Stevenson & Associates
Engineering Solutions for Nuclear Energy

Document No: 16C4435-RPT-002
Revision 1
July 24, 2017

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

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REVISION RECORD

Initial Issue (Rev. 0) Date

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Revision History

Rev. No.	Prepared by/ Date	Reviewed by/ Date	Approved by/ Date	Description of Revision
1	A. Masiunas 7/24/2017	A. Karavoussianis 7/24/2017	A. Karavoussianis 7/24/2017	Corrected Drawing Titles for Two Citations

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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 NRC in a letter dated October 27, 2015 [6].

This report describes the High Frequency Confirmation evaluation undertaken for McGuire 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 McGuire 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)[i], 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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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 NRC in a letter dated October 27, 2015 [6].[ii]

On March 20, 2014, McGuire Nuclear Station submitted a reevaluated seismic hazard to the NRC as a part of the Seismic Hazard and Screening Report [7]. By letter dated December 22,

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[i] Seismic Hazard Evaluation on page 7 of Enclosure 1

[ii] In this letter, McGuire Nuclear Station was not included in the list of plants requiring High Frequency Confirmation. The necessity for high frequency evaluations at McGuire was established in further correspondence with the NRC [463, 8].

2016 [8], the NRC transmitted revised results of the screening and prioritization review of the seismic hazards reevaluation.

This report describes the High Frequency Confirmation evaluation undertaken for McGuire 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 the 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 McGuire 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:

- McGuire 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

McGuire Nuclear Station submitted reevaluated seismic hazard information including GMRS and seismic hazard information to the NRC on March 20, 2014 [7]. In a letter dated July 20, 2015, the NRC staff concluded that the submitted GMRS adequately characterizes the reevaluated seismic hazard for the McGuire Nuclear Station site [9].

The NRC revised screening determination letter [8] concluded that the McGuire 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.[iii]

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

[iii] The selection of components for high frequency screening is described in Stevenson & Associates report 16C4435-RPT-001 [429] and is summarized herein.

A table listing the valves selected for analysis and their associated flow diagrams is included as Table B-2 of this report.

2.2.1 Reactor Coolant System Valves

Pressurizer Safety Relief Valves 1/2NC0001/2/3

Based on review of the mechanical drawing for these valves [10, 11, 12], these valves are mechanically-operated pressure relief valves. Because they lack electrical control these valves are excluded from high frequency analysis.

Pressurizer Power Operated Relief Valves 1/2NC0032B, 1/2NC0034A, 1/2NC0036B

Electrical control for the solenoid-operated pilot valves is via rugged hand switches and relays that energize on high pressurizer pressure [13, 14, 15, 16, 17, 18] (U1), [19, 20, 21, 22, 23, 24] (U2) [25, 26, 27, 28, 29, 30, 31] (Common). There is no seal-in of the pressure signal or valve control. Chatter in the vulnerable devices could only lead to momentary valve opening, and no device would prevent valve closure via the hand switch. Thus, no devices meet the selection criteria.

Pressurizer Spray Valves 1/2NC0027C, 1/2NC0029C

Electrical control for the solenoid-operated pilot valves is via rugged hand switches and relays that energize on activation of the standby shutdown system [32, 33, 34]. Chatter in the vulnerable devices could only lead to momentary valve opening, and no device would prevent valve closure via the hand switches. Thus, no devices meet the selection criteria.

Reactor Vessel Head Vent Valves 1/2NC0272AC, 1/2NC0273AC, 1/2NC0274B, 1/2NC0275B

Electrical control for these solenoid-operated valves is via rugged hand control switches with interposing control relays for the standby shutdown system [35, 36, 37, 38, 39, 40] (U1), [41, 42, 43, 44, 45, 46] (U2). Chatter in the vulnerable devices could only lead to momentary valve opening, and no device would prevent valve closure via the hand switches. Thus, no devices meet the selection criteria.

2.2.2 Chemical and Volume Control Valves

Reactor Coolant Letdown to Regenerative Heat Exchanger Isolation Valves 1/2NV0001A, 1/2NV0002A

Electrical control for these solenoid-operated valves is via rugged hand control switches and relays that energize on pressurizer low level [47, 48, 49, 50, 27]. Chatter may momentarily delay closure of these normally open valves, however there is no circuit seal-in which would prevent manual or automatic valve closure after the period of strong shaking. Thus, no devices meet the selection criteria.

Reactor Coolant to Excess Letdown Heat Exchanger Isolation Valves 1/2NV0024B, 1/2NV0025B

Electrical control for these solenoid-operated valves is via rugged hand control switches with a seal-in relay and permissive from the safety injection logic [51, 52, 53, 54]. Chatter in the seal-in contacts of BB(NV24L) or BA(NV25L) in panel 1ATC4A, or DA(NV24L) or DA1(NV25L) in panel 2ATC4A, may energize their coils and open the associated valves. If this were to occur the valves would remain open until closed manually or automatically on safety injection actuation. These relays meet the selection criteria for the high frequency program.

2.2.3 Residual Heat Removal System Valves

Reactor Coolant Discharge to Residual Heat Removal Isolation Valves 1/2ND001B, 1/2ND002AC

These normally-closed motor-operated valves are controlled by rugged hand switches only [55, 56, 57, 58, 59, 60, 61, 62]. Permissive logic in the opening control circuit prevents the valves from being opened without proper alignment of other valves. This permissive logic is comprised of the limit switches associated with these other valves. Since limit switches are considered rugged, and one of these valves, 1/2FW0027A, is open during normal operation [63, 64], chatter in the opening circuit is blocked. The control circuit for 1/2ND002AC includes contacts from the standby shutdown system which may cause partial opening due to contact chatter, however 1/2ND001B would remain closed and prevent a LOCA condition. Thus, no devices meet the selection criteria.

2.3 RCS/Reactor Vessel 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 nuclear service water system[iv] 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-3.

[iv] Flow paths within the nuclear service water system up to the TDAFW tie-ins are analyzed in Section 2.5.4.6.

2.4.1 Nuclear Service Water to Auxiliary Feedwater Supply Valves

Nuclear Service Water to Auxiliary Feedwater Isolation Valves 1/2RN0069A, 1/2RN0162B; Nuclear Service Water Supply Valves 1/2CA0086A, 1/2CA0116B

These motor-operated valves are normally closed and must open to provide a safety-related suction source for the TDAFW pump. The valves are controlled by hand switches and pressure switches via a reversing motor starter [65, 66, 67, 68, 69, 70] (U1), [71, 72, 73, 74, 75, 76] (U2). When closed, chatter in the opening circuit could cause the valve to open, which is desired; and chatter in the closing circuit is blocked by open rugged limit and torque switches. When open, chatter in the opening circuit is blocked by open rugged limit and torque switches; and chatter in the closing circuit could cause the valve to close. If an open valve were to close and the non-seismic sources were unavailable, low suction pressure in the non-seismic source piping would cause the valve to automatically open after the period of strong shaking. Based on this analysis, chatter in the control circuits of these valves would not lead to a sustained loss of cooling water; and thus, no devices in the control circuits for these valves meet the selection criteria.

2.4.2 Auxiliary Feedwater Discharge Flow Control and Isolation Valves

Turbine Driven Auxiliary Feedwater Pump Discharge Flow Control Valves 1/2CA0036AB, 1/2CA0048AB, 1/2CA0052AB, 1/2CA0064AB

These air operated valves are normally closed and open when their associated solenoid valves de-energize [77, p. 25]. The solenoid valves are controlled by the auxiliary feedwater turbine start circuit via normally closed contacts of relays BD and HE1 [78, 79, 80, 81]. When the TDAFW pump is started, relays BD and HE1 energize, opening these contacts and deenergizing the solenoids. There is no seal-in associated with these relays that would prevent valve opening once the TDAFW pump is started. Chatter in the contacts of these relays, or in contacts in their coil circuits could only delay valve opening. Once strong shaking subsides valve operation would return to normal, and thus no devices in the control circuits for these valves meet the selection criteria.

Turbine Driven Auxiliary Feedwater Pump Isolation Valves 1/2CA0038B, 1/2CA0050B, 1/2CA0054AC, 1/2CA0066AC

These motor-operated valves are normally open and must remain open to provide water flow from the TDAFW pump to the steam generators [82, 83, 84, 85, 86, 87, 88, 89]. The valves are controlled by hand switches via a reversing motor starter. Chatter in the opening circuits is blocked by open rugged limit and torque switches. Chatter in the auxiliary contact of the closing contactors could cause the closing contactor to seal-in and close their respective valve. For this reason, M/C contactors in 1/2EMXB-03D, 1/2EMXB2-F04B, 1EMXA5-03D, 1EMXA5-02A, 2EMXA4-01C, and 2EMXA4-01D are selected for high frequency seismic analysis.

2.4.3 Turbine Driven Auxiliary Feedwater Pump Steam Valves

Turbine Driven Auxiliary Feedwater Pump Steam Supply Valves 1/2SA0048ABC, 1/2SA0049AB

These air operated valves are normally closed and open when their associated solenoid valves de-energize [90, p. 10]. The solenoid valves are controlled by the auxiliary feedwater turbine start circuit via normally open contacts of automatic start relays BE and HF2 and manual start relays BG and HG [79, 91]. The manual start relays are energized when the pump control hand switches are in the stop position. The automatic start relays are energized and sealed-in when the pump is not running. Loss of offsite power or a low-low steam generator level breaks the seal-in and deenergizes the automatic start relays. Chatter in the either start circuit could only delay the opening of these valves and start of the pump during the period of strong shaking. Once strong shaking subsides valve operation would return to normal, and thus no devices in the control circuits for these valves meet the selection criteria.

Turbine Driven Auxiliary Feedwater Pump Trip and Throttle Valves 1/2SA0003

These valves are mechanically-operated and close on turbine overspeed [90, p. 15]. Because they lack electrical control these valves are excluded from high frequency analysis.

Turbine Driven Auxiliary Feedwater Pump Governor Valves 1/2SA0004

These valves are mechanically-operated and controlled by turbine speed [90, p. 15]. Because they lack electrical control these valves are excluded from high frequency analysis.

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 McGuire's UFSAR [92]. McGuire 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-4 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 broken down into the generator circuit breaker control and protective relaying, sequencer, and diesel engine control. General descriptions of these systems and controls appear in the UFSAR [92]. 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[v] and automatically started. It is expected that under degraded voltage conditions the normal power 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 affected) is not considered in this analysis.

2.5.1.1 Generator Circuit Breaker Control and Protective Relaying

The diesel generator circuit breakers are closed manually by rugged hand switches, or automatically via the sequencer with engine speed permissives [93, 94, 95, 96, 97, 98] (U1), [99, 100, 101, 102, 103, 104] (U2). Lockout relays for the breaker failure circuits and the main and standby feed breakers are permissives for both manual and automatic closure [105, 106, 107, 108, 109, 110] (U1), [111, 112, 113, 114, 115, 116] (U2). These lockout relays are rugged and their associated protective relaying is solid state, so the lockout circuits are not susceptible to

[v] 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.

chatter. Simultaneous Chatter in the sequencer relays CG(LSATX)/CG(LSBTX) and speed permissive relays MU(SSTA) and MV(SSTB) could lead to premature closure of their associated diesel generator circuit breaker. Chatter in the coil circuits of these relays are covered in the discussion of the sequencer and diesel engine circuits below, Sections 2.5.1.2 and 2.5.1.3, respectively. All other vulnerable devices in the diesel generator circuit breaker closure circuits are blocked by rugged contacts.

The diesel generator circuit breakers are tripped manually by rugged hand switches, or automatically by either the diesel engine control circuits or breaker protective relaying and lockout circuits [93, 94, 95, 96, 97, 98] (U1), [99, 100, 101, 102, 103, 104] (U2). Chatter in the diesel generator start relays DK(2TRA) after breaker closure could trip their associated breakers. Chatter in the voltage restrained overcurrent relays PA(51V), PB(51V), PC(51V) could cause them to seal-in. If this occurs in two out of three of any set than the lockout relay for that breaker will be energized and the breaker will be tripped and locked out. Simultaneous chatter in two out of three of the auxiliary relays associated with these overcurrent relays, RD(51VA), RE(51VB), and RF(51VC), could also cause circuit breaker lockout. For this reason, these protective relays and their associated auxiliary relays meet the selection criteria. Additional protective relaying and a trip signal associated with safety injection are only associated with parallel operation and will not normally trip the circuit breakers during emergency start. Auxiliary contacts AF(52S) from the main and standby feed breakers block these functions when these breakers are both tripped [117, 118, 119, 120, 121, 122, 123, 124]. Chatter in these additional relays would be blocked by the breaker auxiliary contacts provided the auxiliary contacts are sufficiently rugged. The main and standby feeder breakers were selected to determine if their auxiliary contracts are sufficiently rugged to high frequency motions.

Finally, the diesel generator circuit breakers themselves are vulnerable and could potentially trip after closure but before strong shaking subsides [125, 126, 127, 128]. For this reason, the diesel generator circuit breakers meet the selection criteria.

2.5.1.2 Sequencer

Due to the dependence of the diesel generator, essential auxiliary power switchgear, chargers, and nuclear service water valves on signals from the sequencer, the sequencer is included in the High Frequency Program. The following scenarios were analyzed:

- Chatter which could lead to premature breaker closure loading the busses prior to or during EDG start
- Chatter which could lead to breaker trip after normal reclosure
- Chatter which could interfere with signaling to charger or valve motor starters

For this analysis, relay descriptions contained in the device indices [129, 130, 131, 132, 133, 134] (typical) were used in conjunction with the design basis specification [135] to determine the function of the relays in the sequencer circuits [136, 137, 138, 139, 140, 141, 142, 143] (Train 1A) [144, 145, 146, 147, 148, 149, 150, 151] (Train 1B) [152, 153, 154, 155, 156, 157, 158, 159] (Train 2A) [160, 161, 162, 163, 164, 165, 166, 167] (Train 2B).

Load Shed

Chatter in the load shed circuit after normal sequencing[vi] could lead to tripping of the nuclear service water pump or 4160/600V stepdown transformer circuit breakers. For this reason, relays EC(LT2A)/EC(LT2B), GC(LSAT)/GC(LSBT), AB(LSA1)/AB(LSB1), AA(LSA2)/AA(LSB2), as well as the AE(52S) auxiliary contacts on the main and standby feeder breakers [117, 118, 119, 120, 122, 121, 124, 123] meet the selection criteria.

Sequencing

Chatter in the auto-advance circuit relays, the sequence timers, or the seal-in relays for each sequence could lead to premature sequencing prior to diesel generator breaker closure. For this reason, the following relays[vii] meet the selection criteria:

- CB(127AX)
- CB(127BX)
- CB(227AX)
- CB(227BX)
- 4AA(1EQBRL27AX)
- 4AA(1EQBRL27BX)
- 4AA(2EQBRL27AX)
- 4AA(2EQBRL27BX)
- MW(SSTC)
- DC(BOA)
- DC(BOB)
- 2CB(AA1)
- 2CB(AB1)
- 2AB(LRA4)
- 2AB(LRB4)
- JA(ST1A)
- JA(ST1B)
- 2CA(RA1)
- 2CA(RB1)
- BD(1ESGAX1)
- BD(1ESGBX1)
- BD(2ESGAX1)
- BD(2ESGBX1)
- 2EA(RA3)
- 2EA(RB3)
- GA(ST4A)
- GA(ST4B)
- 2FA(RA4)
- 2FA(RB4)
- GB(ST2A)
- GB(ST2B)
- 2DA(RA2)
- 2DA(RB2)
- HB(ST6A)
- HB(ST6B)
- 2HA(RA6)
- 2HA(RB6)
- HA(ST7A)
- HA(ST7B)
- 2IA(RA7)
- 2IA(RB7)
- IC(ST8A)
- IC(ST8B)
- 2JA(RA8)
- 2JA(RB8)
- IB(ST9A)
- IB(ST9B)
- 2HB(RA9)
- 2HB(RB9)
- IA(ST10A)
- IA(ST10B)
- 2IB(RA10)
- 2IB(RB10)
- JB(ST11A)
- JB(ST11B)
- 2JB(RA11)
- 2JB(RB11)

In addition to these, chatter in relay FA(RGA)/FA(RGB) could lead to premature EDG breaker closure by energizing CG(LSATX)/CG(LSBTX) via GC(LSAT)/GC(LSBT). See Section 2.5.1.1 for the EDG breaker circuit analysis.

Signaling

Chatter in the relays that, in response to the loss of essential auxiliary power and EDG start, signal the realignment of nuclear service water valves and the start of the turbine driven auxiliary feedwater pump would only delay these functions during the period of strong shaking. Once strong shaking subsides the signals would be applied to those control systems [139, 147, 155,

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[vi] In this scenario, loss of offsite power occurs, loads are shed, and the diesel starts and is loaded normally. After this occurs and before strong shaking subsides, chatter causes a false load shed signal while the sequencer is sending a sustained breaker closure signal. Due to the anti-pumping feature in the circuit breakers, it is expected that the tripped breaker would not automatically close and some form of operator action would be required to reclose the breaker.

[vii] This list applies to all four trains. Devices with the same identification in the same train of both units, or the same identification in all four trains, are not repeated.

163]. SILO relays that these signals are derived from, DC(BOA)/DC(BOB) and EC(LT2A)/EC(LT2B), are already selected above.

Degraded Voltage Relaying

The degraded voltage relaying trips the main and standby feeder breakers when there is a sustained degraded voltage condition affecting the essential auxiliary power system [168, 169, 170, 171, 172, 173, 174, 175]. Once these breakers are tripped the loss of bus voltage triggers diesel generator start. There is no seal-in in this circuit and chatter within the circuit could only lead to a delay in tripping the feeder breakers or lead to a premature trip. This chatter would not prevent diesel generator start after the period of strong shaking and for that reason no devices in this circuit meet the selection criteria.

2.5.1.3 Diesel Engine Control

Chatter analysis for the diesel engine control was performed on the start and shutdown circuits of each EDG [176, 177, 178, 179, 180, 181, 182, 183] (Train 1A), [184, 185, 186, 187, 188, 189, 190, 191] (Train 1B), [192, 193, 194, 195, 196, 197, 198, 199] (Train 2A), [200, 201, 202, 203, 204, 205, 206, 207] (Train 2B). For this analysis, relay descriptions contained in the device indices were used [208, 209, 210, 211] (typical) in conjunction with the design basis specification [212] to determine the function of the relays in these circuits.

Upon a sustained loss of voltage on the essential auxiliary power busses, the sequencers signal the diesel generators to start. These signals energize the automatic start relays. Once energized, automatic start relay GL(DASR) seals-in and bypasses several non-critical engine interlocks. Provided this relay is sufficiently rugged, chatter in the sequencer signal or non-critical interlocks have no effect on diesel generator start. For this reason, GL(DASR) is selected for the high frequency program.

The diesel start relays control the diesel stop relays, and in turn the stop relays control the fuel rack solenoids. Chatter in either circuit having the potential to deenergize the fuel rack solenoids could lead to engine shutdown. For this reason, diesel start relays DJ(2TRC) and FJ(2TRB), and diesel stop relays GM(RVG2) and DL(RVG3) meet the selection criteria. (Diesel start relay DK(2TRA) is already selected above.) Other relays in the start circuit have separate coil circuits which need to be analyzed, these are discussed below.

Overspeed Relays

Chatter in the overspeed trip circuits could cause the relays associated with this fault to seal-in and stop the diesel or block starting. For this reason, the following relays meet the selection criteria:

- AB(1EQCSW7740)
- AB(1EQCSW7770)
- AB(2EQCSW7740)
- AB(2EQCSW7770)
- MA(1EQCSW7720)
- MA(1EQCSW7750)
- MA(2EQCSW7720)
- MA(2EQCSW7750)
- MB(1EQCSW7730)
- MB(1EQCSW7760)
- MB(2EQCSW7730)
- MB(2EQCSW7760)
- BA(SSTD)
- BB(SSTE)
- BC(SSTF)
- CA(SSTD1)
- CB(SSTE1)

Lube Oil Relays

Prior to diesel start, lube oil pressure is low and the pressure switches are closed. Open contacts on the alarm restrain relay FL(ARR) prevent the lube oil relays JK(SRX1) and LO(SRX2) from energizing and sealing-in until 30 seconds after the diesel reaches 95% speed. Chatter in the alarm restraint relay contacts or in the lube oil relay seal-in contacts could cause these relays to seal in and stop the engine or block starting. The 30-second time delay associated with the alarm restraint relay prevents chatter in its coil circuit from affecting the lube oil relays. Due to the time delay associated with the sequencer issuing a start signal, the time to reach 95% speed, and the additional 30 seconds the alarms are restrained, strong shaking would have subsided prior to the closure of the alarm restraint relay. This prevents chatter in the oil pressure switches from causing a seal-in of the lube oil relays. Based on this analysis, the only devices in this circuit that meet the selection criteria are FL(ARR), JK(SRX1), and LO(SRX2).

Emergency Stop Relays

The emergency stop relays are controlled by rugged hand switches, however the relay includes a seal-in contact which if it were to chatter could seal in, stopping the engine, or preventing start. For this reason, the emergency stop relay LN(ESX) meets the selection criteria.

Engine Speed Relays

Chatter in the 40% speed circuit could lead to chatter in the diesel start circuit. Chatter in relays JJ(S1A2X), JL(S1A1X), EK, EL, and EM all have the potential to de-energize the fuel rack solenoids via the start and stop relays. For this reason, these relays meet the selection criteria. Speed signals used for the sequencer and diesel breaker control have already been covered by the selection of speed switches above, and in the discussion of the sequencer and diesel breaker circuits above. There are no further devices in the engine speed circuits meeting the selection criteria.

2.5.2 Battery Chargers

2.5.2.1 125VDC Vital Instrumentation and Control Power

125VDC Vital Instrumentation and Control Power Normal Battery Chargers EVCA, EVCB, EVCC, EVCD

These battery chargers are powered from the 600V Essential Auxiliary Power System via non-reversing motor starters and a charger connection box that provides a manual transfer scheme between normal and alternate power sources [213, 214, 215, 216, 217]. Since transfer between power sources is a manual operation using rugged molded-case circuit breakers, the connection box circuitry is not included in this analysis and normal power feeds are credited only. The motor starters are controlled manually by rugged hand switches or automatically from the sequencer [218, 219, 220, 221]. Chatter in the sequencer is covered in Section 2.5.1.2. There is a seal-in circuit in the motor starter associated with manual start. This circuit is comprised of an auxiliary relay, contactor, and time delay drop-out relay, all of which energize to seal-in when the contactor is started. If a seismic event occurs but does not lead to loss of offsite power, chatter in the seal-in circuit would be blocked by the time delay relay. If there is a loss of offsite power due to the event, a sustained contact closure from the sequencer bypasses the seal-in and keeps the charger started. Chatter in the sequencer contact may delay the start of the charger, however normal motor starter function would be restored when strong shaking subsides. The sequencing of the chargers is concurrent with the sequencing of the 600V Essential Auxiliary Power Load Centers they are powered from. Since the motor starter control power originates from the load center feed, premature sequencing of the motor starter due to chatter in its sequencer contact is not possible due to the lack of control power prior to its sequence. Based on this analysis, no devices in the battery charger motor starters meet the selection criteria.

Chatter analysis on the battery chargers themselves was performed using information from the Design Basis Specification [222, p. 28], as well as vendor schematic diagrams contained in the battery charger manual [223]. Each battery charger has a high voltage shutdown circuit which is intended to protect the batteries and DC loads from output overvoltage due to charger failure. In an overvoltage condition, the X320 High DC Voltage Sense Board will shunt-trip the AC Input Circuit Breaker B301 via time delay pickup relay K307. Chatter in the K307 contacts could cause an unintended circuit breaker trip, which would render the chargers unavailable. Any effect from chatter in X320 is blocked by the 5-second pick up delay of K307. Based on this analysis, K307 in battery chargers EVCA, EVCB, EVCC, and EVCD are selected for high frequency analysis.

125VDC Vital Instrumentation and Control Power Spare Battery Charger EVCS

The spare battery charger requires operator action to close circuit breakers prior to use, and for that reason is not included in this analysis [92, pp. 8.3-34].

2.5.2.2 125VDC Diesel Generator Control Power

125VDC Vital Instrumentation and Control Power Normal Battery Chargers 1/2EDGA, 1/2EDGB

These battery chargers are powered from 600V Essential Auxiliary Power System motor control centers via rugged molded-case circuit breakers [224, 225, 226, 227, 228]. AC power to these chargers is not separately controlled and is instead present whenever the motor control centers are powered.

Chatter analysis on the battery chargers themselves was performed using information from the design basis specification [229, p. 14], as well as vendor schematic diagrams [230, 231]. Each battery charger has a high voltage shutdown circuit which is intended to protect the batteries and DC loads from output overvoltage due to charger failure. In an overvoltage condition, the X309 High DC Voltage Sense Board will shunt-trip the AC Input Circuit Breaker B301 via time delay pickup relay K301. Chatter in the K301 contacts could cause an unintended circuit breaker trip, which would render the chargers unavailable. Any effect from chatter in X309 is blocked by the 15-second pick up delay of K301. Based on this analysis, K301 in battery chargers 1EDGA, 1EDGB, 2EDGA, and 2EDGB are selected for high frequency analysis.

2.5.3 Inverters

120VAC Vital Instrumentation and Control Power Inverters 1/2EVIA, 1/2EVIB, 1/2EVIC, 1/2EVID

The inverters are powered from 125VDC Vital Instrumentation and Control Power distribution centers via rugged molded case circuit breakers [217, 232, 222, p. 32]. Review of the design basis specification [233], as well as vendor schematic diagrams [234, 235, 236] 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

To start and operate the Emergency Diesel Generators, several components and systems are required. For identifying electrical contact devices, only systems and components which are electrically controlled are analyzed. Information in the UFSAR [92] as well as various one-line drawings, flow diagrams, and system design basis specifications were used as necessary for this analysis.

2.5.4.1 Starting Air

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 [237, 238, 239], which are covered under the EDG engine control analysis in Section 2.5.1.3.

2.5.4.2 Combustion Air Intake and Exhaust

The combustion air intake and exhaust for the Diesel Generators are passive systems which do not rely on electrical control [240, 241, 242].

2.5.4.3 Lube Oil

During operation, the Diesel Generators utilize engine-driven mechanical lubrication oil pumps which do not rely on electrical control [243, 244, 245, 246, 247]. The Before and After Lube Oil Pump and Lube Oil Heater Pump are not necessary during EDG operation, and any short-term loss of operation between the start of strong shaking and EDG start would not impact generator availability. For these reasons, no lube oil pumps are included in the High Frequency Program.

Diesel Generator Engine Lube Oil Bypass Valves 1/2LD0108A, 1/2NV0113B

This motor-operated valve is normally closed and is opened by a pressure switch or rugged hand switches via a reversing motor starter [248, 249, 250, 251, 252, 253, 254, 255]. Chatter in the pressure switch or motor starter opening contactor auxiliary contact could cause the contactor to seal-in and open the valve. This would bypass the Lube Oil Filter; however, a bypassed filter would not impact the emergency operation of the Diesel Generators. For this reason, these contact devices are excluded from the High Frequency Program.

2.5.4.4 Fuel Oil

The Diesel Generators utilize engine-driven mechanical pumps[viii] and DC-powered booster pumps to supply fuel oil to the engines from the day tanks [256, 257, 258, 259, 260]. The day tanks are re-supplied using AC-powered fuel oil transfer pumps.

Diesel Generator Fuel Oil Booster Pumps

The starter contactor for the booster pumps energize and seal-in on a low fuel pressure signal while its associated diesel generator is operating, and deenergize when the diesel generator stops or fuel pressure is sufficiently high [261, 262, 263, 264]. Chatter in the booster pump control circuit when the diesel generator is stopped could cause the pump to start momentarily, however seal-in is blocked by an open EDG start permissive. Similarly, chatter when the diesel generator is operating and fuel pressure is above the high-pressure threshold could cause the pump to start momentarily, however seal-in is blocked by the open high-pressure switch. Chatter when the diesel generator is operating but fuel pressure is between the low- and high-pressure thresholds would cause the pump to start and contactor to seal-in, however this would not impact diesel generator operation, and the pump would stop when pressure rises above the high-pressure threshold. Since none of these potential chatter consequences impact diesel generator availability or operation, no devices in the fuel oil booster pump control circuit meet the selection criteria.

Diesel Generator Fuel Oil Transfer Pumps

The fuel oil transfer pumps are controlled automatically by the fuel level in the day tanks, or manually via rugged hand switches, with permissives from the EDG auto-start, fire detection, and power monitor circuits [265, 266, 267, 268, 269, 270, 271, 272]. The auto-start circuit is covered under the EDG engine control analysis in Section 2.5.1.3. An automatic start signal prevents the fire detection relay from energizing and sealing-in, and the power monitor relay has no seal-in. As stated above the day tanks are considered full at the start of strong shaking. In this condition, the pump is stopped and chatter in the motor starter circuit could only cause temporary pump operation during the period of strong shaking. Once shaking subsides pump operation would return to normal (automatic control based on day tank level). Based on this analysis, no devices in the fuel oil transfer pump control meet the selection criteria.

2.5.4.5 Engine Cooling Water

An analysis of the design basis specification [273] and flow diagrams [274, 275, 276, 277] for the diesel generator engine cooling water system identified only three electrically controlled components, the intercooler and jacket water pumps, the jacket water circulating pump, and the intercooler temperature controller.

Diesel Generator Intercooler and Jacket Water Pumps

The intercooler and jacket water pumps are controlled via a non-reversing motor starter manually by a rugged hand switch or automatically by the EDG engine control system [278, 279, 280, 281]. The motor starter has no seal-in, and the EDG engine control system is already covered in Section 2.5.1.3. Chatter in the motor starter circuit would only have a temporary effect on the

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[viii] The mechanical pumps do not rely on electrical control.

pumps during the period of strong shaking, and normal operation would return after strong shaking subsides. No devices specific to the control of the intercooler and jacket water pumps meet the selection criteria.

Diesel Generator Jacket Water Circulating Pumps

The jacket water circulating pumps maintain flow through the jacket water heaters to keep their respective engine warm when not operating [273, p. 21]. The pump starters are controlled by a normally closed auxiliary contact of the intercooler and jacket water pump motor starter contactor [282, 283, 284, 285], preventing them from running during diesel generator operation. An interruption in pump operation from the start of strong shaking until diesel generator start would have no impact on the availability of the diesel generator. For this reason, these pumps are not included in the High Frequency Program.

Diesel Generator Intercooler Temperature Controllers

The intercooler temperature controllers provide a continuous signal to position the intercooler water temperature control valves [273, p. 14]. Because the signal is continuous, discrete SILO devices are not used and therefore these controllers are excluded from the High Frequency Program.

2.5.4.6 Nuclear Service Water

Nuclear service water is required to cool the diesel generator jacket water heat exchangers. Besides the nuclear service water pumps, an analysis of the design basis specification [286] and flow diagrams [287, 288, 289, 290, 291, 292] (U1 and Common), [293, 294, 295, 296] (U2) indicated the following valves either need to change their state or remain open to establish the credited flow path:

- 0RN0009B
- 0RN0011B
- 0RN0012AC
- 0RN0013A
- 0RN0147AC
- 0RN0148AC
- 0RN0152B
- 0RN0284B
- 1RN0001
- 1RN0016A
- 1RN0018B
- 1RN0041B
- 1RN0043A
- 1RN0063B
- 1RN0064A
- 1RN0070A
- 1RN0073A
- 1RN0171B
- 1RN0174B
- 1RN0296A
- 1RN0297B
- 2RN0016A
- 2RN0018B
- 2RN0041B
- 2RN0043A
- 2RN0063B
- 2RN0064A
- 2RN0070A
- 2RN0073A
- 2RN0171B
- 2RN0174B
- 2RN0296A
- 2RN0297B

These valves are included in the High Frequency Program to ensure contact chatter in their control circuits does not prevent proper cooling flow to the EDG heat exchangers.

Nuclear Service Water Pumps

All protective relaying for the nuclear service water pump circuit breakers are solid state [297, 298, 299, 300]. The only vulnerable devices associated with the control of these circuit breakers are the sequencer relays, which are discussed in section 2.5.1.2 [301, 302, 303, 304], and circuit breaker auxiliary contacts for the auxiliary feedwater pump circuit breakers [305, 306, 307, 308].

Chatter in these auxiliary contacts could cause the nuclear service water pump circuit breaker to close prematurely, prior to closure of the diesel generator circuit breaker, leading to miss-sequencing. In addition, the nuclear service water pump circuit breakers themselves are vulnerable and could potentially trip after closure but before strong shaking subsides [309, 310, 311, 312]. For this reason, the circuit breakers for the auxiliary feedwater and nuclear service water pumps meet the selection criteria.

Nuclear Service Water Low-Level Intake Isolation Valve 1RN001

This motor operated valve is normally open and must remain open to maintain the credited flow path necessary to cool the A-train diesel generators for both units. The valve is controlled by rugged hand switches only, via a reversing motor starter [313]. Power to the valve motor is routed from the motor starter and control circuit in MCC SMXL compartment 3D to a separate disconnect circuit breaker in SMXL-3C. The breaker in SMXL-3C is normally disconnected preventing any seal-in in the valve motor starter from closing the valve [286, p. 61]. For this reason, no devices in the control circuit for this valve meet the selection criteria.

Diesel Generator Heat Exchanger Control Valves 1/2RN073A, 1/2RN174B

These motor operated valves are normally throttled and are controlled by rugged hand switches only, via a reversing motor starter [314, 315, 316, 317]. The motor starter has no seal-in and any chatter would be blocked by the open hand switches. No devices in these valve controls meet the selection criteria.

All Other Nuclear Service Water Valves Listed Above

The remaining valves are all motor operated and automatically controlled by the diesel generator start circuit or sequencer such that they are commanded to the proper alignment once the diesels start [318, 319, 320, 321, 322, 323] (Common Train A Suction), [324, 325, 326, 327, 328, 329] (Common Train B Suction), [330, 331, 332, 333, 334, 335, 336, 337, 338] (U1), [339, 340, 341, 342, 343, 344, 345, 346, 347] (U2), [348, 349] (Common Control), [350, 351, 352, 353, 354, 355] (Common Train A Discharge), [356, 357, 358, 359, 360, 361] (Common Train B Discharge). Chatter in the diesel generator start circuit is covered in Section 2.5.1.3; and chatter in the sequencer circuit is covered in Section 2.5.1.2. Chatter in the motor starter circuits of any of these valves could only lead to temporary misalignment. Due to the sustained signals from the diesel generator start and sequencer circuits, normal alignment would be restored after the period of strong shaking. No devices specific to the control of these valves meet the selection criteria.

2.5.4.7 Ventilation

Safety-related ventilation of the diesel buildings is provided by two fans per train, with exhaust via a set of relief dampers [362, 363, 364].

Diesel Building Ventilation Fans DSF-1A, DSF-1B, DSF-2A, DSF-2B

These ventilation fans are controlled by room temperature with diesel generator start and fire detection (halon) permissives [365, 366, 367, 368]. The diesel start circuit is covered under the EDG engine control analysis in Section 2.5.1.3, and the fire detection signal has no seal-in [369, 370, 371, 372, 373, 374, 375, 376]. These fans are stopped when their associated diesel generator is stopped, or when the diesel generator is running but room temperature is below 60°. In either of these states, chatter in the fan motor control circuit could only cause momentary operation of the fan. When the diesel generator is operating and room temperature is above 85° chatter could only delay starting the fan until strong shaking subsides. When the diesel generator is operating and room temperature is between 60° and 85° chatter could lock out the fan, however once room temperature rises above 85° the lockout clears and the fan would start automatically. None of these potential scenarios would impact the availability of the diesel generator to provide emergency electrical power, and for this reason no devices in the fan control circuits meet the selection criteria.

Diesel Building Ventilation Fans DSF-1C, DSF-1D, DSF-2C, DSF-2D

These ventilation fans operate whenever the diesel generator is running, with a fire detection (halon) permissive [377, 378, 379, 380]. The diesel start circuit is covered under the EDG engine control analysis in Section 2.5.1.3, and the fire detection signal is covered in the previous paragraph. There is no seal-in or lock-out associated with the fan control circuit. Chatter in the control circuit would only cause momentary fan operation when the diesel generator is stopped or, when the diesel generator is running, delay fan operation until strong shaking subsides. Neither of these potential scenarios would impact the availability of the diesel generator to provide emergency electrical power, and for this reason no devices in the fan control circuits meet the selection criteria.

Diesel Building Relief Dampers DGA-RAID-1A/B/C/D, DGA-RAID-2A/B/C/D

The relief air actuators for these dampers are controlled by the fire detection (halon) system via an interposing relay [381, 382, 383, 384, 385, 386, 387, 388]. As mentioned previously, the fire detection system has no seal-in, and there is no seal-in in the coil circuit of the interposing relay. Contact chatter in the relief damper control circuits would only have a temporary effect on the relief dampers during the period of strong shaking. Damper operation would return to normal after strong shaking subsides. Based on this analysis, none of the devices in the damper control circuits meet the selection criteria.

2.5.4.8 Crankcase Vacuum

The only active components in this system are the crankcase vacuum blowers [389, 390, 391]. The crankcase vacuum blowers are controlled via a non-reversing motor starter manually by a rugged hand switch or automatically by the EDG engine control system [392, 393, 394, 395]. The motor starter has no seal-in, and the EDG engine control system is already covered in Section 2.5.1.3. Chatter in the motor starter circuit would only have a temporary effect on the blowers during the period of strong shaking, and normal operation would return after strong shaking subsides. No devices specific to the control of the crankcase vacuum blowers meet the selection criteria.

2.5.5 Switchgear, Load Centers, and MCCs

Power distribution from the EDGs to the necessary electrical loads (battery chargers, inverters, fuel oil pumps, jacket water pumps, nuclear service water pumps and valves, ventilation fans, and crankcase vacuum blowers) was traced to identify any SILO devices which could lead to a circuit breaker trip and interruption in power. This effort excluded the EDG circuit breakers and their control devices, which are covered in Section 2.5.1.1, sequencing, which is covered in 2.5.1.2, the service water pump circuit breakers and their control devices, which are covered in Section 2.5.4.6, and 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 4160V switchgear [396, 397] and 600V load centers [398, 399, 400, 401] 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 trip during strong shaking[ix]:

- 1ETA3
- 1ELXA-04B
- 1ELXA-04D
- 1ELXA-05D
- 1ETB3
- 1ELXB-04B
- 1ELXB-05C
- 1ELXB-05D
- 2ETA14
- 2ELXA-04B
- 2ELXA-04D
- 2ELXA-05D
- 2ETB14
- 2ELXB-04B
- 2ELXB-04C
- 2ELXB-05C
- 2ELXB-05D

The 600V AC MCCs and DC power distribution use Molded-Case Circuit Breakers [402, p. 19, 222, p. 32] which are seismically rugged [4, pp. 2-11], and thus excluded from evaluation.

The only medium-voltage circuit breaker control circuits not covered in other sections were those that distribute power via stepdown transformers from the 4160 switchgear to their associated 600V load centers. All protective relaying for the 4160/600V transformer circuit breakers (1ETA3, 1ETB3, 2ETA14, 2ETB14) are solid state [403, 404, 405, 406]. The only vulnerable devices associated with the control of these circuit breakers are the sequencer relays, which are discussed in section 2.5.1.2 [407, 408, 409, 410]. All load center circuit breakers listed above are controlled by rugged hand switches only [411, 412, 413, 414, 415, 416] (U1) [417, 418, 419, 420, 421, 422, 423] (U2). Based on this analysis, only the medium- and low-voltage circuit breakers meet the selection criteria.

[ix] 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 McGuire Nuclear Station horizontal ground motion response spectrum (GMRS), which was generated as part of the McGuire Nuclear Station Seismic Hazard and Screening Report [7] submitted to the NRC on March 20, 2014, and accepted by the NRC on July 20, 2015 [9].

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 1 structures are founded on sound rock per McGuire 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, 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)	Vs30 (ft/s)
1	0.0	0	4,750	0.00000	0.00000	7000
2	6.5	6.5	4,750	0.00137	0.00137	
3	13.0	6.5	7,200	0.00090	0.00227	
4	20.0	7	7,200	0.00097	0.00324	
5	20.5	0.5	7,200	0.00007	0.00331	
6[x]	98.4	77.9	7,251	0.01074	0.01406	
7	3301.3	3280.8	9,285	0.35334	0.36740	

[x] The shear wave velocity in Layer 6 is calculated by interpolating shear wave velocities from Layer 5 and 7.

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 0.305g and the shear wave velocity of 7000ft/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.

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 McGuire Nuclear Station.

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

Frequency (Hz)	HGMRS (g)	V/H Ratio	VGMRS (g)
100	0.305	0.81	0.247
90	0.310	0.84	0.260
80	0.322	0.88	0.283
70	0.351	0.93	0.326
60	0.424	0.94	0.399
50	0.565	0.92	0.520
40	0.670	0.87	0.583
35	0.676	0.82	0.554
30	0.660	0.77	0.508
25	0.629	0.71	0.447
20	0.603	0.7	0.422
15	0.559	0.7	0.391
12.5	0.528	0.7	0.370
10	0.486	0.7	0.340
9	0.455	0.7	0.319
8	0.421	0.7	0.295
7	0.384	0.7	0.269
6	0.344	0.7	0.241
5	0.300	0.7	0.210
4	0.241	0.7	0.169
3.5	0.209	0.7	0.146
3	0.177	0.7	0.124
2.5	0.143	0.7	0.100
2	0.129	0.7	0.090
1.5	0.104	0.7	0.073
1.25	0.089	0.7	0.062
1	0.075	0.7	0.052
0.9	0.072	0.7	0.051
0.8	0.070	0.7	0.049
0.7	0.067	0.7	0.047
0.6	0.062	0.7	0.043
0.5	0.054	0.7	0.038
0.4	0.044	0.7	0.030
0.35	0.038	0.7	0.027
0.3	0.033	0.7	0.023
0.25	0.027	0.7	0.019
0.2	0.022	0.7	0.015
0.15	0.016	0.7	0.011
0.125	0.014	0.7	0.010
0.1	0.011	0.7	0.008

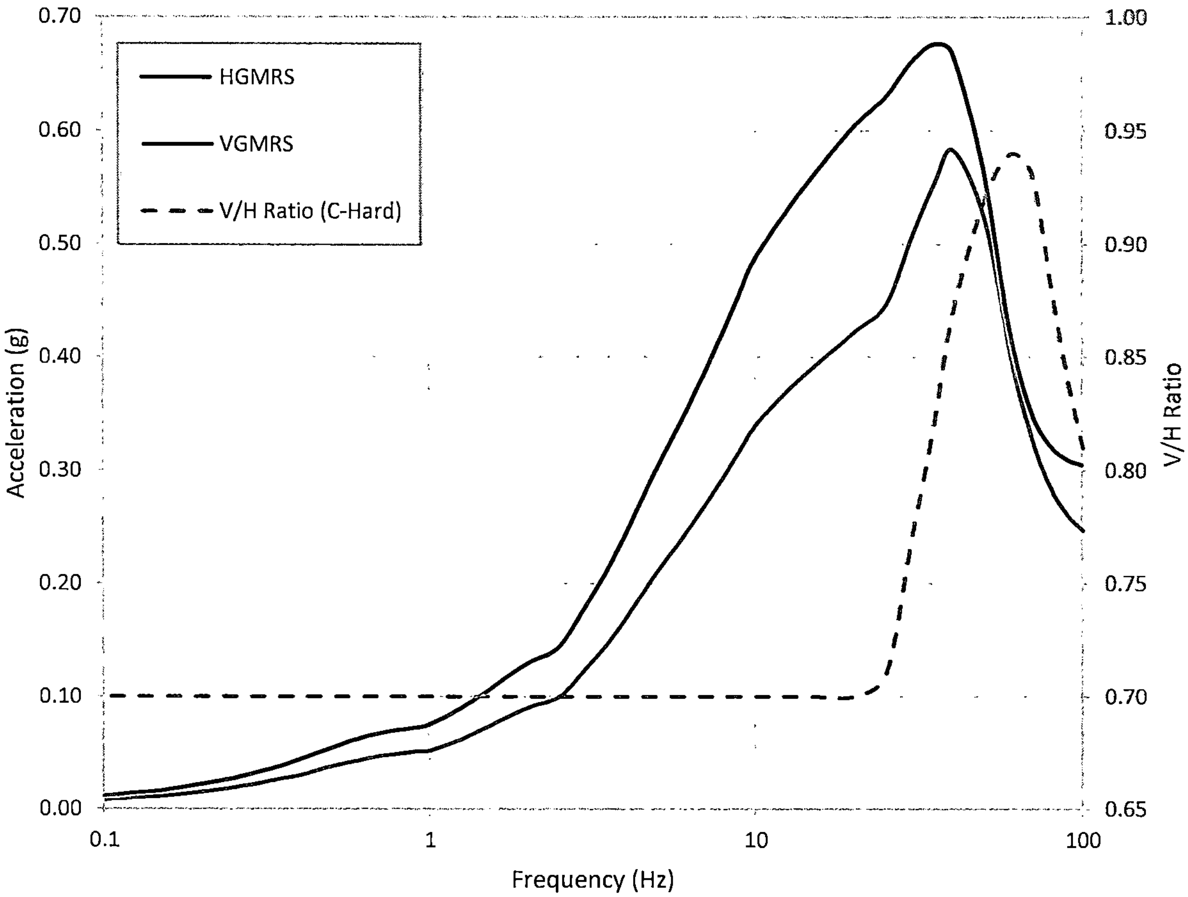

Figure 3-1: Plot of the Horizontal and Vertical Ground Motions Response Spectra and V/H Ratios

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 [424] assuming 5% in-cabinet response spectrum damping. EPRI NP-7148 [424] 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 motor control center 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

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 [425], then the component seismic capacity from this program is used.
(2) If a contact device was not tested as part of [425], 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 [426] and [427].
  (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 3 using the criteria in Section 4.5 of Reference [4]. The high-frequency evaluations as described above were performed in Reference [428].

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

5. CONCLUSIONS

5.1 General Conclusions

McGuire 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 317 components that required evaluation. As summarized in Table B-1 in Appendix B, 289 of the devices have adequate seismic capacity, and 28 components required resolution following the criteria in Section 4.6 of Reference [4].

To improve plant safety, McGuire 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 28 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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[128] McGuire Document MCEE-215-00.21 Rev. 14, *Elementary Diagram 4160V Switchgear 2ETB Unit #2 Diesel Generator 2B Feeder Breaker (Part 1).*

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[130] McGuire Document MCEE-114-00.00-02 Rev. 3, *Elementary Diagram Device Index Diesel Generator 1A Load Sequencer.*

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[132] McGuire Document MCEE-114-00.00-04 Rev. 4, *Elementary Diagram Device Index Diesel Generator 1A Load Sequencer.*

[133] McGuire Document MCEE-114-00.00-05 Rev. 3, *Elementary Diagram Device Index Diesel Generator 1A Load Sequencer.*

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[140] McGuire Document MCEE-114-00.05 Rev. 7, *Elementary Diagram Diesel Generator 1A Load Sequencer (Part 5).*

[141] McGuire Document MCEE-114-00.06 Rev. 10, *Elementary Diagram Diesel Generator 1A Load Sequencer (Part 6).*

[142] McGuire Document MCEE-114-00.07 Rev. 3, *Elementary Diagram Diesel Generator 1A Load Sequencer (Part 7).*

[143] McGuire Document MCEE-114-00.08 Rev. 10, *Elementary Diagram Diesel Generator 1A Load Sequencer (Part 8).*

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[145] McGuire Document MCEE-114-00.10 Rev. 8, *Elementary Diagram Diesel Generator 1B Load Sequencer (Part 2).*

[146] McGuire Document MCEE-114-00.11 Rev. 5, *Elementary Diagram Diesel Generator 1B Load Sequencer (Part 3).*

[147] McGuire Document MCEE-114-00.12 Rev. 8, *Elementary Diagram Diesel Generator 1B Load Sequencer (Part 4).*

[148] McGuire Document MCEE-114-00.13 Rev. 7, *Elementary Diagram Diesel Generator 1B Load Sequencer (Part 5).*

[149] McGuire Document MCEE-114-00.14 Rev. 10, *Elementary Diagram Diesel Generator 1B Load Sequencer (Part 6).*

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[159] McGuire Document MCEE-214-00.08 Rev. 9, *Elementary Diagram Diesel Generator 2A Load Sequencer (Part 8).*

[160] McGuire Document MCEE-214-00.09 Rev. 9, *Elementary Diagram Diesel Generator 2B Load Sequencer (Part 1).*

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[181] McGuire Document MCEE-0120-01.05 Rev. 4, *Elementary Diagram Diesel Generator 1A Governor Control Circuit.*

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[184] McGuire Document MCEE-0120-09.01 Rev. 5, *Elementary Diagram Diesel Generator 1B Start Circuit.*

[185] McGuire Document MCEE-0120-09.01-02 Rev. 1, *Elementary Diagram Diesel Generator 1B Start Circuit.*

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[199] McGuire Document MCEE-0220-01.07 Rev. 6, *Elementary Diagram Diesel Generator 2A Start Circuit.*

[200] McGuire Document MCEE-0220-09.01 Rev. 5, *Elementary Diagram Diesel Generator 2B Start Circuit.*

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[263] McGuire Document MCEE-0220-05.02 Rev. 2, *Elementary Diagram Fuel Oil Booster Pump Diesel Generator 2A.*

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[268] McGuire Document MCEE-0120-13.01-01 Rev. 2, *Elementary Diagram Diesel Generator 1B Fuel Oil Day Tank Level.*

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[270] McGuire Document MCEE-0220-05.01-01 Rev. 1, *Elementary Diagram Diesel Generator 2A Fuel Oil Day Tank Level.*

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[298] McGuire Document MCEE-115-00.32-01 Rev. 5, *Elementary Diagram 4160V Switchgear 1ETB Unit #12 Nuclear Service Water Pump Motor 1B (Part 2).*

[299] McGuire Document MCEE-215-00.04-01 Rev. 3, *Elementary Diagram 4160V Switchgear 2ETA Unit #5 Nuclear Service Water Pump Motor 2A (Part 2).*

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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].

Sample calculations for the high-frequency seismic demand of components 4AA(1EQBRL27AX) contained in control cabinet 1DGLSA, located in the Auxiliary Building at elevation 750', and JJ(S1A2X) contained in control cabinet 1DGCPA, located in the Diesel Generator Building at elevation 736.5'. Reference [428] calculates the high-frequency seismic demand for all the subject components.

A.1.1 Horizontal Seismic Demand

The horizontal site-specific GMRS for McGuire 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): $SA_{HGMRS} = 0.676g$ (at 35 Hz)

Compute the distance between the subject floor elevation and the building foundation elevation. Per Attachment F of Reference [428], the foundation elevation for the Auxiliary Building (AB) is 712' and for Diesel Generator (DG) Building is 726'. Per Reference [429], components 4AA(1EQBRL27AX) and JJ(S1A2X) are mounted on panel 1DGLSA and 1DGCPA, respectively. The panel type and elevation for 1DGLSA and 1DGCPA is provided in Attachment D of Reference [428]; 1DGLSA is located in the Auxiliary Building (AB) and 1DGCPA is located in the Diesel Generator Building (DGB).

Foundation Elevation (Attachment F of Ref. [428]):	$EL_{found} = 712$ ft	Auxiliary Building
	$EL_{found} = 726$ ft	Diesel Generator Building
Component Floor Elevation:	$EL_{comp} = 750$ ft	*4AA(1EQBRL27AX)*
	$EL_{comp} = 736.5$ ft	*JJ(S1A2X)*

Distance Between Component Floor and Foundation Elevation: $h_{comp} = EL_{comp} - EL_{found} = 38.0$ ft *4AA(1EQBRL27AX) (in AB)*

$h_{comp} = EL_{comp} - EL_{found} = 10.5$ ft *JJ(S1A2X) (in DGB)*

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 $h_{comp} <= 40$ft

2.1 otherwise

$AF_{SH}(h_{comp}) = 2.055$ *4AA(1EQBRL27AX)*

$AF_{SH}(h_{comp}) = 1.436$ *JJ(S1A2X)*

Calculate the horizontal in-cabinet amplification factor based on the type of cabinet that contains the subject component. Per Attachment D of Reference [428], 1DGLSA and 1DGCPA are both control cabinets. Per Ref. [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 *4AA(1EQBRL27AX)*"

cab2 = "Control Cabinet for *JJ(S1A2X)*"

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: $ICRS_{c.h} = AF_{SH} * AF_{c.h} * SA_{GMRS}$

$ICRS_{c.h} = 2.055*4.5*0.676 = 6.25g$ *4AA(1EQBRL27AX)*

$ICRS_{c.h} = 1.436*4.5*0.676 = 4.37g$ *JJ(S1A2X)*

A.1.2 <u>Vertical Seismic Demand</u>

The vertical site-specific GMRS for McGuire 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): $SA_{VGMRS} = 0.583g$ (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): $h_{comp} = 38.0$ ft *4AA(1EQBRL27AX)*

$h_{comp} = 10.5$ ft *JJ(S1A2X)*

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: $AF_{SV}(h_{comp}) = m_v * h_{comp} + b_v$

$AF_{SV}(h_{comp}) = 1.646$ *4AA(1EQBRL27AX)*

$AF_{SV}(h_{comp}) = 1.179$ *JJ(S1A2X)*

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): $ICRS_{c.v} = AF_{SV} * AF_{c.v} * SAV_{GMRS}$

$ICRS_{c.v} = 1.646*4.7*0.583=4.51g$ *4AA(1EQBRL27AX)*

$ICRS_{c.v} = 1.179*4.7*0.583=3.23g$ *JJ(S1A2X)*

A.2 High Frequency Capacity

A sample calculation for the high-frequency seismic capacity of components 4AA(1EQBRL27AX) (contained in 1DGLSA) and JJ(S1A2X) (contained in 1DGCPA) 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 4AA(1EQBRL27AX) Capacity

The make and model for component 4AA(1EQBRL27AX) is ITE ITE-27H(211B0171D) per Table 9.1 of Reference [429] and was not tested as part of the high-frequency testing program. The seismic capacity is 15.00g for 5% damping, based on low frequency GERS qualification data [426, pp. B-92].

A.2.1.2 JJ(S1A2X) Capacity

The make and model for component JJ(S1A2X) is Struthers-Dunn 219BBXP per Table 9.1 of Reference [429] and was not tested as part of the high-frequency testing program. The electrical state of component JJ(S1A2X) located in Panel 1DGCPA is non-operate (de-energized), with a normally-open contact configuration. The seismic capacity is 7.50g for 5% damping, based on low frequency GERS qualification data [426, pp. B-29].

GERS spectral acceleration for the components 4AA(1EQBRL27AX) and JJ(S1A2X) is used as the seismic test capacity. Therefore, there is no spectral acceleration increase and the effective spectral test capacity is equal to the seismic test capacity.

Effective Spectral Test Capacity (Ref. [4, pp. 4-16]): $SA_T = 15.0$ g *4AA(1EQBRL27AX)*

$SA_T = 7.5$ g *JJ(S1A2X)*

A.2.2 Seismic Capacity Knockdown Factor

The seismic capacity for components 4AA(1EQBRL27AX) and JJ(S1A2X) was obtained from the GERS test program [426]. There is no clear indication provided in that program 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 factor is considered for all components under GERS testing. Using Table 4-2 of Reference [4], the knockdown factors are chosen as:

Seismic Capacity Knockdown Factor: $F_K = 1.50$ GERS, Lowest Level without Chatter *4AA(1EQBRL27AX)*

$F_K = 1.50$ GERS, Lowest Level without Chatter *JJ(S1A2X)*

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].

Single-Axis Correction Factor (Ref. [4, pp. 4-17 - 4-18] and Attachment A of Ref. [428]): $F_{MS} = 1.0$ *4AA(1EQBRL27AX)*

$F_{MS} = 1.0$ *JJ(S1A2X)*

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 = 10.00g *4AA(1EQBRL27AX)*

TRS = 5.00g *JJ(S1A2X)*

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 4AA(1EQBRL27AX) and JJ(S1A2X) is presented here. A table that calculates the high-frequency seismic margin for all the subject relays is contained in Attachment A of Reference [428].)

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

$$\frac{TRS}{ICRS_{c.h}} = \begin{vmatrix} 1.60 > 1.0, \text{OK} & \textit{4AA(1EQBRL27AX)} \\ 1.14 > 1.0, \text{OK} & \textit{JJ(S1A2X)} \end{vmatrix}$$

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

$$\frac{TRS}{ICRS_{c.v}} = \begin{vmatrix} 2.22 > 1.0, \text{OK} & \textit{4AA(1EQBRL27AX)} \\ 1.55 > 1.0, \text{OK} & \textit{JJ(S1A2X)} \end{vmatrix}$$

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	NV24L(BB)	Control Relay	Seal-In Auxiliary Relay	Cutler-Hammer	D26MRD30A1	1ATC4A	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
2	1	NV25L(BA)	Control Relay	Seal-In Auxiliary Relay	Cutler-Hammer	D26MRD30A1	1ATC4A	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
3	1	DJ(2TRC)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
4	1	DK(2TRA)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD704A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
5	1	DL(RVG3)	Control Relay	Diesel Stop Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
6	1	EK	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
7	1	EL	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
8	1	EM	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
9	1	FJ(2TRB)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD704A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
10	1	FL(ARR)	Control Relay	Alarm Restraint Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
11	1	GL(DASR)	Control Relay	Diesel Automatic Start Relay	Cutler-Hammer	D26MRD704A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
12	1	GM(RVG2)	Control Relay	Diesel Stop Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
13	1	JJ(S1A2X)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219DXBP	1DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
14	1	JK(SRX1)	Control Relay	Lube Oil Low Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire 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
15	1	JL(S1A1X)	Control Relay	40% Speed Relay	Struthers-Dunn	219BBXP	1DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
16	1	LN(ESX)	Control Relay	Emergency Stop Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
17	1	LO(SRX2)	Control Relay	Lube Oil Low Relay	Cutler-Hammer	D26MRD70A1	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
18	1	MA(1EQCSW7720)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
19	1	MB(1EQCSW7730)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	1DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
20	1	MU(SSTA)	Control Relay	95% Speed Relay	Struthers-Dunn	219BBXP	1DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
21	1	MV(SSTB)	Control Relay	95% Speed Relay	Struthers-Dunn	219BBXP	1DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
22	1	MW(SSTC)	Control Relay	97% Speed Relay	Struthers-Dunn	219BBXP	1DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
23	1	DJ(2TRC)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
24	1	DK(2TRA)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD704A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
25	1	DL(RVG3)	Control Relay	Diesel Stop Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
26	1	EK	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
27	1	EL	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
28	1	EM	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
29	1	FJ(2TRB)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD704A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire 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
30	1	FL(ARR)	Control Relay	Alarm Restraint Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
31	1	GL(DASR)	Control Relay	Diesel Automatic Start Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
32	1	GM(RVG2)	Control Relay	Diesel Stop Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
33	1	JJ(S1A2X)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	1DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
34	1	JK(SRX1)	Control Relay	Lube Oil Low Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
35	1	JL(S1A1X)	Control Relay	40% Speed Relay	Struthers-Dunn	219BBXP	1DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
36	1	LN(ESX)	Control Relay	Emergency Stop Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
37	1	LO(SRX2)	Control Relay	Lube Oil Low Relay	Cutler-Hammer	D26MRD70A1	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
38	1	MA(1EQCSW7750)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
39	1	MB(1EQCSW7760)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	1DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
40	1	MU(SSTA)	Control Relay	95% Speed Relay	Struthers-Dunn	219BBXP	1DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
41	1	MV(SSTB)	Control Relay	95% Speed Relay	Struthers-Dunn	219BBXP	1DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
42	1	MW(SSTC)	Control Relay	97% Speed Relay	Struthers-Dunn	219BBXP	1DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
43	1	2AB(LRA4)	Control Relay	Blackout and/or LOCA Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
44	1	2CA(RA1)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire 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
45	1	2CB(AA1)	Control Relay	Auto-Advance Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
46	1	2DA(RA2)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
47	1	2EA(RA3)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
48	1	2FA(RA4)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
49	1	2HA(RA6)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
50	1	2HB(RA9)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
51	1	2IA(RA7)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
52	1	2IB(RA10)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
53	1	2JA(RA8)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
54	1	2JB(RA11)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
55	1	4AA(1EQBRL27AX)	Protective Relay	Undervoltage Relay	ITE	ITE-27H (211B0171D)	1DGLSA	Control Cabinet	Auxiliary Building	750	GERS	Cap>Dem
56	1	AA(LSA2)	Control Relay	Load Shed Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
57	1	AB(LSA1)	Control Relay	Load Shed Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
58	1	BD(1ESGAX1)	Control Relay	LOCA Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
59	1	CB(127AX)	Control Relay	Undervoltage Auxiliary Relay	Cutler-Hammer	D26MRD70A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire 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
60	1	CG(LSATX)	Control Relay	DG Breaker Closure Control	Cutler-Hammer	D26MRD30A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
61	1	DC(BOA)	Control Relay	Blackout Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
62	1	EC(LT2A)	Control Relay	Generator Restart Relay	Cutler-Hammer	D26MRD704A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
63	1	FA(RGA)	Control Relay	Generator Restart Relay	Cutler-Hammer	D26MRD70A1	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
64	1	GA(ST4A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-08-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
65	1	GB(ST2A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-08-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
66	1	GC(LSAT)	Control Relay	Load Shed Timer	TEMPO	812-1-6-01-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
67	1	HA(ST7A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
68	1	HB(ST6A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
69	1	IA(ST10A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-07-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
70	1	IB(ST9A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-09-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
71	1	IC(ST8A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
72	1	JA(ST1A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-01-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
73	1	JB(ST11A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-07-0	1DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
74	1	2AB(LRB4)	Control Relay	Blackout and/or LOCA Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire 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
75	1	2CA(RB1)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
76	1	2CB(AB1)	Control Relay	Auto-Advance Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
77	1	2DA(RB2)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
78	1	2EA(RB3)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
79	1	2FA(RB4)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
80	1	2HA(RB6)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
81	1	2HB(RB9)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
82	1	2IA(RB7)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
83	1	2IB(RB10)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
84	1	2JA(RB8)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
85	1	2JB(RB11)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
86	1	4AA(1EQBRL27BX)	Protective Relay	Undervoltage Relay	ITE	ITE-27H (211B0171D)	1DGLSB	Control Cabinet	Auxiliary Building	733	GERS	Cap>Dem
87	1	AA(LSB2)	Control Relay	Load Shed Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
88	1	AB(LSB1)	Control Relay	Load Shed Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
89	1	BD(1ESGBX1)	Control Relay	LOCA Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire 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
90	1	CB(127BX)	Control Relay	Undervoltage Auxiliary Relay	Cutler-Hammer	D26MRD70A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
91	1	CG(LSBTX)	Control Relay	DG Breaker Closure Control	Cutler-Hammer	D26MRD30A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
92	1	DC(BOB)	Control Relay	Blackout Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
93	1	EC(LT2B)	Control Relay	Generator Restart Relay	Cutler-Hammer	D26MRD704A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
94	1	FA(RGB)	Control Relay	Generator Restart Relay	Cutler-Hammer	D26MRD70A1	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
95	1	GA(ST4B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-08-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
96	1	GB(ST2B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-08-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
97	1	GC(LSBT)	Control Relay	Load Shed Timer	TEMPO	812-1-6-01-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
98	1	HA(ST7B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
99	1	HB(ST6B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
100	1	IA(ST10B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-07-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
101	1	IB(ST9B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-09-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
102	1	IC(ST8B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
103	1	JA(ST1B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-01-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
104	1	JB(ST11B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-07-0	1DGLSB	Control Cabinet	Auxiliary Building	733	McGuire 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
105	1	K301	Control Relay	Over Voltage Time Delay Auxiliary Relay	<Unknown>	<Unknown>	1EDGA	Control Cabinet	Auxiliary Building	736+ 06	McGuire Report	Mitigation Strategies
106	1	K301	Control Relay	Over Voltage Time Delay Auxiliary Relay	<Unknown>	<Unknown>	1EDGB	Control Cabinet	Auxiliary Building	736+ 06	McGuire Report	Mitigation Strategies
107	1	52@1ELXA-04B	LV Circuit Breaker	Load Center Feeder Breaker	ITE	K-2000S	1ELXA	Switch-gear	Auxiliary Building	750	McGuire Report	Cap>Dem
108	1	52@1ELXA-04D	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	1ELXA	Switch-gear	Auxiliary Building	750	McGuire Report	Cap>Dem
109	1	52@1ELXA-05D	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	1ELXA	Switch-gear	Auxiliary Building	750	McGuire Report	Cap>Dem
110	1	52@1ELXB-04B	LV Circuit Breaker	Load Center Feeder Breaker	ITE	K-2000S	1ELXB	Switch-gear	Auxiliary Building	733	McGuire Report	Cap>Dem
111	1	52@1ELXB-05C	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	1ELXB	Switch-gear	Auxiliary Building	733	McGuire Report	Cap>Dem
112	1	52@1ELXB-05D	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	1ELXB	Switch-gear	Auxiliary Building	733	McGuire Report	Cap>Dem
113	1	M/C@1EMXA5-02A	Contactor	Valve Closing Contactor	Joslyn Clark	T30U031-76	1EMXA5	MCC	Auxiliary Building	750	GERS	Mitigation Strategies
114	1	M/C@1EMXA5-03D	Contactor	Valve Closing Contactor	Joslyn Clark	T30U031-76	1EMXA5	MCC	Auxiliary Building	750	GERS	Mitigation Strategies
115	1	M/C@1EMXB-03D	Contactor	Valve Closing Contactor	Joslyn Clark	T30U031-76	1EMXB	MCC	Auxiliary Building	733	GERS	Mitigation Strategies
116	1	M/C@1EMXB2-F04B	Contactor	Valve Closing Contactor	Joslyn Clark	T30U031-76	1EMXB2	MCC	Auxiliary Building	733	GERS	Mitigation Strategies
117	1	52@1ETA12	MV Circuit Breaker	Pump Circuit Breaker	ABB/ITE	5HK-250	1ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
118	1	52@1ETA14	MV Circuit Breaker	DG Circuit Breaker	ABB/ITE	5HK-250	1ETA	Switch-gear	Auxiliary Building	750	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
119	1	52@1ETA3	MV Circuit Breaker	Load Center Transformer Primary Breaker	ABB/ITE	5HK-250	1ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
120	1	52S@1ETA11	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
121	1	AE(52S/F)@1ETA1	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
122	1	AE(52S/F)@1ETA2	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
123	1	AF(52S)@1ETA1	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
124	1	AF(52S)@1ETA2	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
125	1	PA(51V)@1ETA14	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	1ETA	Switch-gear	Auxiliary Building	750	SQURTS	Mitigation Strategies
126	1	PB(51V)@1ETA14	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	1ETA	Switch-gear	Auxiliary Building	750	SQURTS	Mitigation Strategies
127	1	PC(51V)@1ETA14	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	1ETA	Switch-gear	Auxiliary Building	750	SQURTS	Mitigation Strategies
128	1	52@1ETB12	MV Circuit Breaker	Pump Circuit Breaker	ABB/ITE	5HK-250	1ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
129	1	52@1ETB14	MV Circuit Breaker	DG Circuit Breaker	ABB/ITE	5HK-250	1ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
130	1	52@1ETB3	MV Circuit Breaker	Load Center Transformer Primary Breaker	ABB/ITE	5HK-250	1ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
131	1	52S@1ETB11	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
132	1	AE(52S/F)@1ETB1	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETB	Switch-gear	Auxiliary Building	733	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
133	1	AE(52S/F)@1ETB2	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
134	1	AF(52S)@1ETB1	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
135	1	AF(52S)@1ETB2	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	1ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
136	1	PA(51V)@1ETB14	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	1ETB	Switch-gear	Auxiliary Building	733	SQURTS	Mitigation Strategies
137	1	PB(51V)@1ETB14	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	1ETB	Switch-gear	Auxiliary Building	733	SQURTS	Mitigation Strategies
138	1	PC(51V)@1ETB14	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	1ETB	Switch-gear	Auxiliary Building	733	SQURTS	Mitigation Strategies
139	1	K307	Control Relay	High DC Voltage Time Delay Relay	<Unknown>	<Unknown>	EVCA	Control Cabinet	Auxiliary Building	733	McGuire Report	Mitigation Strategies
140	1	K307	Control Relay	High DC Voltage Time Delay Relay	<Unknown>	<Unknown>	EVCB	Control Cabinet	Auxiliary Building	733	McGuire Report	Mitigation Strategies
141	1	RD(51VA)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP1A	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
142	1	RE(51VB)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP1A	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
143	1	RF(51VC)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP1A	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
144	1	RD(51VA)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP1B	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
145	1	RE(51VB)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP1B	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
146	1	RF(51VC)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP1B	Control Cabinet	Auxiliary Building	733	McGuire 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
147	1	AB(1EQCSW7740)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	TB672	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
148	1	BA(SSTD)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB672	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
149	1	BB(SSTE)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB672	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
150	1	BC(SSTF)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB672	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
151	1	CA(SSTD1)	Control Relay	Overspeed Trip Relay	Cutler-Hammer	D26MRD70A1	TB672	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
152	1	CB(SSTE1)	Control Relay	Overspeed Trip Relay	Cutler-Hammer	D26MRD70A1	TB672	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
153	1	AB(1EQCSW7770)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	TB673	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
154	1	BA(SSTD)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB673	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
155	1	BB(SSTE)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB673	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
156	1	BC(SSTF)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB673	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
157	1	CA(SSTD1)	Control Relay	Overspeed Trip Relay	Cutler-Hammer	D26MRD70A1	TB673	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
158	1	CB(SSTE1)	Control Relay	Overspeed Trip Relay	Cutler-Hammer	D26MRD70A1	TB673	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
159	2	NV24L(DA)	Control Relay	Seal-In Auxiliary Relay	Cutler-Hammer	D26MRD30A1	2ATC4A	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
160	2	NV25L(DA1)	Control Relay	Seal-In Auxiliary Relay	Cutler-Hammer	D26MRD30A1	2ATC4A	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
161	2	DJ(2TRC)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire 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
162	2	DK(2TRA)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD704A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
163	2	DL(RVG3)	Control Relay	Diesel Stop Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
164	2	EK	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
165	2	EL	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
166	2	EM	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
167	2	FJ(2TRB)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD704A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
168	2	FL(ARR)	Control Relay	Alarm Restraint Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
169	2	GL(DASR)	Control Relay	Diesel Automatic Start Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
170	2	GM(RVG2)	Control Relay	Diesel Stop Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
171	2	JJ(S1A2X)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219DXBP	2DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
172	2	JK(SRX1)	Control Relay	Lube Oil Low Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
173	2	JL(S1A1X)	Control Relay	40% Speed Relay	Struthers-Dunn	219BBXP	2DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
174	2	LN(ESX)	Control Relay	Emergency Stop Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
175	2	LO(SRX2)	Control Relay	Lube Oil Low Relay	Cutler-Hammer	D26MRD70A1	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
176	2	MA(2EQCSW7720)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire 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
177	2	MB(2EQCSW7730)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	2DGCPA	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
178	2	MU(SSTA)	Control Relay	95% Speed Relay	Struthers-Dunn	219BBXP	2DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
179	2	MV(SSTB)	Control Relay	95% Speed Relay	Struthers-Dunn	219BBXP	2DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
180	2	MW(SSTC)	Control Relay	97% Speed Relay	Struthers-Dunn	219BBXP	2DGCPA	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
181	2	DJ(2TRC)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
182	2	DK(2TRA)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD704A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
183	2	DL(RVG3)	Control Relay	Diesel Stop Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
184	2	EK	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
185	2	EL	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
186	2	EM	Control Relay	Speed Switch Auxiliary Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
187	2	FJ(2TRB)	Control Relay	Diesel Start Relay	Cutler-Hammer	D26MRD704A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
188	2	FL(ARR)	Control Relay	Alarm Restraint Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
189	2	GL(DASR)	Control Relay	Diesel Automatic Start Relay	Cutler-Hammer	D26MRD704A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
190	2	GM(RVG2)	Control Relay	Diesel Stop Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
191	2	JJ(S1A2X)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219DXBP	2DGCPB	Control Cabinet	Diesel Building	736+06	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
192	2	JK(SRX1)	Control Relay	Lube Oil Low Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
193	2	JL(S1A1X)	Control Relay	40% Speed Relay	Struthers-Dunn	219BBXP	2DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
194	2	LN(ESX)	Control Relay	Emergency Stop Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
195	2	LO(SRX2)	Control Relay	Lube Oil Low Relay	Cutler-Hammer	D26MRD70A1	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
196	2	MA(2EQCSW7750)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
197	2	MB(2EQCSW7760)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	2DGCPB	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
198	2	MU(SSTA)	Control Relay	95% Speed Relay	Struthers-Dunn	219BBXP	2DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
199	2	MV(SSTB)	Control Relay	95% Speed Relay	Struthers-Dunn	219BBXP	2DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
200	2	MW(SSTC)	Control Relay	97% Speed Relay	Struthers-Dunn	219BBXP	2DGCPB	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
201	2	2AB(LRA4)	Control Relay	Blackout and/or LOCA Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
202	2	2CA(RA1)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
203	2	2CB(AA1)	Control Relay	Auto-Advance Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
204	2	2DA(RA2)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
205	2	2EA(RA3)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
206	2	2FA(RA4)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire 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
207	2	2HA(RA6)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
208	2	2HB(RA9)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
209	2	2IA(RA7)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
210	2	2IB(RA10)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
211	2	2JA(RA8)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
212	2	2JB(RA11)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
213	2	4AA(2EQBRL27AX)	Protective Relay	Undervoltage Relay	ITE	ITE-27H (211B0171D)	2DGLSA	Control Cabinet	Auxiliary Building	750	GERS	Cap>Dem
214	2	AA(LSA2)	Control Relay	Load Shed Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
215	2	AB(LSA1)	Control Relay	Load Shed Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
216	2	BD(2ESGAX1)	Control Relay	LOCA Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
217	2	CB(227AX)	Control Relay	Undervoltage Auxiliary Relay	Cutler-Hammer	D26MRD70A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
218	2	CG(LSATX)	Control Relay	DG Breaker Closure Control	Cutler-Hammer	D26MRD30A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
219	2	DC(BOA)	Control Relay	Blackout Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
220	2	EC(LT2A)	Control Relay	Generator Restart Relay	Cutler-Hammer	D26MRD704A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
221	2	FA(RGA)	Control Relay	Generator Restart Relay	Cutler-Hammer	D26MRD70A1	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire 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
222	2	GA(ST4A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-08-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
223	2	GB(ST2A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-08-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
224	2	GC(LSAT)	Control Relay	Load Shed Timer	TEMPO	812-1-6-01-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
225	2	HA(ST7A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
226	2	HB(ST6A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
227	2	IA(ST10A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-07-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
228	2	IB(ST9A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-09-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
229	2	IC(ST8A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
230	2	JA(ST1A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-01-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
231	2	JB(ST11A)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-07-0	2DGLSA	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
232	2	2AB(LRB4)	Control Relay	Blackout and/or LOCA Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
233	2	2CA(RB1)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
234	2	2CB(AB1)	Control Relay	Auto-Advance Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
235	2	2DA(RB2)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
236	2	2EA(RB3)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire 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
237	2	2FA(RB4)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
238	2	2HA(RB6)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
239	2	2HB(RB9)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
240	2	2IA(RB7)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
241	2	2IB(RB10)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
242	2	2JA(RB8)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
243	2	2JB(RB11)	Control Relay	Load Actuate Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
244	2	4AA(2EQBRL27BX)	Protective Relay	Undervoltage Relay	ITE	ITE-27H (211B0171D)	2DGLSB	Control Cabinet	Auxiliary Building	733	GERS	Cap>Dem
245	2	AA(LSB2)	Control Relay	Load Shed Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
246	2	AB(LSB1)	Control Relay	Load Shed Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
247	2	BD(2ESGBX1)	Control Relay	LOCA Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
248	2	CB(227BX)	Control Relay	Undervoltage Auxiliary Relay	Cutler-Hammer	D26MRD70A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
249	2	CG(LSBTX)	Control Relay	DG Breaker Closure Control	Cutler-Hammer	D26MRD30A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
250	2	DC(BOB)	Control Relay	Blackout Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
251	2	EC(LT2B)	Control Relay	Generator Restart Relay	Cutler-Hammer	D26MRD704A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire 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
252	2	FA(RGB)	Control Relay	Generator Restart Relay	Cutler-Hammer	D26MRD70A1	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
253	2	GA(ST4B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-08-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
254	2	GB(ST2B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-08-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
255	2	GC(LSBT)	Control Relay	Load Shed Timer	TEMPO	812-1-6-01-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
256	2	HA(ST7B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
257	2	HB(ST6B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
258	2	IA(ST10B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-07-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
259	2	IB(ST9B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-09-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
260	2	IC(ST8B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-05-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
261	2	JA(ST1B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-01-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
262	2	JB(ST11B)	Control Relay	Sequence Timer Relay	TEMPO	812-1-6-07-0	2DGLSB	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
263	2	K301	Control Relay	Over Voltage Time Delay Auxiliary Relay	<Unknown>	<Unknown>	2EDGA	Control Cabinet	Auxiliary Building	736+06	McGuire Report	Mitigation Strategies
264	2	K301	Control Relay	Over Voltage Time Delay Auxiliary Relay	<Unknown>	<Unknown>	2EDGB	Control Cabinet	Auxiliary Building	736+06	McGuire Report	Mitigation Strategies
265	2	52@2ELXA-04B	LV Circuit Breaker	Load Center Feeder Breaker	ITE	K-2000S	2ELXA	Switch-gear	Auxiliary Building	750	McGuire Report	Cap>Dem
266	2	52@2ELXA-04D	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	2ELXA	Switch-gear	Auxiliary Building	750	McGuire 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
267	2	52@2ELXA-05D	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	2ELXA	Switch-gear	Auxiliary Building	750	McGuire Report	Cap>Dem
268	2	52@2ELXB-04B	LV Circuit Breaker	Load Center Feeder Breaker	ITE	K-2000S	2ELXB	Switch-gear	Auxiliary Building	733	McGuire Report	Cap>Dem
269	2	52@2ELXB-04C	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	2ELXB	Switch-gear	Auxiliary Building	733	McGuire Report	Cap>Dem
270	2	52@2ELXB-05C	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	2ELXB	Switch-gear	Auxiliary Building	733	McGuire Report	Cap>Dem
271	2	52@2ELXB-05D	LV Circuit Breaker	MCC Feeder Breaker	ITE	K-1600S	2ELXB	Switch-gear	Auxiliary Building	733	McGuire Report	Cap>Dem
272	2	M/C@2EMXA4-01C	Contactor	Valve Closing Contactor	Joslyn Clark	T30U031-76	2EMXA4	MCC	Auxiliary Building	750	GERS	Mitigation Strategies
273	2	M/C@2EMXA4-01D	Contactor	Valve Closing Contactor	Joslyn Clark	T30U031-76	2EMXA4	MCC	Auxiliary Building	750	GERS	Mitigation Strategies
274	2	M/C@2EMXB-03D	Contactor	Valve Closing Contactor	Joslyn Clark	T30U031-76	2EMXB	MCC	Auxiliary Building	733	GERS	Mitigation Strategies
275	2	M/C@2EMXB2-F04B	Contactor	Valve Closing Contactor	Joslyn Clark	T30U031-76	2EMXB2	MCC	Auxiliary Building	733	GERS	Mitigation Strategies
276	2	52@2ETA14	MV Circuit Breaker	Load Center Transformer Primary Breaker	ABB/ITE	5HK-250	2ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
277	2	52@2ETA2	MV Circuit Breaker	DG Circuit Breaker	ABB/ITE	5HK-250	2ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
278	2	52@2ETA5	MV Circuit Breaker	Pump Circuit Breaker	ABB/ITE	5HK-250	2ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
279	2	52S@2ETA6	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
280	2	AE(52S/F)@2ETA15	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETA	Switch-gear	Auxiliary Building	750	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
281	2	AE(52S/F)@2ETA16	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
282	2	AF(52S)@2ETA15	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
283	2	AF(52S)@2ETA16	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETA	Switch-gear	Auxiliary Building	750	EPRI HF Test	Cap>Dem
284	2	PA(51V)@2ETA2	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	2ETA	Switch-gear	Auxiliary Building	750	SQURTS	Mitigation Strategies
285	2	PB(51V)@2ETA2	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	2ETA	Switch-gear	Auxiliary Building	750	SQURTS	Mitigation Strategies
286	2	PC(51V)@2ETA2	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	2ETA	Switch-gear	Auxiliary Building	750	SQURTS	Mitigation Strategies
287	2	52@2ETB14	MV Circuit Breaker	Load Center Transformer Primary Breaker	ABB/ITE	5HK-250	2ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
288	2	52@2ETB2	MV Circuit Breaker	DG Circuit Breaker	ABB/ITE	5HK-250	2ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
289	2	52@2ETB5	MV Circuit Breaker	Pump Circuit Breaker	ABB/ITE	5HK-250	2ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
290	2	52S@2ETB6	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
291	2	AE(52S/F)@2ETB15	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
292	2	AE(52S/F)@2ETB16	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
293	2	AF(52S)@2ETB15	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETB	Switch-gear	Auxiliary Building	733	EPRI HF Test	Cap>Dem
294	2	AF(52S)@2ETB16	MV Circuit Breaker	Circuit Breaker Auxiliary Contact	ABB/ITE	5HK-250	2ETB	Switch-gear	Auxiliary Building	733	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
295	2	PA(51V)@2ETB2	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	2ETB	Switch-gear	Auxiliary Building	733	SQURTS	Mitigation Strategies
296	2	PB(51V)@2ETB2	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	2ETB	Switch-gear	Auxiliary Building	733	SQURTS	Mitigation Strategies
297	2	PC(51V)@2ETB2	Protective Relay	Voltage-Controlled Over Current Protective Relay	Westinghouse	COV-8 (1876244)	2ETB	Switch-gear	Auxiliary Building	733	SQURTS	Mitigation Strategies
298	2	K307	Control Relay	High DC Voltage Time Delay Relay	<Unknown>	<Unknown>	EVCC	Control Cabinet	Auxiliary Building	733	McGuire Report	Mitigation Strategies
299	2	K307	Control Relay	High DC Voltage Time Delay Relay	<Unknown>	<Unknown>	EVCD	Control Cabinet	Auxiliary Building	733	McGuire Report	Mitigation Strategies
300	2	RD(51VA)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP2A	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
301	2	RE(51VB)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP2A	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
302	2	RF(51VC)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP2A	Control Cabinet	Auxiliary Building	750	McGuire Report	Cap>Dem
303	2	RD(51VA)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP2B	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
304	2	RE(51VB)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP2B	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
305	2	RF(51VC)	Control Relay	Voltage-Controlled Over Current Auxiliary Relay	Cutler-Hammer	D26MRD70A1	GMP2B	Control Cabinet	Auxiliary Building	733	McGuire Report	Cap>Dem
306	2	AB(2EQCSW7740)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	TB1672	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
307	2	BA(SSTD)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB1672	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
308	2	BB(SSTE)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB1672	Control Cabinet	Diesel Building	736+06	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
309	2	BC(SSTF)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB1672	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
310	2	CA(SSTD1)	Control Relay	Overspeed Trip Relay	Cutler-Hammer	D26MRD70A1	TB1672	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
311	2	CB(SSTE1)	Control Relay	Overspeed Trip Relay	Cutler-Hammer	D26MRD70A1	TB1672	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
312	2	AB(2EQCSW7770)	Process Switch	Overspeed Switch	Dynalco	SST-2400A	TB1673	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
313	2	BA(SSTD)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB1673	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
314	2	BB(SSTE)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB1673	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
315	2	BC(SSTF)	Control Relay	Speed Switch Auxiliary Relay	Struthers-Dunn	219BBXP	TB1673	Control Cabinet	Diesel Building	736+06	GERS	Cap>Dem
316	2	CA(SSTD1)	Control Relay	Overspeed Trip Relay	Cutler-Hammer	D26MRD70A1	TB1673	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem
317	2	CB(SSTE1)	Control Relay	Overspeed Trip Relay	Cutler-Hammer	D26MRD70A1	TB1673	Control Cabinet	Diesel Building	736+06	McGuire Report	Cap>Dem

Table B-2: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve	Flow Diagram	Comment	Evaluation Needed
Unit 1			
1NC0004	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Closed.	No
1NC0013	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Closed.	No
1NC0014	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Open. No Relays	No
1NC0015	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Open. No Relays	No
1NC0019	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Closed.	No
1NC0022	MCFD-1553-01.00 [430]	Manual Valve Normally Closed	No
1NC0024	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Closed. Both sides of the Head Gasket would have to Fail and there are no Relays	No
1NC0025A	MCFD-1553-01.00 [430]	Air Operated Valve Normally Open. Both sides of the Head Gasket would have to Fail	No
1NC0026	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Closed	No
1NC0037	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Open. No Relays	No
1NC0094	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Closed.	No
1NC0112	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Open. No Relays	No
1NC0228	MCFD-1553-01.00 [430]	Packless Manual Valve Normally Closed.	No
1NC0001	MCFD-1553-02.00 [431]	Safety Relief Valve	Yes
1NC0002	MCFD-1553-02.00 [431]	Safety Relief Valve	Yes
1NC0003	MCFD-1553-02.00 [431]	Safety Relief Valve	Yes
1NC0027C	MCFD-1553-02.00 [431]	Packless Air Valve Failed Closed. Bypass has 3/8" flow restrictors	Potential
1NC0029C	MCFD-1553-02.00 [431]	Packless Air Valve Failed Closed. Bypass has 3/8" flow restrictors	Potential
1NC032B	MCFD-1553-02.00 [431]	Piston Valve Failed Closed.	Yes
1NC034A	MCFD-1553-02.00 [431]	Piston Valve Failed Closed.	Yes
1NC036B	MCFD-1553-02.00 [431]	Piston Valve Failed Closed.	Yes
1NC0272AC	MCFD-1553-02.01 [432]	Potential leak path only if 1NC0273AC fails to close	Potential
1NC0273AC	MCFD-1553-02.01 [432]	Failed Closed Valve	Yes
1NC0274B	MCFD-1553-02.01 [432]	Potential leak path only if 1NC0275B fails to close	Potential
1NC0275B	MCFD-1553-02.01 [432]	Failed Closed Valve	Yes
1NV0031	MCFD-1554-01.00 [433]	Simple Check Valve	No
1NV0034A	MCFD-1554-01.00 [433]	Air Operated Valve Normally Open. Upstream of Simple Check Valve 1NV1020	No
1NV0038	MCFD-1554-01.00 [433]	Packless Check Valve Operator.	No
1NV0041	MCFD-1554-01.00 [433]	Packless Check Valve Operator.	No
1NV0047	MCFD-1554-01.00 [433]	Simple Check Valve	No
1NV0050B	MCFD-1554-01.00 [433]	Air Operated Valve Normally Open. Upstream of Simple Check Valve 1NV1021	No
1NV0054	MCFD-1554-01.00 [433]	Packless Check Valve Operator.	No
1NV0057	MCFD-1554-01.00 [433]	Packless Check Valve Operator.	No
1NV0810	MCFD-1554-01.00 [433]	Packless Check Valve Operator. Upstream of 1NV0031	No
1NV0811	MCFD-1554-01.00 [433]	Packless Check Valve Operator. Upstream of 1NV0047	No
1NV1020	MCFD-1554-01.00 [433]	Simple Check Valve	No
1NV1021	MCFD-1554-01.00 [433]	Simple Check Valve	No
1NV0063	MCFD-1554-01.01 [434]	Simple Check Valve	No

Table B-2: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve	Flow Diagram	Comment	Evaluation Needed
1NV0066A	MCFD-1554-01.01 [434]	Air Operated Valve Normally Open. Upstream of Simple Check Valve 1NV1022	No
1NV0070	MCFD-1554-01.01 [434]	Packless Check Valve Operator.	No
1NV0073	MCFD-1554-01.01 [434]	Packless Check Valve Operator.	No
1NV0079	MCFD-1554-01.01 [434]	Simple Check Valve	No
1NV0082B	MCFD-1554-01.01 [434]	Air Operated Valve Normally Open. Upstream of Simple Check Valve 1NV1023	No
1NV0086	MCFD-1554-01.01 [434]	Packless Check Valve Operator.	No
1NV0089	MCFD-1554-01.01 [434]	Packless Check Valve Operator.	No
1NV0812	MCFD-1554-01.01 [434]	Packless Check Valve Operator. Upstream of 1NV0063	No
1NV0813	MCFD-1554-01.01 [434]	Packless Check Valve Operator. Upstream of 1NV0079	No
1NV1022	MCFD-1554-01.01 [434]	Simple Check Valve	No
1NV1023	MCFD-1554-01.01 [434]	Simple Check Valve	No
1NV0001A	MCFD-1554-01.02 [435]	Piston Valve Failed Closed.	Yes
1NV0002A	MCFD-1554-01.02 [435]	Piston Valve Failed Closed. Potential only if 1NV001A fails to close	Potential
1NV0015	MCFD-1554-01.02 [435]	Packless Check Valve Operator.	No
1NV0018	MCFD-1554-01.02 [435]	Packless Check Valve Operator.	No
1NV024B	MCFD-1554-01.02 [435]	Piston Valve Failed Closed.	Yes
1NV025B	MCFD-1554-01.02 [435]	Piston Valve Failed Closed. Potential only if 1NC024B fails to close	Potential
1ND001B	MCFD-1561-01.00 [436]	MOV Valve Normally Closed.	Yes
1ND002AC	MCFD-1561-01.00 [436]	MOV Valve Normally Closed. Potential only if 1ND001B fails to close	Potential
1NI0015	MCFD-1562-01.00 [437]	Packless Check Valve Operator.	No
1NI0017	MCFD-1562-01.00 [437]	Packless Check Valve Operator.	No
1NI0019	MCFD-1562-01.00 [437]	Packless Check Valve Operator.	No
1NI0021	MCFD-1562-01.00 [437]	Packless Check Valve Operator.	No
1NI0060	MCFD-1562-02.00 [438]	Simple Check Valve	No
1NI0071	MCFD-1562-02.00 [438]	Simple Check Valve	No
1NI0082	MCFD-1562-02.01 [439]	Simple Check Valve	No
1NI0094	MCFD-1562-02.01 [439]	Simple Check Valve	No
1NI0126	MCFD-1562-03.00 [440]	Simple Check Valve	No
1NI0134	MCFD-1562-03.00 [440]	Simple Check Valve	No
1NI0157	MCFD-1562-03.00 [440]	Simple Check Valve	No
1NI0160	MCFD-1562-03.00 [440]	Simple Check Valve	No
1NI0885	MCFD-1562-03.00 [440]	Simple Check Valve - Internals removed	No
1NI0887	MCFD-1562-03.00 [440]	Simple Check Valve - Internals removed	No
1NM022AC	MCFD-1572-01.00 [441]	MOV Valve Normally Open. Not considered a leak Path due to the 3/8" Orifice upstream	No
1NM025AC	MCFD-1572-01.00 [441]	MOV Valve Normally Closed. Not considered a leak Path due to the 3/8" Orifice upstream	No
Unit 2			
2NC0004	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Closed.	No
2NC0013	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Closed.	No
2NC0014	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Open. No Relays	No

Table B-2: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve	Flow Diagram	Comment	Evaluation Needed
2NC0015	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Open. No Relays	No
2NC0019	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Closed.	No
2NC0022	MCFD-2553-01.00 [442]	Manual Valve Normally Closed	No
2NC0024	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Closed. Both sides of the Head Gasket would have to Fail and there are no Relays	No
2NC0025A	MCFD-2553-01.00 [442]	Air Operated Valve Normally Open. Both sides of the Head Gasket would have to Fail and there are no Relays	No
2NC0026	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Closed	No
2NC0037	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Open. No Relays	No
2NC0094	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Closed.	No
2NC0112	MCFD-2553-01.00 [442]	Packless Manual Valve Normally Open. No Relays	No
2NC0001	MCFD-2553-02.00 [443]	Safety Relief Valve	Yes
2NC0002	MCFD-2553-02.00 [443]	Safety Relief Valve	Yes
2NC0003	MCFD-2553-02.00 [443]	Safety Relief Valve	Yes
2NC0027C	MCFD-2553-02.00 [443]	Packless Air Valve Failed Closed. Bypass has 3/8" flow restrictors	Potential
2NC0029C	MCFD-2553-02.00 [443]	Packless Air Valve Failed Closed. Bypass has 3/8" flow restrictors	Potential
2NC032B	MCFD-2553-02.00 [443]	Piston Valve Failed Closed.	Yes
2NC034A	MCFD-2553-02.00 [443]	Piston Valve Failed Closed.	Yes
2NC036B	MCFD-2553-02.00 [443]	Piston Valve Failed Closed.	Yes
2NC0272AC	MCFD-2553-02.01 [444]	Potential leak path only if 1NC0273AC fails to close	Potential
2NC0273AC	MCFD-2553-02.01 [444]	Failed Closed Valve	Yes
2NC0274B	MCFD-2553-02.01 [444]	Potential leak path only if 1NC0275B fails to close	Potential
2NC0275B	MCFD-2553-02.01 [444]	Failed Closed Valve	Yes
2NV0031	MCFD-2554-01.00 [445]	Simple Check Valve	No
2NV0034A	MCFD-2554-01.00 [445]	Air Operated Valve Normally Open. Upstream of Simple Check Valve 1NV1020	No
2NV0038	MCFD-2554-01.00 [445]	Packless Check Valve Operator.	No
2NV0041	MCFD-2554-01.00 [445]	Packless Check Valve Operator.	No
2NV0047	MCFD-2554-01.00 [445]	Simple Check Valve	No
2NV0050B	MCFD-2554-01.00 [445]	Air Operated Valve Normally Open. Upstream of Simple Check Valve 1NV1021	No
2NV0054	MCFD-2554-01.00 [445]	Packless Check Valve Operator.	No
2NV0057	MCFD-2554-01.00 [445]	Packless Check Valve Operator.	No
2NV0810	MCFD-2554-01.00 [445]	Packless Check Valve Operator. Upstream of 1NV0031	No
2NV0811	MCFD-2554-01.00 [445]	Packless Check Valve Operator. Upstream of 1NV0047	No
2NV1020	MCFD-2554-01.00 [445]	Simple Check Valve	No
2NV1021	MCFD-2554-01.00 [445]	Simple Check Valve	No
2NV0063	MCFD-2554-01.01 [446]	Simple Check Valve	No
2NV0066A	MCFD-2554-01.01 [446]	Air Operated Valve Normally Open. Upstream of Simple Check Valve 1NV1022	No
2NV0070	MCFD-2554-01.01 [446]	Packless Check Valve Operator.	No
2NV0073	MCFD-2554-01.01 [446]	Packless Check Valve Operator.	No
2NV0079	MCFD-2554-01.01 [446]	Simple Check Valve	No

Table B-2: Reactor Coolant Leak Path Valves Identified for High Frequency Confirmation

Valve	Flow Diagram	Comment	Evaluation Needed
2NV0082B	MCFD-2554-01.01 [446]	Air Operated Valve Normally Open. Upstream of Simple Check Valve 1NV1023	No
2NV0086	MCFD-2554-01.01 [446]	Packless Check Valve Operator.	No
2NV0089	MCFD-2554-01.01 [446]	Packless Check Valve Operator.	No
2NV0812	MCFD-2554-01.01 [446]	Packless Check Valve Operator. Upstream of 1NV0063	No
2NV0813	MCFD-2554-01.01 [446]	Packless Check Valve Operator. Upstream of 1NV0079	No
2NV1022	MCFD-2554-01.01 [446]	Simple Check Valve	No
2NV1023	MCFD-2554-01.01 [446]	Simple Check Valve	No
2NV0001A	MCFD-2554-01.02 [447]	Piston Valve Failed Closed.	Yes
2NV0002A	MCFD-2554-01.02 [447]	Piston Valve Failed Closed. Potential only if 1NV001A fails to close	Potential
2NV0015	MCFD-2554-01.02 [447]	Packless Check Valve Operator.	No
2NV0018	MCFD-2554-01.02 [447]	Packless Check Valve Operator.	No
2NV024B	MCFD-2554-01.02 [447]	Piston Valve Failed Closed.	Yes
2NV025B	MCFD-2554-01.02 [447]	Piston Valve Failed Closed. Potential only if 1NC024B fails to close	Potential
2ND001B	MCFD-2561-01.00 [448]	MOV Valve Normally Closed.	Yes
2ND002AC	MCFD-2561-01.00 [448]	MOV Valve Normally Closed. Potential only if 1ND001B fails to close	Potential
2NI0015	MCFD-2562-01.00 [449]	Packless Check Valve Operator.	No
2NI0017	MCFD-2562-01.00 [449]	Packless Check Valve Operator.	No
2NI0019	MCFD-2562-01.00 [449]	Packless Check Valve Operator.	No
2NI0021	MCFD-2562-01.00 [449]	Packless Check Valve Operator.	No
2NI0060	MCFD-2562-02.00 [450]	Simple Check Valve	No
2NI0071	MCFD-2562-02.00 [450]	Simple Check Valve	No
2NI0082	MCFD-2562-02.01 [451]	Simple Check Valve	No
2NI0094	MCFD-2562-02.01 [451]	Simple Check Valve	No
2NI0126	MCFD-2562-03.00 [452]	Simple Check Valve	No
2NI0134	MCFD-2562-03.00 [452]	Simple Check Valve	No
2NI0157	MCFD-2562-03.00 [452]	Simple Check Valve	No
2NI0160	MCFD-2562-03.00 [452]	Simple Check Valve	No
2NI0852	MCFD-2562-03.00 [452]	Simple Check Valve - Internals removed	No
2NI0853	MCFD-2562-03.00 [452]	Simple Check Valve - Internals removed	No
2NM022AC	MCFD-2572-01.00 [453]	MOV Valve Normally Open. Not considered a leak Path due to the 3/8" Orifice upstream	No
2NM025AC	MCFD-2572-01.00 [453]	MOV Valve Normally Closed. Not considered a leak Path due to the 3/8" Orifice upstream	No

Table B-3: Core Cooling Equipment Identified for High Frequency Confirmation

Component	Description	Reference
	Unit 1	
1RN0069A	Nuclear Service Water to Auxiliary Feedwater Isolation Valve	MCFD-1574-02.00 [290]
1RN0162B	Nuclear Service Water to Auxiliary Feedwater Isolation Valve	MCFD-1574-03.00 [291]
1CA0086A	Nuclear Service Water Supply Valve	MCFD-1592-01.01 [454]
1CA0116B	Nuclear Service Water Supply Valve	MCFD-1592-01.01 [454]
1CA0036AB	AFWPT Discharge Flow Control Valve	MCFD-1592-01.00 [455]
1CA0038B	AFWPT Isolation Valve	MCFD-1592-01.00 [455]
1CA0048AB	AFWPT Discharge Flow Control Valve	MCFD-1592-01.00 [455]
1CA0050B	AFWPT Isolation Valve	MCFD-1592-01.00 [455]
1CA0052AB	AFWPT Discharge Flow Control Valve	MCFD-1592-01.00 [455]
1CA0054AC	AFWPT Isolation Valve	MCFD-1592-01.00 [455]
1CA0064AB	AFWPT Discharge Flow Control Valve	MCFD-1592-01.00 [455]
1CA0066AC	AFWPT Isolation Valve	MCFD-1592-01.00 [455]
1SA0003	AFWPT Trip & Throttle Valve	MCFD-1593-01.02 [456]
1SA0004	AFWPT Governor Valve	MCFD-1593-01.02 [456]
1SA0048ABC	AFWPT Steam Supply Valve	MCFD-1593-01.02 [456]
1SA0049AB	AFWPT Steam Supply Valve	MCFD-1593-01.02 [456]
	Unit 2	
2RN0069A	Nuclear Service Water to Auxiliary Feedwater Isolation Valve	MCFD-2574-02.00 [294]
2RN0162B	Nuclear Service Water to Auxiliary Feedwater Isolation Valve	MCFD-2574-03.00 [295]
2CA0086A	Nuclear Service Water Supply Valve	MCFD-2592-01.01 [457]
2CA0116B	Nuclear Service Water Supply Valve	MCFD-2592-01.01 [457]
2CA0036AB	AFWPT Discharge Flow Control Valve	MCFD-2592-01.00 [458]
2CA0038B	AFWPT Isolation Valve	MCFD-2592-01.00 [458]
2CA0048AB	AFWPT Discharge Flow Control Valve	MCFD-2592-01.00 [458]
2CA0050B	AFWPT Isolation Valve	MCFD-2592-01.00 [458]
2CA0052AB	AFWPT Discharge Flow Control Valve	MCFD-2592-01.00 [458]
2CA0054AC	AFWPT Isolation Valve	MCFD-2592-01.00 [458]
2CA0064AB	AFWPT Flow Control Valve	MCFD-2592-01.00 [458]
2CA0066AC	AFWPT Isolation Valve	MCFD-2592-01.00 [458]
2SA0003	AFWPT Trip & Throttle Valve	MCFD-2593-01.02 [459]
2SA0004	AFWPT Governor Valve	MCFD-2593-01.02 [459]
2SA0048ABC	AFWPT Steam Supply Valve	MCFD-2593-01.02 [459]
2SA0049AB	AFWPT Steam Supply Valve	MCFD-2593-01.02 [459]

Table B-4: Electrical Power Equipment Identified for High Frequency Confirmation

Component	Description	Reference
	Common	
0RN0009B	SNSWP Supply B Shutoff Valve	MCFD-1574-01.00 [288]
0RN0011B	Low Level Supply B Shutoff Valve	MCFD-1574-01.00 [288]
0RN0012AC	Low Level Supply A Shutoff Valve	MCFD-1574-01.00 [288]
0RN0013A	Low Level Supply A Shutoff Valve	MCFD-1574-01.00 [288]
0RN0147AC	CCW Discharge A Isolation Valve	MCFD-1574-01.00 [288]
0RN0148AC	CCW Discharge A Isolation Valve	MCFD-1574-01.00 [288]
0RN0152B	SNSWP Discharge B Isolation Valve	MCFD-1574-01.00 [288]
0RN0284B	CCW Discharge B Isolation Valve	MCFD-1574-01.00 [288]
	Unit 1	
1EDGA	Diesel Generator Battery Charger 1A	MCCD-1703-06.09 [224]
1EDGB	Diesel Generator Battery Charger 1B	MCCD-1703-07.04 [225]
1ELXA-04B	Feeder from 1ELXA-XFMR	MCCD-1703-06.00 [398]
1ELXA-04D	1EMXE MCC Feeder	MCCD-1703-06.00 [398]
1ELXA-05D	1EMXA MCC Feeder	MCCD-1703-06.00 [398]
1ELXA-XFMR	4160/600 Volt Transformer	MCCD-1702-02.00 [396]
1ELXB-04B	Feeder from 1ELXB-XFMR	MCCD-1703-07.00 [399]
1ELXB-05D	1EMXF MCC Feeder	MCCD-1703-07.00 [399]
1ELXB-05C	1EMXB MCC Feeder	MCCD-1703-07.00 [399]
1ELXB-XFMR	4160/600 Volt Transformer	MCCD-1702-02.00 [396]
1EMXA-F01E	EVCA Charger Control	MCCD-1703-06.01 [213]
1EMXA-F06C	1CA86A Valve Motor Control	MCCD-1703-06.01 [213]
1EMXA-R09A	1RN64A Valve Motor Control	MCCD-1703-06.01 [213]
1EMXA-R09B	1RN69A Valve Motor Control	MCCD-1703-06.01 [213]
1EMXA-R11D	1RN43A Valve Motor Control	MCCD-1703-06.01 [213]
1EMXB-02C	1CA116B Valve Motor Control	MCCD-1703-07.01 [214]
1EMXB-05F	EVCB Charger Control	MCCD-1703-07.01 [214]
1EMXB2-R02B	1RN162B Valve Motor Control	MCCD-1703-07.06 [460]
1EMXB2-R03A	1RN63B Valve Motor Control	MCCD-1703-07.06 [460]
1EMXB2-R04A	Feeder from 1EMXB Load Center	MCCD-1703-07.06 [460]
1EMXB2-R04B	1RN41B Valve Motor Control	MCCD-1703-07.06 [460]
1EMXE-F01A	1EDGA Battery Charger Feeder	MCCD-1703-06.09 [224]
1EMXE-F01C	DG1A Crankcase Vacuum Blower Motor Control	MCCD-1703-06.09 [224]
1EMXE-F03C	DG1A Jacket/Intercooler Water Pump Motor Control	MCCD-1703-06.09 [224]
1EMXE-R01D	DSF1A DG Building Ventilation Fan Motor Control	MCCD-1703-06.09 [224]
1EMXE-R01E	1RN70A Valve Motor Control	MCCD-1703-06.09 [224]
1EMXE-R02B	DG1A Fuel Oil Transfer Pump Motor Control	MCCD-1703-06.09 [224]
1EMXE-R02E	DSF1C DG Building Ventilation Fan Motor Control	MCCD-1703-06.09 [224]
1EMXE-R03D	1DG1A Panelboard Feeder	MCCD-1703-06.09 [224]
1EMXF-F01A	1EDGB Battery Charger Feeder	MCCD-1703-07.04 [225]
1EMXF-F01C	DG1B Crankcase Vacuum Blower Motor Control	MCCD-1703-07.04 [225]
1EMXF-F03C	DG1B Jacket/Intercooler Water Pump Motor Control	MCCD-1703-07.04 [225]
1EMXF-R01D	DSF1B DG Building Ventilation Fan Motor Control	MCCD-1703-07.04 [225]
1EMXF-R01E	1RN171B Valve Motor Control	MCCD-1703-07.04 [225]
1EMXF-R02B	DG1B Fuel Oil Transfer Pump Motor Control	MCCD-1703-07.04 [225]
1EMXF-R02E	DSF1D DG Building Ventilation Fan Motor Control	MCCD-1703-07.04 [225]
1EMXF-R03D	1DG1B Panelboard Feeder	MCCD-1703-07.04 [225]
1EQAGE0001	Diesel Generator 1A	MCCD-1702-02.00 [396]
1EQAGE0002	Diesel Generator 1B	MCCD-1702-02.00 [396]

Table B-4: Electrical Power Equipment Identified for High Frequency Confirmation

Component	Description	Reference
1ETA03	4160/600 Volt Transformer 1ELXA Feeder	MCCD-1702-02.00 [396]
1ETA12	Nuclear Service Pump 1A Motor Feeder	MCCD-1702-02.00 [396]
1ETA14	Feeder from Diesel Generator 1A	MCCD-1702-02.00 [396]
1ETB03	4160/600 Volt Transformer 1ELXB Feeder	MCCD-1702-02.00 [396]
1ETB12	Nuclear Service Pump 1B Motor Feeder	MCCD-1702-02.00 [396]
1ETB14	Feeder from Diesel Generator 1A	MCCD-1702-02.00 [396]
1EVIA	Inverter 1A	MC-1705-01.00 [217]
1EVIB	Inverter 1B	MC-1705-01.00 [217]
1EVIC	Inverter 1C	MC-1705-01.00 [217]
1EVID	Inverter 1D	MC-1705-01.00 [217]
1FDPU0044	Fuel Oil Booster Pump 1A	MCFD-1609-03.00 [256]
1FDPU0045	Fuel Oil Booster Pump 1B	MCFD-1609-03.01 [257]
1FDPU0054	Fuel Oil Transfer Pump 1A	MCFD-1609-03.00 [256]
1FDPU0055	Fuel Oil Transfer Pump 1B	MCFD-1609-03.01 [257]
1KDPU0009J	Diesel Generator Jacket Water Pump 1A	MCFD-1609-01.00 [274]
1KDPU0009I	Diesel Generator Intercooler Water Pump 1A	MCFD-1609-01.00 [274]
1KDPU0010J	Diesel Generator Jacket Water Pump 1B	MCFD-1609-01.01 [275]
1KDPU0010I	Diesel Generator Intercooler Water Pump 1B	MCFD-1609-01.01 [275]
1RN0001	Low Level Intake Isolation Valve	MCFD-1574-01.00 [288]
1RN0016A	RN Channel 1A Supply Isolation Valve	MCFD-1574-01.01 [289]
1RN0018B	RN Channel 1B Supply Isolation Valve	MCFD-1574-01.01 [289]
1RN0041B	Non-Essential Supply Isolation Valve	MCFD-1574-01.01 [289]
1RN0043A	Non-Essential Supply Isolation Valve	MCFD-1574-01.01 [289]
1RN0063B	Non-Essential Return Isolation Valve	MCFD-1574-01.00 [288]
1RN0064A	Non-Essential Return Isolation Valve	MCFD-1574-01.00 [288]
1RN0070A	1A Diesel Generator Heat Exchanger Supply Isolation Valve	MCFD-1574-02.00 [290]
1RN0073A	1A Diesel Generator Heat Exchanger Control Valve	MCFD-1574-02.00 [290]
1RN0171B	1B Diesel Generator Heat Exchanger Supply Isolation Valve	MCFD-1574-03.00 [291]
1RN0174B	1B Diesel Generator Heat Exchanger Control Valve	MCFD-1574-03.00 [291]
1RN0296A	Essential Header 1A Return Isolation Valve	MCFD-1574-01.00 [288]
1RN0297B	Essential Header 1B Return Isolation Valve	MCFD-1574-01.00 [288]
1RNPU0003	Nuclear Service Water Pump 1A	MCCD-1702-02.00 [396]
1RNPU0004	Nuclear Service Water Pump 1B	MCCD-1702-02.00 [396]
1VDAH0008	Diesel Generator Building Ventilation Fan DSF-1A	MC-1579-01.00 [362]
1VDAH0003	Diesel Generator Building Ventilation Fan DSF-1B	MC-1579-01.00 [362]
1VDAH0006	Diesel Generator Building Ventilation Fan DSF-1C	MC-1579-01.00 [362]
1VDAH0001	Diesel Generator Building Ventilation Fan DSF-1D	MC-1579-01.00 [362]
1ZDBW0080	Diesel Generator Crankcase Vacuum Blower 1A	MCFD-1609-06.00 [390]
1ZDBW0081	Diesel Generator Crankcase Vacuum Blower 1B	MCFD-1609-06.00 [390]
DGR-RAID-1A	Diesel Generator Building Relief Air Damper 1A	MC-1579-01.00 [362]
DGR-RAID-1B	Diesel Generator Building Relief Air Damper 1B	MC-1579-01.00 [362]
DGR-RAID-1C	Diesel Generator Building Relief Air Damper 1C	MC-1579-01.00 [362]
DGR-RAID-1D	Diesel Generator Building Relief Air Damper 1D	MC-1579-01.00 [362]
EVCA	Battery Charger A	MCCD-1703-06.01 [213]
EVCB	Battery Charger B	MCCD-1703-07.01 [214]
	Unit 2	
2EDGA	Diesel Generator Battery Charger 2A	MCCD-2703-06.06 [226]
2EDGB	Diesel Generator Battery Charger 2B	MCCD-2703-07.05 [227]
2ELXA-04B	Feeder from 2ELXA-XFMR	MCCD-2703-06.00 [400]

Table B-4: Electrical Power Equipment Identified for High Frequency Confirmation

Component	Description	Reference
2ELXA-04D	2EMXE MCC Feeder	MCCD-2703-06.00 [400]
2ELXA-05D	2EMXA MCC Feeder	MCCD-2703-06.00 [400]
2ELXA-XFMR	4160/600 Volt Transformer	MCCD-1702-02.00 [396]
2ELXB-04B	Feeder from 2ELXB-XFMR	MCCD-2703-07.00 [401]
2ELXB-04C	2EMXH MCC Feeder	MCCD-2703-07.00 [401]
2ELXB-05C	2EMXB MCC Feeder	MCCD-2703-07.00 [401]
2ELXB-05D	2EMXF MCC Feeder	MCCD-2703-07.00 [401]
2ELXB-XFMR	4160/600 Volt Transformer	MCCD-1702-02.00 [396]
2EMXA-F02E	EVCC Charger Control	MCCD-2703-06.01 [215]
2EMXA-F06C	2CA86A Valve Motor Control	MCCD-2703-06.01 [215]
2EMXA-R09A	2RN64A Valve Motor Control	MCCD-2703-06.01 [215]
2EMXA-R09B	2RN69A Valve Motor Control	MCCD-2703-06.01 [215]
2EMXA-R11D	2RN43A Valve Motor Control	MCCD-2703-06.01 [215]
2EMXB-02C	2CA116B Valve Motor Control	MCCD-2703-07.01 [216]
2EMXB-06E	EVCD Charger Control	MCCD-2703-07.01 [216]
2EMXB2-R02B	2RN162B Valve Motor Control	MCCD-2703-07.09 [461]
2EMXB2-R03A	2RN63B Valve Motor Control	MCCD-2703-07.09 [461]
2EMXB2-R04A	Feeder from2EMXB Load Center	MCCD-2703-07.09 [461]
2EMXB2-R04B	2RN41B Valve Motor Control	MCCD-2703-07.09 [461]
2EMXE-F01A	2EDGA Battery Charger Feeder	MCCD-2703-06.06 [226]
2EMXE-F01C	DG2A Crankcase Vacuum Blower Motor Control	MCCD-2703-06.06 [226]
2EMXE-F03C	DG2A Jacket/Intercooler Water Pump Motor Control	MCCD-2703-06.06 [226]
2EMXE-R01D	DSF2C DG Building Ventilation Fan Motor Control	MCCD-2703-06.06 [226]
2EMXE-R01E	2RN70A Valve Motor Control	MCCD-2703-06.06 [226]
2EMXE-R02B	DG2A Fuel Oil Transfer Pump Motor Control	MCCD-2703-06.06 [226]
2EMXE-R02E	DSF2A DG Building Ventilation Fan Motor Control	MCCD-2703-06.06 [226]
2EMXE-R03D	2DG2A Panelboard Feeder	MCCD-2703-06.06 [226]
2EMXF-F01A	2EDGB Battery Charger Feeder	MCCD-2703-07.05 [227]
2EMXF-F01C	DG2B Crankcase Vacuum Blower Motor Control	MCCD-2703-07.05 [227]
2EMXF-F03C	DG2B Jacket/Intercooler Water Pump Motor Control	MCCD-2703-07.05 [227]
2EMXF-R01D	DSF2D DG Building Ventilation Fan Motor Control	MCCD-2703-07.05 [227]
2EMXF-R01E	2RN171B Valve Motor Control	MCCD-2703-07.05 [227]
2EMXF-R02B	DG2B Fuel Oil Transfer Pump Motor Control	MCCD-2703-07.05 [227]
2EMXF-R02E	DSF2B DG Building Ventilation Fan Motor Control	MCCD-2703-07.05 [227]
2EMXF-R03D	2DG2B Panelboard Feeder	MCCD-2703-07.05 [227]
2EMXH-F2D	0RN11B Valve Motor Control	MCCD-2703-07.02 [462]
2EMXH-F2C	0RN9B Valve Motor Control	MCCD-2703-07.02 [462]
2EMXH-F3D	0RN152B Valve Motor Control	MCCD-2703-07.02 [462]
2EMXH-F3C	0RN284B Valve Motor Control	MCCD-2703-07.02 [462]
2EQAGE0001	Diesel Generator 2A	MCCD-1702-02.00 [396]
2EQAGE0002	Diesel Generator 2B	MCCD-1702-02.00 [396]
2ETA02	Feeder from Diesel Generator 2A	MCCD-1702-02.00 [396]
2ETA05	Nuclear Service Pump 2A Motor Feeder	MCCD-1702-02.00 [396]
2ETA14	4160/600 Volt Transformer 2ELXA Feeder	MCCD-1702-02.00 [396]
2ETB02	Feeder from Diesel Generator 2A	MCCD-1702-02.00 [396]
2ETB05	Nuclear Service Pump 2B Motor Feeder	MCCD-1702-02.00 [396]
2ETB14	4160/600 Volt Transformer 2ELXB Feeder	MCCD-1702-02.00 [396]
2EVIA	Inverter 2A	MC-2705-01.00 [232]
2EVIB	Inverter 2B	MC-2705-01.00 [232]

Table B-4: Electrical Power Equipment Identified for High Frequency Confirmation

Component	Description	Reference
2EVIC	Inverter 2C	MC-2705-01.00 [232]
2EVID	Inverter 2D	MC-2705-01.00 [232]
2FDPU0044	Fuel Oil Booster Pump 2A	MCFD-2609-03.00 [258]
2FDPU0045	Fuel Oil Booster Pump 2B	MCFD-2609-03.01 [259]
2FDPU0054	Fuel Oil Transfer Pump 2A	MCFD-2609-03.00 [258]
2FDPU0055	Fuel Oil Transfer Pump 2B	MCFD-2609-03.01 [259]
2KDPU0009J	Diesel Generator Jacket Water Pump 2A	MCFD-2609-01.00 [276]
2KDPU0009I	Diesel Generator Intercooler Water Pump 2A	MCFD-2609-01.00 [276]
2KDPU0010J	Diesel Generator Jacket Water Pump 2B	MCFD-2609-01.01 [277]
2KDPU0010I	Diesel Generator Intercooler Water Pump 2B	MCFD-2609-01.01 [277]
2RN0016A	RN Channel 2A Supply Isolation Valve	MCFD-2574-01.01 [293]
2RN0018B	RN Channel 2B Supply Isolation Valve	MCFD-2574-01.01 [293]
2RN0041B	Non-Essential Supply Isolation Valve	MCFD-2574-01.01 [293]
2RN0043A	Non-Essential Supply Isolation Valve	MCFD-2574-01.01 [293]
2RN0063B	Non-Essential Return Isolation Valve	MCFD-2574-04.00 [296]
2RN0064A	Non-Essential Return Isolation Valve	MCFD-2574-04.00 [296]
2RN0070A	2A Diesel Generator Heat Exchanger Supply Isolation Valve	MCFD-2574-02.00 [294]
2RN0073A	2A Diesel Generator Heat Exchanger Control Valve	MCFD-2574-02.00 [294]
2RN0171B	2B Diesel Generator Heat Exchanger Supply Isolation Valve	MCFD-2574-03.00 [295]
2RN0174B	2B Diesel Generator Heat Exchanger Control Valve	MCFD-2574-03.00 [295]
2RN0296A	Essential Header 2A Return Isolation Valve	MCFD-2574-01.01 [293]
2RN0297B	Essential Header 2B Return Isolation Valve	MCFD-2574-03.00 [295]
2RNPU0003	Nuclear Service Water Pump 2A	MCCD-1702-02.00 [396]
2RNPU0004	Nuclear Service Water Pump 2B	MCCD-1702-02.00 [396]
2VDAH0008	Diesel Generator Building Ventilation Fan DSF-2A	MC-2579-01.00 [363]
2VDAH0003	Diesel Generator Building Ventilation Fan DSF-2B	MC-2579-01.00 [363]
2VDAH0006	Diesel Generator Building Ventilation Fan DSF-2C	MC-2579-01.00 [363]
2VDAH0001	Diesel Generator Building Ventilation Fan DSF-2D	MC-2579-01.00 [363]
2ZDBW0080	Diesel Generator Crankcase Vacuum Blower 2A	MCFD-2609-06.00 [391]
2ZDBW0081	Diesel Generator Crankcase Vacuum Blower 2B	MCFD-2609-06.00 [391]
DGR-RAID-2A	Diesel Generator Building Relief Air Damper 2A	MC-2579-01.00 [363]
DGR-RAID-2B	Diesel Generator Building Relief Air Damper 2B	MC-2579-01.00 [363]
DGR-RAID-2C	Diesel Generator Building Relief Air Damper 2C	MC-2579-01.00 [363]
DGR-RAID-2D	Diesel Generator Building Relief Air Damper 2D	MC-2579-01.00 [363]
EVCC	Battery Charger C	MCCD-2703-06.01 [215]
EVCD	Battery Charger D	MCCD-2703-07.01 [216]