Dominion Nuclear Connecticut, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060
Web Address: www.dom.com

Dominion®

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U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
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Docket Nos. 50-336/423
License Nos. DPR-65
NPF-49

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNITS 2 AND 3
RESPONSE TO MARCH 12, 2012 INFORMATION REQUEST
HIGH FREQUENCY SENSITIVE EQUIPMENT FUNCTIONAL CONFIRMATION FOR RECOMMENDATION 2.1

References:

1. NRC Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012 [ADAMS Accession Nos. ML12056A046 and ML12053A340].
2. NRC Letter, "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," dated October 27, 2015 [ADAMS Accession No. ML15194A015].
3. EPRI Report 3002004396, Final Report, *High Frequency Program Application Guidance for Functional Confirmation and Fragility Evaluation*, July 2015 [ADAMS Accession No. ML15223A102].
4. EPRI Report 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 [ADAMS Accession No. ML12333A170].

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 to all power reactor licensees and holders of construction permits in active or deferred status. Enclosure 1, Item (4), of Reference 1 requested addressees to provide information related to the functionality of high-frequency sensitive structures, systems, and components (SSCs) under certain circumstances. By letter dated October 27, 2015 (Reference 2), the NRC transmitted final seismic information request tables, which identified that Millstone Units 2 and 3 were to conduct a limited scope seismic evaluation that included a high-frequency (HF) sensitive equipment evaluation.

Electric Power Research Institute (EPRI) Report 3002004396, *High Frequency Program Application Guidance for Functional Confirmation and Fragility Evaluation* (Reference 3), provides methods and criteria for evaluating the HF sensitive equipment to the reevaluated ground motion response spectrum (GMRS) hazard levels. This report supplements the guidance provided in the Seismic Evaluation Guidance, Screening,

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Prioritization and Implementation Details (SPID) (Reference 4), for plants where the GMRS exceeds the safe shutdown earthquake (SSE) spectrum in the frequency range greater than 10 Hz.

Attachments 1 and 2 provide the information requested in response to Enclosure 1, Item (4) of Reference 1 for Millstone Units 2 and 3, respectively, based on the high-frequency sensitive equipment evaluation guidance from EPRI Report 3002004396.

This letter completes the submittal of information requested by Reference 1, Enclosure 1, Recommendation 2.1: Seismic, for Millstone Units 2 and 3.

If you have any questions regarding this information, please contact Diane E. Aitken at (804) 273-2694.

Sincerely,

David A. Heacock
President Dominion Nuclear
Dominion Nuclear Connecticut, Inc.

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

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

Acknowledged before me this 22ND day of December, 2016.

My Commission Expires: 12/31/20

Notary Public

CRAIG D SLY
Notary Public
Commonwealth of Virginia
Reg. # 7518653
My Commission Expires December 31, 2020

Commitments made in this letter: No new regulatory commitments

Attachments:
1. High-Frequency Sensitive Equipment Functional Confirmation for Millstone Unit 2
2. High-Frequency Sensitive Equipment Functional Confirmation for Millstone Unit 3

cc: U.S. Nuclear Regulatory Commission
Region I
2100 Renaissance Blvd
Suite 100
King of Prussia, PA 19406-2713

Richard V. Guzman
Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North, Mail Stop 08 C 2
11555 Rockville Pike
Rockville, MD 20852-2738

NRC Senior Resident Inspector
Millstone Power Station

50.54f_Seismic.Resource@nrc.gov

ATTACHMENT 1

HIGH-FREQUENCY SENSITIVE EQUIPMENT FUNCTIONAL CONFIRMATION FOR MILLSTONE UNIT 2

MILLSTONE POWER STATION UNIT 2
DOMINION NUCLEAR CONNECTICUT, INC.

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this attachment is to provide information requested by the NRC in its March 12, 2012 10 CFR 50.54(f) letter issued to all power reactor licensees and holders of construction permits in active or deferred status (Reference 1). Specifically, this attachment provides the results of the High Frequency Confirmation required by Item (4), Enclosure 1, Recommendation 2.1: Seismic, of the letter.

The High Frequency Confirmation evaluation undertaken for Millstone Power Station Unit 2 (MPS2) used the methodologies in EPRI Report 3002004396, "High Frequency Program, Application Guidance for Functional Confirmation and Fragility Evaluation" (Reference 8) as described herein.

A summary of the High Frequency Confirmation evaluations and results are provided below.

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 10 CFR 50.54(f) letter on March 12, 2012 (Reference 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 Report 1025287, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic" (Reference 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 Report 3002004396, "High Frequency Program, Application Guidance for Functional Confirmation and Fragility Evaluation," (Reference 8) and was endorsed by the NRC in a letter dated September 17, 2015 (Reference 3). Final screening identifying plants needing to perform a High Frequency Confirmation was provided by NRC in a letter dated October 27, 2015 (Reference 2).

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

The reevaluated seismic hazard was developed in order to provide the information requested by the NRC in Reference 1 and does not constitute a new or supplemental seismic design or licensing basis for MPS2. As such, the conclusions of the High Frequency Confirmation review do not result in a challenge to the design basis function of any plant structures, systems, or components important to safety.

1.3 APPROACH

EPRI Report 3002004396 (Reference 8) is used for the MPS2 engineering evaluations described in this attachment. Section 4.1 of Reference 8 provided general steps to follow for the high-frequency confirmation component evaluation. Accordingly, the following topics are addressed in the subsequent sections of this attachment:

- MPS2 Safe Shutdown Earthquake (SSE) and Ground Motion Response Spectrum (GMRS) Information
- Selection of components and a list of specific components for high-frequency confirmation
- Estimation of seismic demand for subject components
- Estimation of seismic capacity for subject components
- Summary of high-frequency evaluations for subject components
- Summary of Results

1.4 PLANT SCREENING

MPS2 submitted the reevaluated seismic hazard information, including the GMRS, to the NRC on March 31, 2014 (Reference 4). In letters dated December 15, 2015 and March 15, 2016 (References 12 and 13, respectively), the NRC staff concluded that the submitted GMRS adequately characterizes the reevaluated seismic hazard for the MPS site.

The NRC final screening determination letter (Reference 2) concluded that the MPS2 GMRS to SSE comparison resulted in a need to perform a High Frequency Confirmation in accordance

with the screening criteria in the SPID (Reference 6).

1.5 INITIAL CONDITIONS

For the purposes of this High Frequency Confirmation review, the plant is assumed to be operating normally prior to the occurrence of the severe seismic event with offsite power sources available. The seismic event was presumed to cause a Loss of Offsite Power (LOOP) and a normal reactor trip.

2.0 SELECTION OF COMPONENTS FOR HIGH-FREQUENCY SCREENING

The fundamental objective of the high-frequency confirmation review was to determine whether the occurrence of a seismic event could cause critical equipment to fail to perform as necessary. An optimized evaluation process was applied that focused 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 coolant system 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 and support systems).

Within the applicable functions, the components that would need a high-frequency confirmation are contact control devices subject to intermittent states (e.g., relay contact chatter) in seal-in or lockout circuits. Accordingly, the objective of the review, as stated in Section 4.2.1 of Reference 8, was to determine if seismic induced high-frequency relay chatter would prevent the completion of key plant safety functions.

For each function, a review was performed to identify plant equipment supporting the function. The control circuit schematic diagrams for this equipment were then reviewed using the guidance from EPRI NP-7148 (Reference 11) and EPRI Report 3002004396 (Reference 8) to determine whether seismic-induced contact chatter could result in seal-in or lockout (SILO) conditions that could have an adverse impact on the equipment capability to support key plant safety functions. From this review, a list of contact control devices for which contact chatter could result in SILO conditions was identified. These devices (termed "relays" for the purposes of this evaluation) were further evaluated for seismic capacity margin, as described in Sections 3 and 4.

2.1 REACTOR TRIP/SCRAM

Consistent with the guidance in Reference 8, the design requirements for reactor trip systems preclude the application of seal-in or lockout circuits that prevent reactor trip/SCRAM functions and no high-frequency component chatter review is necessary for this function.

2.2 REACTOR COOLANT SYSTEM INVENTORY CONTROL

The reactor coolant system inventory control systems were reviewed to identify components that could be susceptible to adverse operation due to contact control devices in SILO circuits that could create loss of coolant-type events, such as inadvertent opening of a pressurizer power-operated relief valve (PORV).

The following components were identified for control circuit review for SILO conditions:

- Pressurizer PORVs

2.3 REACTOR COOLANT SYSTEM PRESSURE CONTROL

Consistent with the guidance in Reference 8, no specific high-frequency component chatter review is required for this function.

2.4 CORE COOLING

The core cooling systems were reviewed to identify components that could be susceptible to adverse operation due to contact control devices in SILO circuits that would prevent accomplishment of the core cooling function. The intent of the review was to ensure at least a single train of non-AC power driven decay heat removal capability was maintained (e.g., auxiliary feedwater flow from at least one pump to at least one steam generator).

The following components were identified for control circuit review for SILO conditions:

- Auxiliary Feedwater (AFW) Flow Regulating Valves
- AFW Discharge Header Cross-tie Valve
- Atmospheric Steam Dump Valves
- Turbine-driven AFW Pump Steam Supply Valves
- Turbine-driven AFW Pump Trip-Throttle Valve
- Turbine-driven AFW Pump

2.5 AC/DC POWER SUPPORT SYSTEMS

The AC and DC power support systems were reviewed to identify components that could be susceptible to adverse operation due to contact control devices in SILO circuits that prevent the availability of DC and/or AC power sources. The following AC and DC power support systems

were reviewed:

- Emergency Diesel Generators (EDG),
- EDG Support Systems and associated Switchgear, Load Centers, and MCCs,
- Battery Chargers and Inverters,
- Vital 125vdc and 120vac Distribution

The analysis considered the reactor operating normally at power with no equipment failures prior to the seismic event. The EDGs are not operating, but are available. The seismic event was presumed to cause a Loss of Offsite Power (LOOP) and a normal reactor trip.

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 following components were identified for control circuit review for SILO conditions:

- 4kV Emergency Bus Feeder and Bus Tie Breakers (Emergency and Offsite sources)
- 480v Emergency Bus Feeder and Tie Breakers
- 4kV / 480v Emergency Bus Transformers and 4kV Supply Breakers
- 4kV Emergency Bus Load Breakers to Service Water, AFW, High Pressure Safety Injection, Low Pressure Safety Injection, Containment Spray and Reactor Building Closed Cooling Water Pumps
- 480v Emergency Bus Load Breakers to 125vdc Battery Chargers, various MCCs, and Load Centers
- 125vdc Batteries, DC Busses, Battery Chargers, and Distribution System Components
- 120vac Vital Inverters and Distribution System Components
- EDGs
- EDG Air Start System Valves
- EDG Room Ventilation Fans and Dampers
- Service Water Pumps and Strainers
- Service Water System Valves (required for cooling water supply to EDGs)

2.6 SUMMARY OF SELECTED COMPONENTS

A list of the contact devices requiring a high-frequency confirmation is provided in Appendix 1.

3.0 SEISMIC DEMAND ESTIMATE

The high-frequency functional confirmation process for the relays subject to the potential for seismic-induced contact chatter requires the mounting point seismic demand to be determined, which requires the development of in-structure seismic demand based on the GMRS input and the in-cabinet amplification of the in-structure floor motion at the location of the electrical cabinet housing the relay.

The calculation of in-structure response typically requires the development of a foundation input response spectrum (FIRS) and dynamic analysis of the structure. MPS2 has not developed these inputs from the GMRS for plant structures. Therefore, consistent with the guidance in Reference 8, Section 4.3, the in-structure response for buildings and floor elevations where subject relays are located was estimated as described in subsection 3.1 below.

The mounting point high-frequency seismic demand was determined consistent with the guidance in Reference 8, Sections 4.4 and 4.5, and is described in subsection 3.2 below.

3.1 ESTIMATE OF HIGH FREQUENCY IN-STRUCTURE RESPONSE

Per Reference 8, Sect. 4.3, the basis for calculating high-frequency seismic demand in the horizontal direction is the horizontal control point GMRS, which was developed in response to Reference 1 and reported in the MPS Seismic Hazard and Screening Report (Reference 4). As noted in Reference 8, Section 3.3,

> *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.*

MPS is a rock site, and the MPS2 structures of interest for the high-frequency confirmation (Auxiliary Building and Turbine Building) are rock-founded. Therefore, the control point GMRS was the appropriate review level earthquake (RLE) input for the purposes of the high-frequency confirmation.

3.1.1 HORIZONTAL SEISMIC DEMAND

The horizontal response structural amplification factor to be applied for estimating the horizontal in-structure seismic demand is provided in Reference 8, Figure 4-3 and is based upon the height of the electrical cabinet (that the relay is mounted within) above the building foundation. For the MPS2 high-frequency confirmation, this height was taken as the difference between the lowest floor elevation and the floor elevation of the cabinet anchorage.

The horizontal seismic demand was calculated in accordance with Reference 8, Equation 4-1a:

$$SA_{cH} = SA_{GMRS} * AF_{SH}$$

SA_{cH} is the Spectral Acceleration, Clipped Horizontal (i.e., in-structure [floor] horizontal acceleration).

SA_{GMRS} is the peak GMRS between 15-40Hz. The SA_{GMRS} value is 0.422g from Reference 4. The horizontal GMRS is plotted in Figure 3-1.

AF_{SH} is the Horizontal Response Structural Amplification Factor from Reference 8, Figure 4-3.

3.1.2 VERTICAL SEISMIC DEMAND

The vertical response structural amplification factor to be applied for estimating the vertical in-structure seismic demand is provided in Reference 8, Figure 4-4 and is based upon the height of the electrical cabinet (that the relay is mounted within) above the building foundation. For the MPS2 high-frequency confirmation, this height was taken as the difference between the lowest floor elevation and the floor elevation of the cabinet anchorage.

The vertical seismic demand was calculated in accordance with Reference 8, Equation 4-1b:

$$SA_{cV} = SA_{VGMRS} * AF_{SV}$$

SA_{cV} is the Spectral Acceleration, Clipped Vertical (in-structure [floor] vertical acceleration).

SA_{VGMRS} is the peak estimated Spectral Acceleration, Vertical GMRS in the 15 to 40Hz frequency range. The peak SA_{VGMRS} is the maximum product of the Vertical-to-Horizontal (V/H) function values and the corresponding horizontal GMRS values between 15 and 40Hz. The GMRS values are from Reference 4. The V/H function is derived from Reference 8, Tables 3-1 and 3-2, utilizing the GMRS peak ground acceleration (PGA) [0.190g] and the shear wave travel time from a depth of 30 meters to the ground surface (Vs30) from Reference 4. For MPS2, the V/H function values are between 0.680 @ 15 Hz and 0.860 @ 40Hz, and are based on the GMRS Horizontal PGA = 0.19g and Vs30 > 1,000 mps corresponding to a site class 'B-Hard' per Reference 8, Table 3-2. The maximum product of the V/H function values and the corresponding GMRS is 0.31g, which occurs at 40Hz (GMRS = 0.36g, V/H = 0.86). The GMRS, estimated vertical GMRS (VGMRS), and V/H Ratio values are plotted in Figure 3-1, along with the SSE spectrum.

AF_{SV} is the Vertical Response Structural Amplification Factor from Reference 8, Figure 4-4.

3.2 ESTIMATE OF HIGH FREQUENCY MOUNTING POINT SEISMIC DEMAND

The mounting point seismic demand was determined by applying in-cabinet amplification factors to the in-structure demand, as described in Reference 8, Sections 4.4 and 4.5.1.

The in-structure demand was determined as described in Section 3.1 above. The in-cabinet amplification factor is applied to account for the amplification of the structure seismic response at the cabinet anchor points. The in-structure demand (horizontal or vertical) was multiplied by the applicable in-cabinet amplification factor to obtain the mounting point demand.

Horizontal cabinet amplification factors used were:

Motor Control Centers	$AF_c = 3.6$
Switchgear (flexible panels)	$AF_c = 7.2$
Control Cabinets (e.g., Control Room electrical panels and bench boards, etc.)	$AF_c = 4.5$

Cabinet types were determined based on guidance in EPRI NP-7148, "Procedure for Evaluating Nuclear Power Plant Relay Seismic Functionality" (Reference 11).

The vertical cabinet amplification factor used was $AF_c = 4.7$ for all three cabinet types.

For electrical cabinets/enclosures that did not correspond to the listed cabinet types, in-cabinet amplification factors consistent with the cabinet configuration were used and justified on a case-by-case basis.

The mounting point demand, $ICRS_c$, used in the horizontal and vertical directions for evaluation of the relays, is equal to the product of the clipped in-structure demand and the applicable cabinet amplification factor within the 15 to 40 Hz frequency range, as described in Reference 8, Sections 4.4:

$$ICRS_{cH} = AF_{cH} * SA_{cH}$$

$$ICRS_{cV} = AF_{cV} * SA_{cV}$$

The cabinet type classification and the mounting point seismic demand are tabulated for each evaluated relay in Appendix 1.

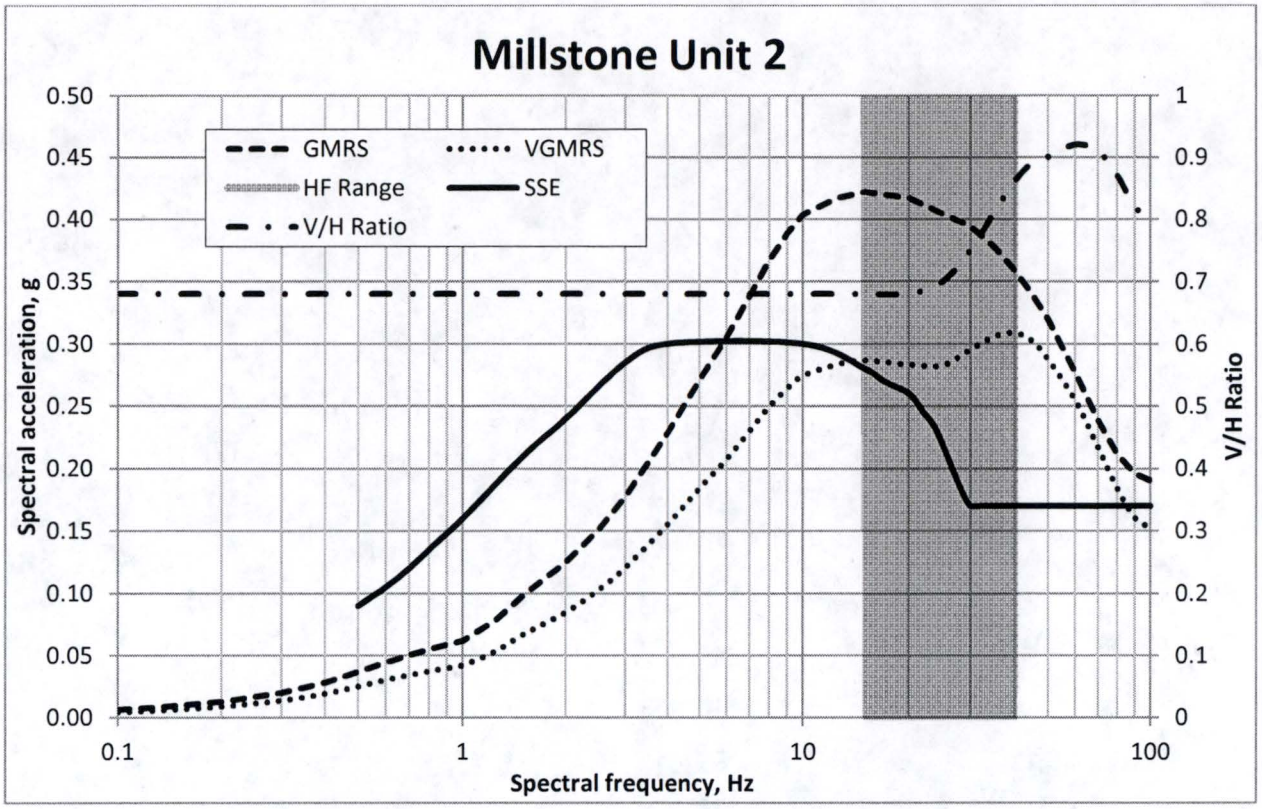

Figure 3-1: Plot of Horizontal and Vertical Ground Motion Response Spectra, Safe Shutdown Earthquake Spectrum, and V/H Ratio

4.0 CONTACT DEVICE EVALUATIONS

The high-frequency functional confirmation process for the relays subject to the potential for seismic-induced contact chatter requires the comparison of relay seismic capacity to the applicable seismic demand to determine whether the relay is predicted to experience contact chatter during a GMRS-level seismic event. Seismic demand was determined as described in Section 3.0. The deterministic high confidence of low probability of failure (HCLPF) capacity of the relay device was determined in accordance with the guidance of Reference 8, Section 4.5.

4.1 HCLPF COMPONENT CAPACITY

The HCLPF capacities of the relays were developed based on the guidance in Reference 8, Section 4.5.2. The effective wide band capacity, TRS, is given by Reference 8, Equation 4-5:

$$TRS = (SA_T / F_K) * F_{MS}$$

SA_T is the Spectral Acceleration, Effective Spectral Test Capacity (Relay Seismic Capacity) for relays as obtained from one of the following sources:

- EPRI High Frequency Test Program (References 7 and 8)
- Generic Equipment Ruggedness Spectrum (GERS) (Reference 9 and 10)
- Seismic Qualification Reporting and Testing Standardization (Reference 14)
- Site-specific seismic qualification test data

Certain relay model numbers identified on the relay list are not explicitly covered by the testing referenced in the list above and a comparison of the relay to other similar relay types having seismic qualification test data (e.g., same manufacturer & same family of relay, similar size, shape, features, construction, etc.) was made in those cases in order to provide a SA_T value.

F_K is the Conservative Deterministic Failure Margin (CFDM) Knockdown Factor and its value depends on the source of the test value chosen to represent test capacity. F_K was obtained from Reference 8, Table 4-2.

F_{MS} is the Multi-axis to Single-axis Correction Factor and is equal to either 1.0 or 1.2 depending on the expected seismic response of the relay enclosure cabinet. The value of F_{MS} was chosen consistent with the guidance from Reference 8, Section 4.5.2.

The effective wide band capacity, along with the source for the device capacity, is tabulated for each evaluated relay in Appendix 1.

4.2 SEISMIC MARGIN EVALUATION

The seismic margin to the onset of contact chatter was determined by comparing the HCLPF capacity, TRS, to the mounting point seismic demand, $ICRS_c$, to obtain the capacity/demand ratio:

$C/D = TRS / ICRS_c$ (C/D is determined for horizontal and vertical directions)

The results of the relay chatter evaluation is tabulated for each evaluated relay in Appendix 1. Two representative sample relay evaluations are included in Appendix 2.

5.0 CONCLUSIONS

5.1 SUMMARY OF RESULTS

The high-frequency confirmation review was performed consistent with the guidance in EPRI Report 3002004396 (Reference 8). The following results were obtained:

- 132 essential plant components were selected for detailed review
- 103 components were selected for relay chatter evaluation (the remaining 29 components are non-electrical, and do not require relay chatter evaluation)
- 363 relays were identified for the 103 components evaluated for relay chatter

- 104 relays were identified with the potential to cause SILO conditions and required seismic margin evaluation
- 101 relays were determined to have adequate seismic margin to chatter (C/D ratio >/= 1)

The high-frequency confirmation review determined there are three relays associated with essential components for which, based on available high-frequency seismic capacity information and the conservatively estimated seismic demand, the seismic capacity is exceeded by the GMRS in-cabinet seismic demand. These relays are identified in the table below. The relays are associated with protection and/or metering for 4kV Emergency Diesel Generator output breakers. The relays are located within the 4kV Emergency Switchgear A3 and A4 cubicles.

Appendix 1 Item No.	Component ID (Breaker ID)	Associated Relay ID(s) (Switchgear Cubicle location)
6	15G-12U-2 (52-A312)	81 (A312)
15	15G-13U-2 (52-A401)	81 (A401)
18	15G-13U-2 (52-A401)	51V-A, B & C (A401)

Chatter of the relays could cause trip and/or prevent closure of the emergency diesel generator (EDG) output breaker at a time when the EDG is required to provide emergency power to the associated 4kV emergency bus (i.e., LOOP).

Further review of the consequences of potential contact chatter associated with these relays determined that operator action guided by existing emergency response procedures would resolve the condition. As part of the immediate actions, response to a reactor trip, as detailed in the Standard Post Trip Actions Emergency Operating Procedure, EOP-2525, the operator in the main control room is directed to check that vital electrical buses are energized. If the 4kV emergency bus(es) is(are) not energized, the procedure provides the immediate action to confirm that the EDG is running and ensure that the output breaker is closed. As part of this action, if the breaker had not closed, or had tripped open, as a result of 81 (frequency) or 51 (time overcurrent) relay device contact chatter, the operator would manually close the output breaker remotely from the panel in the main control room after confirming appropriate permissives are established (also from the main control room). This action would resolve the adverse effect that could result from the relay contact chatter. Since this action would take place within the main control room and is guided by an existing procedure, the action to manually close the EDG output breaker to resolve the potential relay contact chatter consequence is not considered to be an excessive operational burden. In addition, the plant would initially reach safe and stable conditions without emergency AC power.

5.2 CONCLUSION

This attachment provides the information required by Enclosure 1, Recommendation 2.1:

Seismic, Item (4) of the NRC's March 12, 2012 request for information letter (Reference 1).

A high-frequency confirmation review has been performed for MPS2 to determine whether the occurrence of a severe seismic event could cause selected essential equipment to fail to perform as necessary. As a result of this review, it is concluded that accomplishment of the key plant safety functions defined in Reference 8 will not be adversely affected due to relay chatter during a severe seismic event equivalent to the level of the reevaluated seismic hazard for Millstone Power Station Unit 2.

6.0 REFERENCES

1. NRC Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012.
2. NRC Letter, "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," dated October 27, 2015.
3. NRC Letter, "Endorsement of Electric Power Research Institute Final Draft Report 3002004396, "High Frequency Program: Application Guidance for Functional Confirmation and Fragility"," dated September 17, 2015.
4. Dominion Nuclear Connecticut, Inc. Letter, "Millstone Power Station Units 2 and 3, Response to March 12, 2012 Information Request – Seismic Hazard and Screening Report (CEUS Sites) for Recommendation 2.1," dated March 31, 2014.
5. EPRI Report 1015109, "Program on Technology Innovation: Seismic Screening of Components Sensitive to High-Frequency Vibratory Motions," October 2007.
6. EPRI Report 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 Report 3002002997, "High Frequency Program: High Frequency Testing Summary," September 2014.
8. EPRI Report 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. EPRI NP-7148 "Procedure for Evaluating Nuclear Power Plant Relay Seismic Functionality," 1990.
12. NRC Letter, "Millstone Power Station, Units 2 and 3 – 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 Nos. MF3968 and MF3969),"

dated December 15, 2015.

13. NRC Letter, "Millstone Power Station, Units 2 and 3 – Supplement to 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 (CAC Nos. MF3968 and MF3969)," dated March 15, 2016.
14. EPRI Report 1019309, "Seismic Qualification Reporting and Testing Standardization (SQURTS) Test Report Database v2.0," 2009.

Appendix 1 - Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
1	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	51-A, B & C (A302)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IAC53A101A	SQURTS 7S015SE	8.747	Capacity meets or exceeds demand
2	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	51GS (A302)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IAC53A3A	SQURTS 7S015SE	8.747	Capacity meets or exceeds demand
3	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	51V-A, B & C (A312)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IJCV52A9A	SQURTS 50098.7	5.463	Capacity meets or exceeds demand
4	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	59 (C38)	Control Cabinet	AUX	14'-6"	3.987	2.905	GE 12NGV12A11A	EPRI NP-7147-SL, GERS-RLY-PPM.4	5.333	Capacity meets or exceeds demand
5	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	5X (reviewed for H-7A) (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P3211	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
6	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	81 (A312)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12CFF12A63A	SQURTS 50098.7	4.370	Close Breaker from Control Room (C08) [2]
7	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	86 (A312)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12HEA61B235	EPRI NP-7147-SL, GERS-RLY-AL0.2	8.000	Capacity meets or exceeds demand
8	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	86-2/22S3-24C-2 (A302)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
9	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	87-A, B & C (A312X)	Switchgear	TURB	31'-6"	0.886	0.628	GE 12IJD52A11A	SQURTS 61267.2	1.717	Capacity meets or exceeds demand
10	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	BUS A3 LOAD SHED (K534A) (RC02B)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
11	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	HSR (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	GE CR120BD09041	EPRI NP-7147-SL, GERS-RLY-AI1.4 (increased by SQURTS TR-105988-V2, Table 3-1)	5.667	Capacity meets or exceeds demand
12	15G-12U-2 (52-A312)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A)	AC/DC Power and Support Systems	SDR (reviewed for H-7A) (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P8111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
13	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	51-A, B & C (A411)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12IAC53A101A	SQURTS 7S015SE	8.747	Capacity meets or exceeds demand

Appendix 1 - Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
14	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	51GS (A411)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12IAC53A3A	SQURTS 7S015SE	8.747	Capacity meets or exceeds demand
15	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	51V-A, B & C (A401)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12IJCV52A9A	SQURTS 50098.7	5.463	Close Breaker from Control Room (C08) [2]
16	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	59 (C39)	Control Cabinet	AUX	14'-6"	3.987	2.905	GE 12NGV12A11A	EPRI NP-7147-SL, GERS-RLY-PPM.4	5.333	Capacity meets or exceeds demand
17	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	5X (reviewed for H-7B) (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P3211	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
18	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	81 (A401)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12CFF12A63A	SQURTS 50098.7	4.370	Close Breaker from Control Room (C08) [2]
19	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	86 (A401)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12HEA61B235	EPRI NP-7147-SL, GERS-RLY-AL0.2	8.000	Capacity meets or exceeds demand
20	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	86-2/22S3-24D-2 (A411)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
21	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	87-A, B & C (A401X)	Switchgear	TURB	56'-6"	0.886	0.628	GE 12IJD52A11A	SQURTS 61267.2	1.717	Capacity meets or exceeds demand
22	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	BUS A3 LOAD SHED (K634A) (RC02C)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
23	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	HSR (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P6511	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
24	15G-13U-2 (52-A401)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER FROM EDG "B" (H7B)	AC/DC Power and Support Systems	SDR (reviewed for H-7B) (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P8111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
25	24C1-2 (52-A303)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER TO UB5	AC/DC Power and Support Systems	3 (A303)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand

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Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
26	24C1-2 (52-A303)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER TO UB5	AC/DC Power and Support Systems	50/51-A, B & C (A303)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IAC53B104A for all	SQURTS S1430SE	7.964	Capacity meets or exceeds demand
27	24C1-2 (52-A303)	4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER TO UB5	AC/DC Power and Support Systems	50GS (A303)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12PJC11AV1A	EPRI 3002002997	7.027	Capacity meets or exceeds demand
28	24C-2T-2 (52-A305)	4KV EMERGENCY BUS 24C (A3) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	50/51-A, B & C (A505)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IAC53B810A	SQURTS S1430SE	7.964	Capacity meets or exceeds demand
29	24C-2T-2 (52-A305)	4KV EMERGENCY BUS 24C (A3) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	51-A, B & C (A305)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IAC53A101A	SQURTS 7S015SE	8.747	Capacity meets or exceeds demand
30	24C-2T-2 (52-A305)	4KV EMERGENCY BUS 24C (A3) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	51GS (A305)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IAC53A3A	SQURTS 7S015SE	8.747	Capacity meets or exceeds demand
31	24C-2T-2 (52-A305)	4KV EMERGENCY BUS 24C (A3) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	62GS (A505)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12SAM11B22A	EPRI NP-7147-SL, GERS-RLY-PPM.4	8.000	Capacity meets or exceeds demand
32	24C-2T-2 (52-A305)	4KV EMERGENCY BUS 24C (A3) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	86 (A305)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12HFA151A2H (DC)	EPRI 3002004396 (12HFA151A2F), July 2015	16.385	Capacity meets or exceeds demand
33	24C-2T-2 (52-A305)	4KV EMERGENCY BUS 24C (A3) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	86-1/34B-24E-2 (A505)	Switchgear	TURB	31'-6"	4.810	1.866	GE HFA51A (DC)	EPRI NP-7147-SL, GERS-RLY-ARH.5	4.800	Capacity meets or exceeds demand
34	24C-2T-2 (52-A305)	4KV EMERGENCY BUS 24C (A3) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	86-2 (A505)	Switchgear	TURB	31'-6"	4.810	1.866	GE HFA51A (DC)	EPRI NP-7147-SL, GERS-RLY-ARH.5	4.800	Capacity meets or exceeds demand
35	24C-2T-2 (52-A305)	4KV EMERGENCY BUS 24C (A3) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	86X (A305)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12HGA11J52 (DC)	EPRI NP-7147-SL, GERS-RLY-ARH.5	7.040	Capacity meets or exceeds demand
36	24C3-2 (52-A307)	4KV EMERGENCY BUS 24C (A3) BREAKER TO P9A	AC/DC Power and Support Systems	K534I/(SEQ 0) (RC02B)K534L/(SEQ 4) (RC02B)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
37	24C4-2 (52-A308)	4KV EMERGENCY BUS 24C (A3) BREAKER TO P41A	AC/DC Power and Support Systems	SIAS-1/SEQ. 1 (K514A) (RC02B)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand

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High-frequency Review Equipment List								Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
38	24C5-2 (52-A309)	4KV EMERGENCY BUS 24C (A3) BREAKER TO P42A	AC/DC Power and Support Systems	SIAS SEQ. 3 (K517A) (RC02B)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
39	24C6-2 (52-A310)	4KV EMERGENCY BUS 24C (A3) BREAKER TO P43A	AC/DC Power and Support Systems	CSAS1 SEQ. 3 (K509A) (RC02B)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
40	24C7-2 (52-A311)	4KV EMERGENCY BUS 24C (A3) BREAKER TO P11A	AC/DC Power and Support Systems	SIAS 1/SEQ 2 (K516A) (RC02B)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
41	24D1-2 (52-A402)	4KV EMERGENCY BUS 24D (A4) BREAKER TO P11C	AC/DC Power and Support Systems	SIAS 2/SEQ 2 (K616A) (RC02C)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
42	24D2-2 (52-A403)	4KV EMERGENCY BUS 24D (A4) BREAKER TO P41C	AC/DC Power and Support Systems	SIAS-2/SEQ. 1 (K614A) (RC02C)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
43	24D-2T-2 (52-A408)	4KV EMERGENCY BUS 24D (A4) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	51-A, B & C (A408)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12IAC53A101A	SQURTS 7S015SE	8.747	Capacity meets or exceeds demand
44	24D-2T-2 (52-A408)	4KV EMERGENCY BUS 24D (A4) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	51GS (A408)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12IAC53A3A	SQURTS 7S015SE	8.747	Capacity meets or exceeds demand
45	24D-2T-2 (52-A408)	4KV EMERGENCY BUS 24D (A4) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	86 (A408)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
46	24D-2T-2 (52-A408)	4KV EMERGENCY BUS 24D (A4) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	86-1/34B-24E-2 (A505)	Switchgear	TURB	31'-6"	4.810	1.866	GE HFA51A (DC) (	EPRI NP-7147-SL, GERS-RLY-ARH.5	4.800	Capacity meets or exceeds demand
47	24D-2T-2 (52-A408)	4KV EMERGENCY BUS 24D (A4) BREAKER - TIE TO 4KV BUS 24E (A5)	AC/DC Power and Support Systems	86X (A408)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12HGA11J52 (DC)	EPRI NP-7147-SL, GERS-RLY-ARH.5	7.040	Capacity meets or exceeds demand
48	24D3-2 (52-A404)	4KV EMERGENCY BUS 24D (A4) BREAKER TO P42B	AC/DC Power and Support Systems	SIAS2 SEQ. 3 (K617A) (RC02C)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
49	24D4-2 (52-A405)	4KV EMERGENCY BUS 24D (A4) BREAKER TO P43B	AC/DC Power and Support Systems	CSAS2 SEQ. 3 (K609A) (RC02C)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
50	24D5-2 (52-A406)	4KV EMERGENCY BUS 24D (A4) BREAKER TO P9B	AC/DC Power and Support Systems	K634L/(SEQ 0) (RC02C)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
51	24D5-2 (52-A406)	4KV EMERGENCY BUS 24D (A4) BREAKER TO P9B	AC/DC Power and Support Systems	K634M/(SEQ 4) (RC02C)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
52	24D7-2 (52-A409)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER TO UB6	AC/DC Power and Support Systems	3 (A409)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
53	24D7-2 (52-A409)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER TO UB6	AC/DC Power and Support Systems	50/51-A, B & C (A409)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12IAC53B101A	SQURTS S1430SE	7.964	Capacity meets or exceeds demand
54	24D7-2 (52-A409)	4KV EMERGENCY BUS 24D (A4) FEEDER BREAKER TO UB6	AC/DC Power and Support Systems	50GS (A409)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12PJC11AV1A	EPRI 3002002997	7.027	Capacity meets or exceeds demand
55	24E2-2 (52-A503)	4KV EMERGENCY BUS 24E (A5) BREAKER TO P41B	AC/DC Power and Support Systems	KS514B (RC02E) KS614B (RC02E)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
56	24E3-2 (52-A504)	4KV EMERGENCY BUS 24E (A5) BREAKER TO P11B	AC/DC Power and Support Systems	SIAS 5/SEQ 2 (KS516B) (RC02E) SIAS 5/SEQ 2 (KS616B) (RC02E)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
57	2-FW-43A	S/G NO. 1 STEAM GENERATOR AUX FEEDWATER REGULATING VALVE - AVAILABLE TO THROTTLE	Core Cooling	20X/Z1-5276 (C05)	Control Cabinet	AUX	36'-6"	3.987	3.436	GE 12HFA151A2H (DC)	EPRI 3002002997	13.654	Capacity meets or exceeds demand
58	2-FW-43B	S/G NO. 2 STEAM GENERATOR AUX FEEDWATER REGULATING VALVE - AVAILABLE TO THROTTLE	Core Cooling	20X/Z2-5279 (C05)	Control Cabinet	AUX	36'-6"	3.987	3.436	GE 12HFA151A2H (DC)	EPRI 3002002997	13.654	Capacity meets or exceeds demand
59	2-FW-44	AFW PUMP DISCHARGE HEADER CROSSTIE VALVE	Core Cooling	42-C/a (B6203)	MCC	AUX	36'-6"	0.886	0.731	STARTER / CONTACTOR [1]	EPRI NP-5223-SLR1, GERS-MCC.9	1.200	Capacity meets or exceeds demand

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Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
60	2-MS-201	TDAFW STEAM SUPPLY VALVE FROM S/G NO. 1	Core Cooling	42-C/a (B5202)	MCC	AUX	38'-6"	0.886	0.731	STARTER / CONTACTOR [1]	EPRI NP-5223-SLR1, GERS-MCC.9	1.200	Capacity meets or exceeds demand
61	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	5/DG02 (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	AGASTAT E7022PE002	EPRI NP-7147-SL, GERS-RLY-PNT.7	6.667	Capacity meets or exceeds demand
62	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	5X (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P3211	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
63	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	86 (A312)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12HEA61B235	EPRI NP-7147-SL, GERS-RLY-AL0.2	8.000	Capacity meets or exceeds demand
64	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	EOR (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P4111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
65	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	ESS	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P4111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
66	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	K4 (C38)	Control Cabinet	AUX	14'-6"	3.987	2.905	ALLEN BRADLEY 700DC-P800Z1	EPRI 3002002997	12.821	Capacity meets or exceeds demand
67	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	K524C (SIAS1)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
68	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	K530A (LP1)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
69	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	OP1 (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P6111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
70	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	OP2 (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P6111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
71	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	OP3 (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P6111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand

Appendix 1 - Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
72	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	OPL1 (T040)	Control Cabinet	AUX	14'-6"	0.886	0.618	DETROIT SWITCH NO. 222-10 / COLTEC INDUSTRIES INC. 11 906 729	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
73	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	OPL2 (T040)	Control Cabinet	AUX	14'-6"	0.886	0.618	DETROIT SWITCH NO. 222-10 / COLTEC INDUSTRIES INC. 11 906 729	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
74	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	OPL3 (T040)	Control Cabinet	AUX	14'-6"	0.886	0.618	DETROIT SWITCH NO. 222-10 / COLTEC INDUSTRIES INC. 11 906 729	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
75	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	Relay 4 (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	GE CR120BD05041	EPRI NP-7147-SL, GERS-RLY-AI1.4 (increased by SQURTS TR-105988-V2, Table 3-1)	5.667	Capacity meets or exceeds demand
76	H-7A	EMERGENCY DIESEL GENERATOR H-7A - DC CONTROL POWER FROM DV10	AC/DC Power and Support Systems	SDR (T040)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P8111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
77	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	5/DG02 (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	AGASTAT E7022PE002	EPRI NP-7147-SL, GERS-RLY-PNT.7	6.667	Capacity meets or exceeds demand
78	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	5X (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P3211	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
79	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	86 (A401)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12HEA61B235	EPRI NP-7147-SL, GERS-RLY-AL0.2	8.000	Capacity meets or exceeds demand
80	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	EOR (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P4111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
81	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	ESS	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P4111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
82	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	K4 (C39)	Control Cabinet	AUX	14'-6"	3.987	2.905	ALLEN BRADLEY 700DC-P800Z1	EPRI 3002002997	12.821	Capacity meets or exceeds demand
83	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	K624C (SIAS2)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand

Appendix 1 - Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
84	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	K630A (LP2)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
85	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	OP1 (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P6111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
86	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	OP2 (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P6111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
87	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	OP3 (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P6111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
88	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	OPL1 (T041)	Control Cabinet	AUX	14'-6"	0.886	0.618	DETROIT SWITCH NO. 222-10 / COLTEC INDUSTRIES INC. 11 906 729	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
89	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	OPL2 (T041)	Control Cabinet	AUX	14'-6"	0.886	0.618	DETROIT SWITCH NO. 222-10 / COLTEC INDUSTRIES INC. 11 906 729	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
90	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	OPL3 (T041)	Control Cabinet	AUX	14'-6"	0.886	0.618	DETROIT SWITCH NO. 222-10 / COLTEC INDUSTRIES INC. 11 906 729	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
91	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	Relay 4 (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	GE CR120BD05041	EPRI NP-7147-SL, GERS-RLY-AI1.4 (increased by SQURTS TR-105988-V2, Table 3-1)	5.667	Capacity meets or exceeds demand
92	H-7B	EMERGENCY DIESEL GENERATOR H-7B - DC CONTROL POWER FROM DV20	AC/DC Power and Support Systems	SDR (T041)	Control Cabinet	AUX	14'-6"	3.987	2.905	TELEMECHANIQUE CLASS J13P8111	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
93	P-5A	SERVICE WATER PUMP A (AC POWER FROM 4KV BUS 24C [A3], 24C2-2 [52-A306])	AC/DC Power and Support Systems	3 (A306)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
94	P-5A	SERVICE WATER PUMP A (AC POWER FROM 4KV BUS 24C [A3], 24C2-2 [52-A306])	AC/DC Power and Support Systems	50/51-A, B & C (A306)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IAC66K8A	EPRI 3002002997	6.923	Capacity meets or exceeds demand
95	P-5A	SERVICE WATER PUMP A (AC POWER FROM 4KV BUS 24C [A3], 24C2-2 [52-A306])	AC/DC Power and Support Systems	50GS (A306)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12PJC11AV1A	EPRI 3002002997	7.027	Capacity meets or exceeds demand

Appendix 1 - Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
96	P-5A	SERVICE WATER PUMP A (AC POWER FROM 4KV BUS 24C [A3], 24C2-2 [52-A306])	AC/DC Power and Support Systems	LOAD SHED (K529A) (RC02B)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
97	P-5B	SERVICE WATER PUMP B (SWING) (AC POWER FROM 4KV BUS 24E [A5], 24E1-2 [52-A502])	AC/DC Power and Support Systems	3 (A502)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
98	P-5B	SERVICE WATER PUMP B (SWING) (AC POWER FROM 4KV BUS 24E [A5], 24E1-2 [52-A502])	AC/DC Power and Support Systems	50/51-A, B & C (A502)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12IAC66K8A	EPRI 3002002997	6.923	Capacity meets or exceeds demand
99	P-5B	SERVICE WATER PUMP B (SWING) (AC POWER FROM 4KV BUS 24E [A5], 24E1-2 [52-A502])	AC/DC Power and Support Systems	50GS (A502)	Switchgear	TURB	31'-6"	4.810	1.866	GE 12PJC11AV1A	EPRI 3002002997	7.027	Capacity meets or exceeds demand
100	P-5B	SERVICE WATER PUMP B (SWING) (AC POWER FROM 4KV BUS 24E [A5], 24E1-2 [52-A502])	AC/DC Power and Support Systems	LOAD SHED (KS531A, KS631A) (RC02E)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand
101	P-5C	SERVICE WATER PUMP C (AC POWER FROM 4KV BUS 24D [A4], 24D6-2 [52-A407])	AC/DC Power and Support Systems	3 (A407)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
102	P-5C	SERVICE WATER PUMP C (AC POWER FROM 4KV BUS 24D [A4], 24D6-2 [52-A407])	AC/DC Power and Support Systems	50/51-A, B & C (A407)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12IAC66K8A	EPRI 3002002997	6.923	Capacity meets or exceeds demand
103	P-5C	SERVICE WATER PUMP C (AC POWER FROM 4KV BUS 24D [A4], 24D6-2 [52-A407])	AC/DC Power and Support Systems	50GS (A407)	Switchgear	TURB	56'-6"	6.379	2.468	GE 12PJC11AV1A	EPRI 3002002997	7.027	Capacity meets or exceeds demand
104	P-5C	SERVICE WATER PUMP C (AC POWER FROM 4KV BUS 24D [A4], 24D6-2 [52-A407])	AC/DC Power and Support Systems	LOAD SHED (K629A) (RC02C)	Control Cabinet	AUX	36'-6"	3.987	3.436	MPR ASSOC. 0200-0068-PN01-M	MPR-2665, Design Verification of the Davis-Besse SFAS and Millstone Unit 2 ESAS Replacement Relays, Revision 0, June 2004	8.200	Capacity meets or exceeds demand

Notes:

1. GERS capacity data for starter/contactors from EPRI NP-5223-SLR1, GERS-MCC.9 is not model-specific.
2. See Section 5.1.

Appendix 2 - Representative Sample Component Evaluations

This appendix provides two (2) representative sample component evaluations for relays selected from the list in Appendix 1.

1st Example – Equipment ID 15G-12U-2 (52-A312) [Line Item 7 from Appendix 1]

Description of component:

Equipment ID 15G-12U-2 (52-A312) - 4KV EMERGENCY BUS 24C (A3) FEEDER BREAKER FROM EDG "A" (H7A) – supporting the AC/DC Power and Support Systems function. Relay from seal-in / lockout circuit analysis – relay 86 (A312). Relay is a GE Model 12HEA61B235.

Plant Location:

Mounted in panel A312 in the Turbine Building, Vital 4kV Electrical Equipment Room, Elevation 31'6". Cabinet type: Switchgear.

Description of Mounting Point Demand Estimate:

Horizontal Response Estimate - Turbine Building foundation elevation: 14' 6". Panel A312 is 31'6" – 14'6" = 17 feet above foundation. AF_{SH} = 1.583 (from Reference 8, Figure 4-3). SA_{GMRS} = 0.422g (from Reference 4). Then, SA_{cH} = 0.422 * 1.583 = 0.668g.

Vertical Response Estimate – As described in Section 3.1.2, SA_{VGMRS} = 0.309g. AF_{SV} = 1.283 (from Reference 8, Figure 4-4). Then, SA_{cV} = 0.309 * 1.283 = 0.397g.

For cabinet type Switchgear, AF_{cH} = 7.2 and AF_{cV} = 4.7 (from Reference 8, Section 4.4). Then, mounting point demand is:

$ICRS_{cH}$ = 0.668 * 7.2 = 4.810g

$ICRS_{cV}$ = 0.397 * 4.7 = 1.866g

Description of Relay Capacity:

The capacity of the relay is based on EPRI GERS - GERS-RLY-AL0.2 (Reference 9 and 10). For this relay, GERS capacity for non-operating, normally closed contact is applicable – SA_T = 10g.

Appendix 2 - Representative Sample Component Evaluations

The CDFM knockdown factor, F_K, of 1.5 was selected based on the GERS capacity that represented the lowest test level without chatter. The F_{MS} factor value of 1.2 was selected based on the base-mounted cantilever cabinet (switchgear) relay mounting.

Then, TRS = (10/1.5) * 1.2 = 8g.

Capacity / Demand Ratio:

C / D = TRS / $ICRS_c$

= 8g / 4.810g = 1.663 - Horizontal (governing) - acceptable

Capacity exceeds demand.

2nd Example – Equipment ID 2-FW-43A [Line Item 57 from Appendix 1]

Description of component:

Equipment ID 2-FW-43A - S/G NO. 1 STEAM GENERATOR AUX FEEDWATER REGULATING VALVE - AVAILABLE TO THROTTLE – supporting the Core Cooling (turbine-driven AFW pump feedwater flow to steam generator) function. Relay from seal-in / lockout circuit analysis – 20X/Z1-5276 (C05). Relay is a GE Model 12HFA151A2H (DC).

Plant Location:

Mounted in panel C05 in the Auxiliary Building, Main Control Room, Elevation 36'6". Cabinet type: Control Cabinet (benchboard).

Description of Mounting Point Demand Estimate:

Horizontal Response Estimate - Auxiliary Building foundation elevation: (-)45' 6". Panel C05 is 36' 6" – ((-)45' 6") = 82 feet above foundation. AF_{SH} = 2.1 (from Reference 8, Figure 4-3). SA_{GMRS} = 0.422g (from Reference 4). Then, SA_{cH} = 0.422 * 2.1 = 0.886g.

Vertical Response Estimate – As described in Section 3.1.2, SA_{VGMRS} = 0.309g. AF_{SV} = 2.367 (from Reference 8, Figure 4-4). Then, SA_{cV} = 0.309 * 2.367 = 0.731g.

For cabinet type Control Cabinet, AF_{cH} = 4.5 and AF_{cV} = 4.7 (from Reference 8, Section 4.4).

Appendix 2 - Representative Sample Component Evaluations

Then, mounting point demand is:

$ICRS_{cH}$ = 0.886 * 4.5 = 3.987g

$ICRS_{cV}$ = 0.731 * 4.7 = 3.436g

Description of Relay Capacity:

The capacity of the relay is based on EPRI Report 3002002997 (Reference 7) fragility threshold test results for GE 12HFA151A2F: SA_T = 21.3g. Test results for GE 12HFA151A2F were used based on similarity with the installed GE 12HFA151A2H relay.

The CDFM knockdown factor, F_K, of 1.56 was selected based on Reference 8, Table 4-2 (HF Test Program, Fragility Threshold). The F_{MS} factor value of 1.0 was selected based on the benchboard cabinet relay mounting (similar stiffness in three directions).

Then, TRS = (21.3/1.56) * 1.0 = 13.654g.

Capacity / Demand Ratio:

C / D = TRS / $ICRS_c$

= 13.654g / 3.987g = 3.425 - Horizontal (governing) - acceptable

Capacity exceeds demand.

ATTACHMENT 2

HIGH-FREQUENCY SENSITIVE EQUIPMENT FUNCTIONAL CONFIRMATION FOR MILLSTONE UNIT 3

MILLSTONE POWER STATION UNIT 3
DOMINION NUCLEAR CONNECTICUT, INC.

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this attachment is to provide information requested by the NRC in its March 12, 2012 10 CFR 50.54(f) letter issued to all power reactor licensees and holders of construction permits in active or deferred status (Reference 1). Specifically, this attachment provides the results of the High Frequency Confirmation required by Item (4), Enclosure 1, Recommendation 2.1: Seismic, of the letter.

The High Frequency Confirmation evaluation undertaken for MPS Unit 3 (MPS3) used the methodologies in EPRI Report 3002004396, "High Frequency Program, Application Guidance for Functional Confirmation and Fragility Evaluation" (Reference 8) as described herein.

A summary of the High Frequency Confirmation evaluations and results are provided below.

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 10 CFR 50.54(f) letter on March 12, 2012 (Reference 1), requesting information to assure that these recommendations are addressed by all U.S. nuclear power plants. The 10 CFR 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 Report 1025287, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic" (Reference 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 Report 3002004396, "High Frequency Program, Application Guidance for Functional Confirmation and Fragility Evaluation," (Reference 8) and was endorsed by the NRC in a letter dated September 17, 2015 (Reference 3). Final screening identifying plants needing to perform a High Frequency Confirmation was provided by NRC in a letter dated October 27, 2015 (Reference 2).

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

The reevaluated seismic hazard was developed in order to provide the information requested by the NRC in Reference 1 and does not constitute a new or supplemental seismic design or licensing basis for MPS3. As such, the conclusions of the High Frequency Confirmation review do not result in a challenge to the design basis function of any plant structures, systems, or components important to safety.

1.3 APPROACH

EPRI Report 3002004396 (Reference 8) was used for the MPS3 engineering evaluations described in this attachment. Section 4.1 of Reference 8 provided general steps to follow for the high-frequency confirmation component evaluation. Accordingly, the following topics are addressed in the subsequent sections of this attachment:

- MPS3 Safe Shutdown Earthquake (SSE) and Ground Motion Response Spectrum (GMRS) Information
- Selection of components and a list of specific components for high-frequency confirmation
- Estimation of seismic demand for subject components
- Estimation of seismic capacity for subject components
- Summary of high-frequency evaluations for subject components
- Summary of Results

1.4 PLANT SCREENING

MPS3 submitted the reevaluated seismic hazard information, including the GMRS, to the NRC on March 31, 2014 (Reference 4). In letters dated December 15, 2015 and March 15, 2016 (References 12 and 13, respectively), the NRC staff concluded that the submitted GMRS adequately characterizes the reevaluated seismic hazard for the MPS site.

The NRC final screening determination letter (Reference 2) concluded that the MPS3 GMRS to SSE comparison resulted in a need to perform a High Frequency Confirmation in accordance with the screening criteria in the SPID (Reference 6).

1.5 INITIAL CONDITIONS

For the purposes of this High Frequency Confirmation review, the plant is assumed to be operating normally prior to the occurrence of the severe seismic event with offsite power sources available. The seismic event was presumed to cause a Loss of Offsite Power (LOOP) and a normal reactor trip.

2.0 SELECTION OF COMPONENTS FOR HIGH-FREQUENCY SCREENING

The fundamental objective of the high-frequency confirmation review was to determine whether the occurrence of a seismic event could cause critical equipment to fail to perform as necessary. An optimized evaluation process was applied that focused 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 coolant system 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 and support systems).

Within the applicable functions, the components that would need a high-frequency confirmation are contact control devices subject to intermittent states (e.g., relay contact chatter) in seal-in or lockout circuits. Accordingly, the objective of the review, as stated in Section 4.2.1 of Reference 8, was to determine if seismic induced high-frequency relay chatter would prevent the completion of key plant safety functions.

For each function, a review was performed to identify plant equipment supporting the function. The control circuit schematic diagrams for this equipment were then reviewed using the guidance from EPRI NP-7148 (Reference 11) and EPRI Report 3002004396 (Reference 8) to determine whether seismic-induced contact chatter could result in seal-in or lockout (SILO) conditions that could have an adverse impact on the equipment capability to support key plant safety functions. From this review, a list of contact control devices for which contact chatter could result in SILO conditions was identified. These devices (termed "relays" for the purposes of this evaluation) were further evaluated for seismic capacity margin, as described in Sections 3 and 4.

2.1 REACTOR TRIP/SCRAM

Consistent with the guidance in Reference 8, the design requirements for reactor trip systems preclude the application of seal-in or lockout circuits that prevent reactor trip/SCRAM functions and no high-frequency component chatter review is necessary for this function.

2.2 REACTOR COOLANT SYSTEM INVENTORY CONTROL

The reactor coolant system inventory control systems were reviewed to identify components that could be susceptible to adverse operation due to contact control devices in SILO circuits that could create loss of coolant-type events, such as inadvertent opening of a pressurizer power-operated relief valve (PORV).

The following components were identified for control circuit review for SILO conditions:

- Pressurizer PORVs

2.3 REACTOR COOLANT SYSTEM PRESSURE CONTROL

Consistent with the guidance in Reference 8, no specific high-frequency component chatter review is required for this function.

2.4 CORE COOLING

The core cooling systems were reviewed to identify components that could be susceptible to adverse operation due to contact control devices in SILO circuits that would prevent accomplishment of the core cooling function. The intent of the review was to ensure at least a single train of non-AC power driven decay heat removal capability was maintained (e.g., auxiliary feedwater flow from at least one pump to at least one steam generator).

The following components were identified for control circuit review for SILO conditions:

- Auxiliary Feedwater (AFW) Flow Regulating Valves
- AFW Discharge Header Cross-tie Valve
- Atmospheric Steam Dump Valves
- Turbine-driven AFW Pump Steam Supply Valves
- Turbine-driven AFW Pump Trip-Throttle Valve
- Turbine-driven AFW Pump

2.5 AC/DC POWER SUPPORT SYSTEMS

The AC and DC power support systems were reviewed to identify components that could be

susceptible to adverse operation due to contact control devices in SILO circuits that prevent the availability of DC and/or AC power sources. The following AC and DC power support systems were reviewed:

- Emergency Diesel Generators (EDG),
- EDG Support Systems and associated Switchgear, Load Centers, and MCCs,
- Battery Chargers and Inverters,
- Vital 125vdc and 120vac Distribution

The analysis considered the reactor operating normally at power with no equipment failures prior to the seismic event. The EDGs are not operating, but are available. The seismic event was presumed to cause a Loss of Offsite Power (LOOP) and a normal reactor trip.

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 following components were identified for control circuit review for SILO conditions:

- 4kV Emergency Bus Feeder Breakers (Emergency and Offsite sources)
- 480v Emergency Bus Feeder Breakers
- 4kV / 480v Emergency Bus Transformers and 4kV Supply Breakers
- 4kV Emergency Bus Load Breakers to Service Water, AFW, Containment Recirculation, Charging, Safety Injection, Residual Heat Removal, Quench Spray, and Reactor Plant Component Cooling Water Pumps and Control Building Chiller Units
- 480v Emergency Bus Load Breakers to 125vdc Battery Chargers, various MCCs, and Load Centers
- 125vdc Batteries, DC Busses, Battery Chargers, and Distribution System Components
- 120vac Vital Inverters and Distribution System Components
- EDGs
- EDG Air Start, Lubricating Oil, and Fuel Oil Systems
- EDG Room Ventilation Fans and Dampers
- Service Water Pumps and Strainers
- Service Water System Valves (required for cooling water supply to EDGs)

2.6 SUMMARY OF SELECTED COMPONENTS

A list of the contact devices requiring a high-frequency confirmation is provided in Appendix 1.

3.0 SEISMIC DEMAND ESTIMATE

The high-frequency functional confirmation process for the relays subject to the potential for seismic-induced contact chatter requires the mounting point seismic demand, which requires the development of in-structure seismic demand based on the GMRS input and the in-cabinet amplification of the in-structure floor motion at the location of the electrical cabinet housing the relay.

The calculation of in-structure response typically requires the development of a foundation input response spectrum (FIRS) and dynamic analysis of the structure. MPS3 has not developed these inputs from the GMRS for plant structures. Therefore, consistent with the guidance in Reference 8, Section 4.3, the in-structure response for buildings and floor elevations where subject relays are located was estimated as described in subsection 3.1 below.

The mounting point high-frequency seismic demand was determined consistent with the guidance in Reference 8, Sections 4.4 and 4.5, and is described in subsection 3.2 below.

3.1 ESTIMATE OF HIGH FREQUENCY IN-STRUCTURE RESPONSE

Per Reference 8, Sect. 4.3, the basis for calculating high-frequency seismic demand in the horizontal direction is the horizontal control point GMRS, which was developed in response to Reference 1 and reported in the MPS Seismic Hazard and Screening Report (Reference 4). As noted in Reference 8, Section 3.3,

> *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.*

The structures of interest for the high-frequency confirmation are the Control Building, the Emergency Generator Enclosure Building, the Auxiliary Building and the Engineered Safety Features (ESF) Building. MPS is a rock site, and the Auxiliary Building and ESF Building are founded on bedrock. The Control Building and the Emergency Generator Enclosure Building are founded on shallow soil overburden over bedrock.

The Control Building is founded on basal till, of thickness varying between 1 foot on the east side and 15 feet on the west, overlying bedrock. Isolated zones of softened till were excavated and replaced with fill concrete or compacted structural backfill. The Emergency Generator Enclosure Building wall footings are founded on basal till varying in thickness from less than 10 feet to 30 feet overlying bedrock. Based on velocity measurements obtained during site subsurface explorations conducted for initial plant construction, a representative shear wave velocity (Vs) for the dense basal till overburden material is 2200 fps.

Section 3.3 of Reference 8 describes that, for buildings on shallow soil layers at rock sites, the soil layers typically shift the frequency range of seismic input towards the lower frequency range of the response spectrum. Given the guidance from Reference 8, for purposes of high-frequency sensitive equipment evaluations in this attachment, the GMRS is likely to be richer in high-frequency content than a FIRS for a shallow layer soil-founded structure at a rock site such as the Control Building and the Emergency Generator Enclosure Building. Therefore, the control point GMRS is an appropriate review level earthquake (RLE) input for the purposes of the high-frequency confirmation.

3.1.1 HORIZONTAL SEISMIC DEMAND

The horizontal response structural amplification factor to be applied for estimating the horizontal in-structure seismic demand is provided in Reference 8, Figure 4-3 and is based upon the height of the electrical cabinet (that the relay is mounted within) above the building foundation. For the MPS3 high-frequency confirmation, this height was taken as the difference between the lowest floor elevation and the floor elevation of the cabinet anchorage.

The horizontal seismic demand was calculated in accordance with Reference 8, Equation 4-1a:

$$SA_{cH} = SA_{GMRS} * AF_{SH}$$

SA_{cH} is the Spectral Acceleration, Clipped Horizontal (i.e., in-structure [floor] horizontal acceleration).

SA_{GMRS} is the peak GMRS between 15-40Hz. The SA_{GMRS} value is 0.422g from Reference 4. The horizontal GMRS is plotted in Figure 3-1.

AF_{SH} is the Horizontal Response Structural Amplification Factor from Reference 8, Figure 4-3.

3.1.2 VERTICAL SEISMIC DEMAND

The vertical response structural amplification factor to be applied for estimating the vertical in-structure seismic demand is provided in Reference 8, Figure 4-4 and is based upon the height of the electrical cabinet (that the relay is mounted within) above the building foundation. For the MPS3 high-frequency confirmation, this height was taken as the difference between the lowest floor elevation and the floor elevation of the cabinet anchorage.

The vertical seismic demand was calculated in accordance with Reference 8, Equation 4-1b:

$$SA_{cV} = SA_{VGMRS} * AF_{SV}$$

SA_{cV} is the Spectral Acceleration, Clipped Vertical (in-structure [floor] vertical acceleration).

SA_{VGMRS} is the peak estimated Spectral Acceleration, Vertical GMRS in the 15 to 40Hz range.. The peak SA_{VGMRS} is the maximum product of the Vertical-to-Horizontal (V/H) function values and the corresponding horizontal GMRS values between 15 and 40Hz. The GMRS values are from Reference 4. The V/H function is derived from Reference 8, Tables 3-1 and 3-2, utilizing the GMRS peak ground acceleration (PGA) [0.190g] and the shear wave travel time from a depth of 30 meters to the ground surface (Vs30) from Reference 4. For MPS3, the V/H function values are between 0.680 @ 15 Hz and 0.860 @ 40Hz, and are based on the GMRS Horizontal PGA = 0.19g and Vs30 > 1,000 mps corresponding to a site class 'B-Hard' per Reference 8, Table 3-2. The maximum product of the V/H function values and the corresponding GMRS is 0.31g, which occurs at 40Hz (GMRS = 0.36g, V/H = 0.86). The GMRS, estimated vertical GMRS (VGMRS), and the V/H Ratio values are plotted in Figure 3-1, along with the SSE spectrum.

AF_{SV} is the Vertical Response Structural Amplification Factor from Reference 8, Figure 4-4.

3.2 ESTIMATE OF HIGH FREQUENCY MOUNTING POINT SEISMIC DEMAND

The mounting point seismic demand was determined by applying in-cabinet amplification factors to the in-structure demand, as described in Reference 8, Sections 4.4 and 4.5.1.

The in-structure demand was determined as described in Section 3.1 above. The in-cabinet amplification factor is applied to account for the amplification of the structure seismic response at the cabinet anchor points. The in-structure demand (horizontal or vertical) was multiplied by the applicable in-cabinet amplification factor to obtain the mounting point demand.

Horizontal cabinet amplification factors used were:

Motor Control Centers	$AF_c = 3.6$
Switchgear (flexible panels)	$AF_c = 7.2$
Control Cabinets (e.g., Control Room electrical panels and bench boards, etc.)	$AF_c = 4.5$

Cabinet types were determined based on guidance in EPRI NP-7148, "Procedure for Evaluating Nuclear Power Plant Relay Seismic Functionality" (Reference 11).

The vertical cabinet amplification factor used was $AF_c = 4.7$ for all three cabinet types.

For electrical cabinets/enclosures that did not correspond to the listed cabinet types, in-cabinet amplification factors consistent with the cabinet configuration were used and justified on a case-by-case basis.

The mounting point demand, $ICRS_c$, used in the horizontal and vertical directions for evaluation of the relays was the product of the clipped in-structure demand and the applicable cabinet amplification factor within the 15 to 40 Hz frequency range, as described in Reference 8, Sections 4.4:

$$ICRS_{cH} = AF_{cH} * SA_{cH}$$

$$ICRS_{cV} = AF_{cV} * SA_{cV}$$

The cabinet type classification and the mounting point seismic demand are tabulated for each evaluated relay in Appendix 1.

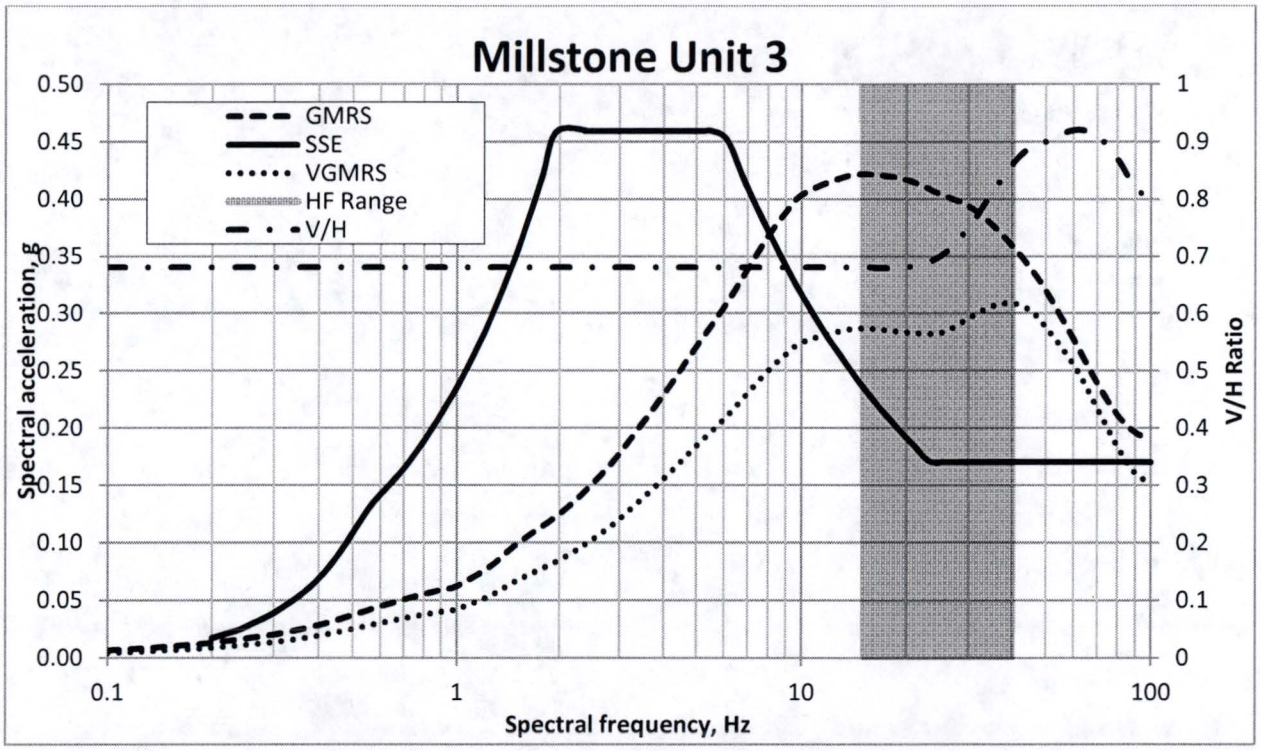

Figure 3-1: Plot of Horizontal and Vertical Ground Motion Response Spectra, Safe Shutdown Earthquake Spectrum, and V/H Ratio

4.0 CONTACT DEVICE EVALUATIONS

The high-frequency functional confirmation process for the relays subject to the potential for seismic-induced contact chatter requires the comparison of relay seismic capacity to the applicable seismic demand to determine whether the relay is predicted to experience contact chatter during a GMRS-level seismic event. Seismic demand was determined as described in Section 3.0. The deterministic high confidence of low probability of failure (HCLPF) capacity of the relay device was determined in accordance with the guidance of Reference 8, Section 4.5.

4.1 HCLPF Component Capacity

The HCLPF capacities of the relays were developed based on the guidance in Reference 8, Section 4.5.2. The effective wide band capacity, TRS, is given by Reference 8, Equation 4-5:

$$TRS = (SA_T / F_K) * F_{MS}$$

SA_T is the Spectral Acceleration, Effective Spectral Test Capacity (Relay Seismic Capacity) for relays as obtained from one of the following sources:

- EPRI High Frequency Test Program (References 7 and 8)
- Generic Equipment Ruggedness Spectrum (GERS) (Reference 9 and 10)
- Seismic Qualification Reporting and Testing Standardization (SQURTS) (Reference 14)
- Site-specific seismic qualification test data

Certain relay model numbers identified on the relay list are not explicitly covered by the testing referenced in the list above and a comparison of the relay to other similar relay types having seismic qualification test data (e.g., same manufacturer & same family of relay, similar size, shape, features, construction, etc.) was made in those cases in order to provide a SA_T value.

As an alternative to relay-specific seismic margin evaluations, the adequacy of relay seismic capacity (with respect to the GMRS) for selected relays not covered by EPRI High Frequency Test Program testing, GERS, or SQURTS has been evaluated through an assessment of the original site specific seismic qualification basis for electrical components. The MPS3 seismic licensing basis is IEEE-323 1974 (Reference 15) and IEEE-344 1975 (Reference 16), and safety related relays contained within plant control panels, motor control centers, switchgear, etc., were qualified to the MPS3 SSE per the requirements of IEEE-344 1975 (Reference 16). Seismic qualification was performed to design specifications which established, based on the SSE, the applicable mounting point seismic demand for each component (panels, motor control centers, switchgear, etc.) based on applicable structure and floor acceleration response spectra. Subsequent changes to the plant have maintained the original seismic qualification of electrical components through the MPS3 Design Control Program.

Comparing the peak spectral acceleration from the MPS3 SSE (0.459g between 2 and 6 Hz from Reference 4) to the peak spectral acceleration from the GMRS (0.422g at 15 Hz from

Reference 4), the SSE peak exceeds the GMRS peak by approximately 9%. This exceedance would be expected to translate to a higher in-structure response and mounting point seismic demand with respect to the demand estimated for the GMRS (refer to Section 3.0), although the peak would occur at lower spectral frequencies. From the EPRI High Frequency Test Program (References 7 and 8), the capacity of relays (with respect to contact chatter) in the high-frequency range was shown to be equal to or greater than the capacity of the relay in the lower frequency range . It follows, then, that relays qualified to the MPS3 design basis SSE (to higher accelerations at lower frequencies) would be expected to function acceptably at the (lower acceleration, higher frequency) GMRS-level mounting point demand. Based on the relay-specific seismic margin evaluation performed for the majority (approximately 75%) of MPS3 relays (see Appendix 1) that concludes that there is considerable margin to contact chatter, this alternative approach to show margin to contact chatter for a portion of the relays (approximately 25%) is reasonable for MPS3.

F_K is the Conservative Deterministic Failure Margin (CFDM) Knockdown Factor and its value depends on the source of the test value chosen to represent test capacity. F_K was obtained from Reference 8, Table 4-2.

F_{MS} is the Multi-axis to Single-axis Correction Factor and is equal to either 1.0 or 1.2 depending on the expected seismic response of the relay enclosure cabinet. The value of F_{MS} was chosen consistent with the guidance from Reference 8, Section 4.5.2.

The effective wide band capacity, along with the source for the device capacity, is tabulated for each evaluated relay in Appendix 1.

4.2 SEISMIC MARGIN EVALUATION

The seismic margin to the onset of contact chatter was determined by comparing the HCLPF capacity, TRS, to the mounting point seismic demand, $ICRS_c$, to obtain the capacity/demand ratio:

$C/D = TRS / ICRS_c$ (C/D is determined for horizontal and vertical directions)

The results of the relay chatter evaluation is tabulated for each evaluated relay in Appendix 1. Two representative sample relay evaluations are included in Appendix 2.

5.0 CONCLUSIONS

5.1 SUMMARY OF RESULTS

The high-frequency confirmation review was performed consistent with the guidance in EPRI Report 3002004396 (Reference 8). The following results were obtained:

- 229 plant components supporting the key safety functions were selected for detailed review
- 192 components were selected for relay chatter evaluation (the remaining 37 components are non-electrical, and do not require relay chatter evaluation)
- 410 relays were identified for the 192 components evaluated for relay chatter
- 212 relays were identified with the potential to cause SILO conditions and required seismic margin evaluation
- 212 relays were determined to have adequate seismic margin to chatter (C/D ratio >/= 1)

5.2 CONCLUSION

This attachment provides information required by Enclosure 1, Recommendation 2.1: Seismic, Item (4) of the NRC's March 12, 2012 request for information letter (Reference 1).

A high-frequency confirmation review has been performed for MPS3 to determine whether the occurrence of a severe seismic event could cause selected essential equipment to fail to perform as necessary. As a result of the review, it is concluded that accomplishment of the key plant safety functions defined in Reference 8 will not be adversely affected due to relay chatter during a severe seismic event equivalent to the level of the reevaluated seismic hazard for Millstone Power Station Unit 3.

6.0 REFERENCES

1. NRC Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012.
2. NRC Letter, "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," dated October 27, 2015.

3. NRC Letter, "Endorsement of Electric Power Research Institute Final Draft Report 3002004396, "High Frequency Program: Application Guidance for Functional Confirmation and Fragility"," dated September 17, 2015.
4. Dominion Nuclear Connecticut, Inc. Letter, "Millstone Power Station Units 2 and 3, Response to March 12, 2012 Information Request – Seismic Hazard and Screening Report (CEUS Sites) for Recommendation 2.1," dated March 31, 2014.
5. EPRI Report 1015109, "Program on Technology Innovation: Seismic Screening of Components Sensitive to High-Frequency Vibratory Motions," October 2007.
6. EPRI Report 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 Report 3002002997, "High Frequency Program: High Frequency Testing Summary," September 2014.
8. EPRI Report 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. EPRI NP-7148, "Procedure for Evaluating Nuclear Power Plant Relay Seismic Functionality," 1990.
12. NRC Letter, "Millstone Power Station, Units 2 and 3 – 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 Nos. MF3968 and MF3969)," dated December 15, 2015.
13. NRC Letter, "Millstone Power Station, Units 2 and 3 – Supplement to 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 (CAC Nos. MF3968 and MF3969)," dated March 15, 2016.
14. EPRI Report 1019309, "Seismic Qualification Reporting and Testing Standardization (SQURTS) Test Report Database v2.0," 2009.
15. The Institute of Electrical and Electronics Engineers (IEEE) Standard IEEE-323 1974, IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations
16. IEEE-344 1975, IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.

Appendix 1 –Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
1	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	5	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	AGASTAT 7022PE	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	4.000	Capacity meets or exceeds demand
2	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	4A	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
3	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	4B	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
4	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	5E	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	AGASTAT 7022PE	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	4.000	Capacity meets or exceeds demand
5	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK90	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
6	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK91	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
7	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	OP1	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
8	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	OP2	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
9	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	OP3	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
10	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	OPL1	Control Cabinet	EMER GEN ENCL	24'-6"	0.696	0.412	DETROIT SWITCH INC. 222-1024	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
11	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	OPL2	Control Cabinet	EMER GEN ENCL	24'-6"	0.696	0.412	DETROIT SWITCH INC. 222-1024	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
12	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	OPL3	Control Cabinet	EMER GEN ENCL	24'-6"	0.696	0.412	DETROIT SWITCH INC. 222-1024	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
13	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	SDR	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P2012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
14	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	SFR	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
15	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	T2A	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	AGASTAT 7012PC	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	8.333	Capacity meets or exceeds demand
16	3EGS*EGA	DIESEL GENERATOR A	AC/DC POWER AND SUPPORT SYSTEMS	T2B	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	AGASTAT 7012PC	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	8.333	Capacity meets or exceeds demand
17	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	5	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	AGASTAT 7022PE	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	4.000	Capacity meets or exceeds demand
18	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	4A	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
19	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	4B	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand

Appendix 1 –Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
20	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	5E	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	AGASTAT 7022PE	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	4.000	Capacity meets or exceeds demand
21	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK90	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
22	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK91	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
23	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	OP1	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
24	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	OP2	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
25	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	OP3	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
26	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	OPL1	Control Cabinet	EMER GEN ENCL	24'-6"	0.696	0.412	DETROIT SWITCH INC. 222-1024	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
27	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	OPL2	Control Cabinet	EMER GEN ENCL	24'-6"	0.696	0.412	DETROIT SWITCH INC. 222-1024	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand
28	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	OPL3	Control Cabinet	EMER GEN ENCL	24'-6"	0.696	0.412	DETROIT SWITCH INC. 222-1024	EPRI NP-5223-SLR1, GERS-PS.5	4.000	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
29	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	SDR	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P2012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
30	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	SFR	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P3012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
31	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	T2A	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	AGASTAT 7012PC	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	8.333	Capacity meets or exceeds demand
32	3EGS*EGB	DIESEL GENERATOR B	AC/DC POWER AND SUPPORT SYSTEMS	T2B	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	AGASTAT 7012PC	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	8.333	Capacity meets or exceeds demand
33	3ENS*ACB-10A (34C10-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3CCP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK39 (Bypass)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
34	3ENS*ACB-10A (34C10-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3CCP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK43 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
35	3ENS*ACB-15B (34D15-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3FWA*P1B	AC/DC POWER AND SUPPORT SYSTEMS	3	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
36	3ENS*ACB-15B (34D15-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3FWA*P1B	AC/DC POWER AND SUPPORT SYSTEMS	AMSAC(B)/K104	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	WESTINGHOUSE 405A10H01	[1]	[1]	Capacity meets or exceeds demand [1]
37	3ENS*ACB-15B (34D15-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3FWA*P1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK47	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
38	3ENS*ACB-15B (34D15-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3FWA*P1B	AC/DC POWER AND SUPPORT SYSTEMS	PSCA1/K640	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-134-1 (NON-LATCHING)	EPRI NP-7147-SLR1, GERS-RLY-ARR.3	6.667	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
39	3ENS*ACB-16A (34C16-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3FWA*P1A	AC/DC POWER AND SUPPORT SYSTEMS	3	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
40	3ENS*ACB-16A (34C16-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3FWA*P1A	AC/DC POWER AND SUPPORT SYSTEMS	AMSAC(A)/K104	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	WESTINGHOUSE 405A10H01	[1]	[1]	Capacity meets or exceeds demand [1]
41	3ENS*ACB-16A (34C16-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3FWA*P1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK47	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
42	3ENS*ACB-16A (34C16-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3FWA*P1A	AC/DC POWER AND SUPPORT SYSTEMS	PSCA1/K640	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-134-1 (NON-LATCHING)	EPRI NP-7147-SLR1, GERS-RLY-ARR.3	6.667	Capacity meets or exceeds demand
43	3ENS*ACB-16B (34D16-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	62	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT E7012PC001	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
44	3ENS*ACB-16B (34D16-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	50/51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC66K1A	[1]	[1]	Capacity meets or exceeds demand [1]
45	3ENS*ACB-16B (34D16-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	50GS	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFC21B1A	[1]	[1]	Capacity meets or exceeds demand [1]
46	3ENS*ACB-16B (34D16-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	86E	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
47	3ENS*ACB-16B (34D16-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	86HBED3-3ENSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
48	3ENS*ACB-16B (34D16-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	87BE-A, B & C (3ENSB02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
49	3ENS*ACB-16B (34D16-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK18 (MSB)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
50	3ENS*ACB-16B (34D16-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK34 (LOP)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
51	3ENS*ACB-17A (34C17-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	62	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT E7012PC001	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand
52	3ENS*ACB-17A (34C17-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	50/50/51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC66K1A GE 12IFC66D1A GE 12IFC66K1A	[1]	[1]	Capacity meets or exceeds demand [1]
53	3ENS*ACB-17A (34C17-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	50GS	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFC21B1A	[1]	[1]	Capacity meets or exceeds demand [1]

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
54	3ENS*ACB-17A (34C17-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	86E	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
55	3ENS*ACB-17A (34C17-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	86HAED3-3ENSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
56	3ENS*ACB-17A (34C17-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	87AE-A, B & C (3ENSA02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
57	3ENS*ACB-17A (34C17-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK18 (MSB)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
58	3ENS*ACB-17A (34C17-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK34 (LOP)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
59	3ENS*ACB-17B (34D17-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1D	AC/DC POWER AND SUPPORT SYSTEMS	62	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT E7012PC001	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand
60	3ENS*ACB-17B (34D17-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1D	AC/DC POWER AND SUPPORT SYSTEMS	50/51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC66K1A	[1]	[1]	Capacity meets or exceeds demand [1]
61	3ENS*ACB-17B (34D17-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1D	AC/DC POWER AND SUPPORT SYSTEMS	50GS	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFC21B1A	[1]	[1]	Capacity meets or exceeds demand [1]
62	3ENS*ACB-17B (34D17-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1D	AC/DC POWER AND SUPPORT SYSTEMS	86E	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
63	3ENS*ACB-17B (34D17-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1D	AC/DC POWER AND SUPPORT SYSTEMS	86HBED3-3ENSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
64	3ENS*ACB-17B (34D17-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1D	AC/DC POWER AND SUPPORT SYSTEMS	87BE-A, B & C (3ENSB02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
65	3ENS*ACB-17B (34D17-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1D	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK18 (MSB)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
66	3ENS*ACB-17B (34D17-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SWP*P1D	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK38 (LOP)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
67	3ENS*ACB-18A (34C18-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	62	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT E7012PC001	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand
68	3ENS*ACB-18A (34C18-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	50/51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC66K1A	[1]	[1]	Capacity meets or exceeds demand [1]
69	3ENS*ACB-18A (34C18-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	50GS	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFC21B1A	[1]	[1]	Capacity meets or exceeds demand [1]

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
70	3ENS*ACB-18A (34C18-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	86E	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
71	3ENS*ACB-18A (34C18-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	86HAED3-3ENSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
72	3ENS*ACB-18A (34C18-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	87AE-A, B & C (3ENSA02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
73	3ENS*ACB-18A (34C18-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK18 (MSB)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
74	3ENS*ACB-18A (34C18-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SWP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK38 (LOP)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
75	3ENS*ACB-18B (34D18-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1B	AC/DC POWER AND SUPPORT SYSTEMS	1X	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HGA111J2G	EPRI NP-7147-SLR1, GERS-RLY-ARH.5	7.040	Capacity meets or exceeds demand
76	3ENS*ACB-18B (34D18-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1B	AC/DC POWER AND SUPPORT SYSTEMS	3-3RHS*P1B	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
77	3ENS*ACB-18B (34D18-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1B	AC/DC POWER AND SUPPORT SYSTEMS	3QSS*LS54B	Field	ESF BLDG.	16'-6" (SWITCH EL.) - 4'-6" (FLOOR EL.)	0.886	0.574	STATIC-O-RING, INC. 12N6BB4-U8-C1A-JJTTNQ	EPRI NP-5223-SLR1, GERS-PS.5	2.000	Capacity meets or exceeds demand
78	3ENS*ACB-18B (34D18-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1B	AC/DC POWER AND SUPPORT SYSTEMS	3QSS*LS54D	Field	ESF BLDG.	16'-6" (SWITCH EL.) - 4'-6" (FLOOR EL.)	0.886	0.574	STATIC-O-RING, INC. 12N6BB4-U8-C1A-JJTTNQ	EPRI NP-5223-SLR1, GERS-PS.5	2.000	Capacity meets or exceeds demand

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High-frequency Review Equipment List								Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
79	3ENS*ACB-18B (34D18-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1B	AC/DC POWER AND SUPPORT SYSTEMS	86E1-3RSSB01	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B22F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
80	3ENS*ACB-18B (34D18-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK60 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
81	3ENS*ACB-19A (34C19-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1A	AC/DC POWER AND SUPPORT SYSTEMS	1X	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HGA111J2G	EPRI NP-7147-SLR1, GERS-RLY-ARH.5	7.040	Capacity meets or exceeds demand
82	3ENS*ACB-19A (34C19-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1A	AC/DC POWER AND SUPPORT SYSTEMS	3-3RHS*P1A	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
83	3ENS*ACB-19A (34C19-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1A	AC/DC POWER AND SUPPORT SYSTEMS	3QSS*LS54A	Field	ESF BLDG.	15'-4" (SWITCH EL.) - 4'-6" (FLOOR EL.)	0.886	0.568	STATIC-O-RING, INC. 12N6BB4-U8-C1A-JJTTNQ	EPRI NP-5223-SLR1, GERS-PS.5	2.000	Capacity meets or exceeds demand
84	3ENS*ACB-19A (34C19-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1A	AC/DC POWER AND SUPPORT SYSTEMS	3QSS*LS54C	Field	ESF BLDG.	18'-4" (SWITCH EL.) - 4'-6" (FLOOR EL.)	0.886	0.584	STATIC-O-RING, INC. 12N6BB4-U8-C1A-JJTTNQ	EPRI NP-5223-SLR1, GERS-PS.5	2.000	Capacity meets or exceeds demand
85	3ENS*ACB-19A (34C19-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1A	AC/DC POWER AND SUPPORT SYSTEMS	86E-3RSSA01	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B22F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
86	3ENS*ACB-19A (34C19-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK60 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
87	3ENS*ACB-19B (34D19-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1D	AC/DC POWER AND SUPPORT SYSTEMS	3	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA151A2H (DC)	EPRI NP-7147-SLR1, GERS-RLY-ARH.5	16.385	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
88	3ENS*ACB-19B (34D19-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1D	AC/DC POWER AND SUPPORT SYSTEMS	62A	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT E7012PC002	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand
89	3ENS*ACB-19B (34D19-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RSS*P1D	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK-62 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
90	3ENS*ACB-1B (34D1-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3HVK*CHL1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK46	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
91	3ENS*ACB-20A (34C20-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1C	AC/DC POWER AND SUPPORT SYSTEMS	3	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA151A2H (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
92	3ENS*ACB-20A (34C20-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1C	AC/DC POWER AND SUPPORT SYSTEMS	62A	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT E7012PC002	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand
93	3ENS*ACB-20A (34C20-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RSS*P1C	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK-62 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
94	3ENS*ACB-20B (34D20-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3CHS*P3B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK21	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
95	3ENS*ACB-21A (34C21-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3CHS*P3A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK21	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
96	3ENS*ACB-21B (34D21-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3CHS*P3C	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK23	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
97	3ENS*ACB-22A (34C22-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3CHS*P3C	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK23	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
98	3ENS*ACB-2A (34C2-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3HVK*CHL1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK46	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
99	3ENS*ACB-5B (34D5-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3QSS*P3B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK-25	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
100	3ENS*ACB-6A (34C6-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3QSS*P3A	AC/DC POWER AND SUPPORT SYSTEMS	3	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	6.110	Capacity meets or exceeds demand
101	3ENS*ACB-6A (34C6-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3QSS*P3A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK-25	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
102	3ENS*ACB-6B (34D6-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3RHS*P1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK-29 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
103	3ENS*ACB-7A (34C7-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RHS*P1A	AC/DC POWER AND SUPPORT SYSTEMS	3	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	6.110	Capacity meets or exceeds demand
104	3ENS*ACB-7A (34C7-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3RHS*P1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK-29 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
105	3ENS*ACB-7B (34D7-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3SIH*P1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK27	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
106	3ENS*ACB-8A (34C8-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3SIH*P1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK-27	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
107	3ENS*ACB-8B (34D8-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3CCP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK40 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
108	3ENS*ACB-8B (34D8-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3CCP*P1B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK42 (Bypass)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
109	3ENS*ACB-9A (34C9-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3CCP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK40 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
110	3ENS*ACB-9A (34C9-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3CCP*P1A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK42 (Bypass)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
111	3ENS*ACB-9B (34D9-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3CCP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK39 (Bypass)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
112	3ENS*ACB-9B (34D9-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3CCP*P1C	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK43 (SSS)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
113	3ENS*ACB-AA (34C3-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-1A	AC/DC POWER AND SUPPORT SYSTEMS	50/51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC53BD1A	EPRI NP-7147-SLR1, GERS-RLY-PP1.5	6.000	Capacity meets or exceeds demand
114	3ENS*ACB-AA (34C3-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-1A	AC/DC POWER AND SUPPORT SYSTEMS	50GS	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFC21B1A	[1]	[1]	Capacity meets or exceeds demand [1]
115	3ENS*ACB-AA (34C3-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-1A	AC/DC POWER AND SUPPORT SYSTEMS	86E	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
116	3ENS*ACB-AA (34C3-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-1A	AC/DC POWER AND SUPPORT SYSTEMS	86HAED1-3ENSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
117	3ENS*ACB-AA (34C3-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-1A	AC/DC POWER AND SUPPORT SYSTEMS	87AE-A, B & C (3ENSA02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
118	3ENS*ACB-AC (34C5-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-3A	AC/DC POWER AND SUPPORT SYSTEMS	50/51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC53BD1A	EPRI NP-7147-SLR1, GERS-RLY-PP1.5	6.000	Capacity meets or exceeds demand
119	3ENS*ACB-AC (34C5-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-3A	AC/DC POWER AND SUPPORT SYSTEMS	50GS	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFC21B1A	[1]	[1]	Capacity meets or exceeds demand [1]
120	3ENS*ACB-AC (34C5-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-3A	AC/DC POWER AND SUPPORT SYSTEMS	86E	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand
121	3ENS*ACB-AC (34C5-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-3A	AC/DC POWER AND SUPPORT SYSTEMS	86HAED1-3ENSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
122	3ENS*ACB-AC (34C5-2)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3EJS*US-3A	AC/DC POWER AND SUPPORT SYSTEMS	87AE-A, B & C (3ENSA02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
123	3ENS*ACB-AR	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	27A, B, C & D (3ENSA02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12NGV13B21A	[1]	[1]	Capacity meets or exceeds demand [1]
124	3ENS*ACB-AR	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	27A,B-3NNSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12NGV13A11A	EPRI NP-7147-SLR1, GERS-RLY-PPM.4	12.000	Capacity meets or exceeds demand
125	3ENS*ACB-AR	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	27R (3ENSA18)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	ITE-27H	EPRI NP-7147-SLR1, GERS-RLY-PPM.4	10.000	Capacity meets or exceeds demand
126	3ENS*ACB-AR	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	27RX-3ENSA02	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-137-8	EPRI NP-7147-SLR1, GERS-RLY-ARR.3	6.667	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
127	3ENS*ACB-AR	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	62V/3NNSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT 7012PB	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand
128	3ENS*ACB-AR	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	BB (BG30)	Control Cabinet	CNTL BLDG	4'-6"	2.277	1.452	N/A	[1]	[1]	Capacity meets or exceeds demand [1]
129	3ENS*ACB-BA (34D2-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-1B	AC/DC POWER AND SUPPORT SYSTEMS	50/51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC53BD1A	EPRI NP-7147-SLR1, GERS-RLY-PP1.5	6.000	Capacity meets or exceeds demand
130	3ENS*ACB-BA (34D2-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-1B	AC/DC POWER AND SUPPORT SYSTEMS	50GS	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFC21B1A	[1]	[1]	Capacity meets or exceeds demand [1]
131	3ENS*ACB-BA (34D2-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-1B	AC/DC POWER AND SUPPORT SYSTEMS	86E	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
132	3ENS*ACB-BA (34D2-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-1B	AC/DC POWER AND SUPPORT SYSTEMS	86HBED1-3ENSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
133	3ENS*ACB-BA (34D2-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-1B	AC/DC POWER AND SUPPORT SYSTEMS	87BE-A, B & C (3ENSB02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
134	3ENS*ACB-BC (34D4-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-3B	AC/DC POWER AND SUPPORT SYSTEMS	50/51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC53BD1A	EPRI NP-7147-SLR1, GERS-RLY-PP1.5	6.000	Capacity meets or exceeds demand
135	3ENS*ACB-BC (34D4-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-3B	AC/DC POWER AND SUPPORT SYSTEMS	50GS	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFC21B1A	[1]	[1]	Capacity meets or exceeds demand [1]
136	3ENS*ACB-BC (34D4-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-3B	AC/DC POWER AND SUPPORT SYSTEMS	86E	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA154B25F (DC)	QTR97P1230, Qualification Test Report for Qualified General Electric Relays Northeast Utilities Systems - Millstone Nuclear Power Station, Order #02044599, REV. 001, REV. 0, November 5, 1997	4.916	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
137	3ENS*ACB-BC (34D4-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-3B	AC/DC POWER AND SUPPORT SYSTEMS	86HBED1-3ENSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
138	3ENS*ACB-BC (34D4-2)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3EJS*US-3B	AC/DC POWER AND SUPPORT SYSTEMS	87BE-A, B & C (3ENSB02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
139	3ENS*ACB-BR	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	27A, B, C & D (3ENSB02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12NGV13B21A	[1]	[1]	Capacity meets or exceeds demand [1]
140	3ENS*ACB-BR	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	27A,B-3NNSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12NGV13A11A	EPRI NP-7147-SLR1, GERS-RLY-PPM.4	12.000	Capacity meets or exceeds demand
141	3ENS*ACB-BR	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	27R (3ENSB18)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	ITE-27H	EPRI NP-7147-SLR1, GERS-RLY-PPM.4	10.000	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
142	3ENS*ACB-BR	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	27RX-3ENSB02	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-137-8	EPRI NP-7147-SLR1, GERS-RLY-ARR.3	6.667	Capacity meets or exceeds demand
143	3ENS*ACB-BR	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	62V/3NNSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT 7012PB	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand
144	3ENS*ACB-BR	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO RESERVE OFFSITE POWER	AC/DC POWER AND SUPPORT SYSTEMS	BB (BG3P)	Control Cabinet	CNTL BLDG	4'-6"	2.277	1.452	N/A	[1]	[1]	Capacity meets or exceeds demand [1]
145	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	32	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12ICW51A2A	[1]	[1]	Capacity meets or exceeds demand [1]
146	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	40	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12CEH51A1A	[1]	[1]	Capacity meets or exceeds demand [1]
147	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	32X	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	ELECTROMAX CAT TRIP IND. RELAY 6319234	[1]	[1]	Capacity meets or exceeds demand [1]

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
148	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	40X	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	ELECTROMAX CAT TRIP IND. RELAY 6319234	[1]	[1]	Capacity meets or exceeds demand [1]
149	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	51N	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC51AD1A	[1]	[1]	Capacity meets or exceeds demand [1]
150	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	51NX-3ENSA07	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA151A2P CD42 (DC)	EPRI 3002002997	5.769	Capacity meets or exceeds demand
151	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	51V-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IJCV51B21A	[1]	[1]	Capacity meets or exceeds demand [1]
152	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	51VX	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HGA111J2G (DC)	EPRI NP-7147-SLR1, GERS-RLY-ARH.5	7.040	Capacity meets or exceeds demand
153	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	51X-3ENSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA151A2P CD42 (DC)	EPRI 3002002997	5.769	Capacity meets or exceeds demand
154	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	62M	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT E7012PA002	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand

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High-frequency Review Equipment List								Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
155	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	81 (3EGSA05)	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GE 12SFF31A1A	[1]	[1]	Capacity meets or exceeds demand [1]
156	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	86HAED4-3ENSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
157	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	86HBU-3ENSA07	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
158	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	86HP	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
159	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	87AE-A, B & C (3ENSA02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
160	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	87G-A, B & C (3ENS*ACB-G-A)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
161	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	87G-A, B & C (3ENS*ACB-G-A)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cv}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
162	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	DGA/SDR	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P2012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
163	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	ESCA/XK96	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
164	3ENS*ACB-G-A	4KV EMERGENCY BUS 34C BREAKER CONNECTING TO EDG A	AC/DC POWER AND SUPPORT SYSTEMS	Unit Substation FDR OC 1A, 2A, 3A, 4A: 51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC53AD1A	[1]	[1]	Capacity meets or exceeds demand [1]
165	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	32	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12ICW51A2A	[1]	[1]	Capacity meets or exceeds demand [1]
166	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	40	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12CEH51A1A	[1]	[1]	Capacity meets or exceeds demand [1]
167	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	32X	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	ELECTROMAX CAT TRIP IND. RELAY 6319234	[1]	[1]	Capacity meets or exceeds demand [1]

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Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
168	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	40X	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	ELECTROMAX CAT TRIP IND. RELAY 6319234	[1]	[1]	Capacity meets or exceeds demand [1]
169	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	51N	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC51AD1A	[1]	[1]	Capacity meets or exceeds demand [1]
170	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	51NX-3ENSB07	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA151A2P CD42 (DC)	EPRI 3002002997	5.769	Capacity meets or exceeds demand
171	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	51V-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IJCV51B21A	[1]	[1]	Capacity meets or exceeds demand [1]
172	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	51VX	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HGA111J2G (DC)	EPRI NP-7147-SLR1, GERS-RLY-ARH.5	7.040	Capacity meets or exceeds demand
173	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	51X-3ENSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA151A2P CD42 (DC)	EPRI 3002002997	5.769	Capacity meets or exceeds demand
174	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	62M	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	AGASTAT E7012PA002	EPRI NP-7147-SLR1, GERS-RLY-PNT.7	10.000	Capacity meets or exceeds demand

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
175	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	81 (3EGSB05)	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GE 12SFF31A1A	[1]	[1]	Capacity meets or exceeds demand [1]
176	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	86HBED4-3ENSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
177	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	86HBU-3ENSB07	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
178	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	86HP	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HEA61C239X2	EPRI NP-7147-SLR1, GERS-RLY-ALO.2	8.000	Capacity meets or exceeds demand
179	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	87BE-A, B & C (3ENSB02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
180	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	87G-A, B & C (3ENS*ACB-G-B)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
181	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	87G-A, B & C (3ENS*ACB-G-B)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]

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	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
182	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	DGA/SDR	Control Cabinet	EMER GEN ENCL	24'-6"	3.132	1.936	GOULD / ITE J13P2012	EPRI TR-105988-V2 (SQURTS), Table 3-1	9.467	Capacity meets or exceeds demand
183	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	ESCB/XK96	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	AGASTAT GPCNR	EPRI NP-7147-SLR1, GERS-RLY-ARS.4 (increased by EPRI TR-105988 [SQURTS], Table 3-1)	9.333	Capacity meets or exceeds demand
184	3ENS*ACB-G-B	4KV EMERGENCY BUS 34D BREAKER CONNECTING TO EDG B	AC/DC POWER AND SUPPORT SYSTEMS	Unit Substation FDR OC 1A, 2A, 3A, 4A: 51-A, B & C	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12IFC53AD1A	[1]	[1]	Capacity meets or exceeds demand [1]
185	3ENS*ACB-GNA (15G-14U-2N)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3ENS*RES-GNA	AC/DC POWER AND SUPPORT SYSTEMS	51NX-3ENSA07	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	N/A	EPRI 3002002997	16.385	Capacity meets or exceeds demand
186	3ENS*ACB-GNA (15G-14U-2N)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3ENS*RES-GNA	AC/DC POWER AND SUPPORT SYSTEMS	87AE-A, B & C (3ENSA02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
187	3ENS*ACB-GNA (15G-14U-2N)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3ENS*RES-GNA	AC/DC POWER AND SUPPORT SYSTEMS	87G-A, B & C (3ENS*ACB-G-A)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]

Appendix 1 –Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
188	3ENS*ACB-GNA (15G-14U-2N)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3ENS*RES-GNA	AC/DC POWER AND SUPPORT SYSTEMS	94EAE-3ENSA02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	WESTINGHOUSE 774B470A12	EPRI NP-7147-SLR1, GERS-RLY-AI1.4	8.000	Capacity meets or exceeds demand
189	3ENS*ACB-GNA (15G-14U-2N)	4KV EMERGENCY BUS 34C (SWGR A) BREAKER TO 3ENS*RES-GNA	AC/DC POWER AND SUPPORT SYSTEMS	94G-3ENS*ACB-G-A	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	WESTINGHOUSE 774B470A12	EPRI NP-7147-SLR1, GERS-RLY-AI1.4	8.000	Capacity meets or exceeds demand
190	3ENS*ACB-GNB (15G-15U-2N)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3ENS*RES-GNB	AC/DC POWER AND SUPPORT SYSTEMS	51NX-3ENSB07	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12HFA151A2P CD42 (DC)	EPRI 3002002997	16.385	Capacity meets or exceeds demand
191	3ENS*ACB-GNB (15G-15U-2N)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3ENS*RES-GNB	AC/DC POWER AND SUPPORT SYSTEMS	87BE-A, B & C (3ENSB02)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
192	3ENS*ACB-GNB (15G-15U-2N)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3ENS*RES-GNB	AC/DC POWER AND SUPPORT SYSTEMS	87G-A, B & C (3ENS*ACB-G-B)	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	GE 12PVD99AB1A	[1]	[1]	Capacity meets or exceeds demand [1]
193	3ENS*ACB-GNB (15G-15U-2N)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3ENS*RES-GNB	AC/DC POWER AND SUPPORT SYSTEMS	94EBE-3ENSB02	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	WESTINGHOUSE 774B470A12	EPRI NP-7147-SLR1, GERS-RLY-AI1.4	8.000	Capacity meets or exceeds demand

Appendix 1 –Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
194	3ENS*ACB-GNB (15G-15U-2N)	4KV EMERGENCY BUS 34D (SWGR B) BREAKER TO 3ENS*RES-GNB	AC/DC POWER AND SUPPORT SYSTEMS	94G-3ENS*ACB-G-B	Switchgear	CNTL BLDG	4'-6"	3.643	1.452	WESTINGHOUSE 774B470A12	EPRI NP-7147-SLR1, GERS-RLY-AI1.4	8.000	Capacity meets or exceeds demand
195	3MSS*MOV17A (V12)	TDAFW STEAM SUPPLY VALVE FROM S/G A MOV	CORE COOLING	42C	MCC	ESF BLDG.	36'-6"	0.886	0.677	[2]	EPRI NP-5223-SLR1, GERS-MCC.9	1.200	Capacity meets or exceeds demand
196	3MSS*MOV17B (V37)	TDAFW STEAM SUPPLY VALVE FROM S/G B MOV	CORE COOLING	42C	MCC	ESF BLDG.	36'-6"	0.886	0.677	[2]	EPRI NP-5223-SLR1, GERS-MCC.9	1.200	Capacity meets or exceeds demand
197	3MSS*MOV17D (V38)	TDAFW STEAM SUPPLY VALVE FROM S/G D MOV	CORE COOLING	42C	MCC	ESF BLDG.	36'-6"	0.886	0.677	[2]	EPRI NP-5223-SLR1, GERS-MCC.9	1.200	Capacity meets or exceeds demand
198	3MSS*MSV5	TURBINE DRIVEN AUXILIARY FEEDWATER PUMP - TURBINE ISOLATION VALVE (INCLUSIVE OF TURBINE OVERSPEED TRIP SOLENOID 3FWL*SOV104 SOV)	CORE COOLING	1CON	Control Cabinet	ESF BLDG.	21'-6"	3.987	2.820	N/A	[1]	[1]	Capacity meets or exceeds demand [1]

Appendix 1 –Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cv}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
199	3MSS*MSV5	TURBINE DRIVEN AUXILIARY FEEDWATER PUMP - TURBINE ISOLATION VALVE (INCLUSIVE OF TURBINE OVERSPEED TRIP SOLENOID 3FWL*SOV104 SOV)	CORE COOLING	3CR	Control Cabinet	ESF BLDG.	21'-6"	3.987	2.820	GE CR120BD03041	EPRI NP-7147-SL, GERS-RLY-A11.4 (increased by EPRI TR-105988-V2 [SQURTS], Table 3-1)	5.667	Capacity meets or exceeds demand
200	3MSS*MSV5	TURBINE DRIVEN AUXILIARY FEEDWATER PUMP - TURBINE ISOLATION VALVE (INCLUSIVE OF TURBINE OVERSPEED TRIP SOLENOID 3FWL*SOV104 SOV)	CORE COOLING	K2	Control Cabinet	ESF BLDG.	21'-6"	3.987	2.820	N/A	[1]	[1]	Capacity meets or exceeds demand [1]
201	3MSS*PV20A (V48)	S/G A MAIN STEAM PRESSURE RELIEVING VALVE	CORE COOLING	PSCB/K627 (SLI)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-4076 (LATCHING)	EPRI NP-7147-SL, GERS-RLY-ARR.3 (increased by EPRI TR-105988-V2 [SQURTS], Table 3-1)	9.533	Capacity meets or exceeds demand

Appendix 1 –Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
202	3MSS*PV20B (V55)	S/G B MAIN STEAM PRESSURE RELIEVING VALVE	CORE COOLING	PSCA/K627 (SLI)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-4076 (LATCHING)	EPRI NP-7147-SL, GERS-RLY-ARR.3 (increased by EPRI TR-105988-V2 [SQURTS], Table 3-1)	9.533	Capacity meets or exceeds demand
203	3MSS*PV20C (V62)	S/G C MAIN STEAM PRESSURE RELIEVING VALVE	CORE COOLING	PSCB/K627 (SLI)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-4076 (LATCHING)	EPRI NP-7147-SL, GERS-RLY-ARR.3 (increased by EPRI TR-105988-V2 [SQURTS], Table 3-1)	9.533	Capacity meets or exceeds demand
204	3MSS*PV20D (V69)	S/G D MAIN STEAM PRESSURE RELIEVING VALVE	CORE COOLING	PSCA/K627 (SLI)	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-4076 (LATCHING)	EPRI NP-7147-SL, GERS-RLY-ARR.3 (increased by EPRI TR-105988-V2 [SQURTS], Table 3-1)	9.533	Capacity meets or exceeds demand
205	3RCS*PCV455A (V168)	PRESSURE OPERATED RELIEF VALVE SOV	RCS INVENTORY CONTROL	PSCA1/K628	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-134-1 (NON-LATCHING)	EPRI NP-7147-SL, GERS-RLY-ARR.3	6.667	Capacity meets or exceeds demand
206	3RCS*PCV455A (V168)	PRESSURE OPERATED RELIEF VALVE SOV	RCS INVENTORY CONTROL	PSCA2/K743	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-134-1 (NON-LATCHING)	EPRI NP-7147-SL, GERS-RLY-ARR.3	6.667	Capacity meets or exceeds demand
207	3RCS*PCV456 (V170)	PRESSURE OPERATED RELIEF VALVE SOV	RCS INVENTORY CONTROL	PSCB1/K628	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-134-1 (NON-LATCHING)	EPRI NP-7147-SL, GERS-RLY-ARR.3	6.667	Capacity meets or exceeds demand

Appendix 1 –Relay List and Evaluation Data

	High-frequency Review Equipment List							Seismic Demand		Seismic Capacity			Evaluation Result
Item No.	Equipment ID	Equipment Description	Key Safety Function	Relay ID(s)	Cabinet Type	Bldg	Elev	$ICRS_{cH}$	$ICRS_{cV}$	Relay Mfg. & Model	Seismic Capacity Source Document	TRS	
208	3RCS*PCV456 (V170)	PRESSURE OPERATED RELIEF VALVE SOV	RCS INVENTORY CONTROL	PSCB2/K743	Control Cabinet	CNTL BLDG	47'-6"	3.987	2.491	POTTER & BRUMFIELD MDR-134-1 (NON-LATCHING)	EPRI NP-7147-SL, GERS-RLY-ARR.3	6.667	Capacity meets or exceeds demand
209	3VBA*INV1	120VAC VITAL INVERTER INV-1	AC/DC POWER AND SUPPORT SYSTEMS	Static Switch Relays	Control Cabinet	CNTL BLDG	4'-6"	0.506	0.309	AMETEK Solidstate Controls Model 85-VC0250-29	[1]	[1]	Capacity meets or exceeds demand [1]
210	3VBA*INV2	120VAC VITAL INVERTER INV-2	AC/DC POWER AND SUPPORT SYSTEMS	Static Switch Relays	Control Cabinet	CNTL BLDG	4'-6"	0.506	0.309	AMETEK Solidstate Controls Model 85-VC0250-29	[1]	[1]	Capacity meets or exceeds demand [1]
211	3VBA*INV3	120VAC VITAL INVERTER INV-3	AC/DC POWER AND SUPPORT SYSTEMS	Static Switch Relays	Control Cabinet	CNTL BLDG	4'-6"	0.506	0.309	AMETEK Solidstate Controls Model 85-VC0250-29	[1]	[1]	Capacity meets or exceeds demand [1]
212	3VBA*INV4	120VAC VITAL INVERTER INV-4	AC/DC POWER AND SUPPORT SYSTEMS	Static Switch Relays	Control Cabinet	CNTL BLDG	4'-6"	0.506	0.309	AMETEK Solidstate Controls Model 85-VC0250-29	[1]	[1]	Capacity meets or exceeds demand [1]

Notes:

1. Acceptable margin to contact chatter is based on the MPS3 design basis seismic qualification of components as described in Section 4.1.
2. GERS capacity data for starter/contactors from EPRI NP-5223-SLR1, GERS-MCC.9 is not model-specific.

Appendix 2 - Representative Sample Component Evaluations

This appendix provides two (2) representative sample component evaluations for relays selected from the list in Appendix 1.

1st Example – Equipment ID 3EGS*EGB [Line Item 20 from Appendix 1]

Description of component:

Equipment ID 3EGS*EGB – EMERGENCY DIESEL GENERATOR EDG "B" – supporting the AC/DC POWER AND SUPPORT SYSTEMS function. Relay from seal-in / lockout circuit analysis – stopping relay 5E. Relay is an AGASTAT Model 7022PE.

Plant Location:

Mounted in panel 3EGS*TBEG1B EDG "B" Control and Relay Box located in the Emergency Generator Enclosure Building, Elevation 24'6". Cabinet type: Control Cabinet.

Description of Mounting Point Demand Estimate:

Horizontal Response Estimate - Emergency Generator Enclosure Building foundation elevation: 4'6". Panel 3EGS*TBEG1B is 24'6" – 4'6" = 20 feet above foundation. AF_{SH} = 1.650 (from Reference 8, Figure 4-3). SA_{GMRS} = 0.422g (from Reference 4). Then, SA_{cH} = 0.422 * 1.650 = 0.696g.

Vertical Response Estimate – As described in Section 3.1.2, SA_{VGMRS} = 0.309g. AF_{SV} = 1.333 (from Reference 8, Figure 4-4). Then, SA_{cV} = 0.309 * 1.333 = 0.412g.

For cabinet type Control Cabinet, AF_{cH} = 4.5 and AF_{cV} = 4.7 (from Reference 8, Section 4.4). Then, mounting point demand is:

$ICRS_{cH}$ = 0.696 * 4.5 = 3.132g

$ICRS_{cV}$ = 0.412 * 4.7 = 1.936g

Description of Relay Capacity

The capacity of the relay is based on EPRI GERS - GERS- RLY-PNT.7 (Reference 9 and 10). For this relay, GERS capacity for non-operating, normally closed contact is applicable – SA_T = 6g.

Appendix 2 - Representative Sample Component Evaluations

The CDFM knockdown factor, F_K, of 1.5 was selected based on the GERS capacity that represented the lowest test level without chatter. The F_{MS} factor value of 1.0 was selected based on the cabinet relay mounting (similar stiffness in three directions).

Then, TRS = (6/1.5) * 1.0 = 4g.

Capacity / Demand Ratio:

C / D = TRS / $ICRS_c$

= 4g / 3.132g = 1.277 - Horizontal (governing) - acceptable

Capacity exceeds demand.

2nd Example – Equipment ID 3RCS*PCV455A (V168) [Line Item 206 from Appendix 1]

Description of component:

Equipment ID 3RCS*PCV455A (V168) – PRESSURIZER PRESSURE OPERATED RELIEF VALVE SOV – supporting the RCS Inventory Control function. Relay from seal-in / lockout circuit analysis – PSCA2/K743. Relay is a POTTER & BRUMFIELD MDR-134-1 (NON-LATCHING).

Plant Location:

Mounted in panel PSCA2 Reactor Protection System Relay Cabinet in the Control Building, Main Control Room, Elevation 47'6". Cabinet type: Control Cabinet.

Description of Mounting Point Demand Estimate:

Horizontal Response Estimate - Control Building foundation elevation: 4' 6". Panel PSCA2 is 47'6" – 4'6" = 43 feet above foundation. AF_{SH} = 2.1 (from Reference 8, Figure 4-3). SA_{GMRS} = 0.422g (from Reference 4). Then, SA_{cH} = 0.422 * 2.1 = 0.886g.

Vertical Response Estimate – As described in Section 3.1.2, SA_{VGMRS} = 0.309g. AF_{SV} = 1.717 (from Reference 8, Figure 4-4). Then, SA_{cV} = 0.309 * 1.717 = 0.530g.

For cabinet type Control Cabinet, AF_{cH} = 4.5 and AF_{cV} = 4.7 (from Reference 8, Section 4.4).

Appendix 2 - Representative Sample Component Evaluations

Then, mounting point demand is:

$ICRS_{cH}$ = 0.886 * 4.5 = 3.987g

$ICRS_{cV}$ = 0.530 * 4.7 = 2.491g

Description of Relay Capacity:

The capacity of the relay is based on EPRI GERS - GERS- RLY-ARR.3 (Reference 9 and 10). For this relay, GERS capacity for non-operating, normally open contact is applicable – SA_T = 10g.

The CDFM knockdown factor, F_K, of 1.5 was selected based on the GERS capacity that represented the lowest test level without chatter. The F_{MS} factor value of 1.0 was selected based on the cabinet relay mounting (similar stiffness in three directions).

Then, TRS = (10/1.50) * 1.0 = 6.667g.

Capacity / Demand Ratio:

C / D = TRS / $ICRS_c$

= 6.667g / 3.987g = 1.672 - Horizontal (governing) – acceptable

Capacity exceeds demand.