



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

August 3, 2015

Mr. Eric McCartney  
Site Vice President  
NextEra Energy Point Beach, LLC  
6610 Nuclear Road  
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SUBJECT: POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 - STAFF ASSESSMENT OF INFORMATION PROVIDED PURSUANT TO TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* PART 50, SECTION 50.54(f), SEISMIC HAZARD REEVALUATIONS FOR RECOMMENDATION 2.1 OF THE NEAR-TERM TASK FORCE REVIEW OF INSIGHTS FROM THE FUKUSHIMA DAI-ICHI ACCIDENT (TAC NOS. MF3959 AND MF3960)

Dear Mr. McCartney:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued a request for information pursuant to Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.54(f) (hereafter referred to as the 50.54(f) letter). The purpose of that request was to gather information concerning, in part, seismic hazards at each operating reactor site and to enable the NRC staff, using present-day NRC requirements and guidance, to determine whether licenses should be modified, suspended, or revoked.

By letter dated March 31, 2014, NextEra Energy Point Beach, LLC (NextEra, the licensee) responded to this request for Point Beach Nuclear Plant, Units 1 and 2 (Point Beach).

The NRC staff has reviewed the information provided related to the reevaluated seismic hazard for Point Beach and, as documented in the enclosed staff assessment, determined that the licensee provided sufficient information in response to Enclosure 1, Items (1) through (3), (5), (7) and comparison portion of Item (4) of the 50.54(f) letter. Further, the NRC staff concludes that the licensee's reevaluated seismic hazard is suitable for other actions associated with Near-Term Task Force Recommendation 2.1, "Seismic".

Contingent upon the NRC's review and acceptance of NextEra's expedited seismic evaluation process, and seismic risk evaluation including the high frequency and spent fuel pool evaluations (i.e., Items (4), (6), (8), and (9)) for Point Beach, the Seismic Hazard Evaluation identified in Enclosure 1 of the 50.54(f) letter will be completed.

E. McCartney

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If you have any questions, please contact me at (301) 415-6197 or at [Tekia.Govan@nrc.gov](mailto:Tekia.Govan@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read 'Tekia V. Govan', with a stylized flourish at the end.

Tekia V. Govan, Project Manager  
Hazards Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Docket Nos. 50-266 and 50-301

Enclosure:  
Staff Assessment of Seismic  
Hazard Evaluation and Screening Report

cc w/encl: Distribution via Listserv

STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO SEISMIC HAZARD AND SCREENING REPORT  
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2  
DOCKET NOS. 50-266 and 50-301

1.0 INTRODUCTION

By letter dated March 12, 2012 (NRC, 2012a), the U.S. Nuclear Regulatory Commission (NRC or Commission) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) "Conditions of license" (hereafter referred to as the "50.54(f) letter"). The request and other regulatory actions were issued in connection with implementing lessons-learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the "Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident" (NRC, 2011b).<sup>1</sup> In particular, the NRC Near-Term Task Force (NTTF) Recommendation 2.1, and subsequent Staff Requirements Memoranda (SRMs) associated with Commission Papers SECY-11-0124 (NRC, 2011c) and SECY-11-0137 (NRC, 2011d), instructed the NRC staff to issue requests for information to licensees pursuant to 10 CFR 50.54(f).

Enclosure 1 to the 50.54(f) letter requests that addressees perform a reevaluation of the seismic hazards at their sites using present-day NRC requirements and guidance to develop a ground motion response spectrum (GMRS).

The required response section of Enclosure 1 requests that each addressee provide the following information:

- (1) Site-specific hazard curves (common fractiles and mean) over a range of spectral frequencies and annual exceedance frequencies,
- (2) Site-specific, performance-based GMRS developed from the new site-specific seismic hazard curves at the control point elevation,
- (3) Safe Shutdown Earthquake (SSE) ground motion values including specification of the control point elevation,
- (4) Comparison of the GMRS and SSE. A high frequency evaluation (if necessary),

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<sup>1</sup> Issued as an enclosure to Commission Paper SECY-11-0093 (NRC, 2011a).

- (5) Additional information such as insights from NTF Recommendation 2.3 walkdown and estimates of plant seismic capacity developed from previous risk assessments to inform NRC screening and prioritization,
- (6) Interim evaluation and actions taken or planned to address the higher seismic hazard relative to the design basis, as appropriate, prior to completion of the risk evaluation (if necessary),
- (7) Statement if a seismic risk evaluation is necessary,
- (8) Seismic risk evaluation (if necessary), and
- (9) Spent fuel pool (SFP) evaluation (if necessary).

Present-day NRC requirements and guidance with respect to characterizing seismic hazards use a probabilistic approach in order to develop a risk-informed performance-based GMRS for the site. Regulatory Guide (RG) 1.208, A Performance-based Approach to Define the Site-Specific Earthquake Ground Motion (NRC, 2007), describes this approach. As described in the 50.54(f) letter, if the reevaluated seismic hazard, as characterized by the GMRS, is not bounded by the current plant design-basis SSE, further seismic risk evaluation of the plant is merited.

By letter dated November 27, 2012 (Keithline, 2012), the Nuclear Energy Institute (NEI) submitted Electric Power Research Institute (EPRI) report "Seismic Evaluation Guidance: Screening, Prioritization, and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1 Seismic" (EPRI, 2012), hereafter called the SPID. The SPID supplements the 50.54(f) letter with guidance necessary to perform seismic reevaluations and report the results to NRC in a manner that will address the Requested Information Items in Enclosure 1 of the 50.54(f) letter. By letter dated February 15, 2013 (NRC, 2013b), the NRC staff endorsed the SPID.

The required response section of Enclosure 1 to the 50.54(f) letter specifies that Central and Eastern United States (CEUS) licensees provide their Seismic Hazard and Screening Report (SHSR) by 1.5 years after issuance of the 50.54(f) letter. However, in order to complete its update of the EPRI seismic ground motion models (GMM) for the CEUS (EPRI, 2013), industry proposed a six-month extension to March 31, 2014, for submitting the SHSR. Industry also proposed that licensees perform an expedited assessment, referred to as the Augmented Approach, for addressing the requested interim evaluation (Item 6 above), which would use a simplified assessment to demonstrate that certain key pieces of plant equipment for core cooling and containment functions, given a loss of all alternating current (ac) power, would be able to withstand a seismic hazard up to two times the design-basis. Attachment 2 to the April 9, 2013, letter (Pietrangelo, 2013) provides a revised schedule for plants needing to perform (1) the Augmented Approach by implementing the Expedited Seismic Evaluation Process (ESEP) and (2) a seismic risk evaluation. By letter dated May 7, 2013 (NRC, 2013a), the NRC determined that the modified schedule was acceptable and by letter dated August 28, 2013

(NRC, 2013c), the NRC determined that the updated GMM (EPRI, 2013) is an acceptable GMM for use by CEUS plants in developing a plant-specific GMRS.

By letter dated April 9, 2013 (Pietrangelo, 2013), industry agreed to follow the SPID to develop the SHSR for existing nuclear power plants. By letter dated September 12, 2013 (Meyer, 2013), NextEra Energy Point Beach, LLC (NextEra, the licensee) submitted at least partial site response information for Point Beach Nuclear Plant (Point Beach), Units 1 and 2. By letter dated March 31, 2014 (McCartney, 2014), the licensee submitted its t SHSR for Point Beach.

## 2.0 REGULATORY BACKGROUND

The structures, systems, and components (SSCs) important to safety in operating nuclear power plants are designed either in accordance with, or meet the intent of Appendix A to 10 CFR Part 50, General Design Criteria (GDC) 2: "Design Bases for Protection Against Natural Phenomena;" and Appendix A to 10 CFR Part 100, "Reactor Site Criteria." The GDC 2 states that SSCs important to safety at nuclear power plants shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions.

For initial licensing, each licensee was required to develop and maintain design bases that, as defined by 10 CFR 50.2, identify the specific functions that an SSC of a facility must perform, and the specific values or ranges of values chosen for controlling parameters as reference bounds for the design. The design bases for the SSCs reflect appropriate consideration of the most severe natural phenomena that had been historically reported for the site and surrounding area. The design bases also considered limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The seismic design bases for currently operating nuclear power plants were either developed in accordance with, or meet the intent of GDC 2 and 10 CFR Part 100, Appendix A. Although the regulatory requirements in Appendix A to 10 CFR Part 100 are fundamentally deterministic, the NRC process for determining the seismic design-basis ground motions for new reactor applications after January 10, 1997, as described in 10 CFR 100.23, requires that uncertainties be addressed through an appropriate analysis such as a probabilistic seismic hazard analysis (PSHA).

Section 50.54(f) of 10 CFR states that a licensee shall at any time before expiration of its license, upon request of the Commission, submit written statements, signed under oath or affirmation, to enable the Commission to determine whether or not the license should be modified, suspended, or revoked. On March 12, 2012, the NRC staff issued requests for licensees to reevaluate the seismic hazards at their sites using present-day NRC requirements and guidance, and identify actions planned to address plant-specific vulnerabilities associated with the updated seismic hazards.

Attachment 1 to Enclosure 1 of the 50.54(f) letter described an acceptable approach for performing the seismic hazard reevaluation for plants located in the CEUS. Licensees are expected to use the CEUS Seismic Source Characterization (CEUS-SSC) model in NUREG- 2115 (NRC, 2012b) along with the appropriate EPRI (2004, 2006) ground motion

models. The SPID provided further guidance regarding the appropriate use of GMMs for the CEUS. Specifically, Section 2.3 of the SPID recommended the use of the updated GMM (EPRI, 2013) and, as such, licensees used the NRC-endorsed updated EPRI GMM instead of the older EPRI (2004, 2006) GMM to develop PSHA base rock hazard curves. Finally, Attachment 1 requested that licensees conduct an evaluation of the local site response in order to develop site-specific hazard curves and GMRS for comparison with the plant SSE.

## 2.1 Screening Evaluation Results

By letter dated March 31, 2014 (McCartney, 2014), the licensee provided the SHSR for the Point Beach site. The licensee's SHSR indicated that the plant GMRS exceeds the SSE for Point Beach over the frequency range between 1 to 10 Hertz (Hz). As such, Point Beach screens in to perform a seismic risk evaluation, as well as a SFP evaluation. Additionally, due to exceedances at frequencies above 10 Hz, the licensee indicated that a high-frequency confirmation will be performed.

On May 9, 2014 (NRC, 2014), the NRC staff issued a letter providing the outcome of its 30-day screening and prioritization evaluation. As indicated in the letter, the NRC staff confirmed the licensee's screening results. The licensee's GMRS, as well as the confirmatory GMRS, developed by the NRC staff, exceeds the SSE for Point Beach site o the frequency range of approximately 3 to 100 Hz. Therefore, a seismic risk evaluation, SFP evaluation, and a high frequency confirmation are merited for Point Beach, Units 1 and 2.

## 3.0 TECHNICAL EVALUATION

The NRC staff evaluated the licensee's submittal to determine if the provided information responded appropriately to Enclosure 1 of the 50.54(f) letter with respect to characterizing the reevaluated seismic hazard.

### 3.1 Plant Seismic Design-Basis

Enclosure 1 of the 50.54(f) letter requests the licensee provide the SSE ground motion values, as well as the specification of the control point elevation(s) for comparison to the GMRS. For operating reactors licensed before 1997, the SSE is the plant licensing basis ground motion and is characterized by 1) a peak ground acceleration (PGA) value which anchors the response spectra at high frequencies (typically between 20 to 30 Hz for the existing fleet of nuclear power plants (NPPs)); 2) a response spectrum shape which depicts the amplified response at all frequencies below the PGA; and 3) a control point where the SSE is defined.

In Section 3.1 of its SHSR, the licensee described its seismic design-basis for Point Beach. The licensee stated that the design-basis of Point Beach was determined by considering the maximum earthquake potential for the region surrounding the site. The licensee combined a horizontal ground acceleration of 0.06g with a vertical acceleration of 0.04g acting simultaneously to develop the PGA anchor point for the SSE. The licensee specified that the control point elevation for the SSE is located at the highest foundation of key, safety-related structures at an elevation of 8.0 ft. (2.4 m).

Based on the review of the licensee's submittal and the Updated Final Safety Analysis Report (UFSAR), the NRC staff confirms that the licensee's SSE as well as the SSE control point elevation are consistent with information provided in the Point Beach UFSAR as well as guidance in the SPID.

### 3.2 Probabilistic Seismic Hazard Analysis

In Section 2.2 of its SHSR, the licensee stated that, in accordance with the 50.54(f) letter and the SPID, it performed a PSHA using the CEUS-SSC model and the updated EPRI GMM for the CEUS (EPRI, 2013). The licensee used a minimum magnitude cutoff of **M**5.0, as specified in the 50.54(f) letter. The licensee further stated that it included the CEUS-SSC background sources out to a distance of 400 mi (640 km) around the site and included the Commerce, Eastern Rift Margin-North, Eastern Rift Margin-South, New Madrid Fault System, and Wabash Valley Repeated Large Magnitude Earthquake (RLME) sources, which lie within 620 mi (1,000 km) of Point Beach. The RLME sources are those source areas or faults for which more than one large magnitude (**M**  $\geq$  6.5) earthquake has occurred in the historical or paleo-earthquake (geologic evidence for prehistoric seismicity) record. The licensee used the mid-continent version of the updated EPRI GMM for each of the CEUS-SSC sources. Consistent with the SPID, the licensee did not provide its base rock seismic hazard curves since a site response analysis is necessary to determine the control point seismic hazard curves. The licensee provided its control point seismic hazard curves in Section 2.3.7 of the SHSR. The NRC staff's review of the licensee's control point seismic hazard curves is provided in Section 3.3 of this staff assessment.

As part of its confirmatory analysis of the licensee's GMRS, the NRC staff performed PSHA calculations for base rock site conditions at the Point Beach site. As input, the NRC staff used the CEUS-SSC model as documented in NUREG-2115 (NRC, 2012b) along with the updated EPRI GMM (EPRI, 2013). Consistent with the guidance provided in the SPID, the NRC staff included all CEUS-SSC background seismic sources within a 310 mi (500 km) radius of the Point Beach site. In addition, the NRC staff included the Commerce, Eastern Rift Margin-North, Eastern Rift Margin-South, New Madrid Fault System, and Wabash Valley RLME sources, which lie within 620 km (1,000 mi) of the Point Beach site. For each of the CEUS-SSC sources used in the PSHA, the NRC staff used the mid-continent version of the updated EPRI GMM.

Based on its review of the SHSR, the NRC staff concludes that the licensee appropriately followed the guidance provided in the SPID for selecting the PSHA input models and parameters for the site. This includes the licensee's use and correct implementation of the CEUS-SSC model and the updated EPRI GMM.

### 3.3 Site Response Evaluation

After completing PSHA calculations for reference rock conditions, Attachment 1 to Enclosure 1 of the 50.54(f) letter requests that the licensee provide a GMRS developed from the site-specific seismic hazard curves at the control point elevation. In addition, the 50.54(f) letter specifies that the subsurface site response model, for both soil and rock sites, should extend to sufficient depth to reach the generic or reference rock conditions as defined in the ground motion models

used in the PSHA. To develop site-specific hazard curves at the control point elevation, Attachment 1 requests that licensees perform a site response analysis.

Detailed site response analyses were not typically performed for many of the older operating plants; therefore, Appendix B of the SPID provides detailed guidance on the development of site-specific amplification factors (including the treatment of uncertainty) for sites that do not have detailed, measured soil and rock parameters to extensive depths.

The purpose of the site response analysis is to determine the site amplification that would occur as a result of bedrock ground motions propagating upwards through the soil/rock column to the surface. The critical parameters that determine what frequencies of ground motion are affected by the upward propagation of bedrock motions are the layering of soil and/or soft rock, the thicknesses of these layers, the shear-wave velocities and low-strain damping of these layers, and the degree to which the shear modulus and damping change with increasing input bedrock amplitude. To develop site-specific hazard curves at the control point, the licensee performed a site response analysis.

### 3.3.1 Site Base Case Profiles

In its SHSR, the licensee indicated that it performed a site response analysis for Point Beach. According to the licensee, the site rests on 16 ft (4.9 m) of glacial till underlain by 35 ft (10.7 m) of lacustrine deposits. A further thickness of 50 ft (15.24 m) of glacial deposits lie atop the dolomite bedrock encountered at elevation -75 ft (-22.8 m).

The licensee provided site profile descriptions in Sections 2.3.1 and 2.3.2 of its SHSR based on information in the Point Beach UFSAR (Point Beach, 2013). Because limited detailed geophysical data, which was collected at the site during initial construction, the licensee stated that it used the shear-wave velocity measurements from its previous Individual Plant Examination of External Events (IPEEE) investigations (GEI, 1995) as the recommended best-estimate values.

Using these measured shear-wave velocity estimates, along with guidance provided in the SPID, the licensee developed the best-estimate shear-wave velocity profile. The licensee also developed upper and lower base case profiles using a scale factor of 1.57, which implies a natural log standard deviation of 0.35, following guidance in the SPID. This approach to developing base case profiles resulted in three profiles, which are shown below in Figure 3.3-1 of this assessment.

To account for the potential nonlinear behavior for the soil layers, the licensee assumed that the soil material in the upper 83 ft (25 m) could be modeled with either EPRI cohesionless soil or Peninsular Range shear modulus and hysteretic damping curves. To represent nonlinear response, the licensee used the EPRI soil curves (model M1) and, for linear behavior, used the Peninsular Range curves for soils (model M2).

The licensee also considered the impact of kappa, or small strain damping, on site response. Kappa is measured in units of seconds (sec), and is the damping contributed by both intrinsic hysteretic damping as well as scattering due to wave propagation in heterogeneous material.



The licensee calculated kappa for each profile independently, resulting in three kappa estimates. Using the guidance in the SPID, the licensee estimated the mean base-case kappa based on a total soil thickness of 83 ft (25 m) and then included the kappa contribution from the hard basement rock value of 0.006 sec. The resulting kappa values for the best, lower and upper base-case profiles are 0.008 sec, 0.009 sec, and 0.007 sec, respectively.

To account for aleatory variability in material properties across the plant site in its site response calculations, the licensee stated that it randomized its base case profiles in accordance with Appendix B of the SPID. For the profiles with reference rock at a depth of 83 ft (25 m), the licensee stated that it also randomized the depth to reference rock  $\pm 16$  ft (5 m). The licensee stated that this randomization did not represent actual uncertainty in the depth to reference rock, but was used to broaden the spectral peak. For the base case profiles with reference rock located at the top of rock, the licensee did not randomize the depth to reference rock.

### 3.3.2 Site Response Method and Results

In Section 2.3.4 of its SHSR, the licensee stated that it followed the guidance in Appendix B of the SPID to develop input ground motions for the site response analysis, and in Section 2.3.5, the licensee described its implementation of the random vibration theory (RVT) approach to perform its site response calculations. Finally, Section 2.3.6 of the SHSR shows the resulting amplification functions and associated uncertainties for the eleven input loading levels for the each base case profile. The mean base case profile is shown with both EPRI rock modulus reduction and hysteretic damping curves with base-case kappa and linear site response (model M2) and base-case kappa.

In order to develop probabilistic site-specific control point hazard curves, as requested in Requested Information Item (1) of the 50.54(f) letter, the licensee used Method 3, described in Appendix B-6.0 of the SPID. The licensee's use of Method 3 involved computing the site-specific control point elevation hazard curves for a broad range of spectral accelerations by combining the site-specific reference rock hazard curves and site-specific estimates of soil or soft-rock response, determined from the initial PSHA (Section 3.2 of this assessment), and the amplification function and their associated uncertainties, determined from the site response analysis.

### 3.3.3 Staff Confirmatory Analysis

To confirm the licensee's site response analysis, the NRC staff performed site response calculations for the Point Beach site. The NRC staff independently developed three base case shear-wave velocity profiles from information provided in UFSAR. The NRC staff developed three separate profiles in order to capture the epistemic uncertainty in the shear wave velocity of the subsurface layers. The NRC staff's base case shear-wave velocity profiles are shown along with the licensee's base case profiles in Figure 3.3-1 of this assessment. The NRC staff's shear wave velocity profiles agree well with those submitted by the licensee over the upper 80 ft (24 m) where the licensee's profile encounters bedrock. The NRC staff's profile continues to a depth of 1100 ft (335 m) in order to account for the lower velocity Maquoketa formation that the general geology suggests lies beneath the higher velocity Niagara formation. The NRC staff considered shear wave velocity information for the Maquoketa formation from other nuclear

power plant sites and concluded that the Maquoketa formation was a softer rock than what is considered by the SPID to be hard reference or base rock and therefore the NRC staff's profile extends to a depth of 1100 ft (335 m), which is the bottom of the Maquoketa Formation.

Similar to the approach used by the licensee, the NRC staff used the SPID guidance to characterize the dynamic material behavior of the base case profiles. The NRC staff assumed that the soil material in the upper 100 ft. could behave both linearly and non-linearly under alternate loading conditions. For soil type material the EPRI soil curves were used to model the non-linear response and the Peninsular curves were used to represent linear behavior. Below all material defined as soil, the NRC staff assumed linear behavior in material response with a constant hysteretic damping value of 1.25 percent.

Using the guidance provided in the SPID for the determination of site kappa resulted in values of 0.010 sec, 0.015 sec and 0.007 sec for the base, lower and upper base case profiles, respectively. These values are slightly higher than the licensee's values due to the additional depth to base rock in the NRC staff's profiles. In addition, to account for the aleatory variability in material properties across the plant site, the NRC staff randomized its base case shear-wave velocity profiles following the SPID guidance provided in Appendix B of the SPID.

In order to calculate control point hazard curves for the Point Beach site, the licensee and NRC staff developed median amplification functions for the site for several different loading levels. The median site amplification and associated uncertainty for two separate loading levels are shown in Figure 3.3-2 of this assessment. It can be seen that both the NRC staff's and licensee's site amplifications are similar in shape with small differences at peak amplification, which is due to the more shallow subsurface profile used by the licensee. The licensee's and staff's control point hazard curves resulting from the convolution of the site amplification with the PSHA rock hazard are shown in Figure 3.3-3 of this assessment. As shown in Figure 3.3-3, the licensee's and staff's control point hazard curves for the Point Beach site are very similar.

In summary, the NRC staff concludes that the licensee's site response was conducted using present-day guidance and methodology, including the NRC-endorsed SPID. The NRC staff performed independent calculations to confirm that the licensee's amplification factors and control point hazard curves adequately characterize the site response, including the uncertainty associated with the subsurface material properties, for the Point Beach site.

### 3.4 Ground Motion Response Spectra

In Section 2.4 of its SHSR, the licensee stated that it used the control point hazard curves, described in SHSR Section 2.3.7, to develop the  $10^{-4}$  and  $10^{-5}$  (mean annual frequency of exceedance) uniform hazard response spectra (UHRs) and then computed the GMRS using the criteria in RG 1.208.

The NRC staff independently calculated the  $10^{-4}$  and  $10^{-5}$  UHRs using the results of its confirmatory PSHA and site response analysis, as described in Sections 3.2 and 3.3 of this staff assessment, respectively. Figure 3.4-1 of this assessment shows a comparison of the GMRS determined by the licensee to that determined by the NRC staff. As shown in Figure 3.4-1, the licensee's GMRS shape is generally similar to that calculated by the NRC staff, although the

licensee's GMRS is slightly higher than the NRC staff's. These differences in GMRS are the result of differences in the site response analyses performed by the licensee and staff as discussed in Section 3.3 above. The NRC staff concludes that these differences are acceptable for this application because the licensee followed the guidance provided in the SPID with respect to both the PSHA and site response analysis for the Point Beach site.

The NRC staff confirms that the licensee used the present-day guidance and methodology outlined in RG 1.208 and the SPID to calculate the horizontal GMRS, as requested in the 50.54(f) letter. The NRC staff performed both a PSHA and site response confirmatory analysis and achieved results consistent with the licensee's horizontal GMRS. As such, the NRC staff concludes that the GMRS determined by the licensee adequately characterizes the reevaluated hazard for the Point Beach site. Therefore, this GMRS is suitable for use in subsequent evaluations and confirmations, as needed, for the licensee's response to the 50.54(f) letter, dated March 12, 2012.

#### 4.0 CONCLUSION

The NRC staff reviewed the information provided by the licensee for the reevaluated seismic hazard for the Point Beach site. Based on its review, the NRC staff concludes that the licensee conducted the seismic hazard reevaluation using present-day methodologies and regulatory guidance, appropriately characterized the site given the information available, and met the intent of the guidance for determining the reevaluated seismic hazard. Based on the preceding analysis, the NRC staff concludes that the licensee provided an acceptable response to Requested Information Items (1) through (3), (5), and (7) and the comparison portion to Item (4), identified in Enclosure 1 of the 50.54(f) letter. Further, the licensee's reevaluated seismic hazard is acceptable to address other actions associated with NTTF Recommendation 2.1: "Seismic."

In reaching this determination, the NRC staff confirms the licensee's conclusion that the licensee's GMRS exceeds the SSE for the Point Beach site in the frequency range of approximately 3 to 100. As such, a seismic risk evaluation, SFP evaluation, and high-frequency confirmation are merited. The licensee indicated that it would perform the high frequency confirmation as part of its seismic risk evaluation. The NRC review and acceptance of the NextEra Energy plant seismic risk evaluation with the high frequency confirmation, and also an interim ESEP evaluation and SFP evaluation (i.e., Items (4), (6), (8), and (9)) for Point Beach, Units 1 and 2 will complete the Seismic Hazard Evaluation identified in Enclosure 1 of the 50.54(f) letter.

## REFERENCES

Note: ADAMS Accession Nos. refers to documents available through NRC's Agencywide Documents Access and Management System (ADAMS). Publicly-available ADAMS documents may be accessed through <http://www.nrc.gov/reading-rm/adams.html>.

### U.S. Nuclear Regulatory Commission Documents and Publications

NRC (U.S. Nuclear Regulatory Commission), 2007, A Performance-based Approach to Define the Site-Specific Earthquake Ground Motion, Regulatory Guide (RG) 1.208, March 2007.

NRC (U.S. Nuclear Regulatory Commission), 2011a, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," Commission Paper SECY-11-0093, July 12, 2011, ADAMS Accession No. ML11186A950.

NRC (U.S. Nuclear Regulatory Commission), 2011b, "Recommendations for Enhancing Reactor Safety in the 21<sup>st</sup> Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident," Enclosure to SECY-11-0093, July 12, 2011, ADAMS Accession No. ML11186A950.

NRC (U.S. Nuclear Regulatory Commission), 2011c, "Recommended Actions to be Taken Without Delay from the Near-Term Task Force Report," Commission Paper SECY-11-0124, September 9, 2011, ADAMS Accession No. ML11245A158.

NRC (U.S. Nuclear Regulatory Commission), 2011d, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," Commission Paper SECY-11-0137, October 3, 2011, ADAMS Accession No. ML11272A111.

NRC (U.S. Nuclear Regulatory Commission), 2012a, letter from Eric J. Leeds, Director, Office of Nuclear Reactor Regulation and Michael R. Johnson, Director, Office of New Reactors, to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status, March 12, 2012, ADAMS Accession No. ML12053A340.

NRC (U.S. Nuclear Regulatory Commission), 2012b, "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities", NUREG-2115, ADAMS stores the NUREG as multiple ADAMS documents, which are most easily accessed through the web page, <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr2115/>.

NRC (U.S. Nuclear Regulatory Commission), 2013a. Letter From Eric J. Leeds, Director, Office of Nuclear Reactor Regulation to Joseph Pollock, Executive Director NEI, Acceptance Letter for NEI Submittal of Augmented Approach, Ground Motion Model Update Project, and 10 CFR 50.54(f) Schedule Modifications Related to the NTTF Recommendation 2.1, Seismic Reevaluations, May 7, 2013, ADAMS Accession No. ML13106A331.

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Institute, Endorsement of Electric Power Research Institute Draft Report 1025287, "Seismic Evaluation Guidance," February 15, 2013, ADAMS Accession No. ML12319A074.

NRC (U.S. Nuclear Regulatory Commission), 2013c. Letter from D. L. Skeen (NRC) to K. A. Keithline (NEI), Approval of Electric Power Research Institute Ground Motion Model Review Project Final Report for Use by Central and Eastern United States Nuclear Power Plants, August 28, 2013 ADAMS Accession No. ML13233A102.

NRC (U.S. Nuclear Regulatory Commission) 2014. Letter from Eric J. Leeds, Director, Office of Nuclear Reactor Regulation to All Power Reactor Licensees and holders of Construction Permits in Active or Deferred Status, Seismic Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Seismic Hazard Reevaluations for Recommendations 2.1 of the Near-Term Task Force Review of Insights, May 9, 2014, ADAMS Accession No. ML14111A147.

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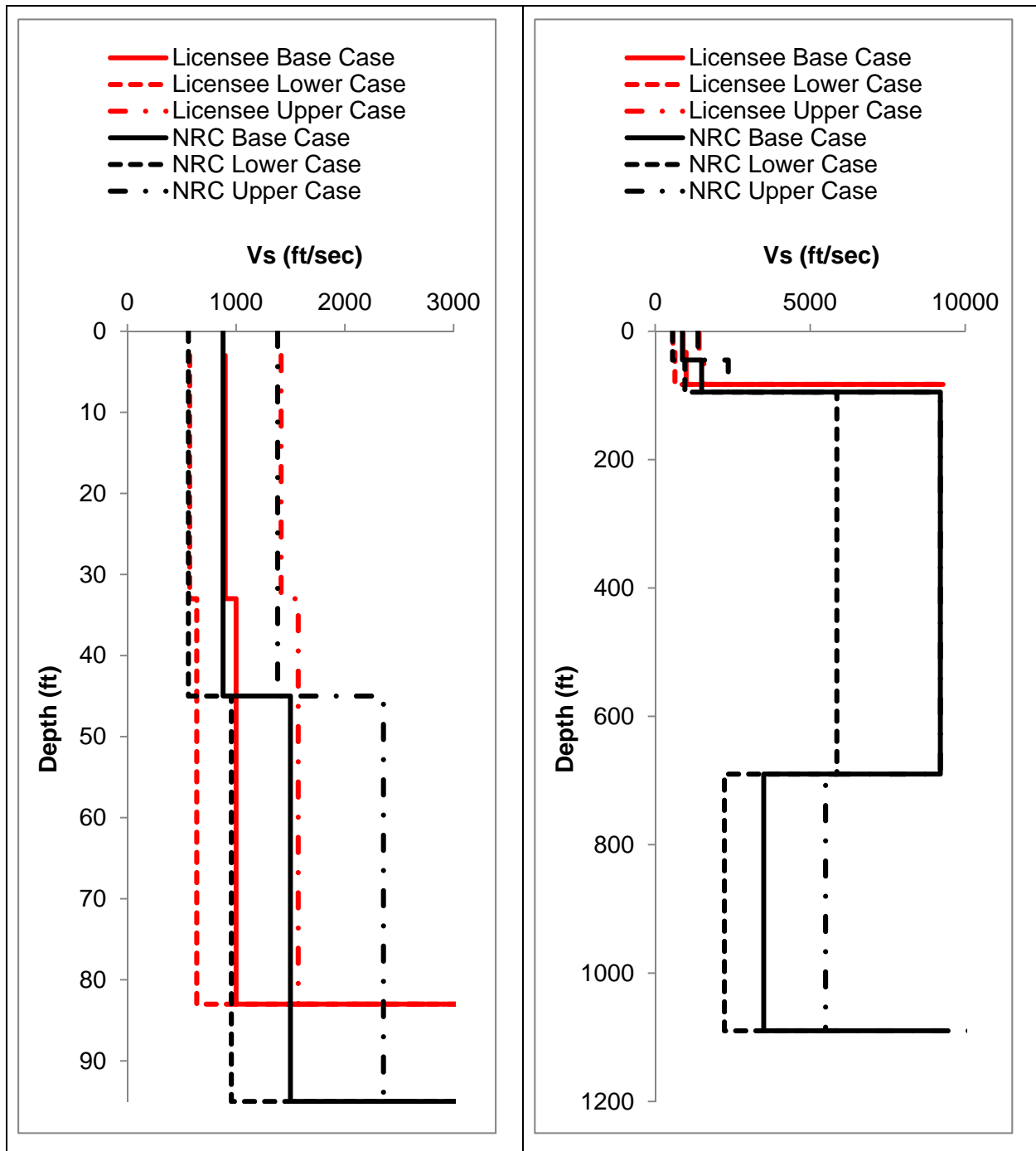
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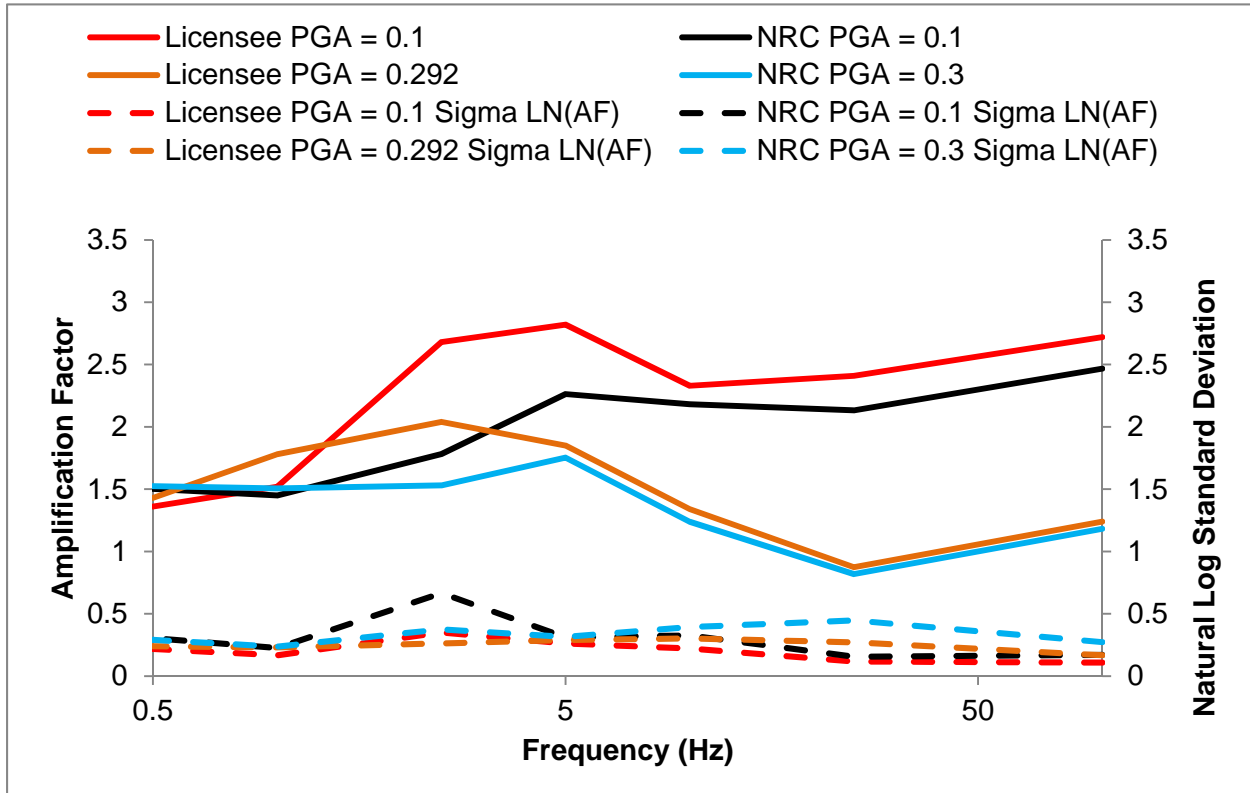
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**Figure 3.3-1 Plot of Staff's and Licensee's Base Case Shear-Wave Velocity Profiles for the Point Beach Site**

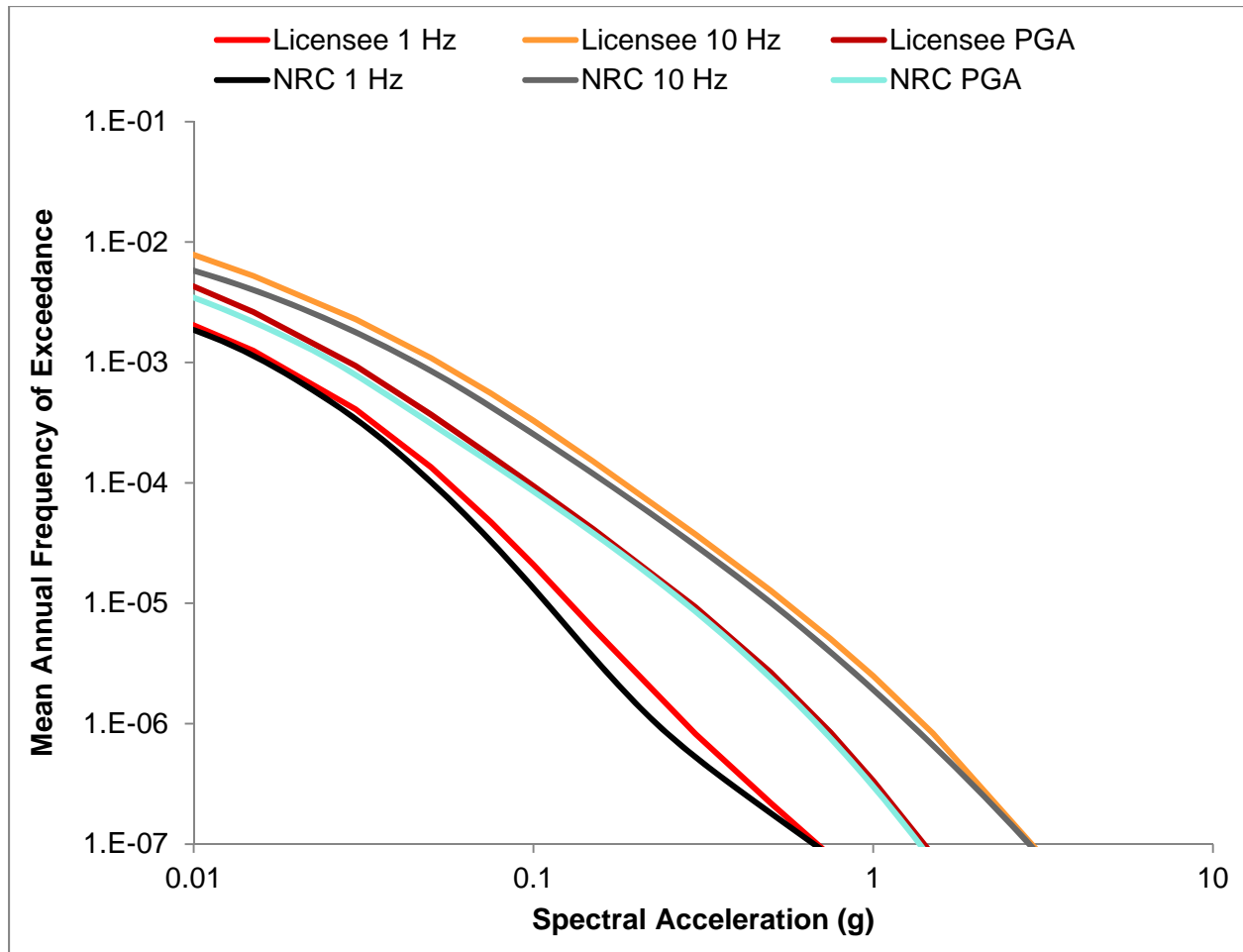


**Figure 3.3- 1 Plot Comparing the NRC staff's and the Licensee's Median Amplification Functions and Uncertainties for the Point Beach site.**

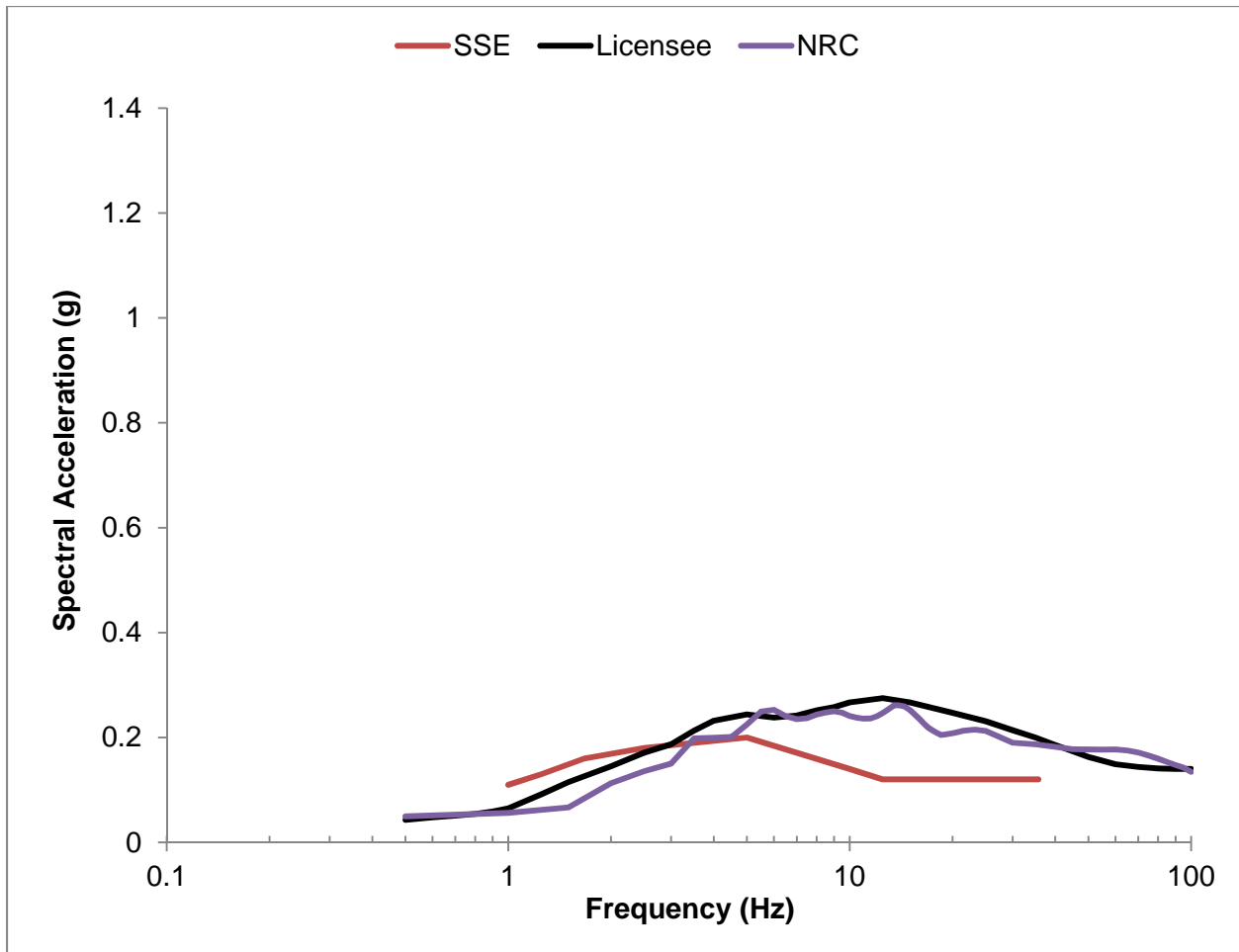




**Figure 3.3-2 Plot Comparing the NRC staff's and the Licensee's Mean Control Point Hazard Curves at a Variety of Frequencies for the Point Beach site**



**Figure 3.4-1 Comparison of the NRC staff's GMRS with Licensee's GMRS and the SSE for the Point Beach site**



E. McCartney

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If you have any questions, please contact me at (301) 415-6197 or at Tekia.Govan@nrc.gov.

Sincerely,

**/RA/**

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Office of Nuclear Reactor Regulation

Docket Nos. 50-266 and 50-301

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