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

October 31, 2017

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: NUCLEAR REGULATORY COMMISSION REPORT FOR THE AUDIT OF NEXTERA ENERGY SEABROOK, LLC'S FLOOD HAZARD REEVALUATION REPORT SUBMITTAL RELATING TO THE NEAR-TERM TASK FORCE RECOMMENDATION 2.1-FLOODING FOR SEABROOK STATION, UNIT 1 (CAC NO. MF6782; EPID L-2015-JLD-0019)

Dear Mr. Nazar:

The purpose of this letter is to provide you with the final audit report which summarizes and documents the U.S. Nuclear Regulatory Commission's (NRC's) regulatory audit of the Flood Hazard Reevaluation Report (FHRR) submitted by NextEra Energy Seabrook, LLC (NextEra, the licensee), related to Seabrook Station, Unit 1 (Seabrook). The FHRR was submitted as part of implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear plant. Specifically, the FHRR documents the results of the flood hazard reevaluation being completed as part of NRC Near-Term Task Force Recommendation 2.1.

By letter dated October 21, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15292A259), the NRC informed you of the staff's plan to conduct a regulatory audit of NextEra's FHRR submittal for Seabrook. The audit was intended to support the NRC staff's review of the licensee's FHRR and the subsequent issuance of a staff assessment documenting the staff's review. The audit was conducted over several interactions with the licensee via teleconferences and/or webinars on December 16, 2015, February 11, 2016, April 27, 2016, June 20, 2016, June 23, 2016, and August 10, 2016. The audit was performed consistent with NRC Office of Nuclear Reactor Regulation Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008 (ADAMS Accession No. ML082900195). The details of the audit were discussed with Shaun Kline of your staff.

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

Sincerely,

/RA/

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

Docket No. 50-443

Enclosure:
Audit Report

cc w/encl: Distribution via Listserv

NUCLEAR REGULATORY COMMISSION REPORT FOR THE AUDIT NEXTERA ENERGY SEABROOK FLOOD HAZARD REEVALUATION REPORT SUBMITTAL RELATING TO THE NEAR-TERM TASK FORCE RECOMMENDATION 2.1-FLOODING FOR SEABROOK STATION, UNIT 1 DATED OCTOBER 31, 2017

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OFFICE	NRR/DLP/PBMB/PM	NRR/DLP/PBMB/LA	NRO/DSEA/RHM1/TR*	NRO/DSEA/RHM1/TL
NAME	FVega	SLent	LQuinn-Willingham	LHibler
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NAME	SDevlin-Gill	MShams	FVega	
DATE	10/27/2017	10/29/2017	10/31/2017	

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

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR THE AUDIT OF NEXTERA ENERGY SEABROOK

FLOOD HAZARD REEVALUATION REPORT

SUBMITTAL RELATING TO THE NEAR-TERM TASK FORCE RECOMMENDATION 2.1-

FLOODING FOR SEABROOK STATION, UNIT 1

DOCKET NO. 50-443

BACKGROUND AND AUDIT BASIS

By letter dated March 12, 2012, 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, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), "Conditions of Licenses" (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 report. Recommendation 2.1 in that document recommended that the NRC staff issue orders to all licensees to reevaluate seismic and flooding hazards for their sites using current NRC requirements and guidance. Subsequent staff requirements memoranda associated with SECY-11-0124 and SECY-11-0137 instructed the NRC staff address this recommendation through the issuance of requests for information to licensees pursuant to 10 CFR 50.54(f).

By letter dated November 7, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16314D429), NextEra Energy Seabrook, LLC (NextEra, the licensee), submitted its Flood Hazard Reevaluation Report (FHRR) for Seabrook Station, Unit 1 (Seabrook). The NRC is in the process of reviewing the aforementioned submittal and has completed a regulatory audit to inform the licensee of its review of the submittal, identify any similarities/differences with past work completed, and ultimately aid in its review of licensees' FHRR. This audit summary is being completed in accordance with the guidance set forth in NRC Office of Nuclear Reactor Regulation Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008 (ADAMS Accession No. ML082900195).

AUDIT LOCATION AND DATES

The audit was completed by document review via the electronic reading room (ERR) and teleconferences/webinars held on December 16, 2015, February 11, 2016, April 27, 2016, June 20, 2016, June 23, 2016, and August 10, 2016.

AUDIT TEAM

Title	Team Member	Organization
Team Leader, NRR/JLD	Lauren Gibson	NRC
Branch Chief, NRO/DSEA	Aida Rivera	NRC
Branch Chief, NRO/DSEA	Christopher Cook	NRC
Technical Manager	Richard Rivera-Lugo	NRC
Lead Hydrologist	Michelle Bensi	NRC
Contractor	Lyle Hibler	NRC
Contractor	Chris Bender	Taylor Engineering, Inc.
Contractor	William Miller	Taylor Engineering, Inc.
Contractor	Pat Fitzpatrick	Taylor Engineering, Inc.
Contractor	Greg Zimmerman	Oak Ridge National Laboratory
Contractor	Scott DeNeale	Oak Ridge National Laboratory
Contractor	Kevin Stewart	Oak Ridge National Laboratory

DOCUMENTS AUDITED

Attachment 1 of this report contains a list that details all the documents reviewed by the NRC staff, in part or in whole, as part of this audit. The documents were located in an ERR during the NRC staff review.

AUDIT ACTIVITIES

In general, the audit activities consisted of the following actions:

- Review background information on site topography and geographical characteristics of the watershed.
- Review site physical features and plant layout.
- Understand the selection of important assumptions and parameters that would be the basis for evaluating the individual flood-causing mechanisms described in the 50.54(f) letter.
- Review model input/output computer files, such as FLO-2D, Delft3D, and HEC-Hydrologic Modeling System (HMS), to gain an understanding of how modeling assumptions were programmed and executed.

Attachment 2 of this report provides more detail and summarizes specific technical topics (and resolution) of important items that were discussed and clarified during the audit. The items discussed in Attachment 2 may be referenced/mentioned in the staff assessment in more detail.

Attachment 3 of this report provides details regarding the licensee's storm surge analysis discussed during the audit.

CLOSEOUT TELECONFERENCE MEETING

During the April 27, 2016, webinar, the NRC staff identified information that needed to be provided on the docket. The licensee submitted the requested information on May 10, 2016 (ADAMS Accession No. ML16137A504). During the August 10, 2016, teleconference, the NRC staff identified certain information that needed to be provided on the docket in order to resolve some of the items discussed during the audit. The licensee committed to submit an addendum to the FHRR on the docket.

On December 21, 2016 (ADAMS Accession No. ML16356A479), the NRC staff issued the Interim Staff Response letter for the reevaluated flood-causing mechanisms described in the FHRR and the audit was henceforth considered closed.

Attachments:

1. Seabrook Station, Unit 1 Audit Document List
2. Seabrook Station, Unit 1 Information Needs and Response Summary
3. Seabrook Station, Unit 1 Storm Surge Summary

ATTACHMENT 1
Seabrook Station, Unit 1 Audit Document List

1. ENERCON, 2015 Calc. No. FPL-081-CALC-001, "Delft3d Bathymetry and Topography Calculation," Revision. 0, Includes Attachments B and C, July 21, 2015, 62 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1271, "FLP-081-CALC-001_DELFT3D Bathymetry and Topography Calculation Rev 0". Located in the Certrec Electronic Reading Room.

2. ENERCON, 2015, Calc. No. FPL-081-CALC-002, "Precipitation Events Calculation," Revision 0, Includes Attachments A and B, August 26, 2015, 62 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1275 "FPL-081-CALC-002 Precipitation Events Calculation Rev0". Located in the Certrec Electronic Reading Room.

3. ENERCON, 2015, Calc. No. FPL-081-CALC-003, "Nor'easter Climatology Calculation," Revision 0, Includes Attachments A and B, March 3, 2015, 46 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1276, "FPL-081-CALC-003_Noreaster Climatology Calculation Rev 0". Located in the Certrec Electronic Reading Room.

4. ENERCON, 2015, Calc. No. FPL-081-CALC-004, "10% Exceedance High and Low Tides Calculation," Revision 0, Includes Attachments A and B, August 26, 2015, 28 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1278, "FPL-081-CALC-004-10% Exceedance High and Low Rev 0". Located in the Certrec Electronic Reading Room.

5. ENERCON, 2015, Calc. No. FPL-081-CALC-005, "Sea Level Rise Calculation," Revision 0, Includes Attachments A and B, July 31, 2015, 17 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1281, "FPL-081-CALC-005_Sea Level Rise Calculation Rev0". Located in the Certrec Electronic Reading Room.

6. ENERCON, 2015, Calc. No. FPL-081-CALC-006, "Dam Screening and Evaluation Calculation," Revision 0, Includes Attachments A, B and C, March 3, 2015, 23 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1285, "FPL-081-CALC-006_Dam Screening and Evaluation Calculation Rev 0". Located in the Certrec Electronic Reading Room.

7. ENERCON, 2015, Calc. No. FPL-081-CALC-007, "Ice Effects Calculation," Includes Attachment A, Revision 0, August 27, 2015, 16 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1286, "FPL-081-CALC-007 Ice Effects Calculation Rev0". Located in the Certrec Electronic Reading Room.

8. ENERCON, 2015, Calc. No. FPL-081-CALC-008, "Tsunami Source Calculation," Revision 0, Includes Attachments A and B, August 26, 2015, 23 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1290, "FPL081-CALC-008_Tsunami Source Calculation Rev0". Located in the Certrec Electronic Reading Room.

9. ENERCON, 2015, Calc. No. FPL-081-CALC-009, “Hurricane Wind and Pressure Field Calculation,” Revision 0, Includes Attachment B and C, August 26, 2015, 39 pages,NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1291, “FPL081-CALC-009 Hurricane Wind and Pressure Field Calculation”. Located in the Certrec Electronic Reading Room.

10. ENERCON, 2015, Calc. No. FPL-081-CALC-010, “DELFT3D Surge Model Geometry Calculation,” Revision 0, Includes Attachments B and C, August 27, 2015, 59 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1294, “FPL-081-CALC-010 DELFT3D Surge Model Geometry Calculation Rev 0”. Located in the Certrec Electronic Reading Room.

11. ENERCON, 2015, Calc. No. FPL-081-CALC-011, “Delft3D Surge Model Calibration Calculation,” Revision 0, Includes Attachments B and C, August 27, 2015, 76 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID, 1298, “FPL-081-CALC-011 Delft3D Surge Model Calibration Calculation Rev 0”. Located in the Certrec Electronic Reading Room. Located in the Certrec Electronic Reading Room.

12. ENERCON, 2015, Calc. No. FPL-081-CALC-012, “HEC-HMS Hydrology Model Development Calculation,” Revision 0, Includes Attachment A, B, and C, August 26, 2015, 67 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1302, “FPL-081-CALC-012_HEC-HMS Model Development and Calibration Calculation Rev0”. Located in the Certrec Electronic Reading Room.

13. ENERCON, 2015, Calc. No. FPL-081-CALC-013, “HEC-HMS Warm/Cool Season Probable Maximum Flood PMF Hydrologic Calculation,” Revision 0, Includes Attachments A, B, C, D, E, and F, August 26, 2015, 67 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1306, “FPL-081-CALC-013 HEC-HMS Warm-Cool Season Probable Maximum Flood (PMF) Hydrologic Calculation Rev. 0”. Located in the Certrec Electronic Reading Room.

14. ENERCON, 2015, Calc. No. FPL-081-CALC-014, “Probable Maximum Tsunami (PMT) Calculation,” Revision 0, Includes Attachments A, B, C and D, August 27, 2015, 66 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1314, “FPL-081-CALC-014 Probable Maximum Tsunami (PMT) Calculation_Rev0”. Located in the Certrec Electronic Reading Room.

15. ENERCON, 2015, Calc. No. FPL-081-CALC-015, “FLO-2D Bathymetry and Topography Calculation,” Revision 0, Includes Attachments A, B and C, July 23, 2015, 25 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1314, “FPL-081-CALC-015_FLO-2D Bathymetry and Topography Calculation Rev 0”. Located in the Certrec Electronic Reading Room.

16. ENERCON, 2015, Calc. No. FPL-081-CALC-016, “Probable Maximum Storm Surge (PMSS), Wave Runup, Combined Effects, and Low Water Calculation,” Revision 0, Includes Attachments A, B, C, and D, September 11, 2015, 106 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1321, “FPL-081-CALC-0016_Probable Maximum Storm Surge (PMSS) Wave Runup Combined Effects and Low Water Calculation Rev 0”. Located in the Certrec Electronic Reading Room.

17. ENERCON, 2015, Calc. No. FPL-081-CALC-017, “Seiche Calculation,” Revision 0, Includes Attachments A. B, and C, August 26, 2015, 31 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1323, “FPL-081-CALC-017_Seiche Calculation Rev 0”. Located in the Certrec Electronic Reading Room.

18. ENERCON, 2015, Calc. No. FPL-081-CALC-019, “FLO-2D Evaluation of Local Intense Precipitation (LIP) Calculation,” Revision 0, Includes Attachments A, C, D and E, August 17, 2015, 62 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1325, “FPL-081-CALC-019_FLO—2D Evaluation of Local Intense Precipitation (LIP) Calculation Revision 0”. Located in the Certrec Electronic Reading Room.

19. ENERCON, 2015, Calc. No. FPL-081-CALC-021, “Hydrostatic and Hydrodynamic Loading Calculation,” Revision 0, Includes Attachment A, September 2, 2015, 30 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1333, “FPL-081-CALC-021_Hydrostatic and Hydrodynamic Loading Calculation Rev 0”. Located in the Certrec Electronic Reading Room.

20. ENERCON, 2015, Calc. No. FPL-081-CALC-024, “Hurricane Climatology Calculation,” Revision 0, Includes Attachments A, B, C, and D, August 20, 2015, 43 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1329, “FPL-081-CALC-024 Hurricane Climatology Calculation Rev 0”. Located in the Certrec Electronic Reading Room.

21. ENERCON, 2015, Calc. No. FPL-081-CALC-025, “Site-Specific Local Intense Precipitation (LIP) Calculation,” Revision 0, Includes Attachments A, B, and C, August 27, 2015, 34 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1310, “FPL-081-CALC-025-Seabrook-LIP-Rev 0”. Located in the Certrec Electronic Reading Room.

22. ENERCON, 2016, Calc. No. FPL-081-CALC-016, “Probable Maximum Storm Surge (PMSS), Wave Runup, Combined Effects, and Low Water Calculation,” Revision 1, Includes Attachments A, B, C, and D, March 2, 2016, 104 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1590, “FPL-081-CALC-016 PMSS Wave Runup Combined Effects and Low Water Calc Rev1 (rec’d 3-2-16)”. Located in the Certrec Electronic Reading Room.

23. ENERCON, 2016, Calc. No. FPL-081-CALC-016, “Probable Maximum Storm Surge (PMSS), Wave Runup, Combined Effects, and Low Water Calculation,” Revision 2, Includes Attachments A, B, C, and D, October 5, 2016, 110 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 2022, “FPL-081-CALC-016 PMSS Wave Runup Combined Effects and Low Water Calculation Rev 2”. Located in the Certrec Electronic Reading Room.

24. ENERCON, 2016, Calc. No. FPL-081-CALC-024, “Hurricane Climatology Calculation,” Revision 1, Includes Attachments A, B, C, and D, March 2, 2016, 43 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1544, “FPL-081-CALC-024 Hurricane Climatology Calculation Rev 1 signed”. Located in the Certrec Electronic Reading Room.

25. ENERCON, 2016, Calc. No. FPL-081-CALC-021, “Hydrostatic and Hydrodynamic Loading Calculation,” Revision 1, Includes Attachment A, October 17, 2016, 31 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, , Flood Hazard Reevaluation Audit, Item ID 2028, “FPL-081-CALC-021_Hydrostatic and Hydrodynamic Loading Calculation Rev 1”. Located in the Certrec Electronic Reading Room.

26. NextEra (NextEra Energy Seabrook, LLC.), 2015, “Flooding Hazards Reevaluation Report”, Seabrook Station, Revision 0, Enclosure to Letter from Dean Curtland to the U.S. Nuclear Regulatory Commission, Document Control Desk, Subject: “Response to NRC 10 CFR 50.54(f) Request for Information Regarding Near-Term Task Force Recommendation 2.1, Flooding – Submittal of Flooding Hazards Reevaluation Report", SBK-L-15181, September 25, 2015, ADAMS Accession No. ML15274A245 (non-publicly available).

27. NextEra (NextEra Energy Seabrook, LLC.), 2015, Input and output files, Contained on a hard drive, transmitted to NRC as part of the audit.

28. NextEra (NextEra Energy Seabrook, LLC.), 2016, “Flooding Hazards Reevaluation Report”, Seabrook Station, Revision 1, Enclosure to Letter from Eric McCartney to the U.S. Nuclear Regulatory Commission, Document Control Desk, Subject: “Response to NRC 10 CFR 50.54(f) Request for Information Regarding Near-Term Task Force Recommendation 2.1, Flooding – Submittal of Flooding Hazards Reevaluation Report", SBK-L-16175, November 7, 2016, ADAMS Accession No. ML16314D429 (non-publicly available).

29. NextEra (NextEra Energy Seabrook, LLC.), 2016, “Addendum A to the Flooding Hazards Reevaluation Report,” FPL-081-PR-002, Revision 0, March 2, 2016, 13 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1540, “Addendum A to FPL-081-PR-002 Rev 0 Flooding Hazard Reevaluation Report w…”. Located in the Certrec Electronic Reading Room.

30. NextEra (NextEra Energy Seabrook, LLC.), 2016, ”NRC Question 3 Response 3-30-16”, March 30, 2016, 2 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1581, “IN03_LIPRoofDrainage_Final_signed”. Located in the Certrec Electronic Reading Room.

31. NextEra (NextEra Energy Seabrook, LLC.), 2016, ”Information Need #4: Reevaluated Flood Level,” March 29, 2016, 6 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1581, “IN04_ReevaluatedFloodLevel_Final_signed”. Located in the Certrec Electronic Reading Room.

32. NextEra (NextEra Energy Seabrook, LLC.), 2016, “Seabrook Flood Hazard Reevaluation Report Audit: Bathymetric Anomalies White Paper,” Revision 0, Document Number NEESBX087, January 11, 2016, 3 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1486, “SeabrookFHRRAudit_BathymetricAnomaliesWhitePaper_Rev0”. Located in the Certrec Electronic Reading Room.

33. NextEra (NextEra Energy Seabrook, LLC.), 2016, “Seabrook Flood Hazard Reevaluation Report Audit: Bathymetric Anomalies White Paper,” Revision 2, Document Number NEESBX087, Signed January 28, 2016, 8 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1526, “SeabrookFHHR Audit_BathymetricAnomaliesWhitePaper_Rev2_signed”. Located in the Certrec Electronic Reading Room.

34. NextEra (NextEra Energy Seabrook, LLC.), 2016, “Seabrook Flood Hazard Reevaluation Report Audit: Bathymetric Anomalies White Paper,” Revision 6, Document Number NEESBX087, March 2, 2016, 11 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1548, “SeabrookFHRRAudit_BathymetricAnomaliesWhitePaper_Rev6_signed”. Located in the Certrec Electronic Reading Room.

35. NextEra (NextEra Energy Seabrook, LLC.), 2016, “Response to Request for Additional Information Regarding the Seabrook Flooding Hazard Reevaluation Report” Enclosure to Letter from Michael Ossing to U.S. Nuclear Regulatory Commission, Document Control Desk, Subject: “Response to Request for Information Regarding the Seabrook Flooding Hazards Reevaluation Report”, SBK-L-16044, included a DVD, March 28, 2016, ADAMS Accession No. ML16098A468 (publicly available).

36. NextEra (NextEra Energy Seabrook, LLC.), 2016, Letter from Michael Ossing to U.S. Nuclear Regulatory Commission, Subject: “Seabrook Station Re-evaluated Bounding Flood Elevation for Riverine Flooding”, SBK-L-16073, May 10, 2016, ADAMS Accession No. ML16137A504 (publicly available).

ATTACHMENT 2
Seabrook Station, Unit 1 Information Needs and Response Summary

Information Need No.	Information Need Description	Response Summary
1	**Figures** Background: Figures contained in the Flood Hazard Reevaluation Report (FHRR) (NextEra, 2015) lack visual clarity. Request: Provide (on the docket) standalone, high quality versions of the following figures for use in the NRC's staff assessment: a) FHRR Figure 4-8, *Seabrook Manning's – n* b) FHRR Figure 4-12, *Maximum Flow Depths: East* c) FHRR Figure 4-13, *Maximum WSEL, East* d) FHRR Figure 4-14, *Maximum Flow Depths: West* e) FHRR Figure 4-15, *Maximum WSEL, West* f) FHRR Figure 4-21, *Example of Difference Time-Distributed Hyetographs* g) Figure 5-1 in Section 5.1 of Calculation No. FPL-081-CALC-012 (ENERCON, 2015a)	The licensee provided higher quality electronic versions of the requested figures (NextEra, 2016a). The NRC staff reviewed the provided figures and determined they were sufficient to resolve the information need request.
2	**All Flood-Causing Mechanisms – Comparison of Reevaluated Flood Hazard with Current Design Basis**	In a letter to NRC dated March 28, 2016 (NextEra, 2016a), the licensee stated that the CLB flooding information used for comparison in FHRR Section 5 is consistent with the CDB for

	Background: Recommendation 2.1 of the 50.54(f) (NRC, 2012a) letter provides instructions for the FHRR. Under Section 1, Hazard Reevaluation Report, Items c and d, licensees are requested to perform: c) Comparison of current and reevaluated flood causing mechanisms at the site. Provide an assessment of the current design basis flood elevation to the reevaluated flood elevation for each flood-causing mechanism. Include how the findings from Enclosure 4 of this letter (i.e., Recommendation 2.3 flooding walkdowns) support this determination. If the current design basis flood bounds the reevaluated hazard for all flood causing mechanisms, include how this finding was determined. d) Interim evaluation and actions taken or planned to address any higher flooding hazards relative to the design basis, prior to completion of the integrated assessment described below, if necessary. Section 3.0 of the Seabrook FHRR (NextEra, 2015) provides a description of the current licensing basis (CLB) for each flood hazard. The FHRR then provides comparisons of the reevaluated flood hazards with the CLB for each flood hazard mechanism. Request: Clarify and, where necessary, correct the description and/or comparison of the reevaluated flood hazard to the current design basis (CDB).	flooding at Seabrook. The comparisons in FHRR Section 5 are not affected by the change in terminology and remain valid for a comparison of the reevaluated values in the FHRR to the CDB. The NRC reviewed the information provided by the licensee and determined it was sufficient to resolve the information need request.

3	**Local Intense Precipitation-Roof Drainage** Background: Section 4.1.4 of the FHRR (NextEra, 2015) describes how roof drainage from rainfall onto buildings and rooftops was handled in the FLO-2D modeling, and it states, "The analysis assumes roof drains are nonfunctional; runoff from building rooftops is routed directly to the ground adjacent to the building." However, it is not clear how and where roof drainage was distributed to the surrounding grid elements in the FLO-2D modeling. Furthermore, Section 4.1.4 of the FHRR states (NextEra, 2015), "A levee component was added to the model to represent the parapet structures." The staff agrees that the assumption of nonfunctional roof drains allows water to flow to the ground and provides a conservative flooding estimate. However, the assumption that roof drains are blocked, such the water is stored on parapet roofs, is not conservative with regards to flooding. That is, water storage on building roofs due to parapets could represent a substantial decrease in the overall water volume on the site. This modeling approach is not conservative for LIP flooding since the runoff could flow to the ground. Request: Provide discussion or clarification pertaining to the following: a) Clarify how roof drainage was routed in the model and demonstrate that the model implementation accounts for roof drainage in a manner consistent with actual roof	The licensee's response (NextEra, 2016b) expanded on information provided in the FHRR and calculation packages, i.e. FPL-081-CALC-019, "FLO-2D Evaluation of Local Intense Precipitation Calculation" (ENERCON, 2015b). The response confirmed that all roof drains are assumed to be blocked (with one exception as described in the next paragraph) (NextEra, 2016b). The licensee also described how roof drainage routing is dependent upon roof configuration: (1) drainage from flat roofs without parapets is divided equally along the edges of the roof and is assumed to be distributed evenly along each edge, (2) drainage from sloped roofs without parapets flows off the lowest edges and is assumed to be divided equally among the edges and distributed evenly across each edge, and (3) water is assumed to be trapped and accumulated on roofs with parapets until it overflows the parapet, then the overflow is assumed to be distributed evenly along the edges of the parapets (NextEra, 2016b). The licensee described an exception to the blocked-drain assumption for the roof of the Service Water Cooling Tower, whose roof drains are directed into the cooling water pool, which would in turn overflow out the ventilation ports on the north and south sides of the building (NextEra, 2016b). All water collected on this roof is therefore assumed to be equally divided between the north and south ventilation discharge ports and evenly distributed along the length of each port (NextEra, 2016b). The licensee stated that, in addition to the assumption that the roof drains are blocked, the site storm drain system was also assumed to be blocked at grade level gratings during the LIP event (NextEra, 2016b). If the storm drains were not blocked, then the site drainage system would carry more flow away from the site than what is introduced by the roof drains; hence, the

	drainage. If roof drainage is routed to a concentrated discharge point, provide a description of how the model simulated localized flooding impacts due to concentrated discharge, and, if necessary, provide sensitivity analysis results that demonstrate the significance of localized flooding impacts from roof drainage. b) Provide justification for the use of levees for simulating parapet walls, which effectively store rainfall occurring over buildings and could result in reduced LIP flood levels. Provide an analysis that shows the effect of allowing water falling on roofs to drain to the site grounds where the LIP depths exceed the wall height.	resulting flooding water surface levels would be no greater than the scenario analyzed in the FHRR (NextEra, 2016b). The NRC reviewed the information provided by the licensee and determined it was sufficient to resolve the information need request.
4	**<u>Probable Maximum Flood - Reevaluated Flood Level</u>** <u>Background</u>: Section 5.2 of the FHRR states that the reevaluation of riverine flooding "determined a bounding flow volume from the All-Season Probable Maximum Flood (PMF) to be 26,158 cfs [cubic feet per second]", which is significantly less than the CLB value of 136,500 cfs (NextEra, 2015). According to Section 4.2.2.1 of the FHRR, calibration of the U.S. Army Corps of Engineers Hydrologic Engineering Center - Hydrologic Modeling System (HEC-HMS) model used for reevaluation was not possible due to a lack of gage information. <u>Request</u>: Discuss the primary differences in how the PMF flow volume was estimated for the CDB and for the FHRR, and explain how the FHRR	The licensee's response (NextEra, 2016c) expanded on information provided in the FHRR and calculation packages, FPL-081-CALC-012, "HEC-HMS Hydrology Model Development Calculation", "FPL-081-CALC-013", and "HEC-HMS Warm/Cool Season Probable Maximum Flood PMF Hydrologic Calculation" (ENERCON, 2015a; ENERCON, 2015c). In its response and discussed during the April 27, 2016 webinar, the licensee identified, tabulated and summarized a variety of differences in the way the PMF flow was calculated in the CLB analysis and in the FHRR (NextEra, 2016c). While the overall watershed drainage area was approximately the same for the two analyses, the CLB divided the watershed into 2 subbasins and the FHRR used 13 subbasins. The amount of impervious surface within the watershed was increased by about 60% in the FHRR analysis. The probable maximum precipitation (PMP) rainfall increased from 23.8 inches (in) over 24-hour (hr) (in the CLB analysis) to 30.3 in over 72-hr (in the FHRR analysis). The FHRR analysis incorporated 5 dams,

	value was determined to be reasonable, given a lack of model calibration. Discuss the basis for value of the time of concentration used in the reevaluation of the hazard and with respect to the value reported in the FSAR [Final Safety Analysis Resport]. Discuss the basis for the Muskingum coefficient and the rationale for using flow velocity rather than flood wave celerity in the coefficient computation.	whereas no dams were included in the CLB analysis (NextEra, 2016c). The time of concentration (T_c) value in the CLB analysis was derived from a modified Kirpich method that incorporated the difference in elevation along the length of the basin, whereas the FHRR analysis used a Soil Conservation Service Unit Hydrograph Method applicable to coastal regions (such as the Delmarva peninsula) (NextEra, 2016c). The CLB analysis did not use reach routing for its two subbasins, but the FHRR analysis used the Muskingum method in HEC-HMS model (NextEra, 2016c). The NRC staff considered the licensee's response, including the responses to Information Need # 4a and #6, and determined this information need is resolved.
4a	**<u>Streams and Rivers – Follow-up to Information Need #4</u>** <u>Background</u>: The staff reviewed the response to Information Need #4, "IN04_ReevaluatedFloodLevel_Final_signed.pdf" (NextEra, 2016c), provided in the Electronic Reading Room and determined that further information is needed to assess the PMF flow rate and elevation for the site. 1) The staff notes that the reevaluated peak PMF runoff rate (26,000 cfs) is significantly lower than the CLB value (136,000 cfs), due to using much longer time of concentration (e.g., adjusted T_c = 19 hours for the reevaluation of sub-basin number 3, while T_c = 2 hours for the CLB of the whole watershed). Given the size of the basin, the time of concentration used in the	The licensee's responses to Items #4 and #4a aided the staff's understanding of the model's assumptions (including T_c and definition of routing parameters) and the application of the model. The licensee also provided a discussion, during the audit, to support not having originally reported a reevaluated flooding elevation for flooding in river and streams in the FHRR by utilizing the storm surge model flooding results. Regarding item (1) of 4a Information Need, the licensee presented contributing factors during the webinar that account for the large difference in the peak PMF rate between the CLB and the FHRR. The contributing factors were adjusted from CLB to FHRR, including watershed area, impervious area, rainfall duration and depth, numbers of sub-basins, rainfall loss, rainfall-runoff transformation method, and reach routing method. The licensee also discussed, during the webinar, the two different time-of-concentration formulas used in the CLB and FHRR analyses. The licensee indicated that the formula for

	analysis in the FHRR may be unreasonably long. 2) The staff notes that the licensee's flow-velocity approach can make the Muskingum K value larger than expected, when compared to staff's results of flood-wave-celerity approach. If the K value is not calibrated (due to the lack of recorded flows), other physically-based reach routing (such as the Kinematic Wave routing, etc.) must be used. Request: Provide justification for the T_c parameters used in HEC-HMS to estimate peak flow. Provide a comparison of time of concentration values computed using other methods, and discuss the applicability of each method. For the reach routing, include a discussion of the adequacy of the selected parameter values (e.g. flood-wave-celerity approach to calculate the Muskingum K value).	the CLB analysis was originally used in California. The formula for the FHRR analysis was originally created for use in Florida. The NRC staff recognized that both formulas were typical regression equations but they were created from different data sets. The licensee did not fully describe the selected formula used to calculate the longer hour (e.g. 19 hours for sub-basin #3) for the T_c. For item (2) of 4a, during the webinar, the licensee explained that the Muskingum K values were appropriately calculated with a flow-velocity approach. The licensee stated the flow-velocity approach could be reasonably used to replace the flood-wave-celerity approach. During the webinar, the licensee explained how the PMF discharge would not be a dominant factor on the flood elevation at the Seabrook site. The licensee explained that when the PMF, approximately 26,000 cfs, was added to the tidal wave model to calculate the flood elevation, the increments of flood elevation would be minimal, approximately 2 inches. In a letter dated May 10, 2016 (NextEra, 2016d), the licensee described that the peak PMF water surface elevation was insensitive to higher PMF flow contributions and references Figure 7.2 (not included here or in the letter) within Calculation FPL-081-CALC-016, Revision 1, "Probable Maximum Storm Surge (PMSS), Wave Runup, Combined Effects, and Low Water Calculation," (ENERCON, 2016). The licensee basis for concluding insensitivity to the PMF flow contribution is based on the PMF flow be small relative to the tidal flows into Hampton Harbor and the topography/bathymetry of the harbor, contributing channels and the site at high tide conditions.

		The NRC reviewed the information provided by the licensee and determined it was sufficient to resolve the information need request.
5	**<u>Hazard Input to the Integrated Assessment – Flood Event Duration Parameters</u>** <u>Background</u>: The "Closure Plan for the Reevaluation of Flooding Hazard for Operating Nuclear Power Plants" (COMSECY-15-0019) (NRC, 2015) requests the licensee to perform an additional assessment(s) of the plant's response to the reevaluated hazard if the reevaluated flood hazard is not bounded by the current design basis. Flood scenario parameters from the flood hazard reevaluation serve as the input to the focused evaluation and additional assessment. To support efficient and effective evaluations, staff will review flood scenario parameters as part of the flood hazard reevaluation and document results of the review as part of the staff assessment of the flood hazard reevaluation. While the FHRR does provide a partial set of flood duration parameters for LIP in FHRR Table 4-3 and for PMF in FHRR Table 4-21, some parameters (e.g., warning time and the period of site preparation) were not evaluated (NextEra, 2015) <u>Request</u>: If available, provide the applicable flood event duration parameters (see definition and Figure 6 of the Guidance for Performing an Integrated Assessment, Japan Lessons-Learned Division (JLD) Interim Staff Guidance (ISG) JLD-ISG-2012-05; NRC, 2012b) associated with mechanisms that trigger an additional assessment using the results of the flood hazard reevaluation.	In its response (NextEra, 2016a), the licensee stated that the riverine and dam break flooding mechanisms do not result in site flooding, so event duration and warning time parameters are not needed for these flooding mechanisms. However, the licensee stated that the LIP event does result in site flooding, and duration and warning time parameters will be addressed in the licensee's Mitigating Strategies Assessment (NextEra, 2016a). The NRC reviewed the information provided by the licensee and determined it was sufficient to resolve the information need request.

	This includes (as applicable) the warning time the site will have to prepare for the event (e.g., the time between notification of an impending flood event and arrival of floodwaters on site) and the period of time the site is inundated for the mechanisms that are not bounded by the current design basis. If available, provide the basis or source of information for the flood event duration, which may include a description of relevant forecasting methods (e.g., products from local, regional, or national weather forecasting centers) and/or timing information derived from the hazard analysis.	
6	**Streams and Rivers – Probable Maximum Flood** Background: As stated in FHRR Section 4.2.6, the reevaluated PMF peak flow was found to be 26,158 cfs and is associated with the All-Season PMP (NextEra, 2015). However, the FHRR does not state a reevaluated peak water surface elevation associated with the All-Season PMP event. Request: Provide the reevaluated streams and rivers PMF scenario flood hazard stillwater elevation at the Seabrook site, and wave runup effects, if applicable, and the CDB flood elevation appropriate for comparison.	During the webinar, the licensee presented flood elevations varied with time for the combined tidal wave, PMF, and dam breach (Figure 4-32). The licensee stated that the re-evaluated bounding flood elevation for riverine flooding is 4.55 ft. North American Vertical Datum of 1988 (stillwater elevation), as determined in Calculation FPL-081-CALC-016, Revision 1 (ENERCON, 2016), which the licensee posted to its ERR. The licensee's review of Figure 7.2 in Calculation FPL-081-CALC-016 concluded that the peak PMF water surface elevation was insensitive to higher PMF flow contributions due to two factors: (1) the small contribution of PMF flow relative to the tidal flow through the Hampton Harbor inlet, and (2) the hypsometry of the Harbor and contributing channels, especially at high tide levels. The NRC reviewed the information provided by the licensee and determined it was sufficient to close the information need request. Because no PMF elevation for the stream and river hazard for the Seabrook site was provided in the FHRR, the NRC staff asked the licensee to provide a supplement or a letter with the numerical value of PMF elevation for CLB and

		FHRR. The licensee submitted the requested information on May 10, 2016 (NextEra, 2016d).
7	**Dam Breach Flow Estimation** Background: The total PMF inflow to Hampton Harbor, including dam breach flow occurring during the PMF event, was computed to be 58,913 cfs (FHRR Section 4.4.8) (NextEra, 2015). For the sunny day dam failure case, the dam breach flow was computed as 18,363 cfs (FHRR Table 4-22). In FHRR Section 4.3 and on FHRR Table 4-22, the dam breach flows were described as the computational results of regression equations. In FHRR Section 5.3, the licensee states that, "The scenario was modeled within the HEC-HMS hydrologic model, which resulted in a flow volume of 18,363 [cfs] at Hampton Harbor." The staff was not able to find a dam breach flow simulation within the HEC-HMS model using the peak flows for each potentially critical dam that resulted in, or used, a combined peak flow of 18,363 cfs at Hampton Harbor. In the FHRR, Table 4-22 indicated that the 18,363 cfs of dam breach flow is for Seabrook site, not at Hampton Harbor (NextEra, 2015). Request: Clarify how the dam breach flows were incorporated into the HEC-HMS model, and indicate whether the model input specific to this scenario was previously provided. Include in the discussion which previously submitted model input and output files are consistent with the FHRR description. Clarify that the peak flood elevations associated with the reevaluated dam break flood hazards are described for the Seabrook site.	During the audit, the licensee did not present the confidence intervals or the input parameter sensitivity for the licensee's selected dam-breach flow equation. Instead, the licensee presented seven inflow points of the PMF event to the downstream of Seabrook site (NextEra, 2015; ENERCON, 2015d). The flow rate of peak PMF at each inflow point at the downstream Seabrook site were presented (ENERCON, 2015c). All the inflows were within Hampton Harbor. As shown on the flood elevation diagram in the FHRR (Figure 4-32), the licensee indicated that the dam breach outflow plus PMF would have minimal impact on the maximum flood elevation at the Seabrook site, approximately a 2 inch increment (NextEra, 2015). Based on the information provided by the licensee during the audit, the NRC staff noted that the dam breach flow would not be a dominant flow to contribute flood elevation at the Seabrook site, and also noted that the tidal wave, plus PMF and dam-breach flow would not inundate the Seabrook site. Therefore, the confidence intervals and the input parameter sensitivity for the licensee's selected dam-breach flow equation is not needed. The NRC reviewed the information provided by the licensee and determined it was sufficient to resolve the information need request.

	Clarify whether the flood hazard specified for Hampton Harbor is intended to be representative of Seabrook site hazard. Consistent with guidance document JLD-ISG-2013-01, "Guidance for Assessment of Flooding Hazards Due to Dam Failure," (NRC, 2013) the licensee is requested to present the confidence intervals for the procedure selected, and evaluate the effect of model selection and input parameter sensitivity on the results of the analysis. Justify the approach used to represent dam breach peak flows in a conservative manner.	

Sources:

1. ENERCON, 2015a, Calc. No. FPL-081-CALC-012, "HEC-HMS Hydrology Model Development Calculation," Revision 0, Includes Attachment A, B, and C, August 26, 2015, 67 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1302, "FPL-081-CALC-012_HEC-HMS Model Development and Calibration Calculation Rev0". Located in the Certrec Electronic Reading Room.

2. ENERCON, 2015b, Calc. No. FPL-081-CALC-019, "FLO-2D Evaluation of Local Intense Precipitation (LIP) Calculation," Revision 0, Includes Attachments A, C, D and E, August 17, 2015, 62 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1325, "FPL-081-CALC-019_FLO—2D Evaluation of Local Intense Precipitation (LIP) Calculation Revision 0". Located in the Certrec Electronic Reading Room.

3. ENERCON, 2015c, Calc. No. FPL-081-CALC-013, "HEC-HMS Warm/Cool Season Probable Maximum Flood PMF Hydrologic Calculation," Revision 0, Includes Attachments A, B, C, D, E, and F, August 26, 2015, 67 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, Item ID 1306, "FPL-081-CALC-013 HEC-HMS Warm-Cool Season Probable Maximum Flood (PMF) Hydrologic Calculation Rev. 0". Located in the Certrec Electronic Reading Room.

4. ENERCON, 2015d, Calc. No. FPL-081-CALC-006, "Dam Screening and Evaluation Calculation," Revision 0, Includes Attachments A, B and C, 23 pages, March 3, 2015, NextEra Online Reference Portal, "FPL-081-CALC-006_Dam Screening and Evaluation Calculation Rev 0". Located in the Certrec Electronic Reading Room.

5. ENERCON, 2016, Calc. No. FPL-081-CALC-016, "Probable Maximum Storm Surge (PMSS), Wave Runup, Combined Effects, and Low Water Calculation," Revision 1, Includes Attachments A, B, C, and D, March 2, 2016, 104 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1590, "FPL-081-CALC-016 PMSS Wave Runup Combined Effects and Low Water Calc Rev1 (rec'd 3-2-16)". Located in the Certrec Electronic Reading Room.

6. NextEra, 2015, “Flooding Hazards Reevaluation Report”, Seabrook Station, Revision 0, Enclosure to Letter from Dean Curtland to the U.S. Nuclear Regulatory Commission, Document Control Desk, Subject: “Response to NRC 10 CFR 50.54(f) Request for Information Regarding Near-Term Task Force Recommendation 2.1, Flooding – Submittal of Flooding Hazards Reevaluation Report", SBK-L-15181, September 25, 2015, ADAMS Accession No. ML15274A245 (non-publicly available).

7. NextEra, 2016a, “Response to Request for Additional Information Regarding the Seabrook Flooding Hazard Reevaluation Report” Enclosure to Letter from Michael Ossing to U.S. Nuclear Regulatory Commission, Document Control Desk, Subject: “Response to Request for Information Regarding the Seabrook Flooding Hazards Reevaluation Report”, SBK-L-16044, included a DVD, March 28, 2016, ADAMS Accession No. ML16098A468 (publicly available).

8. NextEra 2016b, ”NRC Question 3 Response 3-30-16”, March 30, 2016, 2 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1581, “IN03_LIPRoofDrainage_Final_signed”. Located in the Certrec Electronic Reading Room.

9. NextEra, 2016c, ”Information Need #4: Reevaluated Flood Level,” March 29, 2016, 6 pages, NextEra Online Reference Portal, Fukushima Project, Seabrook, Flood Hazard Reevaluation Audit, Item ID 1581, “IN04_ReevaluatedFloodLevel_Final_signed”. Located in the Certrec Electronic Reading Room.

10. NextEra, 2016d, Letter from Michael Ossing to U.S. Nuclear Regulatory Commission, Subject: “Seabrook Station Re-evaluated Bounding Flood Elevation for Riverine Flooding”, SBK-L-16073, May 10, 2016, ADAMS Accession No. ML16137A504 (publicly available).

11. 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, Subject: “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 No. ML12056A046.

12. NRC (U.S. Nuclear Regulatory Commission), 2012b, “Guidance for Performing the Integrated Assessment for External Flooding,” Japan Lessons-Learned Project Directorate, Interim Staff Guidance JLD-ISG-2012-05, Revision 0, November 30, 2012, ADAMS Accession No. ML12311A214.

13. NRC (U.S. Nuclear Regulatory Commission), 2013, “Guidance For Assessment of Flooding Hazards Due to Dam Failure,” Japan Lessons-Learned Project Directorate, Interim Staff Guidance JLD-ISG-2013-01, Revision 0, July 29, 2013, ADAMS Accession No. ML13151A153.

14. NRC (U.S. Nuclear Regulatory Commission), 2015, “Closure Plan for the Reevaluation of Flooding Hazard for Operating Nuclear Power Plants,” Commission Paper COMSECY-15-0019, June 30, 2015, ADAMS Accession No. ML15153A104.

ATTACHMENT 3
Seabrook Station, Unit 1 Storm Surge Summary

During the audit, the NRC staff identified concerns related to the licensee's storm surge analysis contained in the FHRR Revision 0 (NextEra, 2015). Over the course of the audit the licensee provided additional information in the electronic reading room which the NRC staff reviewed. No formal information needs were submitted to resolve the NRC staff concerns. In order to address the NRC staff's concerns, the licensee submitted FHRR Revision 1 (NextEra, 2016c), posted revised calculation packages (ENERCON, 2016a; ENERCON, 2016b; ENERCON, 2016c), and additional documentation, "Seabrook Flood Hazard Reevaluation Report Audit: Bathymetric Anomalies White Paper" Revisions 0 and 2 (NextEra, 2016a; NextEra, 2016b) for NRC staff review. During the NRC staff's review of the licensees' storm surge analysis, the staff evaluated the details of the probabilistically based aspects of the storm selection which were not included in the FHRR. The NRC staff review of the FHRR Revision 1 will be discussed in the staff assessment.

References:

ENERCON, 2016a, Calc. No. FPL-081-CALC-016, "Probable Maximum Storm Surge (PMSS), Wave Runup, Combined Effects, and Low Water Calculation," Revision 1, Includes Attachments A, B, C, and D, 104 pages, March 2, 2016, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, "FPL-081-CALC-016 PMSS Wave Runup Combined Effects and Low Water Calc Rev1 (rec'd 3-2-16)". Located in the Certrec Electronic Reading Room.

ENERCON, 2016b, Calc. No. FPL-081-CALC-016, "Probable Maximum Storm Surge (PMSS), Wave Runup, Combined Effects, and Low Water Calculation," Revision 2, Includes Attachments A, B, C, and D, 110 pages, October 5, 2016, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, "FPL-081-CALC-016 PMSS Wave Runup Combined Effects and Low Water Calculation Rev 2". Located in the Certrec Electronic Reading Room.

ENERCON, 2016c, Calc. No. FPL-081-CALC-024, "Hurricane Climatology Calculation," Revision 1, Includes Attachments A, B, C, and D, 43 pages, March 2, 2016, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, "FPL-081-CALC-024 Hurricane Climatology Calculation Rev 1 signed". Located in the Certrec Electronic Reading Room.

NextEra, 2015, "Flooding Hazards Reevaluation Report", Seabrook Station, Revision 0, Enclosure to Letter from Dean Curtland to the U.S. Nuclear Regulatory Commission, Document Control Desk, Subject: "Response to NRC 10 CFR 50.54(f) Request for Information Regarding Near-Term Task Force Recommendation 2.1, Flooding – Submittal of Flooding Hazards Reevaluation Report", SBK-L-15181, September 25, 2015, ADAMS Accession No. ML15274A245 (non-publicly available).

NextEra, 2016a, "Seabrook Flood Hazard Reevaluation Report Audit: Bathymetric Anomalies White Paper," Revision 0, Document Number NEESBX087, 3 pages, January 11, 2016, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, "SeabrookFHRRAudit_Bathymetric Anomalies WhitePaper_Rev0". Located in the Certrec Electronic Reading Room.

NextEra, 2016b, “Seabrook Flood Hazard Reevaluation Report Audit: Bathymetric Anomalies White Paper,” Revision 2, Document Number NEESBX087, 8 pages, Signed January 28, 2016, NextEra Online Reference Portal, Fukushima Project, Seabrook, NTTF 2.1 Flooding, “Seabrook FHHR Audit_BathymetricAnomaliesWhitePaper_Rev2_signed”. Located in the Certrec Electronic Reading Room.

NextEra, 2016c, “Flooding Hazards Reevaluation Report”, Seabrook Station, Revision 1, Enclosure to Letter from Eric McCartney to the U.S. Nuclear Regulatory Commission, Document Control Desk, Subject: “Response to NRC 10 CFR 50.54(f) Request for Information Regarding Near-Term Task Force Recommendation 2.1, Flooding – Submittal of Flooding Hazards Reevaluation Report", SBK-L-16175, November 7, 2016, ADAMS Accession No. ML16314D429 (Non-publicly available).