

NRR-PMDAPEm Resource

From: Thompson, Russell R [rrthompson@tva.gov]
Sent: Tuesday, May 26, 2015 11:12 AM
To: Wyman, Stephen
Cc: DiFrancesco, Nicholas
Subject: Advanced Response - BFN ESEP Clarifying Questions
Attachments: Advanced Response - BFN ESEP Clarifying Questions.docx; Attachment - BFN Elevation Reference.xlsx

Attached are the advanced responses to the clarifying questions on the BFN ESEP.

The formal response will be submitted in the near future.

Please call me if you have any questions.

Russell Thompson

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Browns Ferry ESEP Clarifying Questions

- 1) Section 3.2 of EPRI 3002000704 stated that “The selection process for the ESEL should assume the FLEX strategies (modifications, equipment, procedures, etc.) have been implemented.” The staff noted that not all “non-portable” FLEX components have been installed during the development of the licensee’s ESEP. Clarify whether HCLFP evaluations will be performed to ensure they achieve the RLGM capacity when those “non-portable” FLEX components are installed in the future and propose any following actions

Response: In accordance with ESEP requirements, pre-staged FLEX equipment that is not anchored or connected to electrical or fluid systems is treated as non-installed equipment and evaluated primarily as an interaction concern for the plant. Pre-staged FLEX equipment that is anchored in the plant is treated as installed equipment and if required for the success of the FLEX strategy is evaluated using the ESEP criteria. This is true for FLEX equipment that was installed prior to ESEP submittal and is true for FLEX equipment installed after ESEP submittal.

- 2) Provide the justification why the following components are not included in the ESEL for Units 1,2 & 3:
- FCV-64-18, 19, 20, 21, FSV 84-8B & 8C, and FCV 76-19 & 24 for each unit (These valves may need to be closed for the Hardened Containment Venting Systems (HCVS) to work)
 - HCVS Instrumentation such as those for process temperature
 - Breaker, such as 1-BKR-071-0019, for MOVs

Response:

Component	Resolution
FCV-64-18	Valve FCV-64-18 is an eighteen-inch diameter, air-operated, butterfly valve used for primary containment isolation (FSAR Table 5.2-2). This valve is normally closed and the desired FLEX state is for the valve to stay closed. The valve requires air to open and will spring closed, therefore a spurious opening of the valve will not occur. This approach is supported by the EPRI 3002000704 NTTF 2.1 “Seismic Augmented Approach Guideline Questions & Answers,” which states “The only Containment Isolation Valves (CIVs) which would be included in the ESEL are those which need to be manipulated as part of implementing a Phase 1 or 2 FLEX strategy.” In summary, this item was not included on the ESEL because the valve is normally closed and does not need to change state or be manipulated for Phase 1 or Phase 2 FLEX strategy.
FCV-64-19	Valve FCV-64-19 is a twenty-inch diameter, air-operated, butterfly valve used for primary containment isolation (FSAR Table 5.2-2). This valve is normally closed and the desired FLEX state is for the valve to stay closed. The valve requires air to open and will spring closed, therefore a spurious opening of the valve will not occur. This approach is supported by the EPRI 3002000704 NTTF 2.1 “Seismic Augmented Approach Guideline Questions & Answers,” which states “The only Containment

Component	Resolution
	Isolation Valves (CIVs) which would be included in the ESEL are those which need to be manipulated as part of implementing a Phase 1 or 2 FLEX strategy.”In summary, this item was not included on the ESEL because the valve is normally closed and does not need to change state or be manipulated for Phase 1 or Phase 2 FLEX strategy.
FCV-64-20	<p>Valve FCV-64-20 is a twenty-inch diameter, air-operated butterfly valve used for primary containment isolation (FSAR Table 5.2-2). This valve is normally closed and the desired FLEX state is for the valve to stay closed. The valve will spring open and requires air to close; therefore, a spurious opening of the valve could possibly occur with loss of service air. Manual action can be used to keep the valve closed. However, containment isolation would still be accomplished by the check valve that is located within the flow path, (DWG 47E610-64-1), regardless of the state of FCV-64-20. Rather than credit valve FCV-64-20 and the air accumulator needed to keep the valve closed, the associated check valve CKV-064-0800 was selected as the success path for this containment isolation function.</p> <p>In accordance with the Seismic Evaluation Guidance – Augmented Approach for the Resolution of the Fukushima Near-Term Task Force Recommendation 2.1 – Seismic, Section 3.2, the check valve was excluded from the ESEL.</p>
FCV-64-21	<p>Valve FCV-64-21 is a twenty-inch diameter, air-operated butterfly valve used for primary containment isolation. (FSAR Table 5.2-2). This valve is normally closed and the desired FLEX state is for the valve to stay closed. The valve will spring open and requires air to close; therefore, a spurious opening of the valve could possibly occur with loss of service air. Manual action can be used to keep the valve closed. However, containment isolation would still be accomplished by the check valve that is located within the flow path, (DWG 47E610-64-1), regardless of the state of FCV-64-21. Rather than credit valve FCV-64-21 and the air accumulator needed to keep the valve closed, the associated check valve CKV-064-0801 was selected as the success path for this containment isolation function.</p> <p>In accordance with the Seismic Evaluation Guidance – Augmented Approach for the Resolution of the Fukushima Near-Term Task Force Recommendation 2.1 – Seismic, Section 3.2, the check valve was excluded from the ESEL.</p>
FSV-84-8B	<p>Valve FSV-84-8B is a two-inch diameter, solenoid-operated, globe valve used for primary containment isolation (FSAR Table 5.2-2). This valve is normally closed and the desired FLEX state is for the valve to stay closed. The valve requires AC power to open and will spring closed, therefore a spurious opening of the valve will not occur. This approach is supported by the EPRI 3002000704 NTTF 2.1 “Seismic Augmented Approach Guideline Questions & Answers,” which states “The only Containment Isolation Valves (CIVs) which would be included in the ESEL are those which need to be manipulated as part of implementing a Phase 1 or 2 FLEX strategy.”In summary, this item was not included on the ESEL because the valve is normally closed and does not need to change state or be manipulated for Phase 1 or Phase 2 FLEX strategy.</p>
FSV-84-8C	<p>Valve FSV-84-8C is a two-inch diameter, solenoid-operated, globe valve used for primary containment isolation (FSAR Table 5.2-2). This valve is normally closed and the desired FLEX state is for the valve to stay closed. The valve requires AC power to open and will spring closed therefore a spurious opening of the valve will not occur. This approach is supported by the EPRI 3002000704 NTTF 2.1 “Seismic Augmented Approach Guideline Questions & Answers,” which states “The only Containment Isolation Valves (CIVs) which would be included in the ESEL are those which need to be manipulated as part of implementing a Phase 1 or 2 FLEX strategy.”In summary, this item was not included on the ESEL because the valve is normally closed and does</p>

Component	Resolution
	not need to change state or be manipulated for Phase 1 or Phase 2 FLEX strategy.
FCV-76-19	Valve FCV-76-19 is a two-inch diameter, air-operated, butterfly valve used for primary containment isolation (FSAR Table 5.2-2). This valve is normally closed and the desired FLEX state is for the valve to stay closed. The valve requires air to open and will spring closed, therefore a spurious opening of the valve will not occur. This approach is supported by the EPRI 3002000704 NTTF 2.1 "Seismic Augmented Approach Guideline Questions & Answers," which states "The only Containment Isolation Valves (CIVs) which would be included in the ESEL are those which need to be manipulated as part of implementing a Phase 1 or 2 FLEX strategy." In summary, this item was not included on the ESEL because the valve is normally closed and does not need to change state or be manipulated for Phase 1 or Phase 2 FLEX strategy.
FCV-76-24	Valve FCV-76-24 is a ten-inch diameter, air-operated, butterfly valve used for primary containment isolation (FSAR Table 5.2-2). This valve is normally closed and the desired FLEX state is for the valve to stay closed. The valve requires air to open and will spring closed, therefore a spurious opening of the valve will not occur. This approach is supported by the EPRI 3002000704 NTTF 2.1 "Seismic Augmented Approach Guideline Questions & Answers," which states "The only Containment Isolation Valves (CIVs) which would be included in the ESEL are those which need to be manipulated as part of implementing a Phase 1 or 2 FLEX strategy." In summary, this item was not included on the ESEL because the valve is normally closed and does not need to change state or be manipulated for Phase 1 or Phase 2 FLEX strategy.
HCVS Instrumentation	ESEL instrumentation currently includes drywell pressure, drywell temperature, torus temperature and torus level. The components included are those presented in the BFN Overall Integrated Plan (OIP) for containment control. Seismic Evaluation Guidance – Augmented Approach for the Resolution of the Fukushima Near-Term Task Force Recommendation 2.1, Table 3-1 provides containment pressure, suppression pool temperature, and suppression pool level as parameters required for containment control.
MOV Breakers	Breakers in MCCs or busses are treated as rule of the box. This is consistent with the EPRI 3002000704 NTTF 2.1 "Seismic Augmented Approach Guideline Questions & Answers,"

- 3) Section 4.1 of the ESEP report describes the control point for the SSE and the GMRS. However, the control point for the IPEEE RLE is not discussed. In order to confirm that the control point of the IPEEE RLE is at the same location as the GMRS, provide the IPEEE RLE control point.

Response: The IPEEE RLE control point is the same as the SSE control point and GMRS control point.

- 4) Section 6.2 of the ESEP Report describes ESEL component screening using Table 2-4 of EPRI NP-6041-SL. This table is applicable to components located up to 40 ft above grade. The ESEP report is silent concerning screening or HCLPF calculations at

elevations beyond 40 ft above grade. Therefore, describe how ESEL components located at elevations beyond 40 ft above grade either were screened or had their HCLPF capacities calculated, including specific references for the applicable guidance utilized.

Response: Effective Grade at BFN is at approximately 550 ft. as shown in TVA Calculation CDQ0000940339. Components located above elevation 590 ft. are included in the attached table. Most components were evaluated in the earlier A-46 or seismic IPEEE program and are indicated as such. For components above base elevation, the Table 2-4 of EPRI NP-6041-SL screening capacities were conservatively interpreted as applicable for comparison with in-structure response spectra (ISRS). That is, the 5% damped spectral acceleration capacity was taken as 1.2g for the center capacity column of Table 2-4 of EPRI NP-6041 SL, and used for comparison to ISRS. Note that according to Section B.2 of EPRI 1019200 (Seismic Fragility Applications Guide Update), the appropriate capacity for the center capacity column of Table 2-4 of EPRI NP-6041 SL should be increased to 1.8g for comparison with clipped ISRS. This was done for ESEP. The additional HCLPF evaluations are performed in TVA Calculation CDQ0009992014000268.

- 5) Section 6.3.3 of the ESEP report indicates that HCLPF capacity evaluations were recommended for 12 components; however, the results for a number of these components could not be identified in the text portion of the report or the HCLPF table, e.g., main control room benchboard, blocks walls, Terry turbine control box, RCIC Back-Up Control Panel, and LPNL Instrument Rack. Please provide the HCLPF values and failure modes for those items.

Response: The requested information is documented in TVA Calculation CDQ0009992014000268, Rev. 02. Results are as follows:

Description	HCLPF Capacity for RLE at Rock Outcrop	Failure Mode
Main Control Room Benchboard	0.62g	Functional
Block Walls	>0.30g	Structural Integrity and Anchorage (per 80-11 program)
Terry Turbine Control Box (controls)	0.85g	Functional
RCIC Back-up Control Panel	0.62g	Functional
LPNL Instrument Rack	0.74g	Anchorage

- 6) The licensee reported that the ESEL items included in the IPEEE program are screened out based on previous evaluations against the IPEEE RLE which envelops the ESEP

RLGM for frequencies between 1 and 10 Hz and on recent walk-by verifications. Section 6.4 of the ESEP report states that the ESEL items not included in the IPEEE program are evaluated using the criteria in EPRI NP-6041-SL. Section 5.2 of the ESEP report states that "The RLGM ISRS for the Browns Ferry Nuclear Plant are generated by scaling the design basis SSE up to 0.3 g RLE as determined in the Seismic IPEEE." Please clarify if the licensee evaluated ESEL items not included in the IPEEE program using the ISRS developed by scaling the SSE up to the IPEEE RLE with a PGA of 0.3 g, instead of the ESEP RLGM with a PGA of 0.4 g, and, if so, provide the justification.

Response: ESEL items not included in the IPEEE program were evaluated using the ISRS developed by scaling the SSE up to the IPEEE RLE with a PGA of 0.3g. It is appropriate to use the IPEEE RLE with a PGA of 0.3g because that spectra envelops the ESEP RLGM with a PGA of 0.4g in the 1-10 Hz range, which is the frequency range of interest. This is shown graphically in Figure 6-1 of the Browns Ferry Nuclear Plant ESEP Report.

- 7) Section 7.0 states that some components inside drywell were not accessible during the walk by verifications. Those components were later assessed by the licensee's SRT to be free of seismic interaction concerns through the use of "current" photographs. Please specify the date(s) the photographs were taken.

Response: The photographs were observed on the Browns Ferry Video Tours Omnicast Web Viewer page at the recommendation of BFN Radiation Control personnel in the interest of ALARA considerations. The Drywell web page includes the note "Last modified: 5/09/09". There is no date on the photographs.

Equipment ID	Description	A-46	IPEEE	Building/Room	EL
1-FIC-71-36A	RCIC Flow Indicating Controller	N	N	U1 CB/ MCR	617'
1-PX-71-36A	Power Supply for RCIC flow controller	N	N	U1 RB/ NW Corner	621'
1-13A-K15	RCIC Auto Isol. Seal-In Relay	N	N	U1 RB	621
1-13A-K10	RCIC High Space Temperature Relay	N	N	U1 RB	621
1-13A-K11	RCIC High Space Temperature Relay	N	N	U1 RB	621
1-13A-K13	RCIC Low Steam Supply Press. Relay	N	N	U1 RB	621
1-2-71-K12	RCIC Steam Line High Differential Pressure Relay	N	N	U1 RB	621
1-13A-K44	RCIC High Rupt. Disc Pres. Relay	N	N	U1 RB	621
1-13A-K45	RCIC High Rupt. Disc Pres. Relay	N	N	U1 RB	621
1-13A-K12	RCIC Auto Isol. Seal-In Relay	N	N	U1 RB	621
1-13A-K14	RCIC Auto Isol. Seal-In Relay	N	N	U1 RB	621
1-13A-K16	RCIC Auto Isol. Seal-In Relay	N	N	U1 RB	621
1-13A-K38	RCIC Manual Steam Isolation	N	N	U1 RB	621
1-13A-K17	RCIC Auto Discharge Circuit Reset	N	N	U1 RB	621
1-13A-K18	RCIC Auto Discharge Circuit Reset	N	N	U1 RB	621
1-13A-K37	RCIC Vessel Low Water Lev.	N	N	U1 RB	621
2-13A-K15	RCIC Auto Isol. Seal-In Relay	N	N	U2 RB	621
2-13A-K10	RCIC High Space Temperature Relay	N	N	U2 RB	621
2-13A-K11	RCIC High Space Temperature Relay	N	N	U2 RB	621
2-13A-K13	RCIC Low Steam Supply Press. Relay	N	N	U2 RB	621
2-2-71-K12	RCIC Steam Line High Differential Pressure Relay	N	N	U2 RB	621
2-13A-K44	RCIC High Rupt. Disc Pres. Relay	N	N	U2 RB	621
2-13A-K45	RCIC High Rupt. Disc Pres. Relay	N	N	U2 RB	621
2-13A-K12	RCIC Auto Isol. Seal-In Relay	N	N	U2 RB	621
2-13A-K14	RCIC Auto Isol. Seal-In Relay	N	N	U2 RB	621

2-13A-K16	RCIC Auto Isol. Seal-In Relay	N	N	U1 RB	621
2-13A-K38	RCIC Manual Steam Isolation	N	N	U2 RB	621
2-13A-K17	RCIC Auto Discharge Circuit Reset	N	N	U2 RB	621
2-13A-K18	RCIC Auto Discharge Circuit Reset	N	N	U2 RB	621
2-13A-K37	RCIC Vessel Low Water Lev.	N	N	U2 RB	621
2-FIC-71-36A	RCIC Flow Indicating Controller	N	N	U2 CB/ MCR	617'
2-PX-71-36A	Power Supply for RCIC flow controller	N	N	U2 RB/ Q/R2	621'
3-FIC-71-36A	RCIC Flow Indicating Controller	N	N	U3 CB/ MCR	617'
3-PX-71-36A	Power Supply for RCIC flow controller	N	N	U3 RB/ Q/R2	621'
3-13A-K15	RCIC Auto Isol. Seal-In Relay	N	N	U3 RB	621
3-13A-K10	RCIC High Space Temperature Relay	N	N	U3 RB	621
3-13A-K11	RCIC High Space Temperature Relay	N	N	U3 RB	621
3-13A-K13	RCIC Low Steam Supply Press. Relay	N	N	U3 RB	621
3-2-71-K12	RCIC Steam Line High Differential Pressure Relay	N	N	U3 RB	621
3-13A-K44	RCIC High Rupt. Disc Pres. Relay	N	N	U3 RB	621
3-13A-K45	RCIC High Rupt. Disc Pres. Relay	N	N	U3 RB	621
3-13A-K12	RCIC Auto Isol. Seal-In Relay	N	N	U3 RB	621
3-13A-K14	RCIC Auto Isol. Seal-In Relay	N	N	U3 RB	621
3-13A-K16	RCIC Auto Isol. Seal-In Relay	N	N	U3 RB	621
3-13A-K38	RCIC Manual Steam Isolation	N	N	U3 RB	621
3-13A-K17	RCIC Auto Discharge Circuit Reset	N	N	U3 RB	621
3-13A-K18	RCIC Auto Discharge Circuit Reset	N	N	U3 RB	621
3-13A-K37	RCIC Vessel Low Water Lev.	N	N	U3 RB	621
1-HS-1-4	1-PCV 1-4 Control room hand switch	Y	Y	U1 CB/ MCR	617'
2-XS-1-4	Transfer Switch for 2-PCV-1-4	N	N	U1-RB	621'
1-HS-1-5A	1-PCV 1-5 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-5	Transfer Switch for 1-PCV-1-5	N	N	U1-RB	621'

1-HS-1-18	1-PCV 1-18 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-HS-1-19A	1-PCV 1-19 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-HS-1-22A	1-PCV 1-22 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-22	Transfer Switch for 2-PCV-1-22A	N	N	U1-RB	621'
1-HS-1-23A	1-PCV 1-23 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-232	Transfer Switch for 2-PCV-1-23A	N	N	U1-RB	621'
1-HS-1-30A	1-PCV 1-30 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-30	Transfer Switch for 1-PCV-1-30A	N	N	U1-RB	621'
1-HS-1-31A	1-PCV 1-31 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-HS-1-34A	1-PCV 1-34 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-34	Transfer Switch for 1-PCV-1-34	N	N	U1-RB	621'
1-HS-1-41	1-PCV 1-41 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-41	Transfer Switch for 1-PCV-1-41	N	N	U1-RB	621'
1-HS-1-42	1-PCV 1-42 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-42	Transfer Switch for 1-PCV-1-42	N	N	U1-RB	621'
1-HS-1-179A	1-PCV 1-179 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-HS-1-180A	1-PCV 1-180 Control room hand switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-180	Transfer Switch for 1-PCV-1-180	N	N	U1-RB	621'
1-XS-1-159A	ADS inhibit Switch	Y	Y	U1 CB/ MCR	617'
1-XS-1-161A	ADS inhibit Switch	Y	Y	U1 CB/ MCR	617'
1-LPNL-925-0032	Local Panel 25-32: Backup Control	Y	Y	U1 RB/ Q/R2	621'
2-HS-1-4	1-PCV 1-4 Control room hand switch	Y	Y	U2 CB/ MCR	617'
2-XS-1-4	Transfer Switch for 2-PCV-1-4	N	N	U2-RB	621'
2-HS-1-5A	1-PCV 1-5 Control room hand switch	Y	Y	U2 CB/ MCR	617'
2-xS-1-5	Transfer Switch for 1-PCV-1-5	N	N	U2-RB	621'
1-HS-1-18	1-PCV 1-18 Control room hand switch	Y	Y	U2 CB/ MCR	617'
1-HS-1-19A	1-PCV 1-19 Control room hand switch	Y	Y	U2 CB/ MCR	617'
1-HS-1-22A	1-PCV 1-22 Control room hand switch	Y	Y	U2 CB/ MCR	617'

2-XS-1-22	Transfer Switch for 2-PCV-1-22A	N	N	U2-RB	621'
1-HS-1-23A	1-PCV 1-23 Control room hand switch	Y	Y	U2 CB/ MCR	617'
2-xS-1-232	Transfer Switch for 2-PCV-1-23A	N	N	U2-RB	621'
1-HS-1-30A	1-PCV 1-30 Control room hand switch	Y	Y	U2 CB/ MCR	617'
2-xS-1-30	Transfer Switch for 1-PCV-1-30A	N	N	U2-RB	621'
1-HS-1-31A	1-PCV 1-31 Control room hand switch	Y	Y	U2 CB/ MCR	617'
1-HS-1-34A	1-PCV 1-34 Control room hand switch	Y	Y	U2 CB/ MCR	617'
2-XS-1-34	Transfer Switch for 1-PCV-1-34	N	N	U2-RB	621'
1-HS-1-41	1-PCV 1-41 Control room hand switch	Y	Y	U2 CB/ MCR	617'
2-XS-1-41	Transfer Switch for 1-PCV-1-41	N	N	U2-RB	621'
1-HS-1-42	1-PCV 1-42 Control room hand switch	Y	Y	U2 CB/ MCR	617'
2-xS-1-42	Transfer Switch for 1-PCV-1-42	N	N	U2-RB	621'
1-HS-1-179A	1-PCV 1-179 Control room hand switch	Y	Y	U2 CB/ MCR	617'
1-HS-1-180A	1-PCV 1-180 Control room hand switch	Y	Y	U2 CB/ MCR	617'
2-XS-1-180	Transfer Switch for 1-PCV-1-180	N	N	U2-RB	621'
2-XS-1-159A	ADS inhibit Switch	Y	Y	U2 CB/ MCR	617'
2-XS-1-161A	ADS inhibit Switch	Y	Y	U2 CB/ MCR	617'
1-LPNL-925-0032	Local Panel 25-32: Backup Control	Y	Y	U2 RB/ Q/R2	621'
3-HS-1-4	1-PCV 1-4 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-4	Transfer Switch for 3-PCV-1-4	N	N	U3-RB	621'
3-HS-1-5A	1-PCV 1-5 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-5	Transfer Switch for 1-PCV-1-5	N	N	U3-RB	621'
3-HS-1-18	1-PCV 1-18 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-HS-1-19A	1-PCV 1-19 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-HS-1-22A	1-PCV 1-22 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-22	Transfer Switch for 3-PCV-1-22A	N	N	U3-RB	621'
3-HS-1-23A	1-PCV 1-23 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-23	Transfer Switch for 3-PCV-1-23A	N	N	U3-RB	621'

3-HS-1-30A	1-PCV 1-30 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-30	Transfer Switch for 1-PCV-1-30A	N	N	U3-RB	621'
3-HS-1-31A	1-PCV 1-31 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-HS-1-34A	1-PCV 1-34 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-34	Transfer Switch for 1-PCV-1-34	N	N	U3-RB	621'
3-HS-1-41	1-PCV 1-41 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-41	Transfer Switch for 1-PCV-1-41	N	N	U3-RB	621'
3-HS-1-42	1-PCV 1-42 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-42	Transfer Switch for 1-PCV-1-42	N	N	U3-RB	621'
3-HS-1-179A	1-PCV 1-179 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-HS-1-180A	1-PCV 1-180 Control room hand switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-180	Transfer Switch for 1-PCV-1-180	N	N	U3-RB	621'
3-XS-1-159A	ADS inhibit Switch	Y	Y	U3 CB/ MCR	617'
3-XS-1-161A	ADS inhibit Switch	Y	Y	U3 CB/ MCR	617'
1-LPNL-925-0032	Local Panel 25-32: Backup Control	Y	Y	U3 RB/ Q/R2	621'
1-LI-3-58B	RPV Level Instrument	Y	N	U1 CB/ MCR	617'
1-LI-3-55	RPV Shutdown Floodup Range	N	Y	U1 CB/Main Cont Rm	617'
1-PI-3-74B	RPV Pressure Indicator	Y	Y	U1 CB/Main Cont Rm	617'
1-TIS-64-52AA	Drywell Temperature Indicator Switch	Y	Y	U1 RB	621'
1-TI-64-52AB	Drywell Temperature Indicator	Y	Y	U1 CB/Main Cont Rm	617'
1-PI-064-67B	Drywell Pressure Indicator	Y	Y	U1 CB/Main Cont Rm	617'
1-LI-064-159A	Suppression Pool Level Indicator (Div II)	N	Y	U1 CB/ MCR	617'
1-TI-064-161	Torus Bulk Water Temperature (Div I)	Y	N	U1 CB/ MCR	617'
1-PNLA-009-0003A	REACTOR SD & CONT. COOLING PNL	Y	Y	U1 CB/ MCR	617'
1-PNLA-009-0003B	REACTOR SD & CONT. COOLING PNL	Y	Y	U1 CB/ MCR	617'
1-PNLA-009-009	I&C Bus 1A and 1B (Cabinet 2 and 3 of panel 1-9-9)	Y	Y	U1 CB/ MCR	617'
1-PNLA-925-0031	Local Panel 25-31	Y	Y	U1 RB/ Q/R2	621'
2-LI-3-58B	RPV Level Instrument	Y	N	U2 CB/ MCR	617'
2-LI-3-55	RPV Shutdown Floodup Range	N	Y	U2 CB/Main Cont Rm	617'
2-PI-3-74B	RPV Pressure Indicator	Y	Y	U2 CB/ MCR	617'
2-TIS-64-52AA	Drywell Temperature Indicator Switch	Y	Y	U2 RB	621'

2-TI-64-52AB	Drywell Temperature Indicator	Y	Y	U2 CB/Main Cont Rm	617'
2-PI-064-67B	Drywell Pressure Indicator	Y	Y	U2 CB/ MCR	617'
2-LI-064-159A	Suppression Pool Level Indicator (Div II)	Y	N	U2 CB/ MCR	617'
2-TI-064-161	Torus Bulk Water Temperature (Div I)	Y	N	U2 CB/ MCR	617'
2-PNLA-009-0003A	REACTOR SD & CONT. COOLING PNL	Y	Y	U2 CB/ MCR	617'
2-PNLA-009-0003B	REACTOR SD & CONT. COOLING PNL	Y	Y	U2 CB/ MCR	617'
2-PNLA-009-009	I&C Bus 1A and 1B (Cabinet 2 and 3 of panel 1-9-9)	Y	Y	U2 CB/ MCR	617'
2-PNLA-925-0031	Local Panel 25-31	Y	Y	U2 RB/ Q/R2	621'
3-LI-3-58B	RPV Level Instrument	Y	N	U3 CB/ MCR	617'
3-LI-3-55	RPV Shutdown Floodup Range	N	Y	U3 CB/Main Cont Rm	617'
3-PI-3-74B	RPV Pressure Indicator	Y	Y	U2 CB/ MCR	617'
3-TIS-64-52AA	Drywell Temperature Indicator Switch	Y	Y	U3 RB	621'
3-TI-64-52AB	Drywell Temperature Indicator	Y	Y	U3 CB/Main Cont Rm	617'
3-PI-064-67B	Drywell Pressure Indicator	Y	Y	U34 CB/Main Cont Rm	617'
3-LI-064-159A	Suppression Pool Level Indicator (Div II)	Y	N	U3 CB/ MCR	617'
3-TI-064-161	Torus Bulk Water Temperature (Div I)	Y	N	U3 CB/ MCR	617'
3-PNLA-009-0003A	REACTOR SD & CONT. COOLING PNL	Y	Y	U3 CB/ MCR	617'
3-PNLA-009-0003B	REACTOR SD & CONT. COOLING PNL	Y	Y	U3 CB/ MCR	617'
3-PNLA-009-009	I&C Bus 1A and 1B (Cabinet 2 and 3 of panel 1-9-9)	Y	Y	U3 CB/ MCR	617'
3-PNLA-925-0031	Local Panel 25-31	Y	Y	U3 RB/ Q/R2	621'
1-BDBB-281-0001A	250V RMOV Board 1A	Y	Y	U1 RB/ Q/R1	621'
2-BDBB-281-0002A	250V RMOV Board 2A	Y	Y	U2 RB/ Q/R14	621'
3-BDBB-281-0003A	250V RMOV Board 3A	Y	Y	U3 RB/ SD BD E	621'
0-PNLA-248-A	250V DISTRIBUTION PANEL SB-A	Y	Y	U1 RB/ S/R2	621'
0-BATA-248-0000A	250V BATTERY SB-A	Y	Y	U1 RB/ S/R2	621'
0-CHGA-248-0000A	250V BATTERY CHARGER SB-A	Y	Y	U1 RB/ S/R2	621'
0-PNLA-248-B	250V DISTRIBUTION PANEL SB-B	Y	Y	U1 RB/ S/R2	621'
0-BATA-248-0000B	250V BATTERY SB-B	Y	Y	U1 RB/ S/R2	621'
0-CHGA-248-0000B	250V BATTERY CHARGER SB-B	Y	Y	U2 RB/ S/R2	621'
0-BATA-248-0000C	250V BATTERY SB-C	Y	Y	U2 RB/ S/R13	621'
0-PNLA-248-0000C	250V DISTRIBUTION PANEL SB-C	Y	Y	U2 RB/ S/R13	621'
0-CHGA-248-0000C	250V BATTERY CHARGER SB-C	Y	Y	U2 RB/ S/R13	621'
0-BATA-248-0000D	250V BATTERY SB-D	Y	Y	U1 RB/ S/R13	621'

0-PNLA-248-0000D	250V DISTRIBUTION PANEL SB-D	Y	Y	U2 RB/ S/R13	621'
0-CHGA-248-0000D	250V BATTERY CHARGER SB-D	Y	Y	U2 RB/ S/R13	621'
1-BDBB-231-0001A	480 V SD Board 1A	Y	Y	U1 RB/ S/R1	621'
1-BDBB-231-0001B	480 V SD Board 1B	Y	Y	U1 RB/ S/R2	621'
2-BDBB-231-0002A	480 V SD Board 2A	Y	Y	U2 RB/ S/R13	621'
2-BDBB-231-0002B	480 V SD Board 2B	Y	Y	U2 RB/ S/R14	621'
3-BDBB-231-0003A	480 V SD Board 3A	Y	Y	U3 RB/ S/R20	621'
3-BDBB-231-0003B	480 V SD Board 3B	Y	Y	U3 RB/ R/R1	621'
1-BDBB-268-0001A	480 V RMOV Board 1A	Y	Y	U1 RB/ R/R1	617'
2-BDBB-268-0002A	480 V RMOV Board 2A	Y	Y	U2 RB/ R/R14	621'
3-BDBB-268-0003A	480 V RMOV Board 3A	Y	Y	U3 RB/ SD BD F	621'
0-BDAA-211-0000A	4 kV Shutdown Board A	Y	Y	U1 RB	621
0-BDAA-211-0000C	4 kV Shutdown Board C	Y	Y	U2 RB	621
1-XFA-231-TS1A	4KV/480 Trans. TS1A	Y	Y	U1 RB	621
1-XFA-231-TS1B	4KV/480 Trans. TS1A	Y	Y	U1 RB	621
2-XFA-231-TS2A	4KV/480 Trans. TS2A	Y	Y	U2 RB	621
2-XFA-231-TS2B	4KV/480 Trans. TS2B	Y	Y	U2 RB	621
3-XFA-231-TS2A	4KV/480 Trans. TS2A	Y	Y	U3 RB	621
3-XFA-231-TS2B	4KV/480 Trans. TS2B	Y	Y	U3 RB	621
3-XFA-231-TS1E	4KV/480 Trans. TS1E	Y	Y	U3 RB	621
1-13A-K30	RCIC Steam Line Space Excess Temp. Isol.	N	N	U1 CB U1 Air	593
1-13A-K31	RCIC Steam Line Space Excess Temp. Isol.	N	N	U1 CB U1 Air	593
1-71-K32	RCIC Steam Line Space Excess Temp. Isol.	N	N	U1 CB U1 Air	593
1-13A-K32	RCIC Steam Line Space Excess Temp. Isol.	N	N	U1 CB U1 Air	593
1-13A-K33	RCIC Steam Line Space Excess Temp. Isol.	N	N	U1 CB U1 Air	593
2-13A-K30	RCIC Steam Line Space Excess Temp. Isol.	N	N	U2 CB U2 Air	593
2-13A-K31	RCIC Steam Line Space Excess Temp. Isol.	N	N	U2 CB U2 Air	593
2-71-K32	RCIC Steam Line Space Excess Temp. Isol.	N	N	U2 CB U2 Air	593
3-13A-K33	RCIC Auto Isol. Signal	N	N	U3 CB U3 Air	593
2-13A-K33	RCIC Steam Line Space Excess Temp. Isol.	N	N	U2 CB U2 Air	593
3-13A-K30	RCIC Steam Line Space Excess Temp. Isol.	N	N	U3 CB U3 Air	593
3-13A-K31	RCIC Steam Line Space Excess Temp. Isol.	N	N	U3 CB U3 Air	593
1-71-K32	RCIC Steam Line Space Excess Temp. Isol.	N	N	U3 CB U3 Air	593
3-13A-K32	RCIC Steam Line Space Excess Temp. Isol.	N	N	U3 CB U1 Air	593
3-13A-K33	RCIC Steam Line Space Excess Temp. Isol.	N	N	U3 CB U3 Air	593
1-XS-1-18	Transfer Switch for 1-PCV- 1-18	N	N	Control Bay 1c	593'

1-XS-1-19	Transfer Switch for 1-PCV-1-19A	N	N	Control Bay 1c	593
1-XS-1-31	Transfer Switch for 1-PCV-1-30A	N	N	Control Bay 1c	593'
1-XS-1-179	Transfer Switch for 1-PCV-1-179	N	N	Control Bay 1c	593'
2-xS-1-18	Transfer Switch for 1-PCV-1-18	N	N	Control Bay 1c	593'
2-XS-1-19	Transfer Switch for 1-PCV-1-19A	N	N	Control Bay 1c	593
2-XS-1-31	Transfer Switch for 1-PCV-1-30A	N	N	Control Bay 1c	593'
2-XS-1-179	Transfer Switch for 1-PCV-1-179	N	N	Control Bay 1c	593'
3-XS-1-18	Transfer Switch for 1-PCV-1-18	N	N	Control Bay 1c	593'
3-XS-1-19	Transfer Switch for 1-PCV-1-19A	N	N	Control Bay 1c	593
3-XS-1-31	Transfer Switch for 1-PCV-1-30A	N	N	Control Bay 1c	593'
3-XS-1-179	Transfer Switch for 1-PCV-1-179	N	N	Control Bay 1c	593'
1-LIS-3-58B	RPV Level Indication / Switch	N	N	U1 CB/ U1 AIR	593'
1-LS-3-58B	RPV Level Switch	N	N	U1 CB/ U1 AIR	593'
1-LT-3-55	RPV Shutdown Floodup Range	N	N	U1 RB	593'
1-PIS-3-74B	RPV Pressure Indication / Switch	Y	Y	U1 CB/ Unit 1 AIR	593'
1-PT-3-74B	RPV Pressure Transmitter	Y	Y	U1 RB/ P/R5	593'
1-PT-064-67	Drywell Pressure Transmitter	Y	Y	U1 RB/ S/R3	593'
1-TM-64-161A	Torus temperature module A	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161B	Torus temperature module B	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161C	Torus temperature module C	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161D	Torus temperature module D	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161E	Torus temperature module E	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161F	Torus temperature module F	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161G	Torus temperature module G	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161H	Torus temperature module H	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161J	Torus temperature module J	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161K	Torus temperature module K	Y	N	U1 CB/ U1 AIR	593'
1-TM-64-161L	Torus temperature module L	Y	N	U1 CB/ U1 AIR	593'

1-PNLA-009-0032	RHR, CS, HPCI (CH A), RCIC, ADS PNL	Y	Y	U1 CB/ U1 AIR	593'
1-PNLA-009-0033	RHR, CS, HPCI (CH B), RCIC, ADS Logic PNL	Y	Y	U1 CB/ U1 AIR	593'
1-PNLA-009-0081	DIV I ECCS ATU CABINET	Y	Y	U1 CB/ U1 AIR	593'
1-PNLA-009-0082	DIV II ECCS ATU CABINET	Y	Y	U1 CB/ U1 AIR	593'
1-PNLA-009-0087	DIV I TORUS TEMP MONITORING	Y	Y	U1 CB/ U1 AIR	593'
1-LPNL-925-005A	LOCAL PANEL 25-5A	Y	Y	U1 RB/ S/R3	593'
1-LPNL-925-005B	LOCAL PANEL 25-5B	Y	Y	U1 RB/ S/R3	593'
2-LIS-3-58B	RPV Level Indication / Switch	N	N	U2 CB/ U2 AIR	593'
2-LS-3-58B	RPV Level Switch	N	N	U2 CB/ U2 AIR	593'
2-LT-3-55	RPV Shutdown Floodup Rang	N	N	U2 RB	593'
2-PIS-3-74B	RPV Pressure Indication / Switch	Y	Y	U2 CB/ Unit 1 AIR	593'
2-PT-3-74B	RPV Pressure Transmitter	Y	Y	U2 RB/ P/R5	593'
2-PT-064-67B	Drywell Pressure Transmitter	Y	Y	U2 RB/ S/R3	593'
2-TM-64-161A	Torus temperature module A	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161B	Torus temperature module B	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161C	Torus temperature module C	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161D	Torus temperature module D	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161E	Torus temperature module E	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161F	Torus temperature module F	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161G	Torus temperature module G	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161H	Torus temperature module H	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161J	Torus temperature module J	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161K	Torus temperature module K	Y	N	U2 CB/ U2 AIR	593'
2-TM-64-161L	Torus temperature module L	Y	N	U2 CB/ U2 AIR	593'
2-PNLA-009-0032	RHR, CS, HPCI (CH A), RCIC, ADS PNL	Y	Y	U2 CB/ U2 AIR	593'
2-PNLA-009-0033	RHR, CS, HPCI (CH B), RCIC, ADS Logic PNL	Y	Y	U2 CB/ U2 AIR	593'
2-PNLA-009-0081	DIV I ECCS ATU CABINET	Y	Y	U2 CB/ U2 AIR	593'
2-PNLA-009-0082	DIV II ECCS ATU CABINET	Y	Y	U2 CB/ U2 AIR	593'
2-PNLA-009-0087	DIV I TORUS TEMP MONITORING	Y	Y	U2 CB/ U2 AIR	593'

2-LPNL-925-005A	LOCAL PANEL 25-5A	Y	Y	U2 RB/ S/R3	593'
2-LPNL-925-005B	LOCAL PANEL 25-5B	Y	Y	U2 RB/ S/R3	593'
3-LIS-3-58B	RPV Level Indication / Switch	N	N	U3 CB/ U3 AIR	593'
3-LS-3-58B	RPV Level Switch	N	N	U3 CB/ U3 AIR	593'
3-LT-3-55	RPV Shutdown Floodup Range	N	N	U3 RB	593'
3-PIS-3-74B	RPV Pressure Indication / Switch	Y	Y	U3 CB/ Unit 1 AIR	593'
3-PT-3-74B	RPV Pressure Transmitter	Y	Y	U213RB/ P/R5	593'
3-PT-064-67	Drywell Pressure Transmitter	Y	Y	U34 RB/ S/R3	593'
3-TM-64-161A	Torus temperature module A	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161B	Torus temperature module B	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161C	Torus temperature module C	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161D	Torus temperature module D	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161E	Torus temperature module E	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161F	Torus temperature module F	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161G	Torus temperature module G	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161H	Torus temperature module H	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161J	Torus temperature module J	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161K	Torus temperature module K	Y	N	U3 CB/ U3 AIR	593'
3-TM-64-161L	Torus temperature module L	Y	N	U3 CB/ U3 AIR	593'
3-PNLA-009-0032	RHR, CS, HPCI (CH A), RCIC, ADS PNL	Y	Y	U3 CB/ U3 AIR	593'
3-PNLA-009-0033	RHR, CS, HPCI (CH B), RCIC, ADS Logic PNL	Y	Y	U3 CB/ U3 AIR	593'
3-PNLA-009-0081	DIV I ECCS ATU CABINET	Y	Y	U3 CB/ U3 AIR	593'
3-PNLA-009-0082	DIV II ECCS ATU CABINET	Y	Y	U3 CB/ U3 AIR	593'
3-PNLA-009-0087	DIV I TORUS TEMP MONITORING	Y	Y	U3 CB/ U3 AIR	593'
3-LPNL-925-005A	LOCAL PANEL 25-5A	Y	Y	U3 RB/ S/R3	593'
3-LPNL-925-005B	LOCAL PANEL 25-5B	Y	Y	U3 RB/ S/R3	593'
1-BDBB-281-0001B	250V RMOV Board 1B	Y	Y	U1 RB/ Q/R1	593'
1-BDBB-281-0001C	250V RMOV Board 1C	Y	Y	U1 RB/ Q/R1	565'
2-BDBB-281-0002B	250V RMOV Board 2B	Y	Y	U2 RB/ Q/R14	593'
3-BDBB-281-0003B	250V RMOV Board 3B	Y	Y	U3 RB/ SD BD F	593'
0-BDDD-280-0001	250V Battery Board 1	Y	Y	U1 RB/P/R4	593'
0-BATA-248-0001	250V Main Battery 1	Y	Y	U1 RB/P/R4	593'

0-CHGA-248-0001	Unit Battery Charger 1	Y	Y	U1 RB/P/R4	593'
0-BDDD-280-0002	250V Battery Board 2	Y	Y	U2 RB/P/R10	593'
0-BATA-248-0002	250V Main Battery 2	Y	Y	U2 RB/P/R9	593'
0-CHGA-248-0002A	Unit Battery Charger 2A	Y	Y	U2 RB/P/R9	593'
0-BDDD-280-0003	250V Battery Board 3	Y	Y	U3 RB/P/R18	593'
0-BATA-248-0003	250V Main Battery 3	Y	Y	U3 RB/P/R18	593'
0-CHGA-248-0003	Unit Battery Charger 3	Y	Y	U3 RB/P/R18	593'
1-BDBB-268-0001B	480 V RMOV Board 1B	Y	Y	U1 RB/ R/R1	593'
2-BDBB-268-0002B	480 V RMOV Board 2B	Y	Y	U2 RB/ R/R14	593'
3-BDBB-268-0003B	480 V RMOV Board 3B	Y	Y	U3 RB/ SD BD F	593'
0-BDAA-211-0000B	4 kV Shutdown Board B	Y	Y	U1 RB	593
0-BDAA-211-0000D	4 kV Shutdown Board D	Y	Y	U2 RB	593
3-BDAA-211-0000EA	4 kV Shutdown Board 3EA	Y	Y	U3 DG/ 4KVSD BD	593
3-BDAA-211-0000EC	4 kV Shutdown Board 3EC	Y	Y	U3 DG/ 4KVSD BD	593
TBD	FLEX 480V DG Battery Charging Distribution Panel	N	N	CB	593'
1-FCV-75-25	CS/DIV I INBOARD INJECTION VALVE	Y	Y	U1 RB/ R4/P	593'
2-FCV-75-25	CS/DIV I Inboard Injection valve	Y	Y	U2 RB/ P/R10	593'
1-FCV-75-25	CS/DIV I Inboard Injection valve	Y	Y	U3 RB/ P/R18	593'
2-FCV-74-74	RHR/LOOP II OUTBOARD DRYWELL SPRAY VALVE	Y	Y	U2 RB / R12/S	593'
2-FCV-74-75	RHR/LOOP II INBOARD DRYWELL SPRAY VALVE	Y	Y	U2 RB / R12/S	593'
3-FCV-74-60	RHR/LOOP II OUTBOARD DRYWELL SPRAY VALVE	Y	Y	U3 RB/ R19/S	593'
3-FCV-74-61	RHR/LOOP II INBOARD DRYWELL SPRAY VALVE	Y	Y	U3 RB/ R19/S	593'

transfer switches in HCLPF calc

RCIC in HCLPF calc