NEXTera® ENERGY SEABROOK

March 27, 2014

10 CFR 50.54(f)
Docket No. 50-443
SBK-L-14052

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike,
Rockville. MD 20852

Seabrook Station

NextEra Energy Seabrook, LLC Seismic Hazard and Screening Report (CEUS Sites)
Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding
Recommendation 2.1 of the Near-Term Task Force Review of Insights
From the Fukushima Dai-ichi Accident

References:

1. NRC Letter, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*, dated March 12, 2012 (Accession No. ML12073A348)
2. NEI Letter, *Proposed Path Forward for NTTF Recommendation 2.1: Seismic Reevaluations*, dated April 9, 2013, (Accession No. ML13101A379)
3. NRC Letter, *Electric Power Research Institute Final Draft Report XXXXXX, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," as an Acceptable Alternative to the March 12, 2012, Information Request for Seismic Reevaluations*, dated May 7, 2013, (Accession No. ML13106A331)
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*, dated November 2012. (Accession No. ML12333A170)
5. NRC Letter, *Endorsement of EPRI Final Draft Report 1025287, "Seismic Evaluation Guidance,"* dated February 15, 2013, (Accession No. ML12319A074)

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 of Reference 1 requested each addressee located in the Central and Eastern United States (CEUS) to

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submit a Seismic Hazard Evaluation and Screening Report within 1.5 years from the date of Reference 1.

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

Reference 4 contains industry guidance and detailed information to be included in the Seismic Hazard Evaluation and Screening Report submittals. NRC endorsed this industry guidance in Reference 5.

The attached Seismic Hazard Evaluation and Screening Report for Seabrook Station provides the information described in Section 4 of Reference 4 in accordance with the schedule identified in Reference 2.

This letter contains no new regulatory commitments.

If you have any questions regarding this report, please contact Mr. Michael Ossing, Licensing Manager, at (603) 773-7512.

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

Executed on March 27, 2014

Sincerely,

Kevin Walsh
Site Vice President
NextEra Energy Seabrook, LLC

cc: NRC Region I Administrator
J. G. Lamb, NRC Project Manager
NRC Senior Resident Inspector

Attachment to SBK-L-14052

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Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding
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1.0 Introduction

Following the accident at the Fukushima Daiichi nuclear power plant resulting from the March 11, 2011, Great Tohoku Earthquake and subsequent tsunami, the NRC Commission established a Near Term Task Force (NTTF) to conduct a systematic review of NRC processes and regulations and to determine if the agency should make additional improvements to its regulatory system. The NTTF developed a set of recommendations intended to clarify and strengthen the regulatory framework for protection against natural phenomena. Subsequently, the NRC issued a 50.54(f) letter that requests 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. Depending on the comparison between the reevaluated seismic hazard and the current design basis, the result is either no further risk evaluation or the performance of a seismic risk assessment. Risk assessment approaches acceptable to the staff include a seismic probabilistic risk assessment (SPRA), or a seismic margin assessment (SMA). Based upon this information, the NRC staff will determine whether additional regulatory actions are necessary.

This report provides the information requested in items (1) through (7) of the "Requested Information" section and Attachment 1 of the 50.54(f) letter pertaining to NTTF Recommendation 2.1 for Seabrook Station, located in Rockingham County, New Hampshire. In providing this information, NextEra Energy - Seabrook followed the guidance provided in the *Seismic Evaluation Guidance: Screening, Prioritization, and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* (EPRI 1025287, 2012). The Augmented Approach, *Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* (EPRI 3002000704, 2013), has been developed as the process for evaluating critical plant equipment prior to performing the complete plant seismic risk evaluations.

The original geologic and seismic siting investigations for Seabrook Station meet the requirements of Appendix A to 10 CFR Part 100 and General Design Criterion 2 in Appendix A to 10 CFR Part 50. The Safe Shutdown Earthquake Ground Motion (SSE) was developed in accordance with Regulatory Guide 1.60 and used for the design of seismic Category I systems, structures and components.

In response to the 50.54(f) letter and following the guidance provided in the SPID (EPRI 1025287, 2012), a seismic hazard reevaluation was performed. For screening purposes, a Ground Motion Response Spectrum (GMRS) was developed.

Based on the results of the screening evaluation, Seabrook Station screens in for a risk evaluation, a Spent Fuel Pool evaluation, and a High Frequency Confirmation.

2.0 Seismic Hazard Reevaluation

Seabrook Station is situated on the New Hampshire coast in the Seaboard Lowland section of the New England Physiographic Province. The site is located near the north edge of the town of Seabrook, Rockingham County, New Hampshire, 2 miles to the west of Hampton and Seabrook Beaches and the Atlantic Ocean. The site is 20 feet above mean sea level on a peninsula surrounded by a tidal marsh.

The largest earthquake intensity which has affected the site area in historic times is Intensity VII Modified Mercalli (MM) Scale. The largest coastal area earthquake in which the site is located is the Intensity VIII (MM) offshore event of November 18, 1755. An epicentral Intensity VIII event adjacent to the site is considered to be the maximum earthquake potential. The horizontal peak acceleration associated with the maximum earthquake potential Intensity VIII (MM) is 0.25g. Sources of major earthquakes in the central and eastern United States (CEUS) have been distant, and have not had an appreciable effect at the site. Seabrook Station design response spectra are provided based on an earthquake of 10 to 15 seconds duration with a SSE zero period horizontal ground acceleration of 0.25g.

2.1 Regional and Local Geology

Seabrook Station is located in a tidal marsh on a peninsula composed of quartz diorite and included quartzitic bedrock locally overlain, prior to construction, by a thin veneer of glacial and postglacial soils.

The bedrock basement within 200 miles of the site ranges in geological age from Late Precambrian to Upper Mesozoic, and consists predominantly of hard, crystalline metamorphic and igneous rock types. Mildly metamorphosed to unmetamorphosed, well-consolidated sedimentary and volcanic bedrock types of Carboniferous and Triassic age occur locally in basin structures in the crystalline basement in the Connecticut River Valley, the Narragansett and Boston basins, and in other apparently isolated basins within the Gulf of Maine; loosely consolidated Coastal Plain sediments of Upper Mesozoic and Cenozoic age blanket the crystalline basement rocks and successor basins in wide areas on the Continental Shelf and in scattered patches near shore within the Gulf of Maine. The entire area is widely covered by a thin veneer of loose, unconsolidated sediments of Quaternary age, derived from continental glaciation and postglacial deposition.

There is no evidence of surface faulting at the site. During the construction phase, all plant excavations were subjected to detailed geologic mapping on a continuous basis. The mapping revealed that the bedrock at the site was transected by numerous, short faults. The youngest of these site faults are interpreted to be at least 200 million years old.

All safety-related site structures are founded on sound bedrock, on concrete fill extending to sound bedrock, or on controlled backfill extending to sound bedrock. A large portion of the site is founded on a quartz diorite, a hard, durable crystalline igneous rock consisting of medium to coarse-grained quartz diorite matrix intimately enclosing inclusions of dark gray, fine-grained diorite. A small portion of the site is founded on metaquartzite and granulite which occurs as a large relict inclusion welded into the enclosing igneous mass along a broad, transitional-intrusive contact zone. The physical, chemical, and mechanical qualities of the rock in the metamorphic inclusion are comparable for site foundation purposes to those of the igneous rock. The seismic field data are indicative of sound bedrock with a high in situ compressional wave velocity of 18,000 ft/sec and a shear wave velocity of 8,000 to 10,000 ft/sec.

2.2 Probabilistic Seismic Hazard Analysis

2.2.1 Probabilistic Seismic Hazard Analysis Results

In accordance with the 50.54(f) letter and following the guidance in the SPID (EPRI, 2013a), a probabilistic seismic hazard analysis (PSHA) was completed using the recently developed Central and Eastern United States Seismic Source Characterization (CEUS-SSC) for Nuclear Facilities (CEUS-SSC, 2012) together with the updated EPRI Ground-Motion Model (GMM) for the CEUS (EPRI, 2013b). For the PSHA, a lower-bound moment magnitude of 5.0 was used, as specified in the 50.54(f) letter.

For the PSHA, the CEUS-SSC background seismic source zones out to a distance of 400 miles (640 km) around Seabrook were included. This distance exceeds the 200 mile (320 km) recommendation contained in NRC (2007) and was chosen for completeness. Background sources included in this site analysis are the following:

1. Atlantic Highly Extended Crust (AHEX)
2. Extended Continental Crust—Atlantic Margin (ECC_AM)
3. Great Meteor Hotspot (GMH)
4. Mesozoic and younger extended prior – narrow (MESE-N)
5. Mesozoic and younger extended prior – wide (MESE-W)
6. Midcontinent-Craton alternative A (MIDC_A)
7. Midcontinent-Craton alternative B (MIDC_B)
8. Midcontinent-Craton alternative C (MIDC_C)
9. Midcontinent-Craton alternative D (MIDC_D)
10. Northern Appalachians (NAP)
11. Non-Mesozoic and younger extended prior – narrow (NMESE-N)
12. Non-Mesozoic and younger extended prior – wide (NMESE-W)

13. Paleozoic Extended Crust narrow (PEZ_N)
14. Paleozoic Extended Crust wide (PEZ_W)
15. St. Lawrence Rift, including the Ottawa and Saguenay grabens (SLR)
16. Study region (STUDY_R)

For sources of large magnitude earthquakes, designated Repeated Large Magnitude Earthquake (RLME) sources in CEUS-SSC (2012), the following sources lie within 1,000 km of the site and were included in the analysis:

1. Charlevoix

For each of the above background and RLME sources, the mid-continent version of the updated CEUS EPRI GMM was used.

2.2.2 Base Rock Seismic Hazard Curves

Seabrook is a hard-rock site. To be consistent with the SPID (EPRI 1025287, 2012), hard-rock seismic hazard curves are provided below.

2.3 Site Response Evaluation

Based on information describing the Seabrook site presented in Section 2.3.1, the geologic layers underlying the foundation of the plant consist of hard rock (Vs $\geq$ 9280 fps). Therefore no site-specific evaluation of site amplification was performed for Seabrook.

2.3.1 Description of Subsurface Material

The bedrock basement within 200 miles of the Seabrook site ranges in geological age from Late Precambrian to Upper Mesozoic, and consists predominantly of hard, crystalline metamorphic and igneous rock types. Mildly metamorphosed to unmetamorphosed well-consolidated sedimentary and volcanic bedrock types of Carboniferous and Triassic age occur locally in basin structures in the crystalline basement in the Connecticut River Valley, the Narragansett and Boston basins, and in other apparently isolated basins within the Gulf of Maine; loosely consolidated Coastal Plain sediments of Upper Mesozoic and Cenozoic age blanket the crystalline basement rocks and successor basins in wide areas on the Continental Shelf and in scattered patches near shore within the gulf of Maine. The entire area is widely covered by a thin veneer of loose, unconsolidated sediments of Quaternary age, derived from continental glaciation and postglacial deposition.

The rock supporting the reactor structures has shear-wave velocities of 8,000 to 10,000 fps as reported in the Seabrook UFSAR Section 2.5.2.5. Therefore the Seabrook site is treated as a hard-rock site per the SPID 6.3.3.

2.3.2 Development of Base Case Profiles and Nonlinear Material Properties

Sections 2.3.2—2.3.6 are not applicable because Seabrook Station is a hard rock site.

2.3.7 Control Point Seismic Hazard Curves

The procedure to develop probabilistic seismic hazard curves for hard rock follows standard techniques documented in the technical literature (e.g., McGuire, 2004). Separate seismic hazard calculations are conducted for the 7 spectral frequencies for which ground motion equations are available (100 Hz = peak ground acceleration or PGA, 25 Hz, 10 Hz, 5 Hz, 2.5 Hz, 1 Hz, and 0.5 Hz). As discussed in Section 2.2.1, ground motion equations from the updated EPRI Ground-Motion Model (GMM) for the CEUS (EPRI, 2013b) were used for the calculation of rock hazard. All spectra accelerations presented herein correspond to 5% of critical damping. Figure 2.3.7-1 shows the mean hard-rock seismic hazard curves for the 7 spectral frequencies. The digital values for the mean and fractile hazard curves are provided in Appendix A.

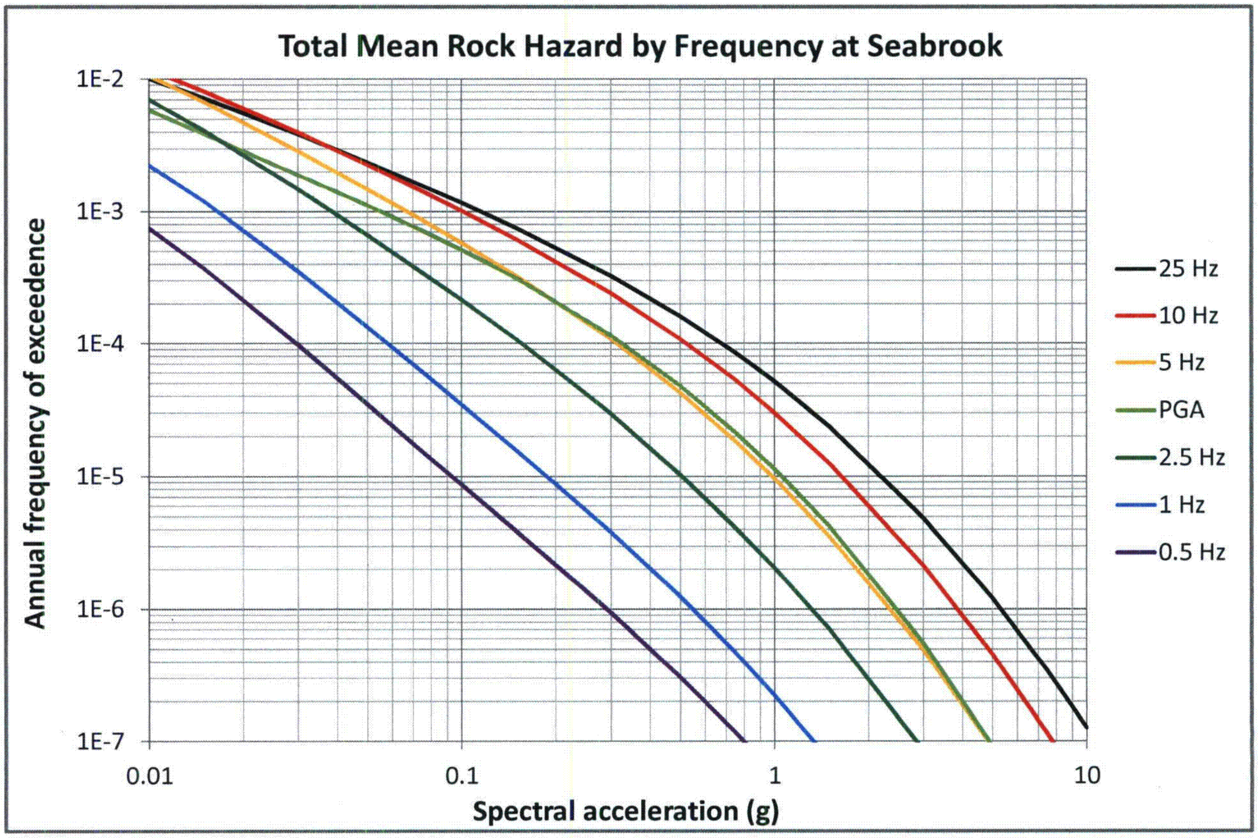

Figure 2.3.7-1. Control point mean hazard curves for spectral frequencies of 0.5, 1, 2.5, 5, 10, 25 and 100 Hz (PGA) at Seabrook.

2.4 Ground Motion Response Spectrum

The control point hazard curves described above were used to develop uniform hazard response spectra (UHRS) and the ground motion response spectrum (GMRS). The UHRS were obtained through linear interpolation in log-log space to estimate the spectral acceleration at each oscillator frequency for the 1E-4 and 1E-5 per year hazard levels.

The 1E-4 and 1E-5 UHRS, along with a design factor (DF) are used to compute the GMRS at the control point using the criteria in Regulatory Guide 1.208. Table 2.4-1 shows the UHRS and GMRS spectral accelerations.

Table 2.4-1. UHRS for 10-4 and 10-5 and GMRS for Seabrook.

Freq. (Hz)	10^{-4} UHRS (g)	10^{-5} UHRS (g)	GMRS
100	3.25E-01	1.05E+00	4.99E-01
90	3.51E-01	1.14E+00	5.40E-01
80	3.98E-01	1.29E+00	6.11E-01
70	4.68E-01	1.52E+00	7.19E-01
60	5.56E-01	1.80E+00	8.53E-01
50	6.36E-01	2.06E+00	9.76E-01
45	6.65E-01	2.15E+00	1.02E+00
40	6.84E-01	2.21E+00	1.05E+00
35	6.92E-01	2.24E+00	1.06E+00
30	6.91E-01	2.23E+00	1.06E+00
25	6.77E-01	2.19E+00	1.04E+00
20	6.58E-01	2.11E+00	1.00E+00
15	6.13E-01	1.95E+00	9.27E-01
12.5	5.76E-01	1.82E+00	8.66E-01
10	5.24E-01	1.64E+00	7.83E-01
9	4.88E-01	1.53E+00	7.30E-01
8	4.49E-01	1.41E+00	6.72E-01
7	4.08E-01	1.28E+00	6.09E-01
6	3.62E-01	1.14E+00	5.42E-01
5	3.13E-01	9.83E-01	4.69E-01
4	2.55E-01	8.06E-01	3.84E-01
3	1.91E-01	6.13E-01	2.91E-01
2.5	1.56E-01	5.06E-01	2.40E-01
2	1.28E-01	4.17E-01	1.98E-01
1.5	9.54E-02	3.09E-01	1.47E-01

1.25	7.69E-02	2.49E-01	1.18E-01
1	5.78E-02	1.87E-01	8.86E-02
0.9	5.29E-02	1.70E-01	8.07E-02
0.8	4.75E-02	1.52E-01	7.22E-02
0.7	4.19E-02	1.33E-01	6.33E-02
0.6	3.59E-02	1.13E-01	5.40E-02
0.5	2.96E-02	9.29E-02	4.43E-02
0.4	2.37E-02	7.43E-02	3.55E-02
0.3	1.78E-02	5.57E-02	2.66E-02
0.2	1.18E-02	3.72E-02	1.77E-02
0.167	9.89E-03	3.10E-02	1.48E-02
0.125	7.40E-03	2.32E-02	1.11E-02
0.1	5.92E-03	1.86E-02	8.87E-03

Figure 2.4-1 shows the control point UHRS and GMRS

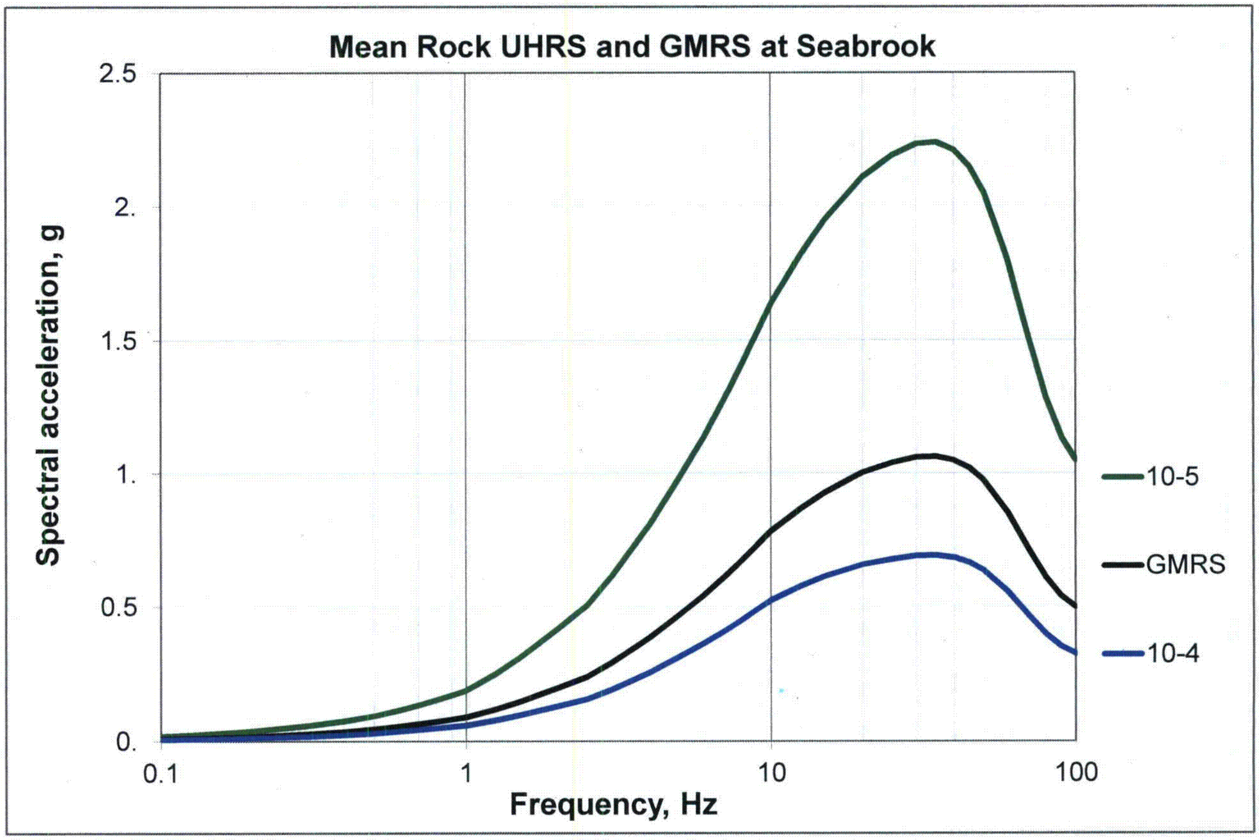

Figure 2.4-1. 10^{-4} and 10^{-5} UHRS and GMRS for Seabrook

3.0 Plant Design Basis and Beyond Design Basis Evaluation Ground Motion

The design basis for Seabrook Station is identified in the Updated Final Safely Evaluation Report.

3.1 SSE Description of Spectral Shape

The SSE developed for Seabrook Station meets the requirements of 10 CFR Part 100 by appropriate consideration for the most intense earthquake recorded for the site with appropriate margin. The largest earthquake intensity which has affected the site area in historic times is Intensity VII Modified Mercalli (MM) Scale. The largest coastal area earthquake in which the site is located is the Intensity VIII (MM) offshore event of November 18, 1755. An epicentral Intensity VIII event adjacent to the site is considered to be the maximum earthquake potential. The horizontal peak acceleration associated with the maximum earthquake potential Intensity VIII (MM) is 0.25g. Sources of major earthquakes in the central and eastern United States (CEUS) have been distant, and have not had an appreciable effect at the site. Seabrook Station design response spectra are provided based on an earthquake of 10 to 15 seconds duration with a SSE zero period horizontal ground acceleration of 0.25g.

The SSE is defined in terms of a PGA and a design response spectrum. Table 3.1-1 shows the spectral acceleration values as a function of frequency for the 5% damped horizontal SSE.

Table 3.1-1 SSE for Seabrook

Freq. (hz)	SA (g)
0.20	0.0755
0.30	0.1368
0.40	0.1733
0.50	0.2082
0.60	0.2419
0.70	0.2746
0.80	0.3065
0.90	0.3377
1.00	0.3683
1.10	0.3983
1.20	0.4279
1.30	0.4570
1.40	0.4857
1.50	0.5141
1.60	0.5421
1.70	0.5698
1.80	0.5972
1.90	0.6244
2.00	0.6513
2.10	0.6780
2.20	0.7044
2.30	0.7306
2.40	0.7567

2.50	0.7825
2.60	0.7782
2.70	0.7740
2.80	0.7700
2.90	0.7662
3.00	0.7625
3.15	0.7573
3.30	0.7523
3.45	0.7476
3.60	0.7431
3.80	0.7374
4.00	0.7320
4.20	0.7270
4.40	0.7222
4.60	0.7177
4.80	0.7133
5.00	0.7092
5.25	0.7043
5.50	0.6997
5.75	0.6953
6.00	0.6911
6.25	0.6871
6.50	0.6833
6.75	0.6797
7.00	0.6762

7.25	**0.6728**
7.50	**0.6696**
7.75	**0.6665**
8.00	**0.6635**
8.50	**0.6578**
9.00	**0.6525**
9.50	**0.6270**
10.00	**0.6037**
10.50	**0.5823**
11.00	**0.5626**
11.50	**0.5445**
12.00	**0.5276**
12.50	**0.5120**
13.00	**0.4974**
13.50	**0.4837**
14.00	**0.4709**
14.50	**0.4588**
15.00	**0.4475**
16.00	**0.4267**
17.00	**0.4080**
18.00	**0.3911**
20.00	**0.3618**
22.00	**0.3373**
25.00	**0.3069**
28.00	**0.2822**

31.00	**0.2618**
33.00	**0.2500**

3.2 Control Point Elevation

The SSE control point elevation is defined at the top of hard rock at + 21'-0" MSL. The SPID Section 2.4.2.b states: For sites classified as a rock site or where the key safety-related structures are rock-founded, then the control point is located at the top of the rock.

4.0 Screening Evaluation

In accordance with SPID Section 3, a screening evaluation was performed as described below.

4.1 Risk Evaluation Screening (1 to 10 Hz)

For a portion of the 1 to 10 Hz range of the response spectrum, the GMRS exceeds the SSE. Therefore, the plant screens in for a risk evaluation.

4.2 High Frequency Screening (> 10 Hz)

In the range above 10 Hz, the GMRS exceeds the SSE. The high frequency exceedences will be addressed in the risk evaluation discussed in 4.1 above.

4.3 Spent Fuel Pool Evaluation Screening (1 to 10 Hz)

In the 1 to 10 Hz part of the response spectrum, the GMRS exceeds the SSE. Therefore, the plant screens in for a spent fuel pool evaluation.

5.0 Interim Actions

Based on the screening evaluation, the expedited seismic evaluation described in EPRI 3002000704 will be performed as proposed in a letter to NRC dated April 9, 2013 (ML131 01A379) and agreed to by NRC in a letter dated May 7, 2013 (ML13106A331).

Consistent with NRC letter dated February 20, 2014, [ML14030A046] the seismic hazard reevaluations presented herein are distinct from the current design and licensing bases of Seabrook Station. Therefore, the results do not call into question the operability or functionality of SSCs and are not reportable pursuant to10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors," and10 CFR 50.73, "Licensee event report system."

The NRC letter also requests that licensees provide an interim evaluation or actions to demonstrate that the plant can cope with the reevaluated hazard while the expedited approach and risk evaluations are conducted. In response to that request, NEI letter dated March 12, 2014, provides seismic core damage risk estimates using the updated seismic hazards for the operating nuclear plants in the Central and Eastern United States. These risk estimates continue to support the following conclusions of the NRC GI-199 Safety/Risk Assessment:

> Overall seismic core damage risk estimates are consistent with the Commission's Safety Goal Policy Statement because they are within the subsidiary objective of 10^{-4}/year for core damage frequency. The GI-199 Safety/Risk Assessment, based in part on information from the U.S. Nuclear Regulatory Commission's (NRC's) Individual Plant Examination of External Events (IPEEE) program, indicates that no concern exists regarding adequate protection and that the current seismic design of operating reactors provides a safety margin to withstand potential earthquakes exceeding the original design basis.

Seabrook Station is included in the March 12, 2014 risk estimates. Using the methodology described in the NEI letter, all plants were shown to be below 10^{-4}/year; thus, the above conclusions apply.

SUMMARY OF NTTF 2.3 SEISMIC WALKDOWNS

Seismic walkdowns have been completed at Seabrook Station in accordance with the NRC endorsed walkdown methodology. All potentially degraded, nonconforming, or unanalyzed conditions identified as a result of the seismic walkdowns were entered into the corrective action program (CAP).

Evaluations of the identified conditions are complete and documented within the CAP. These evaluations determined the Seismic Walkdowns resulted in no adverse anchorage conditions, no adverse seismic spatial interactions, and no other adverse seismic conditions associated with the items on the Seismic Walkdown Equipment List (SWEL). Similarly, the Area Walk-Bys resulted with no adverse seismic conditions associated with other systems, structures, or components located in the vicinity of the SWEL items.

The Seismic Walkdowns identified no degraded, nonconforming, or unanalyzed conditions that required either immediate or follow-on action(s). No planned or newly identified protection or mitigation features have resulted from the efforts to address the 50.54(f) letter.

Additional activities required to complete the efforts to address Enclosure 3 of the 50.54(f) letter include inspection of three (3) items. These inspections are deferred because the cabinets were inaccessible due to the potential electrical hazard from energized buswork. Inspection of these items is scheduled to be completed during the April 2014 refueling outage.

6.0 Conclusions

In accordance with the 50.54(f) request for information, a seismic hazard and screening evaluation was performed for Seabrook Station. A GMRS was developed solely for the purpose of screening for additional evaluations in accordance with the SPID.

Based on the results of the screening evaluation, Seabrook Station screens in for a risk evaluation, a Spent Fuel Pool evaluation, and a High Frequency Confirmation.

7.0 References

2. NRC Letter to All Power Reactor Licensees et al., "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3 and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," March 12, 2012.
3. *Central and Eastern United States Seismic Source Characterization (CEUS-SSC) for Nuclear Facilities* (EPRI 1021097)
4. *Seismic Evaluation Guidance: Screening, Prioritization, and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* (EPRI 1025287, 2012)
5. *Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* (EPRI 3002000704, 2013)
6. *Ground-Motion Model (GMM) for the CEUS* (EPRI 3002000717, 2004, 2006, 2013)
7. EPRI Letter RSM-092513-013, *Seabrook Seismic Hazard and Screening Report.* Dated September 30, 2013.
8. Seabrook Station Updated Final Safety Analysis Report, Revision 16
9. NUREG-2115, *Central and Eastern United States Seismic Source Characterization for Nuclear Facilities,* U.S. Nuclear Regulatory Commission (2012)
10. Regulatory Guide 1.208, *A performance-based approach to define the site-specific earthquake ground motion*, U.S. Nuclear Regulatory Commission (2007)
11. Seismic Walkdown Report in Response to the 50.54(f) Information Request Regarding Fukushima NTTF Recommendation 2.3 for Seabrook Station, dated November 26, 2012.
12. NEI Letter dated March 12, 2014 Project Number 689, Seismic Risk Evaluations for Plants in the Central and Eastern United States

Appendix A

Table A-1a. Mean and Fractile Seismic Hazard Curves for PGA at Seabrook

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	5.32E-02	2.64E-02	4.01E-02	5.27E-02	6.73E-02	7.66E-02
0.001	3.81E-02	1.67E-02	2.76E-02	3.73E-02	4.98E-02	5.91E-02
0.005	1.12E-02	5.20E-03	7.34E-03	1.04E-02	1.38E-02	2.19E-02
0.01	5.81E-03	2.80E-03	3.57E-03	5.20E-03	7.13E-03	1.34E-02
0.015	3.87E-03	1.74E-03	2.25E-03	3.33E-03	4.83E-03	9.65E-03
0.03	1.90E-03	6.54E-04	9.79E-04	1.57E-03	2.60E-03	5.20E-03
0.05	1.11E-03	3.09E-04	4.98E-04	8.98E-04	1.64E-03	3.09E-03
0.075	7.14E-04	1.77E-04	2.96E-04	5.75E-04	1.08E-03	1.95E-03
0.1	5.13E-04	1.18E-04	2.07E-04	4.07E-04	8.00E-04	1.38E-03
0.15	3.11E-04	6.26E-05	1.18E-04	2.46E-04	4.90E-04	8.23E-04
0.3	1.15E-04	2.04E-05	3.90E-05	8.98E-05	1.87E-04	3.01E-04
0.5	4.78E-05	7.45E-06	1.46E-05	3.57E-05	7.89E-05	1.27E-04
0.75	2.14E-05	2.96E-06	5.83E-06	1.55E-05	3.52E-05	5.91E-05
1.	1.14E-05	1.36E-06	2.76E-06	7.89E-06	1.87E-05	3.28E-05
1.5	4.19E-06	3.84E-07	8.23E-07	2.72E-06	6.93E-06	1.34E-05
3.	5.55E-07	2.42E-08	6.45E-08	2.92E-07	8.72E-07	2.22E-06
5.	9.15E-08	1.87E-09	6.09E-09	3.79E-08	1.32E-07	4.31E-07
7.5	1.76E-08	2.10E-10	7.13E-10	5.50E-09	2.32E-08	9.24E-08
10.	4.84E-09	8.12E-11	1.60E-10	1.25E-09	6.09E-09	2.72E-08

Table A-1b. Mean and Fractile Seismic Hazard Curves for 25 Hz at Seabrook

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	6.00E-02	3.73E-02	4.83E-02	5.91E-02	7.34E-02	8.23E-02
0.001	4.70E-02	2.53E-02	3.63E-02	4.63E-02	5.91E-02	6.83E-02
0.005	1.73E-02	8.47E-03	1.21E-02	1.60E-02	2.16E-02	3.14E-02
0.01	1.00E-02	5.05E-03	6.64E-03	9.24E-03	1.21E-02	2.01E-02
0.015	7.16E-03	3.68E-03	4.63E-03	6.54E-03	8.72E-03	1.51E-02
0.03	3.87E-03	1.87E-03	2.42E-03	3.47E-03	4.77E-03	8.60E-03
0.05	2.37E-03	9.93E-04	1.40E-03	2.13E-03	3.09E-03	5.35E-03
0.075	1.57E-03	5.75E-04	8.72E-04	1.40E-03	2.16E-03	3.57E-03
0.1	1.16E-03	3.90E-04	6.09E-04	1.04E-03	1.67E-03	2.60E-03
0.15	7.49E-04	2.22E-04	3.63E-04	6.73E-04	1.11E-03	1.64E-03
0.3	3.26E-04	8.00E-05	1.49E-04	2.88E-04	5.05E-04	7.03E-04
0.5	1.61E-04	3.57E-05	6.93E-05	1.38E-04	2.53E-04	3.52E-04
0.75	8.51E-05	1.79E-05	3.42E-05	7.23E-05	1.34E-04	1.90E-04
1.	5.17E-05	1.04E-05	1.98E-05	4.31E-05	8.23E-05	1.20E-04
1.5	2.37E-05	4.37E-06	8.35E-06	1.92E-05	3.79E-05	5.91E-05
3.	4.88E-06	7.03E-07	1.34E-06	3.68E-06	8.00E-06	1.40E-05
5.	1.21E-06	1.25E-07	2.57E-07	8.35E-07	2.01E-06	3.95E-06
7.5	3.41E-07	2.39E-08	5.50E-08	2.10E-07	5.66E-07	1.23E-06
10.	1.27E-07	6.36E-09	1.62E-08	6.93E-08	2.13E-07	4.90E-07

Table A-1c. Mean and Fractile Seismic Hazard Curves for 10 Hz at Seabrook

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	6.59E-02	4.83E-02	5.42E-02	6.36E-02	7.89E-02	8.72E-02
0.001	5.48E-02	3.57E-02	4.31E-02	5.35E-02	6.73E-02	7.55E-02
0.005	2.14E-02	1.15E-02	1.51E-02	2.04E-02	2.76E-02	3.42E-02
0.01	1.18E-02	6.26E-03	8.12E-03	1.11E-02	1.51E-02	2.01E-02
0.015	8.08E-03	4.31E-03	5.42E-03	7.66E-03	1.02E-02	1.42E-02
0.03	3.97E-03	2.01E-03	2.60E-03	3.68E-03	5.05E-03	7.55E-03
0.05	2.27E-03	1.01E-03	1.40E-03	2.10E-03	2.96E-03	4.50E-03
0.075	1.43E-03	5.50E-04	8.23E-04	1.32E-03	1.95E-03	2.84E-03
0.1	1.02E-03	3.52E-04	5.50E-04	9.37E-04	1.46E-03	2.04E-03
0.15	6.17E-04	1.84E-04	3.05E-04	5.66E-04	9.24E-04	1.27E-03
0.3	2.41E-04	5.75E-05	1.07E-04	2.16E-04	3.84E-04	5.20E-04
0.5	1.09E-04	2.29E-05	4.37E-05	9.37E-05	1.77E-04	2.42E-04
0.75	5.29E-05	1.04E-05	1.98E-05	4.43E-05	8.60E-05	1.25E-04
1.	3.01E-05	5.42E-06	1.05E-05	2.46E-05	4.90E-05	7.45E-05
1.5	1.25E-05	2.01E-06	3.95E-06	9.79E-06	2.04E-05	3.33E-05
3.	2.15E-06	2.53E-07	4.98E-07	1.53E-06	3.52E-06	6.73E-06
5.	4.59E-07	3.63E-08	7.89E-08	2.88E-07	7.55E-07	1.62E-06
7.5	1.14E-07	5.83E-09	1.44E-08	6.17E-08	1.90E-07	4.50E-07
10.	3.86E-08	1.40E-09	3.79E-09	1.82E-08	6.36E-08	1.62E-07

Table A-1d. Mean and Fractile Seismic Hazard Curves for 5 Hz at Seabrook

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	6.63E-02	4.83E-02	5.42E-02	6.45E-02	8.00E-02	8.85E-02
0.001	5.54E-02	3.52E-02	4.19E-02	5.50E-02	6.93E-02	7.89E-02
0.005	2.06E-02	1.02E-02	1.40E-02	2.01E-02	2.76E-02	3.28E-02
0.01	1.05E-02	5.27E-03	7.23E-03	1.01E-02	1.40E-02	1.72E-02
0.015	6.70E-03	3.47E-03	4.56E-03	6.36E-03	8.85E-03	1.11E-02
0.03	2.87E-03	1.44E-03	1.87E-03	2.76E-03	3.73E-03	4.98E-03
0.05	1.48E-03	6.36E-04	8.98E-04	1.40E-03	2.01E-03	2.68E-03
0.075	8.62E-04	3.14E-04	4.83E-04	8.12E-04	1.23E-03	1.62E-03
0.1	5.82E-04	1.90E-04	3.05E-04	5.42E-04	8.60E-04	1.13E-03
0.15	3.26E-04	9.11E-05	1.57E-04	2.96E-04	4.98E-04	6.64E-04
0.3	1.08E-04	2.46E-05	4.56E-05	9.37E-05	1.72E-04	2.39E-04
0.5	4.24E-05	8.35E-06	1.57E-05	3.52E-05	6.73E-05	1.01E-04
0.75	1.84E-05	3.14E-06	6.17E-06	1.46E-05	2.96E-05	4.70E-05
1.	9.61E-06	1.49E-06	2.92E-06	7.34E-06	1.57E-05	2.60E-05
1.5	3.54E-06	4.37E-07	8.98E-07	2.53E-06	5.91E-06	1.04E-05
3.	4.93E-07	3.47E-08	8.12E-08	2.96E-07	8.47E-07	1.69E-06
5.	8.98E-08	3.42E-09	9.65E-09	4.31E-08	1.53E-07	3.47E-07
7.5	1.96E-08	4.50E-10	1.40E-09	7.23E-09	3.19E-08	8.23E-08
10.	6.06E-09	1.21E-10	3.19E-10	1.79E-09	9.24E-09	2.68E-08

Table A-1e. Mean and Fractile Seismic Hazard Curves for 2.5 Hz at Seabrook

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	6.24E-02	4.37E-02	4.98E-02	6.09E-02	7.66E-02	8.47E-02
0.001	4.92E-02	3.01E-02	3.57E-02	4.83E-02	6.26E-02	7.23E-02
0.005	1.52E-02	7.66E-03	1.02E-02	1.44E-02	2.07E-02	2.49E-02
0.01	6.99E-03	3.47E-03	4.63E-03	6.54E-03	9.51E-03	1.18E-02
0.015	4.10E-03	1.98E-03	2.64E-03	3.84E-03	5.58E-03	7.23E-03
0.03	1.48E-03	6.45E-04	8.85E-04	1.38E-03	2.04E-03	2.76E-03
0.05	6.63E-04	2.46E-04	3.57E-04	6.00E-04	9.65E-04	1.29E-03
0.075	3.44E-04	1.07E-04	1.69E-04	3.01E-04	5.12E-04	7.13E-04
0.1	2.14E-04	5.83E-05	9.65E-05	1.84E-04	3.23E-04	4.70E-04
0.15	1.07E-04	2.42E-05	4.25E-05	8.72E-05	1.67E-04	2.53E-04
0.3	2.96E-05	4.77E-06	9.51E-06	2.22E-05	4.83E-05	8.00E-05
0.5	1.03E-05	1.27E-06	2.64E-06	7.23E-06	1.74E-05	3.05E-05
0.75	4.12E-06	3.73E-07	8.47E-07	2.60E-06	7.13E-06	1.32E-05
1.	2.04E-06	1.40E-07	3.47E-07	1.20E-06	3.63E-06	7.03E-06
1.5	7.01E-07	3.09E-08	8.60E-08	3.52E-07	1.25E-06	2.57E-06
3.	8.55E-08	1.40E-09	4.90E-09	2.92E-08	1.46E-07	3.63E-07
5.	1.39E-08	1.32E-10	4.37E-10	3.14E-09	2.13E-08	6.26E-08
7.5	2.76E-09	4.31E-11	8.85E-11	4.56E-10	3.68E-09	1.25E-08
10.	7.91E-10	3.01E-11	5.91E-11	1.31E-10	9.65E-10	3.57E-09

Table A-1f. Mean and Fractile Seismic Hazard Curves for 1 Hz at Seabrook

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	4.04E-02	1.92E-02	2.68E-02	4.01E-02	5.35E-02	6.26E-02
0.001	2.60E-02	1.11E-02	1.64E-02	2.53E-02	3.52E-02	4.25E-02
0.005	5.61E-03	2.04E-03	3.23E-03	5.12E-03	7.89E-03	1.08E-02
0.01	2.24E-03	7.03E-04	1.15E-03	1.98E-03	3.33E-03	4.70E-03
0.015	1.20E-03	3.42E-04	5.66E-04	1.01E-03	1.82E-03	2.64E-03
0.03	3.52E-04	8.35E-05	1.40E-04	2.76E-04	5.75E-04	8.35E-04
0.05	1.33E-04	2.64E-05	4.63E-05	9.79E-05	2.22E-04	3.37E-04
0.075	6.03E-05	9.93E-06	1.82E-05	4.19E-05	1.02E-04	1.72E-04
0.1	3.45E-05	4.83E-06	9.24E-06	2.29E-05	5.83E-05	1.05E-04
0.15	1.56E-05	1.69E-06	3.47E-06	9.51E-06	2.64E-05	5.20E-05
0.3	3.82E-06	2.29E-07	5.50E-07	1.92E-06	6.54E-06	1.44E-05
0.5	1.24E-06	4.19E-08	1.13E-07	5.05E-07	2.10E-06	5.12E-06
0.75	4.69E-07	8.72E-09	2.76E-08	1.51E-07	7.66E-07	2.10E-06
1.	2.23E-07	2.57E-09	8.98E-09	5.83E-08	3.42E-07	1.04E-06
1.5	7.19E-08	4.25E-10	1.60E-09	1.29E-08	9.93E-08	3.47E-07
3.	7.90E-09	4.70E-11	9.65E-11	6.64E-10	7.77E-09	3.79E-08
5.	1.21E-09	2.01E-11	3.68E-11	9.79E-11	9.11E-10	5.27E-09
7.5	2.32E-10	2.01E-11	3.01E-11	8.12E-11	1.64E-10	9.51E-10
10.	6.54E-11	2.01E-11	3.01E-11	8.12E-11	8.47E-11	2.72E-10

Table A-1g. Mean and Fractile Seismic Hazard Curves for 0.5 Hz at Seabrook

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	2.02E-02	9.79E-03	1.42E-02	1.92E-02	2.64E-02	3.28E-02
0.001	1.16E-02	5.05E-03	7.66E-03	1.08E-02	1.57E-02	2.07E-02
0.005	2.09E-03	5.42E-04	9.65E-04	1.74E-03	3.28E-03	4.77E-03
0.01	7.46E-04	1.46E-04	2.68E-04	5.58E-04	1.27E-03	1.92E-03
0.015	3.70E-04	6.17E-05	1.13E-04	2.57E-04	6.54E-04	1.02E-03
0.03	9.75E-05	1.23E-05	2.32E-05	5.83E-05	1.79E-04	3.01E-04
0.05	3.46E-05	3.42E-06	6.93E-06	1.84E-05	6.26E-05	1.20E-04
0.075	1.53E-05	1.15E-06	2.53E-06	7.45E-06	2.68E-05	5.91E-05
0.1	8.63E-06	5.12E-07	1.21E-06	3.84E-06	1.46E-05	3.63E-05
0.15	3.87E-06	1.51E-07	4.01E-07	1.46E-06	6.26E-06	1.79E-05
0.3	9.41E-07	1.49E-08	4.70E-08	2.35E-07	1.36E-06	4.90E-06
0.5	3.06E-07	1.98E-09	7.55E-09	4.90E-08	3.84E-07	1.72E-06
0.75	1.17E-07	3.57E-10	1.49E-09	1.18E-08	1.21E-07	6.64E-07
1.	5.62E-08	1.20E-10	4.50E-10	3.95E-09	4.98E-08	3.19E-07
1.5	1.85E-08	4.13E-11	1.02E-10	7.55E-10	1.23E-08	1.01E-07
3.	2.14E-09	2.01E-11	3.01E-11	8.23E-11	8.00E-10	1.01E-08
5.	3.43E-10	2.01E-11	3.01E-11	8.12E-11	1.23E-10	1.40E-09
7.5	6.81E-11	2.01E-11	3.01E-11	8.12E-11	8.12E-11	2.57E-10
10.	1.97E-11	2.01E-11	3.01E-11	8.12E-11	8.12E-11	1.04E-10