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10 CFR 50.54(f)

CNS-14-130
December 31, 2014

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

Duke Energy Carolina, LLC (Duke Energy)
Catawba Nuclear Station, Units 1 and 2
Docket Numbers 50-413 and 50-414
Renewed License Numbers NPF-35 and NPF-52

**Subject:** Catawba Nuclear Station Expedited Seismic Evaluation Process Report (CEUS Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident

**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, ADAMS Accession No. ML12053A340
2. NEI Letter, *Proposed Path Forward for NTTF Recommendation 2.1: Seismic Reevaluations*, dated April 9, 2013, ADAMS Accession No. ML13101A379
3. NRC Letter, *Electric Power Research Institute Final Draft Report 3002000704, "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, ADAMS Accession No. ML13106A331
4. Duke Letter, *Seismic Hazard and Screening Report (CEUS Sites), Response to NRC 10 CFR 50.54(f) Request for Additional 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 31, 2014, ADAMS Accession No. ML14093A052

A010
NRR

Ladies and Gentlemen:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued a 50.54(f) letter to all power reactor licensees and holders of construction permits in active or deferred status. Enclosure 1 of Reference 1 requested each addressee located in the Central and Eastern United States (CEUS) to submit a Seismic Hazard Evaluation and Screening Report within 1.5 years from the date of Reference 1.

In Reference 2, the Nuclear Energy Institute (NEI) requested NRC agreement to delay submittal of the final CEUS Seismic Hazard Evaluation and Screening Reports so that an update to the Electric Power Research Institute (EPRI) ground motion attenuation model could be completed and used to develop that information. NEI proposed that descriptions of subsurface materials and properties and base case velocity profiles be submitted to the NRC by September 12, 2013, with the remaining seismic hazard and screening information submitted by March 31, 2014 (Reference 4). NRC agreed with that proposed path forward in Reference 3.

Reference 1 requested that licensees provide interim evaluations and actions taken or planned to address the higher seismic hazard relative to the design basis, as appropriate, prior to completion of the risk evaluation. In accordance with the NRC endorsed guidance in Reference 3, the attached Expedited Seismic Evaluation Process (ESEP) Report for Catawba provides the information described in Section 7 of Reference 3 in accordance with the schedule identified in Reference 2.

There are no regulatory commitments associated with this submittal.

Should you have any questions concerning this letter or require additional information, please contact Phil Barrett at (803) 701-4138.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 31, 2014.

Sincerely,

Kelvin Henderson
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Attachment 1- Expedited Seismic Evaluation Process (ESEP) Report

xc:

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# Attachment 1

# EXPEDITED SEISMIC EVALUATION PROCESS (ESEP) REPORT

## Catawba Nuclear Station, Units 1 and 2

## Docket Numbers 50-413 and 50-414

## Renewed License Numbers NPF-35 and NPF-52

# EXPEDITED SEISMIC EVALUATION PROCESS (ESEP) REPORT

## December 8, 2014

## Revision 1

## Duke Energy
## Catawba Nuclear Station

# EXPEDITED SEISMIC EVALUATION PROCESS REPORT

## TABLE OF CONTENTS

1.0 PURPOSE AND OBJECTIVE ..... 5

2.0 BRIEF SUMMARY OF THE FLEX SEISMIC IMPLEMENTATION STRATEGIES ..... 5
2.1 Maintain Core Cooling and Heat Removal FLEX Flow Path ..... 6
2.1.1 Steam Generators Available Phase 1 ..... 6
2.1.2 Steam Generators Available Phase 2 ..... 6
2.1.3 Steam Generators Available Phase 3 ..... 6
2.1.4 Steam Generators Not Available Phase 1 ..... 6
2.1.5 Steam Generators Not Available Phase 2 ..... 6
2.1.6 Steam Generators Not Available Phase 3 ..... 7
2.2 Maintain RCS Inventory FLEX Flow Path ..... 7
2.2.1 Phase 1 ..... 7
2.2.2 Phase 2 ..... 7
2.2.3 Phase 3 ..... 7
2.3 Maintain Containment FLEX Flow Path ..... 8
2.3.1 Phase 1 ..... 8
2.3.2 Phase 2 ..... 8
2.3.3 Phase 3 ..... 8

3.0 EQUIPMENT SELECTION PROCESS AND EXPEDITED SEISMIC EQUIPMENT LIST (ESEL) ..... 8
3.1 Equipment Selection Process and ESEL ..... 8
3.1.1 ESEL Development ..... 9
3.1.2 Power-Operated Valves ..... 10
3.1.3 Pull Boxes ..... 10
3.1.4 Termination Cabinets ..... 10
3.1.5 Critical Instrumentation Indicators ..... 11
3.1.6 Phase 2 and Phase 3 Piping Connections ..... 11
3.2 Justification for Use of Equipment that is not the Primary Means for FLEX Implementation ..... 11

4.0 GROUND MOTION RESPONSE SPECTRUM (GMRS) ..... 11
4.1 Plot of GMRS Submitted by the Licensee ..... 11
4.2 Comparison to Safe Shutdown Earthquake (SSE) ..... 13

5.0 REVIEW LEVEL GROUND MOTION (RLGM) ..... 15
5.1 Description of RLGM Selected ..... 15
5.2 Method to Estimate In-Structure Response Spectra (ISRS) ..... 16

6.0 SEISMIC MARGIN EVALUATION APPROACH ..... 16
6.1 Summary of Methodologies Used ..... 17
6.2 HCLPF Screening Process ..... 19
6.3 HCLPF Capacity Determination ..... 20

6.4 Functional Capacity Screening Using EPRI NP-6041-SL ..... 20
6.5 Seismic Walkdown Approach ..... 20
6.5.1 Walkdown Approach ..... 20
6.5.2 Application of Previous Walkdown Information ..... 21
6.5.3 Significant Walkdown Findings ..... 22
6.6 HCLPF Calculation Process ..... 22
6.7 Functional Evaluations of Relays ..... 24
6.8 Tabulated ESEL HCLPF Values (Including Key Failure Modes) ..... 24
7.0 INACCESSIBLE ITEMS ..... 25
7.1 Identification of ESEL Items Inaccessible for Walkdowns ..... 25
7.2 Planned Walkdown / Evaluation Schedule / Close Out ..... 25
8.0 ESEP CONCLUSIONS AND RESULTS ..... 27
8.1 Supporting Information ..... 27
8.2 Identification of Planned Modifications ..... 28
8.3 Modification Implementation Schedule ..... 28
8.4 Summary of Planned Actions ..... 29
9.0 REFERENCES ..... 29

**APPENDICES**

APPENDIX A
Catawba Nuclear Station Unit 1 ESEL and HCLPF Results

APPENDIX B
Catawba Nuclear Station Unit 2 ESEL and HCLPF Results

APPENDIX C
CNS FLEX Flow Paths

**FIGURES**

Figure 4-1. CNS GMRS (5% Damping) – Tabular Form [4]. ..... 12
Figure 4-2. CNS GMRS (5% Damping) – Graphical Form [4]. ..... 13
Figure 4-3. CNS SSE (5% Damping). ..... 14
Figure 4-4. Comparison of CNS GMRS and SSE (5% Damping). ..... 14
Figure 5-1. CNS RLGM (5% Damping). ..... 16
Figure 6-1. Comparison of CNS SSE and RLGM vs. IPEEE RLE. ..... 19

**TABLES**

Table 4-1. CNS SSE (5% Damping) – Tabular Form [4]. ..... 13
Table 5-1. CNS RLGM (5% Damping). ..... 15
Table 6-1. CNS IPEEE RLE (5% Damping). ..... 18
Table 6-2. Unit 1 Components that Require Further Evaluations and/or Modifications. ..... 23
Table 6-3. Unit 2 Components that Require Further Evaluations and/or Modifications. ..... 23
Table 7-1. Unit 2 Walkdowns & Walk-Bys Not Completed at Time of this Report. (2 sheets) ..... 25
Table 8-1. Summary of Planned Actions. ..... 29

## 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 [1], requesting information to assure that these recommendations are addressed by all U.S. nuclear power plants. The 50.54(f) letter [1] requests 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 include a seismic probabilistic risk assessment (SPRA), or a seismic margin assessment (SMA). Based upon the assessment results, the NRC staff will determine whether additional regulatory actions are necessary.

This report describes the Expedited Seismic Evaluation Process (ESEP) undertaken for Catawba Nuclear Station (CNS). The intent of the ESEP is to perform an interim action in response to the NRC's 50.54(f) letter [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 Electric Power Research Institute (EPRI) 3002000704, *Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* [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 enable NRC to understand 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

The CNS FLEX strategies for Reactor Core Cooling and Heat Removal, Reactor Inventory Control/Long-Term Subcriticality, and Containment Function are summarized below. This summary is derived from the CNS Overall Integrated Plan (OIP) in Response to the March 12, 2012, Commission Order EA-12-049 [3] (as supplemented by subsequent six-month updates [22], [23], and [24]).

Conceptual sketches showing FLEX strategy flow paths are included in Appendix C.

## 2.1 Maintain Core Cooling and Heat Removal FLEX Flow Path

The FLEX flow path for maintaining core cooling and heat removal addresses plant operating conditions with or without steam generators available. Both scenarios are addressed below.

### 2.1.1 Steam Generators Available Phase 1

Phase 1 of the Maintain Core Cooling and Heat Removal Strategy relies on routing the Condenser Circulation Water (RC) inventory held in the RC piping through the steam generators. The steam generators route steam to the atmosphere via power-operated relief valves SV01, SV07, SV13, and SV19. Other piping used by both segments includes the piping downstream of the head vent valves and Valves CA178 and CA174 in the Auxiliary Feedwater (CA) system.

### 2.1.2 Steam Generators Available Phase 2

Phase 2 of the Maintain Core Cooling and Heat Removal Strategy introduces cooling water from the ultimate heat sink for use with the steam generators. The water will be provided by diesel-driven portable pumps via any of a number of connection points to either the Nuclear Service Water System (RN) or the Steam Generator Wet Layup Recirculation System (BW) which vary depending on which equipment is available after the initiating event. The RN connection points will be fed by a high-capacity diesel-driven pump and will provide an uninterrupted water supply to the Turbine-Driven Auxiliary Feed Water Pump (TDAFWP) for steam generator makeup, as long as it is operational. Steam generator overfill will be controlled by starting and stopping the TDAFWP as necessary or manually throttling the CA flow control valves. The BW connection points would be fed by a low-capacity, low-pressure diesel-driven pump and include piping isolated by Unit 1 Valves 1BW51, 1BW52, 1BW53, and 1BW54 and Unit 2 Valves 2BW44, 2BW46, 2BW48, and 2BW50. These connection points would feed water directly to the steam generators.

### 2.1.3 Steam Generators Available Phase 3

Phase 3 of the Maintain Core Cooling and Heat Removal Strategy continues operation as Phase 2 with the addition of providing cooling for specific components in the system. Phase 3 starts when equipment arrives from the National SAFER Response Center (NSRC) to provide indefinite coping capabilities.

### 2.1.4 Steam Generators Not Available Phase 1

There are no necessary actions to provide coping during Phase 1. CNS has no means of providing borated Reactor Coolant System (RCS) makeup for Phase 1.

### 2.1.5 Steam Generators Not Available Phase 2

A low pressure pump will provide borated makeup to the RCS if the event were to occur during a refueling outage. This pump will be the same diesel-driven

low-pressure pump identified for connection to the BW system, as both of these strategies will not be performed at the same time. The suction supply for the portable pump will come from a new connection on the Refueling Water Storage Tank (FWST) supply line for the Spent Fuel Pool between valves KF-101B and 103A on Units 1 and 2. The discharge from the portable pump will be into a new connection on the A Train Safety Injection System (NI) pump discharge piping that feeds the RCS hot or cold legs.

If the reactor vessel head is still installed when the event occurs, the reactor head vent valves will be powered using the motor control center back-feed strategy and portable diesel generators. The RCS depressurization will be initiated from the reactor head vent valves which will provide indefinite coping for depressurization. This method allows vapor to be vented in situations where voids may develop during the RCS cooldown/depressurization phase and allows the discharge of liquid inventory if required while injecting the required borated water.

If the reactor vessel head is not installed and fuel is still in the core when the event occurs, discharge of liquid inventory while injecting the required borated water will simply overflow out of the reactor vessel into the cavity/containment, keeping the fuel covered and cooled.

#### 2.1.6 Steam Generators Not Available Phase 3

This strategy will be the same as that used for the Phase 3 strategy when the steam generators were available with the exception that secondary side cooling will not be required.

### 2.2 Maintain RCS Inventory FLEX Flow Path

#### 2.2.1 Phase 1

The CNS OIP identifies that a Phase 1 strategy is not required as the core is not in jeopardy of being uncovered until approximately 55 hours after the initiating event.

#### 2.2.2 Phase 2

The Phase 2 strategy for re-establishing reactor make-up water uses portable pumps to bypass the safety injection pumps, providing make-up water from the FWST to the safety injection pump discharge piping. The portable pump will be connected via connection points which will be installed by the end of each corresponding units' refueling outage.

#### 2.2.3 Phase 3

Phase 3 of the Maintain RCS Inventory strategy relies on the use of a large diesel generator to power the residual heat removal system pumps. This diesel generator will also be provided by the NSRC.

### 2.3 Maintain Containment FLEX Flow Path

#### 2.3.1 Phase 1

The CNS strategy for maintaining containment during Phase 1 relies upon passive cooling from the ice condenser. As the system is passive and does not rely on flow, a FLEX flow path was not established for Phase 1.

#### 2.3.2 Phase 2

The Phase 2 Maintain Containment strategy has two portions. At least one train of hydrogen igniters will be re-powered. Additionally, it is assumed that forced air circulation will be required for containment cooling based on pending analyses. This will be accomplished by operation of the $H_2$ skimmer fans.

#### 2.3.3 Phase 3

The Phase 3 strategy assumes that forced air circulation will be required for containment cooling based on pending analyses. This will be accomplished by operation of the VX Containment Air Return fans, $H_2$ skimmer fans, and two of the Lower Containment Ventilation Units.

## 3.0 Equipment Selection Process and Expedited Seismic Equipment List (ESEL)

The complete ESELs for Unit 1 and Unit 2 are presented in Appendices A and B, respectively. These lists were developed in *Augmented Approach for Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic: Seismic – Catawba Nuclear Station Expedited Seismic Equipment List*, ARES Corporation Report No. 030321.13.01-005, Duke Energy Document No. CNC-1211.00-06-0004 [17].

The selection of equipment for the ESEL followed the guidelines of EPRI 3002000704 [2].

### 3.1 Equipment Selection Process and ESEL

The selection of equipment to be included on the ESEL was based on installed plant equipment credited in the FLEX strategies during Phase 1, 2 and 3 mitigation of a Beyond Design Basis External Event, as outlined in the CNS OIP in Response to the March 12, 2012, Commission Order EA-12-049 [3], as supplemented by subsequent six-month regulatory updates [22], [23], and [24]. The OIP provides the CNS FLEX mitigation strategy and serves as the basis for equipment selected for the ESEP.

The scope of "installed plant equipment" includes equipment relied upon for the FLEX strategies to sustain the critical functions of core cooling and containment integrity consistent with the CNS OIP [3] and supplemented by subsequent six-month regulatory updates [22], [23], and [24]. FLEX recovery actions are excluded from the ESEP scope per EPRI 3002000704 [2]. The overall list of planned FLEX modifications and the scope for consideration herein is limited to those required to support core cooling, reactor coolant inventory and

subcriticality, and containment integrity functions. Portable and pre-staged FLEX equipment (not permanently installed) are excluded from the ESEL per EPRI 3002000704 [2].

The ESEL component selection followed the EPRI guidance outlined in Section 3.2 of EPRI 3002000704 [2].

1. The scope of components is limited to that required to accomplish the core cooling and containment safety functions identified in Table 3-2 of EPRI 3002000704 [2]. The instrumentation monitoring requirements for core cooling/containment safety functions are limited to those outlined in the EPRI 3002000704 [2] guidance, and are a subset of those outlined in the CNS OIP [3] and subsequent updates [22], [23], and [24].
2. The scope of components is limited to installed plant equipment and FLEX connections necessary to implement the CNS OIP [3] and subsequent updates [22], [23], and [24] as described in Section 2.
3. The scope of components assumes the credited FLEX connection modifications are implemented, and are limited to those required to support a single FLEX success path (i.e., either "Primary" or "Back-up/Alternate").
4. The "Primary" FLEX success path is to be specified. Selection of the "Back-up/Alternate" FLEX success path must be justified.
5. Phase 3 coping strategies are included in the ESEP scope, whereas recovery strategies are excluded.
6. Structures, systems, and components excluded per the EPRI 3002000704 [2] guidance are:
   - Structures (e.g., containment, Reactor Building, Control Building, Auxiliary Building, etc.)
   - Piping, cabling, conduit, HVAC, and their supports.
   - Manual valves and rupture disks.
   - Power-operated valves not required to change state as part of the FLEX mitigation strategies.
   - Nuclear steam supply system components (e.g., reactor pressure vessel and internals, reactor coolant pumps and seals, etc.)
7. For cases in which neither train was specified as a primary or back-up strategy, then only one train component (generally 'A' train) is included in the ESEL.

### 3.1.1 ESEL Development

The ESEL was developed by reviewing the CNS OIP [3] and subsequent updates [22], [23], and [24] to determine the major equipment involved in the FLEX strategies. Further reviews of plant drawings (e.g., Process and Instrumentation Diagrams (P&IDs) and Electrical One-Line Diagrams) were

performed to identify the boundaries of the flow paths to be used in the FLEX strategies and to identify specific components in the flow paths needed to support implementation of the FLEX strategies. Boundaries were established at an electrical or mechanical isolation device (e.g., isolation amplifier, valve, etc.) in branch circuits/branch lines off the defined strategy electrical or fluid flow path. P&IDs were the primary reference documents used to identify mechanical components and instrumentation. The flow paths used for FLEX strategies were selected and specific components were identified using detailed equipment and instrument drawings, piping isometrics, electrical schematics and one-line drawings, system descriptions, design basis documents, etc.

### 3.1.2 Power-Operated Valves

Page 3-3 of EPRI 3002000704 [2] notes that power-operated valves not required to change state are excluded from the ESEL. Page 3-2 also notes that "... functional failure modes of electrical and mechanical portions of the installed Phase 1 equipment should be considered (e.g., RCIC/AFW trips)." To address this concern, the following guidance is applied in the CNS ESEL for functional failure modes associated with power-operated valves:

- Power-operated valves that remain energized during the Extended Loss of all AC Power (ELAP) events (such as DC powered valves), were included on the ESEL.
- Power-operated valves not required to change state as part of the FLEX mitigation strategies were not included on the ESEL. The seismic event also causes the ELAP event; therefore, the valves are incapable of spurious operation as they would be de-energized.
- Power-operated valves not required to change state as part of the FLEX mitigation strategies during Phase 1, and are re-energized and operated during subsequent Phase 2 and 3 strategies, were not evaluated for spurious valve operation as the seismic event that caused the ELAP has passed before the valves are re-powered.

### 3.1.3 Pull Boxes

Pull boxes were deemed unnecessary to add to the ESELs as these components provide completely passive locations for pulling or installing cables. No breaks or connections in the cabling are included in pull boxes. Pull boxes were considered part of conduit and cabling, which are excluded in accordance with EPRI 3002000704 [2].

### 3.1.4 Termination Cabinets

Termination cabinets, including cabinets necessary for FLEX Phase 2 and Phase 3 connections, provide consolidated locations for permanently connecting multiple cables. The termination cabinets and the internal connections provide a completely passive function; however, the cabinets are included in the ESEL to

ensure industry knowledge on panel/anchorage failure vulnerabilities is addressed.

#### 3.1.5 Critical Instrumentation Indicators

Critical indicators and recorders are typically physically located on panels/cabinets and are included as separate components; however, seismic evaluation of the instrument indication may be included in the panel/cabinet seismic evaluation (rule-of-the-box).

#### 3.1.6 Phase 2 and Phase 3 Piping Connections

Item 2 in Section 3.1 above notes that the scope of equipment in the ESEL includes "... FLEX connections necessary to implement the CNS OIP [3] and subsequent updates [22], [23], and [24] as described in Section 2." Item 3 in Section 3.1 also notes that "The scope of components assumes the credited FLEX connection modifications are implemented, and are limited to those required to support a single FLEX success path (i.e., either 'Primary' or 'Back-up/Alternate')."

Item 6 in Section 3 above goes on to explain that "Piping, cabling, conduit, HVAC, and their supports ..." are excluded from the ESEL scope in accordance with EPRI 3002000704 [2].

Therefore, piping and pipe supports associated with FLEX Phase 2 and Phase 3 connections are excluded from the scope of the ESEP evaluation. However, any active valves in FLEX Phase 2 and Phase 3 connection flow paths are included in the ESEL.

### 3.2 Justification for Use of Equipment that is not the Primary Means for FLEX Implementation

The ESEL only uses equipment that is the primary means of implementing FLEX strategy.

## 4.0 Ground Motion Response Spectrum (GMRS)

### 4.1 Plot of GMRS Submitted by the Licensee

The CNS GMRS used to select the ESEP Review Level Ground Motion (RLGM) was included in the CNS Seismic Hazard and Screening Report [4]. Digitized GMRS frequency and acceleration values from the CNS Seismic Hazard and Screening Report [4] are shown in Figure 4-1, which is Table 2.4-1 from [4]. The CNS GMRS is plotted in Figure 4-2.

Table 2.4-1 UHRS and GMRS at control point for Catawba (5% of critical damping response spectra)

| Freq (Hz) | 1E-4 UHRS (g) | 1E-5 UHRS (g) | GMRS (g) |
|---|---|---|---|
| 100 | 2.19E-01 | 6.91E-01 | 3.29E-01 |
| 90 | 2.21E-01 | 7.02E-01 | 3.34E-01 |
| 80 | 2.26E-01 | 7.25E-01 | 3.45E-01 |
| 70 | 2.40E-01 | 7.81E-01 | 3.70E-01 |
| 60 | 2.75E-01 | 9.19E-01 | 4.33E-01 |
| 50 | 3.51E-01 | 1.20E+00 | 5.63E-01 |
| 40 | 4.39E-01 | 1.48E+00 | 6.98E-01 |
| 35 | 4.67E-01 | 1.56E+00 | 7.35E-01 |
| 30 | 4.82E-01 | 1.58E+00 | 7.48E-01 |
| 25 | 4.79E-01 | 1.54E+00 | 7.31E-01 |
| 20 | 4.66E-01 | 1.47E+00 | 6.99E-01 |
| 15 | 4.31E-01 | 1.32E+00 | 6.33E-01 |
| 12.5 | 4.06E-01 | 1.22E+00 | 5.89E-01 |
| 10 | 3.74E-01 | 1.11E+00 | 5.35E-01 |
| 9 | 3.52E-01 | 1.03E+00 | 4.98E-01 |
| 8 | 3.29E-01 | 9.49E-01 | 4.61E-01 |
| 7 | 3.05E-01 | 8.63E-01 | 4.21E-01 |
| 6 | 2.77E-01 | 7.72E-01 | 3.77E-01 |
| 5 | 2.45E-01 | 6.67E-01 | 3.28E-01 |
| 4 | 2.03E-01 | 5.36E-01 | 2.65E-01 |
| 3.5 | 1.80E-01 | 4.67E-01 | 2.31E-01 |
| 3 | 1.56E-01 | 3.97E-01 | 1.98E-01 |
| 2.5 | 1.27E-01 | 3.16E-01 | 1.58E-01 |
| 2 | 1.19E-01 | 2.90E-01 | 1.45E-01 |
| 1.5 | 9.49E-02 | 2.26E-01 | 1.14E-01 |
| 1.25 | 8.03E-02 | 1.89E-01 | 9.55E-02 |
| 1 | 7.15E-02 | 1.64E-01 | 8.35E-02 |
| 0.9 | 6.96E-02 | 1.60E-01 | 8.14E-02 |
| 0.8 | 6.73E-02 | 1.55E-01 | 7.87E-02 |
| 0.7 | 6.36E-02 | 1.47E-01 | 7.44E-02 |
| 0.6 | 5.76E-02 | 1.33E-01 | 6.74E-02 |
| 0.5 | 4.90E-02 | 1.13E-01 | 5.74E-02 |
| 0.4 | 3.92E-02 | 9.04E-02 | 4.59E-02 |
| 0.35 | 3.43E-02 | 7.91E-02 | 4.02E-02 |
| 0.3 | 2.94E-02 | 6.78E-02 | 3.44E-02 |
| 0.25 | 2.45E-02 | 5.65E-02 | 2.87E-02 |
| 0.2 | 1.96E-02 | 4.52E-02 | 2.29E-02 |
| 0.15 | 1.47E-02 | 3.39E-02 | 1.72E-02 |
| 0.125 | 1.22E-02 | 2.83E-02 | 1.43E-02 |
| 0.1 | 9.79E-03 | 2.26E-02 | 1.15E-02 |

**Figure 4-1. CNS GMRS (5% Damping) – Tabular Form [4].**

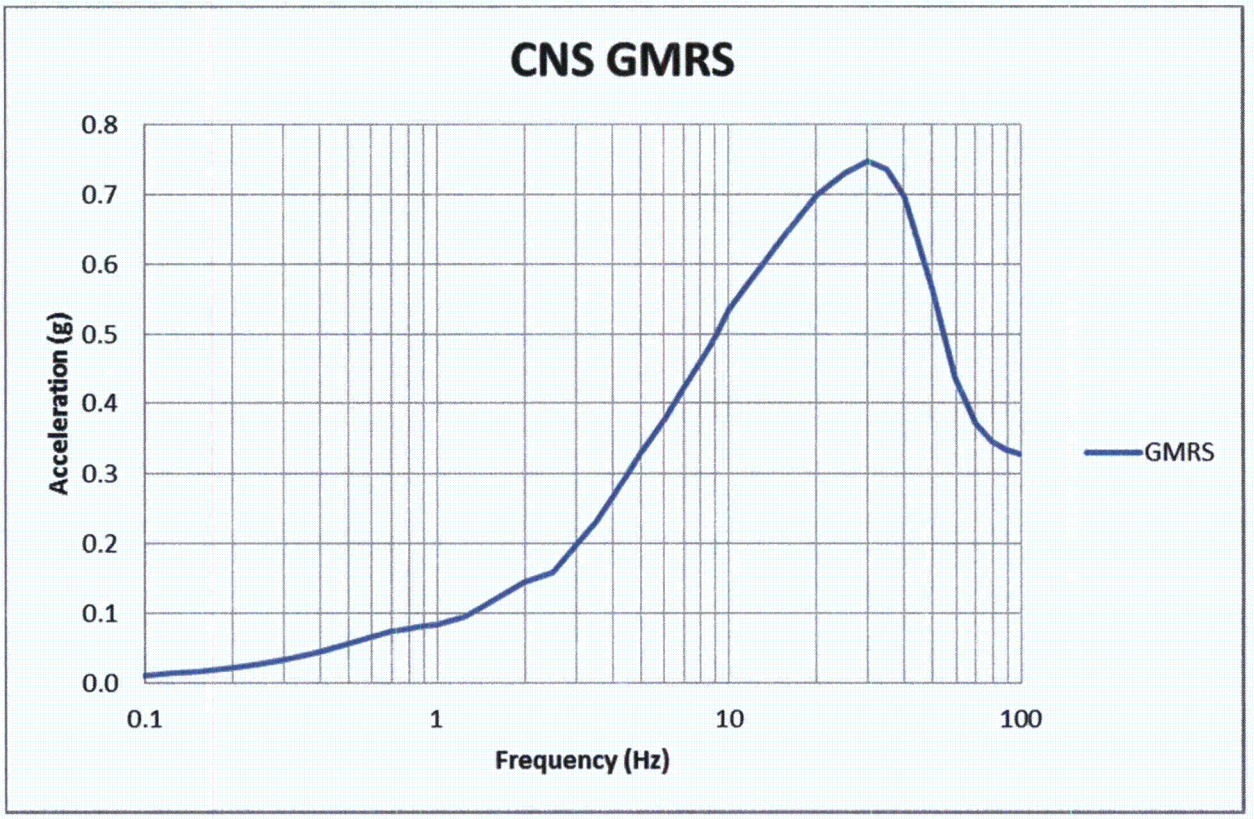



**Figure 4-2. CNS GMRS (5% Damping) – Graphical Form [4].**

The CNS Control Point is located at Elevation 544'-0", which is at the base of the mat foundation of the Reactor Buildings [4].

4.2 Comparison to Safe Shutdown Earthquake (SSE)

A description of the CNS horizontal SSE and spectral shape is included in Section 3.1 of the CNS Seismic Hazard and Screening Report [4]. The SSE is tabulated as a function of frequency in Table 4-1 and plotted in Figure 4-3.

A comparison of the CNS GMRS plotted against the SSE is shown in Figure 4-4.

**Table 4-1. CNS SSE (5% Damping) – Tabular Form [4].**

| Frequency (Hz) | Spectral Acceleration (g) |
|---|---|
| 0.33 | 0.06 |
| 2 | 0.36 |
| 6 | 0.36 |
| 35/PGA | 0.15 |

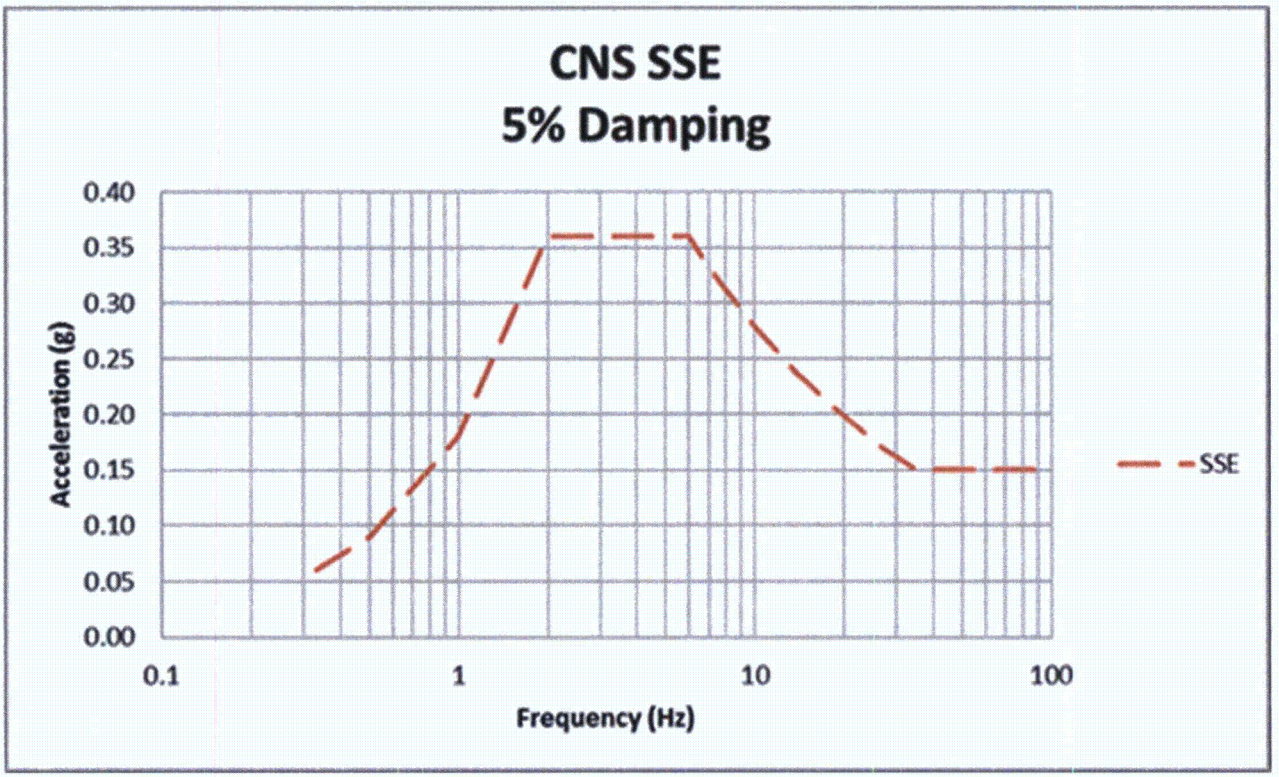



**Figure 4-3. CNS SSE (5% Damping).**

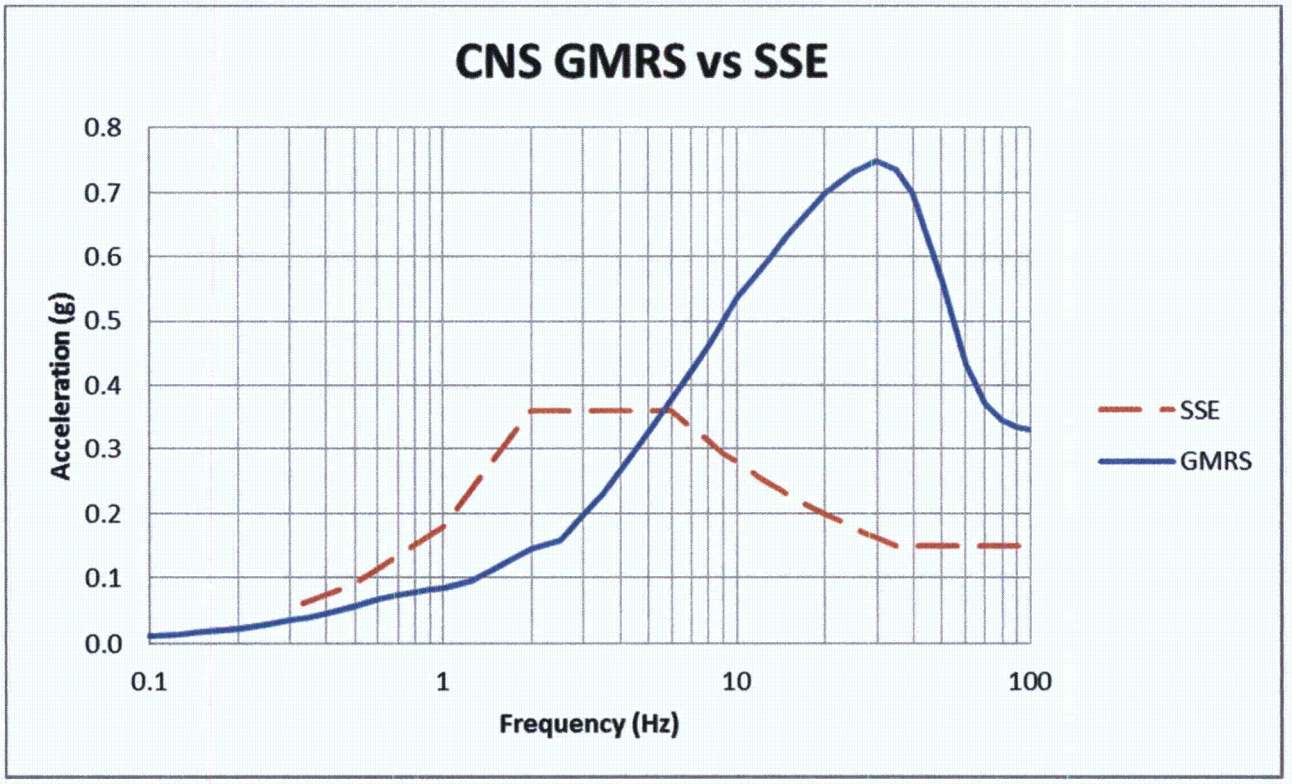



**Figure 4-4. Comparison of CNS GMRS and SSE (5% Damping).**

# 5.0 Review Level Ground Motion (RLGM)

## 5.1 Description of RLGM Selected

The procedure for determining the RLGM for the ESEP is described in Section 4 of EPRI 3002000704 [2]. The RLGM is determined by multiplying the spectral acceleration values for the 5%-damped SSE horizontal ground response spectrum by a scale factor. The scale factor is the largest ratio of spectral accelerations between the 5%-damped GMRS and the 5%-damped SSE ground response spectrum at frequencies from 1 Hz to 10 Hz, but not to exceed 2.0.

The ratio of the GMRS to the SSE over the 1 to 10 Hz frequency range is shown in Figure 4-4. The largest ratio of the GMRS to the SSE in the 1 to 10 Hz range is at 10 Hz. The ratio of the spectral accelerations is 0.535/0.28 = 1.91. Therefore, the RLGM is determined by multiplying the SSE ground response spectrum by 1.91. Digitized RLGM frequency and acceleration values are shown in Table 5-1. The CNS RLGM is plotted in Figure 5-1.

**Table 5-1. CNS RLGM (5% Damping).**

| Frequency (Hz) | Acceleration (g) |
|---|---|
| 0.333 | 0.115 |
| 0.5 | 0.172 |
| 1 | 0.344 |
| 2 | 0.688 |
| 3 | 0.688 |
| 4 | 0.688 |
| 5 | 0.688 |
| 6 | 0.688 |
| 7 | 0.637 |
| 8 | 0.596 |
| 9 | 0.562 |
| 10 | 0.535 |
| 11 | 0.509 |
| 12 | 0.487 |
| 13 | 0.468 |
| 14 | 0.452 |
| 15 | 0.436 |
| 17.5 | 0.404 |
| 20 | 0.378 |
| 22.5 | 0.357 |
| 25 | 0.339 |
| 27.5 | 0.323 |
| 30 | 0.309 |
| 35 | 0.287 |
| 100 | 0.287 |

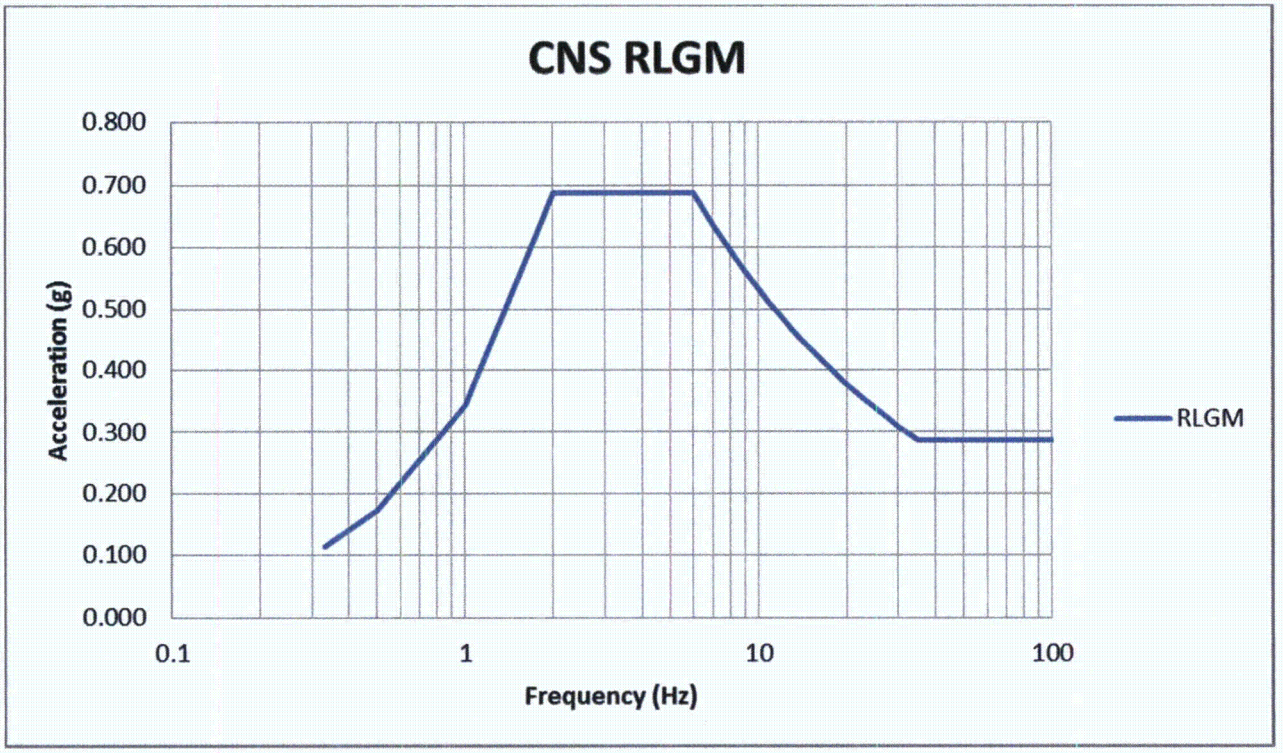



**Figure 5-1. CNS RLGM (5% Damping).**

5.2 Method to Estimate In-Structure Response Spectra (ISRS)

The new ISRS for the ESEP were derived by scaling the CNS design-basis SSE by the RLGM scale factor of 1.91.

## 6.0 Seismic Margin Evaluation Approach

It is necessary to demonstrate that ESEL items have sufficient seismic capacity to meet or exceed the demand characterized by the RLGM. The seismic capacity is characterized as the peak ground acceleration (PGA) for which there is a high confidence of a low probability of failure (HCLPF). The PGA is associated with a specific spectral shape, in this case the 5%-damped RLGM spectral shape. The HCLPF capacity must be equal to or greater than the RLGM PGA. The criteria for seismic capacity determination are given in Section 5 of EPRI 3002000704 [2].

There are two basic approaches for developing HCLPF capacities:

1. Deterministic approach using the conservative deterministic failure margin (CDFM) methodology of EPRI NP-6041-SL, A Methodology for Assessment of Nuclear Power Plant Seismic Margin [7].
2. Probabilistic approach using the fragility analysis methodology of EPRI TR-103959, Methodology for Developing Seismic Fragilities [8].

## 6.1 Summary of Methodologies Used

Seismic capacity screening was done using information from the CNS Individual Plant Examination of External Events (IPEEE) submittal [9] and supporting documentation (CNC-1535.00-00-0005 [18], Seismic Capacity Evaluations for the IPEEE and EPRI Seismic Margins Study]).

CNS used both a SPRA [10] and a SMA to address the IPEEE. The SPRA and SMA are described in the CNS IPEEE Submittal Report [9].

The SMA conducted for Catawba is documented in EPRI NP-6359 [19], Seismic Margin Assessment of the Catawba Nuclear Station. This SMA was a trial plant review to test the EPRI Seismic Margin Methodology. It was performed prior to the publication of NRC Generic Letter 88-20, Supplement 4 [6], and NUREG-1407 [5], Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities, which provided the requirements for IPEEE. Consequently, it differed in some respects from most of the SMAs that were conducted for IPEEE. The Catawba SMA was equivalent to a full-scope SMA, as defined in NUREG-1407 [5], as it included a full-scope evaluation of relays, whereas NUREG-1407 [5] placed Catawba in the focused-scope category and only required a search for low-ruggedness relays. The SMA documented in EPRI NP-6359 [19] was for Unit 2. During the IPEEE, Duke Energy conducted an additional SMA to extend the EPRI NP-6359 [19] results to Unit 1 and all of the items on the IPEEE Seismic Equipment List in Unit 2. This SMA is documented in CNC-1535.00-00-0005 [18].

The SMA documented in CNC-1535.00-00-0005 [18] consisted of screening walkdowns and anchorage calculations. The screening walkdowns used the screening tables from EPRI NP-6041-SL [7]. The walkdowns were conducted by registered professional engineers. Given the standards available at the time each of the two portions of the seismic review was done, the Seismic Review Team met the requirements and intent of EPRI NP-6041-SL [7] and NUREG-1407 [5]. The walkdowns were documented on Screening Evaluation Work Sheets (SEWS) from EPRI NP-6041-SL [7]. Anchorage capacity calculations utilized the CDFM criteria from EPRI NP-6041-SL [7]. Seismic demand was based on the Review Level Earthquake (RLE) selected for the Catawba Trial Plant Review, which was the Sequoyah 84th percentile site-specific spectral shape anchored to 0.3g PGA, which is similar to the NUREG/CR-0098 [11] response spectrum recommended in NUREG-1407 [5]. Frequency and acceleration values for the CNS IPEEE RLE are shown in Table 6-1. Figure 6-1 shows the EPRI NP-6359 [19] RLE compared to the SSE and RLGM response spectra.

**Table 6-1. CNS IPEEE RLE (5% Damping).**

| Freq. (Hz) | Acc. (g) | Freq. (Hz) | Acc. (g) |
|---|---|---|---|
| 0.25 | 0.20 | 3.78 | 0.729 |
| 0.28 | 0.027 | 4.23 | 0.752 |
| 0.31 | 0.033 | 4.74 | 0.772 |
| 0.35 | 0.041 | 5.31 | 0.792 |
| 0.39 | 0.048 | 5.94 | 0.817 |
| 0.44 | 0.055 | 6.66 | 0.839 |
| 0.49 | 0.063 | 7.45 | 0.806 |
| 0.55 | 0.077 | 8.35 | 0.727 |
| 0.62 | 0.093 | 9.35 | 0.644 |
| 0.69 | 0.110 | 10.47 | 0.566 |
| 0.78 | 0.128 | 11.72 | 0.511 |
| 0.87 | 0.148 | 13.13 | 0.473 |
| 0.97 | 0.167 | 14.7 | 0.445 |
| 1.09 | 0.184 | 16.46 | 0.424 |
| 1.22 | 0.201 | 18.43 | 0.410 |
| 1.37 | 0.220 | 20.64 | 0.398 |
| 1.53 | 0.251 | 23.11 | 0.382 |
| 1.71 | 0.301 | 25.88 | 0.363 |
| 1.92 | 0.374 | 28.98 | 0.341 |
| 2.15 | 0.470 | 32.46 | 0.320 |
| 2.4 | 0.546 | 36.34 | 0.308 |
| 2.69 | 0.589 | 40.7 | 0.301 |
| 3.01 | 0.635 | 46 | 0.300 |
| 3.38 | 0.689 | | |

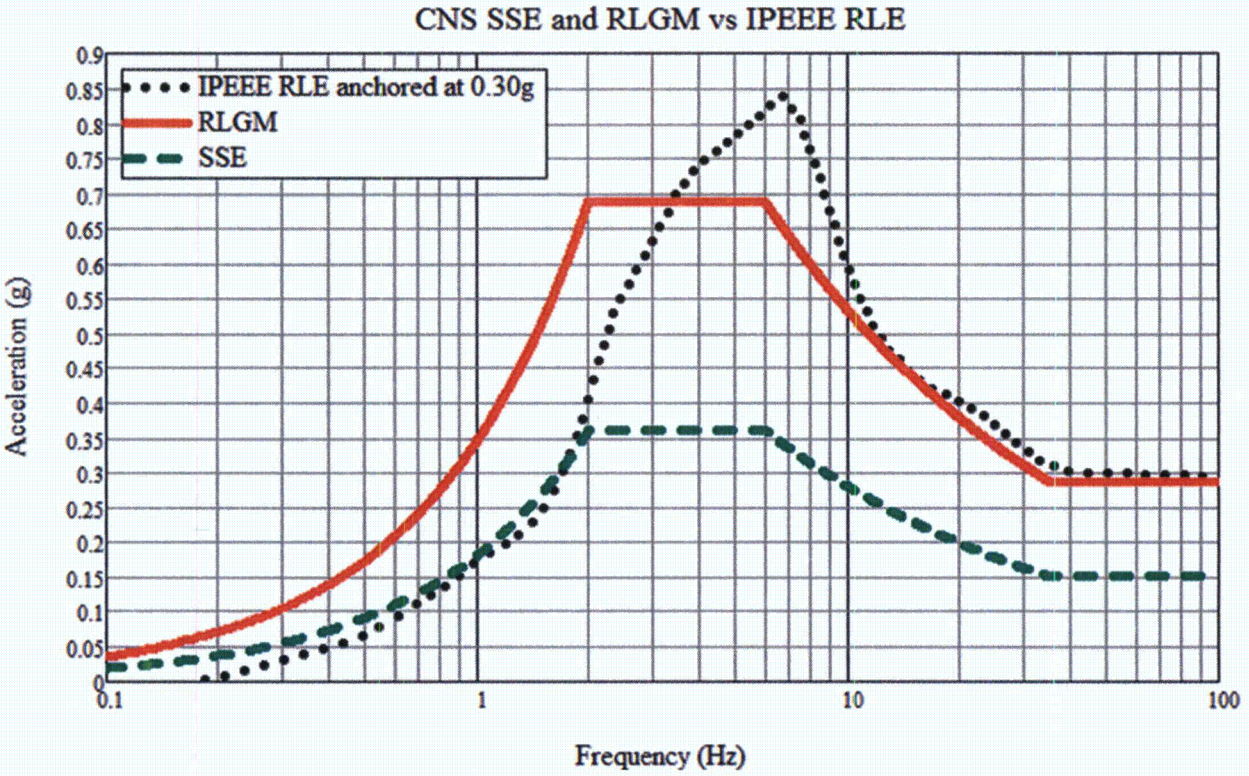



**Figure 6-1. Comparison of CNS SSE and RLGM vs. IPEEE RLE.**

## 6.2 HCLPF Screening Process

The equipment evaluations in the IPEEE were based on plant design information, including equipment qualification test and analysis reports. Failure modes considered were functional failures, including relay chatter, and anchorage failure. The original anchorage capacities were updated as needed based on the SMA walkdowns. Seismic interactions were addressed by the SMA walkdowns.

It is seen from Figure 6-1 that the RLE envelopes the RLGM at all frequencies greater than about 3.4 Hz. The RLE is less than the RLGM at frequencies below about 3.4 Hz. This may be disregarded as there are no CNS ESEL components in this frequency range. Therefore, any components whose SMA based HCLPF exceeds the RLE can be screened out from ESEP seismic capacity determination. The screening tables in EPRI NP-6041-SL [7] are based on ground peak spectral accelerations of 0.8g and 1.2g. These both exceed the RLGM peak spectral acceleration of 0.69g. The anchorage capacity calculations were based on SSE floor response spectra scaled to the RLE, except for equipment in the Auxiliary Building for which new floor response spectra were generated for the RLE per EPRI NP-6359 [19]. Equipment for which the screening caveats were met and for which the anchorage capacity exceeded the RLE seismic demand can be screened out from ESEP seismic capacity determination because the HCLPF capacity exceeds the RLGM.

The results of the IPEEE capacity screening are noted in Appendix A for the Unit 1 ESEL and in Appendix B for the Unit 2 ESEL. For the components that were not screened out, HCLPF capacities were determined using the deterministic EPRI NP-6041-SL [7] CDFM methodology and RLGM spectral shape and/or anchorage evaluations.

## 6.3 HCLPF Capacity Determination

HCLPF capacities were determined by evaluating the function, anchorage, and seismic interaction failure modes. HCLPF functional capacities were determined using the screening tables in EPRI NP-6041-SL [7]. HCLPF anchorage capacities were determined using the CDFM methodology in EPRI NP-6041-SL [7]. HCLPF seismic interaction capacities were determined by walkdown screening.

## 6.4 Functional Capacity Screening Using EPRI NP-6041-SL

The components were screened against EPRI NP-6041-SL [7], Table 2-4. ISRS were used for all components for the screening; therefore, the screening levels of EPRI NP-6041-SL [7] were increased by a factor of 1.5 (EPRI 1019200 [20], Seismic Fragility Applications Guide Update). Thus, the accelerations for the screening levels are 1.2g and 1.8g instead of 0.8g and 1.2g.

The SSE ISRS were amplified by a factor of 1.91 throughout the frequency range and were then clipped (per EPRI 1019200 [20]), using the methodology in EPRI NP-6041-SL, Appendix Q, and the North-South and East-West clipped peaks were averaged. HCLPFs for these components are shown in Appendices A and B.

## 6.5 Seismic Walkdown Approach

### 6.5.1 Walkdown Approach

Walkdowns were performed in accordance with the criteria provided in Section 5 of EPRI 3002000704 [2], which refers to EPRI NP-6041-SL [7] for the Seismic Margin Assessment process. Pages 2-26 through 2-30 of EPRI NP-6041-SL [7] 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 or 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."*

### 6.5.2 Application of Previous Walkdown Information

Many of the components had been walked down previously during IPEEE evaluations and have documented SEWS recording the results. Credit is given to

[1] EPRI 3002000704 [2] 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 [15]."

these walkdowns since they were performed by qualified Seismic Review Teams. A walk-by of these components was performed and documented, except for those Unit 2 items which will be reviewed in March 2015, as detailed in Section 7.2. The primary objective of a walk-by is to verify that the component and/or anchorage has not degraded since the original walkdown and to verify that the component is free of interaction issues that may have developed since the original walkdown.

Walkdowns were performed on all ESEL components which were not previously walked down during the IPEEE evaluations.

Masonry block walls were evaluated as part of IPEEE and shown to meet the RLE demand. Therefore, they also meet the RLGM demand. Proximity of block walls to ESEL components was noted on the SEWS forms and the presence of block walls was considered in determining a HCLPF and identification of key failure modes.

### 6.5.3 Significant Walkdown Findings

All of the ESEL components included in the walkdowns and walk-bys completed to date were determined to have an existing capacity greater than the RLGM, with the exception of the components listed in Tables 6-2 and 6-3. These components require further evaluation and/or modification in order to have a capacity greater than the RLGM.

## 6.6 HCLPF Calculation Process

ESEL items not included in the previous CNS IPEEE evaluations were evaluated using the criteria in EPRI NP-6041-SL [7]. The evaluations included the following steps:

- Performing seismic capability walkdowns for equipment not included in previous seismic walkdowns to evaluate the equipment-installed plant conditions;
- Performing screening evaluations using the screening tables in EPRI NP-6041-SL [7] as described in Section 6.2; and
- Performing HCLPF calculations considering various failure modes that include both structural failure modes (e.g., anchorage, load path, etc.) and functional failure modes.

All HCLPF calculations were performed using the CDFM methodology and are documented in *Expedited Seismic Evaluation Process for Implementation of Seismic Risk Evaluations at Catawba Nuclear Station*, ARES Corporation Report 030321.13.01-003 (Duke Energy Document No. CNC-1211.00-06-0003), Appendix D, "Calculation" [21]. HCLPF results and key failure modes are included in the ESEL tables in Appendices A and B.

**Table 6-2. Unit 1 Components that Require Further Evaluations and/or Modifications.**

| ESEL ID | EIN | Description | Bldg. | El. | Location | Modification/ Recommendation | Problem Description | Action Description Including PIP Numbers |
|---|---|---|---|---|---|---|---|---|
| 45 | 1CA36 | Auxiliary Feedwater to Steam Generator 1D Isolation Valve | AUX | 554 | BB-49 | Brace or stiffen nearby vertical channel. | Vertical channel which supports valve operator tubing is loose and may sway significantly in a seismic event and possibly damage the tubing and/or pressure regulator and render the valve inoperable via the air-operator. | Brace/revise vertical tubing support and tubing to achieve seismic ruggedness. PIP# C-14-09014 |
| 87 | 1PSS | Primary Sample Sink 1B | AUX | 543 | FF-54 | Anchor sink and hood. | The absence of anchorage of the sink and hood will allow the sink and hood to move and possibly overturn in a seismic event. This may damage the sample piping and tubing located within the cabinet/hood. | Inspect sink and hood following seismic event. If significant primary leak is present, manually close valve 1NM26B to isolate damaged tubing. PIP# C-14-09014 |
| 197 | 1EATC 12 | Essential Area Terminal Cabinet | AUX | 577 | FF-56 | Move conduit support. | The cabinet will likely impact a conduit support during a seismic event. This interaction has the potential to cause relay chatter. | Move conduit support for clearance. PIP# C-14-09014 |

**Table 6-3. Unit 2 Components that Require Further Evaluations and/or Modifications.**

| ESEL ID | EIN | Description | Bldg. | El. | Location | Modification/ Recommendation | Problem Description | Action Description Including PIP Numbers |
|---|---|---|---|---|---|---|---|---|
| 38 | 2CA257 | 2CAPUTD Feedwater Safety Valve | AUX | 540 | BB-63 | Remove grating stub. | The grating is touching the valve inlet piping. The ~1" grating cantilever should be removed to provide additional clearance. | Trim grating to achieve 1" min. clearance. PIP# C-14-09014 |
| 41 | 2CA64 | Auxiliary Feedwater to Steam Generator 2A | AUX | 557 | BB-64 | Brace or relocate nearby rod-hung cable tray/support to eliminate interaction. | Potential interaction between fairly lightweight, rod-hung cable tray which may impact valve air lines (soft target). Addition of simple bracing on rod-hung cable tray (near 2CA64) or relocation of the support will mitigate this issue. | Relocate/add supports to eliminate possible interaction. PIP# C-14-09014 |
| 44 | 2CA36 | Auxiliary Feedwater to Steam Generator 2D | AUX | 554 | BB-65 | Brace or relocate nearby rod-hung piping support to eliminate interaction. | Potential interaction between fairly lightweight, rod-hung piping which may impact valve air lines (soft target). Addition of simple bracing on rod-hung piping (near 2CA36) or relocation of the support will mitigate this issue. | Relocate/add supports to eliminate possible interaction. PIP# C-14-09014 |

AUX = Auxiliary PIP = Performance Improvement Plan

6.7 Functional Evaluations of Relays

Two types of relays (located in four cabinets) in the ESEL associated with the FLEX Phase 1 response required functional evaluations. Each relay was evaluated using the SMA relay evaluation criteria in Section 3 of EPRI NP-6041-SL [7].

Specific seismic qualification test-based capacities were available for the relays in existing plant documentation. Relay capacity to demand evaluations were performed by comparing the test-based capacities with the in-cabinet seismic demand. The in-cabinet demand was determined by scaling the ESEP ISRS by the in-cabinet amplification factors from EPRI NP-6041-SL [7]. In each case, the capacity exceeded the demand.

The ESEP relay functional evaluations are documented in *Expedited Seismic Evaluation Process for Implementation of Seismic Risk Evaluations at Catawba Nuclear Station,* ARES Corporation Report 030321.13.01-003 (Duke Energy Document No. CNC-1211.00-06-0003), Appendix D, "Calculation" [21].

6.8 Tabulated ESEL HCLPF Values (Including Key Failure Modes)

Tabulated ESEL HCLPF values are provided in Appendix A for Unit 1 and Appendix B for Unit 2. The following notes apply to the information in the tables:

- For items screened out using the IPEEE evaluations, the HCLPF value is provided as >RLGM and the failure mode is listed as "Screened per IPEEE."
- For items screened out using EPRI NP-6041-SL [7] screening tables, the screening levels are provided as >RLGM and the failure mode is listed as "Screened per EPRI NP-6041."
- For items where interaction with masonry walls controls the HCLPF value, the HCLPF value is listed in the table and the failure mode is noted as "Interaction – Block Walls."
- For items where anchorage controls the HCLPF value, the HCLPF value is provided as >RLGM and the failure mode is noted as "Anchorage."
- For items where component function controls the HCLPF value, the HCLPF value is listed in the table and the failure mode is noted as "Functional Failure."
- For items where relay function controls the HCLPF value, the HCLPF value is listed in the table and the failure mode is noted as "Relay Chatter."

## 7.0 Inaccessible Items

### 7.1 Identification of ESEL Items Inaccessible for Walkdowns

All ESEL items in Unit 1 were accessible for walkdowns except for hydrogen igniters 1EHM0035, 1EHM0039, and 1EHM0045 located in the Unit 1 Reactor Building. These igniters were judged seismically adequate based on similarity to other igniters that were accessible and included in the walkdowns.

There are a total of 38 Unit 2 ESEL items that remain to be walked down as detailed in Section 7.2. All ESEL items in Unit 2, other than items discussed in Section 7.2, were accessible for walkdowns.

### 7.2 Planned Walkdown / Evaluation Schedule / Close Out

Unit 2 components listed in Table 7-1 remain to be evaluated by walk-by or walkdown. These components are scheduled to be reviewed in March 2015.

**Table 7-1. Unit 2 Walkdowns & Walk-Bys Not Completed at Time of this Report. (2 sheets)**

| ESEL ID | EIN | Description | Bldg. | El. | Location | Walkdown or Walk-By |
|---|---|---|---|---|---|---|
| 7 | 2NCTK11 | Pressurizer Relief Tank 2 | CV2 | 554 | 90 Deg | Walkdown |
| 8 | 2NV1A | NC Letdown to Regenerative Heat Exchanger Isolation Valve | CV2 | 554 | 228 Deg 38 Rad | Walkdown |
| 9 | 2ARFD2 | Air Return Fan Damper 2 | CV2 | 595 | 265 Deg 53 Rad | Walk-By |
| 10 | 2ARFD4 | Air Return Fan Damper 4 | CV2 | 595 | 292 Deg 49 Rad | Walk-By |
| 11 | 2AVXCARF | 2A Containment Air Return Fan (CARF-2A) | CV2 | 593 | 265 Deg | Walk-By |
| 12 | 2BVXCARF | 2B Containment Air Return Fan (CARF-2B) | CV2 | 593 | 293 Deg | Walk-By |
| 13 | 2VXHSFA | H2 Skimmer Fan A | CV2 | 645 | 265 Deg | Walkdown |
| 14 | 2VXHSFB | H2 Skimmer Fan B | CV2 | 645 | 220 Deg | Walkdown |
| 15 | 2VX1A | H2 Skimmer Fan A Damper | CV2 | 659 | 263 Deg | Walkdown |
| 16 | 2VX2B | H2 Skimmer Fan B Damper | CV2 | 659 | 283 Deg | Walkdown |
| 17 | 2ND1B | Residual Heat Removal A Train Isolation Valve | CV2 | 572 | 170 Deg 33 Rad | Walk-By |
| 18 | 2ND2A | Residual Heat Removal A Train Isolation Valve | CV2 | 567 | 176 Deg 50 Rad | Walk-By |
| 30 | 2AVVLCVU | 2A Lower Containment Ventilation Unit (LCVU-2A) | CV2 | 565 | 16 Deg | Walkdown |
| 31 | 2DVVLCVU | 2D Lower Containment Ventilation Unit (LCVU-2D) | CV2 | 565 | 344 Deg | Walkdown |
| 145 | 2EHM0041 | Group 5A Igniter Box | CV2 | 601 | 216 Deg 21 Rad | Walkdown |
| 147 | 2EHM0045 | Group 5A Igniter Box | CV2 | 642 | 206 Deg 41 Rad | Walkdown |

**Table 7-1. Unit 2 Walkdowns & Walk-Bys Not Completed at Time of this Report. (2 sheets)**

| ESEL ID | EIN | Description | Bldg. | El. | Location | Walkdown or Walk-By |
|---|---|---|---|---|---|---|
| 212 | 2CFLT5610 | 2A Steam Generator Wide Range Level Channel #1 | AN2 | 566 | 358 Deg 59 Rad | Walkdown |
| 213 | 2CFLT5620 | 2B Steam Generator Wide Range Level Channel #2 | AN2 | 565 | 149 Deg 59 Rad | Walkdown |
| 214 | 2CFLT5630 | 2C Steam Generator Wide Range Level Channel #3 | AN2 | 565 | 205 Deg 59 Rad | Walkdown |
| 215 | 2CFLT5640 | 2D Steam Generator Wide Range Level Channel #4 | AN2 | 567 | 327 Deg 59 Rad | Walkdown |
| 218 | 2CFLT5490 | 2A Steam Generator Narrow Range Level Channel #4 | AN2 | 575 | 002 Deg 59 Rad | Walkdown |
| 219 | 2CFLT5520 | 2B Steam Generator Narrow Range Level Channel #4 | AN2 | 565 | 130 Deg 59 Rad | Walkdown |
| 220 | 2CFLT5550 | 2C Steam Generator Narrow Range Level Channel #4 | AN2 | 575 | 205 Deg 59 Rad | Walkdown |
| 221 | 2CFLT5580 | 2D Steam Generator Narrow Range Level Channel #4 | AN2 | 568 | 315 Deg 59 Rad | Walkdown |
| 222 | 2NCLT5171 | Pressurizer Level-Low Temperature | AN2 | 571 | 113 Deg 56 Rad | Walkdown |
| 230 | 2NCRD5850 | 2A NC Loop Hot Leg Wide Range Temperature | CV2 | 567 | 20 Deg 20 Rad | Walkdown |
| 231 | 2NCRD5860 | 2A NC Loop Cold Leg Wide Range Temperature | CV2 | 567 | 51 Deg 28 Rad | Walkdown |
| 232 | 2NCRD5870 | 2B NC Loop Hot Leg Wide Range Temperature | CV2 | 567 | 160 Deg 18 Rad | Walkdown |
| 233 | 2NCRD5880 | 2B NC Loop Cold Leg Wide Range Temperature | CV2 | 567 | 124 Deg 28 Rad | Walkdown |
| 234 | 2NCRD5900 | 2C NC Loop Hot Leg Wide Range Temperature | CV2 | 567 | 204 Deg 20 Rad | Walkdown |
| 235 | 2NCRD5910 | 2C NC Loop Cold Leg Wide Range Temperature | CV2 | 567 | 240 Deg 29 Rad | Walkdown |
| 236 | 2NCRD5920 | 2D NC Loop Hot Leg Wide Range Temperature | CV2 | 567 | 340 Deg 20 Rad | Walkdown |
| 237 | 2NCRD5930 | 2D NC Loop Cold Leg Wide Range Temperature | CV2 | 567 | 309 Deg 28 Rad | Walkdown |
| 240 | 2NILT5260 | Containment Sump Level | RX2 | 552 | 21 Deg 50 Rad | Walkdown |
| 241 | 2NILT5261 | Containment Sump Level | RX2 | 556 | 2 Deg 45 Rad | Walkdown |
| 242 | 2NILT5262 | Containment Sump Level | RX2 | 560 | 3 Deg 45 Rad | Walkdown |
| 243 | 2NILT5263 | Containment Sump Level | RX2 | 566 | 2 Deg 54 Rad | Walkdown |
| 244 | 2NILT5264 | Containment Sump Level | RX2 | 570 | 18 Deg 56 Rad | Walkdown |

# 8.0 ESEP Conclusions and Results

## 8.1 Supporting Information

CNS has performed the ESEP as an interim action in response to the NRC's 50.54(f) letter [1]. It was performed using the methodologies in the NRC-endorsed guidance in EPRI 3002000704 [2].

The ESEP provides an important demonstration of seismic margin and expedites plant safety enhancements through evaluations and potential near-term modifications of 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 CNS response to the NRC's 50.54(f) letter [1]. On March 12, 2014, the Nuclear Energy Institute (NEI) submitted to the NRC results of a study [12] 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 clearly 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 [14] 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 CNS was included in the fleet risk evaluation submitted in the March 12, 2014, NEI letter [12]; therefore, the conclusions in the NRC's May 9 letter [14] also apply to CNS.

In addition, the March 12, 2014, NEI letter [12] provided an attached "Perspectives on the Seismic Capacity of Operating Plants," which (1) assessed a number of qualitative reasons why the design of structures, systems and components (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 those plants that have actually experienced significant earthquakes. The seismic design process has inherent (and intentional) conservatisms which result in significant seismic

margins within 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 ISRS calculations;
- Broadening criteria for ISRS;
- 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.

## 8.2 Identification of Planned Modifications

Tables 6-2 and 6-3 identify items where modifications will be made to enhance the seismic capacity of the plant

## 8.3 Modification Implementation Schedule

Plant modifications will be performed in accordance with the schedule identified in NEI letter dated April 9, 2013 [13] (endorsed by the NRC in their May 7, 2013, letter [16]), which states that plant modifications not requiring a planned refueling outage will be completed by December 2016 and modifications requiring a refueling outage will be completed within two planned refueling outages after December 31, 2014.

## 8.4 Summary of Planned Actions

The actions Listed in Table 8-1 will be performed as a result of the ESEP.

**Table 8-1. Summary of Planned Actions.**

| Action # | Equipment ID | Equipment Description | Action Description | Completion Date |
|---|---|---|---|---|
| 1 | N/A | N/A | Perform seismic walkdowns, generate HCLPF calculations and design and implement any necessary modifications for Unit 2 items as detailed in Section 7.2. | No later than the end of the second planned Unit 2 refueling outage after December 31, 2014. |
| 2 | N/A | N/A | Complete evaluations/ modifications of Unit 1 components listed in Table 6-2. | No later than the end of the second planned Unit 1 refueling outage after December 31, 2014. |
| 3 | N/A | N/A | Complete evaluations/ modifications of Unit 2 components listed in Table 6-3. | No later than the end of the second planned Unit 2 refueling outage after December 31, 2014. |
| 4 | N/A | N/A | Submit a letter to NRC summarizing results of item 1 and confirming implementation of the plant modifications associated with items 1 through 3. | Within 60 days following completion of ESEP activities, including items 1 through 3. |

# 9.0 References

1) Letter from E. Leeds and M. Johnson, NRC to All Power Reactor Licensees, et al., "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," March 12, 2012.

2) *Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1 – Seismic,* Electric Power Research Institute, Palo Alto, CA: May 2013, EPRI 3002000704.

3) CNS Overall Integrated Plan, Letter from Ben Waldrop to U.S. Nuclear Regulatory Commission, "Duke Energy Carolinas, LLC (Duke Energy); Catawba Nuclear Station (CNS), Units 1 and 2, Docket Nos. 50-413 and 50-414, Renewed License Nos. NPF-35 and NPF-52; Catawba Nuclear Station Overall Integrated Plan in Response to March 12, 2012, Commission Order to Modify Licenses With Regard To Requirements for Mitigation Strategies for Beyond Design Basis External Events (Order EA-12-049)," dated February 28, 2013, Duke Energy, York, SC.

4) Letter from Kelvin Henderson to U.S. Nuclear Regulatory Commission, "Duke Energy Carolinas, LLC (Duke Energy); Catawba Nuclear Station (CNS), Units 1 and 2, Docket Nos. 50-413 and 50-414, Renewed License Nos. NPF-35 and NPF-52; Seismic Hazard and Screening Report (CEUS Sites), Response to NRC 10 CFR 50.54(f) Request for Additional 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 31, 2014, Duke Energy, York, SC.

5) *Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities*, June 1991, Nuclear Regulatory Commission, NUREG-1407.

6) USNRC Generic Letter 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities- 10 CFR 50.54(f)," June 28, 1991, U.S. Nuclear Regulatory Commission, Washington, D.C.

7) *A Methodology for Assessment of Nuclear Power Plant Seismic Margin*, Rev. 1, August 1991, Electric Power Research Institute, Palo Alto, CA, EPRI NP-6041-SL.

8) *Methodology for Developing Seismic Fragilities*, Electric Power Research Institute, Palo Alto, CA, July 1, 1994, EPRI TR-103959.

9) *Catawba Nuclear Station IPEEE Submittal Report*, July 1994, Duke Energy, York, SC.

10) *Catawba Nuclear Station Unit 1, Probabilistic Risk Assessment*, September 1992, Duke Energy, York, SC.

11) *Development of Criteria for Seismic Review of Selected Nuclear Power Plants*, published May 1978, Nuclear Regulatory Commission, NUREG/CR-0098.

12) Letter from A. Pietrangelo, NEI to D. Skeen, 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.

13) Letter from A. Pietrangelo, NEI to D. Skeen, USNRC, "Proposed Path Forward for NTTF Recommendation 2.1: Seismic Reevaluations," April 9, 2013.

14) Letter from E. Leeds, NRC 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.

15) *Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic*, Electric Power Research Institute, Palo Alto, CA, February 2013, EPRI 1025287.

16) Letter from E. Leeds, NRC to J. Pollock, NEI, "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.

17) *Augmented Approach for Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic: Seismic – Catawba Nuclear Station Expedited Seismic Equipment List*, Rev. 0, ARES Corporation Report No. 030321.13.01-005, Duke Energy Document No. CNC-1211.00-06-0004.

18) *Seismic Capacity Evaluations for the IPEEE and EPRI Seismic Margins Study*, Revision 3, Duke Energy Document No. CNC-1535.00-00-0005.

19) *Seismic Margin Assessment of the Catawba Nuclear Station*, Electric Power Research Institute, Palo Alto, CA, April 1989, EPRI NP-6359.

20) *Seismic Fragility Applications Guide Update*, December 2009, Electric Power Research Institute, Palo Alto, CA, EPRI 1019200.

21) *Expedited Seismic Evaluation Process for Implementation of Seismic Risk Evaluations at Catawba Nuclear Station*, Revision 1, ARES Corporation Report 030321.13.01-003, Duke Energy Document No. CNC-1211.00-06-0003.

22) First Update to CNS Overall Integrated Plan, Letter from Kelvin Henderson to U.S. Nuclear Regulatory Commission, "Duke Energy Carolinas, LLC (Duke Energy); Catawba Nuclear Station (CNS), Unit Nos. 1 and 2, Docket Nos. 50-413 and 50-414, Renewed License Nos. NPF-35 and NPF-52; First 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)," dated August 28, 2013, Duke Energy, York, SC.

23) Second Update to CNS Overall Integrated Plan, Letter from Kelvin Henderson to U.S. Nuclear Regulatory Commission, "Duke Energy Carolinas, LLC (Duke Energy); Catawba Nuclear Station (CNS), Unit Nos. 1 and 2, Docket Nos. 50-413 and 50-414, Renewed License Nos. NPF-35 and NPF-52; "Second 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)," dated February 28, 2014, CNS-14-020, Duke Energy, York, SC.

24) Third Update to CNS Overall Integrated Plan, Letter from Kelvin Henderson to U.S. Nuclear Regulatory Commission, "Duke Energy Carolinas, LLC (Duke Energy); Catawba Nuclear Station (CNS), Unit Nos. 1 and 2, Docket Nos. 50-413 and 50-414, Renewed License Nos. NPF-35 and NPF-52; Third 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)," dated August 28, 2014, Duke Energy, York, SC.

# Appendix A

## Catawba Nuclear Station Unit 1 ESEL and HCLPF Results

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1NC250A | Reactor Head Vent Valve | CV1 | 600 | 38 Deg 25 Rad | Closed | Open | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 2 | 1NC253A | Reactor Head Vent Valve | CV1 | 600 | 40 Deg 27 Rad | Closed | Open | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 3 | 1NC1 | Pressurizer Safety Valve | CV1 | 637 | 102 Deg | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 4 | 1NC2 | Pressurizer Safety Valve | CV1 | 637 | 102 Deg | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 5 | 1NC3 | Pressurizer Safety Valve | CV1 | 637 | 102 Deg | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 6 | 1NC34A | Pressurizer Power Operated Relief Valve | CV1 | 665 | 105 Deg | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 7 | 1NCTK11 | Pressurizer Relief Tank 1 | CV1 | 554 | 90 Deg | Functional | Functional | Walkdown | | 0.75 | Screened per EPRI NP-6041 |
| 8 | 1NV1A | NC Letdown to Regenerative Heat Exchanger Isolation Valve | CV1 | 554 | 229 Deg38 Rad | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 9 | 1ARFD2 | Containment Air Return Fan 1A Damper | CV1 | 599 | 265 Deg 53 Rad | Closed | Open | Walk-by | Included in IPEEE, pg 35. | >RLGM | Screened per IPEEE |
| 10 | 1AVXCARF | Containment Air Return Fan 1A | CV1 | 599 | 265 Deg 53 Rad | Off | On | Walk-by | | >RLGM | Screened per IPEEE |
| 11 | 1ARFD4 | Containment Air Return Fan 1B Damper | CV1 | 599 | 293 Deg 49 Rad | Closed | Open | Walk-by | Included in IPEEE, pg 35. | >RLGM | Screened per IPEEE |
| 12 | 1BVXCARF | Containment Air Return Fan 1B | CV1 | 599 | 293 Deg 49 Rad | Off | On | Walk-by | | >RLGM | Screened per IPEEE |
| 13 | 1VX1A | Hydrogen Skimmer Fan 1A Isolation | CV1 | 658 | 260 Deg 45 Rad | Closed | Open | Walkdown | | 0.29 | Functional Failure |
| 14 | 1VXHSFA | Hydrogen Skimmer Fan 1A | CV1 | 652 | 266 Deg 54 Rad | Off | On | Walkdown | | 0.44 | Anchorage |
| 15 | 1VX2B | Hydrogen Skimmer Fan 1B Isolation Valve | CV1 | 658 | 285 Deg 45 Rad | Closed | Open | Walkdown | | 0.29 | Functional Failure |
| 16 | 1VXHSFB | Hydrogen Skimmer Fan 1B | CV1 | 652 | 272 Deg 49 Rad | Off | On | Walkdown | | 0.44 | Anchorage |
| 17 | 1ND1B | Residual Heat Removal A Train Isolation Valve | CV1 | 568 | 176 Deg 25 Rad | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 18 | 1ND2A | Residual Heat Removal A Train Isolation Valve | CV1 | 567 | 176 Deg 50 Rad | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 19 | 1NDPUA | Residual Heat Removal Pump 1A | AUX | 522 | GG-54 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 20 | 1NDHXAPMP | Residual Heat Removal Pump Mechanical Seal Heat Exchanger 1A | AUX | 522 | FF-53 | Functional | Functional | Walk-by | Rule-of-the-box with 1NDPUA | >RLGM | Screened per IPEEE |
| 21 | 1KCHX0040 | Residual Heat Removal Pump 1A Motor Cooler | AUX | 522 | GG-53 | Functional | Functional | Walk-by | Rule-of-the-box with 1NDPUA | >RLGM | Screened per IPEEE |
| 22 | 1NDHXA | Residual Heat Removal Heat Exchanger 1A | AUX | 560 | LL-51 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 23 | 1KF101B | FW System/ KF System Isolation Valve | AUX | 584 | JJ-52 | Closed | Open | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 24 | 1FWTK01 | Refueling Water Storage Tank (FWST) | Yard | | | Intact | Intact | Walkdown | | 0.30 | Anchorage |
| 25 | 1KCHXA | Component Cooling Heat Exchanger 1A | AUX | 577 | HH-56 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 26 | 1KCPUA1 | Component Cooling Pump 1A1 | AUX | 560 | HH-59 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 27 | 1KCPHXA1 | Component Cooling Pump 1A1 Motor Cooler | AUX | 560 | GG-58 | Functional | Functional | Walk-by | Rule-of-the-box with 1KCPUA1 | >RLGM | Screened per IPEEE |
| 28 | 1KC056A | Residual Heat Removal Heat Exchanger 1A Isolation Valve | AUX | 590 | KK-50/51 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 29 | 1RN63A | Nuclear Service Water to Standby Nuclear Service Water Pond Discharge Isolation Valve | AUX | 581 | QQ-60 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 30 | 1RN250A | Nuclear Service Water to 1CAPUTD Isolation Valve | AUX | 587 | LL-55 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 31 | 1AVVLCVU | 1A Lower Containment Ventilation Unit (LCVU-1A) | RX1 | 565 | 16 Deg | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 1DVVLCVU | 1D Lower Containment Ventilation Unit (LCVU-1D) | RX1 | 565 | 344 Deg | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 33 | 1BB24 | Steam Generator 1C Blowdown Flow Control Valve | TB1 | 578 | 1L-29 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 34 | 1BB65 | Steam Generator 1D Blowdown Flow Control Valve | TB1 | 583 | 1L-29 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 35 | 1BB69 | Steam Generator 1A Blowdown Flow Control Valve | TB1 | 583 | 1L-29 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 36 | 1BB73 | Steam Generator 1B Blowdown Flow Control Valve | TB1 | 583 | 1L-29 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 37 | 1CA174 | Condenser Circulating Water System Isolation Valve | AUX | 544 | CC-53 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 38 | 1CA257 | 1CAPUTD Feedwater Safety Valve | AUX | 534 | AA-51 | Closed | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 39 | 1CA116A | Nuclear Service Water System Train 1A Isolation Valve | AUX | 555 | BB-51 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 40 | 1CAPUTD | Turbine Driven Auxiliary Feed Water Pump | AUX | 531 | AA-51 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 41 | 1CAHX01 | Turbine Driven Auxiliary Feed Water Pump Lube Oil Cooler | AUX | 551 | DD-53 | Functional | Functional | Walk-by | Rule-of-the-box with 1CAPUD | >RLGM | Screened per IPEEE |
| 42 | 1CA64 | Auxiliary Feedwater to Steam Generator 1A Isolation Valve | AUX | 556 | BB-50 | Open | Throttled | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 43 | 1CA52 | Auxiliary Feedwater to Steam Generator 1B Isolation Valve | AUX | 546 | CC-53 | Open | Throttled | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 44 | 1CA48 | Auxiliary Feedwater to Steam Generator 1C Isolation Valve | AUX | 551 | DD-53 | Open | Throttled | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 45 | 1CA36 | Auxiliary Feedwater to Steam Generator 1D Isolation Valve | AUX | 554 | BB-49 | Open | Throttled | Walkdown | | >RLGM | Modification/Investigation |
| 46 | 1SV2 | Steam Generator 1D Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 47 | 1SV3 | Steam Generator 1D Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 48 | 1SV4 | Steam Generator 1D Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 49 | 1SV5 | Steam Generator 1D Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 50 | 1SV6 | Steam Generator 1D Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 51 | 1SM1 | Steam Generator 1D Main Steam Isolation Valve | DH1 | 615 | DD-44 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 52 | 1SV8 | Steam Generator 1C Safety Valve | DH1 | 618 | EE-52 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 53 | 1SV9 | Steam Generator 1C Safety Valve | DH1 | 618 | EE-52 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 54 | 1SV10 | Steam Generator 1C Safety Valve | DH1 | 618 | EE-52 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 55 | 1SV11 | Steam Generator 1C Safety Valve | DH1 | 618 | EE-52 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 56 | 1SV12 | Steam Generator 1C Safety Valve | DH1 | 618 | EE-52 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 57 | 1SM3 | Steam Generator 1C Main Steam Isolation Valve | DH1 | 615 | DD-52 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 58 | 1SV14 | Steam Generator 1B Safety Valve | DH1 | 618 | EE-53 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 59 | 1SV15 | Steam Generator 1B Safety Valve | DH1 | 618 | EE-53 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 60 | 1SV16 | Steam Generator 1B Safety Valve | DH1 | 618 | EE-53 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 61 | 1SV17 | Steam Generator 1B Safety Valve | DH1 | 618 | EE-53 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 62 | 1SV18 | Steam Generator 1B Safety Valve | DH1 | 618 | EE-53 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 1SM5 | Steam Generator 1B Main Steam Isolation Valve | DH1 | 615 | DD-54 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 64 | 1SV20 | Steam Generator 1A Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 65 | 1SV21 | Steam Generator 1A Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 66 | 1SV22 | Steam Generator 1A Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 67 | 1SV23 | Steam Generator 1A Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 68 | 1SV24 | Steam Generator 1A Safety Valve | DH1 | 618 | EE-44 | Closed | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 69 | 1SM7 | Steam Generator 1A Main Steam Isolation Valve | DH1 | 615 | DD-43 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 70 | 1SV1 | Power Operated Relief Valve - Steam Generator 1D | DH1 | 601 | FF-44 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 71 | 1SV7 | Power Operated Relief Valve - Steam Generator 1C | DH1 | 601 | FF-53 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 72 | 1SV13 | Power Operated Relief Valve - Steam Generator 1B | DH1 | 601 | FF-53 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 73 | 1SV19 | Power Operated Relief Valve - Steam Generator 1A | DH1 | 601 | FF-44 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 74 | 1SA2 | 1CAPUTD Steam Feed Isolation Valve | DH1 | 628 | FF-53 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 75 | 1SA145 | 1CAPUTD Trip Throttle Valve (Stop Valve) | AUX | 534 | AA-51 | Open | Throttled | Walk-by | Rule-of-the-box with 1CAPUD | >RLGM | Screened per IPEEE |
| 76 | 1SA144 | 1CAPUTD Control Valve | AUX | 531 | AA-51 | Open | Throttled | Walk-by | Rule-of-the-box with 1CAPUD | >RLGM | Screened per IPEEE |
| 77 | 1NDHXB | Residual Heat Removal Heat Exchanger 1B | AUX | 560 | KK-51 | Intact | Intact | Walk-by | | >RLGM | Screened per IPEEE |
| 78 | 1NI54A | Accumulator Tank 1A Isolation Valve | CV1 | 560 | 46 Deg 47 Rad | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 79 | 1NI65B | Accumulator Tank 1B Isolation Valve | CV1 | 560 | 137 Deg 47 Rad | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 80 | 1NI76A | Accumulator Tank 1A Isolation Valve | CV1 | 560 | 226 Deg 47 Rad | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 81 | 1NI88B | Accumulator Tank 1A Isolation Valve | CV1 | 560 | 312 Deg 47 Rad | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 82 | 1NSHXA | Containment Spray Heat Exchanger 1A | AUX | 577 | LL-52 | Intact | Intact | Walk-by | | >RLGM | Screened per IPEEE |
| 83 | 1NSHXB | Containment Spray Heat Exchanger 1B | AUX | 577 | LL-52 | Intact | Intact | Walk-by | | >RLGM | Screened per IPEEE |
| 84 | 1HLPSP | Hot Leg Particulate Sample Panel | AUX | 543 | FF-54 | Intact | Intact | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 85 | 1NMHX07 | Reactor Coolant Hot Leg Sample Heat Exchanger 1A | AUX | 543 | Rm 238 | Intact | Intact | Walkdown | | >RLGM | Modification/Investigation |
| 86 | 1NMHX08 | Reactor Coolant Hot Leg Sample Heat Exchanger 1B | AUX | 543 | Rm 238 | Intact | Intact | Walkdown | | >RLGM | Modification/Investigation |
| 87 | 1PSS | Primary Sample Sink 1B | AUX | 543 | FF-54 | Intact | Intact | Walkdown | | >RLGM | Modification/Investigation |
| 88 | 1EMF46A | A Train KC Radiation Monitor | AUX | 577 | HH-57 | Intact | Intact | Walkdown | | 0.31 | Anchorage |
| 89 | 1KC2B | Auxiliary Building Non-Essential Return Header Isolation Valve | AUX | 567 | HH-57 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 90 | 1KC3A | Reactor Building Non-Essential Return Header Isolation Valve | AUX | 567 | HH-57 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 91 | 1KC53B | Auxiliary Building Non-Essential Return Header Isolation Valve | AUX | 585 | JJ-55 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 92 | 1KC230A | Reactor Building Non-Essential Return Header Isolation Valve | AUX | 586 | HH-55 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 93 | 1KCTKA | Component Cooling Surge Tank 1A | AUX | 594 | NN-59 | Intact | Intact | Walk-by | | >RLGM | Screened per IPEEE |

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 94 | 1KFHXA | Fuel Pool Cooling Heat Exchanger 1A | AUX | 577 | NN-52 | Intact | Intact | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 95 | 1KFHXB | Fuel Pool Cooling Heat Exchanger 1B | AUX | 577 | NN-52 | Intact | Intact | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 96 | 1NVHX0009 | Let Down Heat Exchanger | AUX | 577 | KK-53 | Intact | Intact | Walkdown | | 0.30 | Anchorage |
| 97 | 1RN11A | Nuclear Service Water Pump 1A Isolation Valve | RNB | 603 | Rm A | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 98 | 2RN11A | Nuclear Service Water Pump 2A Isolation Valve | RNB | 603 | 52X71Y | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 99 | 1RN48B | Nuclear Service Water Supply Crossover Isolation Valve | AUX | 585 | PP-53 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 100 | 2RN48B | Nuclear Service Water Supply Crossover Isolation Valve | AUX | 585 | PP-60 | Open | Closed | Walk-by | Included in IPEEE, pg 720. | >RLGM | Screened per IPEEE |
| 101 | 1RNSTA | Nuclear Service Water Strainer 1B | RNB | 600 | Pumphouse | Intact | Intact | Walk-by | | >RLGM | Screened per IPEEE |
| 102 | 2RNSTA | Nuclear Service Water Strainer 2B | RNB | 600 | Pumphouse | Intact | Intact | Walk-by | | >RLGM | Screened per IPEEE |
| 103 | 1RN51A | Unit 1 Nuclear Service Water Non-Essential Return Header Isolation Valve | AUX | 586 | NN-55 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 104 | 2RN51A | Unit 2 Nuclear Service Water Non-Essential Return Header Isolation Valve | AUX | 588 | MM-58 | Open | Closed | Walk-by | Included in IPEEE, pg 720. | >RLGM | Screened per IPEEE |
| 105 | 1RN53B | Nuclear Service Water Crossover Isolation Valve | AUX | 586 | LL-56 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 106 | 1RN57A | Diesel Generator Cooling Water Isolation Valve | AUX | 581 | PP-53 | Open | Closed | Walk-by | Included in IPEEE, pg 720. | >RLGM | Screened per IPEEE |
| 107 | 1RN58B | Unit 1 Nuclear Service Water Header B Return to SNSWP Isolation Valve | AUX | 581 | PP-60 | Closed | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 108 | 1RN232A | 1A Diesel Generator Cooling Water Isolation Valve | D1A | 565 | EE-38 | Closed | Closed | Walk-by | Included in IPEEE, pg 24. | >RLGM | Screened per IPEEE |
| 109 | 1EMXA | Essential Motor Control Center, 600 VAC | AUX | 577 | FF-54 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 110 | 1EMXB | Essential Motor Control Center, 600 VAC | AUX | 560 | FF-56 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 111 | 1EMXC | Essential Motor Control Center, 600 VAC | AUX | 577 | BB-50 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 112 | 1EMXD | Essential Motor Control Center, 600 VAC | AUX | 560 | BB-50 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 113 | 1EMXE | Essential Motor Control Center, 600 VAC | D1A | 556 | CC-39 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 114 | 1EMXG | Essential Motor Control Center, 600 VAC | AUX | 594 | FF-56 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 115 | 1EMXI | Motor Control Center, 600 VAC, single phase, normal power source for Hydrogen Igniter Group A | AUX | 577 | EE-54 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 116 | 1EMXJ | Essential Motor Control Center, 600 VAC | AUX | 560 | GG-56 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 117 | 1EMXK | Essential Motor Control Center, 600 VAC | AUX | 577 | BB-47 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 118 | 1EMXL | Essential Motor Control Center, 600 VAC | AUX | 560 | BB-47 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 119 | 1EMXM | Essential Motor Control Center, 600 VAC | AUX | 577 | CC-53 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 120 | 1EMXN | Essential Motor Control Center, 600 VAC | AUX | 560 | CC-53 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 121 | 1EMXS | Motor Control Center, 480 VAC, single phase, Emergency power source for Hydrogen Igniter Group A | AUX | 577 | BB-48 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 122 | 1ETA | Essential Switchgear, 4160 VAC | AUX | 577 | AA-49 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 123 | 1MXR | Normal Motor Control Center, 600 VAC | AUX | 560 | BB-49 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 124 | 1MXQ | Blackout Motor Control Center, 600 VAC | AUX | 577 | BB-49 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 128 | 1MTSW0006 | Transfer Switch (Single Pole Double Throw), Hydrogen Igniter Group A | AUX | 577 | BB-48 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 129 | 1XFMR0013 | Transformer, 480 VAC - 120 VAC, Hydrogen Igniter Group A | AUX | 577 | BB-48 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 130 | 1VREG0013 | Voltage Regulator, Hydrogen Igniter Group A | AUX | 577 | BB-48 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 131 | 1EATC8 | Essential Area Terminal Cabinet | AUX | 577 | EE-54 | Functional | Functional | Walkdown | | 0.32 | Anchorage |
| 132 | 1ELCP0278 | Hydrogen Igniter Group A Control Panel | AUX | 577 | BB-48 | De-Energized | Energized | Walkdown | | >RLGM | Interaction - Block Walls |
| 133 | 1DGLSA | Diesel Generator Load Sequencing Panel | AUX | 556 | BB-43 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 134 | 1ELCP0357 | SW01, Hydrogen Igniter On/Off switch (Alt. Source) located on panel 1ELCP0357 | AUX | 577 | BB-48 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 135 | 1MC7 | Main Control Room Panel | AUX | 594 | BB-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 136 | 1EHM0003 | Group 2A Igniter Box | CV1 | 562 | 88 Deg 48 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 137 | 1EHM0005 | Group 2A Igniter Box | CV1 | 562 | 178 Deg 50 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 138 | 1EHM0007 | Group 2A Igniter Box | CV1 | 562 | 277 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 139 | 1EHM0009 | Group 2A Igniter Box | CV1 | 562 | 5 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 140 | 1EHM0071 | Group 2A Igniter Box | CV1 | 555 | 103 Deg 35 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 141 | 1EHM0011 | Group 3A Igniter Box | CV1 | 601 | 324 Deg 20 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 142 | 1EHM0013 | Group 3A Igniter Box | CV1 | 590 | 325 Deg 48 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 143 | 1EHM0015 | Group 3A Igniter Box | CV1 | 642 | 335 Deg 41 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 144 | 1EHM0017 | Group 3A Igniter Box | CV1 | 601 | 55 Deg 18 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 145 | 1EHM0019 | Group 3A Igniter Box | CV1 | 590 | 2 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 146 | 1EHM0021 | Group 3A Igniter Box | CV1 | 642 | 18 Deg 41 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 147 | 1EHM0023 | Group 4A Igniter Box | CV1 | 590 | 53 Deg 49 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 148 | 1EHM0025 | Group 4A Igniter Box | CV1 | 590 | 217 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 149 | 1EHM0027 | Group 4A Igniter Box | CV1 | 590 | 245 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 150 | 1EHM0029 | Group 4A Igniter Box | CV1 | 590 | 91 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 151 | 1EHM0031 | Group 4A Igniter Box | CV1 | 603 | 10 Deg 12 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 152 | 1EHM0033 | Group 4A Igniter Box | CV1 | 641 | 113 Deg 32 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 153 | 1EHM0035 | Group 5A Igniter Box | CV1 | 601 | 130 Deg 30 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 154 | 1EHM0037 | Group 5A Igniter Box | CV1 | 590 | 146 Deg 50 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 155 | 1EHM0039 | Group 5A Igniter Box | CV1 | 642 | 161 Deg 41 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 156 | 1EHM0041 | Group 5A Igniter Box | CV1 | 601 | 216 Deg 21 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 157 | 1EHM0043 | Group 5A Igniter Box | CV1 | 590 | 172 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 158 | 1EHM0045 | Group 5A Igniter Box | CV1 | 642 | 204 Deg 41 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 159 | 1EHM0059 | Group 7A Igniter Box | CV1 | 714 | 318 Deg 24 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 160 | 1EHM0061 | Group 7A Igniter Box | CV1 | 714 | 49 Deg 24 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 161 | 1EHM0063 | Group 7A Igniter Box | CV1 | 714 | 140 Deg 24 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 162 | 1EHM0065 | Group 7A Igniter Box | CV1 | 714 | 218 Deg 24 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 163 | 1EHM0053 | Group 6A-1 Igniter Box | CV1 | 666 | 108 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 164 | 1EHM0055 | Group 6A-1 Igniter Box | CV1 | 666 | 157 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 165 | 1EHM0057 | Group 6A-1 Igniter Box | CV1 | 666 | 206 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 166 | 1EHM0047 | Group 6A-2 Igniter Box | CV1 | 666 | 321 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 167 | 1EHM0049 | Group 6A-2 Igniter Box | CV1 | 666 | 11 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 168 | 1EHM0051 | Group 6A-2 Igniter Box | CV1 | 666 | 59 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 169 | 1EHM0067 | Group 8A Igniter Box | CV1 | 653 | 216 Deg 32 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 170 | 1EHM0069 | Group 8A Igniter Box | CV1 | 653 | 41 Deg 32 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 171 | 1AFWPTCP | Auxiliary Feedwater Pump Turbine Control Panel (ELCP0245) | AUX | 543 | CC-53 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 172 | 1EDE | Power Supply for Solenoid valve 1SASV0020 and other valves, 125 VDC Distribution Center, 125 VDC Distribution Center, compartments F01A, F01G, F01I | AUX | 577 | BB-46 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 173 | 1EATC23 | Essential Area Terminal Cabinet | AUX | 577 | BB-50 | Functional | Functional | Walkdown | | 0.37 | Anchorage |
| 174 | 1SSPSA | Solid State Protection System Cabinet, Control Panel, Control Cabinet | AUX | 594 | CC-55 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 175 | 1EATC21 | Essential Area Terminal Cabinet | AUX | 577 | BB-53 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 176 | 1MC1 | Main Control Room Panel | AUX | 594 | BB-53 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 177 | 1MC10 | Main Control Room Panel | AUX | 594 | BB-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 178 | 1MC2 | Main Control Room Panel | AUX | 594 | AA-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 179 | 1MC4 | Main Control Room Panel | AUX | 594 | BB-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 180 | 1MC5 | Main Control Room Panel | AUX | 594 | BB-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 181 | 1PCC1 | PLC Cabinet | AUX | 594 | BB-55 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 182 | 1PCC2 | PLC Cabinet | AUX | 594 | BB-54 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 183 | 1PCC3 | PLC Cabinet | AUX | 594 | BB-55 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 184 | 1PCC4 | PLC Cabinet | AUX | 594 | BB-54 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 185 | 1PCC5 | PLC Cabinet | AUX | 594 | CC-55 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 186 | 1PCC6 | PLC Cabinet | AUX | 594 | CC-54 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 187 | 1PCC7 | PLC Cabinet | AUX | 594 | CC-55 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 188 | 1PCC8 | PLC Cabinet | AUX | 594 | CC-54 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 189 | 1RVLIS | Process Cabinet | AUX | 577 | CC-53 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 190 | 1MC8 | Main Control Room Panel | AUX | 594 | BB-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 191 | 1TBOX0008 | Control Panel | Yard | 598 | S0X46Y | Functional | Functional | Walkdown | | 0.29 | Anchorage |
| 192 | 1TBOX0519 | Wide Range Neutron Flux Signal Processor Terminal Box | AUX | 577 | AA-51 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 193 | 1TBOX0537 | Wide Range Neutron Flux Amplifier Terminal Box | AUX | 577 | AA-51 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 194 | 1TBOX0586 | Wide Range Neutron Flux Power Supply Terminal Box | AUX | 577 | AA-51 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 195 | 1TBOX0587 | Wide Range Neutron Flux Power Supply Terminal Box | AUX | 577 | AA-51 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 196 | 1EPA | 125 VDC Power Panelboard | AUX | 554 | DD-55 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 197 | 1EATC12 | Essential Area Terminal Cabinet | AUX | 577 | FF-56 | Functional | Functional | Walkdown | | 0.29 | Modification/Investigation |
| 198 | 1TBOX0522 | Control Panel | D1A | 556 | BB-45 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 199 | 1SMTC1 | Control Panel | AUX | 577 | FF-55 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 200 | 1EIA | Vital 120 VAC Inverter | AUX | 554 | DD-55 | Energized | Energized | Walkdown | SEWS included in IPEEE, pg 392. However, inverter replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 201 | 1EIB | Vital 120 VAC Inverter | AUX | 554 | CC-55 | Energized | Energized | Walkdown | SEWS included in IPEEE, pg 392. However, inverter replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 202 | 1EIC | Vital 120 VAC Inverter | AUX | 554 | CC-55 | Energized | Energized | Walkdown | SEWS included in IPEEE, pg 392. However, inverter replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 203 | 1EID | Vital 120 VAC Inverter | AUX | 554 | BB-55 | Energized | Energized | Walkdown | SEWS included in IPEEE, pg 392. However, inverter replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 204 | 1ERPD | 120 VAC Power Panel | AUX | 554 | BB-55 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 205 | 1ERPB | 120 VAC Power Panel | AUX | 554 | CC-55 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 206 | 1ERPA | 120 VAC Power Panel | AUX | 554 | DD-55 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 207 | 1ERPC | 120 VAC Power Panel | AUX | 554 | CC-55 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 208 | 1EATC13 | Essential Area Terminal Cabinet | AUX | 560 | JJ-56 | Functional | Functional | Walkdown | | 0.29 | Relay Chatter |
| 209 | 1EDF | 125 VDC Panel, 125 VDC Distribution Center, compartments F01A, F01I | AUX | 560 | BB-46 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 210 | 1SSPSB | Control Cabinet | AUX | 594 | DD-55 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 211 | 1EADA | Auctioneering Diode Assembly | AUX | 577 | BB-51 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Wall |
| 212 | 1EADB | Auctioneering Diode Assembly | AUX | 560 | BB-51 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Wall |
| 213 | 1EBA | 125 VDC Battery | AUX | 554 | DD-54 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 404. However, battery rack modified since original evaluation. | >RLGM | Interaction - Block Walls |
| 214 | 1EBB | 125 VDC Battery | AUX | 554 | CC-55 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 404. However, battery rack modified since original evaluation. | >RLGM | Interaction - Block Walls |
| 215 | 1EBC | 125 VDC Battery | AUX | 554 | CC-54 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 404. However, battery rack modified since original evaluation. | >RLGM | Interaction - Block Walls |

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 216 | 1EBD | 125 VDC Battery | AUX | 554 | BB-55 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 404. However, battery rack modified since original evaluation. | >RLGM | Interaction - Block Walls |
| 217 | 1ECA | 125 VDC Battery Charger | AUX | 554 | DD-55 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 389. However, charger replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 218 | 1ECB | 125 VDC Battery Charger | AUX | 554 | CC-54 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 389. However, charger replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 219 | 1ECC | 125 VDC Battery Charger | AUX | 554 | CC-55 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 389. However, charger replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 220 | 1ECD | 125 VDC Battery Charger | AUX | 554 | BB54 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 389. However, charger replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 221 | 1EDA | 125 VDC Distribution Center, compartments F01C, F01D, F02B, F03B, F02A, F03A | AUX | 554 | DD-55 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 222 | 1EDB | 125 VDC Distribution Center, compartments F02B,F03B, F02A, F03A | AUX | 554 | CC-54 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 223 | 1EDC | 125 VDC Distribution Center, compartments F01C, F01D, F02B, F03B, F02A, F03A | AUX | 554 | CC-55 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 224 | 1EDD | 125 VDC Distribution Center, compartments F01C, F01D, F02B, F02A, F03A | AUX | 544 | BB-54 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 225 | 1CAFT5040 | 1CAPUTD Flow Transmitter | AUX | 546 | BB-51 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 226 | 1CFLT5610 | Steam Generator Wide Range Level Instrument | AN1 | 568 | 18 Deg 63 Rad | Functional | Functional | Walkdown | | 0.86 | Functional Failure |
| 227 | 1CFLT5620 | Steam Generator Wide Range Level Instrument | AN1 | 567 | 168 Deg 59 Rad | Functional | Functional | Walkdown | | 0.86 | Functional Failure |
| 228 | 1CFLT5630 | Steam Generator Wide Range Level Instrument | AN1 | 565 | 210 Deg 59 Rad | Functional | Functional | Walkdown | | 0.86 | Functional Failure |
| 229 | 1CFLT5640 | Steam Generator Wide Range Level Instrument | AN1 | 568 | 335 Deg 59 Rad | Functional | Functional | Walkdown | | 0.86 | Functional Failure |
| 230 | 1NCPT5120 | RCS Wide Range Pressure Instrument | AUX | 566 | CC-50 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 231 | 1NCPT5140 | RCS Wide Range Pressure Instrument | AUX | 566 | DD-51 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 232 | 1CFLT5490 | Steam Generator Narrow Range Level Instrument | AN1 | 575 | 1 Deg 59 Rad | Functional | Functional | Walkdown | | 0.86 | Functional Failure |
| 233 | 1CFLT5520 | Steam Generator Narrow Range Level Instrument | AN1 | 569 | 130 Deg 59 Rad | Functional | Functional | Walkdown | | 0.86 | Functional Failure |
| 234 | 1CFLT5550 | Steam Generator Narrow Range Level Instrument | AN1 | 575 | 205 Deg 59 Rad | Functional | Functional | Walkdown | | 0.86 | Functional Failure |
| 235 | 1CFLT5580 | Steam Generator Narrow Range Level Instrument | AN1 | 568 | 315 Deg 59 Rad | Functional | Functional | Walkdown | | 0.86 | Functional Failure |
| 236 | 1NCLT5171 | Pressurizer Level Instrument | AN1 | 570 | 104 Deg 57 Rad | Functional | Functional | Walkdown | | 0.29 | Functional Failure |
| 237 | 1SMPT5080 | Steam Generator Pressure Instrument | AUX | 582 | DD-46 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 238 | 1SMPT5110 | Steam Generator Pressure Instrument | AUX | 582 | DD-52 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 239 | 1SMPT5140 | Steam Generator Pressure Instrument | AUX | 582 | DD-52 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 240 | 1SMPT5170 | Steam Generator Pressure Instrument | AUX | 582 | DD-46 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 241 | 1NCRD5850 | 1A NC Loop Hot Leg Wide Range Temperature | CV1 | 567 | 20 Deg 20 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 242 | 1NCRD5860 | 1A NC Loop Cold Leg Wide Range Temperature | CV1 | 567 | 51 Deg 28 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 243 | 1NCRD5870 | 1B NC Loop Hot Leg Wide Range Temperature | CV1 | 567 | 160 Deg 18 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |

**Catawba Nuclear Station Unit 1 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 244 | 1NCRD5880 | 1B NC Loop Cold Leg Wide Range Temperature | CV1 | 567 | 124 Deg 28 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 245 | 1NCRD5900 | 1C NC Loop Hot Leg Wide Range Temperature | CV1 | 567 | 204 Deg 20 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 246 | 1NCRD5910 | 1C NC Loop Cold Leg Wide Range Temperature | CV1 | 567 | 240 Deg 29 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 247 | 1NCRD5920 | 1D NC Loop Hot Leg Wide Range Temperature | CV1 | 567 | 340 Deg 20 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 248 | 1NCRD5930 | 1D NC Loop Cold Leg Wide Range Temperature | CV1 | 567 | 309 Deg 28 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 249 | 1EATC7 | Essential Area Terminal Cabinet | AUX | 577 | FF-55 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 250 | 1TBOX0691 | SR/IR N31/35 Neutron Flux Amplifier | AUX | 582 | CC-51 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 251 | 1TBOX0089 | N31/35 Neutron Flux Amplifier Isolation Transformer | AUX | 579 | CC-51 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 252 | 1NIS1 | Outer Core Nuclear Instrument Cabinet Rack 1 | AUX | 594 | CC-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 253 | 1NCLT6390 | RVLIS Plenum (Upper Range) Level Channel 1 | AUX | 582 | AA-49 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 254 | 1NCLT6400 | RVLIS Narrow Range Level Channel 1 | AUX | 582 | AA-49 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 255 | 1MC9 | Main Control Room Panel | AUX | 594 | CC-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 256 | 1NILT5260 | Containment Sump Level | RX1 | 552 | 20 Deg 50 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 257 | 1NILT5261 | Containment Sump Level | RX1 | 556 | 2 Deg 45 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 258 | 1NILT5262 | Containment Sump Level | RX1 | 560 | 4 Deg 45 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 259 | 1NILT5263 | Containment Sump Level | RX1 | 565 | 2 Deg 45 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 260 | 1NILT5264 | Containment Sump Level | RX1 | 569 | 0 Deg 56 Rad | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 261 | 1NIMT5260 | Containment Sump Level | AUX | 577 | CC-47 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |

* HCLPF values of >RLGM indicate that the HCLPF exceeds the Review Level Ground Motion (0.29g), but that a specific HCLPF value was not calculated since the component was screened out from further evaluation.

** Key Failure Modes are defined as follows:

Screened per IPEEE - Indicates that the component was evaluated in the IPEEE and therefore meets the RLGM demand.

Screened per EPRI NP-6041 - Indicates that the component meets the screening criteria of EPRI NP-6041, Table 2-4 and that neither anchorage, relay chatter, nor interactions limit the reported HCLPF.

Interaction - Block Walls - Indicates that the component is located near a block wall. The block wall was evaluated in IPEEE and therefore the block wall meets the RLGM demand. The functional and anchorage HCLPFs exceed the reported HCLPF value.

Interaction - Control Room Ceiling - indicates that the component is located in the control room. The control room ceiling was evaluated in this report and has a HCLPF of 0.30g. The functional and anchorage HCLPFs exceed the reported HCLPF value.

Anchorage - Indicates that anchorage is the governing failure mode for the component.

Functional Failure - Indicates that functional failure is the governing failure mode for the component.

Relay Chatter - Indicates that relay chatter is the governing failure mode for the component.

Modification/Investigation - Indicates that the reported HCLPF value is conditional on the modification and/or further investigation as reported on the SEWS.

Total Items: 258

# Appendix B

## Catawba Nuclear Station Unit 2 ESEL and HCLPF Results

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2NC250A | Reactor Head Vent Valve | CV2 | 600 | 38 Deg 25 Rad | Closed | Open | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 2 | 2NC253A | Reactor Head Vent Valve | CV2 | 600 | 43 Deg 27 Rad | Closed | Open | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 3 | 2NC1 | Pressurizer Safety Valve | CV2 | 637 | 102 Deg 37 Rad | Closed | Functional | Walk-by | Included in IPEEE, pg 718. | TBD | TBD |
| 4 | 2NC2 | Safety/Relief Valve | CV2 | 637 | 105 Deg 37 Rad | Closed | Functional | Walk-by | Included in IPEEE, pg 718. | TBD | TBD |
| 5 | 2NC3 | Safety/Relief Valve | CV2 | 637 | 106 Deg 37 Rad | Closed | Functional | Walk-by | Included in IPEEE, pg 718. | TBD | TBD |
| 6 | 2NC34A | Pressurizer Power Operated Relief Valve | CV2 | 635 | 105 Deg 39 Rad | Closed | Closed | Walk-by | Included in IPEEE, pg 718. | TBD | TBD |
| 7 | 2NCTK11 | Pressurizer Relief Tank 2 | CV2 | 554 | 90 Deg | Functional | Functional | Walkdown | | TBD | TBD |
| 8 | 2NV1A | NC Letdown to Regenerative Heat Exchanger Isolation Valve | CV2 | 554 | 228 Deg 38 Rad | Open | Closed | Walkdown | | TBD | TBD |
| 9 | 2ARFD2 | Air Return Fan Damper 2 | CV2 | 595 | 265 Deg 53 Rad | Closed | Open | Walk-by | | TBD | TBD |
| 10 | 2ARFD4 | Air Return Fan Damper 4 | CV2 | 595 | 292 Deg 49 Rad | Closed | Open | Walk-by | | TBD | TBD |
| 11 | 2AVXCARF | 2A Containment Air Return Fan (CARF-2A) | CV2 | 593 | 265 Deg | Off | On | Walk-by | | TBD | TBD |
| 12 | 2BVXCARF | 2B Containment Air Return Fan (CARF-2B) | CV2 | 593 | 293 Deg | Off | On | Walk-by | | TBD | TBD |
| 13 | 2VXHSFA | H2 Skimmer Fan A | CV2 | 645 | 265 Deg | Off | On | Walkdown | | TBD | TBD |
| 14 | 2VXHSFB | H2 Skimmer Fan B | CV2 | 645 | 220 Deg | Off | On | Walkdown | | TBD | TBD |
| 15 | 2VX1A | H2 Skimmer Fan A Damper | CV2 | 659 | 263 Deg | Closed | Open | Walkdown | | TBD | TBD |
| 16 | 2VX2B | H2 Skimmer Fan B Damper | CV2 | 659 | 283 Deg | Closed | Open | Walkdown | | TBD | TBD |
| 17 | 2ND1B | Residual Heat Removal A Train Isolation Valve | CV2 | 572 | 170 Deg 33 Rad | Closed | Open | Walk-by | Included in IPEEE, pg 1316. | TBD | TBD |
| 18 | 2ND2A | Residual Heat Removal A Train Isolation Valve | CV2 | 567 | 176 Deg 50 Rad | Closed | Open | Walk-by | Included in IPEEE, pg 1316. | TBD | TBD |
| 19 | 2NDPUA | Residual Heat Removal Pump 2A | AUX | 522 | FF-60 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 20 | 2NDHXAPMP | Residual Heat Removal Pump Mechanical Seal Heat Exchanger 2A | AUX | 522 | FF-60 | Functional | Functional | Walk-by | Rule-of-the-box with 2NDPUA | >RLGM | Screened per IPEEE |
| 21 | 2KCHX40 | Residual Heat Removal Pump 2A Motor Cooler | AUX | 522 | FF-60 | Functional | Functional | Walk-by | Rule-of-the-box with 2NDPUA | >RLGM | Screened per IPEEE |
| 22 | 2NDHXA | Residual Heat Removal Heat Exchanger 1A | AUX | 560 | LL-62 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 23 | 2KF101B | FW System/ KF System Isolation Valve | AUX | 583 | JJ-62 | Closed | Open | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 24 | 2FWTK01 | Refueling Water Storage Tank (FWST) | Yard | | | Intact | Intact | Walkdown | | 0.30 | Anchorage |
| 25 | 2KCPUA1 | Component Cooling Pump 2A1 | AUX | 577 | EE-58 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 26 | 2KCHXA1 | Component Cooling Pump 2A1 Motor Cooler | AUX | 577 | EE-58 | Functional | Functional | Walk-by | Rule-of-the-box with 2KCPUA1 | >RLGM | Screened per IPEEE |
| 27 | 2KCHXA | Component Cooling Heat Exchanger 2A | AUX | 577 | HH-59 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 28 | 2KC056A | Residual Heat Removal Heat Exchanger 1A Isolation Valve | AUX | 590 | LL-61 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 29 | 2RN250A | Nuclear Service Water to 1CAPUTD Isolation Valve | AUX | 584 | KK-59 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 30 | 2AVVLCVU | 2A Lower Containment Ventilation Unit (LCVU-2A) | CV2 | 565 | 16 Deg | Off | On | Walkdown | | TBD | TBD |
| 31 | 2DVVLCVU | 2D Lower Containment Ventilation Unit (LCVU-2D) | CV2 | 565 | 344 Deg | Off | On | Walkdown | | TBD | TBD |

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 2BB24 | Steam Generator Blowdown Flow Control Valve | TB2 | 581 | 2L-29 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 33 | 2BB65 | Steam Generator Blowdown Flow Control Valve | TB2 | 581 | 2K-29 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 34 | 2BB69 | Steam Generator Blowdown Flow Control Valve | TB2 | 583 | 2L-30 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 35 | 2BB73 | Steam Generator Blowdown Flow Control Valve | TB2 | 583 | 2M-29 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 36 | 2CA174 | Condenser Circulating Water System Isolation Valve | AUX | 545 | CC-61 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 37 | 2CA116A | Nuclear Service Water System Train 2A Isolation Valve | AUX | 555 | BB-62 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 38 | 2CA257 | 2CAPUTD Feedwater Safety Valve | AUX | 540 | BB-63 | Closed | Open | Walkdown | | >RLGM | Modification/Investigation |
| 39 | 2CAPUTD | Turbine Driven Auxiliary Feed Water Pump | AUX | 531 | AA-63 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 40 | 2CAHX04 | Turbine Driven Auxiliary Feed Water Pump Lube Oil Cooler | AUX | 530 | AA-62 | Functional | Functional | Walk-by | Rule-of-the-box with 2 CAPUTD | >RLGM | Screened per IPEEE |
| 41 | 2CA64 | Auxiliary Feedwater to Steam Generator 2A | AUX | 557 | BB-64 | Open | Throttled | Walkdown | | >RLGM | Modification/Investigation |
| 42 | 2CA52 | Auxiliary Feedwater to Steam Generator 2B | AUX | 550 | DD-62 | Open | Throttled | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 43 | 2CA48 | Auxiliary Feedwater to Steam Generator 2C | AUX | 551 | DD-61 | Open | Throttled | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 44 | 2CA36 | Auxiliary Feedwater to Steam Generator 2D | AUX | 554 | BB-65 | Open | Throttled | Walkdown | | >RLGM | Modification/Investigation |
| 45 | 2SV19 | Power Operated Relief Valve - Steam Generator 2A | DH2 | 594 | FF-71 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 46 | 2SV13 | Power Operated Relief Valve - Steam Generator 2B | DH2 | 635 | FF-60 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 47 | 2SV7 | Power Operated Relief Valve - Steam Generator 2C | DH2 | 635 | FF-61 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 48 | 2SV1 | Power Operated Relief Valve - Steam Generator 2D | DH2 | 635 | FF-69 | Closed | Open | Walk-by | | >RLGM | Screened per IPEEE |
| 49 | 2SV2 | Steam Generator 2D Safety Valve | DH2 | 615 | EE-69 | Closed | Functional | Walk-by | Included in IPEEE, pg 721. | >RLGM | Screened per IPEEE |
| 50 | 2SV3 | Steam Generator 2D Safety Valve | DH2 | 615 | EE-69 | Closed | Functional | Walk-by | Included in IPEEE, pg 721. | >RLGM | Screened per IPEEE |
| 51 | 2SV4 | Steam Generator 2D Safety Valve | DH2 | 615 | EE-69 | Closed | Functional | Walk-by | Included in IPEEE, pg 721. | >RLGM | Screened per IPEEE |
| 52 | 2SV5 | Steam Generator 2D Safety Valve | DH2 | 615 | EE-69 | Closed | Functional | Walk-by | Included in IPEEE, pg 721. | >RLGM | Screened per IPEEE |
| 53 | 2SV6 | Steam Generator 2D Safety Valve | DH2 | 615 | EE-69 | Closed | Functional | Walk-by | Included in IPEEE, pg 721. | >RLGM | Screened per IPEEE |
| 54 | 2SM1 | Steam Generator 2D Main Steam Isolation Valve | DH2 | 615 | DD-69 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 55 | 2SV8 | Steam Generator 2C Safety Valve | DH2 | 615 | EE-61 | Closed | Functional | Walk-by | Included in IPEEE, pg 721. | >RLGM | Screened per IPEEE |
| 56 | 2SV9 | Steam Generator 2C Safety Valve | DH2 | 615 | EE-61 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 57 | 2SV10 | Steam Generator 2C Safety Valve | DH2 | 615 | EE-61 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 58 | 2SV11 | Steam Generator 2C Safety Valve | DH2 | 615 | EE-61 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 59 | 2SV12 | Steam Generator 2C Safety Valve | DH2 | 615 | EE-61 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 60 | 2SM3 | Steam Generator 2C Main Steam Isolation Valve | DH2 | 615 | DD-61 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 61 | 2SV14 | Steam Generator 2B Safety Valve | DH2 | 615 | EE-60 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 62 | 2SV15 | Steam Generator 2B Safety Valve | DH2 | 615 | EE-60 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 2SV16 | Steam Generator 2B Safety Valve | DH2 | 615 | EE-60 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 64 | 2SV17 | Steam Generator 2B Safety Valve | DH2 | 615 | EE-60 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 65 | 2SV18 | Steam Generator 2B Safety Valve | DH2 | 615 | EE-60 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 66 | 2SM5 | Steam Generator 2B Main Steam Isolation Valve | DH2 | 615 | DD-60 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 67 | 2SV20 | Steam Generator 2A Safety Valve | DH2 | 615 | EE-70 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 68 | 2SV21 | Steam Generator 2A Safety Valve | DH2 | 615 | EE-70 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 69 | 2SV22 | Steam Generator 2A Safety Valve | DH2 | 615 | EE-70 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 70 | 2SV23 | Steam Generator 2A Safety Valve | DH2 | 615 | EE-70 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 71 | 2SV24 | Steam Generator 2A Safety Valve | DH2 | 615 | EE-70 | Closed | Functional | Walk-by | Included in IPEEE, pg 722. | >RLGM | Screened per IPEEE |
| 72 | 2SM7 | Steam Generator 2A Main Steam Isolation Valve | DH2 | 615 | DD-70 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 73 | 2SA144 | 2CAPUTD Control Valve | AUX | 531 | BB-63 | Open | Throttled | Walk-by | Rule-of-the-box with 1CAPUD | >RLGM | Screened per IPEEE |
| 74 | 2SA145 | 2CAPUTD Trip Throttle Valve (Stop Valve) | AUX | 534 | BB-63 | Open | Throttled | Walk-by | Rule-of-the-box with 1CAPUD | >RLGM | Screened per IPEEE |
| 75 | 2SA2 | 2CAPUTD Steam Feed Isolation Valve | DH2 | 628 | FF-61 | Closed | Open | Walk-by | Included in IPEEE, pg 721. | >RLGM | Screened per IPEEE |
| 76 | 2NDHXB | Residual Heat Removal Heat Exchanger 2B | AUX | 560 | LL-62 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 77 | 2NI54A | Accumulator Tank 2A Isolation Valve | CV2 | 560 | 46 Deg 55 Rad | Open | Closed | Walk-by | Included in IPEEE, pg 719. | >RLGM | Screened per IPEEE |
| 78 | 2NI65B | Accumulator Tank 2B Isolation Valve | CV2 | 560 | 136 Deg 55 Rad | Open | Closed | Walk-by | Included in IPEEE, pg 719. | >RLGM | Screened per IPEEE |
| 79 | 2NI76A | Accumulator Tank 2C Isolation Valve | CV2 | 560 | 222 Deg 45 Rad | Open | Closed | Walk-by | Included in IPEEE, pg 719. | >RLGM | Screened per IPEEE |
| 80 | 2NI88B | Accumulator Tank 2D Isolation Valve | CV2 | 560 | 312 Deg 45 Rad | Open | Closed | Walk-by | Included in IPEEE, pg 719. | >RLGM | Screened per IPEEE |
| 81 | 2NSHXA | Containment Spray Heat Exchanger 2A | AUX | 560 | LL-62 | Intact | Intact | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 82 | 2NSHXB | Containment Spray Heat Exchanger 2B | AUX | 560 | LL-62 | Intact | Intact | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 83 | 2NMHX07 | Reactor Coolant Hot Leg Sample Heat Exchanger A | AUX | 543 | Rm 248 | Intact | Intact | Walkdown | | >RLGM | Modification/Investigation |
| 84 | 2NMHX08 | Reactor Coolant Hot Leg Sample Heat Exchanger B | AUX | 543 | Rm 248 | Intact | Intact | Walkdown | | >RLGM | Modification/Investigation |
| 85 | 2EMF46A | A Train KC Radiation Monitor | AUX | 577 | JJ-60 | Intact | Intact | Walkdown | | 0.31 | Anchorage |
| 86 | 2KC2B | Auxiliary Building Non-Essential Return Header Isolation Valve | AUX | 586 | FF-56 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 87 | 2KC3A | Reactor Building Non-Essential Return Header Isolation Valve | AUX | 586 | FF-57 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 88 | 2KC53B | Auxiliary Building Non-Essential Return Header Isolation Valve | AUX | 584 | HH-59 | Open | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 89 | 2KC230A | Reactor Building Non-Essential Return Header Isolation Valve | AUX | 586 | HH-59 | Open | Closed | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 90 | 2KCTKA | Component Cooling Surge Tank 1A | AUX | 594 | NN-59 | Intact | Intact | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 91 | 2NVHX04 | Let Down Heat Exchanger | AUX | 577 | KK-61 | Intact | Intact | Walkdown | | 0.30 | Anchorage |
| 92 | 2KFHXA | Fuel Pool Heat Exchanger 2A | AUX | 577 | NN-61 | Intact | Intact | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 93 | 2KFHXB | Fuel Pool Heat Exchanger 2B | AUX | 577 | NN-62 | Intact | Intact | Walkdown | | >RLGM | Screened per EPRI NP-6041 |

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 94 | 2RN232A | 2A Diesel Generator Cooling Water Isolation Valve | D2A | 564 | DD-75 | Closed | Closed | Walk-by | | >RLGM | Screened per IPEEE |
| 95 | 2MC1 | Main Control Room Panel | AUX | 594 | AA-57 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 96 | 2MC10 | Main Control Room Panel | AUX | 594 | BB-58 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 97 | 2MC2 | Main Control Room Panel | AUX | 594 | AA-58 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 98 | 2MC4 | Main Control Room Panel | AUX | 594 | BB-58 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 99 | 2MC5 | Main Control Room Panel | AUX | 594 | BB-58 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 100 | 2PCC1 | Process Control Cabinet 1 Protection Set 1 Cabinet | AUX | 594 | BB-59 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 101 | 2PCC2 | Process Control Cabinet 2 Protection Set 2 Cabinet | AUX | 594 | BB-60 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 102 | 2PCC3 | Process Control Cabinet 3 Protection Set 3 Cabinet | AUX | 594 | BB-59 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 103 | 2MC8 | Main Control Room Panel | AUX | 594 | BB-58 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 104 | 2PCC4 | Process Control Cabinet 4Protection Set 4 Cabinet | AUX | 594 | BB-60 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 105 | 2PCC5 | Process Control Cabinet 5Protection Set 5 Cabinet | AUX | 594 | CC-59 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 106 | 2PCC6 | Process Control Cabinet 6 Protection Set 6 Cabinet | AUX | 594 | CC-60 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 107 | 2PCC7 | Process Control Cabinet 7 Protection Set 7 Cabinet | AUX | 594 | CC-59 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 108 | 2PCC8 | Process Control Cabinet 8 Protection Set 8 Cabinet | AUX | 594 | CC-60 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 109 | 2RVLIS | RVLIS Process Control Cabinet | AUX | 577 | CC-61 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 110 | 2TBOX0691 | SR/IR N31/N35 Neutron Flux Amplifier Terminal Box | AUX | 580 | CC-63 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 111 | 2TBOX0089 | SR/IR N31/35 Neutron Flux Amplifier Isolation Transformer Terminal Box | AUX | 580 | CC-63 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 112 | 2NIS1 | Outer Core Nuclear Instrument Cabinet Rack 1 | AUX | 594 | CC-58 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 113 | 2TBOX0519 | Wide Range Neutron Flux Signal Processor Terminal Box | AUX | 577 | AA-63 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 114 | 2TBOX0537 | Wide Range Neutron Flux Amplifier Terminal Box | AUX | 577 | AA-63 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 115 | 2TBOX0586 | Wide Range Neutron Flux Power Supply Terminal Box | AUX | 577 | AA-63 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 116 | 2TBOX0587 | Wide Range Neutron Flux Power Supply Terminal Box | AUX | 577 | AA-63 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 117 | 2MTSW0006 | Transfer Switch (Single Pole Double Throw), Hydrogen Igniter Group A | AUX | 577 | CC-65 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 118 | 2XFMR0013 | Transformer, 480 VAC - 120 VAC, Hydrogen Igniter Group A | AUX | 577 | CC-65 | Energized | Energized | Walkdown | | >RLGM | Interaction - Block Walls |
| 119 | 2VREG0013 | Voltage Regulator, Hydrogen Igniter Group A | AUX | 577 | CC-65 | Energized | Energized | Walkdown | | >RLGM | Interaction - Block Walls |
| 120 | 2EATC8 | Essential Area Terminal Cabinet | AUX | 577 | EE-60 | Functional | Functional | Walkdown | | 0.32 | Anchorage |
| 121 | 2ELCP0278 | Hydrogen Igniter Group A Control Panel | AUX | 577 | CC-65 | De-Energized | Energized | Walkdown | | >RLGM | Interaction - Block Walls |
| 122 | 2DGLSA | Diesel Generator No. 2A Load Sequencer Relay Loading Relay | AUX | 556 | BB-71 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 123 | 2ELCP0357 | SW01, Hydrogen Igniter On/Off switch (Alt. Source) located on panel 2ELCP0357 | AUX | 577 | CC-65 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 124 | 2MC7 | Main Control Room Panel | AUX | 594 | BB-56 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 125 | 2EHM0003 | Group 2A Igniter Box | CV2 | 562 | 88 Deg 48 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 126 | 2EHM0005 | Group 2A Igniter Box | CV2 | 562 | 178 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 127 | 2EHM0007 | Group 2A Igniter Box | CV2 | 562 | 277 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 128 | 2EHM0009 | Group 2A Igniter Box | CV2 | 562 | 5 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 129 | 2EHM0071 | Group 2A Igniter Box | CV2 | 555 | 103 Deg 35 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 130 | 2EHM0011 | Group 3A Igniter Box | CV2 | 601 | 324 Deg 20 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 131 | 2EHM0013 | Group 3A Igniter Box | CV2 | 590 | 326 Deg 49 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 132 | 2EHM0015 | Group 3A Igniter Box | CV2 | 642 | 335 Deg 41 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 133 | 2EHM0017 | Group 3A Igniter Box | CV2 | 601 | 55 Deg 18 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 134 | 2EHM0019 | Group 3A Igniter Box | CV2 | 590 | 2 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 135 | 2EHM0021 | Group 3A Igniter Box | CV2 | 642 | 18 Deg 41 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 136 | 2EHM0023 | Group 4A Igniter Box | CV2 | 590 | 53 Deg 50 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 137 | 2EHM0025 | Group 4A Igniter Box | CV2 | 590 | 214 Deg 48 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 138 | 2EHM0027 | Group 4A Igniter Box | CV2 | 590 | 245 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 139 | 2EHM0029 | Group 4A Igniter Box | CV2 | 590 | 91 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 140 | 2EHM0031 | Group 4A Igniter Box | CV2 | 603 | 10 Deg 12 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 141 | 2EHM0033 | Group 4A Igniter Box | CV2 | 641 | 114 Deg 34 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 142 | 2EHM0035 | Group 5A Igniter Box | CV2 | 601 | 140 Deg 30 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 143 | 2EHM0037 | Group 5A Igniter Box | CV2 | 590 | 146 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 144 | 2EHM0039 | Group 5A Igniter Box | CV2 | 642 | 161 Deg 41 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 145 | 2EHM0041 | Group 5A Igniter Box | CV2 | 601 | 216 Deg 21 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 146 | 2EHM0043 | Group 5A Igniter Box | CV2 | 590 | 173 Deg 51 Rad | De-Energized | Energized | Walkdown | | 0.33 | Anchorage |
| 147 | 2EHM0045 | Group 5A Igniter Box | CV2 | 642 | 206 Deg 41 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 148 | 2EHM0059 | Group 7A Igniter Box | CV2 | 714 | 318 Deg 24 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 149 | 2EHM0061 | Group 7A Igniter Box | CV2 | 714 | 49 Deg 24 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 150 | 2EHM0063 | Group 7A Igniter Box | CV2 | 714 | 140 Deg 24 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 151 | 2EHM0065 | Group 7A Igniter Box | CV2 | 714 | 218 Deg 24 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 152 | 2EHM0053 | Group 6A-1 Igniter Box | CV2 | 666 | 108 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 153 | 2EHM0055 | Group 6A-1 Igniter Box | CV2 | 666 | 157 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 154 | 2EHM0057 | Group 6A-1 Igniter Box | CV2 | 666 | 206 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 155 | 2EHM0047 | Group 6A-2 Igniter Box | CV2 | 666 | 321 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 156 | 2EHM0049 | Group 6A-2 Igniter Box | CV2 | 666 | 11 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 157 | 2EHM0051 | Group 6A-2 Igniter Box | CV2 | 666 | 59 Deg 46 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 158 | 2EHM0067 | Group 8A Igniter Box | CV2 | 653 | 218 Deg 30 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 159 | 2EHM0069 | Group 8A Igniter Box | CV2 | 653 | 41 Deg 32 Rad | De-Energized | Energized | Walkdown | | 0.29 | Functional Failure |
| 160 | 2AFWPTCP | Auxiliary Feedwater Pump Turbine Control Panel (ELCP0245) | AUX | 543 | CC-61 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Wall |
| 161 | 2EDE | 125 VDC Distribution Center, compartments F01A, F01G, F01I | AUX | 577 | BB-68 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 162 | 2EATC23 | Essential Area Terminal Cabinet | AUX | 577 | CC-65 | Functional | Functional | Walkdown | | 0.37 | Anchorage |
| 163 | 2SSPSA | Solid State Protection System Cabinet, Control Panel, Control Cabinet | AUX | 594 | CC-59 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 164 | 2EATC21 | Essential Area Terminal Cabinet | AUX | 577 | BB-62 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 165 | 2EPA | 125 VDC Power Panelboard | AUX | 554 | DD-55 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 166 | 2EATC12 | Essential Area Terminal Cabinet | AUX | 577 | FF-59 | Functional | Functional | Walkdown | | 0.29 | Relay Chatter |
| 167 | 2TBOX0522 | Control Panel | D2A | 556 | BB-69 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 168 | 2SMTC1 | Control Panel | AUX | 577 | GG-59 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 169 | 2EIA | Vital 120 VAC Inverter | AUX | 554 | DD-59 | Energized | Energized | Walkdown | SEWS included in IPEEE, pg 1474. However, inverter replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 170 | 2EIB | Vital 120 VAC Inverter | AUX | 554 | CC-59 | Energized | Energized | Walkdown | SEWS included in IPEEE, pg 1475. However, inverter replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 171 | 2EIC | Vital 120 VAC Inverter | AUX | 554 | CC-59 | Energized | Energized | Walkdown | SEWS included in IPEEE, pg 1476. However, inverter replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 172 | 2EID | Vital 120 VAC Inverter | AUX | 554 | BB-59 | Energized | Energized | Walkdown | SEWS included in IPEEE, pg 1477. However, inverter replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 173 | 2ERPD | 120 VAC Power Panel | AUX | 554 | BB-59 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 174 | 2ERPB | 120 VAC Power Panel | AUX | 554 | CC-59 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 175 | 2ERPA | 120 VAC Power Panel | AUX | 554 | DD-59 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 176 | 2ERPC | 120 VAC Power Panel | AUX | 554 | CC-59 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 177 | 2EATC13 | Essential Area Terminal Cabinet | AUX | 560 | JJ-58 | Functional | Functional | Walkdown | | 0.29 | Relay Chatter |
| 178 | 2EDF | 125 VDC Panel, 125 VDC Distribution Center, compartments F01A, F01I | AUX | 560 | BB-68 | Energized | Energized | Walk-by | | >RLGM | Screened per IPEEE |
| 179 | 2SSPSB | Control Cabinet | AUX | 594 | DD-59 | Functional | Functional | Walkdown | | 0.30 | Interaction - Control Room Ceiling |
| 180 | 2EADA | Auctioneering Diode Assembly | AUX | 577 | BB-63 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Wall |
| 181 | 2EADB | Auctioneering Diode Assembly | AUX | 560 | BB-63 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Wall |
| 182 | 2EBA | 125 VDC Battery | AUX | 554 | DD-60 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 1454. However, battery rack modified since original evaluation. | >RLGM | Interaction - Block Walls |
| 183 | 2EBB | 125 VDC Battery | AUX | 554 | CC-59 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 1455. However, battery rack modified since original evaluation. | >RLGM | Interaction - Block Walls |
| 184 | 2EBC | 125 VDC Battery | AUX | 554 | CC-60 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 1456. However, battery rack modified since original evaluation. | >RLGM | Interaction - Block Walls |

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 185 | 2EBD | 125 VDC Battery | AUX | 554 | BB-59 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 1457. However, battery rack modified since original evaluation. | >RLGM | Interaction - Block Walls |
| 186 | 2ECA | 125 VDC Battery Charger | AUX | 554 | DD-59 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 1464. However, charger replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 187 | 2ECB | 125 VDC Battery Charger | AUX | 554 | CC-60 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 1465. However, charger replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 188 | 2ECC | 125 VDC Battery Charger | AUX | 554 | CC-59 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 1466. However, charger replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 189 | 2ECD | 125 VDC Battery Charger | AUX | 554 | BB-60 | Functional | Functional | Walkdown | SEWS included in IPEEE, pg 1467. However, charger replaced since original evaluation. | >RLGM | Interaction - Block Walls |
| 190 | 2EDA | 125 VDC Distribution Center, compartments F01C, F01D, F02B, F03B, F02A, F03A | AUX | 554 | DD-59 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 191 | 2EDB | 125 VDC Distribution Center, compartments F02B,F03B, F02A, F03A | AUX | 554 | CC-60 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 192 | 2EDC | 125 VDC Distribution Center, compartments F01C, F01D, F02B, F03B, F02A, F03A | AUX | 554 | CC-59 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 193 | 2EDD | 125 VDC Distribution Center, compartments F01C, F01D, F02B, F02A, F03A | AUX | 544 | BB-60 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 194 | 2EMXI | Motor Control Center, 600 VAC, single phase, normal power source for Hydrogen Igniter Group A | AUX | 577 | EE-54 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 195 | 2EMXS | Motor Control Center, 480 VAC, single phase, Emergency power source for Hydrogen Igniter Group A | AUX | 577 | BB-48 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 196 | 2EMXD | Essential Motor Control Center, 600 VAC | AUX | 560 | BB-64 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 197 | 2EMXK | Essential Motor Control Center, 600 VAC | AUX | 577 | BB-67 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 198 | 2EMXC | Essential Motor Control Center, 600 VAC | AUX | 577 | BB-64 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 199 | 2EMXL | Essential Motor Control Center, 600 VAC | AUX | 556 | BB-67 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 200 | 2EMXA | Essential Motor Control Center, 600 VAC | AUX | 577 | FF-60 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 201 | 2EMXJ | Essential Motor Control Center, 600 VAC | AUX | 560 | GG-58 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 202 | 2EMXH | Essential Motor Control Center, 600 VAC | AUX | 594 | FF-58 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 203 | 2EMXE | Essential Motor Control Center, 600 VAC | D2A | 556 | EE-75 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 204 | 2EMXB | 600 VAC Essential MCC | AUX | 560 | FF-58 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 205 | 2EMXM | 600 VAC Essential MCC | AUX | 577 | CC-61 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 206 | 2EMXN | 600 VAC Essential MCC | AUX | 560 | CC-61 | Functional | Functional | Walkdown | | 0.32 | Anchorage |
| 207 | 2ETA | 4160 Essential Switchgear | AUX | 577 | AA-64 | Functional | Functional | Walk-by | | >RLGM | Screened per IPEEE |
| 208 | 2TBOX0008 | Terminal Box for Transmitter 2FWLT5000 | YRD | 598 | 50X53Y | Functional | Functional | Walkdown | | 0.29 | Anchorage |
| 209 | 2NSPT5370 | Containment Pressure Train A | AUX | 581 | CC-63 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 210 | 2TBOX0538 | Terminal Box for 2CM877 & 2CM878 | TB2 | 574 | 2L-17 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 211 | 2CAFT5040 | 2CAPUTD Discharge Flow | AUX | 546 | BB-62 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 212 | 2CFLT5610 | 2A Steam Generator Wide Range Level Channel #1 | AN2 | 566 | 358 Deg 59 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 213 | 2CFLT5620 | 2B Steam Generator Wide Range Level Channel #2 | AN2 | 565 | 149 Deg 59 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 214 | 2CFLT5630 | 2C Steam Generator Wide Range Level Channel #3 | AN2 | 565 | 205 Deg 59 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 215 | 2CFLT5640 | 2D Steam Generator Wide Range Level Channel #4 | AN2 | 567 | 327 Deg 59 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 216 | 2NCPT5120 | NC Loop 2 Hot Leg Wide Range Pressure Channel #1 | AUX | 566 | CC-64 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 217 | 2NCPT5140 | 2C NC Loop Hot Leg Wide Range Pressure Channel #4 | AUX | 566 | CC-63 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 218 | 2CFLT5490 | 2A Steam Generator Narrow Range Level Channel#4 | AN2 | 575 | 002 Deg 59 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 219 | 2CFLT5520 | 2B Steam Generator Narrow Range Level Channel#4 | AN2 | 565 | 130 Deg 59 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 220 | 2CFLT5550 | 2C Steam Generator Narrow Range Level Channel#4 | AN2 | 575 | 205 Deg 59 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 221 | 2CFLT5580 | 2D Steam Generator Narrow Range Level Channel#4 | AN2 | 568 | 315 Deg 59 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 222 | 2NCLT5171 | Pressurizer Level-Low Temperature | AN2 | 571 | 113 Deg 56 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 223 | 2SMPT5080 | 2A Steam Generator Steam Line Pressure Channel 1 | AUX | 582 | DD-69 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 224 | 2SMPT5110 | 2B Steam Generator Steam Line Pressure Channel 1 | AUX | 582 | DD-62 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 225 | 2SMPT5140 | 2C Steam Generator Steam Line Pressure Channel 1 | AUX | 580 | DD-62 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 226 | 2SMPT5170 | 2D Steam Generator Steam Line Pressure Channel 1 | AUX | 580 | DD-69 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 227 | 2EATC7 | Essential Area Terminal Cabinet | AUX | 577 | FF-59 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 228 | 2MXR | Normal Motor Control Center, 600 VAC | AUX | 560 | BB-65 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 229 | 2MXQ | Blackout Motor Control Center, 600 VAC | AUX | 577 | BB-65 | Functional | Functional | Walkdown | | >RLGM | Interaction - Block Walls |
| 230 | 2NCRD5850 | 2A NC Loop Hot Leg Wide Range Temperature | CV2 | 567 | 20 Deg 20 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 231 | 2NCRD5860 | 2A NC Loop Cold Leg Wide Range Temperature | CV2 | 567 | 51 Deg 28 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 232 | 2NCRD5870 | 2B NC Loop Hot Leg Wide Range Temperature | CV2 | 567 | 160 Deg 18 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 233 | 2NCRD5880 | 2B NC Loop Cold Leg Wide Range Temperature | CV2 | 567 | 124 Deg 28 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 234 | 2NCRD5900 | 2C NC Loop Hot Leg Wide Range Temperature | CV2 | 567 | 204 Deg 20 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 235 | 2NCRD5910 | 2C NC Loop Cold Leg Wide Range Temperature | CV2 | 567 | 240 Deg 29 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 236 | 2NCRD5920 | 2D NC Loop Hot Leg Wide Range Temperature | CV2 | 567 | 340 Deg 20 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 237 | 2NCRD5930 | 2D NC Loop Cold Leg Wide Range Temperature | CV2 | 567 | 309 Deg 28 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 238 | 2NCLT6390 | RVLIS Plenum (Upper Range) Level Channel 1 | AUX | 582 | AA-64 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 239 | 2NCLT6400 | RVLIS Narrow Range Level Channel 1 | AUX | 582 | AA-64 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |
| 240 | 2NILT5260 | Containment Sump Level | RX2 | 552 | 21 Deg 50 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 241 | 2NILT5261 | Containment Sump Level | RX2 | 556 | 2 Deg 45 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 242 | 2NILT5262 | Containment Sump Level | RX2 | 560 | 3 Deg 45 Rad | Functional | Functional | Walkdown | | TBD | TBD |

**Catawba Nuclear Station Unit 2 ESEL and HCLPF Results**

| ESEL ID | EIN | Description | Bldg | EL | Location | Normal Operating State | Desired Operating State | Walkdown or Walk-by | Screening Notes | HCLPF* | Key Failure Mode** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 243 | 2NILT5263 | Containment Sump Level | RX2 | 566 | 2 Deg 54 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 244 | 2NILT5264 | Containment Sump Level | RX2 | 570 | 18 Deg 56 Rad | Functional | Functional | Walkdown | | TBD | TBD |
| 245 | 2NIMT5260 | Containment Sump Level | AUX | 577 | BB-67 | Functional | Functional | Walkdown | | >RLGM | Screened per EPRI NP-6041 |

* HCLPF values of >RLGM indicate that the HCLPF exceeds the Review Level Ground Motion (0.29g), but that a specific HCLPF value was not calculated since the component was screened out from further evaluation.

** Key Failure Modes are defined as follows:

Screened per IPEEE - Indicates that the component was evaluated in the IPEEE and therefore meets the RLGM demand.

Screened per EPRI NP-6041 - Indicates that the component meets the screening criteria of EPRI NP-6041, Table 2-4 and that neither anchorage, relay chatter, nor interactions limit the reported HCLPF.

Interaction - Block Walls - Indicates that the component is located near a block wall. The block wall was evaluated in IPEEE and therefore the block wall meets the RLGM demand. The functional and anchorage HCLPFs exceed the reported HCLPF value.

Interaction - Control Room Ceiling - Indicates that the component is located in the control room. The control room ceiling was evaluated in this report and has a HCLPF of 0.30g. The functional and anchorage HCLPFs exceed the reported HCLPF value.

Anchorage - Indicates that anchorage is the governing failure mode for the component.

Functional Failure - Indicates that functional failure is the governing failure mode for the component.

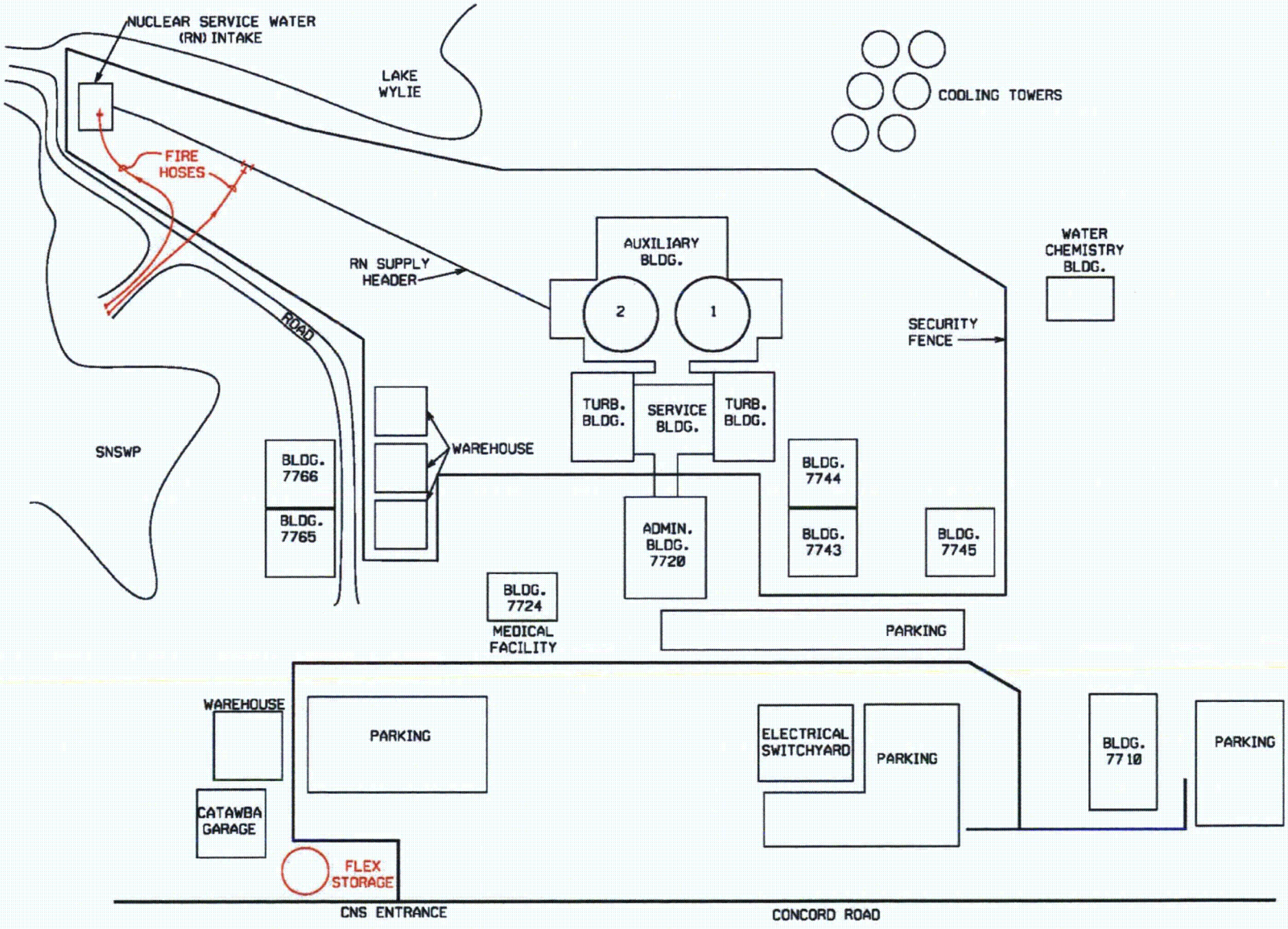
Relay Chatter - Indicates that relay chatter is the governing failure mode for the component.

Modification/Investigation - Indicates that the reported HCLPF value is conditional on the modification and/or further investigation as reported on the SEWS.

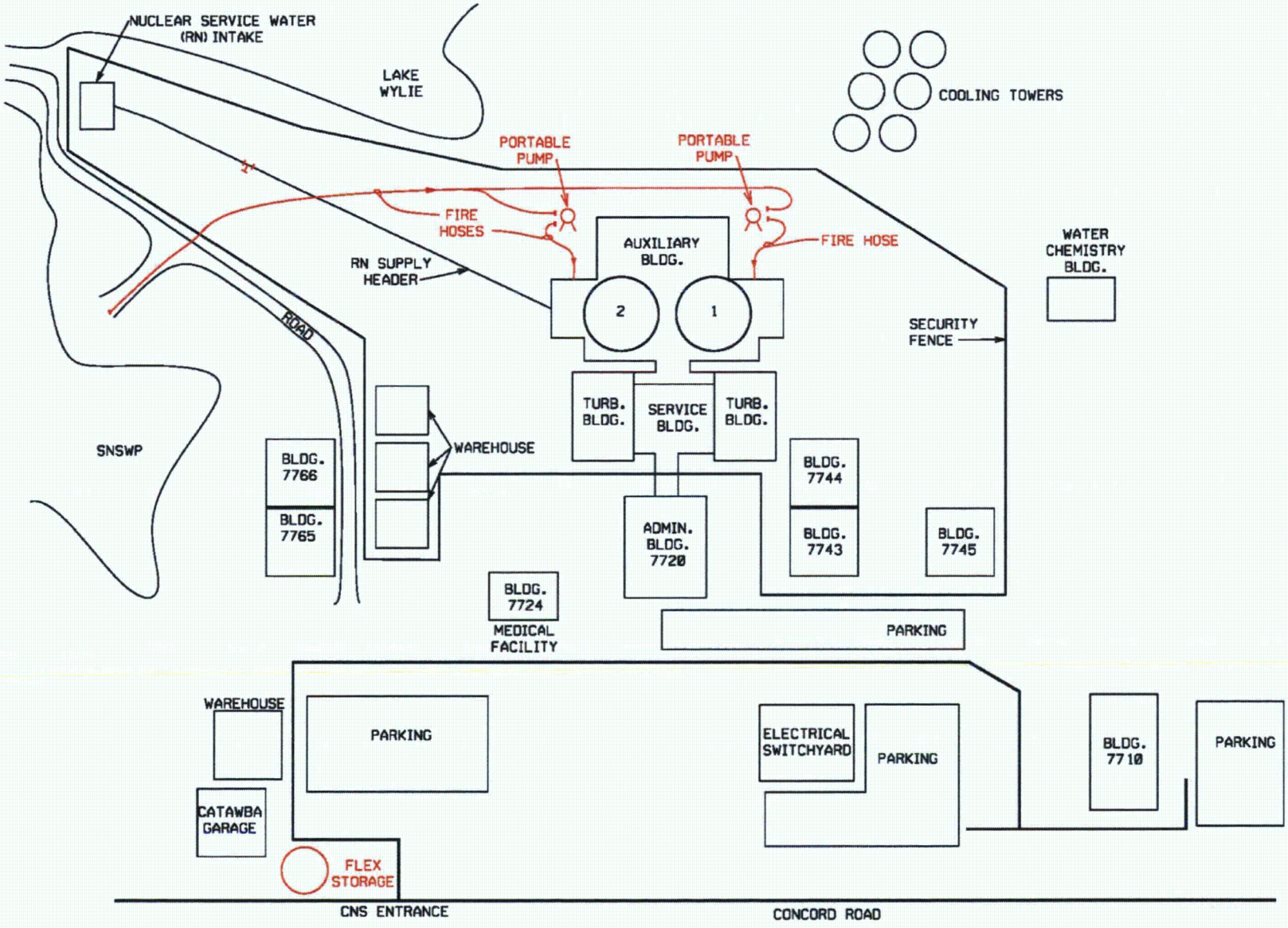
Total Items: 245

# Appendix C

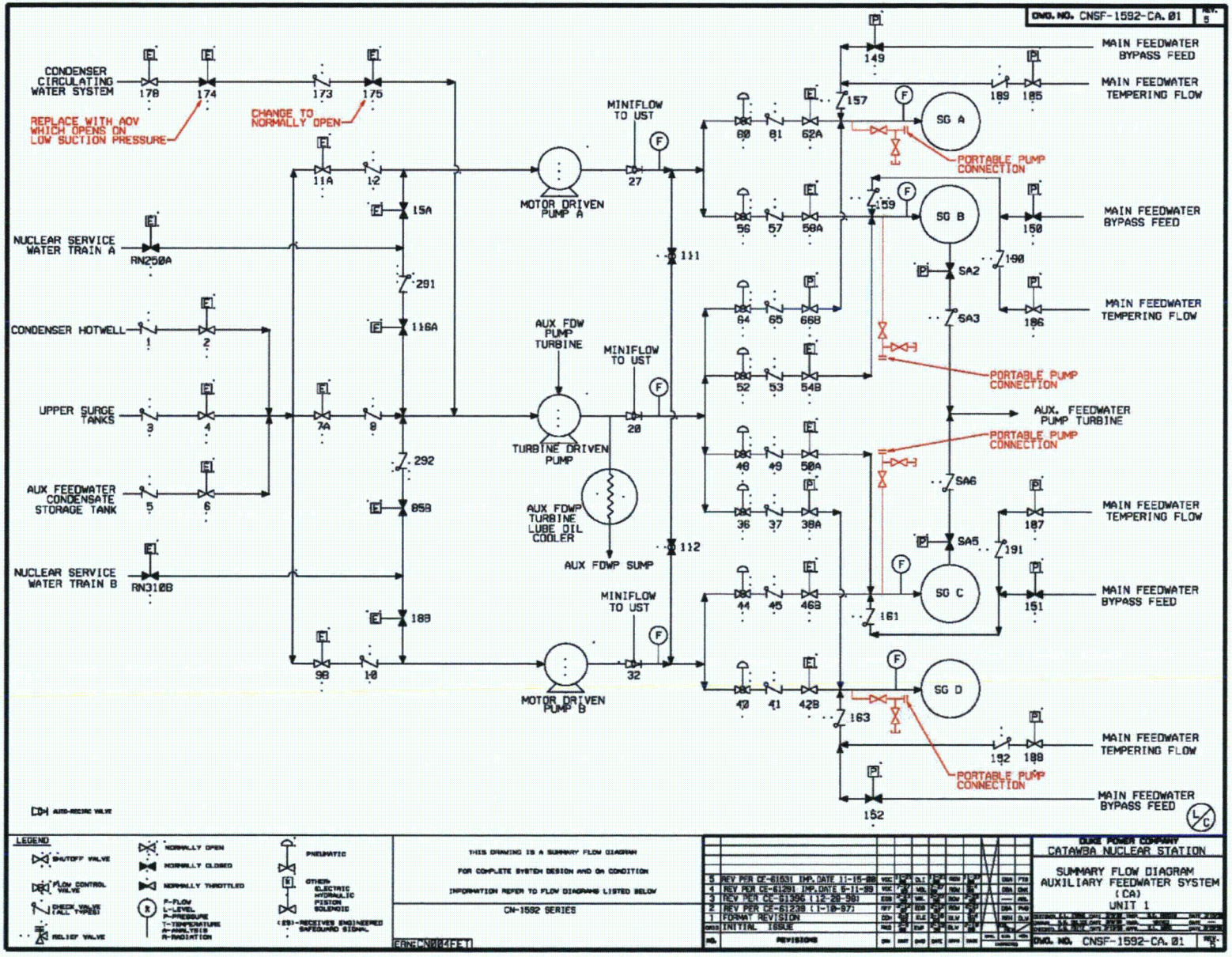
# CNS FLEX Flow Paths



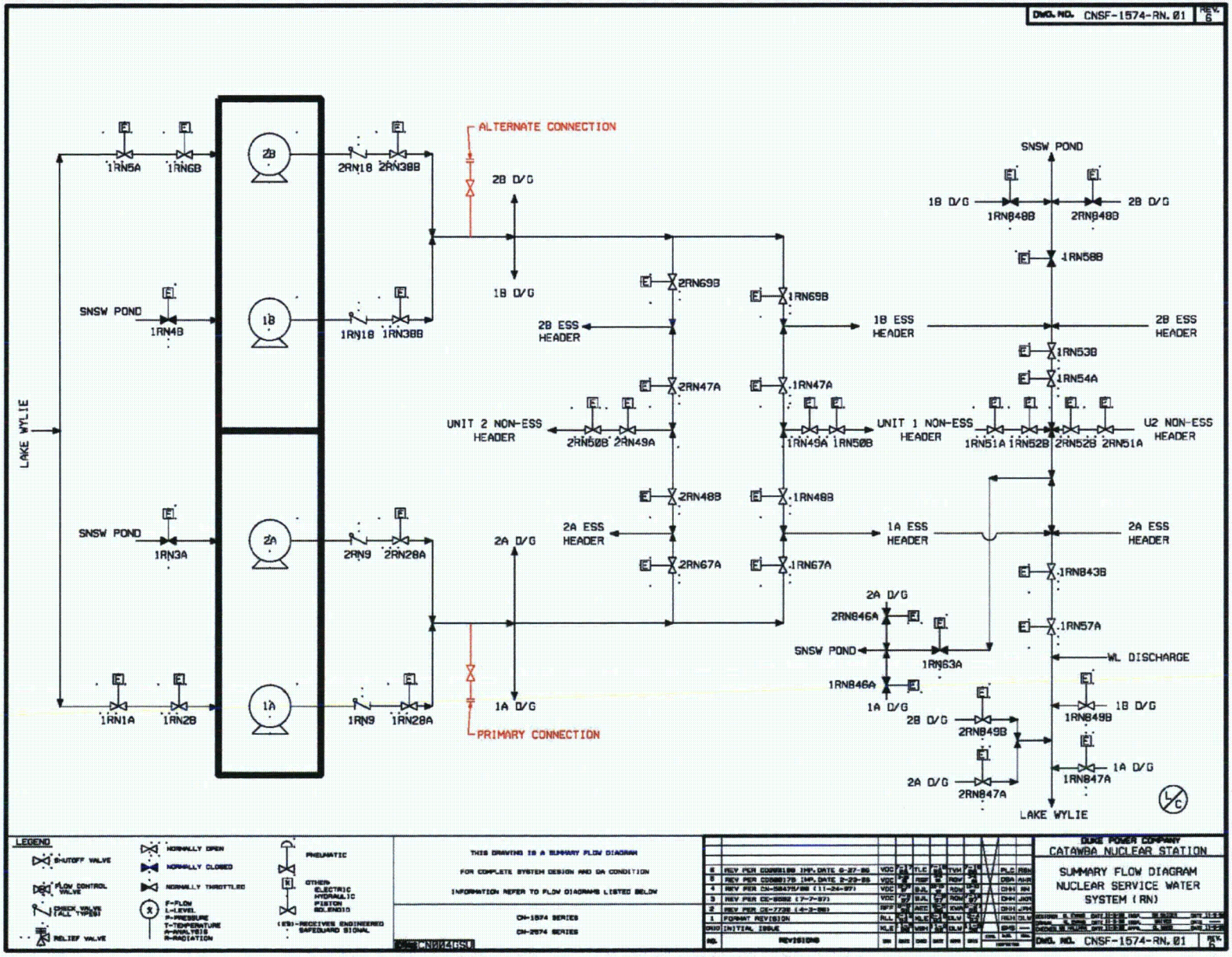

PORTABLE PUMP SUPPLY TO ESSENTIAL SERVICE WATER HEADER / STORAGE FACILITY LOCATION



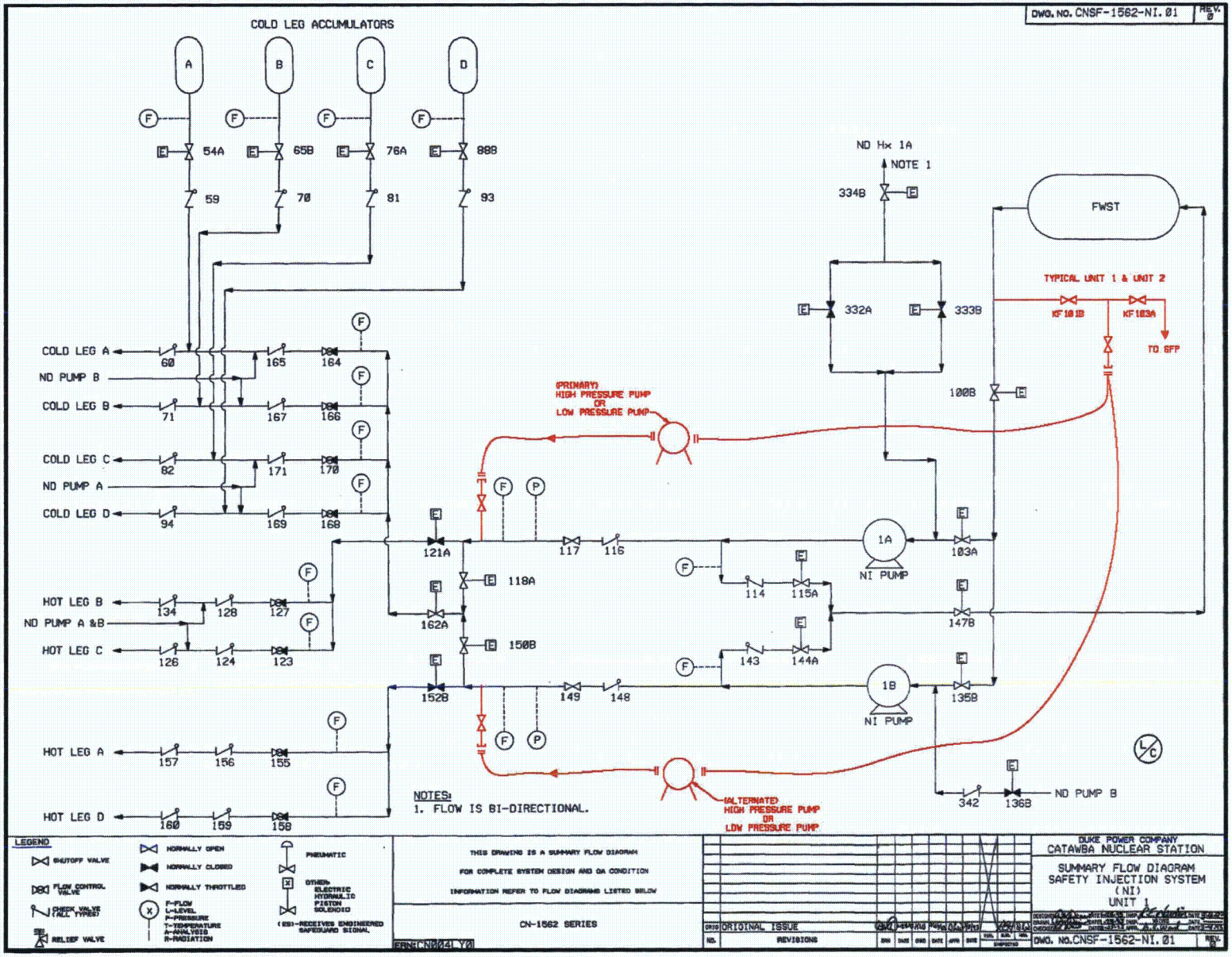

PORTABLE PUMP SUPPLY TO SG's



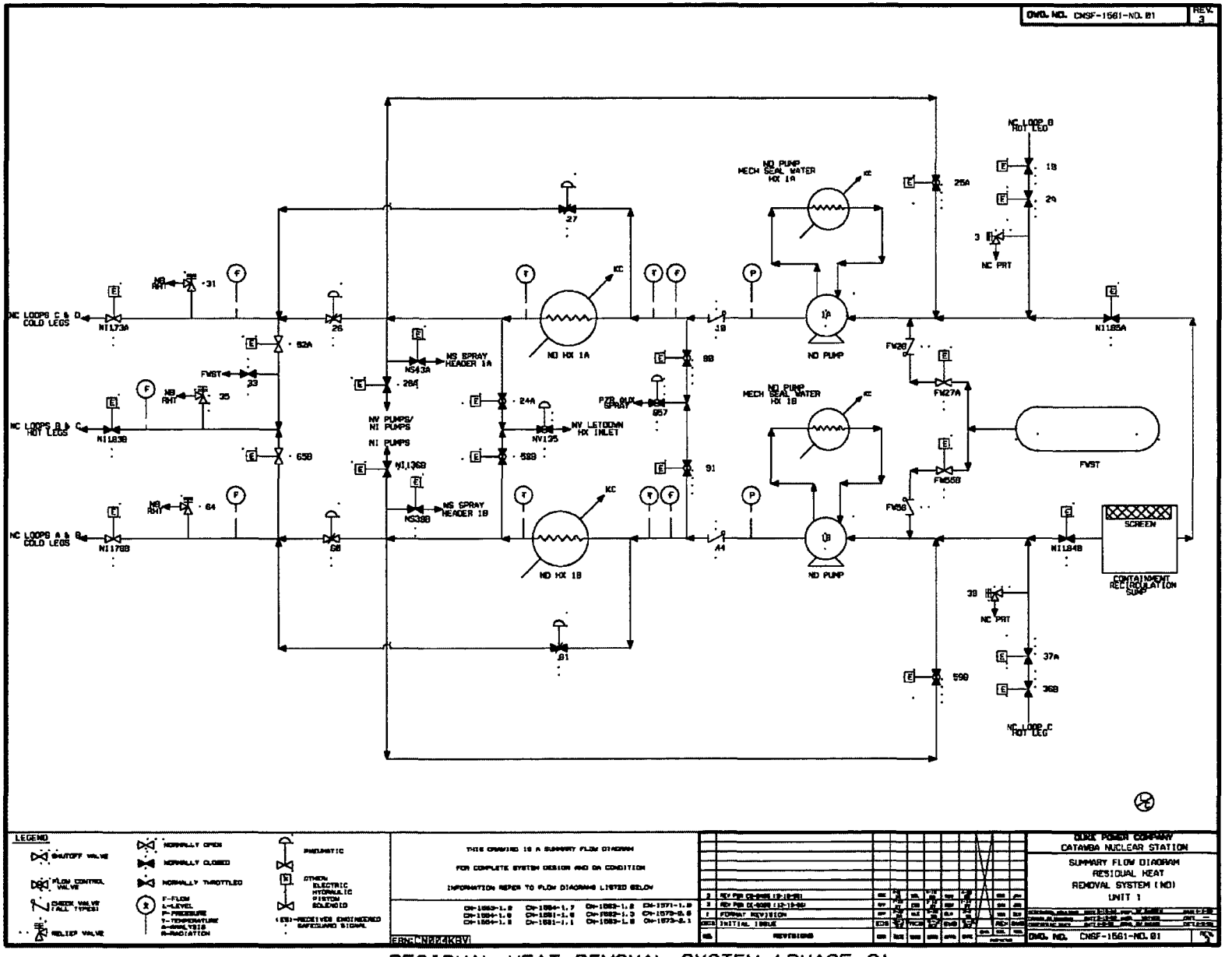

AUXILIARY FEEDWATER (SUPPLY AND ALTERNATE SG MAKEUP)



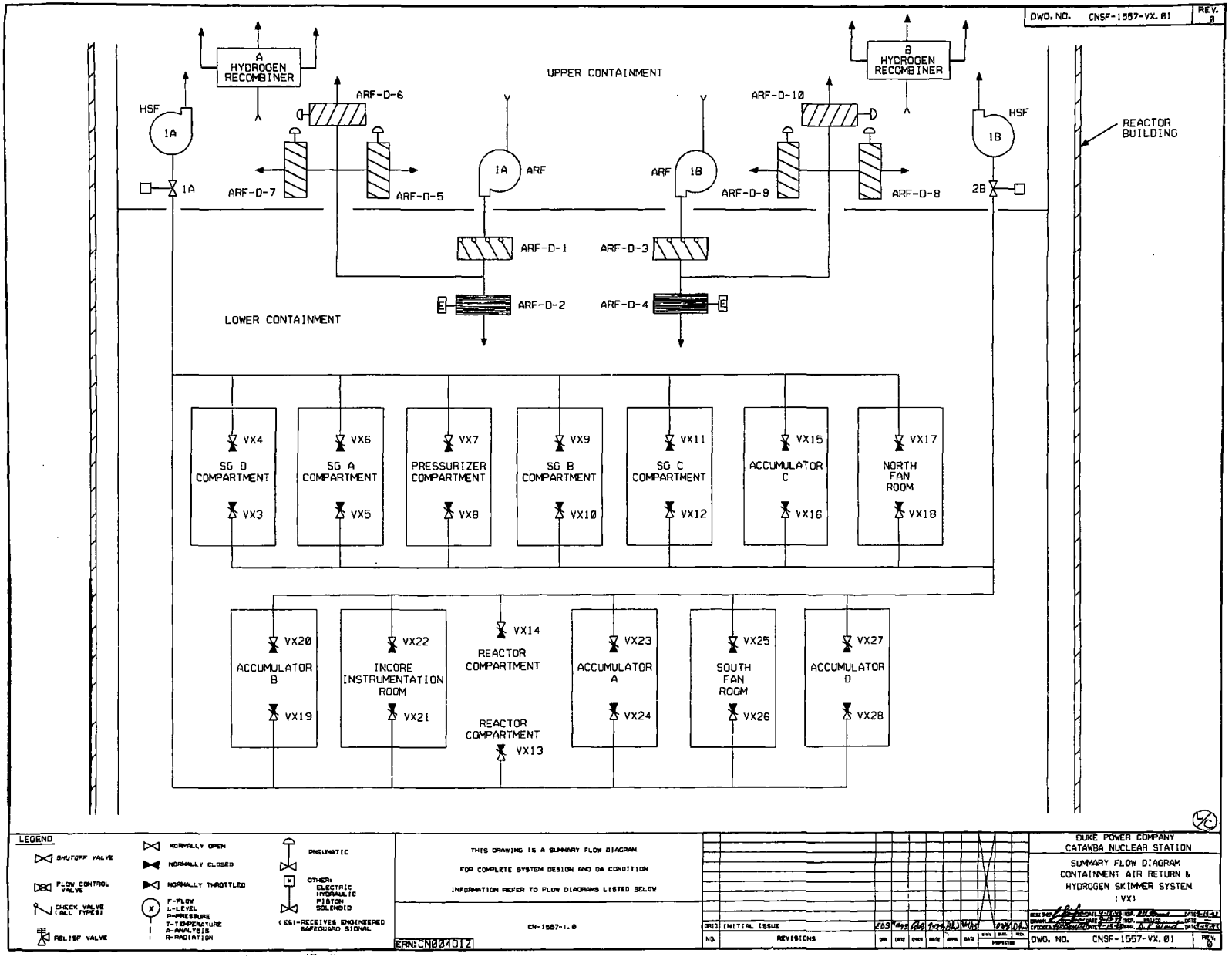

NUCLEAR SERVICE WATER (SUPPLY USING PORTABLE PUMP)

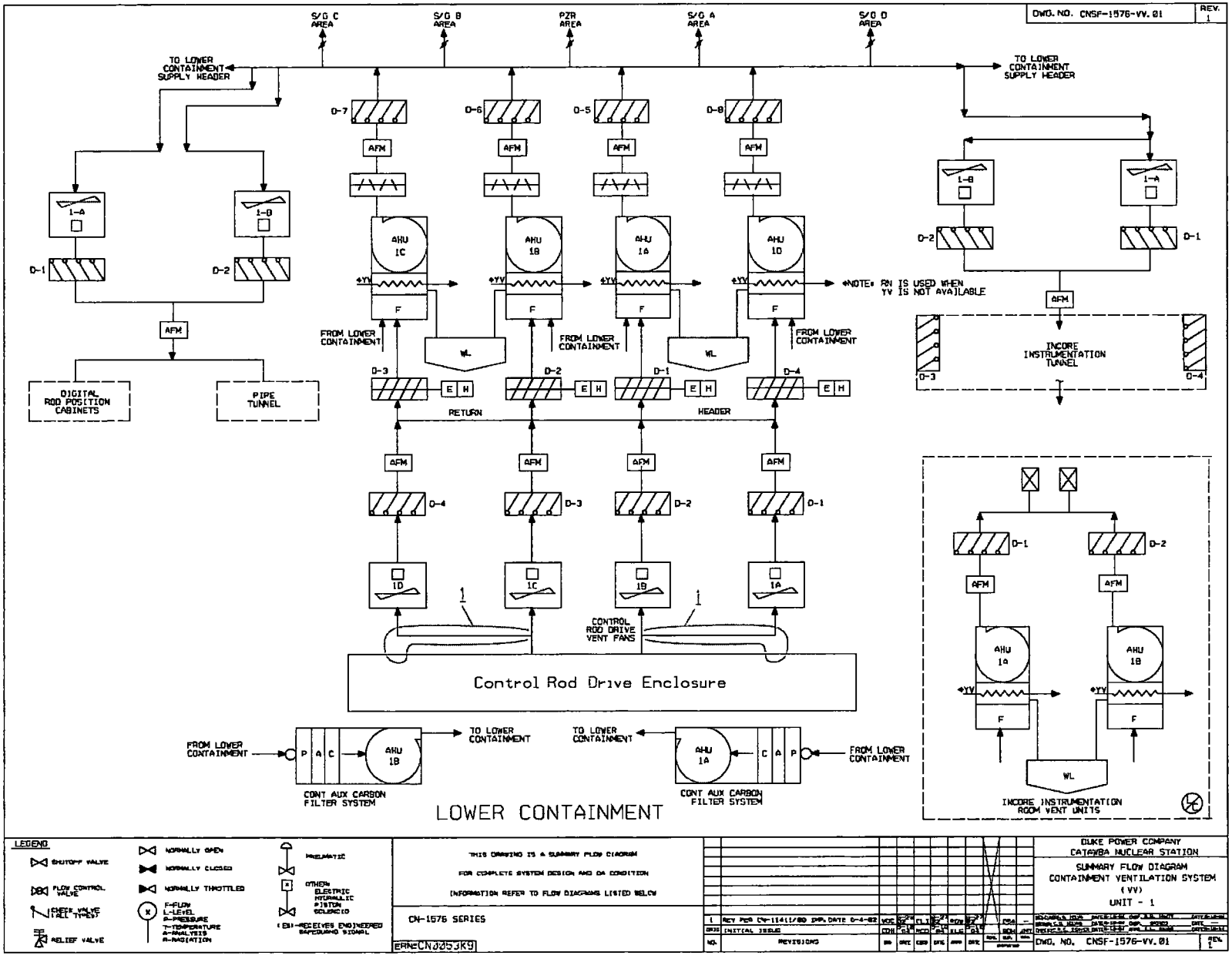



PRIMARY INJECTION




RESIDUAL HEAT REMOVAL SYSTEM (PHASE 3)


DWG. NO. CNSF-1557-VX. 01
REV. 0
A HYDROGEN RECOMBINER
B HYDROGEN RECOMBINER
UPPER CONTAINMENT
REACTOR BUILDING
HSF 1A
HSF 1B
ARF-D-6
ARF-D-10
ARF-D-7
ARF-D-5
ARF-D-9
ARF-D-8
1A ARF
ARF 1B
1A
2B
ARF-D-1
ARF-D-3
ARF-D-2
ARF-D-4
LOWER CONTAINMENT
VX4
SG D COMPARTMENT
VX3
VX6
SG A COMPARTMENT
VX5
VX7
PRESSURIZER COMPARTMENT
VX8
VX9
SG B COMPARTMENT
VX10
VX11
SG C COMPARTMENT
VX12
VX15
ACCUMULATOR C
VX16
VX17
NORTH FAN ROOM
VX18
VX20
ACCUMULATOR B
VX19
VX22
INCORE INSTRUMENTATION ROOM
VX21
VX14
REACTOR COMPARTMENT
REACTOR COMPARTMENT
VX13
VX23
ACCUMULATOR A
VX24
VX25
SOUTH FAN ROOM
VX26
VX27
ACCUMULATOR D
VX28
LEGEND
SHUTOFF VALVE
FLOW CONTROL VALVE
CHECK VALVE (ALL TYPES)
RELIEF VALVE
NORMALLY OPEN
NORMALLY CLOSED
NORMALLY THROTTLED
F-FLOW
L-LEVEL
P-PRESSURE
T-TEMPERATURE
A-ANALYSIS
R-RADIATION
PNEUMATIC
OTHER: ELECTRIC HYDRAULIC PISTON SOLENOID
(ESI)-RECEIVES ENGINEERED SAFEGUARD SIGNAL
THIS DRAWING IS A SUMMARY FLOW DIAGRAM
FOR COMPLETE SYSTEM DESIGN AND QA CONDITION
INFORMATION REFER TO FLOW DIAGRAMS LISTED BELOW
CN-1557-1.0
ERN:CN0040IZ
DRG. INITIAL ISSUE
NO. REVISIONS
DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
SUMMARY FLOW DIAGRAM
CONTAINMENT AIR RETURN & HYDROGEN SKIMMER SYSTEM
(VX)
DWG. NO. CNSF-1557-VX. 01
REV. 0


DWG. NO. CNSF-1576-VV.01
REV. 1
S/G C AREA
S/G B AREA
PZR AREA
S/G A AREA
S/G D AREA
TO LOWER CONTAINMENT SUPPLY HEADER
TO LOWER CONTAINMENT SUPPLY HEADER
AHU 1C
AHU 1B
AHU 1A
AHU 1D
*NOTE: RN IS USED WHEN YV IS NOT AVAILABLE
FROM LOWER CONTAINMENT
FROM LOWER CONTAINMENT
FROM LOWER CONTAINMENT
INCORE INSTRUMENTATION TUNNEL
DIGITAL ROD POSITION CABINETS
PIPE TUNNEL
RETURN
HEADER
CONTROL ROD DRIVE VENT FANS
Control Rod Drive Enclosure
FROM LOWER CONTAINMENT
TO LOWER CONTAINMENT
TO LOWER CONTAINMENT
FROM LOWER CONTAINMENT
CONT AUX CARBON FILTER SYSTEM
CONT AUX CARBON FILTER SYSTEM
INCORE INSTRUMENTATION ROOM VENT UNITS
LOWER CONTAINMENT
LEGEND
SHUTOFF VALVE
FLOW CONTROL VALVE
RELIEF VALVE
NORMALLY OPEN
NORMALLY CLOSED
NORMALLY THROTTLED
PNEUMATIC
OTHERS
THIS DRAWING IS A SUMMARY FLOW DIAGRAM
FOR COMPLETE SYSTEM DESIGN AND OA CONDITION
INFORMATION REFER TO FLOW DIAGRAMS LISTED BELOW
CN-1576 SERIES
DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
SUMMARY FLOW DIAGRAM
CONTAINMENT VENTILATION SYSTEM
(VV)
UNIT - 1
DWG. NO. CNSF-1576-VV.01