



November 2, 2017
SBK-L-17164
Docket No. 50-443

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Seabrook Station
Spent Fuel Pool Integrity Evaluation Summary Supplemental Report in 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," March 12, 2012, ADAMS Accession Number ML12053A340
2. EPRI 3002009564, Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation, January 2017
3. NRC Letter, "Endorsement of Electric Power Research Institute Report 3002009564, 'Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation,'" February 28, 2017, ADAMS Accession Number ML11034A408
4. NRC Letter, "Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," October 27, 2015, ADAMS Accession Number ML15194A015
5. NextEra Energy Seabrook, LLC letter SBK-14052 to the NRC, "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," March 27, 2014, ADAMS Accession Number ML14092A413
6. Seabrook Station, Unit 1 – 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," August 12, 2015, ADAMS Accession Number ML15208A049

The NRC issued a 50.54(f) letter on March 12, 2012 (Ref. 1), requesting information to assure that recommendations from the Fukushima Near-Term Task Force (NTTF) are addressed by all U.S. nuclear power plants. The 50.54(f) letter requests that licensees and holders of construction permits under 10 CFR Part 50 reevaluate the seismic hazards at their sites against present-day NRC requirements and guidance. Included in the 50.54(f) letter was a request that licensees perform a SFP Evaluation.

Subsequent guidance for performing SFP Integrity Evaluations was provided by EPRI in Technical Report 3002009564 (Ref. 2), which provides criteria for evaluating the seismic adequacy of a SFP to the reevaluated ground motion response spectrum (GMRS) hazard levels. EPRI 3002009564 was endorsed by the NRC in Reference 3.

Final screening identifying plants needing to perform a limited scope SFP Integrity Evaluation, including Seabrook Station, was provided by the NRC in Reference 4. Plants were divided into two categories with regard to SFP evaluations, those with GMRS peak spectral accelerations less than 0.8g, and those with higher peak spectral accelerations.

Seabrook Station specific GMRS values were submitted to the NRC in Reference 5, and accepted by the NRC in Reference 6. Seabrook Station's GMRS peak spectral acceleration is greater than 0.8g. Section 4 of EPRI 3002009564 (Ref. 2) is therefore applicable to Seabrook. Section 4.3 of EPRI 3002009564 lists the parameters to be verified to confirm that the results of the report are applicable to NextEra Energy Seabrook, and that the Seabrook Station SFP is seismically adequate in accordance with NTTF 2.1 Seismic evaluation criteria.

The enclosure to this letter provides the SFP Integrity Evaluation Summary for Seabrook Station prepared in accordance with EPRI 3002009564 and confirms that the SFP is seismically adequate in accordance with NTTF 2.1 Seismic evaluation criteria.

This letter contains no new regulatory commitments.

Should you have any questions concerning this submittal, please contact Mr. Kenneth Browne, Licensing Manager, at (603) 773-7932.

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

Executed on November 2nd, 2017.

Sincerely,

NextEra Energy Seabrook, LLC


Eric McCartney
Regional Vice President - Northern Region

Enclosure

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Seabrook Station

NextEra Energy Seabrook, LLC

Docket No. 50-443

Spent Fuel Pool Integrity Evaluation Summary

SEABROOK STATION SPENT FUEL POOL INTEGRITY EVALUATION SUMMARY

The NRC issued a 50.54(f) letter on March 12, 2012 (Ref. 1), requesting information to assure that recommendations from the Fukushima Near-Term Task Force (NTTF) are addressed by all U.S. nuclear power plants. The 50.54(f) letter requested that, in conjunction with the response to NTTF Recommendation 2.1, a seismic evaluation be made of the SFP. More specifically, plants were asked to consider “all seismically induced failures that can lead to draining of the SFP.” Such an evaluation would be needed for any plant in which the ground motion response spectrum (GMRS) exceeds the safe shutdown earthquake (SSE) in the 1 to 10 Hz frequency range. The NRC staff confirmed through References 3 and 4 that the GMRS exceeds the SSE and concluded that a SFP evaluation is merited for Seabrook Station. By letter dated 02/08/2017 (Ref. 5), the NRC staff determined that EPRI 3002009564 (Ref. 6) was an acceptable approach for performing SFP evaluations considering the GMRS hazard levels.

The table below lists the criteria from Section 4.3 of EPRI 3002009564 along with data for Seabrook Station that confirms applicability of the EPRI 3002009564 criteria and confirms that the SFP is seismically adequate in accordance with NTTF 2.1 Seismic evaluation criteria. A site-specific boil off and evaporation calculation was performed in Reference 8 to validate that the EPRI 3002009564 acceptance criteria are met for the two parameters listed below not bounded by EPRI 3002009564 Section 4.3 criteria values.

SFP Criteria from EPRI 3002009564	Site-Specific Data
Site Parameters	
1. The site-specific GMRS should be the same as that submitted to the NRC between March 2014 and July 2015, which the NRC has found acceptable for responding to the NRC 50.54(f) letter.	The Seabrook Station GMRS peak spectral acceleration in Reference 2 as accepted by the NRC in Reference 3 is 1.060g. This same GMRS is used for the Seabrook SFP Structural Integrity evaluations.
Structural Parameters	
2. Site-specific calculations, performed in accordance with Section 4.1 of EPRI 3002009564 should demonstrate that the limiting SFP HCLPF is greater than the site-specific GMRS in the frequency range of interest (e.g., 10-20 Hz).	Site-specific calculations (Ref. 7), performed in accordance with Section 4.1 of EPRI 3002009564, demonstrate that the limiting SFP HCLPF is 1.423g, which exceeds the GMRS peak ground acceleration of 0.499g. Therefore, this criterion is met for Seabrook Station.
3. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.	The SFP structure is included in the Seabrook Station Civil Inspection Program (Ref. 9) in accordance with 10 CFR 50.65, therefore, this criterion is met for Seabrook Station.

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Seabrook Station Spent Fuel Pool Integrity Evaluation Summary

SFP Criteria from EPRI 3002009564	Site-Specific Data
Non-Structural Parameters	
<p>4. To confirm applicability of the piping evaluation in Section 4.2 of EPRI 3002009564, piping attached to the SFP should have penetrations no more than six feet below the water surface.</p>	<p>The maximum depth of piping below the water surface is not less than six feet. The limiting penetration is the 10" SFP cooling return line with a penetration bottom elevation 9.45 ft. below the SFP normal water surface elevation (Ref. 8). Therefore, this criterion is not met for Seabrook Station.</p> <p>A detailed calculation of the boil-off and evaporation rate considering a penetration break and siphoning is provided in Reference 8. It was concluded that that the limiting penetration break and/or siphoning event combined with boil-off and evaporation are not sufficient to uncover 1/3 of the fuel assemblies' height in less than 72 hours (Ref. 8). Time to reach the top of the spent fuel storage racks is calculated in Reference 8 to be 89 hours. Therefore the Seabrook Station SFP penetration heights meet the EPRI 3002009564 acceptance criteria for potential inventory loss due to a seismic event.</p>
<p>5. To confirm ductile behavior under increased seismic demands, SFP gates should be constructed from either aluminum or stainless steel alloys.</p>	<p>The SFP gate is constructed from a stainless steel alloy as documented Reference 10, therefore, this criterion is met for Seabrook Station.</p>

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SFP Criteria from EPRI 3002009564	Site-Specific Data
Non-Structural Parameters (cont.)	
<p>6. Anti-siphoning devices should be installed on any piping that could lead to siphoning water from the SFP. In addition, for any cases where active anti-siphoning devices are attached to 2-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.</p>	<p>Each piping line that could potentially lead to siphoning water from the SFP has an anti-siphoning mechanism (Ref. 8). Therefore, this criterion is technically met. However the Seabrook Station piping configuration would result in a siphoning inventory loss greater than the one assumed in criterion #4 above. Upon review of the existing piping configuration and the locations of the siphon breakers, the 4" SFP purification return line would cause the largest water loss due to siphoning in case of a line break (Ref. 8). The line has a 1/2" siphon hole in the SFP at elevation 13' 0" (Ref. 11). This criterion will therefore be treated as not met.</p> <p>A detailed calculation of the boil-off and evaporation rate considering a line break of the 4" SFP purification return line and siphoning of SFP inventory to elevation 13' 0" is provided in Reference 8. It was concluded that that the limiting siphoning event combined with boil-off and evaporation are not sufficient to uncover 1/3 of the fuel assemblies' height in less than 72 hours (Ref. 8). Time to reach the top of the spent fuel storage racks is calculated in Reference 8 to be 89 hours. Time required to boil off SFP inventory from the top of the spent fuel storage racks to uncover 1/3 of the fuel assemblies' height provides additional margin. Therefore the arrangement of Seabrook Station SFP anti-siphon devices meets the EPRI 3002009564 acceptance criteria for potential inventory loss due to a seismic event.</p>
<p>7. To confirm applicability of the sloshing evaluation in Section 4.2 of EPRI 3002009564, the maximum SFP horizontal dimension (length or width) should be less than 125 ft. and the SFP depth should be greater than 36 ft.</p>	<p>The Seabrook Station SFP has a length of 37.5 ft., a width of 27.0 ft., and a depth of 39.46 ft. based on Reference 12. Therefore, this criterion is met for Seabrook Station.</p>
<p>8. To confirm applicability of the evaporation loss evaluation in Section 4.2 of EPRI 3002009564, the SFP surface area should be greater than 500 ft² and the licensed reactor core thermal power should be less than 4,000 MWt per unit.</p>	<p>The Seabrook Station SFP has a surface area of 1012.5 ft.² (27.0' x 37.5' per Ref. 11), which is greater than 500 ft.². Licensed reactor thermal power for Seabrook Station is 3648 MWt per unit (Reference 13, Section 1.1.1), which is less than 4,000 MWt. Therefore this criterion is met for Seabrook Station.</p>

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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," March 12, 2012, ADAMS Accession Number ML12053A340
2. Seabrook Letter, SBK-L-14052, "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 Recommendations 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", March 27, 2014, ADAMS Accession Number ML14092A413
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5. NRC Letter , "Endorsement Of Electric Power Research Institute Report 3002009564, 'Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation,'" February 28, 2017, ADAMS Accession Number ML17034A408
6. EPRI Technical Report 3002009564, Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation, January 2017
7. FP101180, Rev. 0, Jensen Hughes S&A Calculation 1TCR27128-SQ-CAL-001, "Spent Fuel Pool Structural Evaluations," Rev. 0
8. FP101184, Rev. 0, Jensen Hughes S&A Report 1TCR27128-SQ-RPT-001, "Spent Fuel Pool Evaluation Supplemental Report Submittal," Rev. 0
9. Seabrook Structures Monitoring Program Manual (SMPM), Rev. 2
10. Seabrook Drawing 102217, Fuel Storage Building Stainless Steel Spent Fuel Pool Liner – Sheet 5, Revision 4
11. Seabrook Isometric Drawing SF-1709-03, Spent Fuel Pool Cooling Line 1-SF-1709-02, Revision 5
12. Seabrook Drawing 102200, Fuel Storage Building Stainless Steel Spent Fuel Pool Liner – Sheet 1, Revision 12
13. Seabrook Station Updated Final Safety Analysis Report (UFSAR), Revision 17