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50.54(f) NTTF 2.1 Seismic High Frequency Confirmation for Catawba Nuclear Station

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EXECUTIVE SUMMARY

The purpose of this report is to provide information as requested by the Nuclear Regulatory Commission (NRC) in its March 12, 2012 letter issued to all power reactor licensees and holders of construction permits in active or deferred status [1]. In particular, this report provides information requested to address the High Frequency Confirmation requirements of Item (4), Enclosure 1, Recommendation 2.1: Seismic, of the March 12, 2012 letter [1].

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 [2]. 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 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. Included in the 50.54(f) letter was a request that licensees perform a "*confirmation, if necessary, that SSCs, which may be affected by high-frequency ground motion, will maintain their functions important to safety.*"

EPRI 1025287, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic" [3] provided screening, prioritization, and implementation details to the U.S. nuclear utility industry for responding to the NRC 50.54(f) letter. This report was developed with NRC participation and was subsequently endorsed by the NRC. The SPID included guidance for determining which plants should perform a High Frequency Confirmation and identified the types of components that should be evaluated in the evaluation.

Subsequent guidance for performing a High Frequency Confirmation was provided in EPRI 3002004396, "High Frequency Program, Application Guidance for Functional Confirmation and Fragility Evaluation," [4] and was endorsed by the NRC in a letter dated September 17, 2015 [5]. Final screening identifying plants needing to perform a High Frequency Confirmation was provided by the NRC in a letter dated October 27, 2015 [6].

This report describes the High Frequency Confirmation evaluation undertaken for Catawba Nuclear Station. The objective of this report is to provide summary information describing the High Frequency Confirmation 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 evaluations.

EPRI 3002004396 [4] is used for the Catawba Nuclear Station engineering evaluations described in this report. In accordance with Reference [4], the following topics are addressed in the subsequent sections of this report:

- Process of selecting components and a list of specific components for high-frequency confirmation
- Estimation of a vertical ground motion response spectrum (GMRS)
- Estimation of in-cabinet seismic demand for subject components
- Estimation of in-cabinet seismic capacity for subject components
- Summary of subject components' high-frequency evaluations

1 INTRODUCTION

1.1 Purpose

The purpose of this report is to provide information as requested by the NRC in its March 12, 2012 50.54(f) letter issued to all power reactor licensees and holders of construction permits in active or deferred status [1]. In particular, this report provides requested information to address the High Frequency Confirmation requirements of Item (4), Enclosure 1, Recommendation 2.1: Seismic, of the March 12, 2012 letter [1].

1.2 Background

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 [2]. 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 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. Included in the 50.54(f) letter was a request that licensees perform a "*confirmation, if necessary, that SSCs, which may be affected by high-frequency ground motion, will maintain their functions important to safety.*"

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On March 31, 2014, Catawba Nuclear Station submitted a reevaluated seismic hazard to the NRC as a part of the Seismic Hazard and Screening Report [7]. By letter dated October 27, 2015 [6], the NRC transmitted the results of the screening and prioritization review of the seismic hazards reevaluation.

This report describes the High Frequency Confirmation evaluation undertaken for Catawba Nuclear Station using the methodologies in EPRI 3002004396, "High Frequency Program, Application Guidance for Functional Confirmation and Fragility Evaluation," as endorsed by the NRC in a letter dated September 17, 2015 [5].

The objective of this report is to provide summary information describing the High Frequency Confirmation 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 evaluations.

1.3 Approach

EPRI 3002004396 [4] is used for the Catawba Nuclear Station engineering evaluations described in this report. Section 4.1 of Reference [4] provided general steps to follow for the high frequency confirmation component evaluation. Accordingly, the following topics are addressed in the subsequent sections of this report:

- Catawba Nuclear Station's SSE and GMRS Information
- Selection of components and a list of specific components for high-frequency confirmation
- Estimation of seismic demand for subject components
- Estimation of seismic capacity for subject components
- Summary of subject components' high-frequency evaluations
- Summary of Results

1.4 Plant Screening

Catawba Nuclear Station submitted reevaluated seismic hazard information including GMRS and seismic hazard information to the NRC on March 31, 2014 [7]. In a letter dated April 27, 2015, the NRC staff concluded that the submitted GMRS adequately characterizes the reevaluated seismic hazard for the Catawba Nuclear Station site [8].

The NRC revised screening determination letter [9] concluded that the Catawba Nuclear Station GMRS to SSE comparison resulted in a need to perform a High Frequency Confirmation in accordance with the screening criteria in the SPID [3].

2. SELECTION OF COMPONENTS FOR HIGH FREQUENCY SCREENING

The fundamental objective of the high frequency confirmation review is to determine whether the occurrence of a seismic event could cause credited equipment to fail to perform as necessary. An optimized evaluation process is applied that focuses on achieving a safe and stable plant state following a seismic event. As described in Reference [4], this state is achieved by confirming that key plant safety functions critical to immediate plant safety are preserved (reactor trip, reactor vessel inventory and pressure control, and core cooling) and that the plant operators have the necessary power available to achieve and maintain this state immediately following the seismic event (AC/DC power support systems).

Within the applicable functions, the components that would need a high frequency confirmation are contact control devices subject to intermittent states in seal-in or lockout (SILO) circuits. Accordingly, the objective of the review as stated in Section 4.2.1 of Reference [4] is to determine if seismic induced high frequency relay chatter would prevent the completion of the following key functions.[1]

2.1 Reactor Trip/Scram

The reactor trip/SCRAM function is identified as a key function in Reference [4] to be considered in the High Frequency Confirmation. The same report also states that, *"the design requirements preclude the application of seal-in or lockout circuits that prevent reactor trip/SCRAM functions"* and that *"No [high-frequency] review [of the reactor trip/SCRAM systems is] necessary."*

2.2 RCS/Reactor Vessel Inventory Control

The reactor coolant system/reactor vessel inventory control systems were reviewed for contact control devices in seal-in and lockout (SILO) circuits that would create a Loss of Coolant Accident (LOCA). The focus of the review was contact control devices that could lead to a significant leak path. Check valves in series with active valves would prevent significant leaks due to misoperation of the active valve; therefore, SILO circuit reviews were not required for those active valves.

Reactor coolant system/reactor vessel inventory control system reviews were performed for valves associated with the following functions:

- Pressurizer Pressure Relief,
- Pressurizer Spray,
- Reactor Vessel Head Vent,
- Chemical and Volume Control,
- Residual Heat Removal,

[1] The selection of components for high frequency screening is described in Stevenson & Associates report 16C4437-RPT-001 [220] and is summarized herein.

- Process Sampling

A table listing the valves selected for analysis and their associated flow diagrams is included as Table B-3 of this report.

2.2.1 Reactor Coolant Loop

Pressurizer Power-Operated Relief Valves (PORV) 1/2NC32B, 1/2NC34A, 1/2NC36B, PORV Isolation Valves 1/2NC31B, 1/2NC33A, 1/2NC35B

Electrical control for the solenoid-operated pilot valves is via relays which are energized from process control signals. There are no devices which could seal-in and cause a sustained undesirable opening of the Pressurizer Power Operated Relief Valves [10, 11, 12, 13, 14, 15]. For this reason, these PORV controls can be credited in a high frequency event, and analysis of the Isolation Valve controls is unnecessary.

Pressurizer Safety Valves 1/2NC1, 1/2NC2, 1/2NC3

1/2NC1, 1/2NC2 and 1/2NC3 are passive components with no external or integral electrical devices with the exception of position indication switches and are therefore not subject to spurious opening due to a high frequency seismic event [16, 17].

Reactor Head Vent Block Valves 1/2NC250A, 1/2NC251B

Both Reactor Head Vent Block Valves 1/2NC250A and 1/2NC251B could be subject to undesirable opening due to chatter of the motor-operated valve (MOV) opening contactor. The opening contactor can seal-in resulting in cycling the valve open. In addition, the 1/2NC250A control circuit contains an additional contact associated with the output from digital optical isolator (DOI) FM3 which electrically isolates the SSF Open control switch (NC41/OPEN). Chatter at this contact could initiate actuation of the associated MOV opening contactor [10, 18, 19, 20].

Pressurizer Spray Valves 1/2NC027 and 1/2NC029

1/2NC027 and 1/2NC029 are fail-closed air-operated valves (AOVs) that utilize a dedicated solenoid pilot valve and rugged hand switch, directly venting the AOV to override the pneumatic control signal and ensure closure. There are no vulnerable devices in this circuitry subject to SILO [21, 22].

2.2.2 Chemical and Volume Control

Regenerative Heat Exchanger Letdown Inlet Isolation Valves 1/2NV1A, 1/2NV2A

Both Regenerative Heat Exchanger Letdown Inlet Isolation Valves are controlled by a rugged hand switch. There are no devices in the control circuit subject to chatter [23, 24, 25, 26].

Excess Letdown Isolation Valves 1/2NV122B, 1/2NV123B

Electrical control for the solenoid-operated pilot valves is via a rugged hand control switch. There are no chatter sensitive contact devices involved in the control of these valves [27, 28].

Reactor Coolant Pump Seal Leak-off Isolation Valves 1/2NV052A, 1/2NV063B, 1/2NV074A, and 1/2NV085B

These valves fail open on loss of air or loss of control power [29, 30, 31, 32, 33, 34, 35, 36]. Their associated solenoids, 1/2NVS0520, 1/2NVS0630, 1/2NVS0740, and 1/2NVS0850, are energized by rugged control switches. A normally closed contact on interposing relays GE (ED, EF) transfers control to panel 1/2ASPA (1/2ASPB) when energized by a rugged transfer control switch. When the valves are closed, chatter on the interposing relay contacts could only lead to momentary opening of the valve. The solenoid valves would re-energize and close their associated main valve once shaking subsided. There are no vulnerable devices in this circuitry subject to SILO.

2.2.3 Residual Heat Removal

Residual Heat Removal NC Loop Supply Isolation Valves 1/2ND001B, 1/2ND002A, 1/2ND036B and 1/2ND037A

During Mode 1 power is removed from 1/2NDIB, 1/2ND2A, and 1/2ND37A in the closed position (until the ND System is placed into operation) in order to preclude fire induced interaction which could lead to outside Containment LOCAs. During Mode 1, power is not removed from 1/2ND36B to prevent the loss of the interlock between this valve and 1/2NI136B and 1/2NS38B [37, p. 26]. Therefore, only 1/2ND36B could be vulnerable to spurious opening due to contact chatter during a seismic event. Valve 1/2ND36B is manually operated via Open/Close pushbuttons (rugged devices). Valve position interlocks are provided such that valves FW55B, NI184B, NI136B, and NS38B must be closed before 1/2ND36B can be opened [38, 39]. Valve 1/2FW55B is open during normal operations and the associated limit switch interlock (rugged device) blocks the open circuit for 1/2ND36B [40, 41]. Therefore, no devices meet the selection criteria.

2.2.4 Process Sampling

NC Hot Leg A Sample Line Inside Containment Isolation Valve 1/2NM022A, NC Hot Leg C Sample Line Inside Containment Isolation Valve 1/2NM025A, PZR Liquid Sample Line Inside Containment Isolation Valve 1/2NM003A, Pressurizer Steam Sample Line Inside Containment Isolation Valve 1/2NM006A

All the control circuits for the Process Sampling Valves listed above are vulnerable to chatter of the MOV opening contactor, which can seal-in and cycle the affected valve open. Additionally, these circuits contain a parallel, interposing contact on the open circuit from the output of a DOI (FW1, FX2, FY3, or FAA) used to isolate the Control Room and Sample Room control switches. Chatter of this contact can initiate actuation of the MOV opening contactor [42, 43, 44, 45, 46, 47, 48, 49] (U1) [50, 51, 52, 53, 54, 55, 56, 57] (U2).

2.3 RCS/Reactor Pressure Control

The reactor vessel pressure control function is identified as a key function in Reference [4] to be considered in the High Frequency Confirmation. The same report also states that "*required post event pressure control is typically provided by passive devices*" and that "*no specific high frequency component chatter review is required for this function.*" [4, pp. 4-6]

2.4 Core Cooling

Core cooling is also a key function in Reference [4]. The core cooling systems were reviewed for contact control devices in seal-in and lockout circuits that would prevent at least a single train of non-AC power driven decay heat removal from functioning.

For PWR plants, the decay heat removal mechanism involves the transfer of mass and energy from the steam generators to the atmosphere. This requires replacement of that mass to the steam generators via some feedwater system, e.g. turbine driven auxiliary feedwater (TDAFW) pump. Therefore, for this evaluation the following functions were checked:

- Steam from the steam generators to the TDAFW turbine and exhausted to atmosphere
- Coolant from the upper surge tanks to the steam generators via the TDAFW pump

The selection of contact devices for the TDAFW pump was based on the premise that pump operation is desired, thus any SILO which would lead to pump operation is desirable and for this reason does not meet the selection criteria. Only contact devices which could render the TDAFW system inoperative were considered. The power-operated valves in the flow paths above are listed in Table B-4.

2.4.1 Turbine Driven Auxiliary Feedwater Pump Steam Valves

Steam Generator to Auxiliary Feedwater Pump Turbine Isolation Valves 1/2SA2 and 1/2SA5

These valves are connected upstream of the Main Steam Isolation Valves (MSIVs) and therefore not subject to isolation by MSIV closure [58, 59]. Control for these valves consists of air-to-close actuators supplied by energize to close solenoid valves configured to fail open on loss of control air or loss of DC power and vent off the actuator allowing the spring force to open the valve [60, p. 13]. The associated solenoid valves are normally maintained energized by contacts from relay AB [61, 62, 63, 64]. Relay AB is maintained energized via multiple series contacts associated with the Aux FWPT auto-start circuits. Upon initiation of a LOOP signal, relay DC is energized causing relay AB to de-energize interrupting power to solenoids 1/2SASV0020 and 1/2SASV0050 opening 1/2SA2 and 1/2SA5. Chatter analysis indicates no SILO devices in the circuitry that could cause the valves to isolate or remain isolated due to contact chatter.

Steam Turbine Trip and Throttle Valve 1/2SA145

Any relay chatter that could cause the momentary energization of the Trip and Throttle (T&T) Valve MOV Close Contactor (1SA145MC) could seal in and drive the T&T valve closed requiring operator action to reset and re-open the valve to establish Auxiliary Feedwater flow. Chatter of MOV 1SA145 Closing Contactor (1SA145MC) could seal in resulting in valve closure. Either Mechanical Overspeed Trip Relay (CR4) or Electrical Overspeed Trip Aux Relay (CON1) can actuate 1SA145 Closing Contactor. Electrical Overspeed Trip Relay (CR3) can actuate Overspeed Trip Aux Relay (CON1). Overspeed Trip Switch TM1 (1CAST5762) may cause actuation of Electrical Overspeed Trip Relay (CR3) [65, 66, 67, 68, 69, 70].

2.4.2 Auxiliary Feedwater Supply Valves

Upper Surge Tank Isolation Valves 1/2CA4

Contact chatter of the closing contactor of CA4 Upper Surge Tank Suction Isolation could seal in and result in the valve cycling fully closed [71, 72].

Hotwell Suction Isolation Valves 1/2CA2, and TDAFW Pump Suction Isolation Valves 1/2CA7A

The Hotwell Suction Isolation and TDAFW Pump Suction Isolation Valves are maintained open and de-energized to ensure a suction flow path for the Turbine Driven Auxiliary Feedwater Pumps [73].

2.4.3 Auxiliary Feedwater Discharge Flow Control and Isolation Valves

Auxiliary Feedwater Flow Control Valves 1/2CA36, 1/2CA48, 1/2CA52, and 1/2CA64

These pneumatically-operated valves are configured to fail open on loss of air. Upon a TDAFWP automatic start signal they fully open on to insure flow path availability [74, pp. 38, 44, 46, 52]. To accomplish this, a solenoid valve (1/2CASV0360, 0480, 0520, 0640) in the main valve's airline de-energizes to vent the valve operator, opening the valve. These solenoid valves will permit venting of the actuator independent of positioner signal [74, pp. 118, 152]. The solenoids are de-energized via normally closed contacts when relays DF and DE from the TDAFWP automatic start circuit are energized by a start signal. Chatter analysis indicates no SILO devices in the circuitry that could cause the valves to close or remain closed due to contact chatter [75, 76, 77, 78].

Auxiliary Feedwater Steam Generator Isolation Valves 1/2CA50A, 1/2CA38A, 1/2CA66B and 1/2CA54B

Contact chatter at the MOV Close Contactor for any of the four (4) Auxiliary Feedwater Steam Generator Isolation Valves could seal in and result in closure of the valve [79, 80, 81, 82] (U1) [83, 84, 85, 86] (U2).

2.5 AC/DC Power Support Systems

The AC and DC power support systems were reviewed for contact control devices in seal-in and lockout circuits that prevent the availability of DC and AC power sources. The following AC and DC power support systems were reviewed:

- Emergency Diesel Generators,
- Battery Chargers and Inverters,
- EDG Ancillary Systems, and
- Switchgear, Load Centers, and MCCs.

Electrical power, especially DC, is necessary to support achieving and maintaining a stable plant condition following a seismic event. DC power relies on the availability of AC power to recharge the batteries. The availability of AC power is dependent upon the Emergency Diesel Generators (EDG) and their ancillary support systems. EPRI 3002004396 [4] requires confirmation that the supply of emergency power is not challenged by a SILO device. The

tripping of lockout devices or circuit breakers is expected to require some level of diagnosis to determine if the trip was spurious due to contact chatter or in response to an actual system fault. The actions taken to diagnose the fault condition could substantially delay the restoration of emergency power.

In order to ensure contact chatter cannot compromise the emergency power system, control circuits were analyzed for the Emergency Diesel Generators (EDG), Battery Chargers, Vital AC Inverters, and Switchgear/Load Centers/MCCs as necessary to distribute power from the EDGs to the Battery Chargers and EDG Ancillary Systems. General information on the arrangement of safety-related AC and DC systems, as well as operation of the EDGs, was obtained from Catawba's UFSAR [87]. Catawba has four (4) EDGs which provide emergency power for their two (2) units. Each unit has two (2) divisions of Class 1E loads with one EDG for each division. Table B-5 contains the complete list of components included in the analysis for this category, along with the primary reference drawing used to determine its inclusion.

The analysis considers the reactor is operating at power with no equipment failures or LOCA prior to the seismic event. The Emergency Diesel Generators are not operating but are available. The seismic event is presumed to cause a Loss of Offsite Power (LOOP) and a normal reactor SCRAM.

In response to bus under-voltage relaying detecting the LOOP, the Class 1E control systems must automatically shed loads, start the EDGs, and sequentially load the diesel generators as designed. Ancillary systems required for EDG operation as well as Class 1E battery chargers and inverters must function as necessary. The goal of this analysis is to identify any vulnerable contact devices that could chatter during the seismic event, seal-in or lock-out, and prevent these systems from performing their intended safety-related function of supplying electrical power during the LOOP.

The following sections contain a description of the analysis for each element of the AC/DC Support Systems. Contact devices are identified by description in this narrative and apply to all divisions.

2.5.1 Emergency Diesel Generators

The analysis of the Emergency Diesel Generators is divided into three functional areas, generator circuit breaker control and protective relaying, diesel engine control, and generator load sequencing. General descriptions of these systems and controls appear in the Catawba Nuclear Station UFSAR [87, pp. 8.3-11] as well as design basis specifications [88, 89]. The control and protective circuits for the diesel generator function differently depending on whether the diesel is stopped (immediately prior to starting), starting automatically in response to a loss of bus voltage (emergency start), or manually started (with offsite power available). Only two of these states is considered possible during the period of strong shaking, stopped prior to starting[ii] and automatically starting. It is expected that under degraded voltage conditions the normal power

[ii] Due to uncertainties in predicting seismic events, this analysis does not assume a strict time correlation between loss of offsite power (LOOP) and start of strong shaking at the site. Loss of offsite power could occur at any point immediately prior to or during the period of strong shaking.

feeder breakers would be tripped manually or automatically via the Degraded Voltage Relaying (analyzed herein), and the diesel generator would start automatically on the loss of voltage on the bus. Manual starting during strong shaking (as only a precaution in cases where offsite power has not been effected) is not considered in this analysis.

2.5.1.1 Generator Protective Relaying

The control circuit for the DG1A Output Circuit Breaker includes interlocking contacts in the breaker closing and trip logic. Actuation of the Diesel Generator Lockout Relay 1ETA19 LOR will prevent automatic or manual closure of the Output Breaker if tripped. This relay would have to be manually reset. Diesel Generator Lockout Relay 1ETA19 LOR may be tripped by chatter in Generator Differential Relay 87G or Voltage Controlled Overcurrent Aux Relays 51VX1, 51VX2, 51VX3 (2 of 3). Relays 51VX1, 51VX2, 51VX3 may be actuated by chatter in their respective Voltage Controlled Overcurrent Protective Relays, PA (51V), PB (51V), or PC (51V). If any of the 4160V Essential Bus 1ETA Lockout Relays 86N (Normal Feed), 86S (Standby Feed) or 86B (Breaker Failure) are tripped, DG1A Output Circuit Breaker closure will be blocked and the affecting relay will require manual resetting. These breaker closure interlocks are bypassed by Sequencer Safeguards Actuation Relay 1ESGAX1 in the event of a Safety Injection Signal but not on a Bus Undervoltage. Normal Feed Breaker 1ETA3 Lockout Relay 86N may be tripped by contact chatter in PB (51) Overcurrent or PA (51G) Ground Overcurrent relays. Standby Feed Breaker 1ETA4 Lockout Relay 86S may be tripped by PB (51) Overcurrent or PA (51G) Ground Overcurrent relays. Breaker Failure Lockout Relay 86B may be actuated by contact output from Breaker Failure Timer 62B [90, 91, 92, 93, 94, 95] (U1) [96, 97, 98, 99, 100, 101] (U2). The control circuits for the other three EDG circuit breakers are identical in design and sensitive to chatter in their equivalent devices:

<u>DG1B</u> 1ETB19 (SB-1): 87G, 51VX1, 51VX2, 51VX3, PA (51V), PB (51V), PC (51V); 1ETB3 86N: PB (51), PA (51G); 1ETB4 86S: PB (51), PA (51G); 86B: 62B

<u>DG2A</u> 2ETA19 (SB-1): 87G, 51VX1, 51VX2, 51VX3, PA (51V), PB (51V), PC (51V); 2ETA3 86N: PB (51), PA (51G); 2ETA4 86S: PB (51), PA (51G); 86B: 62B

<u>DG2B</u> 2ETB19 (SB-1): 87G, 51VX1, 51VX2, 51VX3, PA (51V), PB (51V), PC (51V); 2ETB3 86N: PB (51), PA (51G); 2ETB4 86S: PB (51), PA (51G); 86B: 62B

2.5.1.2 Diesel Engine Control

Chatter analysis for the diesel engine control was performed on the start and shutdown circuits of each EDG. Only emergency start in response to a LOOP is considered in this analysis as manual start and non-emergency DG engine trips are disabled in the presence of a sequencer start signal (SI or UV) [102, 103, 104, 105]. Due to the initial conditions and event progression described above, as well as the analysis of RCS leak path valves, generator starting via a safety injection signal is also not considered. Generator droop mode and output breaker non-emergency trips are disabled by breaker auxiliary contacts within the Breaker and Governor Control circuitry from the Normal and Standby 4160V Essential Bus Feeder Breakers when both bus feeder breakers are open as would occur during a LOOP [91, 93, 97, 98]

SILO devices that can block EDG Emergency Start in response to LOOP are the LO-LO Lube Oil Pressure Trip Relay (JB), the DG1A Breaker lockout relay (86D) and (2 of 2) Overspeed relays DA (SST1) R1, DB (SST2) R1 (trip Combustion Air Damper Solenoid 1SLND0004) and (2 of 2) Overspeed relays DA (SST1) R3, DB (SST2) R3 (trip the Fuel Rack Solenoid 1EQSV5130) [106, 107]. Each of the above trips would seal-in an EDG trip signal and require manual resetting to permit EDG automatic starting. Non-Emergency Trip Relay (HB) is included as a selected device but the impact on closure of the Fuel Rack would only be momentary for the duration of contact closure as the seal in (Relay JC) is defeated during an emergency start signal by the Shutdown De-Activation Relays (R9/R10) and the Fuel Rack Solenoid returns to run position in the absence of a stop signal [106] (Note 6). In the automatic starting circuit for the EDGs, contact chatter in the Shutdown De-Activation Relays R9A (R10A) could seal-in and result in a complete automatic start sequence even in the absence of an SIS or Undervoltage signal [102, 103, 104, 105]. This would result in the DG running unloaded in Emergency Mode with the output breaker open. Contact chatter at Fail-to-Start Aux Relays TD4/TD5 (2 of 2) [106, 107] would result in unlatching the DG Auxiliary Run Relays R1, R1A, R1B, R1C and R2 if the DG is already running [108, 109]. The Auxiliary Run Relays are mechanically latching relays. Auxiliary Run Relay R1B (4, 4a) provides a trip signal to the DG Output breaker anytime the Diesel Generator is not running as indicated by the status of R1B. This trip is not inhibited by any other interlock. With an active automatic close signal present, the DG Output breaker would be prevented from re-closing by the breaker anti-pump feature [91, 93, 108, 110] (U1) [97, 99, 109, 111] (U2). Speed Switch ET-1214 (DA) and associated Aux Relay (FA) may permit an inadvertent (premature) Accelerated Sequence permissive to the Sequencer loading relays in advance of the correct speed parameter [112, 113]. Chatter of EQMT5200 (Tach Transmitter Relay) Auxiliary Relays SS1-K1/2 may result in inadvertent (premature) field flash of the diesel Generator [102, 104, 103, 105]. Auxiliary Relay SS1-K4 may allow inadvertent (premature) closure of the DG Output Breaker in advance of the correct speed parameter. [91, 110, 112, 97, 111, 113]. The control circuits for the other three EDG engine control circuits are identical in design and sensitive to chatter in their equivalent devices. Engine control diagrams and component designations are typical for all 4 EDGs.

2.5.1.3 Diesel Engine Load Sequencing

Analysis of the Diesel Generator Sequencing Cabinets 1/2DGLSA-1 and 1/2DGLSA-2 was performed to determine any contact chatter that could result in spurious operation of DG loads or components. Concerns included premature (premature speed or voltage permissive) or concurrent loading that could overload the DG during the scheduled loading sequence. An additional concern was spurious contact operation that would interrupt, delay or re-initiate loading sequence. Contact chatter of any of the Sequencer Loading Relays (RA1 through RA13) [114, 115] or Sequence Timer Relays (ST1A through ST13A) [116, 117] can seal in the relay and result in out-of-sequence overloading of the DG. Chatter of the DG Restart Relay (RGA) [118, 119] could seal-in, actuating Load Shed Timer and Auxiliary Relay (LSATT/LSAT), re-initiating Load Shed via LSA1,2,3. Chatter of the Load Shed Timer (LSATT/LSAT) could also allow premature closure of the DG Output Breaker [90, 91, 96, 97]. Chatter of the Blackout Relay (BOA) could seal-in and cause actuation of Sequencer Actuation Relays (SAA1 through SAA8) [118, 119]. Contact chatter at Engineered Safeguards Aux Relay (1ESGAX1) could seal-in resulting in actuation of 1ESGAX1 through 1ESGAX4 [120, 121]. Contact chatter at 2/3 of

the Phase Undervoltage Relays (127XAX, 127YAX and 127ZAX) [122, 123] could actuate the Blackout Relay (BOA) resulting in seal-in of BOA and actuation of SAA1 through SAA8. Chatter of Undervoltage Relay/Special (127XAX/SPL) may result in a premature Accelerated Sequence Permissive allowing DG loading with less than scheduled voltage only if D/G speed is greater than 430 rpm [122, 123]. Contact chatter of Logic Timer (LT2A) could actuate Blackout Relay (BOA) and seal-in a subsequent Blackout Sequence [122, 123]. Contact chatter of Sequencer Actuation Relays SAA1 (AA) or SAA8 (BE) would initiate a spurious start of the DG via Shutdown De-Activation Relay R9A or R10A [120, 102, 103, 121, 104, 105]. The control circuits for the other three EDG Sequencer cabinets are identical in design and sensitive to chatter in their equivalent devices. The equivalent devices for all trains are listed in Table B-1.

2.5.1.4 Degraded Voltage Relaying

Catawba Nuclear Station 4160V Degraded Voltage protection is arranged in a 2 of 3 relays scheme (27ZY, 27YX and 27ZX) to actuate a trip signal to the Normal and Standby Incoming Bus Feeder Breakers when sustained 4kV bus voltage is detected below the Degraded Voltage set-point [94, 95, 100, 101]. Inherent time delays ensure the condition is not actuated on intermittent conditions. Once the bus is de-energized, first level bus undervoltage protection is actuated resulting in diesel generator start. There is no seal-in to the Degraded Voltage scheme. The signal is reset when bus voltage is restored above the Degraded Voltage set-point. Contact chatter could only momentarily delay or prematurely trip the feeder breakers. There are no devices within the Degraded Voltage scheme that could establish a SILO due to contact chatter that would prevent actuation of the circuit.

2.5.2 Battery Chargers

125VDC Vital Battery Bank Chargers 1ECA, 1ECB, 1ECC, and 1ECD

Analysis of 125 VDC Vital Battery Chargers 1ECA, 1ECB, 1ECC, and 1ECD was performed using information from the UFSAR [87, pp. 8.3-30], as well as vendor schematic diagrams [124]. Each battery charger has a high-voltage shutdown (HVSD) feature, and alarms for charger supply undervoltage and 125 VDC bus high/low voltage conditions. The high voltage shutdown circuit has an output relay K301, which shunt-trips the DC output circuit breaker. Chatter in the contacts of these output relays may disconnect the output of the battery chargers from the batteries and therefore meet the selection criteria.

125VDC Diesel Generator Battery Bank Battery Chargers 1DGCA and 1DGCB

Dedicated EDG Battery Bank Battery Chargers 1DGCA and 1DGCB are also equipped with a high-voltage shutdown (HVSD) feature actuated by internal relay K307 which shunt-trips the DC output circuit breaker. Upstream Timer TD301 may also actuate downstream relay K307 [125, 126].

2.5.3 Inverters

120VAC Vital Instrumentation and Control Power Inverters 1/2EIA, 1/2EIB, 1/2EIC, 1/2EID

The inverters are powered from 125VDC Vital Instrumentation and Control Power distribution centers via rugged molded case circuit breakers [127, 128]. Review of the design basis specification [129], as well as vendor schematic diagrams [130, 131] revealed no SILO contact

devices are present in the inverter control circuits, and thus no devices associated with the inverters meet the selection criteria.

2.5.4 EDG Ancillary Systems

The Emergency Diesel Generators require many components and systems to start and operate. For identifying electrical contact devices, only systems and components which are electrically controlled are analyzed.

2.5.4.1 Starting Air

The Catawba Diesel Generator Starting Air storage capacity for each redundant diesel engine is sufficient for a minimum of five successful engine starts without the use of the air compressors [132]. Based on Diesel Generator availability as an initial condition, the passive air reservoirs are presumed pressurized and the only active components in this system required to operate are the air start solenoids [133, p. 14] which are covered under the EDG engine control analysis in Section 2.5.1.2 above.

2.5.4.2 Combustion Air Intake and Exhaust

The combustion air intake is a passive system taking outside air from outside the building through two air intake lines. The exhaust from the engine is discharged through an exhaust silencer, then routed outside the building at a point separated and removed from the air intake. Both are passive systems, do not rely on electrical control and not subject to high frequency failures [134, p. 12].

2.5.4.3 Lube Oil

The Diesel Generators utilize a "dry" sump lube oil system with engine-driven mechanical lubrication oil pumps [135, p. 2] which do not rely on electrical control.

2.5.4.4 Fuel Oil

The Diesel Generators utilize engine-driven mechanical pumps to supply fuel oil to the engines from the day tanks. The mechanical pumps do not rely on electrical control [136, p. 24]. Fuel oil is transferred by gravity from the storage tanks to the day tanks. A set of level switches located within the day tank control the position of the fuel oil transfer valve; opening the valve to allow fuel to flow to the day tank at low level and closing the valve to shut off the supply at high level. Chatter analysis of the control circuits for the electrically-powered solenoid-actuated fuel oil transfer valves concluded they do not include SILO devices [137, 138, 139, 140].

2.5.4.5 Cooling Water

The Diesel Generator Cooling Water System is described in its Design Basis Document (DBD) [141, p. 20]. The Diesel Generator Engine Cooling Water System for each diesel includes a jacket water-intercooler water heat exchanger which is supplied with cooling water from the Nuclear Service Water System (RN). Engine driven pumps are credited for jacket water circulation when the engine is operating. These mechanical pumps do not rely on electrical

control. The electric jacket water pump is only used during shutdown periods and is thus not included in this analysis.

2.5.4.6 Nuclear Service Water

Nuclear Service Water Pumps

Four (4) Nuclear Service Water (NSW) pumps, 1A, 1B, 2A, and 2B, provide cooling water to the heat exchangers associated with the four EDGs [142]. In automatic mode, these pumps are started via a sequencing signal from either Unit 1 or Unit 2 (SIS or UV) following EDG start. Chatter analysis of the EDG start signal is included in Section 2.5.1.2 above. A chatter analysis of the NSW pump circuit breaker control circuits [143, 144, 145, 146] indicates the Phase Overcurrent Relay 1ETA14 PB (50/51) and Ground Overcurrent Relay 1ETA14 PA (50G) could prevent automatic (sequential) breaker closure following the seismic event. Additionally, chatter of LSA1 (LSB1) Sequencer Load Shed Relay contacts 4/4a may result in an inadvertent trip of the respective RN pump in the event of seismic activity following a successful automatic start. With an active automatic start signal still present, the breaker would be prevented from reclosing by the breaker anti-pump feature [147].

RN Pump Discharge Isolation Valves 1/2RN28A and 1/2RN38B, RN Pump Motor Cooler Isolation Valves 1/2RN11A and 1/2RN20B

These valves are part of the flow path for NSW cooling to the EDGs [148, 149]. The valves are controlled by the position of an auxiliary contact (52S) from the associated NSW pump motor breaker. When the NSW pump motor breaker is closed, the auxiliary contact energizes an interposing relay (AA/AC) that simultaneously blocks the valve closing contactor while energizing the opening contactor. There is no SILO associated with the individual circuits. Contact chatter could only momentarily cause undesired valve movement. Valve position would return to the position demanded by the NSW pump breaker once shaking subsided [150, 151, 152, 153] (U1) [154, 155, 156, 157] (U2).

Diesel Generator Engine Jacket Water Cooler RN Supply Isolation Valves 1/2RN232A and 1/2RN292B

These valves are controlled by the associated Diesel Generator Auxiliary Run Relay (R1C). The Auxiliary Run Relays are controlled by the DG Start/Stop Circuitry. R1C is a latching relay that will maintain set or reset position mechanically. With an active DG run signal, R1C will maintain the set position thus commanding interposing relay AA to block the valve closing contactor and energize the opening contactor. Contact chatter of the interposing relay could only momentarily cause undesired valve movement. Valve position would return to the position demanded by R1C once shaking subsided [158, 159] (U1) [160, 161] (U2).

RN Pumphouse Pit Isolation Valves 1RN1A, 1RN2B, 1RN5A, and 1RN6B

Chatter analysis for these valves indicates they may be susceptible to SILO conditions that have the potential to obstruct the overall RN flow path to or from the UHS that sustains the EDG coolers. These valves are all susceptible to spurious closure signals from contact chatter of their respective MOV Close Contactor. Additionally, each of these valves have control switches at both Unit Main Control boards (1MC11 and 2MC11). Chatter of the interposing auxiliary relays

for the control switches (CD, AA, AE, and DD) can initiate actuation of the respective MOV Close Contactor [162, 163, 164, 165, 166, 167, 168, 169].

Diesel Generator Heat Exchanger Return to Lake Valves 1/2RN847A, and 1/2RN849B
These valves are susceptible to spurious closure due to contact chatter of their MOV Close Contactor [170, 171, 172, 173].

2.5.4.7 Ventilation

The Diesel Generator Building Ventilation System (VD) is described in its Design Basis Specification [174]. The VD System Emergency Fans (DSF-1/2, A1, A2 and DSF-1/2, B1, B2) start any time the diesel receives a start signal. The fans are automatically stopped by a signal from the fire detection system. The fans will also start on a Blackout or LOCA signal, which overrides any fire protection system signal that may be present. [174, p. 21]. Chatter analysis of the control circuits for the Emergency Fans [175, 176, 177, 178, 179, 180, 181, 182] concluded that they do not include SILO devices.

Each set of DG Emergency Ventilation Outside Air Supply (DSF D-1. 3, 7. 9) and Return Air Dampers (DSF D-2, 4, 8, 10) are paired on the same circuit and proportional temperature controller. The circuit is configured such that the Outside Air Supply and Return Air Dampers are connected with polarities reversed so that the dampers will move converse to each other in response to the demanded signal from the proportional temperature controller. The damper controller circuit is enabled by the associated Emergency Fan Run Contactor (M). Emergency Fan operation is described above. Following an emergency start signal, manual purge function is locked-out and any fire protection signal is bypassed. There are no contact devices within the damper controller circuits subject to SILO that are capable of inhibiting damper operation prior to or in the presence of an active Safeguards Signal (SI or UV).

2.5.4.8 Crankcase Vacuum

The crankcase vacuum system is passive and does not require electrical controls to function [183, 184, 185]. No components in this system are sensitive to high frequency motion.

2.5.5 Switchgear, Load Centers, and MCCs

Power distribution from the EDGs to the necessary electrical loads (Battery Chargers, Inverters, Fuel Oil Valves, Nuclear Service Water Components, and EDG Ventilation Fans) was traced to identify any SILO devices which could lead to a circuit breaker trip and interruption in power. This effort excluded control circuits for the EDG circuit breakers, which are covered in Section 2.5.1.1 above, and the NSW Pump breakers which are covered in Section 2.5.4.6 above, as well as component-specific contactors and their control devices, which are covered in the analysis of each component above.

Due to their high frequency sensitivity, the medium- and low-voltage circuit breakers in the 4160V switchgear and 600V load centers which are supplying power to loads identified in this section must be included in the High Frequency Program. Circuit breakers in the following

cubicles have been identified for evaluation because they have the potential to trip during strong shaking[iii]:

- 1ETA5
- 1ETA16
- 1ELXA-04B
- 1ELXA-06C
- 1ELXA-04C
- 1ELXC-04B
- 1ELXC-04C
- 1ETB5
- 1ETB16
- 1ELXB-04B
- 1ELXB-06C
- 1ELXB-04C
- 1ELXD-04B
- 1ELXD-04C
- 2ETA5
- 2ETA16
- 2ELXA-04B
- 2ELXA-06C
- 2ELXA-04C
- 2ELXC-04B
- 2ELXC-04C
- 2ETB5
- 2ETB-16
- 2ELXB-04B
- 2ELXB-06C
- 2ELXB-04C
- 2ELXD-04B
- 2ELXD-04C.

Per the Design Basis Specification for the 125 VDC Vital I&C Power System (EPL) [129, p. 21] DC Distribution uses Molded-Case Circuit Breakers (MCCBs) which are seismically rugged [4, pp. 2-11]. MCCBs are used in low voltage Motor Control Center Buckets [186] and are considered rugged as well.

The only circuit breakers affected by external contact devices not already mentioned were those that distribute power from the 4160V ESF Busses to the 4160/600V step-down transformers (1ETA5, 1ETA16, 1ETB5, 1ETB16, 2ETA5, 2ETA16, 2ETB5, 2ETB16) and from the 4160/600V step-down transformers to the 600V Load Centers (1ELXA-4B, 1ELXC-4B 1ELXB-4C, 1ELXD-4B, 2ELXA-4B, 2ELXC-4B 2ELXB-4C, 2ELXD-4B). A chatter analysis of the control circuits for the 4160V circuit breakers [187, 188, 189, 190, 191, 192, 193, 194] indicates their respective phase overcurrent relays (50/51) and ground fault relays (50G) could trip the transformer feed breakers. With an active automatic close signal still present (SI or UV), the breaker would be prevented from reclosing by the breaker anti-pump feature [147]. A chatter analysis of the control circuits for the 600V Load Center Incoming Feed Circuit Breakers [195, 196, 197, 198, 199, 200, 201, 202, 203, 204] (U1) [205, 44, 206, 207, 208, 209, 210, 211, 212, 213] (U2) indicates contacts from the Sequencer Load Shed Relays LSA3 and LSB3 could trip the Incoming Feed Circuit Breakers. With an active automatic close signal still present (SI or UV), the breaker would be prevented from reclosing by the breaker anti-pump feature [214].

[iii] In the case of 4160 switchgear breakers, which are automatically tripped during load shed and then closed again by the sequencer, strong shaking may be sustained after reclosure depending upon the duration of the event and the timing between the event and loss of offsite power. If the breakers are not sufficiently rugged to high frequency motions, they may trip after reclosure.

3. SEISMIC EVALUATION

3.1 Horizontal Seismic Demand

Per Reference [4], Section 4.3, the basis for calculating high-frequency seismic demand on the subject components in the horizontal direction is the Catawba Nuclear Station horizontal ground motion response spectrum (GMRS), which was generated as part of the Catawba Nuclear Station Seismic Hazard and Screening Report [7] submitted to the NRC on March 31, 2014, and accepted by the NRC on April 27, 2015 [8].

It is noted in Reference [4] that a Foundation Input Response Spectrum (FIRS) may be necessary to evaluate buildings whose foundations are supported at elevations different than the Control Point elevation. However, for sites founded on rock, per Reference [4], "*The Control Point GMRS developed for these rock sites are typically appropriate for all rock-founded structures and additional FIRS estimates are not deemed necessary for the high frequency confirmation effort.*"

All major Category I structures are founded on sound rock per Catawba Nuclear Station Seismic Hazard Evaluation and Screening Report [7]. Therefore, the Control Point GMRS is representative of the input at the building foundation.

The horizontal GMRS values are provided in Table 3-2.

3.2 Vertical Seismic Demand

As described in Section 3.2 of Reference [4], the horizontal GMRS and site soil conditions are used to calculate the vertical GMRS (VGMRS), which is the basis for calculating high-frequency seismic demand on the subject components in the vertical direction.

The site's soil mean shear wave velocity vs. depth profile is provided in Reference [7] Table 2.3.2-2 (profile 1), and reproduced below in Table 3-1.

Table 3-1: Soil Mean Shear Wave Velocity vs. Depth Profile

Layer	Depth (ft)	Thickness, d_i (ft)	Vs_i (ft/s)	d_i / Vs_i (s)	$\sum [d_i / Vs_i]$ (s)	V_{S30} (ft/s)
1	0.0	0	6800	0.000000	0.000000	
2	4.0	4.0	6800	0.000588	0.000588	
3	8.0	4.0	6800	0.000588	0.001176	
4	12.0	4.0	6800	0.000588	0.001765	
5	13.5	1.5	5723	0.000262	0.002027	
6	17.5	4.0	6955	0.000575	0.002602	
7	21.5	4.0	6955	0.000575	0.003177	
8	25.5	4.0	6955	0.000575	0.003752	
9	29.2	3.7	7783	0.000475	0.004228	
10	32.9	3.7	7783	0.000475	0.004703	8077
11	36.5	3.6	7783	0.000463	0.005166	
12	40.0	3.5	8552	0.000409	0.005575	
13	43.5	3.5	8552	0.000409	0.005984	
14	46.9	3.4	8854	0.000384	0.006368	
15	50.2	3.3	8854	0.000373	0.006741	
16	53.5	3.3	8854	0.000373	0.007113	
17	57.0	3.5	8854	0.000395	0.007509	
18	60.5	3.5	8854	0.000395	0.007904	
19[iv]	98.4	37.9	8859	0.004278	0.012182	
20	3365.7	3267.3	9285	0.351890	0.364072	

Using the shear wave velocity vs. depth profile, the velocity of a shear wave traveling from a depth of 30m (98.4ft) to the surface of the site (V_{S30}) is calculated per the methodology of Reference [4], Section 3.2.

- The time for a shear wave to travel through each soil layer is calculated by dividing the layer depth (d_i) by the shear wave velocity of the layer (V_{SI}).
- The total time for a wave to travel from a depth of 30m to the surface is calculated by adding the travel time through each layer from depths of 0m to 30m ($\Sigma[d_i/V_{SI}]$).
- The velocity of a shear wave traveling from a depth of 30m to the surface is therefore the total distance (30m) divided by the total time; i.e., $V_{S30} = (30m)/\Sigma[d_i/V_{SI}]$.

The site's soil class is determined by using the site's shear wave velocity (V_{S30}) and the peak ground acceleration (PGA) of the GMRS and comparing them to the values within Reference [4], Table 3-1. Based on the PGA of 0.329g and the shear wave velocity of 8077ft/s, the site soil class is C-Hard.

Once a site soil class is determined, the mean vertical vs. horizontal GMRS ratios (V/H) at each frequency are determined by using the site soil class and its associated V/H values in Reference [4], Table 3-2.

[iv] The shear wave velocity in Layer 19 is calculated by interpolating shear wave velocities from Layer 18 and 20.

The vertical GMRS is then calculated by multiplying the mean V/H ratio at each frequency by the horizontal GMRS acceleration at the corresponding frequency. It is noted that Reference [4], Table 3-2 values are constant between 0.1Hz and 15Hz. The V/H ratios and VGMRS values are provided in Table 3-2 of this report. Figure 3-1 below provides a plot of the horizontal GMRS, V/H ratios, and vertical GMRS for Catawba Nuclear Station.

Table 3-2: Horizontal and Vertical Ground Motions Response Spectra

Frequency (Hz)	HGMRS (g)	V/H Ratio	VGMRS (g)
100	0.329	0.81	0.266
90	0.334	0.84	0.281
80	0.345	0.88	0.304
70	0.37	0.93	0.344
60	0.433	0.94	0.407
50	0.563	0.92	0.518
40	0.698	0.87	0.607
35	0.735	0.82	0.603
30	0.748	0.77	0.576
25	0.731	0.71	0.519
20	0.699	0.7	0.489
15	0.633	0.7	0.443
12.5	0.589	0.7	0.412
10	0.535	0.7	0.375
9	0.498	0.7	0.349
8	0.461	0.7	0.323
7	0.421	0.7	0.295
6	0.377	0.7	0.264
5	0.328	0.7	0.23
4	0.265	0.7	0.186
3.5	0.231	0.7	0.162
3	0.198	0.7	0.139
2.5	0.158	0.7	0.111
2	0.145	0.7	0.102
1.5	0.114	0.7	0.08
1.25	0.096	0.7	0.067
1	0.084	0.7	0.058
0.9	0.081	0.7	0.057
0.8	0.079	0.7	0.055
0.7	0.074	0.7	0.052
0.6	0.067	0.7	0.047
0.5	0.057	0.7	0.04
0.4	0.046	0.7	0.032
0.35	0.04	0.7	0.028
0.3	0.034	0.7	0.024
0.25	0.029	0.7	0.02
0.2	0.023	0.7	0.016
0.15	0.017	0.7	0.012
0.125	0.014	0.7	0.01
0.1	0.012	0.7	0.008

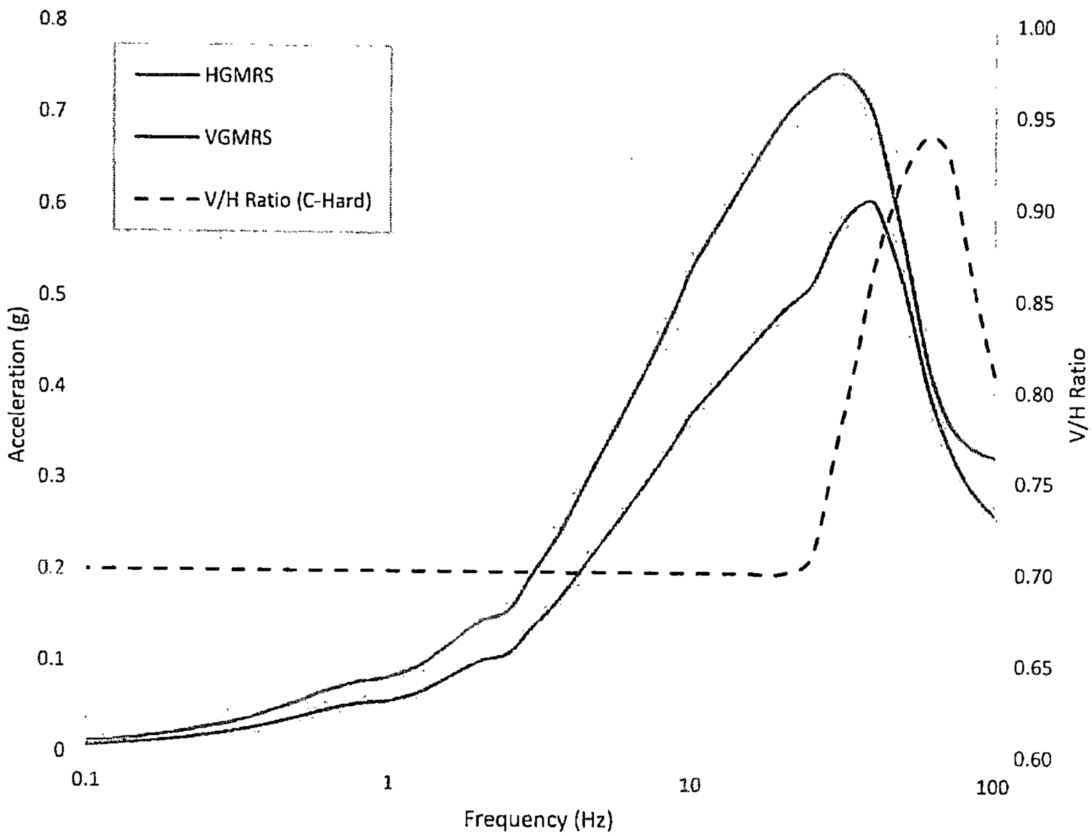

Figure 3-1: Plot of the Horizontal and Vertical Ground Motions Response Spectra and V/H Ratios

3.3 Component Horizontal Seismic Demand

Per Reference [4] the peak horizontal acceleration is amplified using the following two factors to determine the horizontal in-cabinet response spectrum:

- Horizontal in-structure amplification factor AF_{SH} to account for seismic amplification at floor elevations above the control point elevation
- Horizontal in-cabinet amplification factor AF_c to account for seismic amplification within the host equipment (cabinet, switchgear, motor control center, etc.)

The in-structure amplification factor AF_{SH} is derived from Figure 4-3 in Reference [4]. The in-cabinet amplification factor, AF_c is associated with a given type of cabinet construction. The three general cabinet types are identified in Reference [4] and Appendix I of EPRI NP-7148 [215] assuming 5% in-cabinet response spectrum damping. EPRI NP-7148 [215] classified the cabinet types as high amplification structures such as switchgear panels and other similar large

flexible panels, medium amplification structures such as control panels and control room benchboard panels and low amplification structures such as motor control centers.

All of the electrical cabinets containing the components subject to high frequency confirmation (see Table B-1 in Appendix B) can be categorized into one of the in-cabinet amplification categories in Reference [4] as follows:

- Motor Control Centers are typical multi-cubicle cabinets consisting of a lineup of several interconnected sections. Each section is a relatively narrow cabinet structure with height-to-depth ratios of about 4.5 that allow the cabinet framing to be efficiently used in flexure for the dynamic response loading, primarily in the front-to-back direction. This results in higher frame stresses and hence more damping which lowers the cabinet response. In addition, the subject components are not located on large unstiffened panels that could exhibit high local amplifications. These cabinets qualify as low amplification cabinets.
- Switchgear cabinets are large cabinets consisting of a lineup of several interconnected sections typical of the high amplification cabinet category. Each section is a wide box-type structure with height-to-depth ratios of about 1.5 and may include wide stiffened panels. This results in lower stresses and hence less damping which increases the enclosure response. Components can be mounted on the wide panels, which results in the higher in-cabinet amplification factors.
- Control cabinets are in a lineup of several interconnected sections with moderate width. Each section consists of structures with height-to-depth ratios of about 3 which result in moderate frame stresses and damping. The response levels are mid-range between MCCs and switchgear and therefore these cabinets can be considered in the medium amplification category.

3.4 Component Vertical Seismic Demand

The component vertical demand is determined using the peak acceleration of the VGMRS between 15 Hz and 40 Hz and amplifying it using the following two factors:

- Vertical in-structure amplification factor AF_{SV} to account for seismic amplification at floor elevations above the control point elevation
- Vertical in-cabinet amplification factor AF_c to account for seismic amplification within the host equipment (cabinet, switchgear, motor control center, etc.)

The in-structure amplification factor AF_{SV} is derived from Figure 4-4 in Reference [4]. The in-cabinet amplification factor, AF_c is derived in Reference [4] and is 4.7 for all cabinet types.

4. CONTACT DEVICE EVALUATIONS

Solid-state devices were identified using vendor technical data and screened as rugged based on test results from the EPRI High Frequency Testing program [216, pp. 6-3]. These screened solid-state relays appear in Table B-2 along with a reference to the vendor document used to make this determination.

Per Reference [4], seismic capacities (the highest seismic test level reached by the contact device without chatter or other malfunction) for each subject contact device are determined by the following procedures:

(1) If a contact device was tested as part of the EPRI High Frequency Testing program [216], then the component seismic capacity from this program is used.

(2) If a contact device was not tested as part of [216], then one or more of the following means to determine the component capacity were used:

   (a) Device-specific seismic test reports (either from the station, manufacturer/vendor, or from the SQURTS testing program).

   (b) Generic Equipment Ruggedness Spectra (GERS) capacities per [217] and [218].

   (c) Assembly (e.g. electrical cabinet) tests where the component functional performance was monitored.

The high-frequency capacity of each device was evaluated with the component mounting point demand from Section 2.5.1 using the criteria in Section 4.5 of Reference [4]. The high-frequency evaluations as described above were performed in Reference [219].

A summary of the high-frequency evaluation conclusions is provided in Table B-1 in Appendix B.

5. CONCLUSIONS

5.1 General Conclusions

Catawba Nuclear Station has performed a High Frequency Confirmation evaluation in response to the NRC's 50.54(f) letter [1] using the methods in EPRI report 3002004396 [4].

The evaluation identified a total of 374 components that required evaluation. As summarized in Table B-1 in Appendix B, 302 of the devices have adequate seismic capacity, and 72 components required resolution following the criteria in Section 4.6 of Reference [4].

To improve plant safety, Catawba Nuclear Station intends to address equipment sensitive to high frequency ground motion for the reevaluated seismic hazard information through mitigation strategies in lieu of a separate resolution of the 72 components identified under the letter [1] which do not impact the credited path for mitigation strategies.

5.2 Identification of Follow-Up Actions

Based on the general conclusions above, no follow-up actions are necessary.

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A. REPRESENTATIVE SAMPLE COMPONENT EVALUATIONS

A detailed example analysis of two components is provided within this section. This example is intended to illustrate each step of the high frequency analysis methodology given in Section 4 of Reference [4].

A.1 High Frequency Seismic Demand

Calculate the high-frequency seismic demand on the components per the methodology from Reference [4].

These sample calculations are performed for the high-frequency seismic demand of components DA(ST1A), contained in control cabinet 1DGLSA-2, which is in the Diesel Generator Building at elevation 556', and CR3, contained in control cabinet 1ELCP0245, which is in the Auxiliary Building at elevation 543'. Reference [220] contains the list of subject components and their host cabinets, including the components chosen for this example. Reference [219] calculates the high-frequency seismic demand for all the subject components. Note that, per Attachment D of Reference [219], control cabinet 1ELCP0245 is mounted on the wall above the floor at elevation 543' in the Auxiliary Building. Therefore, the floor above that wall (i.e. the next floor at elevation 554'-0") is conservatively used to calculate the demand for this control cabinet.

A.1.1 Horizontal Seismic Demand

The horizontal site-specific GMRS for Catawba Nuclear Station can be found in Section 3, Table 3-2.

Determine the peak acceleration of the horizontal GMRS between 15 Hz and 40 Hz:

Peak Acceleration of Horizontal GMRS
between 15 Hz and 40 Hz (see Section 3, Table 3-2): $SA_{HGMRS} = 0.748g$ (at 30 Hz)

Compute the distance between the subject floor elevation and the building foundation elevation. Per Attachment F of Reference [219], the foundation elevation for the Diesel Generator Building is 548', and 539' for the Auxiliary Building. Per Table 9-1 of Reference [220], components DA(ST1A) and CR3 are mounted on panel 1DGLSA-2 and 1ELCP0245, respectively. Per Attachment D of Reference [219], the building and elevation for 1DGLSA-2 and 1ELCP0245 is the Diesel Generator Building at 556', and the Auxiliary Building at 554', respectively.

Foundation Elevation (Attachment F of Reference [219]):	$EL_{found} = 548$ ft	Diesel Generator Building
	$EL_{found} = 539$ ft	Auxiliary Building
Component Floor Elevation:	$EL_{comp} = 556$ ft	*DA(ST1A)*
	$EL_{comp} = 554$ ft	*CR3*

Distance Between Component Floor and Foundation Elevation: $h_{comp} = EL_{comp} - EL_{found} = 8$ ft *DA(ST1A)*

$h_{comp} = EL_{comp} - EL_{found} = 15$ ft *CR3*

Per Reference [4], Figure 4-3, calculate the horizontal in-structure amplification factor based on the distance between the foundation elevation and the subject floor elevation:

Slope of Amplification Factor Line, $0ft < h_{comp} < 40ft$: $m_h = \frac{2.1-1.2}{40ft-0ft} = 0.0225\frac{1}{ft}$

Intercept of Amplification Factor Line with Amplification Factor Axis: $b_h = 1.2$

Horizontal In-Structure Amplification Factor [4, pp. 4-11]: $AF_{SH}(h_{comp}) = (m_h * h_{comp} + b_h)$ if $h_{comp} <= 40ft$

2.1 otherwise

$AF_{SH}(h_{comp}) = 1.38$ *DA(ST1A)*

$AF_{SH}(h_{comp}) = 1.54$ *CR3*

Calculate the horizontal in-cabinet amplification factor based on the type of cabinet that contains the subject component. The panel types for 1DGLSA-2 and 1ELCP0245 are provided in Attachment D of Reference [219]; both are control cabinets. Per Reference [4], Section 4.4, the effective horizontal amplification of 4.5 (AF_c) is applicable to Control Cabinets/Panels:

Type of Cabinet: (enter "MCC", "Switchgear", "Control Cabinet", or "Rigid")

cab1 = "Control Cabinet for DA(ST1A)"

cab2 = "Control Cabinet for CR3"

Horizontal In-Cabinet Amplification Factor [4, pp. 4-13]:

$AF_{c\,h}(cab) =$ 3.6 if cab = "MCC"

7.2 if cab = "Switchgear"

4.5 if cab = "Control Cabinet"

1.0 if cab = "Rigid"

$AF_{c\,h}(cab1) = 4.5$

$AF_{c\,h}(cab2) = 4.5$

Multiply the peak horizontal GMRS acceleration by the horizontal in-structure and in-cabinet amplification factors to determine the in-cabinet response spectrum demand on the components:

Horizontal In-Cabinet Response Spectrum: $ICRS_{c.h} = AF_{SH} * AF_{c.h} * SA_{GMRS}$

$ICRS_{c.h} = 1.38*4.5*0.748 = 4.65g$ *DA(ST1A)*

$ICRS_{c.h} = 1.54*4.5*0.748 = 5.18g$ *CR3*

A.1.2 Vertical Seismic Demand

The vertical site-specific GMRS for Catawba Nuclear Station can be found in Section 3, Table 3-2.

Determine the peak acceleration of the vertical GMRS between 15 Hz and 40 Hz:

Peak Acceleration of Vertical GMRS between 15 Hz and 40 Hz (see Section 3, Table 3-2): $SA_{VGMRS} = 0.607g$ (at 40 Hz)

Use the distance between the component floor and foundation calculated in Section A.1.1 above to calculate the vertical in-structure amplification factor:

Distance Between Component Floor and Foundation Elevation (from Section A.1.1): $h_{comp} = 8$ ft *DA(ST1A)*

$h_{comp} = 15$ ft *CR3*

Calculate the vertical in-structure amplification factor based on the distance between the foundation elevation and the subject floor elevation:

Slope of Amplification Factor Line: $m_v = \frac{2.7-1.0}{100ft-0ft} = 0.017\frac{1}{ft}$

Intercept of Amplification Factor Line with Amplification Factor Axis: $b_v = 1.0$

Vertical In-Structure Amplification Factor: $AF_{SV}(h_{comp}) = m_v * h_{comp} + b_v$

$AF_{SV}(h_{comp}) = 1.14$ *DA(ST1A)*

$AF_{SV}(h_{comp}) = 1.26$ *CR3*

Per Reference [4] the vertical in-cabinet amplification factor is 4.7 regardless of cabinet type:

Vertical In-Cabinet Amplification Factor: $AF_{c.v} = 4.7$

Multiply the peak vertical GMRS acceleration by the vertical in-structure and in-cabinet amplification factors to determine the in-cabinet response spectrum demand on the component:

Vertical In-Cabinet
Response Spectrum
(Ref. [4, pp. 4-12], Eq. 4-1b): $ICRS_{c,v} = AF_{SV} * AF_{c,v} * SA_{VGMRS}$

$ICRS_{c,v} = 1.14*4.7*0.607=3.24g$ *DA(ST1A)*

$ICRS_{c,v} = 1.26*4.7*0.607=3.58g$ *CR3*

A.2 High Frequency Capacity

A sample calculation for the high-frequency seismic capacity of components DA(ST1A) (contained in 1DGLSA-2) and CR3 (contained in 1ELCP0245) is presented here.

A.2.1 Seismic Test Capacity

The high frequency seismic capacity of a component can be determined from the EPRI High Frequency Testing Program or other broad banded low frequency capacity data such as the Generic Equipment Ruggedness Spectra (GERS) or other qualification reports.

A.2.1.1 DA(ST1A) Capacity

The make and model for component DA(ST1A) is Agastat SSC12 per Table 9.1 of Reference [220] and was not tested as part of the high-frequency testing program. The seismic capacity is 7.0g for 5% damping, based on low frequency GERS qualification data [221, pp. 3-4].

A.2.1.2 CR3 Capacity

The make and model for component CR3 is Agastat EGPD003 per Table 9.1 of Reference [220] and was tested as part of the high-frequency testing program. The seismic capacity is 14.1g for 5% damping, based on EPRI high frequency test data [216, pp. 5-18]. For conservatism, the lowest capacity level of any coil state or contact configuration was chosen.

GERS spectral acceleration is used as the seismic test capacity for component DA(ST1A); therefore, there is no spectral acceleration increase and the effective spectral test capacity is equal to the seismic test capacity. High frequency test spectral acceleration is used as the seismic test capacity for component CR3, and a spectral acceleration increase equal to half the test level increment (1.25g/2) is appropriate [4, pp. 4-16].

Effective Spectral Test Capacity (Ref. [4, pp. 4-16]): $SA_T = 7.00g$ *DA(ST1A)*

$SA_T = 14.1 + 1.25/2$
$= 14.73g$ *CR3*

A.2.2 Seismic Capacity Knockdown Factor

The seismic capacity for component DA(ST1A) was obtained from GERS programs [221]. There is no clear indication provided in those programs as to whether a specific relay was tested to test table limits or the lowest level without chatter. Therefore, it is reasonable (conservative) that a 1.5 knockdown factor is considered for all components under GERS testing, including DA(ST1A). The seismic capacity for component CR3 was obtained from the High Frequency Test Program [216], and corresponds to the lowest testing level without chatter. Therefore, a knockdown factor of 1.56 is appropriate for CR3. Knockdown factors were chosen using Table 4-2 of Reference [4]:

Seismic Capacity Knockdown Factor:	$F_K = 1.50$	GERS, Lowest Level without Chatter	*DA(ST1A)*
	$F_K = 1.56$	High Frequency Test Program, Lowest Level without Chatter	*CR3*

A.2.3 Seismic Testing Single-Axis Correction Factor

Determine the seismic testing single-axis correction factor of the subject relay, which is based on whether the equipment housing to which the relay is mounted has well-separated horizontal and vertical motion or not. Per Reference [4, pp. 4-17 - 4-18], relays mounted within cabinets that are braced, bolted together in a row, mounted to both floor and wall, etc. will have a correction factor of 1.0. Relays mounted within cabinets that are bolted only to the floor or otherwise not well-braced will have a correction factor of 1.2 per Reference [4, pp. 4-18].

Per Attachment D of reference [219], panels 1DGLSA-2 and 1ELCP0245 are floor mounted and wall mounted control panels, respectively. Without further information regarding structural configuration of these panels, it cannot be determined whether these panels have a dominant single-axis response motion. Therefore, it is recommended by the EPRI guidance [4] that the FMS factor of 1.0 is used.

Single-Axis Correction Factor (Ref. [4, pp. 4-17 - 4-18] and Attachment A of Ref. [219]):	$F_{MS} = 1.0$	*DA(ST1A)*
	$F_{MS} = 1.0$	*CR3*

A.2.4 Effective Wide-Band Component Capacity Acceleration

Calculate the effective wide-band component capacity acceleration per Reference [4], Eq. 4-5:

Effective Wide-Band Component Capacity Acceleration (Ref. [4], Eq. 4-5):

$$\text{TRS} = \frac{SA_T}{F_K} * F_{MS}$$

TRS = 4.67g *DA(ST1A)*

TRS = 9.44g *CR3*

A.2.5 Component Margin

Calculate the high-frequency seismic margin for relays per Reference [4], Eq. 4-6:

(A sample calculation for the high-frequency seismic demand of relay components DA(ST1A) and CR3 is presented here. A table that calculates the high-frequency seismic margin for all the subject relays is contained in Attachment A of Reference [219].)

Horizontal Seismic Margin (Ref. [4], Eq. 4-6):

$$\frac{TRS}{ICRS_{c,h}} = \begin{vmatrix} 1.005 > 1.0, \text{ OK} & DA(ST1A) \\ 1.824 > 1.0, \text{ OK} & CR3 \end{vmatrix}$$

Vertical Seismic Margin (Ref. [4], Eq. 4-6):

$$\frac{TRS}{ICRS_{c,v}} = \begin{vmatrix} 1.439 > 1.0, \text{ OK} & DA(ST1A) \\ 2.635 > 1.0, \text{ OK} & CR3 \end{vmatrix}$$

B. COMPONENTS IDENTIFIED FOR HIGH FREQUENCY CONFIRMATION

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
1	1	M-1/C	Contactor	MOV Closing Contactor	Allen-Bradley	205-NX1	1CMTS0028	Control Cabinet	Auxiliary Building	543	GERS	Mitigation Strategies
2	1	DA	Process Switch	Speed Switch 98%	Rochester Instrument Systems	ET-1214	1DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
3	1	FA	Control Relay	Speed Switch 98% Auxiliary Relay	Cutler-Hammer	D26MRD70A	1DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
4	1	R10A	Control Relay	Shutdown De-Actuation Relay	Cutler-Hammer	D26MRD40A1	1DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
5	1	R9A	Control Relay	Shutdown De-Actuation Relay	Cutler-Hammer	D26MRD40A1	1DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
6	1	SS1-K1	Process Switch	200 RPM Auxiliary Relay	Dynalco	SST-2400A	1DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
7	1	SS1-K2	Process Switch	200 RPM Auxiliary Relay	Dynalco	SST-2400A	1DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
8	1	SS2-K3	Process Switch	440 RPM Auxiliary Relay	Dynalco	SST-2400A	1DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
9	1	SS2-K4	Process Switch	440 RPM Auxiliary Relay	Dynalco	SST-2400A	1DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
10	1	TD4	Control Relay	Fail-to-Start Auxiliary Relays	Cutler-Hammer	D87XEL30/ D26MRD40A1	1DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
11	1	TD5	Control Relay	Fail-to-Start Auxiliary Relays	Cutler-Hammer	D87XEL30/ D26MRD40A1	1DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
12	1	DA	Process Switch	Speed Switch 98%	Rochester Instrument Systems	ET-1214	1DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
13	1	FA	Control Relay	Speed Switch 98% Auxiliary Relay	Cutler-Hammer	D26MRD70A	1DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
14	1	R10A	Control Relay	Shutdown De-Actuation Relay	Cutler-Hammer	D26MRD40A1	1DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
15	1	R9A	Control Relay	Shutdown De-Actuation Relay	Cutler-Hammer	D26MRD40A1	1DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
16	1	SS1-K1	Process Switch	200 RPM Auxiliary Relay	Dynalco	SST-2400A	1DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
17	1	SS1-K2	Process Switch	200 RPM Auxiliary Relay	Dynalco	SST-2400A	1DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
18	1	SS2-K3	Process Switch	440 RPM Auxiliary Relay	Dynalco	SST-2400A	1DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
19	1	SS2-K4	Process Switch	440 RPM Auxiliary Relay	Dynalco	SST-2400A	1DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
20	1	TD4	Control Relay	Fail-to-Start Auxiliary Relays	Cutler-Hammer	D87XEL30/ D26MRD40A1	1DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
21	1	TD5	Control Relay	Fail-to-Start Auxiliary Relays	Cutler-Hammer	D87XEL30/ D26MRD40A1	1DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
22	1	K307	Control Relay	High DC Shunt Trip Relay	Tyco (Potter-Brumfield)	CNS 35-96	1DGCA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
23	1	TD301	Control Relay	High DC Shunt Trip Timer	Ametek (Solidstate Controls)	07-740110-00	1DGCA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
24	1	K307	Control Relay	High DC Shunt Trip Relay	Tyco (Potter-Brumfield)	CNS 35-96	1DGCB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
25	1	TD301	Control Relay	High DC Shunt Trip Timer	Ametek (Solidstate Controls)	07-740110-00	1DGCB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
26	1	GD(BOA)	Control Relay	Blackout Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
27	1	GE(127ZAX)	Control Relay	Undervoltage Relay Z-Phase	Cutler-Hammer	D26MRD70A1	1DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
28	1	GF(127YAX)	Control Relay	Undervoltage Relay Y-Phase	Cutler-Hammer	D26MRD70A1	1DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
29	1	GG(127XAX)	Control Relay	Undervoltage Relay X-Phase	Cutler-Hammer	D26MRD70A1	1DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
30	1	GH(127XAX/SPL)	Control Relay	Undervoltage Relay /Special	Cutler-Hammer	D26MRD30A1	1DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
31	1	HG(RGA)	Control Relay	Diesel Generator Restart Relay	Cutler-Hammer	D26MRD40A1	1DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
32	1	AA(SAA1)	Control Relay	Sequencer Actuation Relay	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
33	1	AE(LT2A)	Control Relay	Logic Timer Relay	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
34	1	BE(SAA8)	Control Relay	Sequencer Actuation Relay	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
35	1	CD(LSAT)	Control Relay	Load Shed Timer Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
36	1	DA(ST1A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PAA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
37	1	DB(ST2A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PAA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
38	1	DC(ST3A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PBA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
39	1	DD(ST4A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PBA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
40	1	DE(ST5A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PCA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
41	1	DF(ST6A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PCA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
42	1	DG(ST7A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
43	1	DH(ST8A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
44	1	DJ(ST9A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
45	1	DK(ST10A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PEA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
46	1	DL(ST11A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PMA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
47	1	DM(ST12A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PEA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
48	1	DN(ST13A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PFA	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
49	1	FA(RA1)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
50	1	FB(RA1A)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD30A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
51	1	FC(RA2)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
52	1	FD(RA3)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
53	1	FE(RA4)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
54	1	FF(RA5)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
55	1	FG(RA6)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
56	1	FH(RA7)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
57	1	FJ(RA8)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
58	1	FK(RA9)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
59	1	GA(RA10)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
60	1	GB(RA11)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
61	1	GC(RA12)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
62	1	GD(RA13)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
63	1	HA(1ESGAX1)	Control Relay	Engineered Safeguards Auxiliary Relay	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
64	1	LSA1-4/4a(CA)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
65	1	LSA3-1/1a(CC)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
66	1	LSA3-4/4a(CC)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	1DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
67	1	GD(BOB)	Control Relay	Blackout Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
68	1	GE(127ZBX)	Control Relay	Undervoltage Relay Z-Phase	Cutler-Hammer	D26MRD70A1	1DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
69	1	GF(127YBX)	Control Relay	Undervoltage Relay Y-Phase	Cutler-Hammer	D26MRD70A1	1DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
70	1	GG(127XBX)	Control Relay	Undervoltage Relay X-Phase	Cutler-Hammer	D26MRD70A1	1DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
71	1	GH(127XBX/SPL)	Control Relay	Undervoltage Relay /Special	Cutler-Hammer	D26MRD30A1	1DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
72	1	HG(RGB)	Control Relay	Diesel Generator Restart Relay	Cutler-Hammer	D26MRD40A1	1DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
73	1	AA(SAB1)	Control Relay	Sequencer Actuation Relay	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
74	1	AE(LT2B)	Control Relay	Logic Timer Relay	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
75	1	BE(SAB8)	Control Relay	Sequencer Actuation Relay	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
76	1	CD(LSBT)	Control Relay	Load Shed Timer Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
77	1	DA(ST1B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PAA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
78	1	DB(ST2B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PAA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
79	1	DC(ST3B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PBA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
80	1	DD(ST4B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PBA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
81	1	DE(ST5B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PCA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
82	1	DF(ST6B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PCA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
83	1	DG(ST7B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
84	1	DH(ST8B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
85	1	DJ(ST9B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
86	1	DK(ST10B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PEA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
87	1	DL(ST11B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PMA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
88	1	DM(ST12B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PEA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
89	1	DN(ST13B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PFA	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
90	1	FA(RB1)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
91	1	FB(RB1A)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD30A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
92	1	FC(RB2)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
93	1	FD(RB3)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
94	1	FE(RB4)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
95	1	FF(RB5)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
96	1	FG(RB6)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
97	1	FH(RB7)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
98	1	FJ(RB8)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
99	1	FK(RB9)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
100	1	GA(RB10)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
101	1	GB(RB11)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
102	1	GC(RB12)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
103	1	GD(RB13)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
104	1	HA(1ESGBX1)	Control Relay	Engineered Safeguards Auxiliary Relay	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
105	1	LSB1-4/4a(CA)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
106	1	LSB3-1/1a(CC)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
107	1	LSB3-4/4a(CC)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	1DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
108	1	GB(51VX3)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD30A1	1EATC14	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
109	1	GC(51VX1)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD30A1	1EATC14	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
110	1	JA(51VX2)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD704A1	1EATC14	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
111	1	GB(51VX3)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD30A1	1EATC15	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

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No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
112	1	GC(51VX1)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD30A1	1EATC15	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
113	1	JA(51VX2)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD704A1	1EATC15	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
114	1	AA	Control Relay	Auxiliary Relay	Cutler-Hammer	D23MR40A	1EATC9	Terminal Cabinet	Auxiliary Building	594	GERS	Mitigation Strategies
115	1	AE	Control Relay	Auxiliary Relay	Cutler-Hammer	D23MR40A	1EATC9	Terminal Cabinet	Auxiliary Building	594	GERS	Mitigation Strategies
116	1	CD	Control Relay	Auxiliary Relay	Cutler-Hammer	D23MR40A	1EATC9	Terminal Cabinet	Auxiliary Building	594	GERS	Mitigation Strategies
117	1	DD	Control Relay	Auxiliary Relay	Cutler-Hammer	D23MR40A	1EATC9	Terminal Cabinet	Auxiliary Building	594	GERS	Mitigation Strategies
118	1	K301	Control Relay	High DC Shunt Trip Relay	Ametek (Solidstate Controls)	07-740131-00	1ECA	Control Cabinet	Auxiliary Building	554	Catawba Report	Mitigation Strategies
119	1	K301	Control Relay	High DC Shunt Trip Relay	Ametek (Solidstate Controls)	07-740131-00	1ECB	Control Cabinet	Auxiliary Building	554	Catawba Report	Mitigation Strategies
120	1	K301	Control Relay	High DC Shunt Trip Relay	Ametek (Solidstate Controls)	07-740131-00	1ECC	Control Cabinet	Auxiliary Building	554	Catawba Report	Mitigation Strategies
121	1	K301	Control Relay	High DC Shunt Trip Relay	Ametek (Solidstate Controls)	07-740131-00	1ECD	Control Cabinet	Auxiliary Building	554	Catawba Report	Mitigation Strategies
122	1	CON1	Contactor	Overspeed Trip Auxiliary Relay	Allen-Bradley	202-NX11	1ELCP0245	Control Cabinet	Auxiliary Building	543	GERS	Mitigation Strategies
123	1	CR3	Control Relay	Overspeed Trip Relay	Agastat (or Tyco)	EGPD-003 or -004 (1423176-6)	1ELCP0245	Control Cabinet	Auxiliary Building	543	EPRI HF Test	Cap>Dem
124	1	CR4	Control Relay	Mechanical Overspeed Trip Relay	Agastat (or Tyco)	EGPD-003 or -004 (1423176-6)	1ELCP0245	Control Cabinet	Auxiliary Building	543	EPRI HF Test	Cap>Dem
125	1	HB	Control Relay	Non-Emergency Trip Relay	Cutler-Hammer	D26MRD30A1	1ELCP0328	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
126	1	JB	Control Relay	Lo-Lo Lube Oil Trip Relay	Cutler-Hammer	D26MRD30A	1ELCP0328	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
127	1	JC	Control Relay	Shutdown Cycle Seal-In Timer	Agastat	E7012PELL004	1ELCP0328	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
128	1	R1(DA/SST1)	Process Switch	Overspeed Relay	Dynalco	SST-2400	1ELCP0328	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
129	1	R1(DB/SST2)	Process Switch	Overspeed Relay	Dynalco	SST-2400	1ELCP0328	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
130	1	R3(DA/SST1)	Process Switch	Overspeed Relay	Dynalco	SST-2400	1ELCP0328	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
131	1	R3(DB/SST2)	Process Switch	Overspeed Relay	Dynalco	SST-2400	1ELCP0328	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
132	1	HB	Control Relay	Non-Emergency Trip Relay	Cutler-Hammer	D26MRD30A1	1ELCP0329	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
133	1	JB	Control Relay	Lo-Lo Lube Oil Trip Relay	Cutler-Hammer	D26MRD30A	1ELCP0329	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
134	1	JC	Control Relay	Shutdown Cycle Seal-In Timer	Agastat	E7012PELL004	1ELCP0329	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
135	1	R1(DA/SST1)	Process Switch	Overspeed Relay	Dynalco	SST-2400	1ELCP0329	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
136	1	R1(DB/SST2)	Process Switch	Overspeed Relay	Dynalco	SST-2400	1ELCP0329	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
137	1	R3(DA/SST1)	Process Switch	Overspeed Relay	Dynalco	SST-2400	1ELCP0329	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
138	1	R3(DB/SST2)	Process Switch	Overspeed Relay	Dynalco	SST-2400	1ELCP0329	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
139	1	TM1(1CAST5762)	Process Switch	Overspeed Trip Switch	Dynalco	SST-2400AN-173	1ELCP0334	Control Cabinet	Auxiliary Building	543	Catawba Report	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
140	1	52@1ELXA-04B	LV Circuit Breaker	Normal Incoming Feeder Breaker	ABB	K2000-S	1ELXA	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
141	1	52@1ELXA-04C	LV Circuit Breaker	1EMXA Feeder Breaker	ABB	K1600-S	1ELXA	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
142	1	52@1ELXA-06C	LV Circuit Breaker	1EMXE Feeder Breaker	ABB	K1600-S	1ELXA	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
143	1	52@1ELXB-04B	LV Circuit Breaker	Normal Incoming Feeder Breaker	ABB	K2000-S	1ELXB	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
144	1	52@1ELXB-04C	LV Circuit Breaker	1EMXB Feeder Breaker	ABB	K1600-S	1ELXB	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
145	1	52@1ELXB-06C	LV Circuit Breaker	1EMXF Feeder Breaker	ABB	K1600-S	1ELXB	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
146	1	52@1ELXC-04B	LV Circuit Breaker	Normal Incoming Feeder Breaker	ABB	K2000-S	1ELXC	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
147	1	52@1ELXC-04C	LV Circuit Breaker	1EMXI Feeder Breaker	ABB	K1600-S	1ELXC	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
148	1	52@1ELXD-04B	LV Circuit Breaker	Normal Incoming Feeder Breaker	ABB	K2000-S	1ELXD	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
149	1	52@1ELXD-04C	LV Circuit Breaker	1EMXJ Feeder Breaker	ABB	K1600-S	1ELXD	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
150	1	M/C@1EMXB-R03C	Contactor	MOV Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXB	MCC	Auxiliary Building	556	GERS	Mitigation Strategies
151	1	M/O@1EMXC-F03C	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXC	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
152	1	M/O@1EMXD-F02C	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXD	MCC	Auxiliary Building	556	GERS	Mitigation Strategies

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
153	1	M/O@1EMXD-F05A	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXD	MCC	Auxiliary Building	556	GERS	Mitigation Strategies
154	1	M/C@1EMXE-F01C	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXE	MCC	Diesel Generator Building	556	GERS	Mitigation Strategies
155	1	M/C@1EMXF-F01C	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXF	MCC	Diesel Generator Building	556	GERS	Mitigation Strategies
156	1	M/C@1EMXK-F08B	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXK	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
157	1	M/C@1EMXL-F08A	Contactor	MOV Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXL	MCC	Auxiliary Building	556	GERS	Mitigation Strategies
158	1	M/O@1EMXL-F01B	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXL	MCC	Auxiliary Building	556	GERS	Mitigation Strategies
159	1	M/C@1EMXO-F01B	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXO	MCC	Nuclear Service Water Pump House	600	GERS	Mitigation Strategies
160	1	M/C@1EMXO-F01D	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXO	MCC	Nuclear Service Water Pump House	600	GERS	Mitigation Strategies
161	1	M/C@1EMXS-F04A	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
162	1	M/O@1EMXS-F01D	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
163	1	M/O@1EMXS-F02B	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
164	1	M/O@1EMXS-F06A	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
165	1	M/O@1EMXS-F06B	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
166	1	M/O@1EMXS-F06C	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
167	1	52@1ETA05	MV Circuit Breaker	Feed to 1ETXA	ABB	5HK-250, 1200A	1ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
168	1	52@1ETA14	MV Circuit Breaker	RN1PA Breaker	ABB	5HK-250, 1200A	1ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
169	1	52@1ETA16	MV Circuit Breaker	Feed to 1ETXC	ABB	5HK-250, 1200A	1ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
170	1	52@1ETA18	MV Circuit Breaker	Diesel Generator 1A Output Breaker	ABB	5HK-250, 1200A	1ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
171	1	52S(AF)@1ETA03	MV Circuit Breaker	Normal Feeder Breaker	ABB	700038-K01 or 700038-K51	1ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
172	1	52S(AF)@1ETA04	MV Circuit Breaker	Standby Feeder Breaker	ABB	700038-K01 or 700038-K51	1ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
173	1	PA(51V)@1ETA18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	1ETA	Switchgear	Auxiliary Building	577	SQURTS	Mitigation Strategies
174	1	PB(51V)@1ETA18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	1ETA	Switchgear	Auxiliary Building	577	SQURTS	Mitigation Strategies
175	1	PC(51V)@1ETA18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	1ETA	Switchgear	Auxiliary Building	577	SQURTS	Mitigation Strategies

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
176	1	PD(62B)@1ETA03	Control Relay	Breaker Failure Timer	General Electric	SAM (12SAM11A21A-S)	1ETA	Switchgear	Auxiliary Building	577	GERS	Mitigation Strategies
177	1	52@1ETB05	MV Circuit Breaker	Feed to 1ETXB	ABB	5HK-250, 1200A	1ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
178	1	52@1ETB14	MV Circuit Breaker	RN1PB Breaker	ABB	5HK-250, 1200A	1ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
179	1	52@1ETB16	MV Circuit Breaker	Feed to 1ETXD	ABB	5HK-250, 1200A	1ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
180	1	52@1ETB18	MV Circuit Breaker	Diesel Generator 1B Output Breaker	ABB	5HK-250, 1200A	1ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
181	1	52S(AF)@1ETB03	MV Circuit Breaker	Normal Feeder Breaker	ABB	700038-K01 or 700038-K51	1ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
182	1	52S(AF)@1ETB04	MV Circuit Breaker	Standby Feeder Breaker	ABB	700038-K01 or 700038-K51	1ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
183	1	PA (51V)@1ETB18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	1ETB	Switchgear	Auxiliary Building	560	SQURTS	Mitigation Strategies
184	1	PB (51V)@1ETB18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	1ETB	Switchgear	Auxiliary Building	560	SQURTS	Mitigation Strategies
185	1	PC (51V)@1ETB18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	1ETB	Switchgear	Auxiliary Building	560	SQURTS	Mitigation Strategies
186	1	PD(62B)@1ETB03	Control Relay	Breaker Failure Timer	General Electric	SAM (12SAM11A21A-S)	1ETB	Switchgear	Auxiliary Building	560	GERS	Mitigation Strategies
187	1	M/C@1MXW-F04D	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	1MXW	MCC	Turbine Building	568	GERS	Mitigation Strategies
188	2	M-1/C	Contactor	MOV Closing Contactor	Allen-Bradley	205-NX1	2CMTS0028	Control Cabinet	Auxiliary Building	543	GERS	Mitigation Strategies
189	2	DA	Process Switch	Speed Switch 98%	Rochester Instrument Systems	ET-1214	2DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
190	2	FA	Control Relay	Speed Switch 98% Auxiliary Relay	Cutler-Hammer	D26MRD70A	2DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
191	2	R10A	Control Relay	Shutdown De-Actuation Relay	Cutler-Hammer	D26MRD40A1	2DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
192	2	R9A	Control Relay	Shutdown De-Actuation Relay	Cutler-Hammer	D26MRD40A1	2DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
193	2	SS1-K1	Process Switch	200 RPM Auxiliary Relay	Dynalco	SST-2400A	2DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
194	2	SS1-K2	Process Switch	200 RPM Auxiliary Relay	Dynalco	SST-2400A	2DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
195	2	SS2-K3	Process Switch	440 RPM Auxiliary Relay	Dynalco	SST-2400A	2DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
196	2	SS2-K4	Process Switch	440 RPM Auxiliary Relay	Dynalco	SST-2400A	2DECPA	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
197	2	TD4	Control Relay	Fail-to-Start Auxiliary Relays	Cutler-Hammer	D87XEL30/D26MRD40A1	2DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
198	2	TD5	Control Relay	Fail-to-Start Auxiliary Relays	Cutler-Hammer	D87XEL30/D26MRD40A1	2DECPA	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
199	2	DA	Process Switch	Speed Switch 98%	Rochester Instrument Systems	ET-1214	2DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
200	2	FA	Control Relay	Speed Switch 98% Auxiliary Relay	Cutler-Hammer	D26MRD70A	2DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
201	2	R10A	Control Relay	Shutdown De-Actuation Relay	Cutler-Hammer	D26MRD40A1	2DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
202	2	R9A	Control Relay	Shutdown De-Actuation Relay	Cutler-Hammer	D26MRD40A1	2DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
203	2	SS1-K1	Process Switch	200 RPM Auxiliary Relay	Dynalco	SST-2400A	2DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
204	2	SS1-K2	Process Switch	200 RPM Auxiliary Relay	Dynalco	SST-2400A	2DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
205	2	SS2-K3	Process Switch	440 RPM Auxiliary Relay	Dynalco	SST-2400A	2DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
206	2	SS2-K4	Process Switch	440 RPM Auxiliary Relay	Dynalco	SST-2400A	2DECPB	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
207	2	TD4	Control Relay	Fail-to-Start Auxiliary Relays	Cutler-Hammer	D87XEL30/D26MRD40A1	2DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
208	2	TD5	Control Relay	Fail-to-Start Auxiliary Relays	Cutler-Hammer	D87XEL30/D26MRD40A1	2DECPB	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
209	2	K307	Control Relay	High DC Shunt Trip Relay	Tyco (Potter-Brumfield)	CNS 35-96	2DGCA	Control Cabinet	Diesel Generator Building	560	GERS	Cap>Dem
210	2	TD301	Control Relay	High DC Shunt Trip Timer	Ametek (Solidstate Controls)	07-740110-00	2DGCA	Control Cabinet	Diesel Generator Building	560	Catawba Report	Cap>Dem
211	2	K307	Control Relay	High DC Shunt Trip Relay	Tyco (Potter-Brumfield)	CNS 35-96	2DGCB	Control Cabinet	Diesel Generator Building	560	GERS	Cap>Dem
212	2	TD301	Control Relay	High DC Shunt Trip Timer	Ametek (Solidstate Controls)	07-740110-00	2DGCB	Control Cabinet	Diesel Generator Building	560	Catawba Report	Cap>Dem
213	2	GD(BOA)	Control Relay	Blackout Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
214	2	GE(127ZAX)	Control Relay	Undervoltage Relay Z-Phase	Cutler-Hammer	D26MRD70A1	2DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
215	2	GF(127YAX)	Control Relay	Undervoltage Relay Y-Phase	Cutler-Hammer	D26MRD70A1	2DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
216	2	GG(127XAX)	Control Relay	Undervoltage Relay X-Phase	Cutler-Hammer	D26MRD70A1	2DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
217	2	GH(127XAX/SPL)	Control Relay	Undervoltage Relay /Special	Cutler-Hammer	D26MRD30A1	2DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
218	2	HG(RGA)	Control Relay	Diesel Generator Restart Relay	Cutler-Hammer	D26MRD40A1	2DGLSA-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
219	2	AA(SAA1)	Control Relay	Sequencer Actuation Relay	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
220	2	AE(LT2A)	Control Relay	Logic Timer	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
221	2	BE(SAA8)	Control Relay	Sequencer Actuation Relay	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
222	2	CD(LSAT)	Control Relay	Load Shed Timer	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
223	2	DA(ST1A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PAA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
224	2	DB(ST2A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PAA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
225	2	DC(ST3A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PBA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
226	2	DD(ST4A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PBA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
227	2	DE(ST5A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PCA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
228	2	DF(ST6A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PCA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
229	2	DG(ST7A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
230	2	DH(ST8A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
231	2	DJ(ST9A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
232	2	DK(ST10A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PEA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
233	2	DL(ST11A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PMA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
234	2	DM(ST12A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PEA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
235	2	DN(ST13A)	Control Relay	Committed Sequence Timer	Agastat	SSC12PFA	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
236	2	FA(RA1)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
237	2	FA(RA1A)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD30A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
238	2	FC(RA2)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
239	2	FD(RA3)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
240	2	FE(RA4)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
241	2	FF(RA5)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
242	2	FG(RA6)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
243	2	FH(RA7)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
244	2	FJ(RA8)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
245	2	FK(RA9)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
246	2	GA(RA10)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
247	2	GB(RA11)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
248	2	GC(RA12)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
249	2	GD(RA13)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
250	2	HA(2ESGAX1)	Control Relay	Engineered Safeguards Auxiliary Relay	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
251	2	LSA1-4/4a(CA)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
252	2	LSA3-1/1a(CC)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
253	2	LSA3-4/4a(CC)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	2DGLSA-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
254	2	GD(BOB)	Control Relay	Blackout Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
255	2	GE(127ZBX)	Control Relay	Undervoltage Relay Z-Phase	Cutler-Hammer	D26MRD70A1	2DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
256	2	GF(127YBX)	Control Relay	Undervoltage Relay Y-Phase	Cutler-Hammer	D26MRD70A1	2DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
257	2	GG(127XBX)	Control Relay	Undervoltage Relay X-Phase	Cutler-Hammer	D26MRD70A1	2DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
258	2	GH(127XBX/SPL)	Control Relay	Undervoltage Relay /Special	Cutler-Hammer	D26MRD30A1	2DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
259	2	HG(RGB)	Control Relay	Diesel Generator Restart Relay	Cutler-Hammer	D26MRD40A1	2DGLSB-1	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
260	2	AA(SAB1)	Control Relay	Sequencer Actuation Relay	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
261	2	AE(LT2B)	Control Relay	Logic Timer	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
262	2	BE(SAB8)	Control Relay	Sequencer Actuation Relay	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
263	2	CD(LSBT)	Control Relay	Load Shed Timer	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
264	2	DA(ST1B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PAA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
265	2	DB(ST2B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PAA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
266	2	DC(ST3B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PBA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
267	2	DD(ST4B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PBA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
268	2	DE(ST5B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PCA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
269	2	DF(ST6B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PCA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
270	2	DG(ST7B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
271	2	DH(ST8B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
272	2	DJ(ST9B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PDA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
273	2	DK(ST10B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PEA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
274	2	DL(ST11B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PMA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
275	2	DM(ST12B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PEA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
276	2	DN(ST13B)	Control Relay	Committed Sequence Timer	Agastat	SSC12PFA	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
277	2	FA(RB1)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
278	2	FB(RB1A)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD30A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
279	2	FC(RB2)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
280	2	FD(RB3)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
281	2	FE(RB4)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
282	2	FF(RB5)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
283	2	FG(RB6)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
284	2	FH(RB7)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
285	2	FJ(RB8)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
286	2	FK(RB9)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
287	2	GA(RB10)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
288	2	GB(RB11)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
289	2	GC(RB12)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD70A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
290	2	GD(RB13)	Control Relay	Loading Relay	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
291	2	HA(2ESGBX1)	Control Relay	Engineered Safeguards Auxiliary Relay	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
292	2	LSB1-4/4a(CA)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
293	2	LSB3-1/1a(CC)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
294	2	LSB3-4/4a(CC)	Control Relay	Load Shed	Cutler-Hammer	D26MRD704A1	2DGLSB-2	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
295	2	GB(51VX3)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD30A1	2EATC14	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
296	2	GC(51VX1)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD30A1	2EATC14	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
297	2	JA(51VX2)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD704A1	2EATC14	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
298	2	GB(51VX3)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD30A1	2EATC15	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
299	2	GC(51VX1)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD30A1	2EATC15	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
300	2	JA(51VX2)	Control Relay	Voltage Controlled Overcurrent Auxiliary Relay	Cutler-Hammer	D26MRD704A1	2EATC15	Terminal Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
301	2	AA	Control Relay	Auxiliary Relay	Cutler-Hammer	D23MR40A	2EATC9	Terminal Cabinet	Auxiliary Building	594	GERS	Mitigation Strategies

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
302	2	AE	Control Relay	Auxiliary Relay	Cutler-Hammer	D23MR40A	2EATC9	Terminal Cabinet	Auxiliary Building	594	GERS	Mitigation Strategies
303	2	CD	Control Relay	Auxiliary Relay	Cutler-Hammer	D23MR40A	2EATC9	Terminal Cabinet	Auxiliary Building	594	GERS	Mitigation Strategies
304	2	DD	Control Relay	Auxiliary Relay	Cutler-Hammer	D23MR40A	2EATC9	Terminal Cabinet	Auxiliary Building	594	GERS	Mitigation Strategies
305	2	K301	Control Relay	High DC Shunt Trip Relay	Ametek (Solidstate Controls)	07-740131-00	2ECA	Control Cabinet	Auxiliary Building	554	Catawba Report	Mitigation Strategies
306	2	K301	Control Relay	High DC Shunt Trip Relay	Ametek (Solidstate Controls)	07-740131-00	2ECB	Control Cabinet	Auxiliary Building	554	Catawba Report	Mitigation Strategies
307	2	K301	Control Relay	High DC Shunt Trip Relay	Ametek (Solidstate Controls)	07-740131-00	2ECC	Control Cabinet	Auxiliary Building	554	Catawba Report	Mitigation Strategies
308	2	K301	Control Relay	High DC Shunt Trip Relay	Ametek (Solidstate Controls)	07-740131-00	2ECD	Control Cabinet	Auxiliary Building	554	Catawba Report	Mitigation Strategies
309	2	CON1	Contactor	Overspeed Trip Auxiliary Relay	Allen-Bradley	202-NX11	2ELCP0245	Control Cabinet	Auxiliary Building	543	GERS	Mitigation Strategies
310	2	CR3	Control Relay	Overspeed Trip Relay	Agastat (or Tyco)	EGPD-003 or -004 (1423176-6)	2ELCP0245	Control Cabinet	Auxiliary Building	543	EPRI HF Test	Cap>Dem
311	2	CR4	Control Relay	Mechanical Overspeed Trip Relay	Agastat (or Tyco)	EGPD-003 or -004 (1423176-6)	2ELCP0245	Control Cabinet	Auxiliary Building	543	EPRI HF Test	Cap>Dem
312	2	HB	Control Relay	Non-Emergency Trip Relay	Cutler-Hammer	D26MRD30A1	2ELCP0328	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
313	2	JB	Control Relay	Lo-Lo Lube Oil Trip Relay	Cutler-Hammer	D26MRD30A	2ELCP0328	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
314	2	JC	Control Relay	Shutdown Cycle Seal-In Timer	Agastat	E7012PELL004	2ELCP0328	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
315	2	R1(DA/SST1)	Process Switch	Overspeed Relay	Dynalco	SST-2400	2ELCP0328	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
316	2	R1(DB/SST2)	Process Switch	Overspeed Relay	Dynalco	SST-2400	2ELCP0328	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
317	2	R3(DA/SST1)	Process Switch	Overspeed Relay	Dynalco	SST-2400	2ELCP0328	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
318	2	R3(DB/SST2)	Process Switch	Overspeed Relay	Dynalco	SST-2400	2ELCP0328	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
319	2	HB	Control Relay	Non-Emergency Trip Relay	Cutler-Hammer	D26MRD30A1	2ELCP0329	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
320	2	JB	Control Relay	Lo-Lo Lube Oil Trip Relay	Cutler-Hammer	D26MRD30A	2ELCP0329	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
321	2	JC	Control Relay	Shutdown Cycle Seal-In Timer	Agastat	E7012PELL004	2ELCP0329	Control Cabinet	Diesel Generator Building	556	GERS	Cap>Dem
322	2	R1(DA/SST1)	Process Switch	Overspeed Relay	Dynalco	SST-2400	2ELCP0329	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
323	2	R1(DB/SST2)	Process Switch	Overspeed Relay	Dynalco	SST-2400	2ELCP0329	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
324	2	R3(DA/SST1)	Process Switch	Overspeed Relay	Dynalco	SST-2400	2ELCP0329	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
325	2	R3(DB/SST2)	Process Switch	Overspeed Relay	Dynalco	SST-2400	2ELCP0329	Control Cabinet	Diesel Generator Building	556	Catawba Report	Cap>Dem
326	2	TM1(2CAST5762)	Process Switch	Overspeed Trip Switch	Dynalco	SST-2400AN-173	2ELCP0334	Control Cabinet	Auxiliary Building	543	Catawba Report	Cap>Dem
327	2	52@2ELXA-04B	LV Circuit Breaker	Normal Incoming Feeder Breaker	ABB	K2000-S	2ELXA	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
328	2	52@2ELXA-04C	LV Circuit Breaker	2EMXA Feeder Breaker	ABB	K1600-S	2ELXA	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
329	2	52@2ELXA-06C	LV Circuit Breaker	2EMXE Feeder Breaker	ABB	K1600-S	2ELXA	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
330	2	52@2ELXB-04B	LV Circuit Breaker	Normal Incoming Feeder Breaker	ABB	K2000-S	2ELXB	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
331	2	52@2ELXB-04C	LV Circuit Breaker	2EMXB Feeder Breaker	ABB	K1600-S	2ELXB	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
332	2	52@2ELXB-06C	LV Circuit Breaker	2EMXF Feeder Breaker	ABB	K1600-S	2ELXB	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
333	2	52@2ELXC-04B	LV Circuit Breaker	Normal Incoming Feeder Breaker	ABB	K2000-S	2ELXC	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
334	2	52@2ELXC-04C	LV Circuit Breaker	2EMXI Feeder Breaker	ABB	K1600-S	2ELXC	Load Center	Auxiliary Building	577	Catawba Report	Cap>Dem
335	2	52@2ELXD-04B	LV Circuit Breaker	Normal Incoming Feeder Breaker	ABB	K2000-S	2ELXD	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
336	2	52@2ELXD-04C	LV Circuit Breaker	2EMXJ Feeder Breaker	ABB	K1600-S	2ELXD	Load Center	Auxiliary Building	560	Catawba Report	Cap>Dem
337	2	M/C@2EMXB-R03C	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXB	MCC	Auxiliary Building	560	GERS	Mitigation Strategies
338	2	M/O@2EMXC-F03C	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXC	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
339	2	M/O@2EMXD-F02C	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXD	MCC	Auxiliary Building	560	GERS	Mitigation Strategies
340	2	M/O@2EMXD-F05A	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXD	MCC	Auxiliary Building	560	GERS	Mitigation Strategies
341	2	M/C@2EMXE-F01C	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXE	MCC	Diesel Generator Building	556	GERS	Mitigation Strategies

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
342	2	M/C@2EMXF-F01C	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXF	MCC	Diesel Generator Building	556	GERS	Mitigation Strategies
343	2	M/C@2EMXK-F08B	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXK	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
344	2	M/C@2EMXL-F08A	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXL	MCC	Auxiliary Building	556	GERS	Mitigation Strategies
345	2	M/O@2EMXL-F01B	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXL	MCC	Auxiliary Building	556	GERS	Mitigation Strategies
346	2	M/C@2EMXP-F01B	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXP	MCC	Nuclear Service Water Pump House	600	GERS	Mitigation Strategies
347	2	M/C@2EMXP-F01D	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXP	MCC	Nuclear Service Water Pump House	600	GERS	Mitigation Strategies
348	2	M/C@2EMXS-F04A	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
349	2	M/O@2EMXS-F01D	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
350	2	M/O@2EMXS-F02B	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
351	2	M/O@2EMXS-F06A	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
352	2	M/O@2EMXS-F06B	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
353	2	M/O@2EMXS-F06C	Contactor	Opening Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2EMXS	MCC	Auxiliary Building	577	GERS	Mitigation Strategies
354	2	52@2ETA05	MV Circuit Breaker	Feed to 2ETXA	ABB	5HK-250, 1200A	2ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
355	2	52@2ETA14	MV Circuit Breaker	RN2PA Breaker	ABB	5HK-250, 1200A	2ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
356	2	52@2ETA16	MV Circuit Breaker	Feed to 2ETXC	ABB	5HK-250, 1200A	2ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
357	2	52@2ETA18	MV Circuit Breaker	Diesel Generator 2A Output Breaker	ABB	5HK-250, 1200A	2ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
358	2	52S(AF)@2ETA03	MV Circuit Breaker	Normal Feeder Breaker	ABB	700038-K01 or 700038-K51	2ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
359	2	52S(AF)@2ETA04	MV Circuit Breaker	Standby Feeder Breaker	ABB	700038-K01 or 700038-K51	2ETA	Switchgear	Auxiliary Building	577	EPRI HF Test	Cap>Dem
360	2	PA (51V)@2ETA18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	2ETA	Switchgear	Auxiliary Building	577	SQURTS	Mitigation Strategies
361	2	PB (51V)@2ETA18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	2ETA	Switchgear	Auxiliary Building	577	SQURTS	Mitigation Strategies
362	2	PC (51V)@2ETA18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	2ETA	Switchgear	Auxiliary Building	577	SQURTS	Mitigation Strategies
363	2	PD(62B)@2ETA03	Control Relay	Breaker Failure Timer	General Electric	SAM (12SAM11A21A-S)	2ETA	Switchgear	Auxiliary Building	577	GERS	Mitigation Strategies
364	2	52@2ETB05	MV Circuit Breaker	Feed to 2ETXB	ABB	5HK-250, 1200A	2ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
365	2	52@2ETB14	MV Circuit Breaker	RN2PB Breaker	ABB	5HK-250, 1200A	2ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem

Table B-1: Components Identified for High Frequency Confirmation

No.	Unit	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Device ID	Type	System Function	Manufacturer	Model	ID	Type			Basis for Capacity	Evaluation Result
366	2	52@2ETB16	MV Circuit Breaker	Feed to 2ETXD	ABB	5HK-250, 1200A	2ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
367	2	52@2ETB18	MV Circuit Breaker	Diesel Generator 1B Output Breaker	ABB	5HK-250, 1200A	2ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
368	2	52S(AF)@2ETB03	MV Circuit Breaker	Normal Feeder Breaker	ABB	700038-K01 or 700038-K51	2ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
369	2	52S(AF)@2ETB04	MV Circuit Breaker	Standby Feeder Breaker	ABB	700038-K01 or 700038-K51	2ETB	Switchgear	Auxiliary Building	560	EPRI HF Test	Cap>Dem
370	2	PA(51V)@2ETB18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	2ETB	Switchgear	Auxiliary Building	560	SQURTS	Mitigation Strategies
371	2	PB(51V)@2ETB18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	2ETB	Switchgear	Auxiliary Building	560	SQURTS	Mitigation Strategies
372	2	PC(51V)@2ETB18	Protective Relay	Voltage Controlled Overcurrent Protection Relay	Westinghouse	COV-8 (1876244)	2ETB	Switchgear	Auxiliary Building	560	SQURTS	Mitigation Strategies
373	2	PD(62B)@2ETB03	Control Relay	Breaker Failure Timer	General Electric	SAM (12SAM11A21A-S)	2ETB	Switchgear	Auxiliary Building	560	GERS	Mitigation Strategies
374	2	M/C@2MXW-F04D	Contactor	Closing Contactor	Clark	T13U031-76 Contactor/KTM-10 or A77-463967A-1 Auxiliary Contacts	2MXW	MCC	Turbine Building	568	GERS	Mitigation Strategies

Table B-2: Rugged Solid-State Components Screened from High Frequency Confirmation

Device ID	Enclosure	Function	Make	Model	Reference
FAA	1ELCC0034	Digital Optical Isolator	E-Max	DOI-175C145 or DOI-175C180	[222, 223]
FM3	1ELCC0034	Digital Optical Isolator	E-Max	DOI-175C145 or DOI-175C180	[222, 223]
FW1	1ELCC0034	Digital Optical Isolator	E-Max	DOI-175C145 or DOI-175C180	[222, 223]
FX2	1ELCC0034	Digital Optical Isolator	E-Max	DOI-175C145 or DOI-175C180	[222, 223]
FY3	1ELCC0034	Digital Optical Isolator	E-Max	DOI-175C145 or DOI-175C180	[222, 223]
PA(51G)@1ETA03	1ETA	Ground Overcurrent	ITE	51D (223S6140)	[224]
PB(51)@1ETA03	1ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(51G)@1ETA04	1ETA	Ground Overcurrent	ITE	51D (223S6140)	[224]
PB(51)@1ETA04	1ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@1ETA05	1ETA	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@1ETA05	1ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@1ETA14	1ETA	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@1ETA14	1ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@1ETA16	1ETA	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@1ETA16	1ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
87G@1ETA19	1ETA	Generator Differential	Westinghouse	SA-1 (290B225A10)	[226]
PA(51G)@1ETB03	1ETB	Ground Overcurrent	ITE	51D (223S6140)	[224]
PB(51)@1ETB03	1ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(51G)@1ETB04	1ETB	Ground Overcurrent	ITE	51D (223S6140)	[224]
PB(51)@1ETB04	1ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@1ETB05	1ETB	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@1ETB05	1ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@1ETB14	1ETB	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@1ETB14	1ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@1ETB16	1ETB	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@1ETB16	1ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
87G@1ETB19	1ETB	Generator Differential	Westinghouse	SA-1 (290B225A10)	[226]
FAA	2ELCC0034	Digital Optical Isolator	E-Max	DOI-175C155 or DOI-175C180	[222, 223]
FM3	2ELCC0034	Digital Optical Isolator	E-Max	DOI-175C180	[223]
FW1	2ELCC0034	Digital Optical Isolator	E-Max	DOI-175C145 or DOI-175C180	[222, 223]
FX2	2ELCC0034	Digital Optical Isolator	E-Max	DOI-175C145 or DOI-175C180	[222, 223]
FY3	2ELCC0034	Digital Optical Isolator	E-Max	DOI-175C145 or DOI-175C180	[222, 223]
PA(51G)@2ETA03	2ETA	Ground Overcurrent	ITE	51D (223S6140)	[224]
PB(51)@2ETA03	2ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(51G)@2ETA04	2ETA	Ground Overcurrent	ITE	51D (223S6140)	[224]
PB(51)@2ETA04	2ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@2ETA05	2ETA	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@2ETA05	2ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@2ETA14	2ETA	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@2ETA14	2ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@2ETA16	2ETA	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]

Table B-2: Rugged Solid-State Components Screened from High Frequency Confirmation

Device ID	Enclosure	Function	Make	Model	Reference
PB(50/51)@2ETA16	2ETA	Timed Overcurrent	ITE	51Y (223T2341)	[224]
87G@2ETA19	2ETA	Generator Differential	Westinghouse	SA-1 (290B225A10)	[226]
PA(51G)@2ETB03	2ETB	Ground Overcurrent	ITE	51D (223S6140)	[224]
PB(51)@2ETB03	2ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(51G)@2ETB04	2ETB	Ground Overcurrent	ITE	51D (223S6140)	[224]
PB(51)@2ETB04	2ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@2ETB05	2ETB	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@2ETB05	2ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@2ETB14	2ETB	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@2ETB14	2ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
PA(50G)@2ETB16	2ETB	Ground Overcurrent	ITE	GR-5 (202D6141UL)	[225]
PB(50/51)@2ETB16	2ETB	Timed Overcurrent	ITE	51Y (223T2341)	[224]
87G@2ETB19	2ETB	Generator Differential	Westinghouse	SA-1 (290B225A10)	[226]

Table B-3: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve ID	P&ID	Comment	Evaluation Needed
		Unit 1	
1NC4	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC5	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC6	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC13	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC14	CN-1553-01.00 [227]	Packless Manual Valve Normally Open; No Relays	No
1NC19	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC20	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC23	CN-1553-01.00 [227]	Packless Manual Valve Normally Open; Both sides of the Head Gasket would have to Fail and there are no Relays	No
1NC24	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed; Both sides of the Head Gasket would have to Fail and there are no Relays	No
1NC25A	CN-1553-01.00 [227]	Valve Normally Open; Both sides of the Head Gasket would have to Fail	No
1NC26	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC37	CN-1553-01.00 [227]	Packless Manual Valve Normally Open; No Relays	No
1NC94	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC95	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC106	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC111	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC112	CN-1553-01.00 [227]	Packless Manual Valve Normally Open; No Relays	No
1NC113	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC115	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed; No Relays	No
1NC234	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC235	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC261	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC298	CN-1553-01.00 [227]	Manual Valve Normally Closed	No
1NC311	CN-1553-01.00 [227]	Packless Manual Valve Normally Closed	No
1NC1	CN-1553-01.01 [16]	Relief Valve	Yes
1NC2	CN-1553-01.01 [16]	Relief Valve	Yes
1NC3	CN-1553-01.01 [16]	Relief Valve	Yes
1NC27	CN-1553-01.01 [16]	Packless Air Valve Failed Closed	Yes
1NC28	CN-1553-01.01 [16]	Manual Valve Normally Throttled with a 3/8" Reducing Orifice Down Stream	No
1NC29	CN-1553-01.01 [16]	Packless Air Valve Failed Closed	Yes
1NC30	CN-1553-01.01 [16]	Manual Valve Normally Throttled with a 3/8" Reducing Orifice Down Stream	No
1NC31B	CN-1553-01.01 [16]	Valve Normally Open; Would only be a potential if 32B fails to stay closed	Potential
1NC32B	CN-1553-01.01 [16]	Piston Valve Failed Closed	Yes
1NC33A	CN-1553-01.01 [16]	Valve Normally Open; Would only be a potential if 34A fails to stay closed	Potential

Table B-3: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve ID	P&ID	Comment	Evaluation Needed
1NC34A	CN-1553-01.01 [16]	Piston Valve Failed Closed	Yes
1NC35B	CN-1553-01.01 [16]	Valve Normally Open; Would only be a potential if 36B fails to stay closed	Potential
1NC36B	CN-1553-01.01 [16]	Piston Valve Failed Closed	Yes
1NC108	CN-1553-01.01 [16]	Manual Valve Normally Closed	No
1NC223	CN-1553-01.01 [16]	Packless Manual Valve Normally Closed	No
1NC226	CN-1553-01.01 [16]	Packless Manual Valve Normally Closed	No
1NC250A	CN-1553-01.01 [16]	Failed Closed Valve	Yes
1NC251B	CN-1553-01.01 [16]	Potentially only if 1NC250A Fails to close	Potential
1NC252B	CN-1553-01.01 [16]	Normally Closed Valve depowered	No
1NC253A	CN-1553-01.01 [16]	Normally Closed Valve depowered	No
1NC300	CN-1553-01.01 [16]	Normally Closed Manual Valve	No
1NV1A	CN-1554-01.00 [228]	Piston Valve Failed Closed	Yes
1NV2A	CN-1554-01.00 [228]	Piston Valve Failed Closed; Potential only if 1NV1A fails to close	Potential
1NV34	CN-1554-01.00 [228]	Packless Check Valve Operator	No
1NV38	CN-1554-01.00 [228]	Packless Check Valve Operator	No
1NV41	CN-1554-01.00 [228]	Packless Check Valve Operator	No
1NV122B	CN-1554-01.00 [228]	Piston Valve Failed Closed	Yes
1NV123B	CN-1554-01.00 [228]	Piston Valve Failed Closed; Potential only if 1NV122B fails to close	Potential
1NV49	CN-1554-01.05 [229]	Simple Check Valve	No
1NV52A	CN-1554-01.05 [229]	Fail Open Air Operated Valve. Operators will manually isolate if there is a loss of offsite power.[v] Otherwise the seal package is functioning and is not an RCS leak path.	Yes
1NV60	CN-1554-01.05 [229]	Simple Check Valve	No
1NV63B	CN-1554-01.05 [229]	Fail Open Air Operated Valve. Operators will manually isolate if there is a loss of offsite power.[v] Otherwise the seal package is functioning and is not an RCS leak path.	Yes
1NV71	CN-1554-01.05 [229]	Simple Check Valve	No
1NV74A	CN-1554-01.05 [229]	Fail Open Air Operated Valve. Operators will manually isolate if there is a loss of offsite power.[v] Otherwise the seal package is functioning and is not an RCS leak path.	Yes
1NV82	CN-1554-01.05 [229]	Simple Check Valve	No
1NV85B	CN-1554-01.05 [229]	Fail Open Air Operated Valve. Operators will manually isolate if there is a loss of offsite power.[v] Otherwise the seal package is functioning and is not an RCS leak path.	Yes
1ND1B	CN-1561-01.00 [230]	MOV Valve Normally Closed	Yes
1ND2A	CN-1561-01.00 [230]	MOV Valve Normally Closed; Potential only if 1ND001B fails to close	Potential
1ND4	CN-1561-01.00 [230]	Packless Manual Valve Normally Closed	No

[v] This operator action is performed in accordance with procedure AP-1-A-5500-008 [267].

Table B-3: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve ID	P&ID	Comment	Evaluation Needed
1ND110	CN-1561-01.00 [230]	Packless Manual Valve Normally Closed	No
1ND116	CN-1561-01.00 [230]	Simple Check Valve	No
1ND36B	CN-1561-01.01 [231]	MOV Valve Normally Closed	Yes
1ND37A	CN-1561-01.01 [231]	MOV Valve Normally Closed; Potential only if 1ND36B fails to close	Potential
1ND39	CN-1561-01.01 [231]	Packless Manual Valve Normally Closed	No
1ND111	CN-1561-01.01 [231]	Packless Manual Valve Normally Closed	No
1ND117	CN-1561-01.01 [231]	Simple Check Valve	No
1NI15	CN-1562-01.00 [232]	Packless Check Valve Operator	No
1NI17	CN-1562-01.00 [232]	Packless Check Valve Operator	No
1NI19	CN-1562-01.00 [232]	Packless Check Valve Operator	No
1NI21	CN-1562-01.00 [232]	Packless Check Valve Operator	No
1NI60	CN-1562-01.01 [233]	Simple Check Valve	No
1NI71	CN-1562-01.01 [233]	Simple Check Valve	No
1NI82	CN-1562-01.01 [233]	Simple Check Valve	No
1NI94	CN-1562-01.01 [233]	Simple Check Valve	No
1NI391	CN-1562-01.01 [233]	Not considered a leak Path due to the 3/8" Orifice upstream	No
1NI392	CN-1562-01.01 [233]	Not considered a leak Path due to the 3/8" Orifice upstream	No
1NI393	CN-1562-01.01 [233]	Not considered a leak Path due to the 3/8" Orifice upstream	No
1NI394	CN-1562-01.01 [233]	Not considered a leak Path due to the 3/8" Orifice upstream	No
1NI126	CN-1562-01.02 [234]	Simple Check Valve	No
1NI134	CN-1562-01.02 [234]	Simple Check Valve	No
1NI157	CN-1562-01.02 [234]	Simple Check Valve	No
1NI160	CN-1562-01.02 [234]	Simple Check Valve	No
1NI395	CN-1562-01.02 [234]	Not considered a leak Path due to the 3/8" Orifice upstream	No
1NI396	CN-1562-01.02 [234]	Not considered a leak Path due to the 3/8" Orifice upstream	No
1NI397	CN-1562-01.02 [234]	Not considered a leak Path due to the 3/8" Orifice upstream	No
1NI398	CN-1562-01.02 [234]	Not considered a leak Path due to the 3/8" Orifice upstream	No
1NM2	CN-1572-01.00 [235]	Packless Manual Valve Normally Closed	No
1NM3A	CN-1572-01.00 [235]	Valve Normally Open	Yes
1NM5	CN-1572-01.00 [235]	Packless Manual Valve Normally Closed	No
1NM6A	CN-1572-01.00 [235]	Valve Normally Closed	Yes
1NM21	CN-1572-01.00 [235]	Packless Manual Valve Normally Closed	No
1NM022A	CN-1572-01.00 [235]	Valve Normally Open	Yes
1NM24	CN-1572-01.00 [235]	Packless Manual Valve Normally Closed	No
1NM025A	CN-1572-01.00 [235]	Valve Normally Closed	Yes
1NM424	CN-1572-01.00 [235]	Simple Check Valve	No
1NM425	CN-1572-01.00 [235]	Simple Check Valve	No
1NM490	CN-1572-01.00 [235]	Packless Manual Valve Normally Closed	No
Unit 2			
2NC4	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No

Table B-3: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve ID	P&ID	Comment	Evaluation Needed
2NC5	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC6	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC13	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC14	CN-2553-01.00 [236]	Packless Manual Valve Normally Open; No Relays	No
2NC19	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC20	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC23A	CN-2553-01.00 [236]	Air Operated Valve Normally Open; Both sides of the Head Gasket would have to Fail	No
2NC24A	CN-2553-01.00 [236]	Air Operated Valve Normally Open; Both sides of the Head Gasket would have to Fail	No
2NC25A	CN-2553-01.00 [236]	Air Operated Valve Normally Open; Both sides of the Head Gasket would have to Fail	No
2NC26	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC37	CN-2553-01.00 [236]	Packless Manual Valve Normally Open; No Relays	No
2NC94	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC95	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC106	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC111	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC112	CN-2553-01.00 [236]	Packless Manual Valve Normally Open; No Relays	No
2NC113	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC115	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed; No Relays	No
2NC234	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC235	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC261	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC298	CN-2553-01.00 [236]	Manual Valve Normally Closed	No
2NC311	CN-2553-01.00 [236]	Packless Manual Valve Normally Closed	No
2NC1	CN-2553-01.01 [17]	Relief Valve	Yes
2NC2	CN-2553-01.01 [17]	Relief Valve	Yes
2NC3	CN-2553-01.01 [17]	Relief Valve	Yes
2NC27	CN-2553-01.01 [17]	Packless Air Valve Failed Closed	Yes
2NC28	CN-2553-01.01 [17]	Manual Valve Normally Throttled with a 3/8" Reducing Orifice Down Stream	No
2NC29	CN-2553-01.01 [17]	Packless Air Valve Failed Closed	Yes
2NC30	CN-2553-01.01 [17]	Manual Valve Normally Throttled with a 3/8" Reducing Orifice Down Stream	No
2NC31B	CN-2553-01.01 [17]	Valve Normally Open; Would only be a potential if 32B fails to stay closed	Potential
2NC32B	CN-2553-01.01 [17]	Piston Valve Failed Closed	Yes
2NC33A	CN-2553-01.01 [17]	Valve Normally Open; Would only be a potential if 34A fails to stay closed	Potential
2NC34A	CN-2553-01.01 [17]	Piston Valve Failed Closed	Yes

Table B-3: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve ID	P&ID	Comment	Evaluation Needed
2NC35B	CN-2553-01.01 [17]	Valve Normally Open; Would only be a potential if 36B fails to stay closed	Potential
2NC36B	CN-2553-01.01 [17]	Piston Valve Failed Closed	Yes
2NC108	CN-2553-01.01 [17]	Manual Valve Normally Closed	No
2NC223	CN-2553-01.01 [17]	Packless Manual Valve Normally Closed	No
2NC226	CN-2553-01.01 [17]	Packless Manual Valve Normally Closed	No
2NC250A	CN-2553-01.01 [17]	Failed Closed Valve	Yes
2NC251B	CN-2553-01.01 [17]	Potentially only if 1NC250A Fails to close	Potential
2NC252B	CN-2553-01.01 [17]	Normally Closed Valve depowered	No
2NC253A	CN-2553-01.01 [17]	Normally Closed Valve depowered	No
2NC300	CN-2553-01.01 [17]	Normally Closed Manual Valve	No
2NV1A	CN-2554-01.00 [237]	Piston Valve Failed Closed	Yes
2NV2A	CN-2554-01.00 [237]	Piston Valve Failed Closed; Potential only if 1NV1A fails to close	Potential
2NV34	CN-2554-01.00 [237]	Packless Check Valve Operator	No
2NV38	CN-2554-01.00 [237]	Packless Check Valve Operator	No
2NV41	CN-2554-01.00 [237]	Packless Check Valve Operator	No
2NV122B	CN-2554-01.00 [237]	Piston Valve Failed Closed	Yes
2NV123B	CN-2554-01.00 [237]	Piston Valve Failed Closed; Potential only if 2NV122B fails to close	Potential
2NV49	CN-2554-01.05 [238]	Simple Check Valve	No
2NV52A	CN-2554-01.05 [238]	Fail Open Air Operated Valve. Operators will manually isolate if there is a loss of offsite power.[vi] Otherwise the seal package is functioning and is not an RCS leak path.	Yes
2NV60	CN-2554-01.05 [238]	Simple Check Valve	No
2NV63B	CN-2554-01.05 [238]	Fail Open Air Operated Valve. Operators will manually isolate if there is a loss of offsite power.[vi] Otherwise the seal package is functioning and is not an RCS leak path.	Yes
2NV71	CN-2554-01.05 [238]	Simple Check Valve	No
2NV74A	CN-2554-01.05 [238]	Fail Open Air Operated Valve. Operators will manually isolate if there is a loss of offsite power.[vi] Otherwise the seal package is functioning and is not an RCS leak path.	Yes
2NV82	CN-2554-01.05 [238]	Simple Check Valve	No
2NV85B	CN-2554-01.05 [238]	Fail Open Air Operated Valve. Operators will manually isolate if there is a loss of offsite power.[vi] Otherwise the seal package is functioning and is not an RCS leak path.	Yes
2ND1B	CN-2561-01.00 [239]	MOV Valve Normally Closed	Yes
2ND2A	CN-2561-01.00 [239]	MOV Valve Normally Closed; Potential only if 2ND001B fails to close	Potential
2ND4	CN-2561-01.00 [239]	Packless Manual Valve Normally Closed	No
2ND110	CN-2561-01.00 [239]	Packless Manual Valve Normally Closed	No

[vi] This operator action is performed in accordance with procedure AP-2-A-5500-008 [266].

Table B-3: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve ID	P&ID	Comment	Evaluation Needed
2ND116	CN-2561-01.00 [239]	Simple Check Valve	No
2ND36B	CN-2561-01.01 [240]	MOV Valve Normally Closed	Yes
2ND37A	CN-2561-01.01 [240]	MOV Valve Normally Closed; Potential only if 2ND36B fails to close	Potential
2ND39	CN-2561-01.01 [240]	Packless Manual Valve Normally Closed	No
2ND111	CN-2561-01.01 [240]	Packless Manual Valve Normally Closed	No
2ND117	CN-2561-01.01 [240]	Simple Check Valve	No
2NI15	CN-2562-01.00 [241]	Packless Check Valve Operator	No
2NI17	CN-2562-01.00 [241]	Packless Check Valve Operator	No
2NI19	CN-2562-01.00 [241]	Packless Check Valve Operator	No
2NI21	CN-2562-01.00 [241]	Packless Check Valve Operator	No
2NI60	CN-2562-01.01 [242]	Simple Check Valve	No
2NI71	CN-2562-01.01 [242]	Simple Check Valve	No
2NI82	CN-2562-01.01 [242]	Simple Check Valve	No
2NI94	CN-2562-01.01 [242]	Simple Check Valve	No
2NI391	CN-2562-01.01 [242]	Not considered a leak Path due to the 3/8" Orifice upstream	No
2NI392	CN-2562-01.01 [242]	Not considered a leak Path due to the 3/8" Orifice upstream	No
2NI393	CN-2562-01.01 [242]	Not considered a leak Path due to the 3/8" Orifice upstream	No
2NI394	CN-2562-01.01 [242]	Not considered a leak Path due to the 3/8" Orifice upstream	No
2NI126	CN-2562-01.02 [243]	Simple Check Valve	No
2NI134	CN-2562-01.02 [243]	Simple Check Valve	No
2NI157	CN-2562-01.02 [243]	Simple Check Valve	No
2NI160	CN-2562-01.02 [243]	Simple Check Valve	No
2NI395	CN-2562-01.02 [243]	Not considered a leak Path due to the 3/8" Orifice upstream	No
2NI396	CN-2562-01.02 [243]	Not considered a leak Path due to the 3/8" Orifice upstream	No
2NI397	CN-2562-01.02 [243]	Not considered a leak Path due to the 3/8" Orifice upstream	No
2NI398	CN-2562-01.02 [243]	Not considered a leak Path due to the 3/8" Orifice upstream	No
2NM2	CN-2572-01.00 [244]	Packless Manual Valve Normally Closed	No
2NM3A	CN-2572-01.00 [244]	Valve Normally Closed	Yes
2NM5	CN-2572-01.00 [244]	Packless Manual Valve Normally Closed	No
2NM6A	CN-2572-01.00 [244]	Valve Normally Closed	Yes
2NM21	CN-2572-01.00 [244]	Packless Manual Valve Normally Closed	No
2NM022A	CN-2572-01.00 [244]	Valve Normally Open	Yes
2NM24	CN-2572-01.00 [244]	Packless Manual Valve Normally Closed	No
2NM025A	CN-2572-01.00 [244]	Valve Normally Closed	Yes
2NM424	CN-2572-01.00 [244]	Simple Check Valve	No
2NM425	CN-2572-01.00 [244]	Simple Check Valve	No
2NM465	CN-2572-01.00 [244]	Packless Manual Valve Normally Closed	No

Table B-4: Core Cooling Equipment Identified for High Frequency Confirmation

Component	Description	Reference
	Unit 1	
1CA2	Hotwell Suction Isolation	CN-1592-01.00 [245]
1CA4	Upper Surge Tank Isolation	CN-1592-01.00 [245]
1CA7A	TDAFW Pump Suction Isolation	CN-1592-01.00 [245]
1CA36	CA Pump to S/G D Flow Control	CN-1592-01.01 [73]
1CA38A	CA Pump to S/G D Isolation	CN-1592-01.01 [73]
1CA48	CA Pump to S/G C Flow Control	CN-1592-01.01 [73]
1CA50A	CA Pump to S/G C Isolation	CN-1592-01.01 [73]
1CA52	CA Pump to S/G B Flow Control	CN-1592-01.01 [73]
1CA54B	CA Pump to S/G B Isolation	CN-1592-01.01 [73]
1CA64	CA Pump to S/G A Flow Control	CN-1592-01.01 [73]
1CA66B	CA Pump to S/G A Isolation	CN-1592-01.01 [73]
1SA2	Steam Supply to CA Pump	CN-1593-01.01 [246]
1SA5	Steam Supply to CA Pump	CN-1593-01.01 [246]
1SA145	Trip and Throttle Valve	CN-1593-01.01 [246]
	Unit 2	
2CA2	AFW Hotwell Suction Isolation	CN-2592-01.00 [247]
2CA4	Upper Surge Tank Isolation	CN-2592-01.00 [247]
2CA7A	TDAFW Pump Suction Isolation	CN-2592-01.00 [247]
2CA36	CA Pump to S/G D Flow Control	CN-2592-01.01 [248]
2CA38A	CA Pump to S/G D Isolation	CN-2592-01.01 [248]
2CA48	CA Pump to S/G C Flow Control	CN-2592-01.01 [248]
2CA50A	CA Pump to S/G C Isolation	CN-2592-01.01 [248]
2CA52	CA Pump to S/G B Flow Control	CN-2592-01.01 [248]
2CA54B	CA Pump to S/G B Isolation	CN-2592-01.01 [248]
2CA64	CA Pump to S/G A Flow Control	CN-2592-01.01 [248]
2CA66B	CA Pump to S/G A Isolation	CN-2592-01.01 [248]
2SA2	Steam Supply to CA Pump	CN-2593-01.01 [249]
2SA5	Steam Supply to CA Pump	CN-2593-01.01 [249]
2SA145	Trip and Throttle Valve	CN-2593-01.01 [249]

Table B-5: Electrical Power Equipment Identified for High Frequency Confirmation

Component	Description	Drawing	Function
		Unit 1	
EDG1A	1A Diesel Generator	CN-1702-02.01 [250]	Provides Emergency Power Source
EDG1B	1B Diesel Generator	CN-1702-02.02 [251]	Provides Emergency Power Source
1ETA14	NSW Pump 1RN1PA Breaker	CN-1702-02.01 [250]	EDG Cooling Water
1ETA18	EDG 1A Output Breaker	CN-1702-02.01 [250]	Connect EDG to 4KV ESF Bus
1ETA5	Feed to 1ETXA	CN-1702-02.01 [250]	ESF Bus to 4KV/600V Transformer
1ETA16	Feed to 1ETXC	CN-1702-02.01 [250]	ESF Bus to 4KV/600V Transformer
1ETB14	NSW Pump 1RN1PB Breaker	CN-1702-02.02 [251]	EDG Cooling Water
1ETB18	EDG 1B Output Breaker	CN-1702-02.02 [251]	Connect EDG to 4KV ESF Bus
1ETB5	Feed to 1ETXB	CN-1702-02.02 [251]	ESF Bus to 4KV/600V Transformer
1ETB16	Feed to 1ETXD	CN-1702-02.02 [251]	ESF Bus to 4KV/600V Transformer
1ELXA-04B	Normal Incoming Feed Breaker	CN-1703-01.01 [252]	1ETXA Transformer to 1ELXA Bus
1ELXA-04C	1EMXA Feed Breaker	CN-1703-01.01 [252]	1ELXA to MCC 1EMXA
1ELXA-06C	1EMXE Feed Breaker	CN-1703-01.01 [252]	1ELXA to MCC 1EMXE
1ELXC-04B	Normal Incoming Feed Breaker	CN-1703-01.01 [252]	1ETXC Transformer to 1ELXC Bus
1ELXC-04C	1EMXI Feed Breaker	CN-1703-01.01 [252]	1ELXC to MCC 1EMXI
1ELXB-04B	Normal Incoming Feed Breaker	CN-1703-01.02 [253]	1ETXB Transformer to 1ELXB Bus
1ELXB-04C	1EMXB Feed Breaker	CN-1703-01.02 [253]	1ELXB to MCC 1EMXB
1ELXB-06C	1EMXF Feed Breaker	CN-1703-01.02 [253]	1ELXB to MCC 1EMXF
1ELXD-04B	Normal Incoming Feed Breaker	CN-1703-01.02 [253]	1ETXD Transformer to 1ELXD Bus
1ELXD-04C	1EMXJ Feed Breaker	CN-1703-01.02 [253]	1ELXD to MCC 1EMXJ
1EIA	15KVA Vital Inverter	CN-1705-01.02 [254]	125VDC to 125VAC
1EIB	15KVA Vital Inverter	CN-1705-01.02 [254]	125VDC to 125VAC
1EIC	15KVA Vital Inverter	CN-1705-01.02 [254]	125VDC to 125VAC
1EID	15KVA Vital Inverter	CN-1705-01.02 [254]	125VDC to 125VAC
1ECA	Vital Battery Charger	CN-1705-01.01 [127]	Battery 1EBA Charger
1ECC	Vital Battery Charger	CN-1705-01.01 [127]	Battery 1EBC Charger
1DGCA	DG Battery Charger	CN-1705-04.01 [255]	Battery 1DGBA Charger
1ECB	Vital Battery Charger	CN-1705-01.01 [127]	Battery 1EBB Charger
1ECD	Vital Battery Charger	CN-1705-01.01 [127]	Battery 1EBD Charger
1DGCB	DG Battery Charger	CN-1705-04.01 [255]	Battery 1DGBB Charger
1RN1A	RN Pumphouse Pit A Isolation	CN-1574-01.00 [148]	NSW Suction
1RN2B	RN Pumphouse Pit A Isolation	CN-1574-01.00 [148]	NSW Suction
1RN5A	RN Pumphouse Pit B Isolation	CN-1574-01.00 [148]	NSW Suction
1RN6B	RN Pumphouse Pit B Isolation	CN-1574-01.00 [148]	NSW Suction
1RN11A	RN Pump Motor Cooler Isolation	CN-1574-01.00 [148]	NSW Discharge
1RN20B	RN Pump Motor Cooler Isolation	CN-1574-01.02 [149]	NSW Discharge
1RN28A	RN Pump Discharge Isolation	CN-1574-01.00 [148]	NSW Discharge
1RN38B	RN Pump Discharge Isolation	CN-1574-01.02 [149]	NSW Discharge
1RN232A	Diesel Generator Engine Jacket Water Cooler RN Supply Isolation	CN-1574-02.01 [256]	DG Cooling
1RN292B	Diesel Generator Engine Jacket Water Cooler RN Supply Isolation	CN-1574-02.05 [257]	DG Cooling

Table B-5: Electrical Power Equipment Identified for High Frequency Confirmation

Component	Description	Drawing	Function
1RN847A	DSL GEN 1A Heat Exchanger Return to Lake	CN-1574-02.01 [256]	NSW Return
1RN849B	DSL GEN 1B Heat Exchanger Return to Lake	CN-1574-02.05 [257]	NSW Return
Unit 2			
EDG2A	2A Diesel Generator	CN-2702-02.01 [258]	Provides Emergency Power Source
EDG2B	2B Diesel Generator	CN-2702-02.02 [259]	Provides Emergency Power Source
2ETA14	NSW Pump 2RN1PA Breaker	CN-2702-02.01 [258]	EDG Cooling Water
2ETA18	EDG 2A Output Breaker	CN-2702-02.01 [258]	Connect EDG to 4KV ESF Bus
2ETA5	Feed to 2ETXA	CN-2702-02.01 [258]	ESF Bus to 4KV/600V Transformer
2ETA16	Feed to 2ETXC	CN-2702-02.01 [258]	ESF Bus to 4KV/600V Transformer
2ETB14	NSW Pump 2RN1PB Breaker	CN-2702-02.02 [259]	EDG Cooling Water
2ETB18	EDG 2B Output Breaker	CN-2702-02.02 [259]	Connect EDG to 4KV ESF Bus
2ETB5	Feed to 2ETXB	CN-2702-02.02 [259]	ESF Bus to 4KV/600v Transformer
2ETB16	Feed to 2ETXD	CN-2702-02.02 [259]	ESF Bus to 4kv/600v Transformer
2ELXA-04B	Normal Incoming Feed Breaker	CN-2703-01.01 [260]	2ETXA Transformer to 2ELXA Bus
2ELXA-04C	2EMXA Feed Breaker	CN-2703-01.01 [260]	2ELXA to MCC 2EMXA
2ELXA-06C	2EMXE Feed Breaker	CN-2703-01.01 [260]	2ELXA to MCC 2EMXE
2ELXC-04B	Normal Incoming Feed Breaker	CN-2703-01.01 [260]	2ETXC Transformer to 2ELXC Bus
2ELXC-04C	2EMXI Feed Breaker	CN-2703-01.01 [260]	2ELXC to MCC 2EMXI
2ELXB-04B	Normal Incoming Feed Breaker	CN-2703-01.02 [261]	2ETXB Transformer to 2ELXB Bus
2ELXB-04C	2EMXB Feed Breaker	CN-2703-01.02 [261]	2ELXB to MCC 2EMXB
2ELXB-06C	2EMXF Feed Breaker	CN-2703-01.02 [261]	2ELXB to MCC 2EMXF
2ELXD-04B	Normal Incoming Feed Breaker	CN-2703-01.02 [261]	2ETXD Transformer to 2ELXD Bus
2ELXD-04C	2EMXJ Feed Breaker	CN-2703-01.02 [261]	2ELXD to MCC 2EMXJ
2EIA	15KVA Vital Inverter	CN-2705-01.02 [262]	125VDC to 125VAC
2EIB	15KVA Vital Inverter	CN-2705-01.02 [262]	125VDC to 125VAC
2EIC	15KVA Vital Inverter	CN-2705-01.02 [262]	125VDC to 125VAC
2EID	15KVA Vital Inverter	CN-2705-01.02 [262]	125VDC to 125VAC
2ECA	Vital Battery Charger	CN-2705-01.01 [128]	Battery 2EBA Charger
2ECC	Vital Battery Charger	CN-2705-01.01 [128]	Battery 2EBC Charger
2DGCA	DG Battery Charger	CN-2705-04.01 [263]	Battery 2DGBA Charger
2ECB	Vital Battery Charger	CN-2705-01.01 [128]	Battery 2EBB Charger
2ECD	Vital Battery Charger	CN-2705-01.01 [128]	Battery 2EBD Charger
2DGCB	DG Battery Charger	CN-2705-04.01 [263]	Battery 2DGBB Charger
2RN11A	RN Pump Motor Cooler Isolation	CN-1574-01.00 [148]	NSW Discharge
2RN20B	RN Pump Motor Cooler Isolation	CN-1574-01.02 [149]	NSW Discharge
2RN28A	RN Pump Discharge Isolation	CN-1574-01.00 [148]	NSW Discharge
2RN38B	RN Pump Discharge Isolation	CN-1574-01.02 [149]	NSW Discharge
2RN232A	Diesel Generator Engine Jacket Water Cooler RN Supply Isolation	CN-2574-02.01 [264]	DG Cooling
2RN292B	Diesel Generator Engine Jacket Water Cooler RN Supply Isolation	CN-2574-02.05 [265]	DG Cooling

Table B-5: Electrical Power Equipment Identified for High Frequency Confirmation

Component	Description	Drawing	Function
2RN847A	DSL GEN 2A Heat Exchanger Return to Lake	CN-2574-02.01 [264]	NSW Return
2RN849B	DSL GEN 2B Heat Exchanger Return to Lake	CN-2574-02.05 [265]	NSW Return