

**Detroit
Edison**

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July 13, 1981
EF2 - 54067

Mr. L. L. Kintner
Division of Project Management
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Reference: Enrico Fermi Atomic Power Plant - Unit 2
NRC Docket No. 50-341

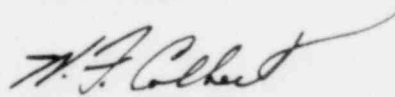
Subject: "Qualification Summary of Equipment" for SQPT

Dear Mr. Kintner:

Enclosed are three (3) copies of "Qualification Summary of Equipment" for BOP and NSSS equipment--identified as items 1 through 25 in the letter of July 7, 1981 from your Mr. Tedesco to our Mr. Tauber.

If you have any questions, please contact our Yogi Anand at 313-649-7363.

Sincerely,



W. F. Colbert
Technical Director
Enri. Fermi 2

WFC/YNA/jj
Enclosures

cc: Dr. Morris Reich
Department of Nuclear Energy
Building 129
Brookhaven National Laboratory
Upton, NY 11973

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Mr. L. L. Kintner
July 13, 1981 - EF2 - 54067
Page 2

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Qualification Summary of Equipment

- I. Plant Name: Fermi 2 Type:
1. Utility: Detroit Edison PWR:
2. NSSS: GE 3. A/E: Detroit Edison BWR: 4-Mark I
- II. Component Name Incore Guide Tube
1. Scope: ☒ NSSS ☐ BOP
2. Model Number: 117C141952 Quantity: 55
3. Vendor: GE
4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
5. Physical Description a. Appearance Long, thin tube with flange
 b. Dimensions 2" OD x 330" long
 c. Weight Approx. 140 lbs. total
6. Location: Building: Reactor
Elevation:
7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☒ Weld (Length 6.3") circumferential
8. a. System in which located: RPV & Internals (incore monitor)
 b. Functional Description: Provide pressure bondage & support for incore instrumentation
 c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☐ Both ☒ Neither
9. Pertinent Reference Design Specifications: 21A8771

- 2 -

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

IV. Equipment Qualification Method:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: DRF 147-B13D016-NX3-15 g

(No., Title and Date) Fermi New Loads Incore - 10/15/81

Company that Prepared Report: GE

Company that Reviewed Report: GE

V. Vibration Input:

1. Loads considered: a. ☐ Seismic only

b. ☐ Hydrodynamic only

c. ☒ Combination of (a) and (b)
(a)

2. Method of Combining RRS: ☒ Absolute Sum ☒ SRSS ☐ [] (other, specify)

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

4. Damping Corresponding to RRS: OBE .01% SSE .02%

5. Required Acceleration in Each Direction: ☐ ZPA ☒ Other (b)
(specify)

OBE S/S = .75 g F/B = (c) V = Small
SSE S/S = 1.09 g F/B = " V = "

6. Were fatigue effects or other vibration loads considered?

☒ Yes ☐ No

If yes, describe loads considered and how they were treated in overall qualification program: Loads considered were pressure (1750 psi)

OBE + SRV. 10 OBE cycles and 7 Cycles/event x (1100 + 1550 + 8750 events) =

79810. Allowable @ 26000 psi is 10^6 cycles.

*NOTE: If more than one report complete items IV thru VII for each report.

12/80

(a) SRSS was used for N/Upset calculations that have lower allowables. Absolute sum was used for faulted and fatigue calculations.

(b) Values given are for first mode. 7 modes were considered for the Hsg and 9 modes for the guide tube.

(c) Model is 1-D. The Max horizontal ARS was multiplied by 1.4 to account for both directions.

- 3 -

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. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
 S/S = _____ F/B = _____ V = _____
6. Method of Determining Natural Frequencies
☐ Lab Test ☐ In-Situ Test ☐ Analysis
7. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs)
☐ No
8. Input g-level Test: OBE S/S = _____ F/B = _____ V = _____
 SSE S/S = _____ F/B = _____ V = _____
9. Laboratory Mounting:
 1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
10. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable
11. Test Results including modifications made: _____

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

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

VII. If Qualification by Analysis, then complete:

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis
☐ Dynamic Analysis: ☐ Time-History ☒ Response Spectrum

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

S/S = 5.4 Hz, 17.4 Hz F/B = (a) V = >140 Hz for Guide Tube

3. Model Type: ☐ 3D ☐ 2D ☐ 1D
☐ Finite Element ☐ Beam ☐ Closed Form Solution

4. ☒ Computer Codes: SAP 4606
Frequency Range and No. of modes considered: 0 to 100 Hz 9 modes for Guide Tube
☐ Hand Calculations

5. Method of Combining Dynamic Responses: ☒ Absolute Sum ☒ SRSS
☐ Other: (specify)

6. Damping: OBE .02 SSE .02 Basis for the damping used:

7. Support Considerations in the model:

8. Critical Structural Elements:

A. Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
<u></u>					

B. Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Opera- bility
<u></u>		

(a) The dynamic model is 1-D. Max horizontal ARS are multiplied by 1.4 to account for both directions.

Qualification Summary of Equipment

- I. Plant Name: Fermi 2 Type: _____
 1. Utility: Detroit Edison PWR _____
 2. NSSS: GE 3. A/E: Detroit Edison BWR 4-Mark I

- II. Component Name Main Steam Isolation Inboard & Outboard Valves
1. Scope: ☒ NSSS ☐ BOP Qty. B21-F022 - 4
 2. Model Number: DWG 21150-H (VPF #2964-1-5) Quantity: B21-F028 - 4
 3. Vendor: Atwood & Morrill, Salem, Mass.
 4. If the component is a cabinet or panel, name and model No. of the devices included: N/A
 5. Physical Description a. Appearance _____
 b. Dimensions 26", Body Length: 63" ± .12"
 c. Weight: Flooded: 10,620 lbs., Dry: 9,520 lbs.
 6. Location: Building: B21-F022: Drywell
B21-F028: Outside Steam Tunnel
 Elevation: _____
 7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☒ Weld (Length _____) Butt Weld on 26" Pipe
 8. a. System in which located: Nuclear Boiler System
 b. Functional Description: Open/Close Service
 c. Is the equipment required for ☐ Hot Standby ☒ Cold Shutdown
☐ Both ☐ Neither
 9. Pertinent Reference Design Specifications: 21A9257, Rev. 4,
732E150, Part-XC

- 2 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: Valve Design Calculations

(No., Title and Date) VPF #2964-8-3

Company that Prepared Report: Atwood & Morrill

Company that Reviewed Report: General Electric

V. Vibration Input:

1. Loads considered: a. ☒ Seismic only
b. ☐ Hydrodynamic only
c. ☐ Combination of (a) and (b)

2. Method of Combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify)

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☐ ZPA ☐ Other
(specify)

OBE S/S = 0.75g F/B = 0.75g V = 0.07g
SSE S/S = 1.5g F/B = 1.5g V = 0.14g

6. Were fatigue effects or other vibration loads considered?

☒ Yes ☐ No

If yes, describe loads considered and how they were treated in overall qualification program: Valve fatigue requirements of ASME code for

pumps and valves (1968) Para 452.5 and cyclic loading conditions of

Para 454 were satisfied.

*NOTE: If more than one report complete items IV thru VII for each report.

12/80

- 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. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
S/S = _____ F/B = _____ V = _____
 6. Method of Determining Natural Frequencies
☐ Lab Test ☐ In-Situ Test ☐ Analysis
 7. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs)
☐ No
 8. Input g-level Test: OBE S/S = _____ F/B = _____ V = _____
SSE S/S = _____ F/B = _____ V = _____
 9. Laboratory Mounting:
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
 10. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable
 11. Test Results including modifications made: _____

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

*Note: If qualification by a combination of test and analysis also complete Item VII.

VII. If Qualification by Analysis, then complete:

NOTE: Valve was modeled in the main steam piping. Dynamic analysis of the main steam piping was performed.

1. Method of Analysis:

- ☒ Static Analysis ☐ Equivalent Static Analysis
 (for Valve Only)
☒ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum
 (for Piping System)

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

S/S = 13.3 Hz F/B = 13.3 Hz V = 13.3 Hz

3. Model Type: ☐ 3D ☐ 2D ☒ 1D
 ☐ Finite Element ☐ Beam ☒ Closed Form Solution

4. ☐ Computer Codes: SAP IV with PISYS Post Processor

Frequency Range and No. of modes considered: _____

☒ Hand Calculations were performed for valve analysis

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

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

7. Support Considerations in the model: (1) Nozzle Weld Ends (2) Bonnet-Body 4

8. Critical Structural Elements:

A. Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
Bonnet-Body Flange		Level D		21,773 PSI	26,700 PSI

B. Max. Critical Deflection	Location	Maximum Allowable Deflection to Assure Functional Opera- bility
	Stem at Top Spring Plate	0.114"

Qualification Summary of Equipment

- I. Plant Name: Fermi 2 Type: _____
1. Utility: Detroit Edison PWR: _____
2. NSSS: GE 3. A/E: Detroit Edison BWR 4-Mark I _____

II. Component Name Relay

1. Scope: ☒ NSSS ☐ BOP
2. Model Number: HGA (E11-K001A) Quantity: 1
(for this MPL No.)
3. Vendor: GE
4. If the component is a cabinet or panel, name and model No. of the devices included: _____

5. Physical Description a. Appearance Box shape
b. Dimensions 4" x 4½" x 2½"
c. Weight _____

6. Location: Building: Reactor
Elevation: 613'6"

7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Panel H11-P617

8. a. System in which located: RHR
b. Functional Description: Energizes to initiate ECCS actions
c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☒ Both ☐ Neither

9. Pertinent Reference Design Specifications: _____
GE PPD 136B3136P001

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: Seismic Test Results, 225A6250, 5/20/70

(No., Title and Date) Seismic Test Results, 234A9802, R2, 4/3/73

Company that Prepared Report: GE

Company that Reviewed Report: GE

V. Vibration Input:

1. Loads considered: a. ☒ Seismic only
b. ☐ Hydrodynamic only
c. ☐ Combination of (a) and (b)

2. Method of Combining RRS ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify) _____

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☐ ZPA ☐ Other
(specify) _____

OBE	S/S =	<u>0.75g</u>	F/B =	<u>0.75g</u>	V =	<u>0.07g</u>
SSE	S/S =	<u>1.5g</u>	F/B =	<u>1.5g</u>	V =	<u>0.14g</u>

6. Were fatigue effects or other vibration loads considered?

☐ Yes ☒ No

If yes, describe loads considered and how they were treated in overall qualification program: _____

*NOTE: If more than one report complete items IV thru V. for each report.

12/80

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 _____
Resonance Endurance (specify) _____
4. Frequency Range: 1-33 hz
5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
S/S = None F/B = 32hz V = None
6. Method of Determining Natural Frequencies
☒ Lab Test ☐ In-Situ Test ☐ Analysis
7. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs)
☐ No N/A
8. Input g-level Test: OBE S/S = _____ F/B = _____ V = _____
SSE S/S = 11.0g F/B = 1.5g V = 2.8g
9. Laboratory Mounting:
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☒ Panel Mounting Simulation
10. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable
11. Test Results including modifications made: Relay (deenergized normally closed contacts) will not chatter (10 msec) up to 1.5g.
12. Other test performed (such as aging or fragility test, including results):
Relay (normally opened contacts) will function properly up to 7.5g.

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

- ☐
- Static Analysis
- ☐
- Equivalent Static Analysis

- ☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

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

3. Model Type: ☐ 3D ☐ 2D ☐ 1D
☐ Finite Element ☐ Beam ☐ Closed Form Solution

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: OBE SSE Basis for the damping used:

7. Support Considerations in the model:

- ### 8. Critical Structural Elements:

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

		Maximum Allowable Deflection to Assure Functional Opera- bility
B. Max. Critical Deflection	<u>Location</u>	_____

Qualification Summary of Equipment

I. Plant Name: Fermi 2 Type:
1. Utility: Detroit Edison PWR
2. NSSS: GE 3. A/E: Detroit Edison BWR 4-Mark I

II. Component Name D/P Transmitter

1. Scope: ☒ NSSS ☐ BOP
2. Model Number: 555 (G33-M041) Quantity: 1
(for this MPL No.)
3. Vendor: GE
4. If the component is a cabinet or panel, name and model No. of the devices included:

5. Physical Description a. Appearance Box shape
b. Dimensions 9.7" x 5.5" x 5.5"
c. Weight 23 lbs.

6. Location: Building:
Elevation:

7. Field Mounting Conditions ☐ Bolt (No. , Size)
☐ Weld (Length)
☒ Local Panel H21-P002

8. a. System in which located: RCWU

b. Functional Description: Measure return flow to RPV

c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☐ Both ☒ Neither

9. Pertinent Reference Design Specifications:
GE PPD 145C3007

12/80

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

- ☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: Seismic Test Results, 225A6259, 5/30/70

(No., Title and Date) _____

Company that Prepared Report: GE

Company that Reviewed Report: GE

V. Vibration Input:

1. Loads considered: a. ☒ Seismic only
b. ☐ Hydrodynamic only
c. ☐ Combination of (a) and (b)

2. Method of Combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A (other, specify)

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☐ ZPA ☐ Other (specify)

OBE	S/S =	<u>0.75g</u>	F/B =	<u>0.75g</u>	V =	<u>0.07g</u>
SSE	S/S =	<u>1.5g</u>	F/B =	<u>1.5g</u>	V =	<u>0.14g</u>

6. Were fatigue effects or other vibration loads considered?

☐ Yes ☒ No

If yes, describe loads considered and how they were treated in overall qualification program: _____

*NOTE: If more than one report complete items IV thru VII for each report.

12/80

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 _____
Resonance Endurance
(specify)
4. Frequency Range: 5-33 hz
5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
S/S = None F/B = None V = None
6. Method of Determining Natural Frequencies
☒ Lab Test ☐ In-Situ Test ☐ Analysis
7. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs)
☐ No
8. Input g-level Test: OBE S/S = 1.5g F/B = 1.5g V = 0.5g
SSE S/S = _____ F/B = _____ V = _____
9. Laboratory Mounting:
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☒ Panel Mounting Simulation
10. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable
11. Test Results including modifications made: Transmitter performed normally up to 12g
12. Other test performed (such as aging or fragility test, including results):
Fragility limit established at 12g with no malfunction
(limit set by shaker table capability)

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

VII. If Qualification by Analysis, then complete:

1. Method of Analysis:

- ☐ Static Analysis ☐ Equivalent Static Analysis
☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

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

3. Model Type: ☐ 3D ☐ 2D ☐ 1D
☐ Finite Element ☐ Beam ☐ Closed Form Solution

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: OBE _____ SSE _____ Basis for the damping used: _____

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Critical	Location	Maximum Allowable Deflection
Deflection		to Assume Functional Opera-
		bility

Qualification Summary of Equipment

- I. Plant Name: Fermi 2 Type:
1. Utility: Detroit Edison PWR:
2. NSSS: GE 3. A/E: Detroit Edison BWR: 4-Mark I

II. Component Name Recirculation System Discharge Valve

1. Scope: ☒ NSSS ☐ BOP
2. Model Number: D-12461 (VPF #2803-99-3) Quantity: 2
3. Vendor: Lunkenheimer, Cincinnati, Ohio
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 Operated Gate Valve
Overall Length: 65.00"
- b. Dimensions 28" x 24" x 28", Overall Height (From Pipe d): 115.50"
Extended
- c. Weight Dry: 8844 lbs. Flooded: 10275 lbs. Structure Wt. 1325.3 lbs.
6. Location: Building: Primary Containment
Elevation:
7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☒ Weld (Length _____) Butt-Weld on 28" Pipe
☐ _____
8. a. System in which located: Reactor Water Recirculation System
b. Functional Description: Open/Close Service
c. Is the equipment required for ☐ Hot Standby ☒ Cold Shutdown
☐ Both ☐ Neither
9. Pertinent Reference Design Specifications: 21A1477, Rev. 5,
920D793, Part-9

- 2 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: GE 386HA605, Rev. 0

(No., Title and Date) Recirculation Discharge Black Valve Model

Company that Prepared Report: General Electric

Company that Reviewed Report: General Electric

V. Vibration Input:

1. Loads considered: a. ☒ Seismic only

b. ☐ Hydrodynamic only

c. ☐ Combination of (a) and (b)

2. Method of Combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify)

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☐ ZPA ☐ Other
(specify)

OBE	S/S =	F/B =	V =
** SSE	S/S =	F/B =	V =
	<u>1.69 g</u>	<u>1.69 g</u>	<u>0.54</u>

6. Were fatigue effects or other vibration loads considered?

☒ Yes ☐ No

If yes, describe loads considered and how they were treated in overall qualification program: Valve fatigue requirements of ASME Section III

Paragraph NB3545.3 and cycle loading conditions of Paragraph NB-3550
were satisfied.

*NOTE: If more than one report complete items IV thru VII for each report.

12/80
** Required acceleration per piping stress report No. 22A2651AB, Rev.2.

N/A

- *Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

VII. If Qualification by Analysis, then complete: *(NOTE: The discharge valve was modeled in the piping analysis. Dynamic analysis was performed on the piping system).

1. Method of Analysis:

☒ Static Analysis ☐ Equivalent Static Analysis
 For Valve Only
☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = 47 Hz F/E = 47 HZ V = 47 HZ

3. Model Type: ☐ 3D ☐ 2D ☒ 1D
 ☐ Finite Element ☐ Beam ☒ Closed Form Solution

4. ☐ Computer Codes: SAP IV with PISYS Post Processor

Frequency Range and No. of modes considered: _____

☒ Hand Calculations

5. Method of Combining Dynamic Responses: ☐ Absolute Sum ☒ SRSS
 ☐ Other: _____

(Specify)

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

7. Support Considerations in the model: Body-Bonnet Flange Weld

8. Critical Structural Elements:

A. Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
Flange		Level-D		28,364 PSI	29,400 PSI

B. Max. Critical
Deflection

Location

Maximum Allowable Deflection
to Assure Functional Opera-
bility

Qualification Summary of EquipmentI. Plant Name: Fermi 2

Type: _____

1. Utility: Detroit Edison

PWR _____

2. NSSS: GE3. A/E: Detroit Edison

BWR 4-Mark I _____

II. Component Name Reactor Vessel Stabilizer1. Scope: ☒ NSSS ☐ BOP2. Model Number: 762E926 PIQuantity: 13. Vendor: GE4. If the component is a cabinet or panel, name and model No. of the devices included: N/A5. Physical Description a. Appearance 8 Steel bumpersb. Dimensions 7 ft. x 15" x 13" eachc. Weight Approx. 2,000 lbs. each6. Location: Building: ContainmentElevation: +565"7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☒ Weld (Length 87")8. a. System in which located: Reactor Assemblyb. Functional Description: Set of bumpers - restrains vessel horizontallyc. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown☒ Both ☐ Neither9. Pertinent Reference Design Specifications: 762E926

- 2 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report[®]: DRF

(No., Title and Date) B13-107

Company that Prepared Report: GE

Company that Reviewed Report: GE

V. Vibration Input:

1. Loads considered: a. ☒ Seismic only
b. ☐ Hydrodynamic only
c. ☐ Combination of (a) and (b)

2. Method of Combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify)

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☐ ZPA ☐ Other (specify)
OBE S/S = 0.75g F/B = 0.75g V = 0.75g
SSE S/S = 1.5g F/B = 1.5g V = 0.14g

6. Were fatigue effects or other vibration loads considered?

☐ Yes ☒ No

If yes, describe loads considered and how they were treated in overall qualification program: _____

*NOTE: If more than one report complete items IV thru VII for each report.

12/80

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. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
S/S = _____ F/B = _____ V = _____
6. Method of Determining Natural Frequencies
☐ Lab Test ☐ In-Situ Test ☐ Analysis
7. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs)
☐ No
8. Input g-level Test: OBE S/S = _____ F/B = _____ V = _____
SSE S/S = _____ F/B = _____ V = _____
9. Laboratory Mounting:
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
10. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable
11. Test Results including modifications made: _____

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

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

VII. If Qualification by Analysis, then complete:

- ### 1. Method of Analysis:

☒ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

BY INSPECTION

S/S • > 33 hz

$$F/B = \quad > 33 \text{ Hz}$$
 $V = > 33 \text{ Hz}$

3. Model Type: ☐ 3D ☐ 2D ☐ 1D

N/A

☐ Finite Element

[] Beam

☐ 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

☒ Other: N/A

(spēcify)

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

7. **Support Considerations in the model:** Pinned to take horizontal loads only

- ### 8. Critical Structural Elements:

A.	Identification	Location	Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
	Rod	Surface	Preload plus emergency	N/A	82,000 psi	90,000 psi

B. <u>Max. Critical Deflection</u>	<u>Location</u>	<u>Maximum Allowable Deflection to Assure Functional Operability</u>
N/A	N/A	N/A

Qualification Summary of Equipment

- I. Plant Name: Ferri 2 Type:
1. Utility: Detroit Edison PWR:
2. NSSS: GE 3. A/E: Detroit Edison BWR: 4-Mark I
- II. Component Name Local Rack - 72"
1. Scope: ☒ NSSS ☐ BOP
2. Model Number: H21-P025 Quantity: 1
3. Vendor: GE
4. If the component is a cabinet or panel, name and model No. of the devices included: 8 D/P Transmitters, GE PPD
163C1561P772203
5. Physical Description a. Appearance Open Rack
b. Dimensions 72" x 78" x 24"
c. Weight:
6. Location: Building:
Elevation:
7. Field Mounting Conditions ☒ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
8. a. System in which located: NBS
b. Functional Description: D/P Transmitters measure steam flow
c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☐ Both ☒ Neither
9. Pertinent Reference Design Specifications:
GE Drawing 145C3403TG

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

- ☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: Seismic Test Results, 225A6555 R1, 1/30/73

(No., Title and Date) _____

Company that Prepared Report: GE

Company that Reviewed Report: GE

V. Vibration Input:

1. Loads considered: a. ☒ Seismic only
b. ☐ Hydrodynamic only
c. ☐ Combination of (a) and (b)

2. Method of Combining RRS: ☐ Absolute Sum ☐ SRSS ☒ ^{N/A} (other, specify) _____

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☐ ZPA ☐ Other (specify) _____

OBE	S/S =	<u>0.75g</u>	F/B =	<u>0.75g</u>	V =	<u>0.07g</u>
SSE	S/S =	<u>1.59g</u>	F/B =	<u>1.5g</u>	V =	<u>0.14g</u>

6. Were fatigue effects or other vibration loads considered?

☐ Yes ☒ No

If yes, describe loads considered and how they were treated in overall qualification program: _____

*NOTE: If more than one report complete items IV thru VII for each report.

12/80

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 _____ Resonance (specify) _____
4. Frequency Range: 5-33 hz
5. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
S/S = 20.1 hz, 23.3 hz F/B = None V = None
6. Method of Determining Natural Frequencies
☒ Lab Test ☐ In-Situ Test ☐ Analysis
7. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs) ☐ No N/A
8. Input g-level Test: OBE S/S = _____ F/B = _____ V = _____
SSE S/S = 0.5g F/B = none V = none
9. Laboratory Mounting:
& clamps
1. ☒ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
10. Functional operability verified: ☐ Yes ☐ No ☒ Not Applicable
11. Test Results including modifications made: Resonance identified at 20.1 hz and 23.3 hz with maximum amplification of ~3.
12. Other test performed (such as aging or fragility test, including results):

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

VII. If Qualification by Analysis, then complete:

- ### 1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S ■ F/B ■ V ■

3. Model Type: ☒ 3D ☐ 2D ☐ 1D
☐ Finite Element ☐ Beam ☐ Closed Form Solution

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: OBE SSE Basis for the damping used: _____

7. Support Considerations in the model: _____

- ### 8. Critical Structural Elements:

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

B. Max. Critical Deflection

Location

Maximum Allowable Deflection
to Assure Functional Opera-
bility

Qualification Summary of Equipment

1. Plant Name: Fermi 2 Type: _____
1. Utility: Detroit Edison PWR _____
2. NSSS: GE 3. A/E: Detroit Edison BWR 4-Mark I

17. Component Name Temperature Control

1. Scope: ☒ NSSS ☐ BOP
2. Model Number: 158B7072(C41-W006) Quantity: 1
(for this MPL No.)
3. Vendor: Weed Instrument

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

5. Physical Description a. Appearance Rectangular Box and Cylindrical Tube
b. Dimensions [7 1/4" x 1" OD - tube] [7"x7"x3 1/4" - box]
c. Weight _____

6. Location: Building: _____
Elevation: _____

7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Local Panel H21-P011

8. a. System in which located: SLC

b. Functional Description: Measure temperature of fluid in SLC tank

c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☐ Both ☒ Neither

9. Pertinent Reference Design Specifications: _____
GE PPD 158B7072

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

☐ Test ☒ Analysis ☐ Combination of Test and Analysis

Qualification Report*: DRF A00-1043-15, 12/23/80

(No., Title and Date)

Company that Prepared Report: GE

Company that Reviewed Report: GE

V. Vibration Input:

1. Loads considered: a. ☐ Seismic only
b. ☐ Hydrodynamic only
c. ☐ Combination of (a) and (b)

2. Method of Combining RRS: ☐ Absolute Sum ☐ SRSS ☐ ^{N/A}
(other, specify)

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☐ ZPA ☐ Other
(specify)

OBE	S/S =	0.75g	F/B =	0.75g	V =	0.07g
SSE	S/S =	1.5g	F/B =	1.5g	V =	0.14g

6. Were fatigue effects or other vibration loads considered?

☐ Yes ☒ No

If yes, describe loads considered and how they were treated in overall qualification program:

*NOTE: If more than one report complete items IV thru VII for each report.

12/80

VI. If Qualification by Test, then Complete*:

- 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. Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
S/S = _____ F/B = _____ V = _____
 6. Method of Determining Natural Frequencies
☐ Lab Test ☐ In-Situ Test ☐ Analysis
 7. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs) ☐ No
 8. Input g-level Test: OBE S/S = _____ F/B = _____ V = _____
SSE S/S = _____ F/B = _____ V = _____
 9. Laboratory Mounting:
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☐ _____
 10. Functional operability verified: ☐ Yes ☐ No ☐ Not Applicable
 11. Test Results including modifications made: _____

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

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

☒ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S = 567 hz F/B = none V = none

3. Model Type: ☐ 3D ☐ 2D ☐ 1D
☐ Finite Element ☒ Beam ☐ Closed Form Solution

4. [] Computer Codes:

Frequency Range and No. of modes considered: _____

[x] Hand Calculations

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

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

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

B. Max. Critical Deflection	Location
0.000	0.000

Maximum Allowable Deflection
to Assure Functional Opera-
bility

Qualification Summary of Equipment

- I. Plant Name: Fermi 2 Type:
1. Utility: Detroit Edison PWR:
2. NSSS: GE 3. A/E: Detroit Edison BWR: 4-Mark I

II. Component Name Hydraulic Control Unit

1. Scope: ☒ NSSS ☐ BOP
2. Model Number: DRWG 761E500G Quantity: 185
3. Vendor: General Electric 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 Assembly of Valves, Pipes, Tanks, Piping and Electric Controls
- b. Dimensions Width 22"; Height 102"; Depth 20"
- c. Weight 785 lbs.
6. Location: Building:
- Elevation:
7. Field Mounting Conditions ☒ Bolt (No. 4, Size 1/2)
☐ Weld (Length)
8. a. System in which located: Control Rod Drive Hydraulic System
- b. Functional Description: To insert and withdraw fuel control rods
- c. Is the equipment required for ☐ Hot Standby ☒ Cold Shutdown
☐ Both ☐ Neither
9. Pertinent Reference Design Specifications: 21A8799

- 2 -

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

☐ Test ☐ Analysis ☒ Combination of Test and Analysis

Qualification Report*: 384HA183

(No., Title and Date) Hydraulic Control Unit Test Report (7/16/75)

Company that Prepared Report: Wyle Lab/General Electric

Company that Reviewed Report: General Electric

V. Vibration Input:

1. Loads considered: a. ☒ Seismic only

b. ☐ Hydrodynamic only

c. ☐ Combination of (a) and (b)

2. Method of Combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify)

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☒ ZPA ☐ Other (specify)

OBE	S/S =	<u>0.75g</u>	F/B =	<u>0.75g</u>	V =	<u>0.07g</u>
SSE	S/S =	<u>1.5g</u>	F/B =	<u>1.5g</u>	V =	<u>.14g</u>

6. Were fatigue effects or other vibration loads considered?

☐ Yes ☒ No

If yes, describe loads considered and how they were treated in overall qualification program: _____

*NOTE: If more than one report complete items IV thru VII for each report.

12/80

VI. If Qualification by Test, then Complete*:1. ☐ Single Frequency☒ Multi-Frequency:☒ random
☒ sine beat
-----2. ☒ Single Axis☐ Multi-Axis3. No. of Qualification Tests: OBE 1 SSE 2 Other (specify) -----4. Frequency Range: 1-33 Hz (Horizontal) 1-100 Hz (Vertical)

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

S/S = 2.75, 5.0, 8.5 & 14 Hz F/B = 2, 4.2, 7.75 & 12.5 Hz V = 10, 38, 41 & 49.5 Hz

6. Method of Determining Natural Frequencies

☒ Lab Test☐ In-Situ Test☐ Analysis7. TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs)
☐ No N/A

8. Input g-level Test: OBE S/S = _____ F/B = _____ V = _____

SSE S/S = 16 g F/B = 15 g V = 18 g

9. Laboratory Mounting:

1. ☒ Bolt (No. 4, Size 1/2") ☐ Weld (Length) ☐ _____10. Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable11. Test Results including modifications made: Test completed without significant damage to HCU that would result in a failure to "scram".

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

Fragility test

*Note: If qualification by a combination of test and analysis also complete Item VII.

VII. If Qualification by Analysis, then complete: *

1. Method of Analysis:

☐ Static Analysis ☐ Equivalent Static Analysis

☒ Dynamic Analysis: ☐ Time-History ☒ Response Spectrum

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

S/S = 2.75, 4.5, 8.5 & 14 Hz F/B = 2, 4, 7.75 & 12.5 Hz V = 10, 38, 41, 49.5 Hz

3. Model Type: ☒ 3D ☐ 2D ☐ 1D
☒ Finite Element ☒ Beam ☐ Closed Form Solution

4. ☒ Computer Codes: SAMIS

Frequency Range and No. of modes considered: 10

☐ Hand Calculations

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

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

7. Support Considerations in the model: Floor Mounted

8. Critical Structural Elements:

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

N/A

B. Max. Critical
Deflection

Location

Maximum Allowable Deflection
to Assure Functional Opera-
bility

N/A

*The purpose of the analysis is to determine the natural frequencies and the HCU capability. A typical spectra was used. No exact stresses were calculated. Since the HCU was tested, the analysis is used as a reference.

12/80

Qualification Summary of Equipment *

- I. Plant Name: Fermi 2 Type: _____
1. Utility: Detroit Edison PWR _____
2. NSSS: GE 3. A/E: Detroit Edison BWR 4-Mark I
- II. Component Name D/P Transmitter
1. Scope: ☒ NSSS ☐ BOP
2. Model Number: 368 (B31-N014A) Quantity: 1
(for this MPL No.)
3. Vendor: Barton
4. If the component is a cabinet or panel, name and model No. of the devices included: _____
5. Physical Description a. Appearance Double Box Shape
- b. Dimensions 8½" x 6" x 9"
- c. Weight 9 lbs.
6. Location: Building: _____
- Elevation: _____
7. Field Mounting Conditions ☐ Bolt (No. _____, Size _____)
☐ Weld (Length _____)
☒ Local Panel HZ1-P006
8. a. System in which located: Recirc
- b. Functional Description: Measure recirculation flow
- c. Is the equipment required for ☐ Hot Standby ☐ Cold Shutdown
☐ Both ☒ Neither
9. Pertinent Reference Design Specifications: _____
GE PPD 145C 3026 (similar to 117C3387)

III. Is Equipment Available for Inspection in the Plant: ☒ Yes ☐ No

IV. Equipment Qualification Method:

☒ Test ☐ Analysis ☐ Combination of Test and Analysis

Qualification Report*: Data Sheet Report - Vibration

(No., Title and Date) VPF 145C 3025-4a

Company that Prepared Report: Wyle Laboratories

Company that Reviewed Report: GE

V. Vibration Input:

1. Loads considered: a. ☒ Seismic only
b. ☐ Hydrodynamic only
c. ☐ Combination of (a) and (b)

2. Method of Combining RRS: ☐ Absolute Sum ☐ SRSS ☒ N/A
(other, specify)

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

4. Damping Corresponding to RRS: OBE N/A SSE N/A

5. Required Acceleration in Each Direction: ☐ ZPA ☐ Other (specify)

OBE	S/S =	<u>0.75g</u>	F/B =	<u>0.75g</u>	V =	<u>0.07g</u>
SSE	S/S =	<u>1.5g</u>	F/B =	<u>1.5g</u>	V =	<u>0.14g</u>

6. Were fatigue effects or other vibration loads considered?

☐ Yes ☒ No

If yes, describe loads considered and how they were treated in overall qualification program: _____

*NOTE: If more than one report complete items IV thru VII for each report.

12/80

VI. If Qualification by Test, then Complete*:

Qualification by Test, then complete:

- ☒ Single Frequency ☐ Multi-Frequency: ☒ random ☐ sine beat
- ☒ Single Axis ☐ Multi-Axis
- No. of Qualification Tests: OBE _____ SSE _____ Other _____
(specify) ^{Resonance} ^{Endurance}
- Frequency Range: 1-50 hz
- Natural Frequencies in Each Direction (Side/Side, Front/Back, Vertical):
S/S = none F/B = none V = none
- Method of Determining Natural Frequencies
☒ Lab Test ☐ In-Situ Test ☐ Analysis
- TRS enveloping RRS using Multi-Frequency Test ☐ Yes (Attach TRS & RRS graphs)
☐ No N/A
- Input g-level Test: OBE S/S = _____ F/B = _____ V = _____
SSE S/S = 1.5g F/B = 1.5g V = 1.5g
- Laboratory Mounting:
1. ☐ Bolt (No. _____, Size _____) ☐ Weld (Length _____) ☒ ^{Panel} ^{Mounting} ^{Simulation}
- Functional operability verified: ☒ Yes ☐ No ☐ Not Applicable
- Test Results including modifications made: No damage or malfunctions
were observed.
- Other test performed (such as aging or fragility test, including results):
Fragility limit established at 6.5g in both horizontal axes, and 3.0g vertical
axis.

*Note: If qualification by a combination of test and analysis also complete Item VII.

12/80

☐ Static Analysis ☐ Equivalent Static Analysis

☐ Dynamic Analysis: ☐ Time-History ☐ Response Spectrum

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

S/S ■ _____ F/B ■ _____ V ■ _____

3. Model Type: ☒ 3D ☐ 2D ☐ 1D
☐ Finite Element ☐ Beam ☐ Closed Form Solution

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: OBE _____ SSE _____ Basis for the damping used _____

7. Support Considerations in the model: _____

8. Critical Structural Elements:

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

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