

**Seismic Adequacy Evaluation
for Application of the GIP
Methodology for New and Replacement Equipment**

2ESV1

Unit 2 ESV Cabinet No.1

ATTACHMENT 1

Oconee Unit 2 ECCW Upgrade Project

NARE (New and Replacement Equipment) Evaluation Packages

2ESV1 Unit 2 ESV Cabinet No. 1

2ESVLCP1 Unit 2 ESV Local Control Cabinet No. 1

2ESVPU0001 Unit 2 ESV Vacuum Pump No. 1

2ESVPU0002 Unit 2 ESV Vacuum Pump No. 2

2ESVPU0003 Unit 2 ESV Vacuum Pump No. 3

Seismic Adequacy Evaluation Checklist for Application of the GIP Methodology to New and Replacement Equipment
--

1.	Equipment Description: 2ESVI, Emergency Siphon Vacuum Cabinet, Cabinet is a Hoffman A-603624FS.																								
2.	GIP, Appendix B, Equipment Class Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Applicable to Equipment? If No, go to 11.																								
3.	Applicable GIP Equipment Class. 20- Instrumentation & Control Panels																								
4.	Identify Licensing Basis Documents(s) which indicate that GIP is an Acceptable Method for Demonstrating Seismic Adequacy Oconee FSAR Section 3.10.2 in conjunction with the Duke Energy Corp. Docket No 50-269, Amendment to Facility License Dated April 24, 1998.																								
5.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">A. Basis for Equipment Seismic Capacity</td> </tr> <tr> <td><input checked="" type="checkbox"/> Earthquake experience</td> <td></td> </tr> <tr> <td><input type="checkbox"/> GERS</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Existing Seismic Qualification Capacity Data</td> <td></td> </tr> <tr> <td colspan="2">(Attach copy of capacity data to this checklist)</td> </tr> <tr> <td colspan="2">B. Basis for Equipment Seismic Demand</td> </tr> <tr> <td><input checked="" type="checkbox"/> In-Structure response spectra approved for USI A-46</td> <td></td> </tr> <tr> <td><input type="checkbox"/> 1.5 x SSE ground response spectra</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other (Describe)</td> <td></td> </tr> <tr> <td colspan="2" style="height: 40px;">(Attach a copy of seismic demand spectrum to this checklist)</td> </tr> <tr> <td colspan="2">C. Equipment seismic capacity exceeds demand? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></td> </tr> <tr> <td colspan="2">If No go to 9.</td> </tr> </table>	A. Basis for Equipment Seismic Capacity		<input checked="" type="checkbox"/> Earthquake experience		<input type="checkbox"/> GERS		<input type="checkbox"/> Existing Seismic Qualification Capacity Data		(Attach copy of capacity data to this checklist)		B. Basis for Equipment Seismic Demand		<input checked="" type="checkbox"/> In-Structure response spectra approved for USI A-46		<input type="checkbox"/> 1.5 x SSE ground response spectra		<input type="checkbox"/> Other (Describe)		(Attach a copy of seismic demand spectrum to this checklist)		C. Equipment seismic capacity exceeds demand? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		If No go to 9.	
A. Basis for Equipment Seismic Capacity																									
<input checked="" type="checkbox"/> Earthquake experience																									
<input type="checkbox"/> GERS																									
<input type="checkbox"/> Existing Seismic Qualification Capacity Data																									
(Attach copy of capacity data to this checklist)																									
B. Basis for Equipment Seismic Demand																									
<input checked="" type="checkbox"/> In-Structure response spectra approved for USI A-46																									
<input type="checkbox"/> 1.5 x SSE ground response spectra																									
<input type="checkbox"/> Other (Describe)																									
(Attach a copy of seismic demand spectrum to this checklist)																									
C. Equipment seismic capacity exceeds demand? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																									
If No go to 9.																									

<p align="center">Seismic Adequacy Evaluation Checklist for Application of the GIP Methodology to New and Replacement Equipment</p>
--

6.	<p>A. Equipment meets intent of caveats and inclusion rules? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>If Yes, proceed to No. 6.b., below. If No, proceed to No. 11., below.</p>
	<p>B. Significant design differences with potential adverse impact on seismic adequacy identified? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p> <p>If Yes, proceed to No. 6.c., below. If No, proceed to No. 7., below.</p>
	<p>C. Description of design differences and potential impact on seismic adequacy:</p> <p>N/A</p>
	<p>D. Design difference has significant adverse impact on seismic adequacy? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>If Yes, proceed to No. 11., below. If No, document basis below or on sheet(s) attached this Checklist.</p> <p>N/A</p>

Seismic Adequacy Evaluation Checklist for Application of the GIP Methodology to New and Replacement Equipment
--

7.	A. Equipment anchorage uses existing bolt pattern?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If Yes, proceed to No. 7.a.(1), below. If No, proceed to No. 7.a.(2), below.		
	(1) Anchorage adequate for GIP methodology utilizing GIP rules for anchorage capacity?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If Yes, proceed to No. 7.b. If No, complete Nos. 7.b and 8; then go to 9.		
	(2) Anchorage adequate for GIP methodology utilizing current licensing criteria factors of safety for anchors?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If Yes, proceed to No. 8. If No, complete No. 8. And go to 9.		
	B. Anchorage meets GIP installation Requirements?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If Yes, go to No. 8. If No, complete No. 8. And go to 9.		
8.	Installed Equipment Free of Significant, Credible Seismic Interaction Concerns?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If Yes, go to No. 10. If No, go to 9.		
9.	GIP Outlier Evaluation Indicates that Screening Criteria Discrepancies ("No" answers to 5.c., 6.a., 7.b., or 8) are Resolved?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	If Yes, go to No. 10. If No, go to 11.		
10.	Complete Seismic Adequacy documentation per GIP and applicable plant Quality Assurance/Quality Control Procedures. Confirm review and approval by Seismic Capacity Engineers (signatures below) and attach applicable documentation to this checklist. Seismic Adequacy Evaluation Complete.		
11.	Use other acceptable methods per plant licensing basis. Describe alternate method. Attach applicable documentation N/A		



 Seismic Capacity Engineer Approval

6/16/98

 Date

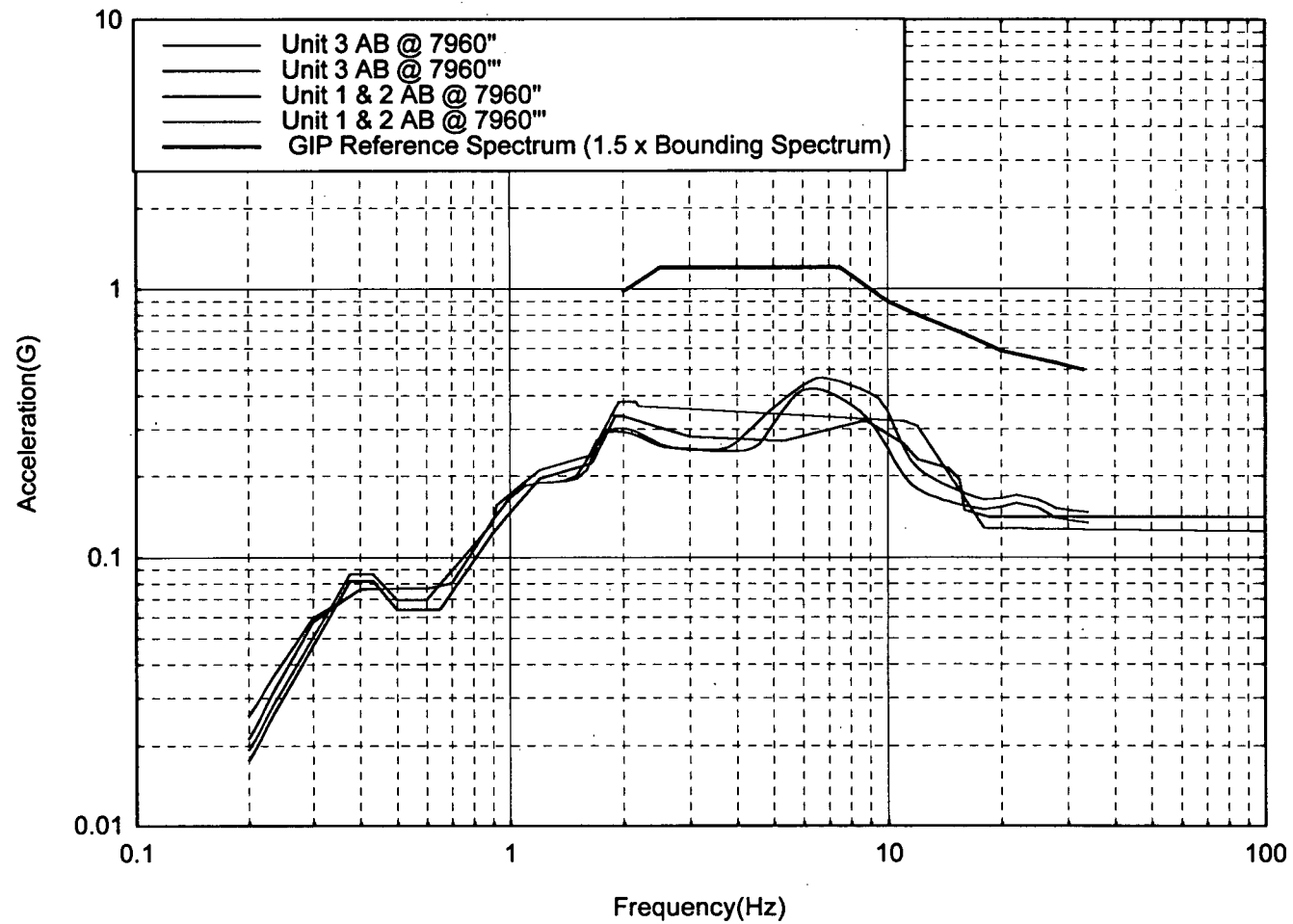


 Seismic Capacity Engineer Approval

6/16/98

 Date

In-Structure Response Spectra vs GIP Reference Spectra (1.5 x Bounding)



SCREENING EVALUATION WORK SHEET (SEWS)

Revision 2, Corrected, 6/28/91
 Status Y N U
 Sheet 1 of _____
 Rev. 2

Equip. ID No. 2ESV1 Equip. Class 20 - Instr. & Control Panels & Cabinets

Equipment Description Essential Siphon Vacuum Cabinet No.1

Location: Bldg. AB Floor El. 796'+6" Room, Row/Col EQ.ROOM

Manufacturer, Model, Etc. (optional) Hoffman A-603624FS

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	<u>796'+6"</u>
2.	Elevation of seismic input below about 40' from grade	[Y] N U
3.	Equipment has fundamental frequency above about 8 Hz	Y [N] U N/A *
4.	Capacity based on: Existing Documentation	DOC
	Bounding Spectrum	BS
	1.5 x Bounding Spectrum	[ABS]
	GERS	GERS
5.	Demand based on: Ground Response Spectrum	GRS
	1.5 x Ground Response Spectrum	AGRS
	Conserv. Des. In-Str. Resp. Spec.	CRS
	Realistic M-Ctr. In-Str. Resp. Spec.	[RRS]
Does capacity exceed demand?		[Y] N U *

CAVEATS - BOUNDING SPECTRUM (Identify with an asterisk (*) those caveats which are met by intent without meeting the specific wording of the caveat rule and explain the reason for this conclusion in the COMMENTS section below)

1.	Equipment is included in earthquake experience equipment class	[Y] N U N/A *
2.	No computers or programmable controllers	[Y] N U N/A
3.	No strip chart recorders	[Y] N U N/A
4.	Steel frame and sheet metal structurally adequate	[Y] N U N/A
5.	Adjacent cabinets or panels which are close enough to impact, or sections of multi-bay cabinets or panels, are bolted together if they contain essential relays	Y N U [N/A]
6.	Drawers and equipment on slides restrained from falling out	Y N U [N/A] *
7.	All doors secured by latch or fastener	[Y] N U N/A
8.	Attached lines have adequate flexibility	[Y] N U N/A
9.	Anchorage adequate (See checklist below for details)	[Y] N U N/A
10.	Relays mounted on equipment evaluated	[Y] N U N/A *
11.	Have you looked for and found no other adverse concerns?	[Y] N U N/A
Is the intent of all the caveats met for Bounding Spectrum?		[Y] N U N/A

ANCHORAGE

1.	Appropriate equipment characteristics determined (mass, CG, natural freq., damping, center of rotation)	[Y] N U N/A
2.	Type of anchorage covered by GIP	[Y] N U N/A *
3.	Sizes and locations of anchors determined	[Y] N U N/A

SCREENING EVALUATION WORK SHEET (SEWS)

Equip. ID No. 2ESV1 Equip. Class 20 - Instr. & Control Panels & Cabinets

Equipment Description Essential Siphon Vacuum Cabinet No.1

ANCHORAGE (Cont'd)

- | | |
|--|---------------|
| 4. Adequacy of anchorage installation evaluated
(weld quality and length, nuts and washers, expansion anchor tightness, etc.) | [Y] N U N/A * |
| 5. Factors affecting anchorage capacity or margin of safety considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking | [Y] N U N/A |
| 6. For bolted anchorages, gap under base less than 1/4-inch | [Y] N U N/A |
| 7. Factors affecting essential relays considered: gap under base, capacity reduction for expansion anchors | [Y] N U N/A |
| 8. Base has adequate stiffness and effect of prying action on anchors considered | [Y] N U N/A * |
| 9. Strength of equipment base and load path to CG adequate | [Y] N U N/A |
| 10. Embedded steel, grout pad or large concrete pad adequacy evaluated | Y N U [N/A] |
| Are anchorage requirements met? | [Y] N U N/A * |

INTERACTION EFFECTS

- | | |
|---|---------------|
| 1. Soft targets free from impact by nearby equipment or structures | [Y] N U N/A |
| 2. If equipment contains sensitive relays, equipment free from all impact by nearby equipment or structures | [Y] N U N/A * |
| 3. Attached lines have adequate flexibility | [Y] N U N/A |
| 4. Overhead equipment or distribution systems are not likely to collapse | [Y] N U N/A |
| 5. Have you looked for and found no other adverse concerns? | [Y] N U N/A |
| Is equipment free of interaction effects? | [Y] N U * |

IS EQUIPMENT SEISMICALLY ADEQUATE

[Y] N U

COMMENTS

Cabinet is seismically adequate pending acceptable interaction and internal component mounting walkdown. Rev. 1: Final walkdown reveals no interaction concerns. All internal components are present and properly mounted. All relays are assumed to be essential unless determined otherwise. Rev. 2 Adds details for inclusion rule evaluation in support of BS caveat #1

COMMENTS FROM SEISMIC CAPACITY VS DEMAND

3 Assumed to be < 8 Hz

Does capacity exceed demand? Demand based on 5% damped instrstructure resonse spectra @ 796' +6" in the AB

1

The ESV panels are judged to meet the inclusion rules for Enclosed Switchboards as listed below. The cabinets are free standing and consist of a steel frame with sheet metal panels. Internal components are mounted on the front face and on the interior walls. The front of the panel consist of a double swing door.

Inclusion Rules for GIP Equipment Class 20 (I & C Panels & Cabinet)

1. Includes all types of electrical panels that support instrumentation and controls.
2. Includes both the sheet metal enclosure and typical control and instrumentation components mounted on or inside the enclosure.
3. Includes a wide diversity of sizes, types, functions, and components.
4. Panels and cabinet structures generally consist of a steel frame supporting sheet metal panels to which instrumentation and control components are bolted or clamped.
5. Cabinet structures range from a single panel, braced against or built into a wall, to a free standing cabinet enclosure.
6. Enclosures are generally categorized as either Switchboards or Benchboards

*****Vertical Switchboards:*****

1. A vertical Switchboard is a single reinforced sheet metal instrument panel, which is either braced against an adjacent wall or built into it.

Enclosed Switchboard:

1. An enclosed switchboard is a free standing enclosed sheet metal cabinet with components mounted on the front face, and possibly on the interior walls.
2. Front or rear panel is usually hinged as a single or double swing door to allow access to the interior.

*****Dual Switchboard:*****

1. A duel switchboard consists of two vertical panels braced against each other to form a freestanding structure, with components mounted on both front and rear panels.
2. The sides are usually open ,and the two panels are joined by cross members spanning between their tops.

*****Duplex Switchboard:*****

1. Similar to a dual Switchboard, except that it consist of a panel fully enclosed by sheet metal on all sides, with access through doors in the two side panels.

*****Benchboards*****

1. Consists of a control desk with an attached vertical panel.
2. A control desk has components mounted on the desk top, and interior access through swinging doors in the rear.
3. The single panel is similar to a vertical Switchboard and is normally braced against or built into a wall.
4. A dual benchboard is similar to a duel switchboard, but the lower half of the front panel is a desk console.
5. A duplex benchboard is similar to a Duplex Switchboard, a totally enclosed panel, but with a desk console in the lower half of the panel.

Panels and cabinet enclosures normally consist of steel angles, channels, or square tubes welded together, with sheet metal siding attached by spot welds. Large panels are typically made of individual sections bolted together through adjoining framing. The cabinet may or may not include a sheet metal floor or ceiling.

The Instrument and Control Panels and cabinets equipment class includes the sheet metal enclosure, switches, push buttons, panel lights, indicators, annunciators, gauges, meters, recorders, relays (provided they meet relay requirements), controllers solid state circuit boards, power supplies, tubing, wiring and terminal blocks.

Design Difference Evaluation:

Cabinets are Hoffman A-603624FS. The new cabinets were compared to similar existing Hoffman cabinets at Oconee which had been previously evaluated per the GIP and found to be seismically adequate. In addition, the 1997 Hoffman catalog was compared to the October 1976 Hoffman catalog to ensure that no significant design or material variations existed. Both new and old cabinets are made of 12 gauge steel, all seams are continuously welded and there are no holes or knockouts. All door hinges and internal frame structures were found to be identical. Both new and existing doors have 3 point latching door handles. These cabinets were found to be identical in construction to existing Hoffman cabinets.

The structural load path of Hoffman type enclosures is similar to that shown for Enclosed Switchboards in Fig. 20-2 of EPRI NP-7149-D. Overall construction of the Hoffman cabinets is judged to be equivalent to typical Control and Instrumentation Panels & Cabinets represented in the earthquake experience database.

All internals were not present at inspection. Final inspection to be performed prior cabinet being declared operational. Rev 1: Final inspection performed per rev 1. All relays present and properly mounted.

6 There are no drawers or equipment on slides in the cabinets

10 All internal components required to function either during or after a seismic event have been evaluated as required per UFSAR 3.10. Field mounting of relays to be inspected prior to start up of system. Rev. 1: Final inspection of cabinet reveals that all relays are present and properly mounted.

COMMENTS OF ANCHORAGE

2 Anchored with 4 HN 1230 sleeve anchors.

4 Anchors were installed per QA procedure MP/0/A/1800/35.

8 Bottom of cabinet is stiffened with inverted channel. Bottom of cabinet is sandwiched between back of channel web and floor. This effectively stiffens the base of the cabinet.

Are anchorage requirements met? See calculation in OSC-6040.

COMMENTS OF INTERACTION EFFECTS

2 There is a 5/8 gap between the North lifting lug and existing conduit. gap is acceptable based low accelerations and stiffness of cabinet about strong axis.


Is equipment free of interaction effects? Cabinet must be walked for interaction prior to putting into service. All adjacent equipment may not have been installed at the time of this assessment. Rev 1: Final walkdown reveals no interaction concerns.

SCREENING EVALUATION WORK SHEET (SEWS)

Equip. ID No. 2ESV1 Equip. Class 20 - Instr. & Control Panels & Cabinets

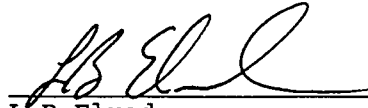
Equipment Description Essential Siphon Vacuum Cabinet No.1

Evaluated by:



R.P. Childs

Date: 06/15/98



L.B. Elrod

Date: 06/15/98

-----Sketch 1-----