

GRAND GULF  
NUCLEAR STATION  
UNIT 1

SEISMIC AND HYDRODYNAMIC LOADS  
REQUALIFICATION CERTIFICATION

JOB NO. MPL-02

EQUIPMENT NAME: Barton 227 Pressure Indicator SPEC. NO:

EQUIPMENT NO: B21-R005

LOCATION:

EQUIPMENT CLASSIFICATION: ☐ ACTIVE ☒ PASSIVE

SEISMIC QUALIFICATION REPORT REFERENCE:

See Attached

THE ABOVE SEISMIC QUALIFICATION REPORT(S) HAVE BEEN REEVALUATED AND  
REQUALIFIED WHERE NECESSARY TO SHOW THAT THE ABOVE-MENTIONED COMPONENT  
IS CAPABLE OF PERFORMING ITS INTENDED SAFETY FUNCTION UNDER ALL THE  
APPLICABLE LOADING COMBINATIONS INCLUDING THE POOL DYNAMIC LOADS.

PREPARED: R.P. Morton  
R.P. Morton  
APPROVED: V.J. Brocato  
V.J. Brocato  
DATE: 4/20/82

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GRAND GULF NUCLEAR STATION UNIT 1

QUALIFICATION SUMMARY

1. Equipment Name Barton 227 Pressure Indicator
2. Equipment No. B21-R005
3. Qualification Documentation (Enclosed with this report.)
  - A. Qualification Summary of Equipment (SQRT form), including required response spectra with TRS plotted on RRS graph as appropriate.

B. Reference Documents

Reference Number	Document Identification	Revision or Date	Title/Subject
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C. Additional Supporting Documents

Document Identification	Revision or Date	Title/Subject
NUTECH File: # 33.0803.096	3/17/82	Seismic Qualification Analysis for Differential Pressure Unit, ITT Barton Model 224

## QUALIFICATION SUMMARY (CONTINUED)

EQUIPMENT NO. B21-R005

### 4. Functional Requirements

The differential pressure unit must maintain its pressure retaining capability during and after a seismic event. Operability is not required.

### 5. Demonstration Capability

Calculations demonstrate that the bellows within the housing of the differential pressure unit is capable of withstanding a 48g vibration load. This is much higher than is expected.

### 6. Rationale for Qualification Certification

(Include Decision analysis with comparison to acceptance criteria, approach for demonstrating operability, and consideration of high-frequency response.)

The bellows within the housing of the differential pressure unit was determined to be the critical component affecting the pressure integrity of the unit.

The capacity of the bellows to withstand seismic loads was demonstrated using basic ASME Code allowable stresses.

Qualification Summary of Equipment

I. Plant Name: Grand Gulf Nuclear Station Unit I

Type:

1. Utility: Mississippi Power and Light Co.

PWR

2. NSSS: G.E.

3. A/E: Bechtel Power Corp.

BWR 6, Mark III

II. Component Name Barton 227 Pressure Indicator

1. Scope: ☒ NSSS ☐ BOP

2. Model Number: 227 Quantity: 1

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 Unit includes Barton Model 224 Differential Pressure Unit with Internal Bellows. Pressure read from circular dial with pointer.

6. Location: Building:  
Elevation:

7. Field Mounting Conditions ☐ Bolt (No. \_\_\_\_\_, Size \_\_\_\_\_)  
☐ Weld (Length \_\_\_\_\_)  
☐ \_\_\_\_\_

8. a. System in which located: Residual Heat Removal

b. Functional Description: Pressure Boundary

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

9. Pertinent Reference Design Specifications:

Prepared by: R. R. Martin 4/20/82

12/80

Verified by: ASCHER 4/20/82

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 Qualification  
Analysis for Differential\*\*  
(No., Title and Date) Pressure Unit, ITT Barton  
Model 224, NUTECH File # 33.0803.096

Company that Prepared Report: NUTECH

Company that Reviewed Report: NUTECH

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 ☐ (other, specify)

3. Required Response Spectra (attach the graphs): \_\_\_\_\_

4. Damping Corresponding to RRS: OBE \_\_\_\_\_ SSE \_\_\_\_\_

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

OBE S/S = \_\_\_\_\_ F/B = \_\_\_\_\_ V = \_\_\_\_\_  
SSE S/S = \_\_\_\_\_ 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: \_\_\_\_\_

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

\*\*Note: Report was written for the Wm. H. Zimmer Nuclear  
Power Station; however, it is used for Grand Gulf 12/80  
since the differential pressure unit is the same  
for both plants.

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:

### 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 ■ N/A F/B ■ N/A V ■ N/A

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

4. ☒ Computer Codes: N/A  
Frequency Range and No. of modes considered: 183 Hz (1st mode), 1st mode  
☒ Hand Calculations considered

5. Method of Combining Dynamic Responses: ☐ Absolute Sum ☐ SRSS  
☒ Other: 1 mode only  
(specify) -----

6. Damping: OEE N/A SSE N/A Basis for the damping used: \_\_\_\_\_

7. Support Considerations in the model: The critical element (bellows in the Differential Pressure Unit)

8. Critical Structural Elements: cantilevered.

A. Identification Location		Governing Load or Response Combination	Seismic Stress	Total Stress	Stress Allowable
Bending + Axial	Base of Bellows	acceleration capacity determined for the ASME code allowable stress		14.4ksi	Bellows shaft
B. Max. Critical Deflection	Location			40.0ksi	Bellows shaft
					Maximum Allowable Deflection to Assure Functional Operability

N/A