

RECORD OF DECISION  
U.S. NUCLEAR REGULATORY COMMISSION  
DOCKET NO. 50-443  
LICENSE RENEWAL APPLICATION FOR  
SEABROOK STATION, UNIT NO. 1

March 12, 2019

**BACKGROUND:**

On May 25, 2010, the NRC received an application from NextEra Energy Seabrook, LLC (NextEra) to issue a renewed operating license for Seabrook Station, Unit No. 1 (Seabrook) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML101590094).

NextEra filed this license renewal application pursuant to Section 103 of the Atomic Energy Act of 1954, as amended (AEA), Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and 10 CFR Part 54, "Requirements for Renewal of Operating License for Nuclear Power Plants." NRC issuance of the renewed license would authorize NextEra to operate Seabrook for an additional 20-year period beyond that specified in the current operating license (until March 15, 2050).

Seabrook is a single-unit nuclear power plant located in Rockingham County, NH. The nuclear reactor for Seabrook is a Westinghouse pressurized-water reactor. The net electrical output from Seabrook is approximately 1,245 megawatt-electric (MWe). Seabrook uses a once-through cooling system that withdraws water from the Gulf of Maine and discharges to the same body of water using a system of tunnels drilled through ocean bedrock. Seabrook began commercial operation in August 1990. The current operating license for Seabrook (NPF-86) expires on March 15, 2030.

On June 16, 2010, the NRC published a notice of receipt of the Seabrook license renewal application in the *Federal Register* (FR) (75 FR 34180). Section 102 of the National Environmental Policy Act of 1969, as amended (NEPA), directs Federal agencies to prepare a detailed statement for major Federal actions that could significantly affect the quality of the human environment. In accordance with the Commission's regulations in 10 CFR Part 51, the NRC prepares an environmental impact statement (EIS) or a supplement to an EIS for all operating reactor license renewal applications, regardless of the action's environmental impact significance (10 CFR 51.20(b)(2)). In this instance, the NRC's major Federal action was to decide whether to issue a renewed operating license for Seabrook for an additional 20-year period beyond that specified in the current operating license.

On July 20, 2010, the NRC published a notice of intent to prepare an environmental impact statement and conduct the scoping process for Seabrook. In the *Federal Register* (75 FR 42168), as required by 10 CFR Part 51. On August 19, 2010, the NRC held two public meetings in Hampton, NH, to obtain public input on the scope of the environmental review related to the Seabrook license renewal application. During the scoping process, the NRC staff solicited comments and participation from the community, stakeholder groups, and the general public. The NRC also consulted with Federal, State, Tribal, regional, and local agencies. NRC issued a scoping summary report on March 1, 2011 (ADAMS Accession No. ML110100113).

## ENVIRONMENTAL IMPACT STATEMENT:

As part of its environmental review for reactor license renewal, the NRC staff prepares a site-specific environmental impact statement. In accordance with 10 CFR 51.95(c), "Operating License Renewal Stage," the NRC publishes this site-specific environmental impact statement as a supplemental environmental impact statement (SEIS) to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (usually called the GEIS). The GEIS documents the results of the NRC staff's systematic approach to evaluating the environmental consequences of renewing the operating licenses of nuclear power plants and operating them for an additional 20 years.

The GEIS facilitates the NRC's environmental review process by identifying and evaluating generic environmental impacts that are common to all nuclear power plants (these common, generic issues are called Category 1 issues). For Category 1 issues, no additional site-specific analysis is required in the site-specific SEIS unless new and significant information is identified that would change the conclusions in the GEIS. The GEIS also identifies site-specific issues that the NRC staff cannot resolve generically (nongeneric, site-specific issues are called Category 2 issues). For Category 2 issues, the NRC staff performs a site-specific review in the site-specific SEIS.

The NRC established a standard of significance for each NEPA issue evaluated in the GEIS based on the Council on Environmental Quality's (CEQ's) regulations on how to evaluate significance (see 40 CFR 1508.27, "Significantly"). Since the significance and severity of an impact can vary with the setting of the proposed action, the NRC considered both "context" and "intensity" as defined in Council on Environmental Quality regulations at 40 CFR 1508.27. Context is the geographic, biophysical, and social context in which the effects will occur. For license renewal, the context is the environment surrounding the nuclear power plant. Intensity refers to the severity of the impact in whatever context it occurs. Based on this, the NRC established a three-level standard of significance for potential impacts—SMALL, MODERATE, and LARGE—as defined below:

SMALL: Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE: Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE: Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

NextEra submitted its Seabrook license renewal application and environmental report under the NRC's 1996 rule governing license renewal environmental reviews,<sup>1</sup> as codified in the NRC's environmental protection regulation at 10 CFR Part 51. The 1996 GEIS<sup>2</sup> and Addendum 1 to the GEIS<sup>3</sup> provides the technical bases for the list of NEPA issues and associated

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<sup>1</sup> 61 FR 28467. U.S. Nuclear Regulatory Commission, "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses," *Federal Register* Vol. 61, No. 109, June 5, 1996, pages 28467–28497.

<sup>2</sup> U.S. Nuclear Regulatory Commission, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG–1437, May 1996, ADAMS Accession Nos. ML040690705 and ML040690738.

<sup>3</sup> U.S. Nuclear Regulatory Commission, Addendum 1, "Section 6.3—Transportation, Table 9.1, Summary of findings on NEPA issues for license renewal of nuclear power plants," to "Generic Environmental

environmental impact findings for license renewal contained in Table B–1, “Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants,” in Appendix B to Subpart A of 10 CFR Part 51. Therefore, for Seabrook, the NRC staff initiated its environmental review in accordance with the 1996 rule and GEIS. Neither NextEra nor the NRC staff identified information that was both new and significant related to Category 1 issues that would call into question the conclusions in the GEIS. This determination is supported by the NRC staff’s review of NextEra’s environmental report and other documentation relevant to NextEra’s activities; consideration of public comments received during the scoping process and the draft SEIS comment period; consultation with Federal, State, and local agencies as well as Tribal representatives; and the findings from the NRC staff’s environmental site audit.

On August 12, 2011, the NRC published a draft, site-specific SEIS on the Seabrook license renewal application for public comment (ADAMS Accession No. ML11213A080). A 75-day comment period began on the date of publication of the U.S. Environmental Protection Agency (EPA) notice of availability of the filing of the draft SEIS (76 FR 50213) and ended on October 26, 2011. The comment period allows members of the public and other government agencies to comment on the results of the environmental review as described in the draft SEIS. On September 15, 2011, the NRC held two public meetings in Hampton, NH, to describe the results of its environmental review, respond to questions, and accept public comments.

On April 26, 2013, the NRC issued a supplement (second draft) to the 2011 draft SEIS (ADAMS Accession No. ML13113A174). The EPA published its notice of availability on May 3, 2013 (78 FR 26027), and the public comment period ended on June 30, 2013. NRC issued the supplement to address the following:

- (a) NextEra’s changes to the severe accident mitigation alternatives (SAMA) analysis for Seabrook
- (b) NRC’s update of the uranium fuel cycle section of the draft SEIS in light of the June 8, 2012, U.S. Court of Appeals for the District of Columbia Circuit decision to vacate the NRC’s Waste Confidence Decision Rule (WCD) (75 FR 81032, 75 FR 81037)
- (c) NRC analysis of the new Category 1 and Category 2 issues in response to the Commission’s December 6, 2012 affirmation<sup>4</sup> of a final rule revising the NRC’s environmental protection regulation (10 CFR Part 51) governing license renewal environmental reviews for nuclear power plants

Under NEPA, the NRC must consider and analyze the potential significant impacts described by the final rule’s new Category 2 issues. If any new and significant information is identified for the final rule’s new Category 1 issues, then their potential significant impacts must also be described. Therefore, in the supplemental draft SEIS, the NRC staff reviewed information relating to the new NEPA issues applicable to Seabrook operations including geology and soils, radionuclides released to groundwater, effects on terrestrial resources (non-cooling system impacts), exposure of terrestrial organisms to radionuclides, exposure of aquatic organisms to

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Impact Statement for License Renewal of Nuclear Plants,” NUREG–1437, August 1999, ADAMS Accession No. ML040690720.

<sup>4</sup> Commission Voting Record for Final Rule: Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses (10 CFR Part 51; RIN 3150–AI42), December 6, 2012. ADAMS Accession No. ML12341A250.

radionuclides, human health impacts from chemicals, physical occupational hazards, environmental justice, and cumulative impacts.

On June 20, 2013, the NRC published a final rule revising 10 CFR, Part 51, including the list of NEPA issues and findings in Table B–1<sup>5</sup> of Appendix B to Subpart A of 10 CFR Part 51. Revision 1 of the GEIS<sup>6</sup> provides the technical bases for the final rule and specifically supports the revised list of NEPA issues and associated environmental impact findings for license renewal contained in Table B–1 in Appendix B to Subpart A of the revised 10 CFR Part 51. The revised GEIS and final rule reflect lessons learned and knowledge gained during previous license renewal environmental reviews. As prompted by this revision in 10 CFR 51, the staff addressed the Table B-1 changes in the Seabrook license renewal final SEIS as appropriate.

On August 26, 2014, the Commission approved a revised rule at 10 CFR 51.23, “Environmental Impacts of Continued Storage of Spent Nuclear Fuel Beyond the Licensed Life for Operation of a Reactor,” as well as the NUREG report associated with the revised rule (NUREG-2157, “Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel”) (ADAMS Accession No. ML14198A440). On September 19, 2014, the NRC published the revised rule (79 FR 56238) in the *Federal Register* along with the associated NUREG-2157 (79 FR 56263). The revised rule adopts the generic impact determinations made in NUREG-2157 and codifies the NRC’s generic determinations regarding the environmental impacts of continued storage of spent nuclear fuel beyond a reactor’s operating license (i.e., those impacts that could occur as a result of the storage of spent nuclear fuel at at-reactor or away-from-reactor sites after a reactor’s licensed life for operation and until a permanent repository becomes available). As directed by 10 CFR 51.23(b), the NRC deems impacts assessed in NUREG-2157 regarding continued storage incorporated by rule into the Seabrook license renewal final SEIS.

On July 31, 2015, the NRC issued the final SEIS (FSEIS) for the Seabrook license renewal application (ADAMS Accession Nos. ML15209A575 and ML15209A870). Appendix A of the FSEIS includes all comments that the NRC received during the comment periods on the 2011 draft SEIS and the 2013 supplemental draft SEIS. In the FSEIS, pursuant to 10 CFR 51.103, “Record of Decision—General,” the NRC staff concluded that the environmental impacts of renewing the Seabrook operating license are not great enough to deny the option of license renewal for energy-planning decision makers. On August 14, 2015, the EPA issued its notice of availability for the Seabrook FSEIS (80 FR 48854). During the 30 days following publication of the notice, the NRC received comments on the FSEIS from EPA Region 1 as discussed later in this record of decision in the section, “Consideration of Emerging Information.”

Pursuant to 10 CFR 51.102(b) and 10 CFR 51.103(a)(1)–(5), the NRC staff has prepared this concise public record of decision (ROD) to document its action on the Seabrook license renewal application. In accordance with 10 CFR 51.103(c), this ROD incorporates by reference the material contained in the FSEIS.

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<sup>5</sup> 78 FR 37282. U.S. Nuclear Regulatory Commission. “Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses,” *Federal Register* Vol. 78, No. 119, June 20, 2013, pages 37282–37324.

<sup>6</sup> U.S. Nuclear Regulatory Commission, “Generic Environmental Impact Statement for License Renewal of Nuclear Plants,” NUREG-1437, Revision 1, Volumes 1, 2, and 3, June 2013, ADAMS Accession Nos. ML13106A241, ML13106A242, and ML13106A244.

*DECISION:*

Pursuant to 10 CFR 54.29(b), “Standards for Issuance of a Renewed License,” the Commission may issue a renewed license if it finds that (a) the license renewal application satisfies the requirements in 10 CFR Part 54, and (b) the applicable requirements of Subpart A, “National Environmental Policy Act-Regulations implementing Section 102(2),” of 10 CFR Part 51 have been satisfied, including the completion of the record of decision.

In making its final decision on the proposed license renewal to authorize the continued operation of Seabrook for an additional 20 years beyond the expiration of the current operating license, the NRC must make a favorable safety finding. The purpose of the NRC’s safety review is to determine if the applicant has adequately demonstrated that the effects of aging will not adversely affect any systems, structures, or components as specified in 10 CFR 54.4, “Scope,” and 10 CFR 54.21, “Contents of Application—Technical Information.” The applicant must demonstrate that it will adequately manage the effects of aging so that the intended functions will be maintained during the license renewal period. The NRC documents the results of its safety review in a safety evaluation report (SER) that it publishes separately. Further, the Advisory Committee on Reactor Safeguards (ACRS) completed its review during its 659<sup>th</sup> meeting held on December 6-7, 2018, and documented its findings recommending renewal of the Seabrook license in a letter to the Commission dated December 19, 2018 (ADAMS Accession No. ML18353A954).

This Record of Decision and the FSEIS (incorporated by reference herein) document the NRC’s final decision for the environmental review of the Seabrook license renewal application. The NRC concludes that the adverse environmental impacts of license renewal for Seabrook are not so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable (see 10 CFR 51.103(a)(5)). The renewed operating license (ADAMS Accession No. ML18355A491) authorizes NextEra to continue operating Seabrook for an additional 20 years beyond the expiration of the current operating license, as requested in the license renewal application.

*PURPOSE AND NEED:*

As identified in Section 1.2, “Purpose and Need for the Proposed Action,” of the FSEIS, the purpose and need for the proposed action (issuance of a renewed license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by energy-planning decisionmakers, such as the State, utilities, and, where authorized, Federal agencies (other than NRC). This definition of purpose and need reflects the Commission’s recognition that, unless there are findings in the safety review required by the AEA or findings in the NEPA environmental analysis that would lead the NRC to reject a license renewal application, the NRC does not decide whether a particular nuclear power plant should continue to operate.

Ultimately, the appropriate energy-planning decisionmakers and NextEra will decide whether the plant will continue to operate based on factors such as the need for power or other factors within the state’s jurisdiction or the purview of the owners.

## *NRC EVALUATION OF ALTERNATIVES:*

Section 102(2)(C)(iii) of NEPA and NRC regulations in 10 CFR Part 51 require the NRC to consider alternatives to the proposed action in the EIS. In this case, the proposed action is whether to issue a renewed license for the continued operation of Seabrook, which would allow the plant to operate for 20 years beyond the current expiration date of its license. In license renewal environmental reviews, the NRC considers the environmental consequences of the proposed action, the no-action alternative (i.e., not renewing the operating license), and the environmental consequences of various alternatives for replacing the nuclear power plant's generating capacity. Chapter 8, "Environmental Impacts of Alternatives," of the FSEIS presents the NRC staff's evaluation and analysis of alternatives to license renewal.

### *i. No-Action Alternative*

The no-action alternative refers to a scenario in which the NRC denies the renewed operating license for Seabrook and the license expires at the end of the current license term in 2030. The environmental consequences of this alternative are the direct impacts from nuclear power plant shutdown. After shutdown, the nuclear plant operators will initiate decommissioning in accordance with 10 CFR 50.82, "Termination of License." As described in Chapter 7 of the FSEIS, the separate environmental impacts from decommissioning and related activities are addressed in several other NRC documents.

Assuming that a need currently exists for the power generated by Seabrook, the no-action alternative would require the appropriate energy-planning decisionmakers (i.e., not the NRC) to rely on alternatives to replace the capacity of Seabrook, to rely on energy conservation or power purchases to offset the plant generating capacity, or to rely on some combination of measures to offset and replace the generation provided by Seabrook. Therefore, the no-action alternative does not satisfy the purpose and need for the FSEIS, as it neither provides power-generation capacity nor meets the needs currently met by Seabrook or that the alternatives evaluated in detail would satisfy.

### *ii. Alternative Energy Sources*

In evaluating replacement power alternatives to license renewal, the NRC considered energy technologies in commercial operation, as well as technologies not in commercial operation but likely to become commercially available by the time the current Seabrook operating license expires on March 15, 2030. Therefore, to be considered in this evaluation, reasonable alternatives must be available (i.e., constructed, permitted, and connected to the grid) by the time of license expiration.

To determine whether alternatives were reasonable, or likely to be commercially available by 2030, the NRC staff reviewed energy relevant statutes, regulations, and policies; the state of technologies; and information on energy outlook from sources such as the Energy Information Administration, other organizations within the U.S. Department of Energy, the EPA, industry sources and publications, and information submitted by NextEra in its environmental report. The NRC staff also considered the generation capacity mix and electricity production data within the Independent System Operator for New England (ISO New England) service area in which Seabrook is located. Within ISO New England, the generation capacity mix principally includes natural gas, nuclear, renewables, hydroelectric, and other power sources.

The NRC staff initially considered 16 alternatives or options to the license renewal of Seabrook; thirteen of these were dismissed or eliminated from detailed study because of existing technical, resource availability, or commercial limitations. These limitations currently exist and the NRC staff believes they are likely to continue to exist when Seabrook's operating license expires, rendering these alternatives not feasible or commercially viable.

Alternatives considered, but eliminated from detailed study, were as follows:

- wind power
- solar power
- wood waste
- conventional hydroelectric power
- ocean wave and current energy
- geothermal power
- municipal solid waste
- biomass fuels
- oil-fired power
- fuel cells
- new coal-fired capacity
- energy conservation energy efficiency
- purchased power

Section 8.5 of the Seabrook FSEIS describes each alternative that the NRC eliminated from detailed study as well as the basis for each elimination.

The NRC staff determined that there were three feasible and commercially viable replacement power alternatives:

- natural-gas-fired combined-cycle alternative (NGCC)
- new nuclear alternative
- combination alternative of natural-gas-fired combined-cycle and wind

For these three alternatives considered in depth, the NRC staff evaluated the environmental impacts across the following impact categories: air quality, surface water resources, groundwater resources, aquatic ecology, terrestrial ecology, human health, land use, socioeconomics, transportation, visual, aesthetics, historic and archaeological resources, environmental justice, and waste management. Section 8.5 of the FSEIS provides a summary of the environmental impacts of each of the alternatives considered in depth, and compares those impacts to the environmental impacts of license renewal. Impacts of each replacement power alternative are summarized in Table 8-7, "Environmental Impacts of Proposed Action and Alternatives," of the FSEIS.

Separately, in Section 8.4 of the FSEIS, the NRC staff also analyzed in detail a technology alternative in the form of a closed-cycle cooling option for continued operation of Seabrook. This technology alternative was added, in part, in response to comments from the EPA, National Marine Fisheries Service (NMFS), and the New Hampshire Department of Environmental Services (NHDES) that the NRC consider, in its SEIS, additional measures that could be taken to mitigate cooling water intake effects on aquatic resources.

### *Natural Gas Combined-Cycle Alternative*

For the natural gas alternative, the NRC staff evaluated the construction and operation of an NGCC facility with a nameplate capacity of 1,348 MWe. The NRC staff assumed the combined-cycle units would be Advanced F-Class design, equipped with water or steam injection as a precombustion control to suppress nitrogen oxide (NO<sub>x</sub>) formation and selective catalytic reduction (SCR) of the exhaust with ammonia for post-combustion control of NO<sub>x</sub> emissions. The new NGCC plant would be supported by a closed-loop cooling system, using seawater supplied through the existing cooling water intake with cooling tower blowdown discharged through the existing discharge tunnel.

The NRC staff estimated that 44 acres (18 hectares (ha)) of land on the Seabrook site would be needed to support a new NGCC plant to replace the Seabrook reactor. Additional direct land use impacts would include onsite and offsite areas for construction of a gas pipeline. This alternative would require much less cooling water than Seabrook because a NGCC plant would operate at a higher thermal efficiency (nearly 60 percent) and because it requires much less water for closed-cycle condenser cooling. For the NGCC alternative, the NRC staff determined that the direct impacts to all resource areas would be SMALL, except for air quality, transportation, and historic and archaeological resources. Air quality impacts would be SMALL to MODERATE due to noticeable criteria air pollutant and carbon dioxide emissions associated with operation of an NGCC facility. Transportation impacts would be SMALL to MODERATE based on traffic-related transportation impacts from workers commuting to the site as well as the delivery of construction materials and equipment. Historic and archaeological resources impacts could be SMALL to MODERATE during construction due to a high potential for additional archaeological sites and resource materials to be discovered at the site.

### *New Nuclear Alternative*

For the new nuclear alternative, the NRC staff assumed that a new nuclear reactor would be constructed and operated on the Seabrook site, allowing for the maximum use of existing ancillary facilities at those locations, such as support buildings and transmission infrastructure. This analysis assumes the replacement reactor would be provided by a pressurized-water reactor of the Areva U.S. Evolutionary Power Reactor (EPR) design, similar to the reactor previously proposed for installation as Unit 3 at the Calvert Cliffs Power Plant in Maryland. That reactor is rated at a core thermal power of 4,590 MWt and a net electrical output of 1,562 MWe. The analysis also assumes the new reactor would not use once-through cooling, but would use closed-cycle cooling with either a mechanical draft or natural draft-cooling tower. However, the cooling system would use seawater, and the existing intake and discharge structures at Seabrook would continue in service with little to no structural modifications.

The NRC staff estimated that 460 acres (186 ha) of land would be required for the new reactor, which the Seabrook site could accommodate. Surface water use (closed-loop) would be substantially less than current Seabrook operations (once-through). The NRC staff determined that the direct impacts to all resource areas would be SMALL, except for socioeconomic, transportation, and historic and archaeological resources. Socioeconomic impacts in communities near Seabrook site could range from SMALL to MODERATE based on the estimated number of construction and operations workers employed and regional effects. Transportation impacts could range from SMALL to LARGE, particularly during construction, due to the number of workers commuting to the site as well as the delivery of construction materials and equipment. Historic and archaeological resources impacts could be SMALL to



MODERATE during construction due to a high potential for additional archaeological sites and resource materials to be discovered at the site.

#### *Combination Natural Gas Combined-Cycle and Wind*

For the combination alternative, the NRC staff assumed that a NGCC facility would be used to replace half of the annual power production capacity of the Seabrook reactor, with the other half replaced by wind energy. Based on the respective capacity factors for new NGCC and wind generation, the new NGCC plant would need to have a nameplate rating of 674 MWe. The NGCC facility would be located on the Seabrook site and would use existing infrastructure and closed-cycle cooling as described for the NGCC alternative. Generation from the wind portion of the alternative would come from at least five wind farms, four of which would be land based within the ISO New England and one of which would be located offshore, in the Outer Continental Shelf opposite the New Hampshire or Massachusetts coasts. The five farms, with a capacity factor of 35 percent, would need a collective nameplate capacity rating of 1,637 MWe.

The NRC staff determined that the direct impacts to all resource areas would be SMALL for most areas, except for in the areas of land use, transportation, aesthetics, and historic and archaeological resources. Land use impacts would be SMALL to MODERATE as of result of the additional land needed for the onshore wind portion. Transportation impacts could range from SMALL to MODERATE during construction of the NGCC facility and wind farms primarily due to delivery of construction materials and equipment to the Seabrook site and delivery of components of wind turbine installations to offsite locations. Aesthetic qualities of the affected viewsheds could experience MODERATE to LARGE impacts during construction and operation of wind farms. This is because: (1) the introduction of wind turbines to rural or remote areas would be in sharp contrast to the visual appearance of the surrounding environment, (2) construction of an offshore wind farm could have visual impacts from nighttime work, and (3) flashing lights associated with the operation of the offshore wind farms could be visible for about 2.5 miles (4 km). Historic and archaeological resources impacts could be SMALL to MODERATE during construction of the NGCC portion of this alternative on the Seabrook site due to a high potential for additional archaeological sites and resource materials to be discovered at the site.

#### *Closed-Cycle Cooling System Alternative*

For this technology alternative, the NRC staff assumed that Seabrook would be retrofitted to include closed-cycle cooling. A total of three saltwater mechanical draft cooling towers would be built, which would include (a) two, 15-cell plume-abated cooling towers at an area known as Snoopy's Head and (b) one, 24-cell plume-abated cooling tower at another site known as the 18-Acre Laydown Area. Other structures would be the same as that described for Seabrook. This alternative would use the site's existing Seabrook power block, transmission lines, intake and discharge structures, and groundwater wells. The closed-cycle cooling system would use an estimated 88 percent less water than Seabrook's existing once-through cooling system. Service water would remain the same as current operations for Unit No. 1 (21,000 gpm).

The NRC staff determined that the impacts would be SMALL for most resource areas, primarily due to the lower withdrawal and discharge rates associated with closed-cycle cooling and the use of previously disturbed habitats to build the new cooling towers. Impacts would be SMALL to MODERATE for the resource areas of noise, traffic, aesthetics, waste management and associated offsite land use, and historic and archaeological resources. The determination is based on (a) noise levels that would be audible at nearby residential and commercial

properties, (b) the large amounts of soil and construction debris that would need to be disposed of or recycled, (c) increased traffic from commuting workers and material deliveries, (d) the change in viewshed from the cooling towers and plumes, and (e) ground-disturbing activities that could affect cultural resources. Impacts would be MODERATE for air quality due criteria air pollutant emissions as a result of replacement power required during construction, fugitive dust created during construction, and cooling tower emissions during operations.

### *iii. Summary*

In the July 2015 Seabrook FSEIS, the NRC staff considered the environmental impacts associated with license renewal and with alternatives to license renewal, including other methods of power generation, and not renewing the Seabrook operating license (the no-action alternative). In the FSEIS, the NRC staff concludes that the continued operation of Seabrook during the license renewal term would have SMALL environmental impacts, except for aquatic resources where the environmental impacts range from SMALL to LARGE. The FSEIS also concludes that the overall environmental impacts of renewal of the operating license for Seabrook would either be smaller than or similar to those of the three replacement power alternatives that were considered. In addition, under the no-action alternative, the act of shutting down Seabrook would have mostly SMALL impacts, although socioeconomic impacts would be SMALL to MODERATE. However, as a result of shutdown should the option of license renewal be denied, the no-action alternative necessitates the implementation of one or a combination of alternatives in order to make up for the loss of power generation, all of which have potentially greater impacts than the proposed action. In the Seabrook FSEIS, the NRC staff concludes that there is no clear, environmentally preferred alternative, as all alternatives capable of meeting the needs currently served by Seabrook entail impacts greater than or equal to the proposed action.

### *CONSIDERATION OF EMERGING INFORMATION*

In this section, the NRC considers emerging information that became available after it issued the FSEIS.

#### *U.S. Environmental Protection Agency Comments on the FSEIS*

On September 14, 2015, the U.S. Environmental Protection Agency (EPA), Region 1 provided comments on the FSEIS (ADAMS Accession No. ML17164A016). EPA stated that it had reviewed the FSEIS, including NRC's responses to EPA's comments on the draft SEIS, as supplemented (ADAMS Accession No. ML11304A059 and ML13189A128), in Section A.2 of the FSEIS. In its letter, EPA offered follow-up observations and specific comments to information provided in the FSEIS in the areas of: (a) cooling water withdrawal and discharge, (b) National Pollutant Discharge Elimination System (NPDES), (c) groundwater contamination monitoring and reporting, and (d) decommissioning impacts. The NRC staff responded to the EPA's comments in a letter dated August 1, 2018 (ADAMS Accession No. ML18156A543). The staff response is summarized below.

Regarding cooling water withdrawal and discharge, the NRC agreed with EPA that the impact level for winter flounder and rainbow smelt should be LARGE, and noted that the staff's basis for retaining the silver hake impact level of SMALL is in Section 4.6 of the FSEIS. Additionally, the NRC acknowledged that a cross-reference to FSEIS Section 4.5.4 in the NRC's response to EPA comments should have been to Section 4.6.4, "Mitigation."

Regarding NPDES permitting, EPA provided information regarding recent changes in the NPDES permitting requirements applicable to Seabrook, including EPA's final regulations implementing Clean Water Act Section 316(b) (79 FR 48300, August 15, 2014). Although the EPA final regulations were published too late to be reflected in the FSEIS, Section 4.6 of the FSEIS acknowledges NextEra's need to employ the best technology available and Section 4.6.4 discusses mitigation measures recommended by the EPA, National Marine Fisheries Service, and the New Hampshire Department of Environmental Services. Since publication of the FSEIS, New Hampshire Department of Environmental Services has issued a Water Quality Certification for Seabrook.

Regarding groundwater contamination monitoring and reporting, EPA expressed concerns about communication to the public and the reliance on voluntary programs in the NRC approach to addressing groundwater contamination. The NRC staff noted that Section 4.5.3 of the FSEIS presents a site-specific analysis of groundwater contamination at Seabrook and noted several modes of communicating information on groundwater contamination. The NRC also noted regulatory requirements to keep releases of radioactive material as low as is reasonably achievable, conduct subsurface surveys to characterize any contamination, and maintain records of radiological information.

Regarding decommissioning impacts, EPA provided comments on potential cleanup issues regarding toxic substances (e.g., polychlorinated biphenyls (PCBs)). The NRC noted that licensees are responsible for conducting decommissioning activities in accordance with Federal, State, and local regulations and that potential environmental impacts associated with decommissioning of Seabrook are discussed in Chapter 7 of the FSEIS.

#### *Sensitivity Analyses for Severe Accident Mitigation Management*

On May 4, 2016, the Commission issued a decision, CLI-16-07 (ADAMS Accession No. ML16125A150), in the Indian Point Nuclear Generating Units 2 and 3 license renewal proceeding stating that documentation was lacking for two inputs in computer modeling of atmospheric releases that are part of the severe accident mitigation alternative (SAMA) analysis. The decision stated that uncertainties in these input values could potentially affect the SAMA analysis cost-benefit conclusions and directed the NRC staff to perform additional sensitivity analyses using values specified by the Commission. Based on this Commission decision, the NRC staff determined that additional sensitivity analyses using the values specified by the Commission should also be performed in support of the Seabrook SAMA analysis that is provided in Appendix F of the Seabrook FSEIS.

The NRC staff requested NextEra to provide additional information regarding the sensitivity analyses for the two decontamination factor inputs described in CLI-16-07 for the Seabrook Station SAMA analysis (ADAMS Accession No. ML16187A204). In response to the NRC staff request for additional information, NextEra performed a sensitivity analysis (ADAMS Accession No. ML16252A222) for Seabrook using the revised values specified by the Commission in CLI-16-07. NextEra's sensitivity analysis determined that the potential SAMAs provided in Table 1 of the Seabrook Station Supplement 2 to the severe accident mitigation alternatives analysis (ADAMS Accession No. ML12080A137) did not change. The NRC staff evaluated NextEra's SAMA sensitivity analysis and concluded that the analysis was adequate, and that no new SAMA candidates were potentially cost-beneficial. Therefore, there are no changes to the conclusions of the NRC's Seabrook Station SAMA analysis provided in Appendix F of the Seabrook FSEIS.

### *Issuance of Water Quality Certification Pursuant to Section 401 of the United States Clean Water Act (CWA) (33 U.S.C. 1341)*

On July 26, 2016, the New Hampshire Department of Environmental Services (NHDES) issued a water quality certification to NextEra (ADAMS Accession No. ML16239A394). In its finding, the NHDES states that it has determined that there is reasonable assurance that continued operation of Seabrook will not violate surface water quality standards. The certification imposes a number of conditions on NextEra as prescribed in Section E of the certificate. This certification implies that discharges from the facility will comply with Clean Water Act requirements and will not cause or contribute to a violation of State water quality standards. Note, to explicitly recognize that conditions are deemed imposed by the Clean Water Act and to remove the need to undertake amendments to incorporate conditions imposed by statute that could be subject to frequent changes, the Commission added 10 CFR 50.54(aa)<sup>7</sup> to specifically state that each 10 CFR Part 50 “license shall be subject to all conditions deemed imposed as a matter of law by sections 401(a)(2) and 401(d) of the [CWA] Federal Water Pollution Control Act, as amended (33 U.S.C.A. 1341(a)(2) and (d)).” The NRC staff concludes that the NHDES’s action provides the necessary certification pursuant to the Clean Water Act Section 401 to permit the NRC to issue a renewed operating license to Seabrook.

### *Updated Status of Endangered Species Act Section 7 Consultation*

In addition to the consultations described in the FSEIS, the NRC reinitiated consultation with the U.S. Fish and Wildlife Service (FWS) by letter dated August 21, 2018 (ADAMS Accession No. ML18186A691). The NRC’s letter requested that FWS concur with the NRC staff’s findings—namely that license renewal was not likely to adversely affect the northern long-eared bat (*Myotis septentrionalis*) or the rufa red knot (*Calidris canutus rufa*). The NRC’s letter also requested that the FWS confirm its previous concurrence that license renewal is not likely to adversely affect the piping plover (*Charadrius melodus*) and roseate tern (*Sterna dougallii dougallii*). To support its request, the NRC prepared a biological evaluation (ADAMS Accession No. ML18186A692), which the NRC submitted to the FWS with its concurrence request. The evaluation analyzed the potential effects of license renewal on the northern long-eared bat and the rufa red knot and considered whether new or updated information exists that would affect the staff’s previous findings concerning the piping plover and roseate tern.

The FWS concurred with the NRC staff’s “not likely to adversely affect” determinations in a letter dated September 20, 2018 (ADAMS Accession No. ML18263A200). The FWS’s concurrence concluded consultation, and the letter documents that the NRC staff has fulfilled its obligations under ESA Section 7(a)(2) with respect to Seabrook license renewal.

### *Annual Updates to the Seabrook License Renewal Application*

As required by 10 CFR 54.21(b), each year following submittal of a license renewal application, the applicant must submit an amendment to the application that identifies any change to the current licensing basis that materially affects the contents of the application, (Appendix E, “Environmental Report”) or the FSEIS, including the Updated Final Safety Analysis Report (UFSAR) supplement and other amendment submittals affecting the Appendix E. The NRC staff’s review of Seabrook submittals for 2015, 2016, 2017, and 2018 (ADAMS Accession Nos. ML15271A161, ML16286A630, ML17291B221, ML18121A403, and ML18165A287,

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<sup>7</sup> 49 FR 9352, 9359-60. “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions and Related Conforming Amendments.” March 12, 1984.

respectively) found no new and significant information within the context of 10 CFR 51.92(a)(2) that would change Seabrook's environmental report or that would otherwise change the NRC staff's environmental impact determinations as presented in the Seabrook FSEIS.

*MITIGATION MEASURES:*

The NRC has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the proposed action (Seabrook license renewal). As discussed in the FSEIS, continued operation of Seabrook would have SMALL environmental impacts in all resources areas, except for aquatic resources, where the environmental impacts range from SMALL to LARGE. Pursuant to 10 CFR 51.45(c), NextEra has separately considered mitigation measures to reduce or avoid adverse impacts to the aquatic resources as described in the FSEIS (Section 4.6.4). The NRC staff also provided additional discussion of potential mitigation measures to reduce impacts to aquatic resources within Section 4.6.4 of the FSEIS.

The NRC is not imposing any license conditions in connection with mitigation measures for the continued operation of Seabrook. However, Seabrook is subject to requirements imposed by other Federal, State, and local agencies. For example, the National Pollutant Discharge Elimination System (NPDES) permits do impose effluent limitations and monitoring requirements as well as best management practices to ensure that the impacts to water quality and aquatic life are minimal. In addition, in the water quality certification, NHDES requires NextEra to continue its biological monitoring program as well as conduct additional biological studies. The NRC is not requiring any new environmental monitoring programs outside what is required by Seabrook's current NPDES permits, water quality certification, or otherwise required of the licensee under NRC's regulations, as described in the Seabrook FSEIS.

*DETERMINATION:*

Based on the NRC staff's (a) independent review, analysis, and evaluation contained in the license renewal FSEIS; (b) careful consideration of all of the identified social, economic, and environmental factors; and input received from other agencies, organizations, and the public; and (c) consideration of mitigation measures, the NRC has determined that the standards for the issuance of a renewed operating license, with respect to environmental matters as described in 10 CFR 54.29(b), have been met and the requirements of Section 102 of NEPA have been satisfied. The NRC has determined that the adverse environmental impacts of issuing a renewed operating license for Seabrook are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

Dated at Rockville, MD, this 12th day of March, 2019.

APPROVED BY:

*/RA/*

Joseph E. Donoghue, Acting Director,  
Division of Materials and License Renewal,  
Office of Nuclear Reactor Regulation.