



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

March 1, 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 ASSESSMENT OF FLOODING
FOCUSED EVALUATION (CAC NO. MF9898; EPID NO. 000495/05000443/L-
2017-JLD-0029)**

Dear Mr. Nazar:

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"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807). Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood 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 (ADAMS Accession No. ML12056A046). By letter dated November 7, 2016 (ADAMS Accession No. ML16314D429, Non-Public), NextEra Energy Seabrook, LLC (NextEra, the licensee) responded to this request for Seabrook Station, Unit 1 (Seabrook).

After its review of the licensee's response, by letter dated December 21, 2016 (ADAMS Accession No. ML16356A479), the NRC issued an interim staff response (ISR) letter for Seabrook. The ISR letter provided the reevaluated flood hazard mechanisms that exceeded the current design basis (CDB) for Seabrook and parameters that are suitable for other assessments associated with NTTF Recommendation 2.1, "Flooding." As stated in the letter, because the local intense precipitation (LIP) and probable maximum storm surge (PMSS) flood-causing mechanisms at Seabrook are not bounded by the plant's CDB, additional assessments of these flood hazard mechanisms are necessary.

By letter dated June 28, 2017 (ADAMS Accession No. ML17181A409), the licensee submitted the focused evaluation (FE) for Seabrook. The FEs are intended to confirm that licensees have adequately demonstrated, for unbounded mechanisms identified in the ISR letter, that: 1) a flood mechanism is bounded based on further reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the unbounded mechanism; or 3) a feasible response

is provided if the unbounded mechanism is local intense precipitation. The purpose of this letter is to provide the NRC's assessment of the Seabrook FE.

As set forth in the attached staff assessment, the NRC staff has concluded that the Seabrook FE was performed consistent with the guidance described in Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178). Guidance document NEI 16-05, Revision 1, has been endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16162A301). The NRC staff has further concluded that the licensee has demonstrated that effective flood protection, if appropriately implemented, exists for the LIP and PMSS flood mechanisms during a beyond-design-basis external flooding event at Seabrook. This closes out the licensee's response for Seabrook for the reevaluated flooding hazard portion of the 50.54(f) letter and the NRC's efforts associated with CAC No. MF9898.

If you have any questions, please contact me at 301-415-1617 or at Frankie.Vega@nrc.gov.

Sincerely,



Frankie Vega, Project Manager
Beyond-Design-Basis Management Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket No: 50-443

Enclosure:
Staff Assessment Related to the
Flooding Focused Evaluation for Seabrook

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE FOCUSED EVALUATION FOR
SEABROOK STATION, UNIT 1
AS A RESULT OF THE REEVALUATED FLOODING HAZARD NEAR-TERM TASK FORCE
RECOMMENDATION 2.1 - FLOODING
CAC NO. MF9898; EPID NO. 000495/05000443/L-2017-JLD-0029

1.0 INTRODUCTION

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"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807).

Enclosure 2 of the 50.54(f) letter requested that licensees reevaluate flood hazards for their respective sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). If the reevaluated hazard for any flood-causing mechanism is not bounded by the plant's current design basis (CDB) flood hazard, an additional assessment of plant response would be necessary. Specifically, the 50.54(f) letter stated that an integrated assessment should be submitted, and described the information that the integrated assessment should contain. By letter dated November 30, 2012 (ADAMS Accession No. ML12311A214), the NRC staff issued Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2012-05, "Guidance for Performing the Integrated Assessment for External Flooding."

On June 30, 2015 (ADAMS Accession No. ML15153A104), the NRC staff issued COMSECY-15-0019, describing the closure plan for the reevaluation of flooding hazards for operating nuclear power plants. The Commission approved the closure plan on July 28, 2015 (ADAMS Accession No. ML15209A682). COMSECY-15-0019 outlines a revised process for addressing cases in which the reevaluated flood hazard is not bounded by the plant's CDB. The revised process describes a graded approach in which licensees with hazards exceeding their CDB flood will not be required to complete an integrated assessment, but instead will perform a focused evaluation (FE). As part of the FE, licensees will assess the impact of the hazard(s) on their site and then evaluate and implement any necessary programmatic, procedural, or plant modifications to address the hazard exceedance.

Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178), has been endorsed by the NRC as an appropriate methodology for licensees to perform the focused evaluation in response to the 50.54(f) letter. The NRC's endorsement of NEI 16-05, including exceptions, clarifications, and additions, is

Enclosure

described in NRC JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16162A301).

2.0 BACKGROUND

This provides the final NRC staff assessment associated with the information that the licensee provided in response to the reevaluated flooding hazard portion of the 50.54(f) letter.

Therefore, this background section includes a summary description of the reevaluated flood information provided by the licensee and the associated assessments performed by the NRC staff. The reevaluated flood information includes: 1) the flood hazard reevaluation report (FHRR); 2) the mitigation strategies assessment (MSA); and 3) the focused evaluation.

Flood Hazard Reevaluation Report

By letter dated November 7, 2016 (ADAMS Accession No. ML16314D429, Non-Public), NextEra Energy Seabrook, LLC (NextEra, the licensee) submitted its flood hazard reevaluation report (FHRR) Revision 1 for Seabrook. After reviewing the licensee's response, by letter dated December 21, 2016 (ADAMS Accession No. ML16356A479), the NRC issued an interim staff response (ISR) letter for Seabrook. The ISR letter discusses the reevaluated flood hazard mechanisms that exceeded the CDB for Seabrook and parameters that are a suitable input for the MSA and the FE. As stated in the ISR letter, because the local intense precipitation (LIP) and probable maximum storm surge (PMSS) flood-causing mechanisms at Seabrook are not bounded by the plant's CDB, additional assessments of the flood hazard mechanisms are necessary. The NRC staff issued a final staff assessment of the FHRR in a letter dated January 12, 2018 (ADAMS Accession No. ML17354B172). The NRC staff's conclusions regarding LIP and PMSS exceeding the Seabrook CDB remained unchanged from the information provided in the ISR letter.

Mitigation Strategies Assessment

By letter dated June 14, 2017 (ADAMS Accession No. ML17166A001), the licensee submitted its MSA for Seabrook for review by the NRC staff. The MSAs are intended to confirm that licensees have adequately addressed the reevaluated flooding hazards within their mitigation strategies for beyond-design-basis external events. By letter dated November 29, 2017 (ADAMS Accession No. ML17306A484), the NRC issued its assessment of the Seabrook MSA. The NRC staff concluded that the Seabrook MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" (ADAMS Accession No. ML16005A625). The NRC's endorsement of NEI 12-06, Revision 2, is described in JLD-ISG-2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15357A163). The NRC staff further concluded that the licensee has demonstrated that the mitigation strategies, if appropriately implemented, are reasonably protected from reevaluated flood hazards conditions for beyond-design-basis external events.

Focused Evaluation

By letter dated June 28, 2017 (ADAMS Accession No. ML17181A409), the licensee submitted the FE for Seabrook. The FEs are intended to confirm that licensees have adequately demonstrated, for unbounded mechanisms identified in the ISR letter, that: 1) a flood mechanism is bounded based on further reevaluation of flood mechanism parameters;

2) effective flood protection is provided for the unbounded mechanism; or 3) a feasible response is provided if the unbounded mechanism is local intense precipitation. These 3 options associated with performing an FE are referred to as Path 1, 2, or 3, as described in NEI 16-05, Revision 1. The purpose of this staff assessment is to provide the results of the NRC's evaluation of the Seabrook FE.

3.0 TECHNICAL EVALUATION

The licensee stated that its FE followed Path 2 of NEI 16-05, Revision 1 and utilized Appendices B and C for guidance on evaluating the site strategy. The Seabrook FE addresses the LIP and PMSS flooding mechanisms, which were found to exceed the plant's CDB as described in the FHRR and ISR letter. This technical evaluation will address the following topics: characterization of flood parameters; evaluation of flood impact assessments; evaluation of available physical margin; reliability of flood protection features; and overall site response.

3.1 Characterization of Flood Parameters

The LIP and PMSS flood elevations, associated effects (AE) and flood event duration (FED) parameters that are used as input to the FE are the same as those that were used for the MSA. These parameters were assessed by NextEra and have already been reviewed by the NRC, as summarized by letter dated November 29, 2017 (ADAMS Accession No. ML17306A484).

For LIP, the maximum reevaluated flood elevations are not bounded by the CDB elevation of 19.9 feet (ft.) North American Vertical Datum of 1988 (NAVD88) at multiple locations throughout the site. For perspective, the site grade level is about 19.2 ft. NAVD88. For a set of eight points of interest (POIs) that were identified in Table 2 of the staff's ISR letter as having reevaluated hazard elevation values that were representative of eight buildings (e.g., outside of containment Unit 1, the turbine building, the administration building), the reevaluated flood levels range from 20.3 to 25.1 ft. NAVD88.

The FE credits passive permanent flooding protection features to demonstrate that key structures, systems, and components (SSCs) are protected from the LIP flooding mechanism. The licensee indicated that the site does not require additional manual actions by plant personnel to protect key SSCs; therefore, an evaluation of the overall site response was not necessary for LIP.

For PMSS, the reevaluated stillwater elevation was estimated at 17.8 ft. NAVD88. As documented in the FHRR, wave run-up against the vertical seawall represents an additional 5.6 ft. Therefore, the maximum water surface elevation as a result of wave run-up is 23.4 ft. NAVD88 at the seawall. This exceeds the CDB flood elevation of 14.8 ft. NAVD88. As a result of the reevaluated storm surge waves overtopping the seawall, flood water would flow across the site. The resulting ponding levels (i.e., the wave-overtopping stillwater elevations) at multiple points of interest across the site exceed the CDB stillwater elevation of 20.2 ft. NAVD88.

The FE credits temporary flooding protection features to demonstrate that key SSCs are protected from the storm surge floods. The licensee indicated that the site requires additional manual actions by plant personnel to protect key SSCs; therefore, an evaluation of the overall site response was provided.

The NRC staff reviewed the LIP and PMSS parameters listed in the licensee's FE and confirmed that they were consistent with the parameters that were presented in the MSA. Based on the review that was previously performed for the MSA, the staff concludes that the licensee's characterization of the LIP and PMSS events in the FE is appropriate.

3.2 Evaluation of Flood Impact Assessment for LIP

3.2.1 Description of Impact of Unbounded Hazard

The Seabrook FE identified the potential impacts on key SSCs as a result of water ingress due to LIP. The LIP event leads to flood water surface elevations above the plant floor elevations at some locations. In order to assess the impacts of the unbounded flood levels, the licensee identified the maximum water surface elevations at the exterior door openings, maximum flood depths above the door threshold, and duration of when the flood levels are above the door threshold. With this information, the licensee assessed the impacts of water ingress and potential for accumulation into rooms housing key SSCs. In addition, the licensee indicated that it analyzed the potential for impacts of the unbounded flood levels on the exterior doors of the plant buildings, including their hydrostatic and hydrodynamic loading.

The licensee's evaluation indicated that the ingress of flood waters during a LIP event could affect the safety-related structures detailed below. Attachment A of the FE provides the critical plant areas impacted by the LIP flooding. The licensee's detailed evaluation on the LIP flood and its potential impacts is provided as part of NextEra's Engineering Evaluation EE-17-005 "Beyond Design Basis Flooding Mitigating Strategy Assessment," Revision. 0 and Engineering Evaluation EE-17-006 "Focused Flooding Evaluation To Support Closure of NRC Fukushima Near Term Task Force Recommendation 2.1, Flooding," Revision.1. A summary of the licensee's results is provided below:

- Fuel Storage Building (FSB) - flood waters would be contained to the truck bay, which does not contain any safety-related equipment.
- Diesel Generator Building (DGB) - the stillwater flood elevation from the reevaluated LIP hazard would not exceed the floor/threshold elevation of the DGB.
- Control Building (Essential Switchgear (ESWGR) Rooms) – internal flooding will not affect or prevent access to safety-related SSCs since these SSCs are mounted on elevated pads with sufficient clearance.
- Residual Heat Removal (RHR) Vaults - internal flooding will not affect or prevent access to safety-related SSCs.
- West Main Steam and Feedwater (MSFW) Pipe Chase - internal flooding will not affect or prevent access to safety related SSCs.
- Service Water Pump House (SWPH) - internal flooding will not affect or prevent access to safety related SSCs.

Based on this evaluation, the licensee concluded that internal flooding from a LIP event will not affect any key safety functions (KSFs). The licensee emphasized that the following modifications would be needed to support this conclusion:

- installation of a flood protection feature in the RHR vault hallway off the lower level walkway to ensure that flood water is routed to the Unit 2 tunnel or waste processing building, and so will not accumulate in the "A" RHR vault;

- sealing of a floor drain and portions of the metal-sided structure in the alternate radiation protection (RP) checkpoint area to prevent flood water ingress;
- modifications to reduce gaps at the following doors:
 - A134, administration building stairwell entrance to radiologically controlled area (RCA) tunnel;
 - C102, "A" ESWGR doorway into the turbine building; and
 - EM401, EM402, and EM414, alternate RP checkpoint / containment personnel hatch areas; and
- adding gap measurements to the existing annual inspections for those doors where inflows were calculated and a maximum door gap was assumed.

The NRC staff reviewed the information provided by the licensee in order to assure that adequate flood parameters were used for the calculation of water ingress and water accumulation. The NRC staff confirmed the flood parameters used for the calculation of water ingress and water accumulation were consistent with previous information reviewed by the staff for the Seabrook MSA.

3.2.2 Evaluation of Available Physical Margin and Reliability of Flood Protection Features

Maximum LIP flood elevations inside safety-related buildings and critical depths that could potentially cause failure of Key SSCs are provided in Table 1 of the FE. The licensee compared these elevations and calculated available physical margin (APM) of key SSCs. For the locations described above and as shown in Table 1 of the FE, the licensee obtained APM values that ranged from 2.0 inches (in.) to 24 in. Based on this information and the conservative assumptions used in the LIP flood analysis, the licensee concludes that the APM for the LIP is adequate.

The staff reviewed NextEra's Engineering Evaluations EE-17-005 and EE-17-006 that provided a detailed explanation of the LIP flooding effects on the safety-related buildings. Specifically, the staff reviewed a series of drawings referenced in EE-17-005 in order to confirm the critical depths of SSCs used in the APM evaluation. The staff verified the elevation and location of the critical SSCs, and confirmed the values used in the APM calculation. Also, as documented in the MSA staff assessment, the NRC staff finds that the licensee's estimation of water ingress and accumulation is reasonable. Therefore, the NRC staff concludes that the licensee has demonstrated that, provided the modifications described in Section 3.2.1 are put in place, there is sufficient APM, as described in Appendix B of NEI 16-05, Revision 1.

Evaluation of Reliability of Protection Features

Seabrook relies on permanent passive flooding protection features such as exterior doors to provide protection from LIP flooding.

The licensee stated that water could accumulate outside several doors of buildings housing SSCs. Attachment A of the FE shows doorways that could potentially serve as pathways into structures containing key SSCs. The same table provides the estimated maximum flood elevations at such doorways. In FHR Section 4.11 the licensee provided a summary of the approach followed to calculate the hydrostatic and hydrodynamic loads on exterior doors due to the LIP flood. The staff verified the information provided in the MSA regarding these loads and,

as stated in the MSA staff assessment, agrees with the licensee that the resultant loads are expected to be low and should not cause excessive leakage at these doors doors.

In addition, the licensee stated that all critical doors are inspected on an annual basis as described in Operating Procedure OP-AA-102-1002, "Seasonal Readiness," Revision 18. The licensee also committed, as part of the FHRR interim actions and MSA regulatory commitments, to inspect doors, correct material degradation and maintain required gaps. By letter dated December 17, 2017 (ADAMS Accession No. ML17220A031, non-public), the staff documented its review of the licensee's interim actions. As stated in the letter, NRC inspectors examined the exterior doors credited for flood protection to assess the material condition of the doors and the door seals. The inspectors also verified that issues identified were entered into NextEra's Corrective Action Program. The staff notes that the procedural revisions and flood protection modifications described in the MSA as regulatory commitments are subject to future NRC inspection.

Because increased focus has been placed on flood protection since the accident at Fukushima, licensees and NRC inspectors have identified deficiencies with equipment, procedures, and analyses relied on to either prevent or mitigate the effects of external flooding at a number of licensed facilities. Recent examples include those found in Information Notice 2015-01, "Degraded Ability To Mitigate Flooding Events" (ADAMS Accession No. ML14279A268). In addition, the NRC is cooperatively performing research with the Electric Power Research Institute to develop flood protection systems guidance that focuses on flood protection feature descriptions, design criteria, inspections, and available testing methods under a memorandum of understanding dated September 28, 2016 (ADAMS Accession No. ML16223A495). The NRC staff expects that licensees will continue to maintain flood protection features in accordance with their current licensing basis. The NRC staff further expects that continued research involving flood protection systems will be performed and shared with licensees in accordance with the guidance provided in Management Directive 8.7, "Reactor Operating Experience Program" (ADAMS Accession No. ML122750292), as appropriate.

The NRC staff concludes that, assuming successful completion of the licensee's regulatory commitments identified in the FE and MSA, the Seabrook flood protection features described above are reliable to maintain KSFs as defined in Appendix B of NEI 16-05, Rev 1.

3.2.3 Overall Site Response

The licensee does not rely on any personnel actions or new modifications to the plant in order to respond to the LIP event. As described above, the licensee's evaluation relied on passive existing flood protection features to demonstrate adequate flood protection; therefore, there is no need to review overall site response.

3.3 Evaluation of Flood Impact Assessment for Probable Maximum Storm Surge

3.3.1 Description of Impact of Unbounded Hazard

The Seabrook FE identified the potential impacts on key SSCs as a result of water ingress due to the PMSS flood. Attachment A of the FE shows the estimated flood depths and heights above door threshold/floor elevation for those affected locations. The licensee stated that installation of temporary flood barriers installed in doorways is required to prevent flood water ingress. These doorways and the respective flood protection heights are provide in Table 2 of the FE. The licensee stated that, with the deployment of these temporary barriers (i.e. sandbag

dikes, a flood gate and sealing floor drains), all KSFs will remain available during the PMSS event. The licensee also stated that water is allowed to enter several structures; however, the flood depths inside these structures is not expected to affect Key SCCs.

The licensee emphasized that revisions to several plant procedures detailed in Section 5.2 of the FE are needed in order to adequately protect key SSCs and therefore support this conclusion.

3.3.2 Evaluation of Available Physical Margin and Reliability of Flood Protection Features

The licensee relies on the use of temporary flood protection features to provide protection against the PMSS flood. As stated in Section 6.2 of its FE, the licensee plans to install temporary sandbag dikes in the 12 doorways specified in Table 2. In addition, the licensee plans to install a flood gate in one doorway and seal floor drains. Table 2 of the FE also provides APM values for these temporary flood protection barriers that ranged from 4 in. to 14 in. Finally, the licensee concluded that APM for the PMSS flood was estimated to be adequate based on the conservative assumptions, inputs and methods used to calculate the maximum storm surge flood levels.

Regarding sandbag placement, the licensee committed to revise Procedure ON1090.13 "Response to Natural Phenomena Affecting Plant Operations, Revision. 13" to reflect the most updated sandbag strategy on flood protection against the storm surge flood. In its MSA, the licensee identified this as a regulatory commitment and committed to revise this procedure by June 1, 2018. This sandbag strategy consists of deploying and placing sandbags at specific doorways and to the specific flood protection heights specified in Table 2 of the FE following the U.S. Army Corps of Engineers (USACE) guidance. Properly placing sandbags to the specified heights will provide adequate physical margin against the PMSS flood. Regarding the placement of the flood gate, the staff agrees that the proper placement of the gate will provide adequate physical margin since the flood expected at that location (approximately 9 in.) is expected to be much less than the actual flood protection provided by the gate (23 in.).

The staff agrees that, if the proposed revisions to Procedure ON1090.13 are completed, the temporary flood barriers will prevent flood waters from entering critical areas with adequate margin. Also, as documented in the MSA staff assessment, the NRC staff finds that the licensee's estimation of flood water levels to be reasonable. Therefore, the NRC staff concludes that adequate margin exists for the reevaluated storm surge flooding mechanism.

Evaluation of Reliability of Protection Features

As stated above, the licensee relies on the use of sandbags, a flood gate and sealing of floor drains to provide protection for flooding from storm surge.

The licensee stated that it plans to enhance its sandbagging strategies to conform to USACE guidance: "Flood Fight Handbook, US Army Corps of Engineers St. Paul District, 2016" and "Sandbagging Techniques, US Army Corps of Engineers, Northwestern Division, 2004" into Procedure ON1090.13. The staff notes that NEI 16-05, Section B.2.3 addresses reliability. It suggests that standards, codes, guidance documents, and operating experience should be used in the configuration of the temporary feature. In the case of a sandbag wall, NEI 16-05 suggests the use of USACE guidelines for sandbag installation. For the use of sandbags, the NRC staff reviewed licensee document EE-17-006, which provides details regarding the planned sandbag construction techniques and confirms the use of USACE guidance for this activity. The NRC

staff reviewed Procedure ON1090.13 and noted that the licensee attached sandbag guidance to the procedure, however, specific locations, flood protection heights (detailed in Table 2 of the FE) and sandbag construction techniques using the USACE guidance (described in detail in EE-17-006) have not yet been included. The staff notes that these actions were identified as commitments in Section 5.2 of the FE and in the MSA and are currently tracked in the station's Action Tracking System. Assuming the successful completion of the licensee's commitments identified in Section 5.2 of the FE and in the MSA, the staff concludes that the current plan to place sandbags would be effective and reliable in preventing flood waters from entering structures.

As stated above, sealing floor drains is also considered part of site flood protection strategy. The methodology for sealing specific floor drains was discussed in the FE and in EE-17-006. Also, Procedure ON1090.13 provides detailed instructions on how to seal these drains, which consisted of placing plastic and tape on the drains and covering them with sandbags. Since sealing drains using sandbags, as described in the FE, is comparable to the approach for doors and detailed instructions are already in place to seal these drains, the staff concludes that sealing floor drains is considered a reliable flood protection feature.

The licensee plans to install a flood gate in doorway A134 to prevent water ingress into areas that could potentially affect Key SSCs. The licensee stated that this gate was judged to be reliable based on guidance in NEI 16-05, Appendix B. No further information was presented to justify this conclusion. The staff reviewed the flood gate's instructions and operator manual as part of the audit process. The staff confirmed that this flood gate was designed to withstand flood depths up to 23 in. Since the maximum water depth expected on door A134 is approximately 9 in., the staff concludes that the flood gate should be able to withstand the loads associated with PMSS flooding at this specific location.

The NRC staff concludes that the Seabrook flood protection features described above are reliable to maintain key safety functions as defined in Appendix B of NEI 16-05, Revision 1.

3.3.3 Overall Site Response

As previously explained, the licensee relies on personnel actions to provide flood protection against the reevaluated PMSS event. In its FE, the licensee explained the current flood protection strategy depends on severe weather warnings, and installation of temporary flood barriers to prevent water intrusion in locations where KSF's are performed. The licensee stated that these time sensitive actions (TSAs) will be detailed in Procedure ON1090.13.

The licensee plans to revise Procedure ON1090.13, as stated in FE Section 5.2 and in the MSA, to include detailed descriptions of the site response to the PMSS event. The licensee stated that these planned revisions are being tracked in the station's Action Tracking system. In its MSA, the licensee also identified these actions as a regulatory commitment and committed to revise the procedure by June 1, 2018.

The licensee's FE states that the estimated time needed to complete the installation of these barriers is 12 hours and activities are expected to commence upon receipt of a hurricane warning (i.e., 36 hours in advance), giving a margin of 24 hours. Additionally, the licensee stated that advance warning of a major hurricane will provide sufficient time to have sandbags deployed prior to the onset of severe weather. Finally, the licensee stated that it has completed an informal validation that all required actions can be performed within the warning period, and states that a formal validation (Level B) in accordance with Appendix E of NEI 12-06 will be

performed. The licensee also stated that the site response to the PMSS event has been demonstrated as adequate by meeting the guidelines in Appendix C of NEI 16-05.

The staff reviewed the information provided in the FE and in Procedure ON1090.13 regarding the critical path and TSAs and agrees that there will be sufficient warning time to install the temporary flood protection barriers before the onset of severe weather. The staff concludes that, subject to completion of the procedural changes described in FE Section 5.2 and in the MSA, as well as confirmation by the validation, the licensee should be able to place the temporary features into place consistent with the FE description.

4.0 AUDIT REPORT

The July 18, 2017, generic audit plan (ADAMS Accession No. ML17192A452) describes the NRC staff's intention to issue an audit report that summarizes and documents the NRC's regulatory audit of the licensee's FE. The NRC staff's Seabrook audit was limited to the review of the calculations and procedures described above. Because this staff assessment appropriately summarizes the results of the audit, the NRC staff concludes that a separate audit report is not necessary, and that this document serves as the audit report described in the staff's July 18, 2017, letter.

5.0 CONCLUSION

The NRC staff concludes that NextEra performed the Seabrook FE in accordance with the guidance described in NEI 16-05, Revision 1, as endorsed by JLD-ISG-2016-01, and that the licensee has demonstrated that effective flood protection will exist for the reevaluated flood hazards when the licensee completes its regulatory commitments to improve the plant's ability to withstand the postulated flood hazards. Furthermore, the NRC staff concludes that Seabrook screens out of performing an integrated assessment based on the guidance found in JLD-ISG-2016-01. As such, in accordance with Phase 2 of the process outlined in the 50.54(f) letter, additional regulatory actions associated with the reevaluated flood hazard following completion of the licensee's regulatory commitments, are not warranted. The licensee has satisfactorily completed providing responses to the 50.54(f) activities associated with the reevaluated flood hazards.

SUBJECT: SEABROOK STATION, UNIT 1 – STAFF ASSESSMENT OF FLOODING
FOCUSED EVALUATION DATED March 1, 2018

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