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August 30, 2017 10 CFR 50.54(f)
NRC-17-0052

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) NRC (E. Leeds and M. Johnson) Letter to All Power Reactor Licensees et al., “Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3 and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident,” March 12, 2012 (ML12053A340)

3) NRC Letter, Electric Power Research Institute Report 3002000704, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," As An Acceptable Alternative to the March 12, 2012, Information Request for Seismic Reevaluations, dated May 7, 2013 (ML13106A331)

4) DTE Energy Company Letter NRC-14-0017, DTE Electric Company’s Seismic Hazard and Screening Report Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushimi Dai-ichi Accident, March 31, 2014 (ML14090A326)

5) NRC (W. Dean) Letter to the Power Reactor Licensees on the Enclosed List, “Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident.” October 27, 2015 (ML15194A015)

6) NEI Letter, “Request for NRC Endorsement of High Frequency Program: Application Guidance for Functional Confirmation and Fragility Evaluation (EPRI 3002004396),” dated July 30, 2015 (ML15223A100/ML15223A102)

7) NRC (J. Davis) Letter to Nuclear Energy Institute (A. Mauer), "Endorsement of Electric Power Research Institute Final Draft Report 3002004396, 'High Frequency Program: Application Guidance for Functional Confirmation and Fragility.'" September 17, 2015 (ML15218A569)

Subject: High Frequency Seismic Confirmation Report, Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued a Request for Information per 10 CFR 50.54(f) (Reference 2) to all power reactor licensees. The required response section of Enclosure 1 of Reference 2 indicated that licensees should provide a Seismic Hazard Evaluation and Screening Report within 1.5 years from the date of the letter. By NRC letter dated May 7, 2013 (Reference 3), the date to submit the report was extended to March 31, 2014. On March 31, 2014, Fermi 2 submitted a reevaluated seismic hazard to the NRC as a part of the Seismic Hazard and Screening Report (Reference 4).

The NRC final seismic hazard evaluation screening determination results and the associated schedules for submittal of the remaining seismic hazard evaluation activities including a High Frequency Confirmation was provided by the NRC in a letter dated October 27, 2015 (Reference 5). The enclosure to this letter provides the High Frequency Confirmation evaluation undertaken for Fermi Unit 2 (Fermi 2) using the methodologies in EPRI 3002004396, "High Frequency Program, Application Guidance for Functional Confirmation and Fragility Evaluation," (Reference 6) as endorsed by the NRC in a letter dated September 17, 2015 (Reference 7).

The High Frequency Evaluation performed for Fermi 2 identified a total of 277 components that required evaluation using the methodologies in EPRI 3002004396. All of the devices evaluated for the High Frequency Confirmation have adequate seismic capacity.

This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments.

Should you have any questions or require additional information, please contact Mr. Scott A. Maglio, Manager – Nuclear Licensing, at (734) 586-5076.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on August 30, 2017

Keith J. Polson
Site Vice President

Enclosure: Near Term Task Force Recommendation 2.1 High Frequency Confirmation Report

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 5, Region III
Regional Administrator, Region III
Michigan Public Service Commission
Regulated Energy Division (kindschl@michigan.gov)

Enclosure to
NRC-17-0052

Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43

Near Term Task Force Recommendation 2.1
High Frequency Confirmation Report

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 NRC established a Near Term Task Force (NTTF) to conduct a systematic review of NRC processes and regulations and to determine if the agency should make additional improvements to its regulatory system. The NTTF developed a set of recommendations intended to clarify and strengthen the regulatory framework for protection against natural phenomena. Subsequently, the NRC issued a 50.54(f) letter on March 12, 2012 [1], requesting information to assure that these recommendations are addressed by all U.S. nuclear power plants. The 50.54(f) letter 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” [6] 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,” [8] and was endorsed by the NRC in a letter dated September 17, 2015 [3]. Final screening identifying plants needing to perform a High Frequency Confirmation was provided by the NRC in a letter dated October 27, 2015 [2].

This report describes the High Frequency Confirmation evaluation undertaken for the Fermi 2 Nuclear Power Plant. 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 [8] is used as needed for the Fermi 2 engineering evaluations described in this report. 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
- Development of a vertical ground motion response spectrum (GMRS)
- Estimation of in-cabinet seismic demand for subject components
- Estimation of in-cabinet seismic capacity for subject components
- Summary of subject components’ high-frequency evaluations

1 Introduction

1.1 PURPOSE

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

1.2 BACKGROUND

Following the accident at the Fukushima Dai-ichi nuclear power plant resulting from the March 11, 2011, Great Tohoku Earthquake and subsequent tsunami, the Nuclear Regulatory Commission (NRC) established a Near Term Task Force (NTTF) to conduct a systematic review of NRC processes and regulations and to determine if the agency should make additional improvements to its regulatory system. The NTTF developed a set of recommendations intended to clarify and strengthen the regulatory framework for protection against natural phenomena. 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” [6] 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 is 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,” [8] and was endorsed by the NRC in a letter dated September 17, 2015 [3]. Final screening identifying plants needing to perform a High Frequency Confirmation was provided by the NRC in a letter dated October 27, 2015 [2].

On March 31, 2014, Fermi 2 submitted a reevaluated seismic hazard to the NRC as a part of the Seismic Hazard and Screening Report [4]. By letter dated October 27, 2015 [2], the NRC transmitted the results of the screening and prioritization review of the seismic hazards reevaluation.

This report describes the High Frequency Confirmation evaluation undertaken for Fermi 2 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 [3].

The objective of this report is to provide summary information describing the High Frequency Confirmation evaluations and results. The level of detail provided in the report is intended to enable NRC to understand the inputs used, the evaluations performed, and the decisions made as a result of the evaluations.

1.3 APPROACH

EPRI 3002004396 [8] is primarily used for the Fermi 2 engineering evaluations described in this report. The Fermi 2 site has the benefit of a recently peer reviewed Seismic Probability Risk Assessment (SPRA). The site GMRS, horizontal In-Structure Response Spectra (ISRS), and vertical ISRS were explicitly calculated during this effort [14]. There is no need to estimate ISRS as described in Reference [8]. This is the same ISRS used in the previous Expedited Seismic Evaluation Process (ESEP) submitted under Reference [15] and accepted under Reference [16]. Section 4.1 of Reference [8] provided general steps to follow for the high frequency confirmation component evaluation. Using the criteria of Reference [8] and the ISRS developed in Reference [14], the following topics are addressed in the subsequent sections of this report:

- Fermi 2 Safe Shutdown Earthquake (SSE) and GMRS Information
- Selection of components and a list of specific components for high-frequency confirmation
- 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

Fermi 2 submitted reevaluated seismic hazard information including GMRS and seismic hazard information to the NRC on March 31, 2014 [4]. In a letter dated October 5, 2015, the NRC staff concluded that the submitted GMRS adequately characterizes the reevaluated seismic hazard for the Fermi 2 site [12].

The NRC final screening determination letter concluded [2] that the Fermi 2 GMRS to SSE comparison resulted in a need to perform a High Frequency Confirmation in accordance with the screening criteria in the SPID [6].

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 [8], 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 circuits. Accordingly, the objective of the review as stated in Section 4.2.1 of Reference [8] is to determine if seismic induced high frequency relay chatter would prevent the completion of the following key functions.

2.1 REACTOR TRIP/SCRAM

The reactor trip/SCRAM function is identified as a key function in Reference [8] 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 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. For this review, 1” lines or smaller are not considered to contribute to a significant LOCA 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:

- Nuclear Steam Supply Shutoff,
- Reactor Water Clean-Up,
- Reactor Core Isolation Cooling,
- Residual Heat Removal,
- Core Spray, and
- High Pressure Core Injection.

Nuclear Steam Supply Shutoff Valves

Reactor Head Vent Valves – B2100F001, B2100F002, and B2100F005

All three valves are manually operated with no electrical interface. Additionally, F001 and F002 are locked closed. The solenoid-operated valves B2100F403 and B2100F404 are similarly de-energized in the closed position and abandoned-in-place.

Safety Relief Valves and Auto Depressurization Valves

There are 15 SRVs, 10 of which are manual depressurization valves and 5 of which are auto depressurization valves. For both types, electrical control for the solenoid-operated pilot valves is via a rugged push button. Each of the SRVs has a seal-in circuit that opens the solenoid. These seal-ins can be overridden with the associated Close push button.

Additionally, the following individual circuits are vulnerable to SILO events. Coincidental chatter in the Low-Low Set Relief relays B21-K33A and B21-K33C will allow seal-ins in both of these circuits, which will open B2104F013A. This seal-in can be overridden by push button 1B217. A similar circuit will cause an identical effect in B2104F013G via B21-K33B and B21-K33D, which can be overridden by push button 1B220. For the Auto Depressurization valves, coincidental chatter in high drywell pressure/low RPV level relays K6A and K8A or K6B and K8B causes seal-ins in these circuits that open B2104F013E/H/J/P/R and bypass the normal Close push button override. These can, however, be overridden by a separate push buttons 52A or 52B. Additionally, in the event that the dedicated shutdown panel (H21P623) is in use, K1SRV/K2SRV can seal-in via the T2/M2 K2SRV contact and open the SRV. This seal-in can be broken by the Close push button.

Main Steam Isolation Valves (MSIVs) – B2103F022A/B/C/D and B2103F028A/B/C/D

There are eight MSIVs in total with four inboard and four outboard. They are solenoid-operated pilot valves electrically controlled via relays, which are slaves to isolation logic relays (B2100M328A/B/C/D (inboard) and B2100M329A/B/C/D (outboard)). The latter relays are energized for at-power operation and de-energized to close the valves. Their configuration by design is likely to seal-in following a seismic event. If the relays do seal-in, they will energize the coils that will close the MSIVs and the Main Steam Line Drain Valves. This is the safe-shutdown position following many types of initiating events. Therefore, this action is a desired response to the seismic event and for this reason chatter is acceptable and no contact devices in this circuit meet the selection criteria.

Main Steam Line Drain Valves - B2103F016 and B2103F019

The opening of normally-closed motor-operated valves is commanded by rugged push buttons and keylock switches required for any change in state. This valve opening control has a potential seal-in, but it requires A71B-K56 contact 5/6 to be closed. This contact is controlled by A71B-K7A and –K7B, neither of which have a seal-in. Thus, the valve opening control is insensitive to contact chatter and thus the valve will remain closed after the seismic event.

Reactor Water Clean-Up Valves

Reactor Water Clean-Up RPV Bottom Head Line Recirculation Valve G3352F101

This normally-open motor-operated valve is controlled by rugged push buttons only. Chatter in the closing circuit, the desired position, will not cause a SILO event. Thus this valve is not affected by seal-in or lock-out.

Reactor Water Clean-Up Pumps A & B Suction Line Isolation Valve G3352F102

This normally-open motor-operated valve is controlled by rugged push buttons. Chatter in the closing circuit, the desired position, will not cause a SILO event.

Additionally, this valve is downstream of G3352F101 and thus is redundant.

Reactor Water Clean-Up Isolation Valves G3352F001 and G3352F004

These are normally-open motor-operated valves which close upon an isolation signal. G3352F119 could also be included as it can serve the same function, though F001 and F004 are the isolation valves. Only one of the three valves needs to successfully close to isolate flow. F001 and F004 are operated by a rugged push button, but can also be activated by relays A71B-K26 and A71B-K27. These are seal-in relays that are prevented from sealing-in due to chatter by several normally open contacts while de-energized. In the energized state the relays are sealed in and any chatter in the control logic would break the seal-in and close the valves. This action is a desired response to the seismic event and for this reason chatter is acceptable and no contact devices in this circuit meet the selection criteria.

In addition, these valves are downstream of G3352F101 and isolation can be achieved by closing that valve regardless of the isolation signal.

Reactor Core Isolation Cooling Valves

Reactor Core Isolation Cooling Steam Supply Line Isolation Valves

Normally-open motor-operated valves E5150F007 and E5150F008 are required to remain open to supply steam to the RCIC turbine. The opening circuit is controlled by a rugged pushbutton. However, seal-in of the RCIC isolation signal (K33/K15) relay could lockout the open relay and chatter or seal-in of the K33/K15 relay in conjunction with chatter in the close relay or the position 16/8 limit switch could seal-in the close circuit. Chatter in the close contactor can seal-itself in during normal operation.

The K33/K15 relay can be sealed-in by chatter in its own circuits, the turbine exhaust diaphragm high pressure K39/K29 relay, the steam line high differential pressure K32/K12 relay, or coincidental chatter in both reactor low pressure relays, K60/K58 and K61/K59. Coincidental chatter in both B21B-S5B/A and B21B-K3B/A is not feasible since S5B/A is a manual switch. The K39/K29 relay can chatter in its own contacts or by coincidental chatter of both E51K201B/A and E51K201D/C. The K32/K12 relay is a time-delay relay that does not seal-in or interface with a SILO circuit, which prevents momentary chatter in its coil circuits from energizing it. K60/K58 and K61/K59 can chatter due to E51K204B/A and E51K204D/C, respectively. A seal-in on the K33/K15 circuit can be overridden by a keylock reset on H11P601.

Therefore, for these valves the close contactors, the K33/K15 relays, the position 16/8 limit switches, the K39/K29 relays, the K60/K58 relays, the K61/K59 relays, and the E51K201A/B/C/D can cause an undesired event and were analyzed in Table B-1.

Residual Heat Removal Valves

Testable Check Valves E11-F050A/B

These solenoid-operated valves are controlled by rugged, normally open push buttons S15A and S15B. There are no SILO devices that would prevent the normal operation of these check valves.

LPCI Isolation Valves

The testable check valves E1100F050A and E1100F050B are not chatter sensitive and can be credited to remain closed, thus these valves do not need to be analyzed.

Drywell Spray Isolation valves

These normally-closed motor-operated valves are operated via push buttons and relay permissive. There is no seal in of the Close circuit via these relays and no lockout of the Open signal. There is the possibility for the Open and Closed contactors themselves to seal-in, but the push buttons will override either of these events.

Core Spray Valves

Testable Check Valves

These solenoid-operated valves are controlled by a rugged, normally open push buttons E2100M061A and E2100M061B. There are no SILO devices that would prevent the normal operation of these check valves.

Core Spray Outboard Check Valves; Core Spray Inboard Motor Operated Valve

The testable check valves E21F006A and E21F006B are not chatter sensitive and can be credited to remain closed, thus these valves do not need to be analyzed.

High Pressure Core Injection Valves

High Pressure Core Injection Steam Supply Line Isolation Valves

These include normally-open motor-operated valves (MOVs) E4150F002 (main 10" line), E4150F600 (1" min flow line), and normally-closed MOV E4150F003 (main 10" line). These valves supply steam to the HPCI turbine, which can be isolated by closing either E4150F002 or both E4150F003 and E4150F600. From normal operation, significant inventory loss will occur due to opening of E4150F003. The opening circuit is controlled by a rugged push button and permissive signal from relays. There is one potential seal-in in the opening circuit, relay OCR. The closing circuit is controlled manually by a rugged push button or automatically via isolation relays. Chatter in the isolation logic along relay K34 for E4150F003 and K44 for E4150F002 will close these valves. These seal-ins can be overridden by keylock resets S35 and S36 respectively. A direct seal-in of the closing circuits via relay CCR can be overridden by the rugged open push button if a change of state is needed. Since RCIC, not HPCI, is credited for core cooling, these seal-ins causing valve closure are not a selection criterion.

2.3 REACTOR VESSEL PRESSURE CONTROL

The reactor vessel pressure control function is identified as a key function in Reference [8] 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."

2.4 CORE COOLING

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.

The initial need for decay heat removal and the related scope of consideration varies based on the plant's NSSS system. The relay chatter impacts that could affect this function would be those that would cause the flow control valves to close and remain closed.

For BWR plants, the decay heat removal mechanism involves the transfer of mass and energy from the reactor vessel to the suppression pool. This requires the replacement of that mass to the reactor vessel via some core cooling system, e.g., reactor core isolation cooling (RCIC). Therefore, for this evaluation the following functions need to be checked: (1) steam from the reactor pressure vessel to the RCIC turbine and exhausted to the suppression pool, (2) coolant from the suppression pool to the reactor via the RCIC pump, and (3) steam from the reactor pressure vessel vented to the suppression pool via the Safety Relief Valves (SRVs). The selection of contact devices for the SRVs overlaps with the RCS/Reactor Vessel Inventory Control Category.

The selection of contact devices for RCIC was based on the premise that RCIC operation is desired, thus any SILO which would lead to RCIC operation is beneficial and thus does not meet the criteria for selection. Only contact devices which could render the RCIC system inoperable were considered.

Reactor Core Isolation Cooling Valves

Reactor Core Isolation Cooling Steam Supply Line Isolation Valves E5150F007 and E5150F008

Section 2.2 identifies issues that could inadvertently close these valves on demand.

Suppression Pool Isolation Valves E5150F029 and E5150F031

Normally-closed motor-operated valves E5150F029 and E5150F031 supply coolant from the suppression pool to the RCIC turbine. There is no lockout of the opening circuit, and opening these valves will override any seal-in in the Close contactor.

RCIC Pump Discharge Isolation Valves E5150F012 and E5150F013

Normally-open motor-operated valve E5150F012 and normally-closed motor-operated valve E5150F013 supply coolant from the RCIC pump to the reactor via check valve, B2100F010B, and locked open valve, B2100F011B. There is no lockout of the opening circuit, but chatter in the closing contactor for E5150F012 can spuriously close this valve. Opening these valves will override any seal-in in the Close contactor.

Safety Relief Valves and Auto Depressurization Valves

As noted in section 2.2, there are 15 solenoid-operated SRVs controlled via a rugged push button. While the Open circuit for these valves has a potential seal-in, there is no SILO event for the Close circuit and the Close push button will override a seal-in in the Open circuit.

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 Motor Control Centers (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 and their ancillary support systems. EPRI 3002004396 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 the Fermi Updated Final Safety Analysis Report (UFSAR). Fermi EDGs provide emergency power for the units. There are 2 divisions of Class 1E loads with two EDGs for each division.

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.

Emergency Diesel Generators

The analysis of the Emergency Diesel Generators is broken down into the generator protective relaying and diesel engine control. General descriptions of these systems and controls appear in the UFSAR.

Generator Protective Relaying

The protective relaying for the EDG circuit breakers include bus differential lockout (3KP94), generator differential lockout (4KU94), offsite under frequency relay (1NL94), and the engine shutdown relays (NCX and SDR). The ground trip string can actuate due to chatter in the CV8/64 ground detector relay or 1ND94 (1NE94/1NF94/1NG94 for EDGs 12/13/14) contacts sealing-in the 1ND94 coil and powering the 2ND94 coil. The offsite under frequency relay can close due to concurrent chatter in both devices 81 and 1PA69. Alternatively, if bus 64B pos B6 is closed or chatters, chatter in the 1PA69 contacts will not be necessary to seal-in 1PA69. The generator differential lockout relay may be tripped by chatter in the differential and ground fault protective relays (ICS), via contacts X-87G, Y-87G and Z-87G. In addition, chatter in the safeguards bus differential protective relays (ICS); via contacts X-87B, Y-87B, and Z-87B; or sympathetic chatter in 2KP94 and 4KP94, could lead to the tripping of the bus lockout relay.

The NCX relay is sealed-in either by chatter in its on circuits or by chatter in the contacts or related switches of at least one of the following five relays: jacket coolant low level relay (CLL), fuel oil low pressure (FPL2), jacket coolant low pressure (CPL), jacket coolant high temperature (CTH), or lube oil high temperature (OTH). However, the NCX relay is isolated by the ESA/ESB contacts and thus will not prevent an auto-start of the EDGs.

The engine trouble shutdown relay SDR is controlled by the engine overspeed switch and relay, the start failure relay, and a set of three switches and relays for lube oil low pressure and crankcase high pressure. Chatter of any of these items will energize relay SDR and cause it to seal-in. This seal-in can be broken by one of two rugged push button resets. Chatter of the contacts of the overspeed relay is blocked by the overspeed switch contacts. Chatter of the overspeed switch could energize the overspeed relay and lead to seal-in of the shutdown relay. The start failure relay is controlled by the two overcrank timing relays. Chatter in the contacts of either of these timing relays may energize the start failure relay and once energized it will seal in. The time delay function of these overcrank relays prevents momentary chatter in their coil circuits from energizing them. Coincident chatter (occurring in two out of three of each group) on the relays of the lube oil low pressure and crankcase high pressure faults could lead to seal-in of the shutdown relay. Chatter in the switches could also cause this fault except they are isolated by the 1/2 contact of the engine at low speed and alarm relay (T3), which is not a SILO device.

Diesel Engine Control Start Circuit

Chatter analysis for the diesel engine control was performed on the start and shutdown circuits of each EDG. The start circuit is blocked by seal-in of the engine trouble shutdown (SDR), EDG differential trip string relay impacted by coincidental chatter in 1KU94 and 3KU94 (2KU94), the seal-in of the emergency start isolation relay (5EX), lockout of IMB86, or lockout of IMG86. Chatter of the SILO contacts of these relays or of the relays that are the “parent” SILO relay may prevent EDG start.

The engine trouble shutdown relay SDR is discussed in the Generator Protective Relaying section and is applicable here.

EDG differential trip string relay 2KU94 can be energized by seal-ins of 1KU94 and 3KU94 (KV94, KW94, and KX94 for EDG 12, 13, and 14 respectively). This can be accomplished either by coincidental chatter of 1KU94 contact 1/2 and 3KU94 contact 1/2 or by chatter in differential relays X-87G, Y-87G, or Z-87G.

The emergency start relay (5EX) is isolated by the emergency stop relay (5E). The 5E relay can be powered by seal-ins of the 1KU94 or SDR relays, but these seal-ins already cause isolation of the EDG start signal, so this circuit contains no unique equipment.

Seal-ins in overcurrent relays for bus 64B can energize lockout relays 1MB86 and 1MG86. The lock-out of the 1MG86 (2KZ94, 2LA94, and 2LB94) relay is via the SI relay (IAC53A) for either X51, Y51, or Z51. The lock-out of the 1MB94 (1KM94, 1KN94 and 1KO94) relay is via the SI relay (IAC66B) for either X50/51, Y50/51, or Z50/51.

Diesel Engine Control Shutdown Circuit

The shutdown circuit can be energized by the seal-in of the engine trouble shutdown relay NCX energizing the stopping relay (5) or the 1KU94 or SDR seal-ins energizing the emergency stop relay (5E). The 1KU94 and SDR relays are discussed in the *Diesel Engine Control Start Circuit* section. The NCX relay is isolated by the emergency start logic via ESA or ESB, however, and thus cannot prevent the start of the EDG.

EDG Ancillary Systems

In order to start and operate the Emergency Diesel Generators, a number of components and systems are required. For the purpose of identifying electrical contact devices, only systems and components which are electrically controlled are analyzed. Information in the UFSAR was used as appropriate for this analysis.

Starting Air

Based on Diesel Generator availability as an initial condition, the passive air reservoirs R3000A009-R3000A016 are presumed pressurized and the only active components in this system required to operate are the air start solenoids R30FA04A/B/C/D and R30FA05A/B/C/D, which are covered under the EDG engine control analysis above.

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.

Lube Oil

The Diesel Generators utilize engine-driven mechanical lubrication oil pumps which do not rely on electrical control.

Fuel Oil

The Diesel Generator Fuel Oil System is described in the UFSAR. The Diesel Generators utilize engine-driven mechanical pumps and DC-powered auxiliary pumps R3001C021-R3001C024 to supply fuel oil to the engines from the day tanks, R3000A017-R3000A020. The day tanks are re-supplied using AC-powered Diesel Oil Transfer Pumps R3000C001-R3000C004 and R3000C009- R3000C012. Chatter analysis of the control circuits for the electrically-powered auxiliary and transfer pumps concluded they do not include SILO devices. The mechanical pumps do not rely on electrical control.

Cooling Water

The Diesel Generator Cooling Water System is described in the UFSAR. This system consists of two cooling loops, jacket water and air cooler, which are each cooled by Diesel Generator Service Water (DGSW). Engine driven pumps operating in both cooling loops are credited when the engine is operating. These mechanical pumps do not rely on electrical control. The electric jacket water pump is only used during shutdown periods and is thus not included in this analysis.

Four DGSW pumps with inter-divisional cross-tie capabilities, R3001C005-R3001C008, provide cooling water to each of the four heat exchangers, R3001B025-R3001B028 associated with the four EDGs. In automatic mode, these pumps are started via the EDG Start Signal. Chatter analysis of the EDG start signal is included above, and thus no unique chatter events exist for this system.

Ventilation

The Residual Heat Removal (RHR) Diesel Generator Room Ventilation System is described in the UFSAR. Ventilation for each Diesel Generator Enclosure is provided via two supply fans, X4103C001-X4103C008. In automatic mode, these fans are started via the EDG Start Signal. Chatter analysis of the EDG start signal is included above. Other than SILO devices identified for the EDG start signal, chatter analysis of the control circuits for these fans concluded they do not include SILO devices.

Battery Chargers

Chatter analysis was performed for each of the non-BOP 130V DC battery chargers: R3200S020A/B/C and R3200S021A/B/C, though only A and B of each are required for operation. 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. The high voltage shutdown circuit has a latching output relay, CRI, which disconnects the charger. This is a non-vulnerable solid-state relay and thus is not susceptible to chatter. No other vulnerable contact device affects the availability of the battery chargers.

Inverters

Analysis of schematics for the 120V AC 2KVA inverters (R31K001, R31K002, R31K004, R31K005), the HPCI inverter (R1100S080), and the 120V Power AC/DC inverters (R1700S011A/B), revealed no vulnerable contact devices and thus chatter analysis is unnecessary.

Cross Tie Breakers

Loss of the cross tie breakers 64B-B8, 64C-C8, 65E-E8, and 65F-F8 results in the bus and functional loss of the RHR pumps and the RHRSW pumps. Seal-in of the 1KP94 (1KR94, 1KS94, and 1KT94 for C8, E8, and F8 respectively), 1KL94 (1KM94, 1KN94 and 1KO94) or 2KY94 (2KZ94, 2LA94, and 2LB94) relay coils can prevent these breakers from closing on demand. The 1KP94 (1KR94, 1KS94, and 1KT94) relay can energize due to seal-in of the ICS differential protection relays (87B/65E) for either X87B, Y87B, or Z87B or via sympathetic chatter in 2KP94 and 4KP94 (2KR94/4KR94, 2KS94/4KS94, and 2KT94/4KT94). The seal-in of the 2KY94 (2KZ94, 2LA94, and 2LB94) relay is via the SI relay (IAC53A) for either X51, Y51, or Z51, with initial closure via the SI seal in contact and then via the 1MB94/86 seal in contacts. The seal in of the 1KL94 (1KM94, 1KN94 and 1KO94) is via the SI relay (IAC66B) for either X50/51, Y50/51, or Z50/51, with initial closure. 64C-C8 can bypass these seal-ins via the local controls. Thus, the ICS differential protection relays 87B/65E, relays 2KP94 and 4KP94 (2KR94/4KR94, 2KS94/4KS94, and 2KT94/4KT94), SI relays IAC53A, and SI relays IAC66B are included in Table B-1.

Switchgear, Load Centers, and MCCs

Power distribution from the EDGs to the necessary electrical loads (Battery Chargers, Inverters, Fuel Oil Pumps, and EDG Ventilation Fans) was traced to identify any SILO devices which could lead to a circuit breaker trip and interruption in power. This effort excluded the EDG circuit breakers, which are covered in above, as well as component-specific contactors and their control devices, which are covered in the analysis of each component above. The medium- and low-voltage power circuit breakers in switchgear and load centers supplying power to loads identified in this section are included in this evaluation. The Molded-Case Circuit Breakers used in the Motor Control Centers are seismically rugged. Power distribution to the inverters, fuel oil pumps, and EDG ventilation fans is via non-vulnerable disconnect switches. The only circuit breakers affected by contact devices (not already covered) were those associated with the battery chargers and the cross tie breakers.

2.6 SUMMARY OF SELECTED COMPONENTS

A list of the contact devices requiring a high frequency confirmation is provided in Appendix B.

3 Seismic Evaluation

3.1 HORIZONTAL SEISMIC DEMAND

After the development of the GMRS presented in Reference [4], the Fermi 2 site elected to develop an additional GMRS for their SPRA using more recent site specific data (Reference [13]). This GMRS is subsequently used in the Expedited Seismic Evaluation Process (ESEP) (Reference [15]). This GMRS is more conservative and envelopes all frequency ranges greater than 15Hz compared to the one used in Reference [4]. The SPRA GMRS is used in this evaluation as well. Additionally, building in-structure response spectra (ISRS) used from Reference [15] are used here as well. The horizontal GMRS is presented in Figure 3-1.

The Reactor/Auxiliary Building (RBAB) and the RHR Complex are the only two structures needed for the High Frequency evaluation. The RBAB is founded at the control point elevation, so the GMRS serves as the Foundation Input Response Spectrum (FIRS) for that structure. Similarly, it is noted in Reference [8] that a 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 Ref. [8], “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.” This is the case of the RHR Complex. It is founded fourteen feet above the control point, but still in rock. While it would have been acceptable to use the GMRS as the FIRS for the RHR Complex, a specific FIRS was developed anyway for the SPRA effort (Reference [14]).

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

3.2 VERTICAL SEISMIC DEMAND

As was the case with the horizontal seismic demand, the vertical seismic demand was independently generated from Reference [4] and used in Reference [15]. The vertical GMRS is used along with the horizontal GMRS to develop detailed ISRS from a building analysis of the Fermi 2 site Category I structures. As described in Reference [13], 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 [13], Table 5-1 and reproduced below in Table 3-1.

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

Layer	Depth (ft)	Depth (m)	Thickness, d_i (ft)	Vs_i (ft/sec)	d_i / Vs_i	Σ [d_i / Vs_i]
1	14	4.2672	14.00	1000	0.01400	0.01400
2	84	25.6032	70.00	6500	0.01292	0.026923
3	114	34.7472	30.00	4500	0.02533	0.052256
4	184	56.0832	70.00	3400	0.05411	0.106374
5	224	68.2752	40.00	3900	0.05743	0.163809
6	234	71.3232	10.00	5000	0.04680	0.210609
7 (bedrock)	--	--	---	9300	--	--

Appropriate V/H ratios are developed for the Fermi 2 site to scale the horizontal GMRS into a vertical GMRS as done on Reference [13]. This is done by combining methodologies from McGuire et al, and Edwards et al, References [17] and [18], respectively. Below 25 Hz, the two methodologies are enveloped. Above 25 Hz, the 25 Hz value from Edwards is combined with the maximum value from McGuire and extrapolated to 100 Hz.

The vertical GMRS is then calculated by multiplying the calculated V/H ratio at each frequency by the horizontal GMRS acceleration at the corresponding frequency.

The HGMRS, 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 Fermi 2.

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

Frequency (Hz)	HGMRS (g)	V/H Ratio	VGMRS (g)
0.100	0.003	0.894	0.003
0.130	0.004	0.893	0.004
0.160	0.006	0.891	0.005
0.200	0.009	0.889	0.008
0.204	0.009	0.889	0.008
0.260	0.012	0.886	0.011
0.302	0.016	0.884	0.014
0.330	0.018	0.883	0.016
0.407	0.024	0.879	0.021
0.420	0.026	0.878	0.022
0.500	0.034	0.874	0.029
0.501	0.034	0.874	0.029
0.530	0.035	0.873	0.030
0.603	0.037	0.869	0.032
0.670	0.040	0.865	0.034
0.708	0.041	0.863	0.035
0.813	0.044	0.858	0.038
0.850	0.046	0.856	0.039
0.912	0.047	0.853	0.040
1.000	0.050	0.848	0.042
1.080	0.055	0.844	0.046
1.370	0.071	0.828	0.058
1.740	0.089	0.808	0.072
2.042	0.111	0.792	0.088
2.210	0.124	0.782	0.097
2.500	0.147	0.766	0.113
2.810	0.182	0.748	0.136
3.020	0.208	0.736	0.153
3.560	0.275	0.706	0.194
4.074	0.316	0.677	0.214
4.520	0.353	0.682	0.240
5.000	0.365	0.687	0.251
5.012	0.365	0.687	0.251
5.740	0.354	0.695	0.246
6.026	0.346	0.699	0.241
7.080	0.314	0.711	0.224
7.280	0.308	0.714	0.220
8.128	0.300	0.724	0.217
9.120	0.291	0.735	0.214
9.240	0.290	0.737	0.213
10.000	0.296	0.745	0.220
11.720	0.316	0.767	0.243
12.023	0.321	0.770	0.247

Frequency (Hz)	HGMRS (g)	V/H Ratio	VGMRS (g)
14.125	0.352	0.820	0.288
14.870	0.363	0.840	0.305
16.218	0.362	0.878	0.318
18.197	0.361	0.904	0.326
18.870	0.360	0.912	0.328
20.417	0.360	0.929	0.335
23.950	0.360	0.961	0.346
25.000	0.366	0.970	0.355
25.119	0.366	0.971	0.356
30.390	0.386	0.972	0.375
30.903	0.386	0.972	0.375
35.481	0.386	0.972	0.375
38.570	0.386	0.973	0.375
40.738	0.380	0.973	0.370
48.940	0.357	0.974	0.348
50.119	0.352	0.974	0.343
60.256	0.309	0.975	0.301
62.100	0.301	0.975	0.294
70.795	0.264	0.975	0.257
78.800	0.230	0.975	0.224
81.283	0.226	0.975	0.220
91.201	0.209	0.975	0.204
100.000	0.195	0.975	0.190

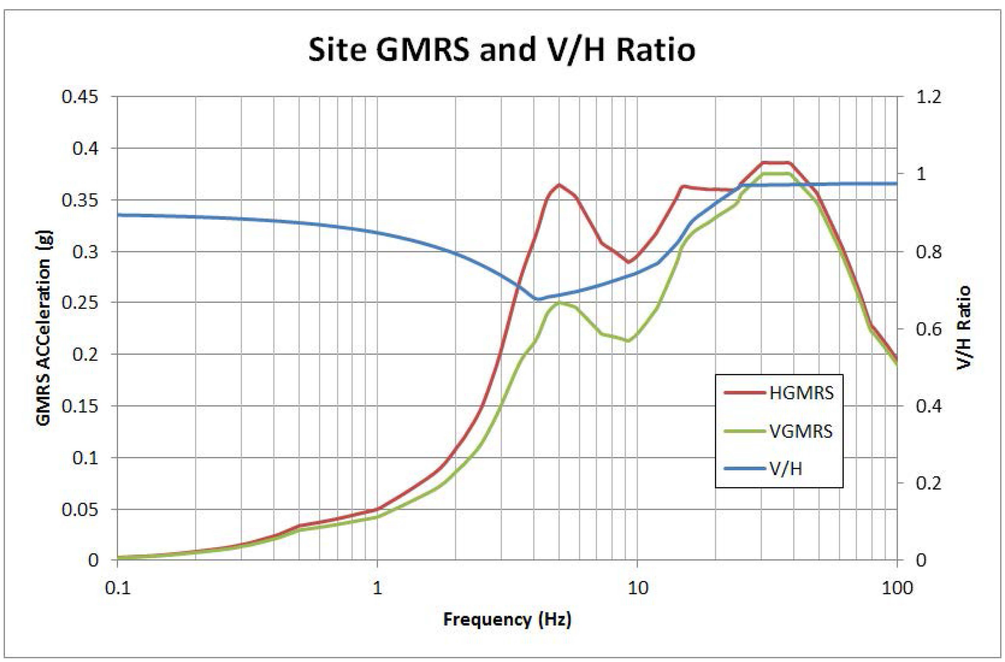

Figure 3-1 Plot of the Horizontal and Vertical Ground Motions Response Spectra and V/H Ratios

3.3 COMPONENT HORIZONTAL SEISMIC DEMAND

Per Reference [14] the horizontal seismic demand is developed with a detailed Soil Structure Interaction (SSI) analysis based on the GMRS. For each of the Category I structures, detailed in-structure response spectra exist based on the GMRS at all floor elevations. No devices that require a High Frequency confirmation in this submittal are installed in non-Category I structures.

From the ISRS level, the in-cabinet demand is derived from the in-cabinet amplification factor, AF_c, and is associated with a given type of cabinet construction. The three general cabinet types are identified in Reference [8] and Appendix I of EPRI NP-7148 [11] assuming 5% in-cabinet response spectrum damping. EPRI NP-7148 [11] 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 discussed in Section 4.4 of Reference [8] 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 results 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 in-structure vertical demand is determined using the same SSI analysis used to develop the horizontal ISRS in Reference [14]. Again, this is for all floors in all Category I structures.

The in-cabinet amplification factor, AF_c is derived in Reference [8] and is 4.7 for all cabinet types.

4 Contact Device Evaluations

Per Reference [8], 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 [7], then the component seismic capacity from this program is used.

(2) If a contact device was not tested as part of [7], 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 or from the SQURTS testing program.

   (b) Generic Equipment Ruggedness Spectra (GERS) capacities per [9] and [10].

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

   (d) Through SSE spectra. All Category I components must be qualified to this level by design, so the SSE ISRS can serve as a lower bound capacity if needed.

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 [8].

For most devices, the SSE spectra were used as a capacity out of simplicity. This is lower bound, but demonstrates that devices are adequate for the criteria in Reference [8]. Given that the SSE capacity is taken at the cabinet input level, the associated in-cabinet amplification factor is taken to be 1.0 for both the horizontal and vertical directions.

For components that utilize other capacity spectra, in-cabinet amplification factors are exclusively taken as described in Section 3 for devices mounted in cabinets. Additionally, devices that are not mounted in cabinets utilize conservative amplifications based on a case by case basis.

The evaluation determined that the capacity exceeded the demand in all cases for the Fermi 2 site.

A summary of the high-frequency evaluation conclusions is provided in Table B-1 in Appendix B. The detail evaluation for all selected components is documented in Reference [19]. Representative sample evaluation is presented in Appendix A for two selected components.

5 Conclusions

5.1 GENERAL CONCLUSIONS

Fermi 2 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 [8].

The evaluation identified a total of 277 components that required evaluation. As summarized in Table B-1 in Appendix B, and detailed in Reference [19], all of the devices evaluated for the High Frequency Confirmation have a seismic capacity greater than the demand in the frequency range of 15Hz to 40Hz.

5.2 IDENTIFICATION OF FOLLOW-UP ACTIONS

No follow up actions are being taken as a result of this High Frequency Confirmation.

6 References

1 NRC (E. Leeds and M. Johnson) Letter to All Power Reactor Licensees et al., "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3 and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," March 12, 2012, ADAMS Accession Number ML12053A340

2 NRC (W. Dean) Letter to the Power Reactor Licensees on the Enclosed List, "Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident." October 27, 2015, ADAMS Accession Number ML15194A015

3 NRC (J. Davis) Letter to Nuclear Energy Institute (A. Mauer), "Endorsement of Electric Power Research Institute Final Draft Report 3002004396, 'High Frequency Program: Application Guidance for Functional Confirmation and Fragility.'" September 17, 2015, ADAMS Accession Number ML15218A569

4 DTE Energy Company (DTE) Letter NRC-14-0017, DTE Electric Company's Seismic Hazard and Screening Report Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushimi Dai-ichi Accident, March 31, 2014, ADAMS Accession Number ML14090A326

5 Not used

6 EPRI 1025287, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic." February 2013

7 EPRI 3002002997, "High Frequency Program: High Frequency Testing Summary." September 2014

8 EPRI 3002004396, "High Frequency Program: Application Guidance for Functional Confirmation and Fragility Evaluation." July 2015

9 EPRI NP-7147-SL, "Seismic Ruggedness of Relays." August 1991

10 EPRI NP-7147 SQUG Advisory 2004-02, "Relay GERS Corrections." September 10, 2004

11 Procedure for Evaluating Nuclear Power Plant Relay Seismic Functionality EPRI, Palo Alto, CA:1990. NP-7148

12 NRC Letter, Fermi, Unit 2 - Staff Assessment of Information provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident (TAC No. MF3861), dated October 5, 2015, ADAMS Accession Number ML15077A028

13 RIZZO Associates, Probabilistic Seismic Hazard Analysis and Foundation Input Response Spectra for Fermi 2 Nuclear Power Plant, Revision 5, dated April 12, 2016.

14 RIZZO Associates, Building Seismic Analysis Report for Fermi 2 Nuclear Power Plant, Revision 3, dated May 26, 2017.

15 DTE Energy Company (DTE) Letter NRC-14-0074, Fermi 2 Expedited Seismic Evaluation Process Report (CEUS Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated December 9, 2014, ADAMS Accession Number ML14345A469

16 NRC Letter, Fermi Unit 2 – Staff Review of Interim Evaluation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 (TAC No. MF5241, dated November 6, 2015, ADAMS Accession Number ML15310A197.

17 McGuire, R. K, Silva, W. J., and Costantino, C. J. (2001), "Technical basis for revision of regulatory guidance on design ground motions: hazard- and risk-consistent ground motion spectra guidelines," NUREG/CR-6728, U.S. Nuclear Regulatory Commission, October, 2001.

18 Edwards, B., Poggi, V., and Fah, D., 2011, "A predictive Equation for the Vertical-to-Horizontal Ratio of Ground Motion at Rock Sites Based on Shear-Wave Velocity Profiles from Japan and Switzerland", Bulletin of Seismological Society of America, Vol. 101, No. 6, pp. 2998-3019, 2011.

19 RIZZO Associates, Final High Frequency Submittal Calculation Package For Near Term Task Force Recommendation 2.1 Seismic For Fermi 2 Nuclear Power Plant, Revision 1, dated July 12, 2017.

A Representative Sample Component Evaluations

EXAMPLE 1

The first example presents the high frequency evaluation of Allen-Bradley Pressure Switch (Model No. 836-C3) mounted on Relay Panel R30P310. The Relay Panel is located on the first floor of RHR Complex at EL 590'. The component ID of the Pressure Switch is R30NA37A.

As per NP-7147 (GERS Addendum 1) Reference [9], the capacity of Allen-Bradley Pressure Switch 836-C3 is 10g for the high frequency range from 15 Hz to 40 Hz.

The seismic demand is obtained from the clipped In-Structure Response Spectra (ISRS) developed for ISRS node 3060 at Elevation 590' of the RHR Complex (Reference [14]). The spectral acceleration is taken from the 5% ISRS as the greatest spectral acceleration beyond 15 Hz to 40 Hz for the high frequency evaluation:

$$Sa_{Horizontal} := 0.41\ g$$

$$Sa_{Vertical} := 0.86\ g$$

Vertical ISRS is clipped beyond 15 Hz in accordance with EPRI NP-6041-SL, Revision 1, "A Methodology for Assessment of Nuclear Power Plant Seismic Margin." Figures A.1 and A.2 show the ISRSc (clipped ISRS) for horizontal (envelope of X & Y) and vertical directions. Clipping of the horizontal spectra is not considered since the peak is below 15 Hz.

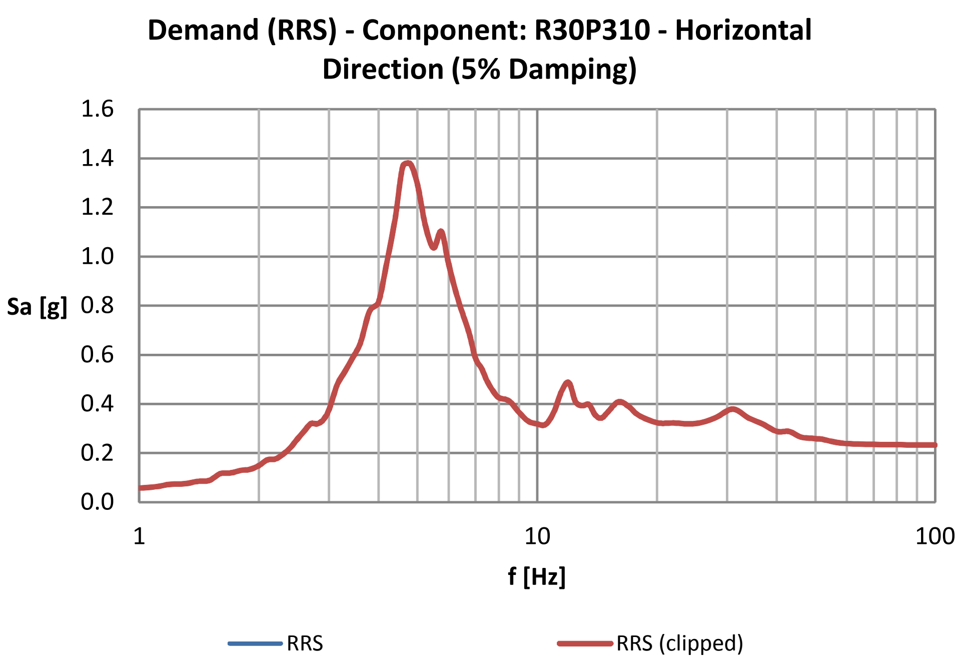

Figure A.1: Horizontal ISRS at RHR Node 3060

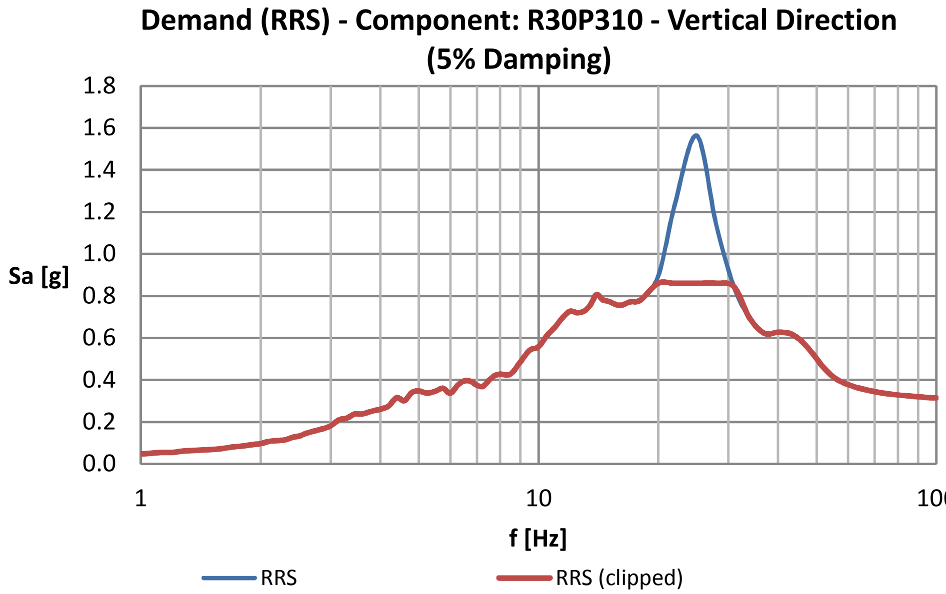

Figure A.2: Clipped Vertical ISRS at RHR Node 3060

According to Table Q-1, EPRI NP-6041, and Chapter 4 of EPRI High Frequency Test Report 3002004396, the amplification factor can be conservatively considered to be 4.5 in the horizontal direction. Similarly, in the vertical direction the amplification factor is taken as 4.7.

$$AF_H := 4.5$$

$$AF_V := 4.7$$

The minimum Capacity (TRS) over Required Response Spectra (RRS) ratio is given as below for the frequency range from 15 Hz to 40 Hz. RRS is the clipped ISRS (ISRSc).

Ratio of Horizontal TRS/RRSc

$$TRS\_RRS_{c\_H} := \frac{10g}{AF_H \cdot Sa_{Horizontal}} = 5.42$$

Ratio of Vertical TRS/RRSc

$$TRS\_RRS_{c\_V} := \frac{10g}{AF_V \cdot Sa_{Vertical}} = 2.47$$

$$TRS\_RRS_c := min\left(TRS\_RRS_{c\_H}, TRS\_RRS_{c\_V}\right) = 2.47$$

The TRS should be modified in accordance with Eqn. Q-9 of EPRI NP-6041 to obtain a 99% exceedance level, TRS_C.

$$TRS_C = \frac{TRS}{\left(\frac{F_k}{F_{MS}}\right)}$$

Single axis correction factor is taken as 1.2 since the panel is cantilevered and vertical motion is well separated from the horizontal motion. (EPRI NP-6041 pg Q-9)

$$F_{MS} := 1.2$$

Knock down factor for Relays (EPRI NP-6041 Table Q-2, pg Q-10):

$$F_k := 1.5$$

The scaling factor (Fs) which is the minimum TRSc/RRSc ratio is calculated as (EPRI NP-6041 Eqn. Q-1):

$$F_{S\_F} := TRS\_RRS_c \cdot \frac{F_{MS}}{F_k}$$

$$F_{S\_F} = 1.98$$

Scaling factor, which is defined as the capacity/demand ratio for high frequency motion (15-40 Hz), is greater than 1.0, therefore high frequency capacity of Allen-Bradley Pressure Switch Model No. 836-C3 is confirmed.

EXAMPLE 2

The second example presents the high frequency evaluation of EGPBC2004002 and FGPBC750 model Agastat relays. These Control Relays are mounted in panels H21P080/1/2/3 at elevation 659’ of the AB.

Given that these panels are Category I, they are, by definition, qualified to the SSE level. Therefore, the SSE ISRS at elevation 659’ can be used as a lower bound capacity curve. As such, capacity vs demand comparison for the High Frequency confirmation of mounted items is performed at the base of the host item, rather than making the comparison at the device level. In addition, the SSE ISRS are clipped to obtain low frequency broadband capacity curves which are extended into the high frequency range (up to 40 Hz) as per EPRI 3002004396.

The seismic demand is obtained from the clipped In-Structure Response Spectra (ISRS) developed for ISRS node 6021 at Elevation 659.5' of the AB. The spectral acceleration taken from the 5% ISRS as the greatest spectral acceleration beyond 15 Hz to 40 Hz for the high frequency evaluation:

$Sa_{Horizontal} := 0.59\ g$ $\quad$ $Sa_{Vertical} := 0.44\ g$ $\quad$ Spectral acceleration demand in horizontal and vertical directions

Both the SSE and GMRS spectra are clipped in accordance with EPRI NP-6041 Appendix Q.

Figures A.3 and A.4 show a comparison of ISRSc (clipped ISRS) for horizontal (envelope of X & Y) and vertical directions with the Capacity Spectra, respectively. The extension of low frequency capacity into the high frequency range is also shown on the plots.

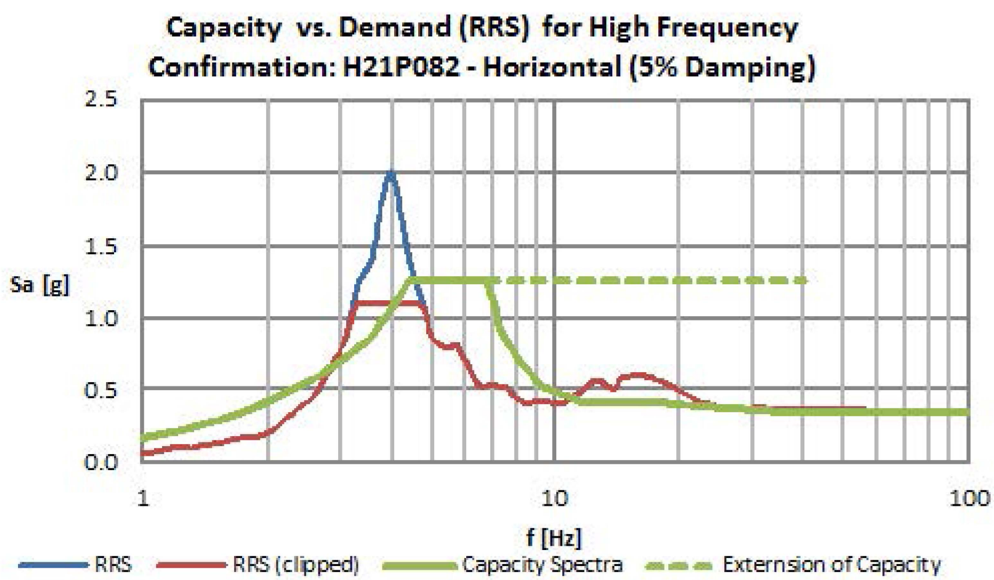

Figure A.3: Comparison of clipped Horizontal ISRS vs Capacity Spectra for High Frequency Confirmation

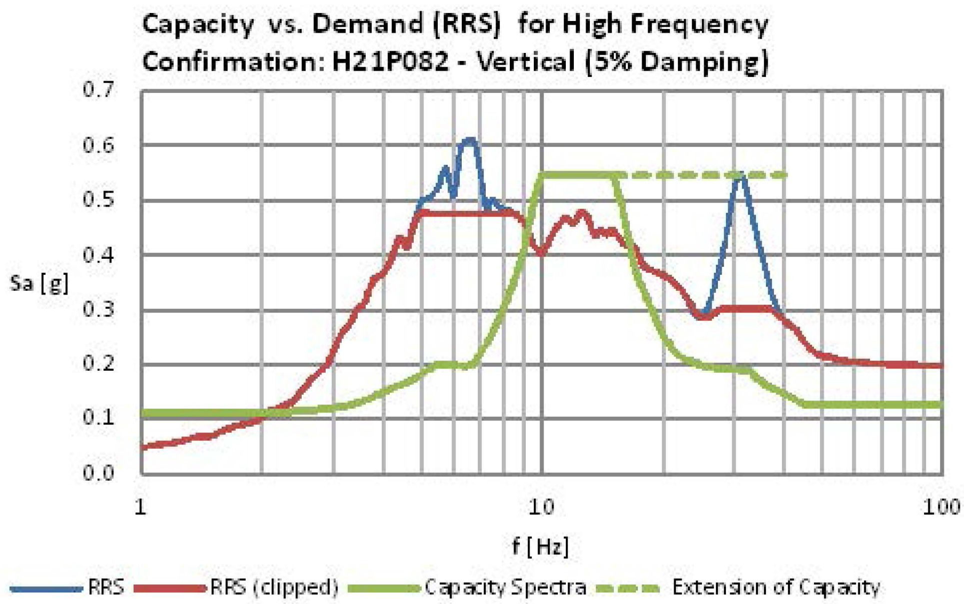

Figure A.4: Comparison of Vertical ISRS vs Capacity Spectra for High Frequency Confirmation

The minimum Capacity (TRS) over Required Response Spectra (RRS) ratio is given as below for the frequency range from 15 Hz to 40 Hz. RRS is the clipped ISRS (ISRSc).

$$TRS\_RRS_{C\_H} = \frac{1.26g}{Sa_{\,Horizontal}} = 2.14$$ *Ratio of Horizontal TRS/RRSc*

$$TRS\_RRS_{C\_V} = \frac{0.55g}{Sa_{\,Vertical}} = 1.25$$ *Ratio of Vertical TRS/RRSc*

$$TRS\_RRS_{C} = \min(TRS\_RRS_{C\_H}, TRS\_RRS_{C\_V}) = 1.25$$

The TRS should be modified in accordance with Eqn. Q-9 of Reference [4] to obtain a 99% exceedance level, TRSC.

$$TRS_C = \frac{TRS}{\left(\frac{F_k}{F_{MS}}\right)}$$

$F_{MS} = 1.0$ *Single axis to Multiaxial factor taken as 1.0 (Reference [4], pg Q-9)*

$F_K = 1.2$ *Knock down factor of Component Specific Testing (Reference [4], Table Q-2, pg Q-10)*

The scaling factor (Fs) which is the minimum TRSc/RRSc ratio is calculated as (Reference [4], Eqn. Q-1):

$F_{S\_F} := TRS\_RRS_c \cdot \frac{F_{MS}}{F_k}$ $F_{S\_F} = 1.04$ *Scaling factor*

$F_{S\_F} = 1.04$ is greater than 1.0, therefore high frequency capacity of 12 devices mounted on the equipment is confirmed.

B Components Identified for High Frequency Confirmation

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
1	R30P311	CC1	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
2	R30P311	CC2	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
3	R30P311	CC3	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
4	R30P311	OP1	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
5	R30P311	OP2	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
6	R30P311	OP3	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
7	R30P311	EOR	Control Relay	ENGINE OVERSPEED	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
8	R3001S001	EOS	Limit Switch	ENGINE OVERSPEED	MICR	BZE6-2RN	R3001S001	EDG	RHR	595	EPRI HF Test	Capacity > Demand
9	R30P311	SDR	Control Relay	ENGINE TROUBLE SHUTDOWN	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
10	R30P311	SFR	Control Relay	START FAILURE	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
11	R30P311	T2A	Time Delay Relay	CRANKING TIME CONTROL	AGAS	E7012PC004	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
12	R30P311	T2B	Time Delay Relay	CRANKING TIME CONTROL	AGAS	E7012PC004	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
13	R14P001A	X-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002A-EA3	BUS	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
14	R14P001A	Y-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002A-EA3	BUS	RHR	617	SSE Spectra	Capacity > Demand
15	R14P001A	Z-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002A-EA3	BUS	RHR	617	SSE Spectra	Capacity > Demand
16	R3000S005	1KU94	Relay	EDG DIFFERENTIAL TRIP STRING	WEST	12HFA151A7H	R3000S005	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
17	R3000S005	2KU94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S005	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
18	R3000S005	3KU94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S005	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
19	R30P311	NCX	Control Relay	ENGINE TROUBLE SHUTDOWN	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
20	R30P311	CLL	Control Relay	JACKET COOLANT LEVEL-LOW	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
21	R30P311	FPL2	Control Relay	FUEL OIL PRESSURE-LOW	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
22	R30P311	CPL	Control Relay	JACKET COOLANT PRESSURE-LOW	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
23	R30P311	CTH	Time Delay Relay	JACKET COOLANT TEMP-HIGH	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
24	R30P311	OTH	Time Delay Relay	LUBE OIL TEMPERATURE-HIGH	AGAS	E7022PD004	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
25	R30N558A	R30N558A	Level Switch	JACKET COOLANT LEVEL-LOW	MCDO	E-8	R3000A005	EDG TANK	RHR	603	SSE Spectra	Capacity > Demand
26	R30NA37A	FPLS	Pressure Switch	FUEL OIL PRESSURE-LOW	ALLB	836-C3	R30P310	EDG ENGINE GAUGE PNL	RHR	590	GERS	Capacity > Demand
27	R30NA02A	CPLA	Pressure Switch	JACKET COOLANT PRESSURE-LOW	ALLB	836-C3	R30P310	EDG ENGINE GAUGE PNL	RHR	590	GERS	Capacity > Demand
28	R30NA01A	CTHA	Temperature Switch	JACKET COOLANT TEMP-HIGH	ALLB	837-A6JX715	R3001S001	EDG	RHR	595	EPRI HF Test	Capacity > Demand
29	R30NA15A	OTHA	Temperature Switch	LUBE OIL TEMPERATURE-HIGH	ALLB	837-A6JX712	R3001S001	EDG	RHR	595	EPRI HF Test	Capacity > Demand
30	R30P311	T3	Control Relay	ENGINE AT LOW SPD & ALM	ITEG	J13P3012	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
31	R30P311	T3A	Time Delay Relay	DELAY TDPU	AGAS	E7012PC004	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
32	R30NA16A	CPS	Pressure Switch	JACKET COOLANT PRESSURE	ALLB	836-C3	R3001S001	EDG	RHR	595	GERS	Capacity > Demand
33	R30P321	CC1	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
34	R30P321	CC2	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
35	R30P321	CC3	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
36	R30P321	OP1	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
37	R30P321	OP2	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
38	R30P321	OP3	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
39	R30P321	EOR	Control Relay	ENGINE OVERSPEED	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
40	R3001S002	EOS	Limit Switch	ENGINE OVERSPEED	MICR	BZE6-2RN	R3001S002	EDG	RHR	595	EPRI HF Test	Capacity > Demand
41	R30P321	SDR	Control Relay	ENGINE TROUBLE SHUTDOWN	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
42	R30P321	SFR	Control Relay	START FAILURE	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
43	R30P321	T2A	Time Delay Relay	CRANKING TIME CONTROL	AGAS	E7012PC004	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
44	R30P321	T2B	Time Delay Relay	CRANKING TIME CONTROL	AGAS	E7012PC004	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
45	R14P001B	X-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002B-EB3	BUS	RHR	617	SSE Spectra	Capacity > Demand
46	R14P001B	Y-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002B-EB3	BUS	RHR	617	SSE Spectra	Capacity > Demand
47	R14P001B	Z-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002B-EB3	BUS	RHR	617	SSE Spectra	Capacity > Demand
48	R3000S006	1KV94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S006	Control Panel	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component: Alt ID	Component: Type	Component: System Function	Component: Manufacturer	Component: Model No.	Enclosure: ID	Enclosure: Type	Building	Floor Elev. (ft)	Component Evaluation: Basis for Capacity	Component Evaluation: Evaluation Result
49	R3000S006	2KV94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S006	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
50	R3000S006	3KV94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S006	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
51	R30P321	NCX	Control Relay	ENGINE TROUBLE SHUTDOWN	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
52	R30P321	CLL	Control Relay	JACKET COOLANT LEVEL-LOW	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
53	R30P321	FPL2	Control Relay	FUEL OIL PRESSURE-LOW	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
54	R30P321	CPL	Control Relay	JACKET COOLANT PRESSURE-LOW	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
55	R30P321	CTH	Time Delay Relay	JACKET COOLANT TEMP-HIGH	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
56	R30P321	OTH	Time Delay Relay	LUBE OIL TEMPERATURE-HIGH	AGAS	E7022PD004	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
57	R30N558B	R30N558B	Level Switch	JACKET COOLANT LEVEL-LOW	MCDO	E-8	R3000A006	EDG TANK	RHR	603	SSE Spectra	Capacity > Demand
58	R30NA37B	FPLS	Pressure Switch	FUEL OIL PRESSURE-LOW	ALLB	836-C3	R30P330	EDG ENGINE GAUGE PNL	RHR	590	GERS	Capacity > Demand
59	R30NA02B	CPLA	Pressure Switch	JACKET COOLANT PRESSURE-LOW	ALLB	836-C3	R30P330	EDG ENGINE GAUGE PNL	RHR	590	GERS	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
60	R30NA01B	CTHA	Temperature Switch	JACKET COOLANT TEMP-HIGH	ALLB	837-A6JX715	R3001S003	EDG	RHR	595	EPRI HF Test	Capacity > Demand
61	R30NA15B	OTHA	Temperature Switch	LUBE OIL TEMPERATURE-HIGH	ALLB	837-A6JX712	R3001S003	EDG	RHR	595	EPRI HF Test	Capacity > Demand
62	R30P321	T3	Control Relay	ENGINE AT LOW SPD & ALM	ITEG	J13P3012	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
63	R30P321	T3A	Time Delay Relay	DELAY TDPU	AGAS	E7012PC004	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
64	R30NA16B	CPL	Pressure Switch	JACKET COOLANT PRESSURE	ALLB	836-C3	R3001S003	EDG	RHR	595	GERS	Capacity > Demand
65	R30P331	CC1	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
66	R30P331	CC2	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
67	R30P331	CC3	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
68	R30P331	OP1	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
69	R30P331	OP2	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
70	R30P331	OP3	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
71	R30P331	EOR	Control Relay	ENGINE OVERSPEED	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
72	R3001S003	EOS	Limit Switch	ENGINE OVERSPEED	MICR	BZE6-2RN	R3001S003	EDG	RHR	595	EPRI HF Test	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
73	R30P331	SDR	Control Relay	ENGINE TROUBLE SHUTDOWN	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
74	R30P331	SFR	Control Relay	START FAILURE	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
75	R30P331	T2A	Time Delay Relay	CRANKING TIME CONTROL	AGAS	E7012PC004	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
76	R30P331	T2B	Time Delay Relay	CRANKING TIME CONTROL	AGAS	E7012PC004	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
77	R14P001C	X-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002C-EC3	BUS	RHR	617	SSE Spectra	Capacity > Demand
78	R14P001C	Y-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002C-EC3	BUS	RHR	617	SSE Spectra	Capacity > Demand
79	R14P001C	Z-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002C-EC3	BUS	RHR	617	SSE Spectra	Capacity > Demand
80	R3000S007	1KW94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S007	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
81	R3000S007	2KW94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S007	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
82	R3000S007	3KW94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S007	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
83	R30P331	NCX	Control Relay	ENGINE TROUBLE SHUTDOWN	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
84	R30P331	CLL	Control Relay	JACKET COOLANT LEVEL-LOW	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
85	R30P331	FPL2	Control Relay	FUEL OIL PRESSURE-LOW	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
86	R30P331	CPL	Control Relay	JACKET COOLANT PRESSURE-LOW	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
87	R30P331	CTH	Time Delay Relay	JACKET COOLANT TEMP-HIGH	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
88	R30P331	OTH	Time Delay Relay	LUBE OIL TEMPERATURE-HIGH	AGAS	E7022PD004	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
89	R30N558C	R30N558C	Level Switch	JACKET COOLANT LEVEL-LOW	MCDO	E-8	R3000A007	EDG TANK	RHR	603	SSE Spectra	Capacity > Demand
90	R30NA37C	FPLS	Pressure Switch	FUEL OIL PRESSURE-LOW	ALLB	836-C3	R30P320	EDG ENGINE GAUGE PNL	RHR	590	GERS	Capacity > Demand
91	R30NA02C	CPLA	Pressure Switch	JACKET COOLANT PRESSURE-LOW	ALLB	836-C3	R30P320	EDG ENGINE GAUGE PNL	RHR	590	GERS	Capacity > Demand
92	R30NA01C	CTHA	Temperature Switch	JACKET COOLANT TEMP-HIGH	ALLB	837-A6JX715	R3001S002	EDG	RHR	595	EPRI HF Test	Capacity > Demand
93	R30NA15C	OTHA	Temperature Switch	LUBE OIL TEMPERATURE-HIGH	ALLB	837-A6JX712	R3001S002	EDG	RHR	595	EPRI HF Test	Capacity > Demand
94	R30P331	T3	Control Relay	ENGINE AT LOW SPD & ALM	ITEG	J13P3012	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
95	R30P331	T3A	Time Delay Relay	DELAY TDPU	AGAS	E7012PC004	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
96	R30NA16C	CPL	Pressure Switch	JACKET COOLANT PRESSURE	ALLB	836-C3	R3001S002	EDG	RHR	595	GERS	Capacity > Demand
97	R30P341	CC1	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
98	R30P341	CC2	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
99	R30P341	CC3	Control Relay	CRANCASE PRESSURE HIGH	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
100	R30P341	OP1	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
101	R30P341	OP2	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
102	R30P341	OP3	Control Relay	LUBE OIL PRESSURE LOW	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
103	R30P341	EOR	Control Relay	ENGINE OVERSPEED	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
104	R3001S004	EOS	Limit Switch	ENGINE OVERSPEED	MICR	BZE6-2RN	R3001S004	EDG	RHR	595	EPRI HF Test	Capacity > Demand
105	R30P341	SDR	Control Relay	ENGINE TROUBLE SHUTDOWN	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
106	R30P341	SFR	Control Relay	START FAILURE	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
107	R30P341	T2A	Time Delay Relay	CRANKING TIME CONTROL	AGAS	E7012PC004	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
108	R30P341	T2B	Time Delay Relay	CRANKING TIME CONTROL	AGAS	E7012PC004	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
109	R14P001D	X-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002D-ED3	BUS	RHR	617	SSE Spectra	Capacity > Demand
110	R14P001D	Y-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002D-ED3	BUS	RHR	617	SSE Spectra	Capacity > Demand
111	R14P001D	Z-87G	Differential Relay	EDG DIFFERENTIAL TRIP STRING	WEST	CA	R1400S002D-ED3	BUS	RHR	617	SSE Spectra	Capacity > Demand
112	R3000S008	1KX94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S008	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
113	R3000S008	2KX94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S008	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
114	R3000S008	3KX94	Relay	EDG DIFFERENTIAL TRIP STRING	GE	12HFA151A7H	R3000S008	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
115	H11P628	B21CK27A	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	FGPDC750	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
116	H11P628	B21CK27B	Auxiliary Relay	G.E. TYPE 'HGA' RELAY	GE	12HGA11A52F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
117	B2104M084	B21CK427C	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
118	B2104M085	B21CK427D	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
119	H11P628	B21CK27E	Auxiliary Relay	G.E. TYPE 'HGA' RELAY	GE	12HGA11A52F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
120	B2104M086	B21CK427F	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
121	B2104M087	B21CK427G	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
122	H11P628	B21CK27H	Auxiliary Relay	G.E. TYPE 'HGA' RELAY	GE	12HGA11A52F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
123	H11P628	B21CK27J	Auxiliary Relay	G.E. TYPE 'HGA' RELAY	GE	12HGA11A52F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
124	B2104M088	B21CK427K	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
125	B2104M097	B21CK427L	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
126	B2104M098	B21CK427M	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
127	B2104M099	B21CK427N	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
128	H11P628	B21CK27P	Auxiliary Relay	G.E. TYPE 'HGA' RELAY	GE	12HGA11A52F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
129	H11P628	B21CK27R	Auxiliary Relay	G.E. TYPE 'HGA' RELAY	GE	12HGA11A52F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component: Alt ID	Component: Type	Component: System Function	Component: Manufacturer	Component: Model No.	Enclosure: ID	Enclosure: Type	Building	Floor Elev. (ft)	Component Evaluation: Basis for Capacity	Component Evaluation: Evaluation Result
130	H21P082	B21-K253A	Control Relay	LLS LOW PRESSURE AND SCRAM SEALED IN	AGAS	EGPBC2004002	H21P082	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
131	H21P083	B21-K253B	Control Relay	LLS LOW PRESSURE AND SRV OPEN PERMISSIVE	AGAS	EGPBC2004002	H21P083	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
132	H21P082	B21-K253E	Control Relay	LLS HIGH PRESSURE AND SCRAM SEALED IN	AGAS	EGPBC2004002	H21P082	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
133	H21P083	B21-K253F	Control Relay	LLS HIGH PRESSURE AND SRV OPEN PERMISSIVE	AGAS	EGPBC2004002	H21P083	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
134	H11P628	K6A	Auxiliary Relay	HIGH DRYWELL PRESSURE	GE	12HFA151A2F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
135	H11P628	K7A	Auxiliary Relay	RPV LOW LEVEL	GE	12HFA151A2F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
136	H11P628	K8A	Auxiliary Relay	RPV LOW LEVEL	GE	12HGA11A52F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
137	H11P628	K6B	Auxiliary Relay	HIGH DRYWELL PRESSURE	GE	12HFA151A2F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
138	H11P628	K7B	Auxiliary Relay	RPV LOW LEVEL	GE	12HFA151A2F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
139	H11P628	K8B	Auxiliary Relay	RPV LOW LEVEL	GE	12HGA11A52F	H11P628	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
140	R30P341	NCX	Control Relay	ENGINE TROUBLE SHUTDOWN	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
141	R30P341	CLL	Control Relay	JACKET COOLANT LEVEL-LOW	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
142	R30P341	FPL2	Control Relay	FUEL OIL PRESSURE-LOW	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
143	R30P341	CPL	Control Relay	JACKET COOLANT PRESSURE-LOW	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
144	R30P341	CTH	Time Delay Relay	JACKET COOLANT TEMP-HIGH	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
145	R30P341	OTH	Time Delay Relay	LUBE OIL TEMPERATURE-HIGH	AGAS	E7022PD004	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
146	R30N558D	R30N558D	Level Switch	JACKET COOLANT LEVEL-LOW	MCDO	E-8	R3000A008	EDG TANK	RHR	603	SSE Spectra	Capacity > Demand
147	R30NA37D	FPLS	Pressure Switch	FUEL OIL PRESSURE-LOW	ALLB	836-C3	R30P340	EDG ENGINE GAUGE PNL	RHR	590	GERS	Capacity > Demand
148	R30NA02D	CPLA	Pressure Switch	JACKET COOLANT PRESSURE-LOW	ALLB	836-C3	R30P340	EDG ENGINE GAUGE PNL	RHR	590	GERS	Capacity > Demand
149	R30NA01D	CTHA	Temperature Switch	JACKET COOLANT TEMP-HIGH	ALLB	837-A6JX715	R3001S004	EDG	RHR	595	EPRI HF Test	Capacity > Demand
150	R30NA15D	OTHA	Temperature Switch	LUBE OIL TEMPERATURE-HIGH	ALLB	837-A6JX712	R3001S004	EDG	RHR	595	EPRI HF Test	Capacity > Demand
151	R30P341	T3	Control Relay	ENGINE AT LOW SPD & ALM	ITEG	J13P3012	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
152	R30P341	T3A	Time Delay Relay	DELAY TDPU	AGAS	E7012PC004	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
153	R30NA16D	CPL	Pressure Switch	JACKET COOLANT PRESSURE	ALLB	836-C3	R30NA16D	EDG	RHR	593	GERS	Capacity > Demand
154	R3200S020A-3D	CRI	Relay	R3200S020A Battery Charger High Voltage Lockout Relay			R3200S020A-3D	BUS	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
155	R3200S020A-10E	CRI	Relay	R3200S020B Battery Charger High Voltage Lockout Relay			R3200S020A-10E	BUS	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
156	R3200S021A-5B	CRI	Relay	R3200S021A Battery Charger High Voltage Lockout Relay			R3200S021A-5B	BUS	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
157	R3200S021A-3D	CRI	Relay	R3200S021B Battery Charger High Voltage Lockout Relay			R3200S021A-3D	BUS	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
158	E5100M033	K33	Auxiliary Relay	RCIC ISOLATION SIGNAL	GE	12HFA151A2F	H11P618	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
159	E5100M039	K39	Auxiliary Relay	TURBINE EXHAUST DIAPHRAGM HIGH PRESSURE	GE	12HGA11A52F	H11P618	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component: Alt ID	Component: Type	Component: System Function	Component: Manufacturer	Component: Model No.	Enclosure: ID	Enclosure: Type	Building	Floor Elev. (ft)	Component Evaluation: Basis for Capacity	Component Evaluation: Evaluation Result
160	E5100M032	K32	Control Relay	STEAM LINE DIFFERENTIAL PRESSURE	AGAS	ETR14D3BC2004002	H11P618	Relay Cabinet	AB	613.5	GERS	Capacity > Demand
161	E5100M060	K60	Control Relay	REACTOR PRESSURE LOW	GE	12HMA24A2F	H11P618	Relay Cabinet	AB	613.5	GERS	Capacity > Demand
162	E5100M061	K61	Control Relay	REACTOR PRESSURE LOW	GE	12HMA24A2F	H11P618	Relay Cabinet	AB	613.5	GERS	Capacity > Demand
163	H21P081	E51K201B	Control Relay	TURBINE EXHAUST DIAPHRAGM HIGH PRESSURE	AGAS	FGPBC750	H21P081	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
164	H21P081	E51K201D	Control Relay	TURBINE EXHAUST DIAPHRAGM HIGH PRESSURE	AGAS	FGPBC750	H21P081	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
165	H21P081	E51K204B	Control Relay	REACTOR PRESSURE LOW	AGAS	FGPBC750	H21P081	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
166	H21P081	E51K204D	Control Relay	REACTOR PRESSURE LOW	AGAS	FGPBC750	H21P081	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
167	E5150F007	16	Limit Switch	NON-RECYCLE (F007 ONLY)			E5150F007	MOV	DW	586'10"	Fermi 2 Plant Specific Report	Capacity > Demand
168	E5150F007	CLOSE	Contactor	E5150F007 Close Contactor			E5150F007	MOV	DW	586'10"	Fermi 2 Plant Specific Report	Capacity > Demand
169	E5100M015	K15	Auxiliary Relay	RCIC ISOLATION SIGNAL	GE	12HFA151A2F	H11P621	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
170	E5100M029	K29	Auxiliary Relay	TURBINE EXHAUST DIAPHRAGM HIGH PRESSURE	GE	12HGA11A52F	H11P621	Relay Cabinet	AB	613.5	EPRI HF Test	Capacity > Demand
171	E5100M012	K12	Control Relay	STEAM LINE DIFFERENTIAL PRESSURE	AGAS	ETR14D3BC2004	H11P621	Relay Cabinet	AB	613.5	GERS	Capacity > Demand
172	E5100M058	K58	Control Relay	REACTOR PRESSURE LOW	GE	12HMA24A2	H11P621	Relay Cabinet	AB	613.5	GERS	Capacity > Demand
173	E5100M059	K59	Control Relay	REACTOR PRESSURE LOW	GE	12HMA24A2	H11P621	Relay Cabinet	AB	613.5	GERS	Capacity > Demand
174	H21P080	E51K201A	Control Relay	TURBINE EXHAUST DIAPHRAGM HIGH PRESSURE	AGAS	FGPBC750	H21P080	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
175	H21P080	E51K201C	Control Relay	TURBINE EXHAUST DIAPHRAGM HIGH PRESSURE	AGAS	FGPBC750	H21P080	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
176	H21P080	E51K204A	Control Relay	REACTOR PRESSURE LOW	AGAS	FGPBC750	H21P080	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
177	H21P080	E51K204C	Control Relay	REACTOR PRESSURE LOW	AGAS	FGPBC750	H21P080	Instrument Rack	AB	659.5	SSE Spectra	Capacity > Demand
178	E5150F007	8	Limit Switch	NON-RECYCLE (F007 ONLY)			E5150F007	MOV	DW	586'10"	Fermi 2 Plant Specific Report	Capacity > Demand
179	E5150F008	CLOSE	Contactor	E5150F008 Close Contactor			E5150F008	MOV	RB	586'10"	Fermi 2 Plant Specific Report	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
180	E5150F012	CLOSE	Contactor	E5150F012 Close Contactor			E5150F012	MOV	RB	578.5	Fermi 2 Plant Specific Report	Capacity > Demand
181	R1400S002A	3KP94	Control Relay	BUS 11EA OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002A	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
182	R1400S002A	4KU94	Control Relay	GENERATOR DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002A	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
183	R3000S005	59SX	Control Relay	OVERVOLTAGE	ITEE	J13P30	R3000S005	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
184	R30P311	T3A1	Time Delay Relay	SPEED PERMISSIVE	AGAS	E7012PB004	R30P311	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
185	R1400S002A-EA4	X-87B	Differential Relay	BUS 11EA OVERALL DIFFERENTIAL STRING			R1400S002A-EA4	BUS	RHR	617	SSE Spectra	Capacity > Demand
186	R1400S002A-EA4	Y-87B	Differential Relay	BUS 11EA OVERALL DIFFERENTIAL STRING			R1400S002A-EA4	BUS	RHR	617	SSE Spectra	Capacity > Demand
187	R1400S002A-EA4	Z-87B	Differential Relay	BUS 11EA OVERALL DIFFERENTIAL STRING			R1400S002A-EA4	BUS	RHR	617	SSE Spectra	Capacity > Demand
188	R1400S002A	2KP94	Control Relay	BUS 11EA OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002A	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
189	R1400S002A	4KP94	Control Relay	BUS 11EA OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002A	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
190	R3000S005	59S	Relay	OVERVOLTAGE	ABBP	1338D83A01 TYPE SSV-T	R3000S005	Control Panel	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
191	R1400S002B	3KR94	Control Relay	BUS 12EB OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002B	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
192	R1400S002B	4KU94	Control Relay	GENERATOR DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002B	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
193	R3000S006	59SX	Control Relay	OVERVOLTAGE	ITEE	J13P30	R3000S006	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
194	R30P321	T3A1	Time Delay Relay	SPEED PERMISSIVE	AGAS	E7012PB004	R30P321	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
195	R1400S002B-EB4	X-87B	Differential Relay	BUS 12EB OVERALL DIFFERENTIAL STRING			R1400S002B-EB4	BUS	RHR	617	SSE Spectra	Capacity > Demand
196	R1400S002B-EB4	Y-87B	Differential Relay	BUS 12EB OVERALL DIFFERENTIAL STRING			R1400S002B-EB4	BUS	RHR	617	SSE Spectra	Capacity > Demand
197	R1400S002B-EB4	Z-87B	Differential Relay	BUS 12EB OVERALL DIFFERENTIAL STRING			R1400S002B-EB4	BUS	RHR	617	SSE Spectra	Capacity > Demand
198	R1400S002B	2KR94	Control Relay	BUS 12EB OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002B	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
199	R1400S002B	4KR94	Control Relay	BUS 12EB OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002B	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
200	R3000S006	59S	Relay	OVERVOLTAGE	ABBP	1338D83A01 TYPE SSV-T	R3000S006	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
201	R1400S002C	3KS94	Control Relay	BUS 13EC OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002C	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
202	R1400S002C	4KU94	Control Relay	GENERATOR DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002C	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
203	R3000S007	59SX	Control Relay	OVERVOLTAGE	ITEE	J13P30	R3000S007	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
204	R30P331	T3A1	Time Delay Relay	SPEED PERMISSIVE	AGAS	E7012PB004	R30P331	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
205	R1400S002C-EC4	X-87B	Differential Relay	BUS 13EC OVERALL DIFFERENTIAL STRING			R1400S002C-EC4	BUS	RHR	617	SSE Spectra	Capacity > Demand
206	R1400S002C-EC4	Y-87B	Differential Relay	BUS 13EC OVERALL DIFFERENTIAL STRING			R1400S002C-EC4	BUS	RHR	617	SSE Spectra	Capacity > Demand
207	R1400S002C-EC4	Z-87B	Differential Relay	BUS 13EC OVERALL DIFFERENTIAL STRING			R1400S002C-EC4	BUS	RHR	617	SSE Spectra	Capacity > Demand
208	R1400S002C	2KS94	Control Relay	BUS 13EC OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002C	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
209	R1400S002C	4KS94	Control Relay	BUS 13EC OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002C	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
210	R3000S007	59S	Relay	OVERVOLTAGE	ABBP	1338D83A01 TYPE SSV-T	R3000S007	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
211	R1400S002D	3KT94	Control Relay	BUS 14ED OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002D	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
212	R1400S002D	4KU94	Control Relay	GENERATOR DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002D	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
213	R3000S008	59SX	Control Relay	OVERVOLTAGE	ITEE	J13P3012	R3000S008	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
214	R30P341	T3A1	Time Delay Relay	SPEED PERMISSIVE	AGAS	E7012PB004	R30P341	Relay Cabinet	RHR	617	SSE Spectra	Capacity > Demand
215	R1400S002D-ED4	X-87B	Differential Relay	BUS 14ED OVERALL DIFFERENTIAL STRING			R1400S002D-ED4	BUS	RHR	617	SSE Spectra	Capacity > Demand
216	R1400S002D-ED4	Y-87B	Differential Relay	BUS 14ED OVERALL DIFFERENTIAL STRING			R1400S002D-ED4	BUS	RHR	617	SSE Spectra	Capacity > Demand
217	R1400S002D-ED4	Z-87B	Differential Relay	BUS 14ED OVERALL DIFFERENTIAL STRING			R1400S002D-ED4	BUS	RHR	617	SSE Spectra	Capacity > Demand
218	R1400S002D	2KT94	Control Relay	BUS 14ED OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002D	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
219	R1400S002D	4KT94	Control Relay	BUS 14ED OVERALL DIFFERENTIAL STRING	GE	12HMA24A4F	R1400S002D	4160V BUS	RHR	617	SSE Spectra	Capacity > Demand
220	R3000S008	59S	Relay	OVERVOLTAGE	ABBP	1338D83A01 TYPE SSV-T	R3000S008	Control Panel	RHR	617	SSE Spectra	Capacity > Demand
221	R3200S020A	DCB	Circuit Breaker	BATTERY CHARGER	SE&A	QJ22B225	R3200S020A-3D	BATTERY CHARGER	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
222	R3200S020B	DCB	Circuit Breaker	BATTERY CHARGER	SE&A	QJ22B225	R3200S020B-10E	BATTERY CHARGER	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
223	R3200S021A	DCB	Circuit Breaker	BATTERY CHARGER	SE&A	QJ22B225	R3200S021A-5B	BATTERY CHARGER	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
224	R3200S021B	DCB	Circuit Breaker	BATTERY CHARGER	SE&A	QJ22B225	R3200S021B-3D	BATTERY CHARGER	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
225	B2104M082	K2SRV	Control Relay	AGASTAT TYPE EGPD CONTROL RELAY	AGAS	EGPD004	B21P401	Relay Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
226	B2100M312A	K33A	Control Relay	NB DIV1 SRV LO-LO SET LOGIC HI PRESS SCRAM	AGAS	FGPDC750	H11P628	Assembly Panel	AB	613.5	EPRI HF Test	Capacity > Demand
227	B2100M312B	K33B	Control Relay	NB DIV2 SRV LO-LO SET LOGIC HI PRESS SCRAM	AGAS	EGPD002	B21P401	Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
228	B2100M312C	K33C	Control Relay	NB DIV2 SRV LO-LO SET LOGIC SRV OPEN	AGAS	FGPDC750	H11P628	Assembly Panel	AB	613.5	EPRI HF Test	Capacity > Demand
229	B2100M312D	K33D	Control Relay	NB DIV2 SRV LO-LO SET LOGIC SRV OPEN	AGAS	EGPD002	B21P401	Cabinet	AB	643.5	EPRI HF Test	Capacity > Demand
230	R3000S005	CV8/64	Ground Detector Relay	EDG 11 GROUND TRIP			R3000S005	CONTROL PANEL	RHR	617	SSE Spectra	Capacity > Demand
231	R3000S005	1ND94	Relay	EDG 11 GROUND TRIP	GE	12HFA151A7H	R3000S005	CONTROL PANEL	RHR	617	SSE Spectra	Capacity > Demand
232	R1400S002A	2ND94	Control Relay	EDG 11 GROUND TRIP	GE	12HMA24A4	BUS 11EA-3	SWITCHGEAR	RHR	617	SSE Spectra	Capacity > Demand
233	R3000S006	CV8/64	Ground Detector Relay	EDG 12 GROUND TRIP			R3000S006	CONTROL PANEL	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
234	R3000S006	1NE94	Relay	EDG 12 GROUND TRIP	GE	12HFA151A7 H	R3000S006	CONTR OL PANEL	RHR	617	SSE Spectra	Capacity > Demand
235	R1400S002B	2NE94	Control Relay	EDG 12 GROUND TRIP	GE	12HMA24A4F	BUS 12EB-3	SWITC HGEAR	RHR	617	SSE Spectra	Capacity > Demand
236	R3000S007	CV8/64	Ground Detector Relay	EDG 13 GROUND TRIP			R3000S007	CONTR OL PANEL	RHR	617	SSE Spectra	Capacity > Demand
237	R3000S007	1NF94	Relay	EDG 13 GROUND TRIP	GE	12HFA151A7 H	R3000S007	CONTR OL PANEL	RHR	617	SSE Spectra	Capacity > Demand
238	R1400S002A	2NF94	Control Relay	EDG 13 GROUND TRIP	GE	12HMA24A4F	BUS 13EC-3	SWITC HGEAR	RHR	617	SSE Spectra	Capacity > Demand
239	R3000S008	CV8/64	Ground Detector Relay	EDG 14 GROUND TRIP			R3000S008	CONTR OL PANEL	RHR	617	SSE Spectra	Capacity > Demand
240	R3000S008	1NG94	Relay	EDG 14 GROUND TRIP	GE	12HFA151A7 H	R3000S008	CONTR OL PANEL	RHR	617	SSE Spectra	Capacity > Demand
241	R1400S002A	2NG94	Control Relay	EDG 14 GROUND TRIP	GE	12HMA24A4	BUS 14ED-3	SWITC HGEAR	RHR	617	SSE Spectra	Capacity > Demand
242	R1400S002A	1NL94	Control Relay	EDG 11 OFFSITE UNDERFRE QUENCY	GE	12HMA24A2F	BUS 11EA-3	SWITC HGEAR	RHR	617	SSE Spectra	Capacity > Demand
243	R1400S002A	1PA69	Control Relay	EDG 11 OFFSITE UNDERFRE QUENCY	GE	12HMA24A2	BUS 11EA-3	SWITC HGEAR	RHR	617	SSE Spectra	Capacity > Demand
244	R1400S001B	Pos. B6	Circuit Breaker	4160V BUS 64B	ITEG	HK	R1400S001B	SWITC HGEAR	AB	613.5	Fermi 2 Plant Specific Report	Capacity > Demand
245	R1400S002B	1NM94	Control Relay	EDG 12 OFFSITE UNDERFRE QUENCY	GE	12HMA24A2F	BUS 12EB-3	SWITC HGEAR	RHR	617	SSE Spectra	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
246	R1400S002B	1PB69	Control Relay	EDG 12OFFSITE UNDERFREQUENCY	GE	12HMA24A2F	BUS 12EB-3	SWITCHGEAR	RHR	617	SSE Spectra	Capacity > Demand
247	R1400S001C	Pos. C6	Circuit Breaker	4160V BUS 64C	ITEG	HK	R1400S001C	SWITCHGEAR	AB	613.5	Fermi 2 Plant Specific Report	Capacity > Demand
248	R1400S002C	1NN94	Control Relay	EDG 13 OFFSITE UNDERFREQUENCY	GE	12HMA24A2F	BUS 13EC-3	SWITCHGEAR	RHR	617	SSE Spectra	Capacity > Demand
249	R1400S002C	1PC69	Control Relay	EDG 13 OFFSITE UNDERFREQUENCY	GE	12HMA24A2	BUS 13EC-3	SWITCHGEAR	RHR	617	SSE Spectra	Capacity > Demand
250	R1400S001E	Pos. E6	Circuit Breaker	4160V BUS 65E	ITEG	HK	R1400S001E	SWITCHGEAR	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
251	R1400S002D	1N094	Control Relay	EDG 14 OFFSITE UNDERFREQUENCY	GE	12HMA24A2F	BUS 14ED-3	SWITCHGEAR	RHR	617	SSE Spectra	Capacity > Demand
252	R1400S002D	1PD69	Control Relay	EDG 14 OFFSITE UNDERFREQUENCY	GE	12HMA24A2F	BUS 14ED-3	SWITCHGEAR	RHR	617	SSE Spectra	Capacity > Demand
253	R1400S001F	Pos. F6	Circuit Breaker	4160V BUS 65F	ITEG	HK	R1400S001F	SWITCHGEAR	AB	643.5	Fermi 2 Plant Specific Report	Capacity > Demand
254	R1400S001B	IAC53A-X51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 64B POS B9	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
255	R1400S001B	IAC53A-Y51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 64B POS B9	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand

Table B-1: Components Identified for High Frequency Confirmation

No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
256	R1400S001B	IAC53A-Z51	Overcurrent Relay	Breaker Protection	GE	12IAC53101A	BUS 64B POS B9	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
257	R1400S001B	IAC66B-X50/51	Overcurrent Relay	Breaker Protection	GE	12IAC66B6A	BUS 64B POS B6	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
258	R1400S001B	IAC66B-Y50/51	Overcurrent Relay	Breaker Protection	GE	12IAC66B1A	BUS 64B POS B6	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
259	R1400S001B	IAC53A-Z50/51	Overcurrent Relay	Breaker Protection	GE	12IAC53B104A	BUS 64B POS B6	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
260	R1400S001C	IAC53A-X51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 64C POS C9	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
261	R1400S001C	IAC53A-Y51	Overcurrent Relay	Breaker Protection	GE	12IAC53A3A	BUS 64C POS C9	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
262	R1400S001C	IAC53A-Z51	Overcurrent Relay	Breaker Protection	GE	12IAC53101A	BUS 64C POS C9	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
263	R1400S001C	IAC66B-X50/51	Overcurrent Relay	Breaker Protection	GE	12IAC66B6A	BUS 64C POS C6	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
264	R1400S001C	IAC66B-Y50/51	Overcurrent Relay	Breaker Protection	GE	12IAC66B1A	BUS 64C POS C6	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
265	R1400S001C	IAC53A-Z50/51	Overcurrent Relay	Breaker Protection	GE	12IAC53B104A	BUS 64C POS C6	SWITCHGEAR	AB	613.5	GERS	Capacity > Demand
266	R1400S001E	IAC53A-X51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 65E POS E9	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
267	R1400S001E	IAC53A-Y51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 65E POS E9	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
268	R1400S001E	IAC53A-Z51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 65E POS E9	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand

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No.	ID	Component					Enclosure		Building	Floor Elev. (ft)	Component Evaluation	
		Alt ID	Type	System Function	Manufacturer	Model No.	ID	Type			Basis for Capacity	Evaluation Result
269	R1400S001E	IAC66B-X50/51	Overcurrent Relay	Breaker Protection	GE	12IAC66B6A	BUS 65E POS E6	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
270	R1400S001E	IAC66B-Y50/51	Overcurrent Relay	Breaker Protection	GE	12IAC66B1A	BUS 65E POS E6	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
271	R1400S001E	IAC53A-Z50/51	Overcurrent Relay	Breaker Protection	GE	12IAC53B104A	BUS 65E POS E6	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
272	R1400S001F	IAC53A-X51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 65F POS E9	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
273	R1400S001F	IAC53A-Y51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 65F POS E9	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
274	R1400S001F	IAC53A-Z51	Overcurrent Relay	Breaker Protection	GE	12IAC53A2A	BUS 65F POS E9	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
275	R1400S001F	IAC66B-X50/51	Overcurrent Relay	Breaker Protection	GE	12IAC66B6A	BUS 65F POS E6	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
276	R1400S001F	IAC66B-Y50/51	Overcurrent Relay	Breaker Protection	GE	12IAC66B1A	BUS 65F POS E6	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand
277	R1400S001F	IAC53A-Z50/51	Overcurrent Relay	Breaker Protection	GE	12IAC53B104A	BUS 65F POS E6	SWITCHGEAR	AB	643.5	GERS	Capacity > Demand