VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

December 17, 2014

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No. 14-565
NL&OS/WDC R3
Docket Nos. 50-338/339
License Nos. NPF-4/7

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
RESPONSE TO MARCH 12, 2012 INFORMATION REQUEST
EXPEDITED SEISMIC EVALUATION PROCESS REPORT FOR RECOMMENDATION 2.1

References:

1. NRC Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012
2. Virginia Electric and Power Company Letter to NRC, "North Anna Power Station Units 1 and 2 Response to March 12, 2012 Information Request – Seismic Hazard and Screening Report (CEUS Sites) for Recommendation 2.1," dated March 31, 2014
3. EPRI Report 3002000704, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Near-Term Task Force Recommendation 2.1: Seismic"
4. NRC Letter, "Electric Power Research Institute Final Draft Report XXXXXX, 'Seismic Evaluation Guidance: Augmented Approach for the Resolution of Near-Term Task Force Recommendation 2.1: Seismic,' as an Acceptable Alternative to the March 12, 2012, Information Request for Seismic Reevaluations," dated May 7, 2013

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 to power reactor licensees and holders of construction permits in active or deferred status. In Reference 2, Virginia Electric and Power Company (Dominion) provided the Seismic Hazard and Screening Report for North Anna Power Station in response to the Reference 1 request. In that submittal, Dominion committed to perform, as an interim measure, an Expedited Seismic Evaluation Process (ESEP) in accordance with Reference 3 and to provide the results of the evaluation to NRC by December 31, 2014.

Reference 3 contains industry guidance and detailed information to be included in the ESEP Report submittal. NRC endorsed this industry guidance in Reference 4.

The attached ESEP Report for North Anna Power Station provides the information described in Section 7 of Reference 3.

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NRR

If you have any questions regarding this information, please contact Mr. Thomas Shaub at (804) 273-2763.

Sincerely,

David A. Heacock
President and Chief Nuclear Officer
Virginia Electric and Power Company

Commitments made in this letter: None

Attachment: Expedited Seismic Evaluation Process Report

Vicki L. Hull
NOTARY PUBLIC
Commonwealth of Virginia
Reg. # 140542
My Commission Expires May 31, 2018

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by David A. Heacock, who is President and Chief Nuclear Officer of Virginia Electric and Power Company. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 17TH day of December, 2014.

My Commission Expires: May 31, 2018

Vicki L. Hull
Notary Public

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ATTACHMENT

EXPEDITED SEISMIC EVALUATION PROCESS REPORT

December 2014

**VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNITS 1 AND 2**

Executive Summary

In response to the NRC 50.54(f) letter of March 12, 2012 on Fukushima Near-Term Task Force Recommendation 2.1: Seismic, a seismic evaluation program, entitled the Expedited Seismic Evaluation Process (ESEP), was conducted for North Anna Power Station Units 1 and 2 (NAPS) as an interim measure until the long-term seismic risk evaluation is completed. The ESEP evaluated the impact of higher than design basis earthquakes on select equipment associated with FLEX strategies that are being implemented for mitigation of beyond design basis events to protect the reactor core. The ESEP was completed for NAPS because the recently developed Ground Motion Response Spectrum (GMRS), which was prepared using probabilistic seismic hazard analysis, exceeds the plant's Safe Shutdown Earthquake (SSE). The ESEP was performed in accordance with the NRC-endorsed guidance in EPRI 3002000704, *Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic.*

This report provides summary information resulting from the ESEP performed for NAPS. The report includes a description of the Review Level Ground Motion Spectra (RLGM), the equipment selection process, the seismic capacity walkdown approach, the screening of components, the methodology used to perform the seismic margin assessment, and the results. The results include seismic factors of safety or high confidence of low probability of failure (HCLPF) capacities for the selected structures, systems and components (SSCs) for both structural integrity and functional failure modes, and, for some SSCs, the basis for screening out from further evaluation.

The report concludes that the SSCs have seismic factors of safety greater than unity and/or HCLPF capacities that are greater than the selected RLGM. Therefore, no upgrades to the plant or modifications to any SSC are required as a result of the ESEP.

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1.0 PURPOSE AND OBJECTIVE

Following the accident at the Fukushima Dai-ichi nuclear power plant resulting from the March 11, 2011, Great Tohoku Earthquake and subsequent tsunami, the Nuclear Regulatory Commission (NRC) established a Near Term Task Force (NTTF) to conduct a systematic review of NRC processes and regulations and to determine if the agency should make additional improvements to its regulatory system. The NTTF developed a set of recommendations intended to clarify and strengthen the regulatory framework for protection against natural phenomena. Subsequently, the NRC issued a 50.54(f) letter on March 12, 2012 (Reference 9.1), which requested information to assure that these recommendations were addressed by all U.S. nuclear power plants. The 50.54(f) letter requested that licensees and holders of construction permits under 10 CFR Part 50 reevaluate the seismic hazards at their sites against present-day NRC requirements and guidance. Depending on the comparison between the reevaluated seismic hazard and the current design basis, further risk assessment may be required. Assessment approaches acceptable to the staff included a seismic probabilistic risk assessment (SPRA), or a seismic margin assessment (SMA). Based upon the assessment results, the NRC staff would determine whether additional regulatory actions are necessary.

This report describes the Expedited Seismic Evaluation Process (ESEP) undertaken for North Anna Power Station (NAPS) Units 1 and 2. The intent of the ESEP is to perform an interim action in response to the NRC's 50.54(f) letter (Reference 9.1) to demonstrate seismic margin through a review of a subset of the plant equipment that can be relied upon to protect the reactor core following beyond design basis seismic events.

The ESEP is implemented using the methodologies in the NRC-endorsed guidance in EPRI 3002000704, *Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* (Reference 9.2).

The objective of this report is to provide summary information describing the ESEP evaluations and results. The level of detail provided in the report is intended to provide the NRC a clear understanding of the inputs used, the evaluations performed, and the decisions made as a result of the interim evaluations.

2.0 BRIEF SUMMARY OF THE FLEX SEISMIC IMPLEMENTATION STRATEGIES

Diverse and flexible (FLEX) strategies have been developed for NAPS in accordance with NEI 12-06 (Reference 9.3) to respond to NRC Order EA-12-049 (Reference 9.4). The NAPS submittal to NRC dated February 28, 2013 (Reference 9.5) and subsequent updates (References 9.6 through 9.8), hereafter collectively referred to as the Overall Integrated Plan (OIP), provide a description of the strategies developed to mitigate a Beyond Design Basis (BDB) event.

FLEX strategies relevant to the ESEP are listed in Table 3-2 of Reference 9.2 and include reactor core cooling and heat removal, Reactor Coolant System (RCS) inventory control and long-term subcriticality, containment function, and core cooling and heat removal during Modes 5 & 6. These strategies, as described in the NAPS OIP, are summarized below.

2.1 REACTOR CORE COOLING AND HEAT REMOVAL

PHASE 1

Reactor core cooling and heat removal is achieved through steam release from the Steam Generators (S/Gs) via remote or local manual operation of the S/G Power-Operated Relief Valves (PORVs). S/G makeup is provided from the Turbine Driven Auxiliary Feedwater Pump (TDAFWP) during FLEX Phase 1 with suction from the Emergency Condensate Storage Tank (ECST). Upon depletion of the ECST, the suction of the TDAFWP is aligned to the Fire Protection (FP) System, with water flow supplied from the Service Water (SW) reservoir via the diesel-driven FP pump.

PHASE 2

The Phase 2 strategy includes deployment of the portable BDB high capacity pump taking suction from Lake Anna or the SW reservoir and providing flow to the suction of the TDAFWP or a deployed portable BDB Auxiliary Feedwater (AFW) pump (while simultaneously refilling the ECST via the permanently installed BDB ECST refill connection.) The portable BDB AFW pump discharges to the S/Gs via the permanent tie-in connection to the AFW system. This configuration is graphically shown in Figure 3 of the OIP.

PHASE 3

No additional Phase 3 strategy is required for core cooling and heat removal, since the TDAFWP and/or the portable BDB AFW pump can provide S/G makeup indefinitely. However, additional pumps, acquired from the National SAFER Response Center (NSRC), provide backup capability should multiple failures occur during extended operation. These pumps will utilize the same flowpaths described above.

2.2 RCS Inventory Control / Long-Term Subcriticality

PHASE 1

The Phase 1 strategy for ensuring adequate RCS inventory and reactivity control consists of monitoring pressurizer level and RCS pressure, and controlling RCS cooldown by S/G depressurization to a steam pressure of 290 psig.

PHASE 2

RCS inventory control and long-term subcriticality is maintained by injecting borated water from the Refueling Water Storage Tank (RWST) to the RCS via the permanently installed BDB RCS pump discharge connection in the Safety Injection (SI) system using the portable BDB RCS injection pump. The BDB RCS injection pump draws the contents of the RWST through the BDB RCS pump suction connection installed in the Quench Spray (QS) pump suction piping. This configuration is graphically shown in Figure 4 of the OIP.

PHASE 3

No additional Phase 3 strategy is required as the portable BDB RCS injection pump can provide RCS makeup indefinitely. However, additional pumps acquired from the NSRC provide backup capability should multiple failures occur during extended operation. The NSRC pumps will utilize the same flowpaths described above.

2.3 Containment Function

PHASE 1

The Phase 1 strategy for containment function is to monitor containment temperature and pressure using installed instrumentation.

PHASE 2

The Phase 2 strategy for containment function is to continue to monitor containment pressure and temperature.

PHASE 3

The Phase 3 strategy for containment function is to continue to monitor containment pressure and temperature. No primary or alternate strategies are required to be defined to maintain the containment function (Reference 9.8).

2.4 Core Cooling and Heat Removal during Modes 5 & 6

PHASE 1

The Phase 1 strategy for core cooling during Modes 5 & 6 involves the initiation of the gravity feed and spill method of removing decay heat. Several different flowpaths can be utilized for gravity feed and spill depending on plant conditions. Valves are aligned in the SI system to allow borated water from the RWST to flow into the cold leg piping of the RCS using the installed plant piping flowpath. A spill path is established through the pressurizer PORVs or a removed pressurizer safety valve.

PHASE 2

The Phase 2 response for core cooling during Modes 5 & 6 includes utilization of the portable BDB AFW pump to provide RCS boration and makeup water flow. Temporary suction hoses for the pump are routed to the permanent FLEX connection in the QS pump suction piping to provide a borated water source from the RWST. Temporary discharge hoses are routed and connected to the permanent FLEX connection in the Chemical and Volume Control System (CVCS) piping. Flow can be directed to either unit's RCS by aligning the manual cross-tie valves in the Unit 1 "C" and Unit 2 "A" CVCS charging pump cubicles.

PHASE 3

No additional Phase 3 strategies or equipment are required for core cooling during Modes 5 & 6. The continued implementation of the Phase 2 strategy ensures adequate decay heat removal indefinitely.

2.5 POWERING KEY PARAMETER INSTRUMENTATION

PHASE 1

The Phase 1 strategy for powering key parameter monitoring instrumentation includes relying on the installed Class 1E 125 VDC station batteries to power 120 VAC vital bus panels through the installed Class 1E inverters, and includes stripping non-critical loads to extend battery life.

PHASE 2

The Phase 2 strategy for re-powering key instrumentation upon depletion of the 125 VDC station batteries involves the deployment of portable 120/240 VAC diesel generators that will be connected to 120 VAC vital buses through installed FLEX cabling, connections and distribution panels. This configuration is graphically shown in Figure 10 of the OIP.

PHASE 3

Although the Phase 3 electrical re-powering strategy includes deployment of a 4160 VAC diesel generator, this strategy is established to provide redundancy and is not the primary strategy. Therefore, it is not included in the scope of the ESEP since the primary strategy described under Phase 2 above is capable of powering the required instrumentation for the duration of the event.

3.0 EQUIPMENT SELECTION AND ESEL

The selection of equipment for the Expedited Seismic Equipment List (ESEL) followed the guidelines of EPRI 3002000704 (Reference 9.2).

3.1 EQUIPMENT SELECTION PROCESS AND ESEL

The selection of equipment was based on installed plant equipment credited in selected FLEX strategies during Phase 1, 2 and 3 mitigation of a Beyond Design Basis External Event (BDBEE), as described in the NAPS OIP and summarized in Section 2. Equipment was selected following the guidance in EPRI 3002000704, Section 3 for reactor core cooling and heat removal, RCS inventory control and long-term subcriticality, containment function, and core cooling and heat removal during Modes 5 & 6 FLEX strategies, including the key parameter monitoring instrumentation that is required to implement the response strategies. Station drawings and the Equipment Data System (EDS) were reviewed to populate the list and to provide supporting information.

The initial plant conditions that define the starting point for identification of FLEX strategy-credited equipment and development of the ESEL is consistent with the boundary conditions identified in NEI 12-06, i.e., the BDBEE impacts all units at the site concurrently, all units are initially operating at power, and each unit successfully shuts down when required. For the core cooling and heat removal during Modes 5 & 6 FLEX strategy, the reactor initial condition is shutdown in either Mode 5 or 6.

3.1.1 FLEX EQUIPMENT LIST

Initially, a FLEX Equipment List was determined for each Unit through the evaluation of the FLEX strategies supporting the core cooling and containment functions to determine the mechanical and electrical flowpaths, installed FLEX connections that support the use of portable FLEX equipment, and key parameter monitoring instrumentation that supports strategy implementation.

The following mechanical and electrical flowpaths support the FLEX strategies and key parameter monitoring instrumentation and were evaluated for identification of equipment for inclusion on the FLEX Equipment List:

- AFW System from the ECST to the suction of the TDAFWP
- SW reservoir to the suction of the TDAFWP via the diesel-driven FP system pump
- AFW from the discharge of the TDAFWP to the S/Gs
- Steam flow from the S/Gs to the atmosphere via the S/G PORVs
- Steam flow from the S/Gs to the TDAFWP turbine
- RCS injection flowpath to the RCS from the RWST via the portable RCS injection pump
- Gravity feed flowpath to the RCS from the RWST

- Vital instrument power from the station batteries through the inverters or from the portable electrical generators via BDB receptacles and distribution panels, to the vital bus distribution panels and to the instrumentation on instrument racks, Main Control Room (MCR) boards, etc.

The following installed FLEX connections support the FLEX strategies and key parameter monitoring instrumentation and were evaluated for identification of equipment for inclusion on the FLEX Equipment List:

- BDB AFW pump discharge connection (flow to the S/Gs)
- BDB ECST refill connection (suction supply source for AFW pump)
- BDB RCS Pump discharge connection (RCS inventory makeup)
- BDB RCS Pump suction connection (borated water source)
- Charging pump discharge header connection (Modes 5&6 RCS inventory makeup)
- 120/240V portable generator connection receptacle (supply to 120VAC vital buses)

The following Key Parameter Instrumentation supports the FLEX strategies and was evaluated for identification of equipment for inclusion on the FLEX Equipment List:

- S/G level indication and pressure indication located in the MCR
- RCS temperature indication and pressure indication located in the MCR
- ECST level indication located in the MCR
- AFW flowrate indication located in the MCR
- Pressurizer level indication in the MCR
- Core Exit Thermocouples indication in the MCR
- Excore Nuclear Instrumentation indication in the MCR
- Reactor Vessel Level Instrumentation System (RVLIS) indication in the MCR
- Containment pressure and temperature indication located in the MCR

The FLEX Equipment List was developed through detailed review of the mechanical and electrical flowpaths, FLEX connections, and key parameter instrumentation to identify specific supporting equipment. Piping and Instrumentation Diagrams (P&IDs) were the primary reference documents used to identify mechanical components, and applicable P&IDs were annotated to define flowpaths and major branch isolation points as part of the review. Components within the flowpath, and associated branch lines to an isolation device, were identified from this review. Instrumentation loop diagrams and electrical schematic drawings were used to identify electrical and instrumentation components, cabinets, panels, etc., that are required to support operation of the key parameter instruments. Mechanical and electrical components were tabulated to produce the FLEX Equipment List. The EDS database and station physical piping drawings were utilized to identify the installed location for each component.

Structures; piping; conduit; heating, ventilation, and air conditioning (HVAC) duct; and nuclear steam supply system (NSSS) components were not included in the FLEX Equipment List tabulation consistent with the guidance provided in EPRI 3002000704, Section 3.2.

3.1.2 ESEL DEVELOPMENT

The guidance in EPRI 3002000704, Section 3.2 was applied to the FLEX Equipment List in order to develop the ESEL by removing components from the list that met the exclusion criteria. The following guidance from EPRI 3002000704 was applied to ESEL component selection:

1. The scope of components was limited to those required to support the Primary FLEX strategy success path. For the Core Cooling and Heat Removal during Modes 5 & 6 strategy, several different flowpaths can be utilized for gravity feed to the RCS depending on plant conditions. The flowpath chosen through the Charging pumps represents one of the flowpaths that are available to operators.
2. The following types of components were not included on the ESEL:
   - Manual valves, check valves, and rupture disks
   - Power-operated valves not required to change state as part of the FLEX mitigation strategies.
3. For cases in which neither train was specified as a primary or back-up strategy, only one train component is included in the ESEL.

The following additional considerations were applied when generating the ESEL for NAPS.

Multiple Trains/Channels Supporting a Strategy

For cases in which multiple trains or channels supported the primary strategy, only components associated with a single train/channel are included in the ESEL.

Power Operated Valves

Page 3-3 of EPRI 3002000704 notes that power operated valves not required to change state are excluded from the ESEL. Implementation of FLEX strategies at NAPS includes manual operation of certain power operated valves. The power operated valves that are manually manipulated to change position are included in the ESEL to ensure their ability to be actuated during FLEX implementation.

Flow Orifices and Flow Venturis

Flow orifices and venturis are located within the pressure boundary of the piping and provide no active function. These components were considered piping components and were excluded from the ESEL.

Electrical Junction Boxes

Junction boxes provide completely passive locations for pulling, installing, or joining cables. These boxes were considered to be equivalent to conduit and were excluded from the ESEL.

Electrical Panels and Cabinets

Electrical panels and cabinets provide consolidated locations for connecting multiple cables and mounting instrumentation. The cabinets are included in the ESEL to ensure industry knowledge on panel/anchorage failure vulnerabilities is addressed. Cabinets and panels are also included if the routing of instrumentation or power cable was found to pass through a cabinet without termination.

Key Parameter Instrumentation

Key parameter instrumentation (indicators and recorders) are typically physically located on panels/cabinets and are included in the ESEL as separate components.

3.1.3 ESEL

The list of components that comprise the ESEL for NAPS Units 1 and 2 are provided in Appendices A and B, respectively.

4.0 GROUND MOTION RESPONSE SPECTRUM (GMRS)

4.1 PLOT OF GMRS SUBMITTED BY THE LICENSEE

The North Anna control point elevation and GMRS are unchanged from the March 2014 submittal (Reference 9.11). The Safe Shutdown Earthquake (SSE) control point elevation was identified following the guidance in EPRI Report 1025287 (SPID) (Reference 9.16) as the highest rock-founded, safety-related structure, which is the Casing Cooling Tank and Pump House structure at elevation 268 ft, or 3 ft below plant grade. A plot of the GMRS at the control point elevation is provided in Figure 1; tabular data are provided in Table 1.

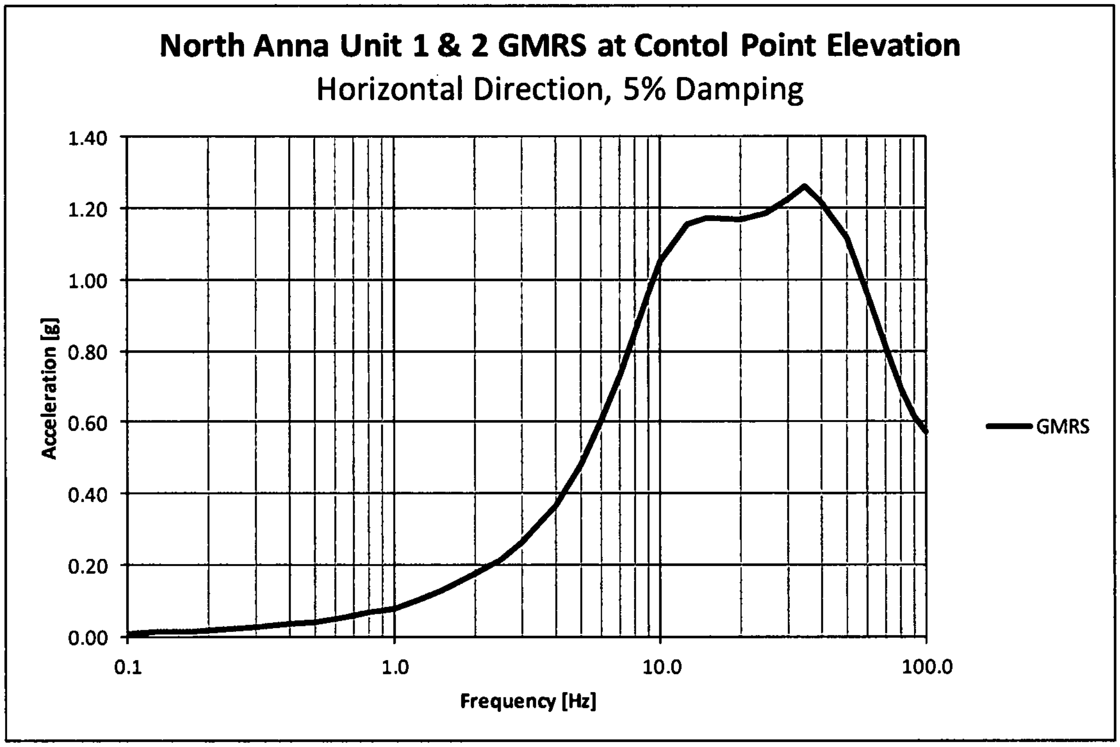

Figure 1 - Control Point GMRS

Table 1 - Control Point GMRS Tabular Data at 5% Damping

Freq [Hz]	Accel [g]	Freq [Hz]	Accel [g]
100.0	0.5721	5.000	0.4847
90.00	0.6149	4.000	0.3702
80.00	0.6965	3.000	0.2667
70.00	0.8132	2.500	0.2159
60.00	0.9601	2.000	0.1770
50.00	1.1145	1.500	0.1317
45.00	1.1652	1.250	0.1065
40.00	1.2155	1.000	0.0806
35.00	1.2617	0.900	0.0745
30.00	1.2226	0.800	0.0677
25.00	1.1889	0.700	0.0602
20.00	1.1670	0.600	0.0522
15.00	1.1707	0.500	0.0435
12.50	1.1525	0.400	0.0347
10.00	1.0508	0.300	0.0260
9.000	0.9622	0.200	0.0174
8.000	0.8562	0.167	0.0145
7.000	0.7346	0.125	0.0109
6.000	0.6068	0.100	0.0087

4.2 COMPARISON TO SSE

The North Anna SSE response spectrum at 5% damping for structures founded on rock is taken at 0.12g for horizontal ground motion. For structures founded on soil, the design basis earthquake is 0.18g for horizontal ground motion. North Anna SSE response spectra are plotted in Figure 2. Tabular data are provided in Table 2 and Table 3 for rock and soil-founded structures, respectively.

The North Anna control point GMRS exceeds the site SSE (both at rock) in the 1 to 10 Hz range; therefore, North Anna screens in for ESEP.

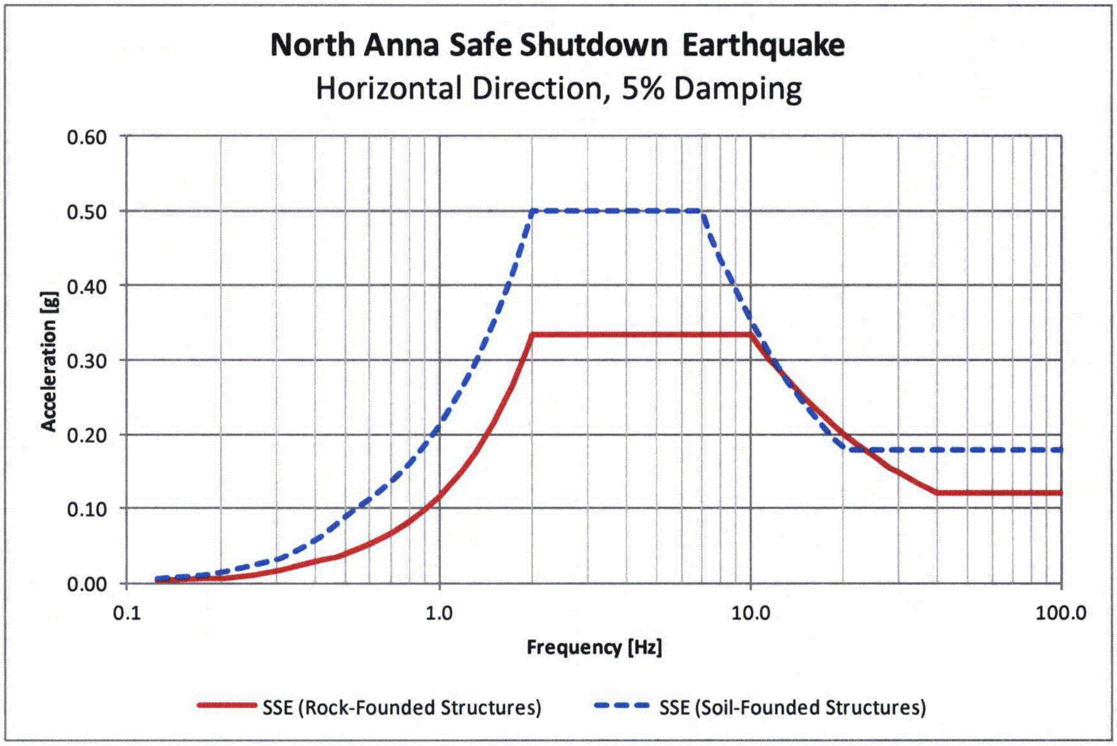

Figure 2 - North Anna Safe Shutdown Earthquake

Table 2 - North Anna SSE Data for Rock-Founded Structures at 5% Damping

Freq [Hz]	Accel [g]	Freq [Hz]	Accel [g]
0.125	0.0030	2.000	0.3330
0.173	0.0050	10.00	0.3330
0.201	0.0070	10.64	0.3180
0.252	0.0110	11.18	0.3070
0.307	0.0170	11.47	0.3010
0.357	0.0230	12.05	0.2910
0.415	0.0300	13.00	0.2750
0.470	0.0360	15.09	0.2460
0.532	0.0440	18.43	0.2120
0.603	0.0530	20.36	0.1970
0.700	0.0670	22.50	0.1830
0.800	0.0820	25.49	0.1670
0.900	0.0980	28.16	0.1550
1.000	0.1160	30.35	0.1470
1.183	0.1490	35.26	0.1320
1.308	0.1740	38.00	0.1250
1.500	0.2140	40.00	0.1200
1.720	0.2650	50.00	0.1200
1.901	0.3090	100.0	0.1200

Table 3 - North Anna SSE Data for Soil-Founded Structures at 5% Damping

Freq [Hz]	Accel [g]	Freq [Hz]	Accel [g]
0.125	0.0060	2.000	0.5000
0.173	0.0110	7.000	0.5000
0.201	0.0150	7.502	0.4670
0.252	0.0230	8.085	0.4350
0.307	0.0340	8.499	0.4140
0.357	0.0460	9.160	0.3850
0.415	0.0620	9.629	0.3670
0.470	0.0800	10.122	0.3490
0.532	0.0970	10.640	0.3330
0.603	0.1140	11.184	0.3170
0.700	0.1370	11.467	0.3090
0.800	0.1610	12.054	0.2950
0.900	0.1860	13.000	0.2740
1.000	0.2130	15.090	0.2370
1.183	0.2610	18.425	0.1950
1.308	0.2960	20.359	0.1800
1.519	0.3560	22.496	0.1800
1.720	0.4150	50.000	0.1800
1.901	0.4700	62.784	0.1800
		100.0	0.1800

5.0 REVIEW LEVEL GROUND MOTION

5.1 DESCRIPTION OF RLGM SELECTED

The review level ground motion spectra (RLGM) selected for the ESEP are in accordance with the two criteria described in Section 4, page 4-1 of EPRI 3002000704, as follows:

Case 1 The RLGM is a scaled version of the SSE. For NAPS, the SSE is defined separately for rock-founded structures (with a PGA of 0.12g) and soil-founded structures (with a PGA of 0.18g). The maximum ratio of the GMRS-to-SSE (both rock-based) in the 1 to 10 Hz range occurs at a frequency of 10 Hz and is greater than 2. Thus, in accordance with EPRI 3002000704, Section 4, criterion 1, the RLGM is taken as two times the SSE. Since there are two SSEs for NAPS, there are two RLGMs defined for the ESEP evaluations - one for rock-founded structures and one for soil-founded structures. Each SSE spectrum is scaled up by a factor of 2 to produce the associated RLGM. Figure 3 shows the plots of the Case 1 horizontal direction RLGMs used for ESEP for rock-founded structures and soil-founded structures at 5% spectral damping. Table 4 and Table 5 provide the corresponding digitized values of frequencies and accelerations for these two RLGMs. In the vertical direction, the rock and soil SSEs are 2/3 of the horizontal SSEs; thus, the RLGM in the vertical direction are taken as 2/3 of the horizontal direction, respectively.

Case 2 The RLGM for this case is taken directly as the control point GMRS consistent with EPRI 3002000704, Section 4, criterion 2. This RLGM was applied for the evaluation of two tanks (i.e., the Refueling Water Storage Tanks, one per unit), which are located outside in the yard area. The tank foundations are located on rock surface at approximately the same elevation as the control point GMRS. The Case 2 RLGM (GMRS) is plotted in Figure 1 of Section 4.1 at 5% spectral damping and the digitized values of frequencies and accelerations are provided in Table 1 of Section 4.1. Vertical GMRS at the control point elevation was developed using V/H ratios consistent with the guidance in NUREG/CR-6728 (Reference 9.14).

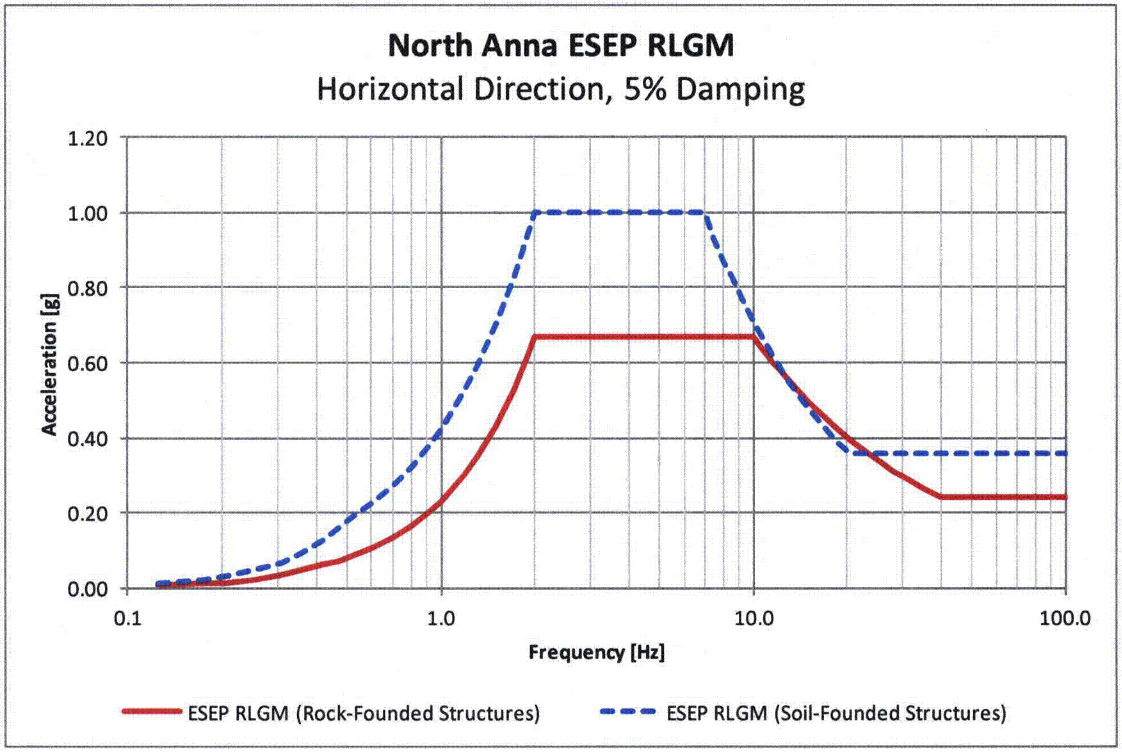

Figure 3 - North Anna ESEP RLGM (2xSSE)

Table 4 - North Anna 2 x SSE RLGM Data for Rock-Founded Structures at 5% Damping

Freq [Hz]	Accel [g]
0.125	0.0060
0.173	0.0100
0.201	0.0140
0.252	0.0220
0.307	0.0340
0.357	0.0460
0.415	0.0600
0.470	0.0720
0.532	0.0880
0.603	0.1060
0.700	0.1340
0.800	0.1640
0.900	0.1960
1.000	0.2320
1.183	0.2980
1.308	0.3480
1.500	0.4280
1.720	0.5300
1.901	0.6180

Freq [Hz]	Accel [g]
2.000	0.6660
10.00	0.6660
10.64	0.6360
11.18	0.6140
11.47	0.6020
12.05	0.5820
13.00	0.5500
15.09	0.4920
18.43	0.4240
20.36	0.3940
22.50	0.3660
25.49	0.3340
28.16	0.3100
30.35	0.2940
35.26	0.2640
38.00	0.2500
40.00	0.2400
50.00	0.2400
100.0	0.2400

Table 5 - North Anna 2 x SSE RLGM Data for Soil-Founded Structures at 5% Damping

Freq [Hz]	Accel [g]
0.125	0.0120
0.173	0.0220
0.201	0.0300
0.252	0.0460
0.307	0.0680
0.357	0.0920
0.415	0.1240
0.470	0.1600
0.532	0.1940
0.603	0.2280
0.700	0.2740
0.800	0.3220
0.900	0.3720
1.000	0.4260

Freq [Hz]	Accel [g]
1.183	0.5220
1.308	0.5920
1.519	0.7120
1.720	0.8300
1.901	0.9400
2.000	1.0000
7.000	1.0000
7.502	0.9340
8.085	0.8700
8.499	0.8280
9.160	0.7700
9.629	0.7340
10.122	0.6980
10.640	0.6660

Freq [Hz]	Accel [g]
11.184	0.6340
11.467	0.6180
12.054	0.5900
13.000	0.5480
15.090	0.4740
18.425	0.3900
20.359	0.3600
22.496	0.3600
50.000	0.3600
62.784	0.3600
100.0	0.3600

5.2 METHOD TO ESTIMATE IN-STRUCTURE RESPONSE SPECTRA

The in-structure response spectra (ISRS) corresponding to the Case 1 RLGMs were derived by scaling the existing design basis (SSE) ISRS for North Anna structures. The spectral ordinates of the SSE-based ISRS were multiplied by a factor of 2 at each frequency to obtain ISRS corresponding to the RLGM.

No estimate of ISRS is required for the Case 2 RLGM because this RLGM (GMRS) is directly used in the analysis of the RWST.

6.0 SEISMIC MARGIN EVALUATION APPROACH

The seismic margin evaluation approach for ESEP consisted of the following steps:

1. Development of the components list (ESEL – described in Section 3 of this report)
2. Development of the review-level seismic demand (RLGM and ISRS) (described in Sections 4 and 5)
3. Seismic capability walkdowns of equipment on the ESEL (described in Section 6.3)
4. Screening of components for which explicit margin calculations were not performed because of previously evaluated large margins or other applicable screening (described in Sections 6.1 and 6.2)
5. Calculation of high confidence of low probability of failure (HCLPF) capacity or factor of safety for ESEL components (described in Sections 6.1 and 6.4)

6.1 SUMMARY OF METHODOLOGIES USED

The seismic margin calculations for the ESEL components were performed using the EPRI seismic margin assessment methodology described in EPRI NP-6041-SL, Revision 1 (Reference 9.15).

In some cases, explicit seismic margin calculations were not performed, such as for components that are part of a larger assembly (rule-of-the-box) or for selected seismically-rugged components that were determined to be acceptable based on Seismic Capability Engineer inspections and judgment during the seismic capacity walkdowns. Additionally, where the factor of safety to the RLGM-based ISRS, as determined by review of previous seismic margin calculations performed for the Individual Plant Examination of External Event (IPEEE) program or component design basis calculations, were determined to be large, explicit calculations to quantify the seismic margin were not required or performed.

Seismic Margin Calculations

The seismic margin to the RLGM was calculated for ESEP as either a HCLPF capacity or a factor of safety. Based on EPRI NP-6041, a simplified expression to calculate the HCLPF capacity of a component can be stated as:

$$HCLPF = ((C-D_{NS})/D_S) \times RLE$$

Where C represents the capacity, D_{NS} represents the concurrent non-seismic demand (typically deadweight), D_S is the seismic demand, and RLE is the review level earthquake, which is the RLGM for ESEP (typically, peak ground acceleration (PGA) of the RLE is used).

For some ESEL components, the HCLPF capacities were calculated and reported using the above approach.

For other ESEL components, a factor of safety to the RLGM-based ISRS was calculated and reported. The factor of safety is simply a ratio of the component's load carrying capacity to the demand or load placed on the component. The factor of safety to the RLGM-based seismic demand provides the assessment of acceptable seismic margin when the factor is greater than unity. The calculated factor of safety, when multiplied with the PGA of the applicable RLGM, will yield an estimate of a component's HCLPF capacity. For the purposes of the ESEP, if the factor of safety was greater than unity, the HCLPF was concluded to be greater than the RLGM and acceptable seismic margin was shown.

Failure Modes

Both structural (anchorage or other load path) and functional failure modes were considered in performing screening evaluations or calculations to determine factors of safety or HCLPF capacities. The governing failure modes were determined and reported.

Seismic Interactions

Seismic interactions, including nearby block walls and piping attached to tanks, were evaluated as part of the seismic margin assessment.

The seismic evaluation of the equipment included evaluating the capacity of nearby masonry block walls whose failure could impact the functionality of the equipment. Block walls whose failure could affect safety related equipment were previously evaluated in response to NRC IE Bulletin 80-11. During the IEB 80-11 effort, for some block walls, steel supports were installed to provide additional support to the walls and increase their ability to withstand earthquakes. The masonry block walls were also later evaluated as a part of the IPEEE program. For the IPEEE, block wall capacities were calculated for the bounding walls of interest following the approach in EPRI NP-6041. A similar approach was followed for the ESEP. Bounding walls in the proximity of ESEL equipment were selected for further evaluation based on wall configuration as discussed in Section 6.6. below.

Piping attached to tanks was reviewed as part of the seismic capacity walkdown of tanks on the ESEL to address the possibility of failures due to differential displacements.

6.2 HCLPF SCREENING PROCESS

EPRI NP-6041 contains a set of screening criteria tables that can be used to "screen out" components from further review because of their generically good performance in earthquakes or seismic simulation tests at or above certain levels. EPRI NP-6041, Table 2-4, Summary of Equipment and Subsystems Screening Criteria for Seismic Margin Evaluations, was used for screening ESEL components. The table provides screening bins based on ground peak spectral accelerations of <0.8g and 0.8 - 1.2g. For rock-founded structures, the RLGM peak spectral acceleration is less than 0.8g. Therefore, the lower screening bin of <0.8g was used to screen equipment located in rock-founded structures. For soil-supported structures, the RLGM peak spectral acceleration is greater than 0.8g, but less than 1.2g. Therefore, the higher screening bin of 0.8 - 1.2g was used to screen equipment located in soil-founded structures.

The use of screening Table 2-4 included the following considerations:

- Caveats and restrictions associated with each specific system or component type are required to be met, as indicated in the table notes.
- The table is applicable to equipment up to 40 ft above grade.

For equipment that did not satisfy the corresponding component caveats or restrictions from Table 2-4 or were located above 40 ft above grade, alternate methods, such as the use of component specific seismic test data, were used to evaluate component functionality.

The screening values given in Table 2-4 of EPRI NP-6041 are for the functional capacity of the component and do not include consideration of anchorage or other load paths. Thus, equipment anchorage was addressed in addition to the guidance given in the screening tables. The anchorage capacity calculations used the conservative deterministic failure margin (CDFM) approach from EPRI NP-6041. Alternatively, the anchorage conditions for some equipment items were found to be acceptable based on either large available margins demonstrated by a previous calculation, or a determination by inspection that the anchorage was very robust compared to the seismic demand (i.e., weight of component small and component robustly anchored). In such cases, an explicit HCLPF calculation was not performed.

6.3 SEISMIC WALKDOWN APPROACH

6.3.1 WALKDOWN APPROACH

Walkdowns were performed in accordance with the criteria provided in Section 5 of EPRI 3002000704, which refers to EPRI NP-6041 for the Seismic Margin Assessment process. Pages 2-26 through 2-30 of EPRI NP-6041 describe the seismic walkdown criteria, including the following key criteria:

"The SRT [Seismic Review Team] should "walk by" 100% of all components which are reasonably accessible and in non-radioactive or low radioactive environments. Seismic capability assessment of components which are inaccessible, in high-radioactive environments, or possibly within contaminated containment, will have to rely more on alternate means such as photographic inspection, more reliance on seismic reanalysis, and possibly, smaller inspection teams and more hurried inspections. A 100% "walk by" does not mean complete inspection of each component, nor does it mean requiring an electrician or other technician to de-energize and open cabinets or panels for detailed inspection of all components. This walkdown is not intended to be a QA or QC review or a review of the adequacy of the component at the SSE level.

If the SRT has a reasonable basis for assuming that the group of components are similar and are similarly anchored, then it is only necessary to inspect one component out of this group. The "similarity-basis" should be developed before the walkdown during the seismic capability preparatory work (Step 3) by reference to drawings, calculations or specifications. The one component of each type which is selected should be thoroughly inspected which probably does mean de-energizing and opening cabinets or panels for this very limited sample. Generally, a spare representative component can be found so as to enable the inspection to be performed while the plant is in operation. At least for the one component of each type which is selected, anchorage should be thoroughly inspected.

The walkdown procedure should be performed in an ad hoc manner. For each class of components the SRT should look closely at the first items and compare the field configurations with the construction drawings and/or specifications. If a one-to-one correspondence is found, then subsequent items do not have to be inspected in as great a detail. Ultimately the walkdown becomes a "walk by" of the component class as the SRT becomes confident that the construction pattern is typical. This procedure for inspection should be repeated for each component class; although, during the actual walkdown the SRT may be inspecting several classes of components in parallel. If serious exceptions to the drawings or questionable construction practices are found then the system or component class must be inspected in closer detail until the systematic deficiency is defined.

The 100% "walk by" is to look for outliers, lack of similarity, anchorage which is different from that shown on drawings or prescribed in criteria for that component, *potential SI [Seismic Interaction[1]] problems, situations that are at odds with the team members' past experience, and any other areas of serious seismic concern. If any such concerns surface, then the limited sample size of one component of each type for thorough inspection will have to be increased. The increase in sample size which should be inspected will depend upon the number of outliers and different anchorages, etc., which are observed. It is up to the SRT to ultimately select the sample size since they are the ones who are responsible for the seismic adequacy of all elements which they screen from the margin review. Appendix D gives guidance for sampling selection."*

6.3.2 APPLICATION OF PREVIOUS WALKDOWN INFORMATION

Previous seismic walkdowns performed for the USI A-46 program, IPEEE program, and in response to the 10CFR 50.54(f) information request related to Fukushima NTTF 2.3: Seismic (Reference 9.1) were used to support the ESEP seismic evaluations.

Seismic capacity walkdowns were performed for several ESEL components during the USI A-46 / Seismic IPEEE program in the 1990's. Those walkdown results were reviewed and the following steps were taken to confirm that the previous walkdown conclusions remained valid.

- A walk by was performed to confirm that the equipment material condition and configuration is consistent with the walkdown conclusions and that no new significant interactions related to block walls or piping attached to tanks exist[1].
- If the ESEL item was screened out based on the previous walkdown, that screening evaluation was reviewed and reconfirmed for the ESEP.

An exception to the first bulleted item was taken for the components on the ESEL that were included in the seismic walkdowns recently conducted (2012) for the Fukushima NTTF 2.3: Seismic effort. These walkdowns confirmed the equipment material condition and configuration and the potential for seismic interaction were consistent with the IPEEE/USI A-46 programs walkdown information, such that additional confirmatory walkdown or walk-by inspections were not required for these components.

6.3.3 WALKDOWN OF BLOCK WALLS

Plant layout drawings were reviewed to determine locations which may have masonry block walls near equipment on the ESEL. Walkdowns were performed in

[1] EPRI 3002000704 page 5-4 limits the ESEP seismic interaction reviews to "nearby block walls" and "piping attached to tanks" which are reviewed "to address the possibility of failures due to differential displacements." Other potential seismic interaction evaluations are "deferred to the full seismic risk evaluations performed in accordance with EPRI 1025287."

the areas that included block walls and equipment on the ESEL. Block walls in close proximity to ESEL equipment were identified for further evaluation. Block walls that could not impact ESEL equipment because of the distance from the equipment, or because the wall was blocked from impacting the equipment, were screened from further evaluation.

6.3.4 SIGNIFICANT WALKDOWN FINDINGS

Consistent with the guidance from NP-6041, no significant outliers or anchorage concerns were identified during the seismic walkdowns. The following findings were noted during the walkdowns and subsequently resolved. In all cases, the ESEL items had capacities greater than the RLGM.

- Several block walls were identified in the proximity of ESEL equipment. These block walls were assessed for their structural adequacy to withstand the seismic loads resulting from the RLGM.
- During walkdown of the ECST, it was noted that for each tank, there was one piping penetration through the missile shield that was identified to be grouted, which limits flexibility of the piping to accommodate any tank displacement. This walkdown observation was reviewed against the ESEP analysis for the ECSTs and the tanks were demonstrated to have adequate capacity for the RLGM.
- There were walkdown observations relating to anchorage that required further review. These observations included gaps between the bottom of base plate or cabinet and the concrete surface and bolt spacing or edge distances that reduced the capacity of the anchor bolts. After reviewing the anchorage capacity for these items, it was determined that the anchor bolts had adequate capacity for the RLGM.

6.4 HCLPF CALCULATION PROCESS

ESEL items were evaluated using the criteria in EPRI NP-6041. The evaluations included the following steps:

- Performing seismic capability walkdowns as described in Section 6.3.
- Performing screening evaluations using the screening tables in EPRI NP-6041 or other approach, as described in Section 6.2.
- Performing HCLPF or factor of safety calculations, as necessary, considering various failure modes that include both structural failure (e.g., anchorage, load path, etc.) and functional failure.

Section 6.1 describes the method / approach used to perform these calculations.

6.5 FUNCTIONAL EVALUATIONS OF RELAYS

Not applicable since no relays were identified for inclusion in the ESEL.

6.6 TABULATED ESEL HCLPF VALUES (INCLUDING KEY FAILURE MODES)

The results of the seismic margin assessment for each component on the ESEL are provided in Appendix A for Unit 1 and Appendix B for Unit 2. The following notes apply to the tabulated information in these appendices.

- The tabulated results are annotated to clarify the reported HCLPF / Factor of Safety and Failure Modes. Notes (1) through (9) are applicable to the tables in Appendices A and B and are defined below:

  RLGM used for evaluation:
  (1) 2 x SSE Rock-Founded Structure (PGA anchored to 0.24g)
  (2) 2 x SSE Soil-Founded Structure (PGA anchored to 0.36g)
  (3) GMRS (PGA of 0.57g)

  HCLPF or Factor of Safety reported:
  (4) HCLPF Capacity (g)
  (5) Factor of Safety to RLGM

  Methods for evaluating anchorage or structural integrity (if no explicit HCLPF or Factor of Safety reported):
  (6) HCLPF > RLGM based on large margins in previous analysis
  (7) HCLPF > RLGM based on walkdown inspection (rugged design)

  Methods for evaluating equipment function (if no explicit HCLPF or Factor of Safety reported):
  (8) HCLPF > RLGM based on NP-6041 screening tables
  (9) HCLPF > RLGM based on review of additional data (e.g., test reports, experience data, etc.)

- The evaluation of masonry block walls located near ESEL equipment determined that the capacity of the walls exceeded the applicable ESEP RLGM of 2 x SSE. Of the eight masonry walls identified for evaluation based on review of drawings and plant walkdowns, two limiting walls were selected for detailed evaluation. Limiting wall margins (the factor by which the RLGM input spectral accelerations could be multiplied while still satisfying CDFM capacity criteria) are tabulated in Table 6. The remaining walls are bounded by the analysis of the two limiting walls.

Table 6 - Limiting Block Wall Results

Wall Identifier	Limiting Wall Margin	Key Failure Mode(s)
SB-271-4	5.19	Mortar Tensile Stress Normal to Bed Joint
SB-271-8	2.78	Mortar Tensile Stress Parallel to Bed Joint

7.0 INACCESSIBLE ITEMS

7.1 IDENTIFICATION OF ESEL ITEMS INACCESSIBLE FOR WALKDOWNS

There are no inaccessible ESEL items that require follow-up seismic walkdown.

7.2 PLANNED WALKDOWN / EVALUATION SCHEDULE / CLOSE OUT

As stated in Section 7.1, there are no inaccessible ESEL items that require follow-up seismic walkdown. Therefore, no schedule or commitments to perform additional seismic walkdowns are required.

8.0 ESEP CONCLUSIONS AND RESULTS

8.1 SUPPORTING INFORMATION

NAPS has performed the ESEP as an interim action in response to the NRC's 50.54(f) letter (Reference 9.1). The ESEP was performed using the methodologies in the NRC-endorsed guidance in EPRI 3002000704 (Reference 9.2).

The ESEP provides an important demonstration of seismic margin for plant equipment that can be relied upon to protect the reactor core following beyond design basis seismic events.

The ESEP is part of the overall NAPS response to the NRC's 50.54(f) letter. On March 12, 2014, NEI submitted to the NRC results of a study (Reference 9.9) of seismic core damage risk estimates based on updated seismic hazard information as it applies to operating nuclear reactors in the Central and Eastern United States (CEUS). The study concluded that "site-specific seismic hazards show that there [...] has not been an overall increase in seismic risk for the fleet of U.S. plants" based on the re-evaluated seismic hazards. As such, the "current seismic design of operating reactors continues to provide a safety margin to withstand potential earthquakes exceeding the seismic design basis."

The NRC's May 9, 2014 NTTF 2.1 Screening and Prioritization letter (Reference 9.10) concluded that the "fleetwide seismic risk estimates are consistent with the approach and results used in the GI-199 safety/risk assessment." The letter also stated that "As a result, the staff has confirmed that the conclusions reached in GI-199 safety/risk assessment remain valid and that the plants can continue to operate while additional evaluations are conducted."

An assessment of the change in seismic risk for NAPS was included in the fleet risk evaluation submitted in the March 12, 2014 NEI letter. Therefore, the conclusions in the NRC's May 9 letter apply to NAPS.

In addition, the March 12, 2014 NEI letter provided an attached "Perspectives on the

Seismic Capacity of Operating Plants," which (1) assessed a number of qualitative reasons why the design of SSCs inherently contain margin beyond their design level, (2) discussed industrial seismic experience databases of performance of industry facility components similar to nuclear SSCs, and (3) discussed earthquake experience at operating plants.

The fleet of currently operating nuclear power plants was designed using conservative practices, such that the plants have significant margin to withstand large ground motions safely. This has been borne out for NAPS, which experienced the Mineral VA M5.8 earthquake in August 2011. The ground response spectra ordinates from the Mineral earthquake exceeded the NAPS SSE spectra in several frequency ranges and the PGA was also exceeded. There was no resulting damage to safety-related SSCs based on extensive plant walkdowns and equipment surveillance testing performed to support restart of the units. The seismic design process has inherent (and intentional) conservatisms which result in significant seismic margins within structures, systems and components (SSCs). These conservatisms are reflected in several key aspects of the seismic design process, including:

- Safety factors applied in design calculations
- Damping values used in dynamic analysis of SSCs
- Bounding synthetic time histories for in-structure response spectra calculations
- Broadening criteria for in-structure response spectra
- Response spectra enveloping criteria typically used in SSC analysis and testing applications
- Response spectra based frequency domain analysis rather than explicit time history based time domain analysis
- Bounding requirements in codes and standards
- Use of minimum strength requirements of structural components (concrete and steel)
- Bounding testing requirements, and
- Ductile behavior of the primary materials (that is, not crediting the additional capacity of materials such as steel and reinforced concrete beyond the essentially elastic range, etc.).

These design practices combine to result in margins such that the SSCs will continue to fulfill their functions at ground motions well above the SSE.

The intent of the ESEP is to perform an interim action in response to the NRC's 50.54(f) letter to demonstrate seismic margin through a review of a subset of the plant equipment that can be relied upon to protect the reactor core following beyond design basis seismic events. In order to complete the ESEP in an expedited amount of time, the RLGMs used for the ESEP evaluation are either a scaled version of the NAPS SSE or the actual GMRS. To more fully characterize the risk impacts of the seismic ground motion represented by the GMRS, a more detailed seismic risk assessment (SPRA) is being performed for NAPS in accordance with EPRI 1025287 (Reference 9.16). As identified in the NAPS Seismic Hazard and Screening Report submittal dated March 31, 2014 (Reference 9.11), NAPS screens in for a risk evaluation. The complete risk evaluation will characterize the state-of-the-art probabilistic seismic ground motions, the plant response to that probabilistic seismic ground motion input, and the resulting plant risk characterization.

8.2 IDENTIFICATION OF PLANNED MODIFICATIONS

There were no modifications identified as a result of the performance of the ESEP.

8.3 MODIFICATION IMPLEMENTATION SCHEDULE

As stated in Section 8.2, there are no required plant modifications. Therefore, no implementation schedule is required.

8.4 SUMMARY OF REGULATORY COMMITMENTS

No new regulatory commitments are required as a result of the performance of the ESEP.

9.0 REFERENCES

9.1 U. S. Nuclear Regulatory Commission (NRC) letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3 and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," dated March 12, 2012.

9.2 EPRI Report No. 3002000704, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1 – Seismic," May 31, 2013.

9.3 NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August 2012.

9.4 NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012.

9.5 Virginia Electric and Power Company Letter to U. S. NRC Document Control Desk, "North Anna Power Station Units 1 and 2 Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), Serial No. 12-162B dated February 28, 2013.

9.6 Virginia Electric and Power Company Letter to U. S. NRC Document Control Desk, "North Anna Power Station Units 1 and 2 Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), Serial No. 12-162D dated August 23, 2013.

9.7 Virginia Electric and Power Company Letter to U. S. NRC Document Control Desk, "North Anna Power Station Units 1 and 2 Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), Serial No. 12-162E dated February 28, 2014.

9.8 Virginia Electric and Power Company Letter to U. S. NRC Document Control Desk, "North Anna Power Station Units 1 and 2 Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), Serial No. 14-394 dated August 28, 2014.

9.9 Nuclear Energy Institute (NEI), A. Pietrangelo, Letter to D. Skeen of the USNRC, "Seismic Core Damage Risk Estimates Using the Updated Seismic Hazards for the Operating Nuclear Plants in the Central and Eastern United States", March 12, 2014.

9.10 NRC (E Leeds) Letter to All Power Reactor Licensees et al., "Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(F) Regarding Seismic Hazard Re-Evaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," May 9, 2014.

9.11 Virginia Electric and Power Company Letter to U. S. NRC Document Control Desk, "North Anna Power Station Units 1 and 2, Response to March 12, 2012 Information Request – Seismic Hazard and Screening Report (CEUS Sites) for Recommendation 2.1," Serial No. 14-133 dated March 31, 2014.

9.12 Nuclear Energy Institute (NEI), A. Pietrangelo, Letter to D. Skeen of the USNRC, "Proposed Path Forward for NTTF Recommendation 2.1: Seismic Reevaluations", April 9, 2013.

9.13 NRC (E Leeds) Letter to NEI (J Pollock), "Electric Power Research Institute Final Draft Report XXXXXX, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," as an Acceptable Alternative to the March 12, 2012, Information Request for Seismic Reevaluations," May 7, 2013.

9.14 NUREG/CR-6728, "Technical Basis for Revision of Regulatory Guidance on Design Ground Motions: Hazard- and Risk-Consistent Ground Motion Spectra Guidelines," November 6, 2001.

9.15 EPRI Report NP-6041-SL, Revision 1, "A Methodology for Assessment of Nuclear Power Plant Seismic Margin".

9.16 EPRI Report No. 1025287, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," February 2013.

APPENDIX A

UNIT 1

Expedited Seismic Equipment List and Seismic Margin Assessment Results

APPENDIX A

ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
1	1-CN-TK-1	EMERGENCY CONDENSATE STORAGE TANK	STAND-BY	IN-SERVICE	0.348 (1) (4)	Tank Sliding Capacity
2	1-FP-P-2	DIESEL DRIVEN FIRE PROTECTION PUMP	NORMALLY STANDBY	IN-SERVICE	5.6 (2) (5)	Fire Pump Embedded Anchorage, Shear/Tension Interaction (Steel Failure)
					> RLGM (2) (8)	Pump Function, Screened
3	1-BY-B-05A	DIESEL FIRE PUMP BATTERIES	CHARGING	OPERATING	2.8 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Battery Function, Screened
4	1-BY-B-05B	DIESEL FIRE PUMP BATTERIES	CHARGING	OPERATING	2.8 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Battery Function, Screened
5	1-BY-B-05C	DIESEL FIRE PUMP BATTERIES	CHARGING	OPERATING	2.8 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Battery Function, Screened
6	1-BY-B-05D	DIESEL FIRE PUMP BATTERIES	CHARGING	OPERATING	2.8 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Battery Function, Screened
7	1-EP-CB-70	DIESEL DRIVEN FP PUMP 2 CONTROL CABINET	INSTALLED	INSTALLED	0.44 (2) (4)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
8	1-FP-TK-4	DIESEL DRIVEN FIRE PUMP 2 FUEL OIL STORAGE TANK	INSTALLED	INSTALLED	1.56 (2) (5)	Anchorage, Shear/Tension Interaction
9	1-FW-P-2	TURBINE DRIVEN AUXILIARY FEEDWATER PUMP	NORMALLY STAND-BY	IN-SERVICE	3.2 (1) (5)	Embedded Anchor - Shear/Tension Interaction (Steel Failure)
10	1-FW-RV-100	TDAFW PUMP DISCHARGE RELIEF VALVE	NORMALLY CLOSED	CLOSED	> RLGM (1) (8)	Valve Function, Screened
11	1-FW-MOV-100D	STEAM GENERATOR A FROM AFW PUMPS INLET ISOL VV	NORMALLY OPEN	OPEN	> RLGM (1) (6)	Valve Component Stresses / Function

APPENDIX A

ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
12	1-FW-MOV-100A	STEAM GENERATOR A FROM AFW INLET ISOLATION VALVE	NORMALLY CLOSED	OPEN	> RLGM (1) (6)	Valve Component Stresses / Function
13	1-FW-MOV-100B	STEAM GENERATOR B FROM AFW INLET ISOLATION VALVE	NORMALLY CLOSED	OPEN	> RLGM (1) (6)	Valve Component Stresses / Function
14	1-FW-MOV-100C	STEAM GENERATOR C FROM AFW INLET ISOLATION VALVE	NORMALLY CLOSED	OPEN	> RLGM (1) (6)	Valve Component Stresses / Function
15	1-MS-TV-111B	TURBINE-DRIVEN AFW PUMP STEAM SUPPLY VALVE	NORMALLY CLOSED	OPEN	> RLGM (1) (8)	Valve Function, Screened
16	1-MS-TV-111A	TURBINE-DRIVEN AFW PUMP STEAM SUPPLY VALVE	NORMALLY CLOSED	OPEN	> RLGM (1) (8)	Valve Function, Screened
17	1-MS-TV-115	AUX FEED PUMP TURBINE DRIVE INLET TRIP VALVE	NORMALLY OPEN	OPEN	>RLGM (1) (6)	Valve Function , Valve Bonnet Neck
18	1-FW-GOV-2	TDAFW PUMP GOVERNOR VALVE	NORMALLY OPEN	OPEN	Rule of the Box Evaluation – See Item 9	
19	1-FW-T-2	TURBINE DRIVEN AUXILIARY FEEDWATER PUMP TURB DRIVE	NORMALLY STAND-BY	IN-SERVICE	Rule of the Box Evaluation – See Item 9	
20	1-FW-RV-604	1-FW-T-2 RELIEF VALVE	NORMALLY CLOSED	CLOSED	Rule of the Box Evaluation – See Item 9	
21	1-MS-PCV-101A	A SG POWER OPERATED RELIEF VALVE (TCA)	NORMALLY CLOSED	CLOSED	> RLGM (1) (6)	Valve Component Stresses / Function
22	1-MS-PCV-101B	B SG POWER OPERATED RELIEF VALVE (TCA)	NORMALLY CLOSED	CLOSED	> RLGM (1) (6)	Valve Component Stresses / Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
23	1-MS-PCV-101C	C SG POWER OPERATED RELIEF VALVE (TCA)	NORMALLY CLOSED	CLOSED	> RLGM [1][6]	Valve Component Stresses / Function
24	1-QS-TK-1	REFUELING WATER STORAGE TANK	STAND-BY	IN-SERVICE	0.59 [3][4]	Anchorage, Tank Overturning Moment Capacity
25	1-QS-P-1A	A QUENCH SPRAY PUMP	STAND-BY	STAND-BY	> RLGM [1][7]	Anchorage
					> RLGM [1]	Pump Function, Screened
26	1-EI-CB-01	MAIN CONTROL BENCHBOARD 1-1	INSTALLED	INSTALLED	> RLGM [2][7]	Anchorage
					> RLGM [2]	Bench Board Equipment Function, Screened based on Guidance in EPRI TR-1019200
27	1-EI-CB-03	MAIN CONTROL VERTICAL BOARD 1-1	INSTALLED	INSTALLED	1.57 [2][5]	Anchorage, Shear/Tension Interaction
					> RLGM [2]	Vertical Board Equipment Function, Screened based on Guidance in EPRI TR-1019200
28	1-EI-CB-04	MAIN CONTROL VERTICAL BOARD 1-2	INSTALLED	INSTALLED	1.57 [2][5]	Anchorage, Shear/Tension Interaction
					> RLGM [2]	Vertical Board Equipment Function, Screened based on Guidance in EPRI TR-1019200
29	1-EI-CB-05	UNIT 1 SAFEGUARDS PANEL / MAIN CONTROL VERTICAL BOARD	INSTALLED	INSTALLED	1.57 [2][5]	Anchorage, Shear/Tension Interaction
					> RLGM [2]	Vertical Board Equipment Function, Screened based on Guidance in EPRI TR-1019200
30	1-EI-CB-23A	SECONDARY PLANT PROCESS RACK A PROT CHANNEL I	INSTALLED	INSTALLED	2.75 [2][5]	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM [2][8]	Cabinet Function, Screened
31	1-EI-CB-23B	SECONDARY PLANT PROCESS RACK B PROT CHANNEL II	INSTALLED	INSTALLED	2.75 [2][5]	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM [2][8]	Cabinet Function, Screened
32	1-EI-CB-23C	SECONDARY PLANT PROCESS RACK C PROT CHANNEL III	INSTALLED	INSTALLED	2.75 [2][5]	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM [2][8]	Cabinet Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
33	1-EI-CB-23D	SECONDARY PLANT PROCESS RACK D PROTECTION CH IV	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
34	1-EI-CB-34	POST ACCIDENT MONITORING & CONTROL PANEL	INSTALLED	INSTALLED	3.10 (2) (5)	Anchorage, Pullout in Expansion Anchor
					> RLGM (2) (8)	Panel Function, Screened
35	1-EI-CB-51	PRIMARY PLANT PROCESS RACK 1 PROTECTION CH I	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
36	1-EI-CB-52	PRIMARY PLANT PROCESS RACK 2 PROTECTION CH II	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
37	1-EI-CB-54	PRIMARY PLANT PROCESS RACK 4 PROT CHANNEL IV	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
38	1-EI-CB-53	PRIMARY PLANT PROCESS RACK 3 PROT CHANNEL III	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
39	1-EI-CB-55	PRIMARY PLANT PROCESS RACK 5 CONTROL CABINET	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
40	1-EI-CB-56	PRIMARY PLANT PROCESS RACK 6 CONTROL CABINET	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
41	1-EI-CB-57	PRIMARY PLANT PROCESS RACK 7 CONTROL CABINET	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
42	1-EI-CB-58	PRIMARY PLANT PROCESS RACK 8 CONTROL CABINET	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
43	1-EP-CB-80C	120VAC INSTRUMENT DISTRIBUTION PANEL 1-III	INSTALLED	INSTALLED	> RLGM (2) (7)	Anchorage
					> RLGM (2) (8)	Distribution Panel Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
44	1-EP-CB-80E	120VAC INSTRUMENT DISTRIBUTION PANEL 1-V	INSTALLED	INSTALLED	> RLGM (2) (7)	Anchorage
					> RLGM (2) (8)	Distribution Panel Function, Screened
45	1-EI-CB-112	INSTRUMENTATION RACK 1-800	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Instruments on Racks Function, Screened
46	1-EI-CB-127	INSTRUMENTATION RACK 1-103	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Instruments on Racks Function, Screened
47	1-EI-CB-131	INSTRUMENTATION RACK 1-107	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Instruments on Racks Function, Screened
48	1-EI-CB-136	INSTRUMENTATION RACK 1-112	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Instruments on Racks Function, Screened
49	1-EI-CB-139	INSTRUMENTATION RACK 1-115	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (9)	Instruments on Racks Function
50	1-EI-CB-300	TECHNICAL SUPPORT CENTER MULTIPLEXER CABINET	INSTALLED	INSTALLED	2.1 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
51	1-EI-CB-301A	TECHNICAL SUPPORT CENTER MULTIPLEXER CABINET	INSTALLED	INSTALLED	4.96 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
52	1-EI-CB-301C	TECHNICAL SUPPORT CENTER MULTIPLEXER CABINET	INSTALLED	INSTALLED	3.53 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
53	1-EI-CB-301D	TECHNICAL SUPPORT CENTER MULTIPLEXER CABINET	INSTALLED	INSTALLED	2.29 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
54	1-EI-CP-03	ICC MULTIPLEXER CABINET	INSTALLED	INSTALLED	4.15 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Cabinet Function, Screened
55	1-EI-CP-04	ICC CABINET	INSTALLED	INSTALLED	2.28 (2) (5)	Anchorage, Support Flange Bending Stress
					> RLGM (2) (8)	Cabinet Function, Screened
56	1-EI-CP-05	MULTIPLEXER MASTER RECEIVER CABINET	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Support Flange Bending Stress
					> RLGM (2) (8)	Cabinet Function, Screened
57	1-BDB-DB-1-PANEL	BEYOND DESIGN BASIS PANEL 1(Distribution Panel)	NOT OPERATING	OPERATING	7.356 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (9)	Distribution Panel Function
58	1-BDB-DB-2-PANEL	BEYOND DESIGN BASIS PANEL 2(Distribution Panel)	NOT OPERATING	OPERATING	7.356 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (9)	Distribution Panel Function
59	1-BDB-DB-3-PANEL	BEYOND DESIGN BASIS PANEL 3, RECEPTACLE ASSEMBLY(Receptacle Panel)	NOT OPERATING	OPERATING	7.356 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (9)	Panel Function
60	1-MS-PI-1474	A MAIN STM HDR TO TURBINE PRESS INDR CHANNEL II	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
61	1-MS-PT-1474	A MAIN STEAM HEADER TO TURBINE PRESS TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation - See Item 45	
62	1-MS-PI-1484	B MAIN STM HDR TO TURBINE PRESS INDR CHANNEL II	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
63	1-MS-PT-1484	B MAIN STEAM HEADER TO TURBINE PRESS TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation - See Item 45	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
64	1-MS-PI-1494	C MAIN STM HDR TO TURBINE PRESS INDR CHANNEL II	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
65	1-MS-PT-1494	C MAIN STEAM HEADER TO TURBINE PRESS TRANSMITTER CHANNEL II	OPERATING	OPERATING	Rule of the Box Evaluation - See Item 45	
66	1-FW-LI-1474	1A STEAM GENERATOR LEVEL INDICATOR CHANNEL I	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
67	1-FW-LT-1474	1A STEAM GENERATOR LEVEL TRANSMITTER	OPERATING	OPERATING	> RLGM (1)(7)	Anchorage
					> RLGM (1)(9)	Transmitter Function
68	1-FW-LI-1484	1B STEAM GENERATOR LEVEL INDICATOR CHANNEL I	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
69	1-FW-LT-1484	1B STEAM GENERATOR LEVEL TRANSMITTER	OPERATING	OPERATING	> RLGM (1)(7)	Anchorage
					> RLGM (1)(9)	Transmitter Function
70	1-FW-LI-1494	1C STEAM GENERATOR LEVEL INDICATOR CHANNEL I	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
71	1-FW-LT-1494	1C STEAM GENERATOR LEVEL TRANSMITTER	OPERATING	OPERATING	> RLGM (1)(7)	Anchorage
					> RLGM (1)(9)	Transmitter Function
72	1-FW-LI-1477A	1A STEAM GENERATOR WIDE RANGE LEVEL INDICATOR	OPERATING	OPERATING	> RLGM (1)(7)	Anchorage
					> RLGM (1)(8)	Instrument Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
73	1-FW-LT-1477	1A STEAM GENERATOR WIDE RANGE LEVEL XMITR	OPERATING	OPERATING	Rule of the Box Evaluation - See Item 48	
74	1-FW-LI-1487A	1B STEAM GENERATOR WIDE RANGE LEVEL INDICATOR	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (8)	Instrument Function, Screened
75	1-FW-LT-1487	1B STEAM GENERATOR WIDE RANGE LEVEL XMTR	OPERATING	OPERATING	Rule of the Box Evaluation - See Item 47	
76	1-FW-LI-1497A	1C STEAM GENERATOR WIDE RANGE LEVEL INDICATOR	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (8)	Instrument Function, Screened
77	1-FW-LT-1497	1C STEAM GENERATOR WIDE RANGE LEVEL TRANSMITTER	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (8)	Transmitter Function, Screened
78	1-LM-PI-100A	REACTOR CONTAINMENT PRESSURE INDICATION (CH 1)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 29	
79	1-LM-PT-100A	PEN 57 LEAK MON SUPPLY LINE PRESSURE TRANSMITTER	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (8)	Transmitter Function, Screened
80	1-LM-PI-110A	PEN 57 LEAK MON SUPPLY LINE PRESSURE INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 29	
81	1-LM-PT-110A	PEN 57 LEAK MON SUPPLY LINE PRESSURE TRANSMITTER	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (8)	Transmitter Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
82	1-LM-TI-100-1	REACTOR CONTAINMENT AIR MONITOR TEMP INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 29	
83	1-LM-TE-100-1	REACTOR CONTAINMENT MONITOR TEMP ELEMENT	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (9)	Temperature Sensor Function
84	1-RC-TR-1410	A LOOP REACTOR COOLANT COLD AND HOT LEG TEMP RECORDER(WIDE RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 27	
85	1-RC-TE-1410	A LOOP REACTOR COOLANT COLD LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
86	1-RC-TE-1413	A LOOP REACTOR COOLANT HOT LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
87	1-RC-TR-1420	B LOOP REACTOR COOLANT HOT LEG TEMP RECORDER (WIDE RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 27	
88	1-RC-TE-1420	B LOOP REACTOR COOLANT COLD LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
89	1-RC-TE-1423	B LOOP REACTOR COOLANT HOT LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
90	1-RC-TR-1430	LOOP 3 WIDE RANGE HOT/COLD LEG TEMP RECORDER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 27	
91	1-RC-TE-1430	C LOOP REACTOR COOLANT COLD LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM [(1) (9)]	Temperature Sensor Function
92	1-RC-TE-1433	C LOOP REACTOR COOLANT HOT LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM [(1) (9)]	Temperature Sensor Function
93	1-RC-PI-1402A	C LOOP REACTOR COOLANT HOT LEG PRESSURE INDICATOR (WIDE RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 27	
94	1-RC-PI-1402B	C LOOP REACTOR COOLANT HOT LEG PRESS IND (NARROW RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation –See Item 27	
95	1-RC-PT-1402	C LOOP REACTOR COOLANT HOT LEG PRESS TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 49	
96	1-RC-PI-1403B	LOOP A HOT LEG TO RH PPS PRESSURE INDICATOR (NARROW RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 26	
97	1-RC-PT-1403	LOOP A HOT LEG TO RH PPS PRESSURE TRANSMITTER	OPERATING	OPERATING	> RLGM [(1) (7)] > RLGM [(1) (8)]	Anchorage Transmitter Function, Screened
98	1-RC-LI-1459A	PRESSURIZER LEVEL INDICATION CHANNEL I	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 27	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
99	1-RC-LT-1459	PRESSURIZER LEVEL TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 46	
100	1-CN-LI-100B-1	EMERGENCY COND STORAGE TANK LEVEL INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
101	1-CN-LT-100B	EMERGENCY COND STORAGE TANK LEVEL TRANSMITTER	OPERATING	OPERATING	3.05 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Transmitter Function, Screened
102	1-FW-FI-100A	AFW PUMPS OUTLET TO S/G A FLOW INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
103	1-FW-FT-100A	AFW PUMPS OUTLET TO S/G A FLOW TRANSMITTER	OPERATING	OPERATING	3.05 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Transmitter Function, Screened
104	1-FW-FI-100B	AFW PUMPS OUTLET TO S/G B FLOW INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
105	1-FW-FT-100B	AFW PUMPS OUTLET TO S/G B FLOW TRANSMITTER	OPERATING	OPERATING	3.05 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Transmitter Function, Screened
106	1-FW-FI-100C	AFW PUMPS OUTLET TO S/G C FLOW INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 28	
107	1-FW-FT-100C	AFW PUMPS OUTLET TO S/G C FLOW TRANSMITTER	OPERATING	OPERATING	3.05 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Transmitter Function, Screened
108	1-CM-MR-3	ICC MASTER RECIEVER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 56	
109	1-RC-LQ-101	ICCM DISPLAY POWER SUPPLY TRAIN A	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 50	
110	1-CM-MUX-32A	REMOTE MULTIPLEXER MODULE	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 54	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
111	1-RC-KBD-101	ICCM CONTROL PAD (TRAIN A)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 26	
112	1-RC-MON-101	GET/CCM/RVLIS MONITOR (TRAIN A)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 27	
113	1-RC-TE-T6	CORE LOCATION E12 EXIT THERMOCOUPLE	OPERATING	OPERATING	> RLGM (1)(9)	Temperature Sensor Function
114	1-RC-LR-1310A	REACTOR VESSEL RECORDER TRAIN A	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 34	
115	1-RC-TE-1313	RX VSL VENT LINE RVLIS TRAIN A TUBING TEMP ELEM	OPERATING	OPERATING	> RLGM (1)(9)	Temperature Sensor Function
116	1-RC-TE-1314	RX VSL VENT LINE RVLIS TRAIN A TUBING TEMP ELEM	OPERATING	OPERATING	> RLGM (1)(9)	Temperature Sensor Function
117	1-RC-TE-1315	C LOOP HOT LEG RVLIS TUBING TEMP ELEMENT	OPERATING	OPERATING	> RLGM (1)(9)	Temperature Sensor Function
118	1-RC-TE-1316	RX VSL VENT LINE RVLIS TRAIN A TUBING TEMP ELEM	OPERATING	OPERATING	> RLGM (1)(9)	Temperature Sensor Function
119	1-RC-TE-1317	RX VSL INCORE THIMBLES RVLIS TEMP ELEM	OPERATING	OPERATING	> RLGM (1)(9)	Temperature Sensor Function
120	1-RC-TE-1318	RX VSL INCORE THIMBLES RVLIS TEMP ELEM	OPERATING	OPERATING	> RLGM (1)(9)	Temperature Sensor Function
121	1-RC-LIS-1310	C LOOP RVLIS TRAIN A HOT LEG ISOLATOR LVL INDR SW	OPERATING	OPERATING	2.14 (1)(5)	Anchorage, Shear/Tension Interaction
					> RLGM (1)(8)	Instruments on Racks Function, Screened
122	1-RC-LIS-1311	REACTOR VESSEL LEVEL INDICATING SYSTEM	OPERATING	OPERATING	2.14 (1)(5)	Anchorage, Shear/Tension Interaction
					> RLGM (1)(8)	Instruments on Racks Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
123	1-RC-LIS-1312	RVLIS TRAIN A SEAL TABLE ISOLATOR LVL INDR SWITCH	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
124	1-RC-LT-1310	REAC VESSEL RVLIS TRAIN A PLENUM LEVEL TRANSMITTER	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
125	1-RC-LT-1311	REAC VESSEL RVLIS TRAIN A NORMAL RANGE LEVEL XMTR	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
126	1-RC-LT-1312	REAC VESSEL RVLIS TRAIN A WIDE RANGE LEVEL XMTR	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
127	1-NM-PRO-NM3	EXCORE NEUTRON FLUX MONITOR CHANNEL 3 PROCESSOR	OPERATING	OPERATING	> RLGM (2) (7)	Anchorage
					> RLGM (2) (8)	Equipment Function, Screened
128	1-NM-AMP-NM3	EXCORE NEUTRON FLUX MONITOR CHANNEL 3 AMPLIFIER	OPERATING	OPERATING	> RLGM (2) (7)	Anchorage
					> RLGM (2) (8)	Equipment Function, Screened
129	1-NM-NFI-1270B1	NEUTRON FLUX INDICATOR, WIDE RANGE LVL,(EXCORE) CHANNEL 3	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 131	
130	1-NM-NFI-1270A1	NEUTRON FLUX INDICATOR, SOURCE RANGE,(EXCORE) CHANNEL 3	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 131	
131	1-EI-CB-36C	NIS CABINET 3	INSTALLED	INSTALLED	2.28 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
132	1-NM-NFD-1270	NEUTRON FLUX DETECTOR (EXCORE) CHANNEL 3	INSTALLED	INSTALLED	> RLGM (1) (9)	Detector Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
133	1-EP-CB-04A	120VAC VITAL BUS DISTRIBUTION PANEL 1-I (TCA)	INSTALLED	INSTALLED	0.428 (2)(4)	Anchorage, Shear/Tension Interaction
					> RLGM (2)(8)	Distribution Panel Function, Screened
134	1-EP-BKR-04A-03-CKTBRK	CIRCUIT BREAKER	INSTALLED	INSTALLED	Rule of the Box Evaluation – See Item 133	
135	1-EP-BKR-04A-16-CKTBRK	CIRCUIT BREAKER	INSTALLED	INSTALLED	Rule of the Box Evaluation – See Item 133	
136	1-EP-BKR-04A-22-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 133	
137	1-EP-BKR-04A-28-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 133	
138	1-EP-BKR-04A-35-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 133	
139	1-EP-BKR-04A-14-CKTBRK	BDB BACKFEED CIRCUIT BREAKER	OPEN	CLOSED	Rule of the Box Evaluation – See Item 133	
140	1-EP-CB-04B	120VAC VITAL BUS DISTRIBUTION PANEL 1-II (TCA)	INSTALLED	INSTALLED	0.428 (2)(4)	Anchorage, Shear/Tension Interaction
					> RLGM (2)(8)	Distribution Panel Function, Screened
141	1-EP-BKR-04B-3-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 140	
142	1-EP-BKR-04B-22-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 140	
143	1-EP-BKR-04B-35-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 140	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
144	1-EP-BKR-04B-14-CKTBRK	BDB BACKFEED CIRCUIT BREAKER	OPEN	CLOSED	Rule of the Box Evaluation – See Item 140	
145	1-EP-CB-04C	120VAC VITAL BUS DISTRIBUTION PANEL 1-III (TCA)	INSTALLED	INSTALLED	0.428 (2)(4)	Anchorage, Shear/Tension Interaction
					> RLGM (2)(8)	Distribution Panel Function, Screened
146	1-EP-BKR-04C-3-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 145	
147	1-EP-BKR-04C-17-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 145	
148	1-EP-BKR-04C-22-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 145	
149	1-EP-BKR-04C-32-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 145	
150	1-EP-BKR-04C-35-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 145	
151	1-EP-BKR-04C-5-CKTBRK	BDB BACKFEED CIRCUIT BREAKER	OPEN	CLOSED	Rule of the Box Evaluation – See Item 145	
152	1-EP-CB-04D	120VAC VITAL BUS DISTRIBUTION PANEL 1-IV	INSTALLED	INSTALLED	0.428 (2)(4)	Anchorage, Shear/Tension Interaction
					> RLGM (2)(8)	Distribution Panel Function, Screened
153	1-EP-BKR-04D-03-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 152	
154	1-EP-BKR-04D-17-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 152	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
155	1-EP-BKR-04D-22-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 152	
156	1-EP-BKR-04D-35-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 152	
157	1-EP-BKR-04D-5-CKTBRK	BDB BACKFEED CIRCUIT BREAKER	OPEN	CLOSED	Rule of the Box Evaluation – See Item 152	
158	1-EP-BKR-80E-11-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 44	
159	1-EP-BKR-80E-12-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 44	
160	1-EP-BKR-80E-13-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 44	
161	1-EP-BKR-80E-19-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 44	
162	1-EP-BKR-80E-20-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 44	
163	1-EP-BKR-80E-21-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 44	
164	1-EP-BKR-80C-4-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 43	
165	1-VB-INV-01	VITAL BUS DISTRIBUTION PANEL 1-I INVERTER	OPERATING	OPERATING	1.72 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Inverter Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
166	1-VB-INV-02	VITAL BUS DISTRIBUTION PANEL 1-II INVERTER	OPERATING	OPERATING	2.22 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Inverter Function, Screened
167	1-VB-INV-03	VITAL BUS DISTRIBUTION PANEL 1-III INVERTER	OPERATING	OPERATING	2.22 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Inverter Function, Screened
168	1-VB-INV-04	VITAL BUS DISTRIBUTION PANEL 1-IV INVERTER	OPERATING	OPERATING	2.22 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Inverter Function, Screened
169	1-BY-B-1-I	STATION BATTERY1-I	CHARGING	OPERATING	0.477 (2) (4)	Battery Rack Structural Integrity
170	1-BY-B-1-II	STATION BATTERY 1-II	CHARGING	OPERATING	0.477 (2) (4)	Battery Rack Structural Integrity
171	1-BY-B-1-III	STATION BATTERY 1-III	CHARGING	OPERATING	0.477 (2) (4)	Battery Rack Structural Integrity
172	1-BY-B-1-IV	STATION BATTERY 1-IV	CHARGING	OPERATING	0.477 (2) (4)	Battery Rack Structural Integrity
173	1-EP-CB-12A	125 VDC DISTRIBUTION PANEL 1-I	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
174	1-EP-BKR-12A-13	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 173	
175	1-EP-CB-12B	125 VDC DISTRIBUTION PANEL 1-II	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
176	1-EP-BKR-12B-14	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 175	
177	1-EP-CB-12C	125 VDC DISTRIBUTION PANEL 1-III	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
178	1-EP-BKR-12C-12	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 177	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
179	1-EP-CB-12D	125 VDC DISTRIBUTION PANEL 1-IV	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
180	1-EP-BKR-12D-11	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 180	
181	1-CH-MOV-1115B	CHARGING PUMP SUCTION FROM RWST ISOLATION VALVE	CLOSED	OPEN	> RLGM (1) (8)	Valve Function, Screened
182	1-CH-P-1A	A CHARGING PUMP	STAND-BY	STAND-BY	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Pump Function, Screened
183	1-CH-P-1B	B CHARGING PUMP	STAND-BY	STAND-BY	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Pump Function, Screened
184	1-CH-P-1C	C CHARGING PUMP	STAND-BY	STAND-BY	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Pump Function, Screened
185	1-SI-MOV-1836	SI COLD LEG INJECTION ALTERNATE HEADER ISOLATION	CLOSED	OPEN	0.71 (1) (4)	Yoke Leg Stress

Note: The superscripts in the column "HCLPF (g) or Factor of Safety" are described in Section 6.6 of the report.

APPENDIX B

UNIT 2

Expedited Seismic Equipment List and Seismic Margin Assessment Results

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
1	2-CN-TK-1	EMERGENCY CONDENSATE STORAGE TANK	STAND-BY	IN-SERVICE	0.348 (1) (4)	Tank Sliding Capacity
2	2-FW-P-2	TURBINE DRIVEN AUXILIARY FEEDWATER PUMP	STAND-BY	IN-SERVICE	3.2 (1) (5)	Embedded Anchor - Shear/Tension Interaction (Steel Failure)
3	2-FW-RV-200	TURBINE DRIVEN AFW PUMP DISCHARGE RELIEF VALVE	NORMALLY CLOSED	CLOSED	> RLGM (1) (8)	Valve Function, Screened
4	2-FW-MOV-200C	STEAM GENERATOR C FROM AFW INLET ISOLATION VALVE	NORMALLY CLOSED	OPEN	> RLGM (1) (6)	Valve Component Stresses / Function
5	2-FW-MOV-200B	STEAM GENERATOR B FROM AFW INLET ISOLATION VALVE	NORMALLY OPEN	OPEN	> RLGM (1) (6)	Valve Component Stresses / Function
6	2-FW-MOV-200A	STEAM GENERATOR A FROM AFW INLET ISOLATION VALVE	NORMALLY CLOSED	OPEN	> RLGM (1) (6)	Valve Component Stresses / Function
7	2-MS-TV-211B	2-FW-P-2 STEAM SUPPLY VALVE	NORMALLY CLOSED	CLOSED	> RLGM (2) (8)	Valve Function, Screened
8	2-MS-TV-211A	2-FW-P-2 STEAM SUPPLY VALVE	NORMALLY CLOSED	CLOSED	> RLGM (2) (8)	Valve Function, Screened
9	2-MS-TV-215	AUX FEED PUMP TURBINE DRIVE INLET TRIP VALVE	NORMALLY OPEN	OPEN	> RLGM (1) (7)	Valve Function , Valve Bonnet Neck
10	2-FW-T-2	TURBINE DRIVEN AUXILIARY FEEDWATER PUMP TURB DRIVE	STAND-BY	IN-SERVICE	Rule of the Box Evaluation – See Item 2	
11	2-FW-RV-704	2-FW-T-2 RELIEF VALVE	NORMALLY CLOSED	CLOSED	Rule of the Box Evaluation – See Item 2	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
12	2-MS-PCV-201A	A SG POWER OPERATED RELIEF VALVE (TCA)	NORMALLY CLOSED	CLOSED	> RLGM (2) (6)	Valve Component Stresses / Function
13	2-MS-PCV-201B	B SG POWER OPERATED RELIEF VALVE (TCA)	NORMALLY CLOSED	CLOSED	> RLGM (2) (6)	Valve Component Stresses / Function
14	2-MS-PCV-201C	C SG POWER OPERATED RELIEF VALVE (TCA)	NORMALLY CLOSED	CLOSED	> RLGM (2) (6)	Valve Component Stresses / Function
15	2-QS-TK-1	REFUELING WATER STORAGE TANK	STAND-BY	IN-SERVICE	0.59 (3) (4)	Anchorage, Tank Overturning Moment Capacity
16	2-QS-P-1B	B QUENCH SPRAY PUMP	STAND-BY	STAND-BY	>RLGM (2) (7)	Anchorage
					> RLGM (2)	Pump Function, Screened
17	2-EI-CB-01	MAIN CONTROL BENCHBOARD 2-1	INSTALLED	INSTALLED	> RLGM (2) (7)	Anchorage
					> RLGM (2)	Bench Board Equipment Function, Screened based on Guidance in EPRI TR-1019200
18	2-EI-CB-02	MAIN CONTROL BOARD, BENCH BOARD SECTION 2-2.	INSTALLED	INSTALLED	> RLGM (2) (7)	Anchorage
					> RLGM (2)	Bench Board Equipment Function, Screened based on Guidance in EPRI TR-1019200
19	2-EI-CB-03	MAIN CONTROL VERTICAL BOARD SECTION 2-1	INSTALLED	INSTALLED	1.57 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2)	Vertical Board Equipment Function, Screened based on Guidance in EPRI TR-1019200
20	2-EI-CB-04	MAIN CONTROL VERTICAL BOARD 2-2	INSTALLED	INSTALLED	1.57 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2)	Vertical Board Equipment Function, Screened based on Guidance in EPRI TR-1019200

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
21	2-EI-CB-05	MAIN CONTROL VERTICAL BOARD / UNIT 2 SAFEGUARDS PANEL	INSTALLED	INSTALLED	1.57 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2)	Vertical Board Equipment Function, Screened based on Guidance in EPRI TR-1019200
22	2-EI-CB-23A	SECONDARY PLANT PROCESS RACK A PROT CHANNEL I	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
23	2-EI-CB-23B	SECONDARY PLANT PROCESS RACK B PROT CHANNEL II	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
24	2-EI-CB-23C	SECONDARY PLANT PROCESS RACK C PROT CHANNEL III	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
25	2-EI-CB-23D	SECONDARY PLANT PROCESS RACK D PROT CHANNEL IV	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
26	2-EI-CB-34	POST ACCIDENT MONITORING CONTROL CABINET	INSTALLED	INSTALLED	3.10 (2) (5)	Anchorage, Pullout in Expansion Anchor
					> RLGM (2) (8)	Panel Function, Screened
27	2-EI-CB-51	PRIMARY PLANT PROCESS RACK 1 PROTECTION CH I	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
28	2-EI-CB-52	PRIMARY PLANT PROCESS RACK 2 PROTECTION CHANNEL II	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
29	2-EI-CB-53	PRIMARY PLANT PROCESS RACK 3 PROT CHANNEL III	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
30	2-EI-CB-54	PRIMARY PLANT PROCESS RACK 4 PROT CHANNEL IV	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
31	2-EI-CB-55	PRIMARY PLANT PROCESS RACK 5 CONTROL CABINET	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
32	2-EI-CB-56	PRIMARY PLANT PROCESS RACK 6 CONTROL CABINET	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
33	2-EI-CB-57	PRIMARY PLANT PROCESS RACK 7 CONTROL CABINET	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
34	2-EI-CB-58	PRIMARY PLANT PROCESS RACK 8 CONTROL CABINET	INSTALLED	INSTALLED	2.75 (2) (5)	Anchorage, Tensile Stress in Cabinet Bolt
					> RLGM (2) (8)	Cabinet Function, Screened
35	2-EP-CB-80A	120VAC INSTRUMENTATION DISTRIBUTION PANEL 2-I	INSTALLED	INSTALLED	> RLGM (2) (7)	Anchorage
					> RLGM (2) (8)	Distribution Panel Function, Screened
36	2-EP-CB-80C	120VAC INSTRUMENT DISTRIBUTION PANEL 2-III	INSTALLED	INSTALLED	> RLGM (2) (7)	Anchorage
					> RLGM (2) (8)	Distribution Panel Function, Screened
37	2-EP-CB-80E	120VAC INSTRUMENT DISTRIBUTION PANEL 2-V	INSTALLED	INSTALLED	> RLGM (2) (7)	Anchorage
					> RLGM (2) (8)	Distribution Panel Function, Screened
38	2-EI-CB-114	INSTRUMENTATION RACK 2-802	INSTALLED	INSTALLED	> RLGM (2) (6)	Anchorage
					> RLGM (2) (8)	Instruments on Racks Function, Screened
39	2-EI-CB-124	INSTRUMENTATION RACK 2-101	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Instruments on Racks Function, Screened
40	2-EI-CB-128	INSTRUMENTATION RACK 2-104	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Instruments on Racks Function, Screened
41	2-EI-CB-139	INSTRUMENTATION RACK 2-115	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (9)	Instruments on Racks Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
42	2-EI-CB-145	INSTRUMENTATION RACK 2-120	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Instruments on Racks Function, Screened
43	2-EI-CB-300	TECHNICAL SUPPORT CENTER MULTIPLEXER CABINET	INSTALLED	INSTALLED	2.1 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
44	2-EI-CB-301A	TECHNICAL SUPPORT CENTER MULTIPLEXER CABINET	INSTALLED	INSTALLED	4.96 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
45	2-EI-CB-301C	TECHNICAL SUPPORT CENTER MULTIPLEXER CABINET	INSTALLED	INSTALLED	3.53 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
46	2-EI-CB-301D	TECHNICAL SUPPORT CENTER MULTIPLEXER CABINET	INSTALLED	INSTALLED	2.29 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
47	2-EI-CP-03	ICC MULTIPLEXER CABINET	INSTALLED	INSTALLED	4.15 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1)	Cabinet Function, Screened
48	2-EI-CP-04	ICC CABINET	INSTALLED	INSTALLED	2.28 (2) (5)	Anchorage, Support Flange Bending Stress
					> RLGM (2) (8)	Cabinet Function, Screened
49	2-EI-CP-05	MULTIPLEXER MASTER RECEIVER CABINET	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Support Flange Bending Stress
					> RLGM (2) (8)	Cabinet Function, Screened
50	2-BDB-DB-1-PANEL	BEYOND DESIGN BASIS PANEL 1(Distribution Panel)	NOT OPERATING	OPERATING	7.356 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (9)	Distribution Panel Function
51	2-BDB-DB-2-PANEL	BEYOND DESIGN BASIS PANEL 2(Distribution Panel)	NOT OPERATING	OPERATING	7.356 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (9)	Distribution Panel Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
52	2-BDB-DB-3-PANEL	BEYOND DESIGN BASIS PANEL 3, RECEPTACLE ASSEMBLY(Receptacle Panel)	NOT OPERATING	OPERATING	7.356 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (9)	Panel Function
53	2-MS-PI-2474	A MAIN STM HDR TO TURBINE PRESS INDR CHANNEL II	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
54	2-MS-PT-2474	A MAIN STEAM HEADER TO TURBINE PRESS TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 38	
55	2-MS-PI-2484	B MAIN STM HDR TO TURBINE PRESS INDR CHANNEL II	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
56	2-MS-PT-2484	B MAIN STEAM HEADER TO TURBINE PRESS TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 38	
57	2-MS-PI-2494	C MAIN STM HDR TO TURBINE PRESS INDR CHANNEL II	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
58	2-MS-PT-2494	C MAIN STEAM HEADER TO TURBINE PRESS TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation - See Item 38	
59	2-FW-LI-2474	1A STEAM GENERATOR LEVEL INDICATOR CHANNEL I	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
60	2-FW-LT-2474	1A STEAM GENERATOR LEVEL TRANSMITTER	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (9)	Transmitter Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
61	2-FW-LI-2484	1B STEAM GENERATOR LEVEL INDICATOR CHANNEL I	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
62	2-FW-LT-2484	1B STEAM GENERATOR LEVEL TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 42	
63	2-FW-LI-2494	1C STEAM GENERATOR LEVEL INDICATOR CHANNEL I	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
64	2-FW-LT-2494	1C STEAM GENERATOR LEVEL TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 41	
65	2-FW-LI-2477A	1A STEAM GENERATOR WIDE RANGE LEVEL INDICATOR	OPERATING	OPERATING	> RLGM [(1)][(7)]	Anchorage
					> RLGM [(1)][(8)]	Instrument Function, Screened
66	2-FW-LT-2477	1A STEAM GENERATOR WIDE RANGE LEVEL XMITR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 40	
67	2-FW-LI-2487A	1B STEAM GENERATOR WIDE RANGE LEVEL INDICATOR	OPERATING	OPERATING	> RLGM [(1)][(7)]	Anchorage
					> RLGM [(1)][(8)]	Instrument Function, Screened
68	2-FW-LT-2487	1B STEAM GENERATOR WIDE RANGE LEVEL XMTR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 42	
69	2-FW-LI-2497A	1C STEAM GENERATOR WIDE RANGE LEVEL INDICATOR	OPERATING	OPERATING	> RLGM [(1)][(7)]	Anchorage
					> RLGM [(1)][(8)]	Instrument Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
70	2-FW-LT-2497	1C STEAM GENERATOR WIDE RANGE LEVEL TRANSMITTER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 39	
71	2-LM-PI-200A	REACTOR CONT PRESS PI	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 21	
72	2-LM-PT-200A	PEN 57 LEAK MON SUPPLY LINE PRESSURE TRANSMITTER	OPERATING	OPERATING	> RLGM (1)(7)	Anchorage
					> RLGM (1)(8)	Transmitter Function, Screened
73	2-LM-PI-210A	PEN 57 LEAK MON SUPPLY LINE PRESSURE INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 21	
74	2-LM-PT-210A	PEN 57 LEAK MON SUPPLY LINE PRESSURE TRANSMITTER	OPERATING	OPERATING	> RLGM (1)(7)	Anchorage
					> RLGM (1)(8)	Transmitter Function, Screened
75	2-LM-TI-200-1	REACTOR CONTAINMENT AIR MONITOR TEMP INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 21	
76	2-LM-TE-200-1	REACTOR CONTAINMENT MONITOR TEMP ELEMENT	OPERATING	OPERATING	> RLGM (1)(7)	Anchorage
					> RLGM (1)(9)	Temperature Sensor Function
77	2-LM-TI-200-2	REACTOR CONTAINMENT AIR MONITOR TEMP INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 21	
78	2-LM-TE-200-2	REACTOR CONTAINMENT AIR MONITOR TEMP ELEMENT	OPERATING	OPERATING	> RLGM (1)(7)	Anchorage
					> RLGM (1)(9)	Temperature Sensor Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
79	2-RC-TR-2410	A LOOP REACTOR COOLANT COLD AND HOT LEG TEMP RECORDER(WIDE RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 19	
80	2-RC-TE-2410	A LOOP REACTOR COOLANT COLD LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
81	2-RC-TE-2413	A LOOP REACTOR COOLANT HOT LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
82	2-RC-TR-2420	B LOOP REACTOR COOLANT COLD AND HOT LEG TEMP RECORDER(WIDE RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 19	
83	2-RC-TE-2420	B LOOP REACTOR COOLANT COLD LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
84	2-RC-TE-2423	B LOOP REACTOR COOLANT HOT LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
85	2-RC-TR-2430	C LOOP REACTOR COOLANT COLD LEG TEMP RECORDER (WIDE RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 19	
86	2-RC-TE-2430	C LOOP REACTOR COOLANT COLD LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
87	2-RC-TE-2433	C LOOP REACTOR COOLANT HOT LEG TEMP DUAL ELEMENT RTD	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
88	2-RC-PI-2402A	C LOOP REACTOR COOLANT HOT LEG PRESSURE INDICATOR (WIDE RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 19	
89	2-RC-PI-2402B	C LOOP REACTOR COOLANT HOT LEG PRESS IND (NARROW RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 19	
90	2-RC-PT-2402	LOOP C HOT LEG TO RH PPS PRESSURE TRANSMITTER	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (9)	Transmitter Function
91	2-RC-PI-2403B	LOOP A HOT LEG TO RH PPS PRESSURE INDICATOR (NARROW RANGE)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 17	
92	2-RC-PT-2403	LOOP A HOT LEG TO RH PPS PRESSURE TRANSMITTER	OPERATING	OPERATING	3.66 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (9)	Transmitter Function
93	2-RC-LI-2459A	PRESSURIZER LEVEL INDICATION CHANNEL I	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 19	
94	2-RC-LT-2459	PRESSURIZER LEVEL TRANSMITTER	OPERATING	OPERATING		
95	2-CN-LI-200B-1	EMERGENCY COND STORAGE TANK LEVEL INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
96	2-CN-LT-200B	EMERGENCY COND STORAGE TANK LEVEL TRANSMITTER	OPERATING	OPERATING	3.05 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Transmitter Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
97	2-FW-FI-200A	AFW PUMPS OUTLET TO S/G A FLOW INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
98	2-FW-FT-200A	AFW PUMPS OUTLET TO S/G A FLOW TRANSMITTER	OPERATING	OPERATING	3.05 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Transmitter Function, Screened
99	2-FW-FI-200B	AFW PUMPS OUTLET TO S/G B FLOW INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
100	2-FW-FT-200B	AFW PUMPS OUTLET TO S/G B FLOW TRANSMITTER	OPERATING	OPERATING	3.05 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Transmitter Function, Screened
101	2-FW-FI-200C	AFW PUMPS OUTLET TO S/G C FLOW INDICATOR	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 20	
102	2-FW-FT-200C	AFW PUMPS OUTLET TO S/G C FLOW TRANSMITTER	OPERATING	OPERATING	3.05 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Transmitter Function, Screened
103	2-CM-MR-3	ICC MASTER RECIEVER	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 49	
104	2-RC-LQ-201	ICCM DISPLAY POWER SUPPLY TRAIN A	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 43	
105	2-CM-MUX-32A	REMOTE MULTIPLEXER MODULE	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 47	
106	2-RC-KBD-201	ICCM CONTROL PAD (TRAIN A)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 18	
107	2-RC-MON-201	GET/CCM/RVLIS MONITOR (TRAIN A)	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 19	
108	2-RC-TE-T6	CORE LOCATION E12 EXIT THERMOCOUPLE	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
109	2-RC-LR-2310A	REACTOR VESSEL LEVEL RECORDER TRAIN A	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 26	
110	2-RC-TE-2313	RX VSL VENT LINE RVLIS TRAIN A TUBING TEMP ELEM	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
111	2-RC-TE-2314	RX VSL VENT LINE RVLIS TRAIN A TUBING TEMP ELEM	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
112	2-RC-TE-2315	INCORE THIMBLES RVLIS TRAIN A TUBING TEMP ELEM	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
113	2-RC-TE-2316	B LOOP HOT LEG RVLIS TUBING TEMP ELEMENT	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
114	2-RC-TE-2317	RX VSL INCORE THIMBLES RVLIS TEMP ELEM	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
115	2-RC-TE-2318	RX VSL INCORE THIMBLES RVLIS TEMP ELEM	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
116	2-RC-TE-2319	INCORE THIMBLES RVLIS TRAIN A TUBING TEMP ELEM	OPERATING	OPERATING	> RLGM (1) (9)	Temperature Sensor Function
117	2-RC-LIS-2310	B LOOP RVLIS TRAIN A HOT LEG ISOLATOR LVL INDR SW	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
118	2-RC-LIS-2311	RVLIS TRAIN A RX VSL HEAD ISOLATOR LVL INDR SWITCH	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
119	2-RC-LIS-2312	RVLIS TRAIN A SEAL TABLE ISOLATOR LVL INDR SWITCH	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
120	2-RC-LT-2310	REAC VESSEL RVLIS TRAIN A PLENUM LEVEL TRANSMITTER	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
121	2-RC-LT-2311	REAC VESSEL RVLIS TRAIN A NORMAL RANGE LEVEL XMTR	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
122	2-RC-LT-2312	REAC VESSEL RVLIS TRAIN A WIDE RANGE LEVEL XMTR	OPERATING	OPERATING	2.14 (1) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (1) (8)	Instruments on Racks Function, Screened
123	2-NM-PRO-NM3	EXCORE NEUTRON FLUX MONITOR CHANNEL 3 PROCESSOR	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (8)	Equipment Function, Screened
124	2-NM-AMP-NM3	EXCORE NEUTRON FLUX MONITOR CHANNEL 3 AMPLIFIER	OPERATING	OPERATING	> RLGM (1) (7)	Anchorage
					> RLGM (1) (8)	Equipment Function, Screened
125	2-NM-NFI-2270B1	NEUTRON FLUX INDICATOR, WIDE RANGE LVL,(EXCORE) CHANNEL 3	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 128	
126	2-NM-NFI-2270A1	NEUTRON FLUX INDICATOR, SOURCE RANGE,(EXCORE) CHANNEL 3	OPERATING	OPERATING	Rule of the Box Evaluation – See Item 128	
127	2-NM-NFD-2270	NEUTRON FLUX DETECTOR (EXOCRE) CHANNEL 3	INSTALLED	INSTALLED	> RLGM (1) (9)	Detector Function

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
128	2-EI-CB-36C	NIS CABINET 3	INSTALLED	INSTALLED	2.28 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Cabinet Function, Screened
129	2-EP-ST-03	ISOLATION TRANSFORMER FOR EXCORE NI CHAN III	OPERATING	OPERATING	> RLGM (2) (7)	Anchorage
					> RLGM (2) (8)	Panel Function, Screened
130	2-EP-CB-04A	120VAC VITAL BUS DISTRIBUTION PANEL 2-I (TCA)	INSTALLED	INSTALLED	0.428 (2) (4)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
131	2-EP-BKR-04A-3-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 130	
132	2-EP-BKR-04A-16-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 130	
133	2-EP-BKR-04A-22-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 130	
134	2-EP-BKR-04A-25-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 130	
135	2-EP-BKR-04A-32-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 130	
136	2-EP-BKR-04A-35-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 130	
137	2-EP-BKR-04A-14-CKTBRK	BDB BACKFEED CIRCUIT BREAKER	OPEN	CLOSED	Rule of the Box Evaluation – See Item 130	
138	2-EP-CB-04B	120VAC VITAL BUS DISTRIBUTION PANEL 2-II (TCA)	INSTALLED	INSTALLED	0.428 (2) (4)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
139	2-EP-BKR-04B-3-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 138	
140	2-EP-BKR-04B-22-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 138	
141	2-EP-BKR-04B-35-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 138	
142	2-EP-BKR-04B-14-CKTBRK	BDB BACKFEED CIRCUIT BREAKER	OPEN	CLOSED	Rule of the Box Evaluation – See Item 138	
143	2-EP-CB-04C	120VAC VITAL BUS DISTRIBUTION PANEL 2-III (TCA)	INSTALLED	INSTALLED	0.428 (2) (4) > RLGM (2) (8)	Anchorage, Shear/Tension Interaction Distribution Panel Function, Screened
144	2-EP-BKR-04C-3-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 143	
145	2-EP-BKR-04C-4-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 143	
146	2-EP-BKR-04C-17-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 143	
147	2-EP-BKR-04C-22-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 143	
148	2-EP-BKR-04C-32-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 143	
149	2-EP-BKR-04C-35-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 143	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
150	2-EP-BKR-04C-5-CKTBRK	BDB BACKFEED CIRCUIT BREAKER	OPEN	CLOSED	Rule of the Box Evaluation – See Item 143	
151	2-EP-CB-04D	120VAC VITAL BUS DISTRIBUTION PANEL 2-IV	INSTALLED	INSTALLED	0.428 (2) (4)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
152	2-EP-BKR-04D-3-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 151	
153	2-EP-BKR-04D-17-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 151	
154	2-EP-BKR-04D-22-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 151	
155	2-EP-BKR-04D-35-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 151	
156	2-EP-BKR-04D-5-CKTBRK	BDB BACKFEED CIRCUIT BREAKER	OPEN	CLOSED	Rule of the Box Evaluation – See Item 151	
157	2-EP-BKR-80A-21-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 35	
158	2-EP-BKR-80C-4-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 36	
159	2-EP-BKR-80E-9-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 37	
160	2-EP-BKR-80E-13-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 37	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
161	2-EP-BKR-80E-19-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 37	
162	2-EP-BKR-80E-20-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 37	
163	2-EP-BKR-80E-21-CKTBRK	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 37	
164	2-VB-INV-01	VITAL BUS DISTRIBUTION PANEL 2-I INVERTER	OPERATING	OPERATING	1.72 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Inverter Function, Screened
165	2-VB-INV-02	VITAL BUS DISTRIBUTION PANEL 2-II INVERTER	OPERATING	OPERATING	2.22 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Inverter Function, Screened
166	2-VB-INV-03	VITAL BUS DISTRIBUTION PANEL 2-III INVERTER	OPERATING	OPERATING	2.22 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Inverter Function, Screened
167	2-VB-INV-04	VITAL BUS DISTRIBUTION PANEL 2-IV INVERTER	OPERATING	OPERATING	2.33 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Inverter Function, Screened
168	2-BY-B-2-I	STATION BATTERY 2-I	CHARGING	OPERATING	0.477 (2) (4)	Battery Rack Structural Integrity
169	2-BY-B-2-II	STATION BATTERY 2-II	CHARGING	OPERATING	0.477 (2) (4)	Battery Rack Structural Integrity
170	2-BY-B-2-III	STATION BATTERY 2-III	CHARGING	OPERATING	0.477 (2) (4)	Battery Rack Structural Integrity
171	2-BY-B-2-IV	STATION BATTERY 2-IV	CHARGING	OPERATING	0.477 (2) (4)	Battery Rack Structural Integrity
172	2-EP-CB-12A	125 VDC DISTRIBUTION CABINET 1-I	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
173	2-EP-BKR-12A-13	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 172	

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
174	2-EP-CB-12B	125 VDC DISTRIBUTION CABINET 1-II	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
175	2-EP-BKR-12B-14	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 174	
176	2-EP-CB-12C	125 VDC DISTRIBUTION CABINET 1-III	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
177	2-EP-BKR-12C-12	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 176	
178	2-EP-CB-12D	125 VDC DISTRIBUTION CABINET 1-IV	INSTALLED	INSTALLED	3.67 (2) (5)	Anchorage, Shear/Tension Interaction
					> RLGM (2) (8)	Distribution Panel Function, Screened
179	2-EP-BKR-12D-11	CIRCUIT BREAKER	CLOSED	CLOSED	Rule of the Box Evaluation – See Item 178	
180	2-SI-MOV-2862A	A LOW HEAD SI PUMP SUCTION FROM RWST	OPEN	CLOSED	> RLGM (1) (8)	Valve Function, Screened
181	2-SI-MOV-2862B	B LOW HEAD SI PUMP SUCTION FROM RWST	OPEN	CLOSED	> RLGM (1) (8)	Valve Function, Screened
182	2-CH-MOV-2115B	CHG PUMP SUCTION FROM RWST ISOLATION VALVE	CLOSED	OPEN	> RLGM (1) (8)	Valve Function, Screened
183	2-CH-P-1C	C CHARGING PUMP	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Pump Function, Screened
184	2-CH-P-1B	B CHARGING PUMP	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Pump Function, Screened
185	2-CH-P-1A	A CHARGING PUMP	INSTALLED	INSTALLED	> RLGM (1) (6)	Anchorage
					> RLGM (1) (8)	Pump Function, Screened

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ESEL ITEM #	EQUIPMENT MARK #	DESCRIPTION	EQUIPMENT NORMAL STATE	EQUIPMENT DESIRED STATE	HCLPF (g) or Factor of Safety	Key Failure Mode(s)
186	2-SI-MOV-2836	SI COLD LEG INJECTION ALTERNATE HEADER ISOLATION	CLOSED	OPEN	0.71 (1) (4)	Yoke Leg Stress
187	2-FW-GOV-2	TDAFW PUMP GOVERNOR VALVE	NORMALLY OPEN	OPEN	Rule of the Box Evaluation – See Item 2	

Note: The superscripts in the column "HCLPF (g) or Factor of Safety" are described in Section 6.6 of the report.