



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

April 30, 2018

Mr. Mano Nazar  
President and Chief Nuclear Officer  
Nuclear Division  
NextEra Energy Seabrook, LLC  
Mail Stop: EX/JB  
700 Universe Blvd.  
Juno Beach, FL 33408

SUBJECT: SEABROOK STATION, UNIT 1 - STAFF REVIEW OF SPENT FUEL POOL  
EVALUATION ASSOCIATED WITH REEVALUATED SEISMIC HAZARD  
IMPLEMENTING NEAR-TERM TASK FORCE RECOMMENDATION 2.1:  
SEISMIC (EPID L-2017-JLD-0053)

Dear Mr. Nazar:

The purpose of this letter is to inform NextEra Energy Seabrook, LLC (NextEra, the licensee), of the results of the U.S. Nuclear Regulatory Commission (NRC) staff's review of the spent fuel pool (SFP) evaluation for Seabrook Station, Unit 1 (Seabrook), which was submitted in response to Item 9 of Enclosure 1 of the NRC's March 12, 2012, request for information (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340) issued under Title 10 of the *Code of Federal Regulations*, Section 50.54(f) (hereafter referred to as the 50.54(f) letter). The NRC staff concludes that the licensee's assessment was performed consistent with the NRC-endorsed SFP Evaluation Guidance Report and that the licensee has provided sufficient information to complete the response to Item 9 of the 50.54(f) letter.

#### BACKGROUND

On March 12, 2012, the NRC issued the 50.54(f) letter as part of implementing lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 1 to the 50.54(f) letter requested that licensees reevaluate seismic hazards at their sites using present-day methodologies and guidance. Enclosure 1, Item (4), of the 50.54(f) letter requested that licensees perform a comparison of the ground motion response spectrum (GMRS) and the safe shutdown earthquake (SSE). The staff's assessment of the information provided in response to Items (1)-(3) and (5)-(7) and the comparison portion of Item (4) of the 50.54(f) letter was provided by letter dated August 12, 2015 (ADAMS Accession No. ML15208A049). Enclosure 1, Item (9), of the 50.54(f) letter requested that, when the GMRS exceeds the SSE in the 1 to 10 Hertz frequency range, the licensee provide a seismic evaluation of the SFP. More specifically, licensees were asked to consider "...all seismically induced failures that can lead to draining of the SFP."

By letter dated January 31, 2017 (ADAMS Accession No. ML17031A171), the Nuclear Energy Institute (NEI) submitted the Electric Power Research Institute (EPRI) Report No. 3002009564 entitled, "Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation" (SFP Evaluation Guidance Report). The SFP Evaluation Guidance Report provides criteria for evaluating the seismic adequacy of an SFP to the reevaluated GMRS hazard levels. This report supplements the guidance in EPRI Report 1025287, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID)" (ADAMS Accession No. ML12333A170). The NRC endorsed the SFP Evaluation Guidance Report by letter dated February 28, 2017 (ADAMS Accession No. ML17034A408), as an acceptable method for licensees to use when responding to Item 9 in Enclosure 1 of the 50.54(f) letter.

By letter dated October 27, 2015 (ADAMS Accession No. ML15194A015), the NRC staff stated that SFP evaluation submittals for sites with GMRS peak spectral accelerations above 0.8g were expected by December 31, 2017.

By letter dated July 6, 2017 (ADAMS Accession No. ML17177A446), the NRC issued a generic audit plan and entered into the audit process described in Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008 (ADAMS Accession No. ML082900195), to assist in the timely and efficient closure of activities associated with the 10 CFR 50.54(f) letter. The Seabrook site was included in the list of applicable licensees. The staff used the audit process as described below during the SFP evaluation review.

#### REVIEW OF LICENSEE SPENT FUEL POOL EVALUATION

By letter dated November 2, 2017 (ADAMS Accession No. ML17307A016), the licensee submitted its SFP evaluation for Seabrook. The NRC staff assessed the licensee's implementation of the SFP Evaluation Guidance Report through the completion of a reviewer checklist, which is included as an enclosure to this letter.

#### TECHNICAL EVALUATION

Section 4.0 of the SFP Evaluation Guidance Report develops SFP evaluation criteria for plants with GMRS peak spectral accelerations greater than 0.8g. These criteria address SFP structural elements (e.g., floors, walls, and supports); non-structural elements (e.g., penetrations); seismically-induced SFP sloshing; and water losses due to heat-up and boil-off. Section 4.0 also provides applicability criteria that enable licensees to determine if their site-specific conditions are within the bounds considered in developing some of the evaluation criteria in the guidance report. In its review, the staff confirmed that the SFP Evaluation Guidance Report methodology has been followed when calculating the site-specific seismic capacity of the SFP, and that Seabrook's site-specific values and conditions are within the acceptable limits and bounds considered for the non-structural evaluation criteria specified in the SFP Evaluation Guidance Report.

#### SPENT FUEL POOL STRUCTURAL EVALUATION

Section 4.1 of the SFP Evaluation Guidance Report provides an SFP structural evaluation approach used to demonstrate that the SFP structure is sufficiently robust for the reevaluated seismic hazard. This approach supplements the guidance in Section 7 of the SPID and follows acceptable methods used to assess the seismic capacity of structures, systems, and components (SSCs) for nuclear power plants. In short, Sections 4.1.1 and 4.1.2 describe an acceptable method for licensees to use to calculate a site-specific seismic high confidence of

low probability of failure (HCLPF) value for the SFP that is then compared to the site-specific GMRS.

The licensee stated that the SFP structural evaluation approach presented in the SFP Evaluation Guidance Report is applicable and, as a part of the audit process, provided site-specific data to the NRC staff to confirm the stated results for Seabrook.

As a part of the audit process, the NRC staff reviewed the information provided in calculation FP 101180-000, "Spent Fuel Pool Structural Evaluations," Revision 0, and confirmed that the site-specific HCLPF value calculated for Seabrook's SFP followed the methodology of the SFP Evaluation Guidance Report and that the HCLPF value is greater than the GMRS. The staff concludes that SFP SSCs were appropriately evaluated and that the licensee has demonstrated that there is high confidence that the SFP structure is sufficiently robust to withstand ground motions with peak spectral accelerations up to and including the peak spectral acceleration of Seabrook's GMRS.

#### SPENT FUEL POOL NON-STRUCTURAL EVALUATION

Section 4.2 of the SFP Evaluation Guidance Report provides criteria for evaluating the non-structural aspects of the SFP, such as piping connections, fuel gates, and anti-siphoning devices, as well as SFP sloshing and heat-up and boil-off of SFP water inventory. Additionally, page 4-11 of the SFP Evaluation Guidance Report provides a summary of the pertinent SFP non-structural parameters important to the methodology described in Section 4.2.

The licensee provided a table in its letter dated November 2, 2017, demonstrating that it generally followed the SFP non-structural evaluation approach presented in the SFP Evaluation Guidance Report and provided site-specific data to confirm its applicability. The staff reviewed the non-structural information provided, which included Seabrook's site-specific attributes, against the criteria described in the SFP Evaluation Guidance Report, and confirmed that the methods and conclusions are applicable to the Seabrook site with the exception of the criterion stating that there are no piping penetrations attached to the SFP more than 6 feet below the surface of the water. This deviation was evaluated as noted below and in the enclosed technical review checklist.

As a part of the audit process, the NRC staff reviewed the information provided in calculation FP 101184-000, "Spent Fuel Pool Evaluation Supplemental Report Submittal," Revision 0, and confirmed that the site-specific calculation demonstrates that the limiting penetration break and/or siphoning event combined with boil-off and evaporation would not lead to uncovering one-third of the fuel assemblies' height in less than 72 hours at Seabrook. Therefore, the staff concludes that the licensee adequately evaluated the non-structural considerations for SSCs whose failure could lead to potential drain-down of the SFP due to a seismic event. Further, the staff concludes that the licensee demonstrated that a potential drain-down of the SFP as a result of the reevaluated seismic hazard is unlikely.

#### AUDIT REPORT

The July 6, 2017, generic audit plan describes the NRC staff's intention to issue an audit report that summarizes and documents the NRC's regulatory audit of licensee's submittals associated with reevaluated seismic hazard analyses. The NRC staff's Seabrook audit was limited to the review of the calculation discussed above. An audit summary document is included as Enclosure 2 to this letter.

CONCLUSION

The NRC staff reviewed the licensee's SFP evaluation report. Based on its review, the NRC staff concludes that the licensee's implementation of the SFP integrity evaluation met the criteria of the SFP Evaluation Guidance Report for Seabrook and therefore, the licensee responded appropriately to Item (9) in Enclosure 1 of the 50.54(f) letter. The NRC staff further concludes that the licensee has demonstrated an adequate margin to preclude a potential drain-down of the SFP as a result of the reevaluated seismic hazard at Seabrook.

If you have any questions, please contact me at (301) 415-3075 or via electronic mail at Brett.Titus@nrc.gov.

Sincerely,



Brett Titus, Senior Project Manager  
Beyond-Design-Basis Management Branch  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures:

1. Technical Review Checklist
2. NRC Staff Audit Summary

cc w/encl: Distribution via Listserv

TECHNICAL REVIEW CHECKLIST  
BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO SPENT FUEL POOL EVALUATIONS FOR HIGH GROUND MOTION  
RESPONSE SPECTRUM SITES  
IMPLEMENTING NEAR-TERM TASK FORCE RECOMMENDATION 2.1 SEISMIC  
SEABROOK STATION, UNIT 1  
DOCKET NO. 50-443

BACKGROUND

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) (hereafter referred to as the "50.54(f) letter"). Enclosure 1 of the 50.54(f) letter requests addressees to reevaluate the seismic hazard at their site using present-day methods and guidance for licensing new nuclear power plants, and identify actions to address or modify, as necessary, plant components affected by the reevaluated seismic hazards. Enclosure 1, Item (4), of the 50.54(f) letter requested that licensees perform a comparison of the ground motion response spectrum (GMRS) with the safe shutdown earthquake (SSE). Enclosure 1, Item (9), requests that, when the GMRS exceeds the SSE in the 1 to 10 Hertz (Hz) frequency range, a seismic evaluation be made of the spent fuel pool (SFP). More specifically, plants were asked to consider all seismically induced failures that can lead to draining of the SFP.

Additionally, by letter dated January 31, 2017 (ADAMS Accession No. ML17031A171), the Nuclear Energy Institute (NEI) submitted the Electric Power Research Institute (EPRI) Report No. 3002009564 entitled, "Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation" (SFP Evaluation Guidance Report). The SFP Evaluation Guidance Report supports the completion of SFP evaluations for sites with reevaluated seismic hazard exceedance in the 1 to 10 Hz frequency range. The NRC endorsed the SFP Evaluation Guidance Report by letter dated February 28, 2017 (ADAMS Accession No. ML17034A408), as an acceptable method for licensees to use when responding to Item (9) in Enclosure 1 of the 50.54(f) letter. Licensee deviations from the SFP Evaluation Guidance should be discussed in their SFP evaluation submittal.

By letter dated November 2, 2017 (ADAMS Accession No. ML17307A016), NextEra Energy Seabrook, LLC (NextEra, the licensee), provided an SFP report in response to Enclosure 1, Item (9), of the 50.54(f) letter for Seabrook Station, Unit 1 (Seabrook). The NRC staff performed its review of the licensee's submittal to assess whether the licensee responded appropriately to Item (9) in Enclosure 1 of the 50.54(f) letter. The NRC staff evaluated whether the SFP Evaluation Guidance Report methodology had been followed when calculating the site-specific seismic capacity of the SFP, and that Seabrook's site-specific values and conditions are within the acceptable limits and bounds considered for the non-structural evaluation criteria specified in the SFP Evaluation Guidance Report. The NRC staff also confirmed that the requested information in response to Item (9) of the 50.54(f) letter was provided.

A review checklist was used for consistency and efficiency. The application of this staff review is limited to the SFP evaluation as part of the seismic review as part of the Near-Term Task Force (NTTF) Recommendation 2.1.

**NTTF Recommendation 2.1 Spent Fuel Pool Evaluations  
Technical Review Checklist for Seabrook Station, Unit 1**

**Site Parameters:**

***I. Site-Specific GMRS***

<p><b>The licensee:</b></p> <ul style="list-style-type: none"> <li>Used the site-specific GMRS hazard, consistent with the information in the Seismic Hazard and Screening Report (SHSR) or its update, that was evaluated and accepted in the NRC staff assessment when calculating the SFP high confidence of low probability of failure (HCLPF) value.</li> </ul>	<p align="center">Yes</p>
<p><b>Notes from the reviewer:</b></p> <ol style="list-style-type: none"> <li>The NRC staff reviewed the licensee's calculation FP 101180-000, "Spent Fuel Pool Structural Evaluations," Revision 0, as a part of the audit process for Seabrook. The staff notes that the calculation derives In-Structure Response Spectra (ISRS) seismic input values for the Fuel Storage Building by employing a scaling methodology to existing ISRS values that were developed for the safe shutdown earthquake (SSE). See conclusion below for details.</li> </ol> <p><b>Deviation(s) or Deficiency(ies), and Resolution:</b></p> <p align="center">No deviations or deficiencies were identified.</p>	
<p><b>The NRC staff concludes that:</b></p> <ul style="list-style-type: none"> <li>The licensee's derivation of the Fuel Storage Building ISRS using scaled data from the SSE ISRS is reasonable for the purposes of this calculation. Scaling of response spectra is a common practice in seismic evaluations, and Seabrook's implementation of this practice is reasonable for this purpose.</li> </ul>	

**Structural Parameters:**

**II. Seismic Design of the SFP Structure**

<p><b>The licensee:</b></p> <ul style="list-style-type: none"><li>• Performed site-specific calculations to demonstrate that the limiting SFP HCLPF capacity value is greater than the peak spectral acceleration of the site-specific GMRS.</li></ul>	<p>Yes</p>
<p><b>Notes from the reviewer:</b></p> <p>1. The NRC staff confirmed that the licensee followed the methodology described in the SFP Evaluation Guidance Report in calculation FP 101180-000, Revision 0, to calculate an SFP HCLPF capacity. The resulting HCLPF value is greater than the site-specific GMRS; therefore, it is reasonable to conclude that the SFP has sufficient capacity to withstand a seismic event at least up to the GMRS without failure that would lead to a rapid draindown.</p> <p><b>Deviation(s) or Deficiency(ies), and Resolution:</b></p> <p>No deviations or deficiencies were identified.</p>	
<p><b>The NRC staff concludes that:</b></p> <ul style="list-style-type: none"><li>• The SFP has sufficient capacity to withstand a seismic event at least up to the GMRS without failure that would lead to a rapid draindown.</li></ul>	

**III. SFP Structure Included in the Civil Inspection Program Performed in Accordance with Maintenance Rule**

<p><b>The licensee:</b></p> <ul style="list-style-type: none"><li>• Stated that the SFP structure is included in the Civil Inspection Program performed in accordance with Maintenance Rule (10 CFR 50.65).</li></ul>	<p>Yes</p>
<p><b>Notes from the reviewer:</b></p> <ol style="list-style-type: none"><li>1. The licensee stated that the SFP structure is included in the Seabrook Structures Monitoring Program Manual, Revision 2.</li></ol> <p><b>Deviation(s) or Deficiency(ies), and Resolution:</b></p> <p>No deviations or deficiencies were identified.</p>	
<p><b>The NRC staff concludes that:</b></p> <ul style="list-style-type: none"><li>• The SFP structure is included in the Civil Inspection Program performed in accordance with Maintenance Rule (10 CFR 50.65).</li></ul>	



**Non-Structural Parameters:**

**IV. Applicability of Piping Evaluation**

<p><b>The licensee:</b></p> <ul style="list-style-type: none"><li>• Stated that there are no piping penetrations attached to the SFP more than 6 feet (ft.) below the surface of the water.</li></ul>	<p>No</p>
<p><b>Notes from the reviewer:</b></p> <ol style="list-style-type: none"><li>1. The licensee's submittal stated that the limiting penetration is a 10-inch SFP cooling return line with a penetration bottom elevation 9.45 ft. below the SFP normal water surface elevation, and that the criterion of the SFP Evaluation Guidance Report was not met for Seabrook.</li><li>2. A site-specific calculation was performed and provided on an ePortal as a part of the audit process to demonstrate that the limiting penetration break and/or siphoning event combined with boil-off and evaporation will not uncover one-third of the fuel assemblies' height in less than 72 hours.</li><li>3. Not uncovering one-third of the fuel assemblies' height in less than 72 hours is the performance measure specified in the EPRI Report 1025287, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID)" (ADAMS Accession No. ML12333A170). The SPID was endorsed by the NRC in a letter dated February 15, 2013 (ADAMS Accession No. ML12319A074).</li><li>4. The staff reviewed the licensee's calculation FP 101184-000, "Spent Fuel Pool Evaluation Supplemental Report Submittal," Revision 0, and the NRC conclusion is as shown below.</li></ol> <p><b>Deviation(s) or Deficiency(ies), and Resolution:</b></p> <p>As described in the Notes directly above, Seabrook does have a configuration that deviates from the maximum penetration depth criterion of the SFP Evaluation Guidance Report. The resolution of this deviation is summarized in the NRC staff conclusions below. No deficiencies were identified.</p>	
<p><b>The NRC staff concludes that:</b></p> <ul style="list-style-type: none"><li>• There is a piping penetration attached to the SFP more than 6 ft. below the surface of the water. However, the licensee's site-specific calculation, FP 101184-000, was reviewed by the staff as part of the audit process. The calculation demonstrates that the limiting penetration break and/or siphoning event combined with boil-off and evaporation will not uncover one-third of the fuel assemblies' height in less than 72 hours. The calculation shows that the time for the SFP water surface elevation to reach the top of the fuel assemblies is 89 hours, and the additional time to reach one-third the fuel assemblies' height is considered additional available margin. Therefore, the SFP performance criterion set forth in the SPID, as endorsed by the NRC, is met.</li></ul>	

**V. Ductile Behavior of SFP Gates**

<p><b>The licensee:</b></p> <ul style="list-style-type: none"><li>• Stated that the SFP gate is constructed from a ductile material (e.g. aluminum or stainless steel alloys).</li></ul>	<p>Yes</p>
<p><b>Notes from the reviewer:</b></p> <ol style="list-style-type: none"><li>1. The licensee stated that the SFP gates are constructed from a stainless steel alloy, referencing site drawing 102217, Fuel Storage Building Stainless Steel Spent Fuel Pool Liner – Sheet 5, Revision 4. This is consistent with the materials specified in the SFP Evaluation Guidance Report to ensure ductile behavior of the gates.</li></ol> <p><b>Deviation(s) or Deficiency(ies), and Resolution:</b></p> <p>No deviations or deficiencies were identified.</p>	
<p><b>The NRC staff concludes that:</b></p> <ul style="list-style-type: none"><li>• The SFP gates are constructed from a material expected to exhibit ductile behavior under higher seismic demands.</li></ul>	

**VI. Siphoning Evaluation**

<p><b>The licensee:</b></p> <ul style="list-style-type: none"> <li>• Stated that anti-siphoning devices are installed on piping systems that could lead to siphoning inventory from the SFP.</li> <li>• In cases where anti-siphoning devices were not included on the applicable piping, a description documenting the evaluation performed to determine the seismic adequacy of the piping is provided.</li> <li>• Stated that the piping of the SFP cooling system cannot lead to rapid drain down due to siphoning.</li> <li>• Stated that no anti-siphoning devices are attached to 2" or smaller piping with extremely large extended operators.</li> <li>• Provided a seismic adequacy evaluation, in accordance with NP-6041, for cases where active siphoning devices are attached to 2" or smaller piping with extremely large extended operators.</li> </ul>	<p>Yes</p> <p>N/A</p> <p>Yes</p> <p>N/A</p> <p>N/A</p>
<p><b>Notes from the reviewer:</b></p> <ol style="list-style-type: none"> <li>1. The licensee stated that anti-siphoning holes are present in SFP-attached piping that could lead to siphoning of water; however, the location of the anti-siphoning holes at Seabrook are located such that the water loss from a siphoning event could be greater than the water loss that is assumed for a potential penetration break in criterion IV. Applicability of Piping Evaluation of this checklist.</li> <li>2. See Notes for criterion IV. Applicability of Piping Evaluation and the staff conclusions of both criteria IV and VI for more details.</li> </ol> <p><b>Deviation(s) or Deficiency(ies), and Resolution:</b></p> <p>No deviations or deficiencies were identified.</p>	
<p><b>The NRC staff concludes that:</b></p> <ul style="list-style-type: none"> <li>• There are anti-siphoning holes in SFP piping that could result in a larger water loss than the water loss that is assumed for a potential penetration break in criterion IV. Applicability of Piping Evaluation. Therefore, the licensee's site-specific calculation, FP 101184-000, was reviewed by the staff as part of the audit process. The calculation demonstrates that the limiting penetration break and/or siphoning event combined with boil-off and evaporation will not uncover one-third of the fuel assemblies' height in less than 72 hours. The calculation shows that the time for the SFP water surface elevation to reach the top of the fuel assemblies is 89 hours, and the additional time to reach one-third the fuel assemblies' height is considered additional available margin. Therefore, the SFP performance criterion set forth in the SPID, as endorsed by the NRC, is met.</li> </ul>	

**VII. Sloshing Evaluation**

<p><b>The licensee:</b></p> <ul style="list-style-type: none"> <li>• Specified the SFP dimensions (length, width, and depth).</li> <li>• Specified that the SFP dimensions are bounded by the dimensions specified in the report (i.e., SFP length and width &lt;125ft.; SFP depth &gt;36ft.).</li> </ul>	<p>Yes Yes</p>
<p><b>Notes from the reviewer:</b></p> <ol style="list-style-type: none"> <li>1. SFP dimensions as stated in the November 2, 2017 submittal letter: <ul style="list-style-type: none"> <li>- SFP Length – 37.5 ft.</li> <li>- SFP Width – 27.0 ft.</li> <li>- SFP Depth – 39.46 ft.</li> </ul> </li> <li>2. The values used in calculation FP 101180-000 were: <ul style="list-style-type: none"> <li>- SFP Length – 37.5 ft.</li> <li>- SFP Width – 27.0 ft.</li> <li>- SFP Depth – 39.9 ft.</li> </ul> </li> <li>3. The difference in the pool depth noted above is not significant, and the calculation results are acceptable.</li> </ol> <p><b>Deviation(s) or Deficiency(ies), and Resolution:</b></p> <p>No deviations or deficiencies were identified.</p>	
<p><b>The NRC staff concludes that:</b></p> <ul style="list-style-type: none"> <li>• SFP dimensions are bounded by the dimensions specified in the report (i.e., SFP length and width &lt;125ft.; SFP depth &gt;36ft.).</li> </ul>	

**VIII. Evaporation Evaluation**

<p><b>The licensee:</b></p> <ul style="list-style-type: none"> <li>• Provided the surface area of the plant's SFP.</li> <li>• Stated that the surface area of the plant's SFP is greater than 500 ft.<sup>2</sup>.</li> <li>• Provided the licensed reactor core thermal power.</li> <li>• Stated that the reactor core thermal power is less than 4,000 megawatt thermal (MW<sub>t</sub>) per unit.</li> </ul>	<p>Yes Yes Yes Yes</p>
<p><b>Notes from the reviewer:</b></p> <ol style="list-style-type: none"> <li>1. Surface area of pool = 1012.5 ft.<sup>2</sup> (dimensions from calculation FP 101180-000)</li> <li>2. Reactor thermal power = 3648 MW<sub>t</sub> (Seabrook Updated Final Safety Analysis Report, Section 1.1.1)</li> </ol> <p><b>Deviation(s) or Deficiency(ies), and Resolution:</b></p> <p>No deviations or deficiencies were identified.</p>	
<p><b>The NRC staff concludes:</b></p> <ul style="list-style-type: none"> <li>• The surface area of the plant's SFP is greater than 500 ft.<sup>2</sup>.</li> <li>• The reactor core thermal power is less than 4,000 MW<sub>t</sub> per unit.</li> </ul>	

**Conclusions:**

The NRC staff reviewed the licensee's SFP evaluation report. Based on its review, the NRC staff concludes that the SFP Evaluation Guidance Report methodology has been followed when calculating the site-specific seismic capacity of the SFP, and that Seabrook's site-specific values and conditions are within the acceptable limits and bounds considered for the non-structural evaluation criteria specified in the SFP Evaluation Guidance Report. Therefore, the licensee responded appropriately to Item (9) in Enclosure 1 of the 50.54(f) letter. The NRC staff further concludes that the licensee has demonstrated an adequate margin to preclude a potential drain-down of the SFP as a result of the reevaluated seismic hazard at Seabrook.

AUDIT SUMMARY BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO

SEABROOK STATION, UNIT 1

SPENT FUEL POOL EVALUATION ASSOCIATED WITH REEVALUATED SEISMIC HAZARD

IMPLEMENTING NEAR-TERM TASK FORCE RECOMMENDATION 2.1: SEISMIC

(EPID L-2017-JLD-0053)

BACKGROUND AND AUDIT BASIS

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) (hereafter referred to as the 50.54(f) letter). Enclosure 1 to the 50.54(f) letter requested that licensees reevaluate the seismic hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses.

By letter dated October 27, 2015 (ADAMS Accession No. ML15194A015), the NRC made a determination of which licensees were to perform: (1) a seismic probabilistic risk assessment (SPRA), (2) limited scope evaluations, or (3) no further actions based on a comparison of the reevaluated seismic hazard and the site's design-basis earthquake. (Note: Some plant-specific changes regarding whether an SPRA was needed or limited scope evaluations were needed at certain sites have occurred since the issuance of the October 27, 2015, letter.)

By letter dated July 6, 2017 (ADAMS Accession No. ML17177A446), the NRC issued a generic audit plan and entered into the audit process described in Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008 (ADAMS Accession No. ML082900195), to assist in the timely and efficient closure of activities associated with the 50.54(f) letter. Seabrook Station, Unit 1 (Seabrook) was included in the list of applicable licensees.

REGULATORY AUDIT SCOPE AND METHODOLOGY

The areas of focus for the regulatory audit are the information contained in the spent fuel pool (SFP) evaluation submittal and all associated and relevant supporting documentation used in the development of the SFP evaluation including, but not limited to, methodology, process information, calculations, computer models, etc.

AUDIT ACTIVITIES

The Seabrook audit took place at the NRC Headquarters in Rockville, MD, beginning on July 6, 2017. Licensee personnel participated remotely, via email, from their respective offices. A list of the licensee staff and NRC staff that participated in the audit is contained in Table 1.

**Table 1**

<b>NRC Staff</b>		<b>Licensee Staff</b>	
<b>Name</b>	<b>Title</b>	<b>Name</b>	<b>Title</b>
Brett Titus	Sr. Project Manager	Christine Thomas	Sr. Licensing Engineer

On January 2, 2018, the NRC staff requested, via email, that the licensee upload the calculation that was performed to determine the high confidence low probability of failure (HCLPF) value for the SFP onto the licensee's ePortal (electronic reading room). The licensee uploaded calculation FP 101180-000, "Spent Fuel Pool Structural Evaluations," Revision 0, onto the ePortal on January 3, 2018, as requested by the NRC staff.

On April 17, 2018, the NRC staff requested, via email, that the licensee upload the calculation that demonstrates that the limiting penetration break and/or siphoning event combined with boil-off and evaporation would not lead to uncovering one-third of the fuel assemblies' height in less than 72 hours. This calculation was necessary because Seabrook's SFP piping penetration configuration does not meet the maximum piping penetration depth criterion of the Electric Power Research Institute (EPRI) Report No. 3002009564, "Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation." The licensee uploaded calculation FP 101184-000, "Spent Fuel Pool Evaluation Supplemental Report Submittal," Revision 0, onto the ePortal on April 17, 2018, as requested by the NRC staff.

**DOCUMENTS AUDITED**

FP 101180-000, "Spent Fuel Pool Structural Evaluations," Revision 0  
FP 101184-000, "Spent Fuel Pool Evaluation Supplemental Report Submittal," Revision 0

**OPEN ITEMS AND REQUEST FOR INFORMATION**

Following the review of the SFP HCLPF calculation and the boil-off and evaporation calculation, there were no open items identified by the NRC staff that required proposed closure paths, and there were no requests for information discussed or planned to be issued.

**DEVIATIONS FROM AUDIT PLAN**

There were no deviations from the July 6, 2017, generic audit plan.

**AUDIT CONCLUSION**

The issuance of this document, containing the staff's review of the SFP evaluation submittal, concludes the SFP audit process for Seabrook.

SUBJECT: SEABROOK STATION, UNIT 1 - STAFF REVIEW OF SPENT FUEL POOL EVALUATION ASSOCIATED WITH REEVALUATED SEISMIC HAZARD IMPLEMENTING NEAR-TERM TASK FORCE RECOMMENDATION 2.1: SEISMIC DATED April 30, 2018

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