldg. Above Elev. 412'-0"	100
SF	XHE-7A,B	Spent Fuel Pool Cooling Heat Exchangers	d	Analysis	Lowest natural frequency determined to be 116 Hz. Static multi-axis analysis.	Auxiliary Bldg. Above Elev. 388'-0"	100
SF	XPP-32A,B	Spent Fuel Cooling Pumps	d	Analysis	Lowest natural frequency determined to be 70.6 Hz. Static multi-axis analysis.	Auxiliary Bldg. Above Elev. 412'-0"	100

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualification	Description of Seismic Qualification[4]	Location	Installation Status % Completion
SF	XTK-25	Refueling Water Storage Tank	a	Analysis	Hydrodynamic frequency determined to be 0.275 Hz. Dynamic multi-axis analysis (TID-25021). Response spectrum input.	Auxiliary Building Elev. 412'-0"	100
SI	XSM-5A,B	RHR Isolation Valve Containers	d	Analysis	Lowest natural frequency determined to be 30 Hz. Static multi-axis analysis.	Auxiliary Bldg. Above Elev. 397'-0"	100
SP	XPP-38A,B	Reactor Bldg. Spray Pumps	d	Analysis	Lowest natural frequency determined to be 56.8 Hz. Static multi-axis analysis.	Auxiliary Bldg. Above Elev. 374'-0"	100
SP	XSM-4A,B	Containment Spray Isolation Valve Containers	d	Analysis	Lowest natural frequency determined to be greater than 30 Hz. Static multi-axis analysis.	Auxiliary Bldg. Above Elev. 397'-0"	100
SP	XTK-60	Sodium Hydroxide Storage Tank	d	Analysis	Lowest natural frequency determined to be 31.7 Hz. Static multi-axis analysis.	Auxiliary Bldg. Above Elev. 412'-0"	100
SS	XCE-1;2; 3A,B,C; 4;5;6;7	Nuclear Sampling Heat Exchangers	d	Analysis	Lowest natural frequency determined to be 90 Hz. Static multi-axis analysis.	Control Complex Above Elev. 425'-0"	100
SW	XPP-39A, B,C	Service Water Pump (3 Pumps)	a	Analysis	Natural frequency determined to be 14 Hz. Dynamic multi-axis analysis, response spectrum input.	Service Water Pump House Elev. 436'-0"	100
SW	XPP-45A,B	Service Water Booster Pump (2 pumps)	a	Analysis	Natural frequency determined to be 36.6 Hz. Static multi-axis analysis.	Intermediate Building Elev. 412'-0"	100

System[1]	Equipment Tag. No.	Description	Safe Shutdown Operation[3]	Method of Seismic Qualifi ation	Description of Seismic Qualification[4]	Location	Installation Status % Completion
SW	XRS-2A,B,C	Service Water System Traveling Water Screens	d	Analysis	Lowest natural frequency determined to be 6.24 Hz. Dynamic multi-axis analysis.	Service Water Pumphouse Elev. 436'-0"	100
VL	XAH-4A,B	RHR/Spray Pump Room Cooling Unit (2 units)	c	(5)	(5)	Auxiliary Building Elev. 385'-0"	100
VL	XAH-1A,B; XAH-2	Charging Pump Room Cooling Units (3 units)	a	(5)	(5)	Auxiliary Building Elev. 400'-0"	100
VL	XAH-11A,B	Emergency Feedwater Pump Area Cooling Unit (2 units)	b	(5)	(5)	Intermediate Building Elev. 423'-6"	100
VL	XAH-24A,B	Battery Room Air Handling Unit (2 units)	a	(5)	(5)	Intermediate Building Elev. 423'-0"	100
VL	XAH-9A,B	Service Water Booster Pump Area Cooling Unit (2 units)	a	(5)	(5)	Intermediate Building Elev. 426'-0"	100
VL	XAH-6, XAH-8	ESF Switchgear Room Cooling Unit (2 units)	a	(5)	(5)	Intermediate Building Elev. 451'-0"	100
VL	XAH-19A,B	Speed Switch Room Cooling Unit (2 units)	a	(5)	(5)	Intermediate Building Elev. 451'-0"	100
VU	XPP-48A,B C	HVAC Chilled Water Pump (3 pumps)	a	Analysis	Natural frequency determined to be 137 Hz. Static multi-axis analysis.	Intermediate Building Elev. 412'-0"	100
VU	XHX-1A,B, C	HVAC Mechanical Chillers (3 chillers)	a	Test	Multiple frequency, multi-axis test (1 to 40 Hz range).	Intermediate Building Elev. 412'-0"	100

System(1)	Equipment Tag. No.	Description	Safe Shutdown Operation(3)	Method of Seismic Qualification	Description of Seismic Qualification(4)	Location	Installation Status % Completion
		Power Actuated Valves (other than control valves and special valves listed above)	a	Analysis/Test	In general, valves (see FSAR Table 3.9-8) were seismically qualified by analysis. Natural frequency was determined and a static multi-axis analysis was performed. Selected valves and/or prototypes were tested by a static seismic load test or by a single frequency, single axis seismic test.	At all Seismic Category I buildings, at all elevations.	95

NOTES:

1. System:
   - AH - Air Handling (HVAC)
   - BR - Boron Recycle
   - CC - Component Cooling Water
   - CD - Condensate
   - CS - Chemical and Volume Control
   - DG - Diesel Generator Services
   - EF - Emergency Feedwater
   - FH - Fuel Handling
   - FW - Feedwater
   - MS - Main Steam
   - MU - Make-Up Water
   - RC - Reactor Coolant
   - RH - Residual Heat Removal
   - SF - Spent Fuel Cooling
   - SI - Safety Injection
   - SP - Containment Spray
   - SS - Sample System
   - SW - Service Water
   - VL - Local Ventilating and Cooling
   - VU - Chilled Water

2. Seismic analysis of each type of control valve. Prototype of each control valve type was seismically tested. Multiple frequency, multi-axis seismic test.

3. Equipment is required to maintain the plant in the following condition:

   a. Hot stand-by and cold shutdown
   b. Hot stand-by
   c. Cold shutdown
   d. Safety related, but not required for shutdown

4. Types of analysis:

   a. Static
   b. Equivalent static (also known as static coefficient analysis)
   c. Dynamic (also known as seismic modal analysis) input to analysis can be either response spectrum or time-history.

5. Qualified by similiarity to XAH-12A,B-AH which was seismically analyzed/tested. XAH-12A,B-AH is the "worst case" for seismic design.

TABLE 2

SEISMIC QUALIFICATION OF NUCLEAR STEAM SUPPLY SYSTEM
MECHANICAL EQUIPMENT REQUIRED FOR SAFE SHUTDOWN

System (1)	Equipment Tag. No.	Description	Safe Shutdown Operation (2)	Method of Seismic Qualification	Description of Seismic Qualification (3)	Location	Installation Status % Completion
CS	XPP-13A,B	Boric Acid Transfer Pump (2 pumps)	a	Analysis	Natural frequency determined greater than 30 Hz. Static multi-axis analysis.	Auxiliary Building Elev. 452'-0"	100
CS	XPP-43A,B C	Charging Pumps (3 pumps)	a	Analysis	Natural frequency determined greater than 30 Hz. Static multi-axis analysis.	Auxiliary Building Elev. 388'-0"	100
RC	XTK-24	Pressurizer Assembly	a	Analysis	Natural frequency determined. Dynamic multi-axis analysis.	Reactor Building Elev. 437'-6"	100
RC	XSG-2A, B,C	Steam Generator (3 units)	a	Analysis	Natural frequency determined. Dynamic multi-axis analysis.	Reactor Building Elev. 437'-6"	100
RH	XPP-31A,B	Residual Heat Removal Pump (2 pumps)	c	Analysis	Natural frequency determined greater 30 Hz. Static multi-axis analysis.	Auxiliary Building Elev. 374'-0"	100
RH	XHE-5A,B	Residual Heat Removal Heat Exchanger (2 heat exchangers)	c	Analysis	Natural frequency determined. Dynamic multi-axis analysis.	Auxiliary Building Elev. 412'-0"	100
SI	XTK-28A,B	Accumulator Tanks	d	Analysis	(Later)	Reactor Building Elev. 412'-0"	100
SI	XTK-27	Boron Injection Tank	d	Analysis	(Later)	Fuel Handling Building Elev. 412'-0"	100
SI	(Later)	ECCS Valves	d	Analysis/Test	In general, valves (See FSAR Table 3.4-8) were seismically qualified by analysis.	Reactor Building Elevs. 412'-0", 436'-0"	100

NOTES:

1. System:
   - AH - Air Handling (HVAC)
   - CC - Component Cooling Water
   - CD - Condensate
   - CS - Chemical and Volume Control
   - DG - Diesel Generator Services
   - EF - Emergency Feedwater
   - FW - Feedwater
   - MS - Main Steam
   - RC - Reactor Coolant
   - RH - Residual Heat Removal
   - SF - Spent Fuel Cooling
   - SI - Safety Injection
   - SW - Service Water
   - VL - Local Ventilating and Cooling
   - VU - Chilled Water

2. Equipment is required to maintain the plant in the following condition:

   a. Hot stand-by and cold shutdown
   b. Hot stand-by
   c. Cold shutdown
   d. Safety related, but not required for shutdown

3. Types of analysis:

   a. Static
   b. Equivalent static (also known as static coefficient analysis)
   c. Dynamic (also known as seismic modal analysis) input to analysis can be either response spectrum or time-history.

TABLE 3

SEISMIC QUALIFICATION OF BALANCE OF PLANT
SEISMIC CATEGORY I INSTURMENTATION, ELECTRICAL EQUIPMENT AND SUPPORTS

Description	Safe Shutdown Operation (1)	Method of Seismic Qualification	Description of Seismic Qualifications	Location	Installation Status % Completion
Valve Operators (actuator)	a	Supplied equipment tested; type test and analysis	Multifrequency, multi-axis, test; sine beat test at reasonant peaks.	Au seismic designed buildings, all elevations	95
7200 Volt Switchgear	a	Type test	Random frequency with superimposed sine beats; multi-axis test	Intermediate Building Elevs. 436'-0", 463'-0" Service Water Pumphouse Elevs. 425'-0" and 441'-0"	100
480 Volt Unit Substations	a	Type test	Multi-frequency with superimposed sine beats; multi-axis test	Auxiliary Building Elev. 463'-0" Intermediate Building Elevs. 436'-0" and 463'-0" Service Water Pumphouse Elevs. 425'-0" and 441'-0"	100
480/120 Volt Vital System Transformers	d	Supplied equipment tested	Random frequency; multi-axis test	Control Building Elev. 436'-0"	100
Motor Control Centers	a	Type test	Random frequency; multi-axis test	Auxiliary Building, Elevs. 412'-0" and 463'-0" Intermediate Building Elevs. 436'-0" and 463'-0" Service Water Pumphouse Elevs. 425'-0" and 441'-0"	100
Motors for Safety Class Pumps and Fans	a	Analysis	Static acceleration of rigid structure; sum of squares combination of stress	Auxiliary Building Elevs. 374'-0", 385'-0" 388'-0", 397'-0", 400'-0" 412'-0", 452'-0", and 475'-0" Intermediate Building Elevs. 412'-0", 423'-0", 423'-6", 400'-0", 426'-0" and 451'-0" Fuel Handling Building Elev. 436'-0" Control Building Elev. 482'-0" Diesel Generating Building Elevs. 427'-0", 436'-0" and 447'-3"	100
Battery Chargers	a	Supplied equipment tested	Random frequency; single axis test	Intermediate Building Elev. 412'-0"	100

TABLE 3 (Cont'd)

Description	Safe Shutdown Operation (1)	Method of Seismic Qualification	Description of Seismic Qualifications	Location	Installation Status % Completion
Diesel Generators	a	Analysis and test of some components	Static acceleration of rigid structures and random frequency for tests; sum of squares combination of stress for analysis and multi-axis test	Diesel Generating Building Elevs. 436'-0", 427'-0", and 463'-0"	100
Cable Tray and Cable Tray Hangers	a	Analysis	Peak response acceleration of structures; vector sum combination of stress	All seismic designed buildings, all elevations	100
Electrical Containment Penetrations and Miscellaneous Connectors	a	Type test	Random frequency; single axis test	Penetration Access Area Elevs. 412'-0", 436'-0" and 463'-0" Fuel Handling Building Elevs. 436'-0" and 463'-0" and other areas.	100
Distribution Panels	a	Type test	Random frequency; multi-axis test	All seismic designed buildings, all elevations	100
Batteries and Battery Racks	a	Type test of cells; modal analysis of racks	Response spectrum for racks and random frequency for tests; sum of squares combination of stress for racks and multi-axis test for cells	Intermediate Building Elev. 412'-0"	100
Speed Switches (7200 volt)	a	Type test	Random frequency; multi-axis test	Intermediate Building Elev. 436'-0" Service Water Pumphouse Elevs. 425'-0" and 441'-0"	100
Transfer Switches (7200 volt)(2)	a	Type test	Random frequency; multi-axis test	Auxiliary Building Elev. 388'-0" Intermediate Building Elev. 436'-0" Service Water Pumphouse Elev. 425'-0"	100
Transfer Switches (480 volt)(2)	a	Type test and analysis	Random frequency; multi-axis test; and static multi-axis analysis	Intermediate Building Elev. 412'-0"	100
Pressure Transmitters	a	Type test	Random frequency; multi-axis test	All seismic designed buildings, all elevations	90

TABLE 3 (Cont'd)

Description	Safe Shutdown Operation (1)	Method of Seismic Qualification	Description of Seismic Qualifications	Location	Installation Status % Completion
Transfer Switch for C Charging Pump Auxiliaries	a	Analysis and type test of components	Random frequency; multiaxis tests of components; natural frequency and stress analysis of panel	Auxiliary Building Elev. 388'-0"	100
Level Transmitters	a	Type test	Random frequency, multi-axis test	All seismic designed buildings, all elevations	90
Flow Transmitters	a	Type test	Random frequency; multi-axis test	All seismic designed buildings, all elevations	90
Temperature Sensors	a	Type test	Single frequency; single axis test	All seismic designed buildings, all elevations	90
Control Board Switch Modules	a	Type test	Random frequency; multi-axis test planned	Control Building Elev. 463'-0"	100
ESF Loading Sequence Control Panels	a	Type test and analysis	Random frequency; multi-axis test	Control Building Elev. 436'-0"	100
Reactor Protection Under-frequency and Voltager Relay Penels	d	Type test and analysis	Random frequency with superimposed sine beats; multi-axis test	Intermediate Building Elev. 436'-0"	100
Main Control Board (4)	a	Supplied equipment tested and analysis	Random frequency; multi-axis test; response spectrum input to dynamic multi-axis analysis; sum of absolute values of stress	Control Building Elev. 463'-0"	100
Heating, Ventilating and Air Conditioning Control Panel (4)	a	Supplied equipment tested and analysis	Random frequency; multi-axis test; response spectrum input to dynamic multi-axis analysis; sum of absolute values of stress	Control Building Elev. 463'-0"	100
Balance of Plant Instrument Panels	a	Type test	Identical to Westinghouse supplied 7300 series process control equipment cabinets	Control Building Elev. 463'-0"	100

TABLE 3 (Cont'd)

Description	Safe Shutdown Operation (1)	Method of Seismic Qualification	Description of Seismic Qualifications	Location	Installation Status % Completion
Control Room Evacuation Panel	a	Type test and analysis	Random frequency multi-axis test; response spectrum input to dynamic multi-axis analysis; sum of absolute values of stress	Intermediate Building Elev. 436'-0"	100
Auxiliary Relay Rack	a	Test and analysis; component tests	Insitu test of panel for frequency and response; analysis for stress; component multifrequency and multiaxis tests	Control Building Elev. 436'-0"	100
HVAC Mechanical Water Chiller Control Panels and Motors	a	Supplied equipment tested	Random frequency; multi-axis test	Intermediate Building Elev. 412'-0"	100
Radiation Monitoring Control Panel	a	Type test	Random frequency, multi-axis tests are planned (3)	Control Building Elev. 463'-0"	100
Termination Panels	a	Analysis	Response spectrum input to dynamic multi-axis analysis; sum of absolute values of stress	Control Building Elev. 448'-0" (supported by Elev. 463'-0")	100
Earthquake Instrumentation	a	Type test and analysis	Random frequency, multi-axis tests are planned; single sine sweep test done previously	Control Building Elev. 436'-0"	100
Hydrogen Analyzer Panels	a	Type test or analysis	Random frequency, multi-axis tests are planned (3)	Penetration Access Area Elev. 463'-0" Fuel Handling Building Elev. 463'-0"	100
Local Control, Relay and Fuse Panels	a	Analysis with component type test data	Random frequency multiaxis tests of components, natural frequency analysis and static stress analysis	Various	90

NOTES:

1. Equipment is required to maintain the plant in the following condition:

   a. Hot stand-by and cold shutdown
   b. Hot stand-by

NOTES (Cont'd):

c. Cold shutdown
d. Safety related, but not required for shutdown

2. Electrical continuity required for safe shutdown but transfer capability not required.

3. Not yet qualified; qualification to be in accordance with methods described in FSAR Section 3.10.

4. The control boards are seismically qualified. Non-nuclear safety class components mounted on the boards are not required to be seismically qualified but the control boards are so designed that failure of non-nuclear safety class components does not degrade any seismically qualified components.

TABLE 4

SEISMIC QUALIFICATION OF NUCLEAR STEAM SUPPLY SYSTEM
SEISMIC CATEGORY I INSTRUMENTATION, ELECTRICAL EQUIPMENT AND SUPPORTS

Description	Safe Shutdown Operation[2]	Method of Seismic Qualification	Description of Seismic Qualifications	Location	Installation Status % Completion
Pressure Transmitters and Differential-Pressure Transmitters	a	Test	Bi-axial, multifrequency[1]	All seismic designed buildings, all elevations	90
Process Control Equipment Cabinets	a	Test	Single axis sine beat, bi-axial multifrequency	Control Building Elev. 436'-0"	100
NSSS Solid State Protection System Cabinets	d	Test	Single axis sine beat	Control Building Elev. 436'-0"	100
Nuclear Instrumentation System Cabinets	d	Test	Single axis sine beat, bi-axial multifrequency	Control Building Elev. 436'-0"	100
Safeguards Test Racks	d	Test	Single axis sine beat	Control Building Elev. 436'-0"	100
Resistance Temperature Detectors	a	Test	Single axis sinusoidal. Refer to WCAP-8234-A.	Control Building Elev. 463'-0"	0
Instrument Supply Inverters	a	Test	Single axis sine beat, bi-axial sine beat. Refer to WCAP-7817, WCAP-7817 Supplement 2, WCAP-7821 Supplement 2 Addendum 1	Control Building Elev. 436'-0"	100
Reactor Trip Switchgear	d	Test	Multi-axis, multifrequency[1]	Intermediate Building Elev. 463'-0"	100
Power Range Neutron Detectors	d	Test	Single axis sinusoidal.	Reactor Building Elev. 412'-0"	0
Post Accident Monitoring Equipment (Indicators)	a	Test	Multi-axis, multifrequency[1]	Control Building Elev. 463'-0"	0
Post Accident Electric Hydrogen Recombiners	d	Test	Single axis sine beat for recombiners, bi-axial sine beat for control panel	Reactor Building Elev. 463'-0"	100
Core Subcooling Monitor	d	Test	Not yet qualified; qualification to be in accordance with methods described in Section 3.10 of the FSAR.	Control Building Elev. 463'-0"	0

Description	Safe Shutdown Operation (2)	Method of Seismic Qualification	Description of Seismic Qualifications	Location	Installation Status % Completion
Critical System Leak Monitoring System	d	Test	Not yet qualified; qualification to be in accordance with methods described in Section 3.10 of the FSAR.	Control Building Elev. 463'-0"	100

NOTES:

1. Not yet completed.

2. Equipment is required to maintain the plant in the following condition:

   a. Hot stand-by and cold shutdown
   b. Hot stand-by
   c. Cold shutdown
   d. Safety related, but not required for shutdown

ATTACHMENT #3

		YES	NO	COMMENT
2.3.8	DYNAMIC ANALYSIS			
1.	Were the pipe supports and restraints modeled properly?	___	___	___
2.	Is application of the response spectrum curves utilized considered appropriate?	___	___	___
3.	Were the spectral curves input properly?	___	___	___
4.	Have all modes up to where the spectral acceleration flattens out to a base level been included in the response calculations?	___	___	___
5.	Does selection of the master node degress of freedom ensure adequate representation of dynamic behavior?	___	___	___
6.	Are the master nodes input properly?	___	___	___
7.	Are the values specified as additional masses representative of the weight of the component to which they apply?	___	___	___
8.	Is a seismic anchor movement (S.A.M.) analysis require?	___	___	___
9.	Does the S.A.M. analysis method utilized conform to an acceptable practice?	___	___	___
10.	Are the displacements for the S.A.M. analysis correctly selected and input?	___	___	___
11.	Is an analysis for occasional loads other than earthquake and S.A.M. required?	___	___	___
12.	Were the calculated unbalanced loadings associated with 2.3.8.11 determined by an appropriate method?	___	___	___
13.	Is the analysis identified by 2.3.8.11 performed properly?	___	___	___
		___	___	___
2.3.9	OUTPUT			
1.	Is the appropriate scaling factor chosen for conversion of OBE to SSE values?	___	___	___
2.	Are pipe stresses within the allowables (see 2.7)?	___	___	___
3.	Where the overlapping modeling technique is applied, are the governing stresses for comparison against the allowables appropriately identified?	___	___	___
4.	Are pipe displacements reasonable?	___	___	___
5.	Are nozzle loads within the allowables (see 2.10)?	___	___	___
6.	Are valve accelerations within the allowables (see 2.8)?	___	___	___
7.	Are penetration loadings within the allowables (see 2.9)?	___	___	___
8.	Are flange stresses within the allowables?	___	___	___
		___	___	___

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	DEPARTMENT NAME	DEPT. NO.	PROJECT CODE
	PROJECT NAME	W.O. NUMBER	PAGE
SUBJECT 2.8 VALVE ACCELERATIONS		ORIGINATOR DATE	VERIFIER DATE

TAG NO.										
JOINT NO.										
ISO NO.										
		ACCELERATION			ACCELERATION			ACCELERATION		
		A_1	A_2	A_3	A_1	A_2	A_3	A_1	A_2	A_3
LOAD DIRECTION	X									
	Y									
	Z									
SRSS LOAD TOTALS	A_{1T}									
	A_{2T}									
	A_{3T}									

	ACCELERATION	ALLOWABLE	ACCELERATION	ALLOWABLE	ACCELERATION	ALLOWABLE
VERTICAL (A_{2T})						
HORIZONTAL *						

* HORIZONTAL ACCELERATION $= \sqrt{(A_{1T})^2 + (A_{3T})^2}$

ATTACHMENT #4

November 14, 1980 GAI Report No. 2226

PROJECT PROCEDURE

FOR

THE DESIGN OF ELECTRICAL AND INSTRUMENTATION EQUIPMENT

BASIS AND ATTACHMENTS

VIRGIL C. SUMMER NUCLEAR STATION

UNIT 1

PREPARED FOR

SOUTH CAROLINA ELECTRIC AND GAS COMPANY

COLUMBIA, SOUTH CAROLINA

BY

GILBERT/COMMONWEALTH, INC.
READING, PENNSYLVANIA 19603

PROJECT PROCEDURE

FOR

THE DESIGN OF ELECTRICAL AND INSTRUMENTATION EQUIPMENT

BASIS AND ATTACHMENTS

VIRGIL C. SUMMER NUCLEAR STATION

UNIT 1

TABLE OF CONTENTS

V. C. SUMMER NUCLEAR STATION

PROJECT PROCEDURE
FOR
THE DESIGN OF ELECTRICAL AND INSTRUMENTATION EQUIPMENT
BASIS AND ATTACHMENTS

1. Definitions:

   a. Base: The intermediate framework between the electrical equipment and the building structure.

   b. Attachment: The method of attaching the electrical equipment to the base.

2. For each piece of safety related equipment the Electrical, or Instrumentation and Control Department provides the following information to the Structural Department:

   a. Test or analysis data, where available, including the following:

      1. Details of anchorage used for attachment during testing or loads calculated by analysis, including bolt size and strength, if applicable.

      2. Natural frequency

      3. Equipment damping

   b. Equipment data as follows:

      1. Weight

      2. Center of gravity if documented, or suggested assumption for center of gravity

      3. Vendor drawings numbers

   c. A conceptual base and attachment design, including the following:

      1. Exact location, including building and elevation

      2. Conceptual base detail

      3. Conceptual attachment detail

3. The Structural Department performs the following tasks:

   a. Finalizes the design of the base in accordance with established criteria (see attached).

   b. Finalizes the design of the attachment in accordance with established criteria (see attached).

   c. Transmits the details of the final design to the Drafting Section of the Electrical Department.

4. The Drafting Section of the Electrical Department performs the following:

   a. Incorporates the detailed designs onto the applicable construction drawings.

   b. Checks the drawings for dimensional adequacy and functional concept.

   c. Signs out the drawing.

5. The Engineering Section of the Electrical Department, or the Instrumentation Department, performs the following:

   a. Reviews the drawing for concept and compatibility with equipment.

   b. Signs out the drawing.

6. The Structural Engineering Department performs the following:

   a. Checks the drawings for correct interpretation of the design.

   b. Signs out the drawing as an interfacing department.

   c. Performs an independent verification of the design.

NOTE: If for any reason any of the interface sign-off steps have been omitted, the reviewer in step 6c, will ensure that all final details are compatible with the design requirements.

V. C. SUMMER NUCLEAR STATION

PROJECT CRITERIA
FOR
DESIGN OF ELECTRICAL AND INSTRUMENTATION EQUIPMENT
BASES AND ATTACHMENTS

DEFINITIONS

1. Base: The intermediate framework between the Electrical Equipment and the building structure.
2. Attachment: The method of attaching the Electrical Equipment to the base.

SAFETY RELATED EQUIPMENT

Criteria for the design of equipment bases:

1. The base shall have adequate strength in accordance with applicable structural codes and standards.

2. The base shall be rigid with respect to the natural resonant frequency of the building.

Criteria for the design of equipment attachments:

1. Equipment qualified by test:
   a. The attachment shall be of the same type, size and strength as used during qualification testing.
   b. Alternatively, the attachments shall be in the same place and shall have equivalent or greater rigidity and strength as the attachment used during qualification testing.
   c. Alternately, the attachment shall be as close as possible to the location of the attachments used during test and shall have an equivalent or greater rigidity and strength as the attachment used during the qualification testing. The equipment base shall be checked to ensure that with the revised attachment location that the effective stiffness has not been decreased.

d. If the type of attachment used during testing is not fully known and documented, the attachment should be designed to have adequate strength in accordance with applicable structural standards for the seismic loading, and will be provided with a positive type connective such as: bolts, Threaded Nelson Studs, plug welds or fillet welds or a combination of these methods.

2. Equipment qualified by analysis: The attachment design shall be consistent with the qualification analysis and shall have a strength equivalent to or greater than that determined as required during the qualification analysis.

Assumptions for the design of equipment bases and attachments:

1. The equipment shall be assumed resonant with the building natural frequency.

2. The equipment damping factor shall be taken as 5 percent maximum.

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	DEPARTMENT NAME: Structural Engineering	DEPT. NO.: 0414	FILING CODE: 0.11.3 - 1
	PROJECT NAME: SCE & G. V.C. Summer #1	W.O. NUMBER: 02-4361-060	PAGE: 1 of 5

SUBJECT: Elec. Equip. Support & Anchorage - Battery Charger 300 Amp.

ORIGINATOR: L.C. Eurman

DATE: 10-31-80

VERIFIER: A.T. DeMore

DATE: 11/4/80

XBC1A, XBC1B, XBC1A-1B Int. Bldg. El. 412'-0"

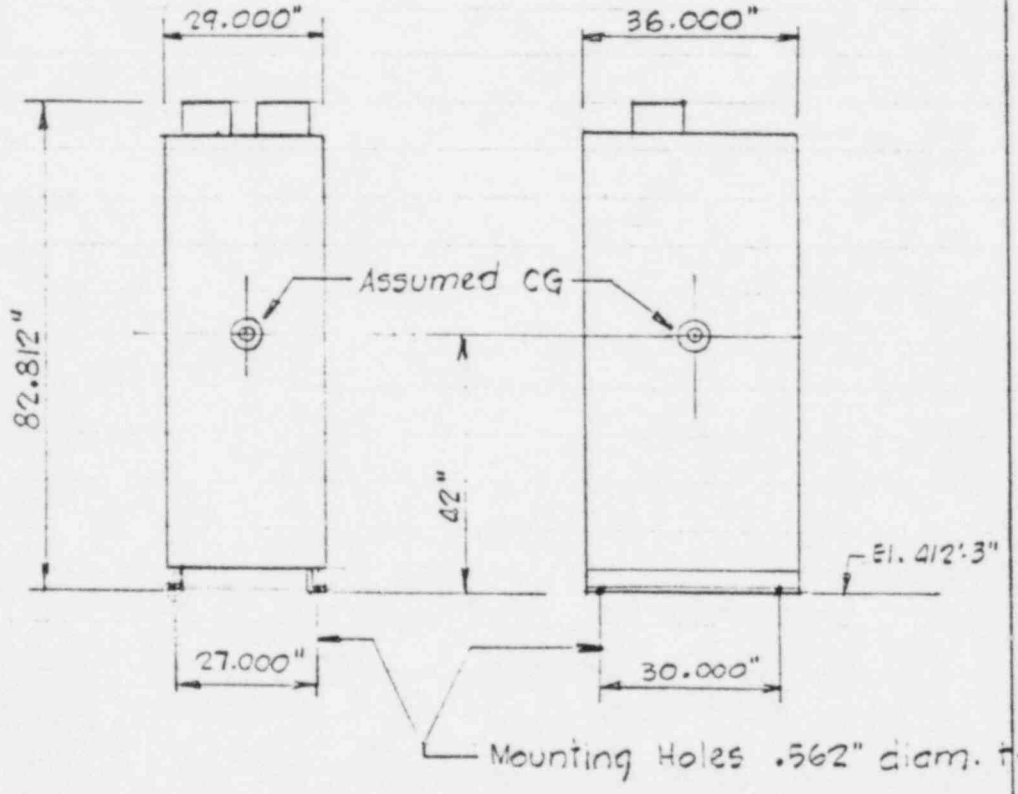
Reference Details:

Vendor Dwg.	IMS-37-027-4
Elec. Plan Dwg.	E-201-194
Elec. Det. Dwg.	E-201-185 Sh.1 Det. "G"
Struct. Det. Dwg.	E-513-121

Unit Wt. : 1650 # Approx. (From Vendor Dwg.)

Test Data Connection: Grade 2 bolts (Information Incomplete)
(Seismic evaluation of equipment - test report)

Physical Dimensions of Cabinet: (From Vendor Dwg.)



FILING CODE 0.11.3 - 1

SUBJECT: Elec. Equip. Support & Anchorage-Battery Charger 300 Amp.

ORIGINATOR: L.C.Bierman
DATE: 10-31-80
VERIFIER: D.F.DeTimes
DATE: 11/4/80

XBC1A, XBC1B, XBC1A-1B Int. Bldg. Fl. El. 412'-0"

Testing data of cabinet base connection is not sufficiently clear to assume strength of bolts used in test. Therefore a strength analysis shall determine capacity of attachment required. Cabinet is inplaced using plug welds in holes provided thru base of unit and stitch welds along base edge.

Seismic Investigation:

Anchorage criteria assumes equipment resonance tuned with that of building and a 5% critical equipment damping factor at peak response. From the response spectrum envelope for OBE, Intermediate Building at el. 412'-0", the following accelerations are read from figures 61.

X-quake : 0.54g (east-west)
Y-quake : 2.20g (north-south)
V-quake : 0.88g (at 1.0 gamma scaling factor)

The above seismic data is taken from Specification "Seismic Analysis, Testing and Documentation - V.C. Summer Nuclear Station - Unit 1 - SP-702-4461-00 May 17, 1972". Figures 61 refer to Response Spectrum envelope for OBE, Intermediate Building Elevation 412'-0".

Design of Cabinent Base Connection

Design detail "G" on Dwg. E-201-185 indicates cab. base is connected to intermediate support member thru holes in base by plug welds and by stitch fillet welds along base edge. To prove connection capacity, however, only plug welds are computed on the following page.

FILING CODE 0.11.3-1

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	DEPARTMENT NAME: Structural Engineering	DEPT. NO.: 0414	FILING CODE: 0.11.3-1
	PROJECT NAME: SCE&G V.C. Summer #1	W.O. NUMBER: 04-4461-060	PAGE: 3 of 5

SUBJECT: Elec. Equip. Support & Anchorage - Battery Charger 300 Amp

ORIGINATOR: C.C. Burmon

DATE: 10-31-30

VERIFIER: A. T. Dillard

DATE: 11-4-80

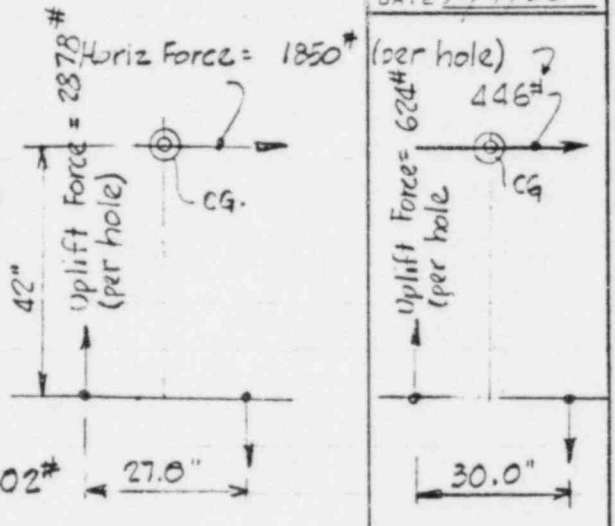
XBC1A, XBC1B, XBC1A-1B Int. Bldg. Fl. El. 412'-0"

Design of Cab. Base Connection

Because of orientation of cabs. assume max. horiz. accel in 27" bolt spacing direction:

Horiz. Force/hole (27" spac. direct) = $\frac{1650^{\#} \times 2.2g}{2 \text{ holes acting per side}} = {}^{\#}1850$

Horiz. Force/hole (30" spac. direct) = $\frac{1650^{\#} \times 0.54g}{2 \text{ holes acting per side}} = 446^{\#}$



Max Uplift Force (per hole) = $\frac{1850 \times 42}{27} + \frac{446 \times 42}{30} = 3502^{\#}$ (2878# + 624#)

Max. shear horiz. acceleration (per hole) = $\frac{1650^{\#} \times 2.2g + 1650^{\#} \times 0.54g}{4 \text{ holes acting}} = 1130^{\#}$ (3630 + 891)

Least down loading vert. up acceleration. (per hole) = $\frac{1650^{\#} - (1650 \times 0.88g)}{4 \text{ holes acting}} = 50^{\#}$ down (1452)

Conservatively assume N-S and E-W (Max!) accelerations occur simultaneously:

Max. combined force (per hole) = 3502# (uplift) + 1130# (shear) - 50# (down) = 4582# ok less than capacity of weld

Conservatively assume only plug weld effective:

Capacity of Plug Weld Per Hole

Hole D = 0.562"

Area of Weld = $D^2 \times 0.7854 = 0.562^2 \times 0.7854 = 0.2481$ sq. in

Allowable stress class E 70 electrodes = 21000 psi (AISC 1969 Table 1.5.2.1)

Strength of weld per hole = $21,000 \times 0.2481 = 5210$ #

Conclusion: The cabinet connection is satisfactory as constructed

FILING CODE: 0.11.3-1

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	DEPARTMENT NAME: Structural Engineering	DEPT. NO.: 0414	FILING CODE: 0.11.3-1
	PROJECT NAME: SCE & G V.C. Summer #1	W.O. NUMBER: 04-4461-060	PAGE: 4 of 5

SUBJECT: Elec. Equip. Support & Anchorage - Battery Cramer 300 Amp.

ORIGINATOR: [illegible]

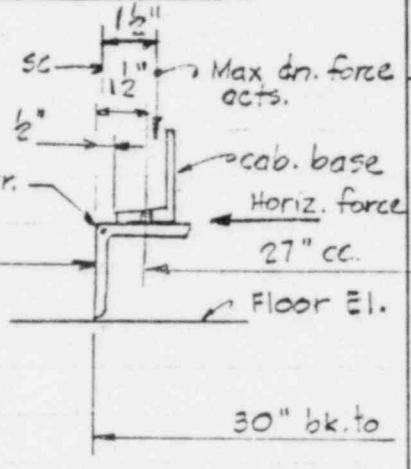
DATE: 10-31-80

VERIFIER: D. T. DeVore

DATE: 11/1/80

XBC1A, XBC1B, XBC1A-1B Int. Bldg. Fl. El. 412'-0"

Design of Intermediate Support



- Note: Non-supporting ∠'s of frame welded to embedded pls. (See next page) ∠ 3 x 3 x ½" spans to framing ∠'s
- Assume ends of ∠ 3 x 3 x ½ restrained against rotation
- Down Force and Directional Horiz. Shear Force combine to produce max. twisting mom in supporting ∠. However, shear force action is so near the shear center of the angle that only bending stress will be examined in the horizontal direction

Twisting Mom (Max Dn Force): $\left[\frac{1650^{\#} \times 2.20g \times 42"}{27"} + \left(\frac{1650 + 1650 \times .38g}{2}\right)\right] \times 1.5" = 12035^{"\#}$ (5647# and 1650 + 726)

- conservative value

$J_{\angle 3\times3\times\frac{1}{2}} = \frac{2.75\,(0.5^3)}{3} \times 2 = 0.23\ in^4$

Torsional Shear (St. Venant): $\frac{Tt}{J} = \frac{12035^{"\#} \times 0.50}{0.23 \times 2} = 13082$ psi at each end (2 for each end)

End Shear Stress (from horiz. force): $\frac{1650^{\#} \times 2.20g}{4 \times 3 \times 0.5} = 605$ psi (4 × area of one leg of ∠)

Combined shear = 13687 psi (ok) less than 14500 psi (0.40 f_y)

Horiz bending stress = $\frac{1650^{\#} \times 2.20g}{2} \times \frac{36"}{8} \times \frac{1}{1.07} = 7633$ psi < less than 22000 psi (0.60 F_Y) (1.07 = SM of ∠)

- Bending stress occurs at center span
- Combined shear stress occurs at end of member
- Combined shear stress = 13082 + 605 = 13687 psi < 14500 psi (0.40 f_y)
- Conclusion: The int. support is satisfactory as constructed

FILING CODE 0.11.3-1

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	DEPARTMENT NAME Structural Engineering	DEPT. NO. 0414	FILING CODE 0.11.3-1
	PROJECT NAME SCE & G V.C. Summer #1	W.O. NUMBER 04-4461-060	PAGE 5 of 5

SUBJECT: Elec. Equip Support Anchorage - Battery Charger 300 Amp

ORIGINATOR: DC Eamon

DATE: 11-6-80

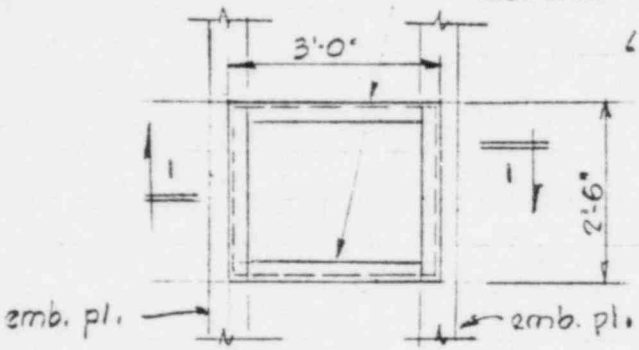
VERIFIER: D. T. DeTilla

DATE: 11/4/80

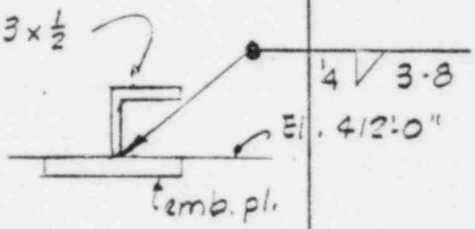
XBC1A, XBC1B, XBC1A-1B Int. Bldg. Fl. El. 412'-0"

Plan of Intermediate Support

Cab. base is supported by these frame members



Plan Typ. Int. Support
All frame L's 3x3x½"



Sec. 1-1
Showing min. weld condition for any frame.

Checking Weld Capacity:

- Assume only welds to embedded pl. at end of frame active against uplift.
- Although all welds resist shear, assume end welds (only) active against shear
- Max. combined net uplift and shear on one ¼" x 3" long fillet weld = 4582 # (refer to calc. pg. 3) (ok) less than

Allowable working strength of ¼" x 3" long fillet weld; (Class E70 electrodes @ 21000 psi - AISC Table 1.5.2.1 - 1969)

.25 x .707 x 21000 psi x 3" long = 11135 # capacity of weld

Therefore, frame attachment to plate embedment is satisfactory as constructed.

FILING CODE 0.11.3-1

ATTACHMENT #5

TAG #	MODEL # (*)	REPORT NO.	LOCATION
PT402	Barton Lot #2	1	Reactor Bldg. Floor EL 412'-0"
PT403	" "	1	Reactor Bldg. Floor EL-412'-0"
PT455	" "	1	Reactor Bldg. Floor EL-436'-0"
PT456	" "	1	Reactor Bldg. Floor EL-436'-0"
PT457	" "	1	Reactor Bldg. Floor EL-436'-0"
PT446	Barton Lot #3	2	Turbine Bldg. Floor EL-436'-0"
PT4465	" "	2	
PT447	" "	2	Turbine Bldg. Floor EL-436'-0"
LT459	Barton Lot #2	1	Reactor Bldg. Floor EL-436'-0"
LT460	" "	1	Reactor Bldg. Floor EL-436'-0"
LT461	" "	1	Reactor Bldg. Floor EL-436'-0"
FT474	" "	1	Reactor Bldg. Floor EL-463'-0"
LT474	" "	1	Reactor Bldg. Floor EL-463'-0"
FT475	" "	1	Reactor Bldg. Floor EL-463'-0"
LT475	" "	1	Reactor Bldg. Floor EL-463'-0"
LT476	" "	1	Reactor Bldg. Floor EL-463'-0"
LT477	" "	1	Reactor Bldg. Floor EL-436'-0"
FT484	" "	1	Reactor Bldg. Floor EL-463'-0"
LT484	" "	1	Reactor Bldg. Floor EL-463'-0"
FT485	" "	1	Reactor Bldg. Floor EL-463'-0"
LT485	" "	1	Reactor Bldg. Floor EL-463'-0"
LT486	" "	1	Reactor Bldg. Floor EL-463'-0"
LT487	" "	1	Reactor Bldg. Floor EL-436'-0"
FT494	" "	1	Reactor Bldg. Floor EL-463'-0"
LT494	" "	1	Reactor Bldg. Floor EL-463'-0"
FT495	" "	1	Reactor Bldg. Floor EL-463'-0"
LT495	" "	1	Reactor Bldg. Floor EL-463'-0"
LT496	" "	1	Reactor Bldg. Floor EL-463'-0"
LT497	" "	1	Reactor Bldg. Floor EL-436'-0"
FT414	Barton Lot#3	2	Reactor Bldg. Floor EL-412'-0"
FT4143	" "	2	
FT415	" "	2	Reactor Bldg. Floor EL-412'-0"
FT416	" "	2	Reactor Bldg. Floor EL-412'-0"
FT424	" "	2	Reactor Bldg. Floor EL-412'-0"
FT425	" "	2	Reactor Bldg. Floor EL-412'-0"
FT426	" "	2	Reactor Bldg. Floor EL-412'-0"
FT434	" "	2	Reactor Bldg. Floor EL-412'-0"
FT435	" "	2	Reactor Bldg. Floor EL-412'-0"
FT436	" "	2	Reactor Bldg. Floor EL-412'-0"
FT476	" "	2	Auxiliary Bldg. Floor EL-436'-0"
FT4765	" "	2	
FT477	" "	2	Auxiliary Bldg. Floor EL-436'-0"
FT486	" "	2	Intermediate Bldg. Floor EL-436'-0"
FT487	" "	2	Intermediate Bldg. Floor EL-436'-0"
FT496	" "	2	Intermediate Bldg. Floor EL-436'-0"
FT497	" "	2	Intermediate Bldg. Floor EL-436'-0"
PT950	" "	2	Auxiliary Bldg. Floor EL-463'-0"

TAG #	MODEL # (*)	REPORT NO.	LOCATION
PT9505	Barton Lot #3	2	
PT951	" "	2	Fuel Handling Bldg. Floor EL-463'-0"
PT952	" "	2	Fuel Handling Bldg. Floor EL-436'-0"
PT953	" "	2	Intermediate Bldg. Floor EL-436'-0"
LT1310	" "	2	Fuel Handling Bldg. Floor EL-412'-0"
LT1311	" "	2	Fuel Handling Bldg. Floor EL-412'-0"
LT1320	" "	2	Diesel Gen. Bldg. Floor EL-427'-0"
LT1321	" "	2	Diesel Gen. Bldg. Floor EL-427'-0"
LT1322	" "	2	Diesel Gen. Bldg. Floor EL-427'-0"

*Westinghouse Proprietary Information

REPORTS

1. NS-TMA-2184
2. WCAP-8687