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

May 18, 2015

Mr. Dean Curtland, Site Vice President
c/o Michael Ossing
Seabrook Station
NextEra Energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

SUBJECT: SEABROOK STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT REGARDING LICENSE AMENDMENT REQUEST REGARDING NEW FUEL VAULT (TAC NO. MF3283)

Dear Mr. Curtland:

The Commission has issued the enclosed Amendment No. 148 to Facility Operating License No. NPF-86 for the Seabrook Station, Unit No. 1. This amendment consists of changes to the facility technical specifications (TSs) in response to your application dated January 30, 2012, as supplemented by letters dated May 10, 2012, September 20, 2012, March 27, 2013, December 20, 2013, January 29, 2014, March 13, 2014, and February 25, 2015.

The original application proposed revisions to the TSs for new and spent fuel storage as a result of the new criticality analyses for the new fuel vault (NFV) and spent fuel pool (SFP). By letter dated December 20, 2013, NextEra requested that the SFP and NFV be separated into two separate license amendment requests. On September 3, 2014, the Commission approved Amendment No. 142 that revised the TSs related to spent fuel storage as a result of new criticality analyses for the SFP. The license amendment request for the NFV is being processed under TAC No. MF3283.

Enclosure 3 transmitted herewith contains sensitive unclassified information
When separated from Enclosure 3, this document is decontrolled.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

John G. Lamb, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures:
1. Amendment No. 148 to NPF-86
2. Non-Proprietary Safety Evaluation
3. Proprietary Safety Evaluation

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

NEXTERA ENERGY SEABROOK, LLC, ET AL.*

DOCKET NO. 50-443

SEABROOK STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 148
License No. NPF-86

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment filed by NextEra Energy Seabrook, LLC, et al., (the licensee) dated January 30, 2012, as supplemented May 10, 2012, September 20, 2012, March 27, 2013, December 20, 2013, January 29, 2014, March 13, 2014, and February 25, 2015, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

*NextEra Energy Seabrook, LLC is authorized to act as agent for the: Hudson Light & Power Department, Massachusetts Municipal Wholesale Electric Company, and Taunton Municipal Light Plant and has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-86 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 148, and the Environmental Protection Plan contained in Appendix B are incorporated into the Facility License No. NPF-86. NextEra Energy Seabrook, LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Douglas A. Broaddus, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the License and Technical Specifications

Date of Issuance: May 18, 2015

ATTACHMENT TO LICENSE AMENDMENT NO. 148

FACILITY OPERATING LICENSE NO. NPF-86

DOCKET NO. 50-443

Replace the following page of Facility Operating License No. NPF-86 with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove	Insert
3	3

Replace the following pages of Appendix A, Technical Specifications, with the attached revised pages as indicated. The revised pages are identified by amendment number and contain marginal lines indicating the area of change.

Remove	Insert
3/4 9-17	3/4 9-17
5-10	5-10

(4) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR 30, 40, and 70, to receive, possess, and use at any time any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source, or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;

(6) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility authorized herein; and

(7) DELETED

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

NextEra Energy Seabrook, LLC, is authorized to operate the facility at reactor core power levels not in excess of 3648 megawatts thermal (100% of rated power).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 148*, and the Environmental Protection Plan contained in Appendix B are incorporated into the Facility License No. NPF-86. NextEra Energy Seabrook, LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) License Transfer to FPL Energy Seabrook, LLC**

a. On the closing date(s) of the transfer of any ownership interests in Seabrook Station covered by the Order approving the transfer, FPL Energy Seabrook, LLC**, shall obtain from each respective transferring owner all of the accumulated decommissioning trust funds for the facility, and ensure the deposit of such funds and additional funds, if necessary, into a decommissioning trust or trusts for Seabrook Station established by FPL Energy Seabrook, LLC**, such that the amount of such funds deposited meets or exceeds the amount required under 10 CFR 50.75 with respect to the interest in Seabrook Station FPL Energy Seabrook, LLC**, acquires on such dates(s).

* Implemented
** On April 16, 2009, the name "FPL Energy Seabrook, LLC" was changed to "NextEra Energy Seabrook, LLC".

3/4.9.14 (This Specification Number is not used)

5.6 FUEL STORAGE

CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. A k_{eff} less than 1.0 when flooded with unborated water, which includes an allowance for biases and uncertainties as described in UFSAR Chapter 9.

b. A k_{eff} less than or equal to 0.95 when flooded with water borated to 500 ppm, which includes an allowance for biases and uncertainties as described in UFSAR Chapter 9.

c. A nominal 10.35 inch center-to-center distance between fuel assemblies placed in the storage racks.

5.6.1.2 The new fuel storage racks are designed and shall be maintained with:

a. A k_{eff} equivalent to less than or equal to 0.95 when fully flooded with unborated water, which includes an allowance for biases and uncertainties as described in UFSAR Chapter 9.

b. A k_{eff} equivalent to less than or equal to 0.98 if moderated by aqueous foam, which includes an allowance for biases and uncertainties as described in UFSAR Chapter 9.

c. At least a nominal 21 inch center-to-center distance between fuel assemblies placed in the storage racks with a nominal 33 inches center-to-center distance (east to west) between fuel assemblies in the center column and adjacent columns.

5.6.1.3 Fresh or irradiated fuel assemblies shall be stored in the spent fuel pool in compliance with the following:

a. Any 2x2 array of Region 1 storage cells containing fuel shall comply with the storage pattern in Figure 5.6-1 and the requirements of Table 5.6-1. The reactivity ranks of fuel assemblies in the 2x2 array (rank determined using Table 5.6-1) shall be equal to or less than defined for the 2x2 array.

b. Any 2x2 array of Region 2 storage cells containing fuel shall comply with the storage requirements defined in Figure 5.6-2 and the requirements of Table 5.6-1 or with the allowable exception of evaluated assemblies stored on the periphery of Region 2 as defined in 5.6.1.3.c. The evaluated assemblies are listed in Table 5.6-2.

UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 148

TO FACILITY OPERATING LICENSE NO. NPF-86

NEXTERA ENERGY SEABROOK, LLC

SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

Proprietary information pursuant to
Title 10 of the *Code of Federal Regulations* (10 CFR), Section 2.390.
has been redacted from this document. Redacted information is identified by blank space enclosed within double brackets as shown here [[ ]].

1.0 INTRODUCTION

By application dated January 30, 2012 (Reference 1), as supplemented by letters dated May 10, 2012 (Reference 2), September 20, 2012 (Reference 3), March 27, 2013 (Reference 4), December 20, 2013 (Reference 5), January 29, 2014 (Reference 6), March 13, 2014 (Reference 7), and February 25, 2015 (Reference 8), NextEra Energy Seabrook, LLC (NextEra or the licensee) requested changes to the technical specifications (TSs) for Seabrook Station, Unit 1 (Seabrook).

The original application proposed revisions to the TSs for new and spent fuel storage as a result of the new criticality analyses for the new fuel vault (NFV) and spent fuel pool (SFP). By letter dated December 20, 2013, NextEra requested that the SFP and NFV be separated into two separate license amendment requests. This amendment revises the TSs related to NFV. On September 3, 2014, the U.S. Nuclear Regulatory Commission (NRC) issued Amendment No. 142 that revised the TSs related to spent fuel storage as a result of new criticality analyses for the SFP. During the review, a revised set of proposed TS were provided as Attachment 8 to Reference 4.

The supplements dated May 10, 2012, September 20, 2012, March 27, 2013, December 20, 2013, January 29, 2014, March 13, 2014, and February 25, 2015, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on August 14, 2012 (77 FR 48559).

HOLTEC report HI-2114996 (Reference 9) presents the nuclear criticality safety (NCS) analysis for the requested Seabrook NFV and SFP changes. The report describes the methodology and analytical models used in the NCS analysis to show that the maximum k-effective (k_{eff}) for fuel stored in the NFV and SFP will meet the appropriate limits specified in Section 50.68 of Title 10 of the *Code of Federal Regulations* (10 CFR 50.68). The following evaluation presents the results of the NRC staff's review of the NCS analysis (Reference 10 provided as Attachment 2 to Reference 1 and revised by Reference 9 provided as Attachment 3 to Reference 4).

2.0 BACKGROUND

New fuel assemblies of the Westinghouse 17x17 Robust Fuel Assembly (RFA) design may be stored in what are normally dry conditions in the Seabrook NFV. The NFV NCS analysis has been updated to support modification of the NFV TS to permit storage of up to 90 fresh fuel assemblies with uranium dioxide fuel enrichments up to a maximum of 5 weight percent Uranium-235. The NFV array is a 5x18 arrangement of storage cells with most cells spaced with a 21 inch center-to-center cell pitch. Along the 5-row side, the spacing between cells in the second and third rows and between the third and fourth rows has a 33 inch center-to-center cell pitch. Each assembly is stored in a nominal 0.093 inch thick steel box. The current TS requires that every other storage location in the third row be left empty if fuel with enrichments of 3.675 weight percent Uranium-235 or higher is stored in the NFV. Elimination of this restriction is proposed in this license amendment request based on the re-analysis of the NFV.

3.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, Criterion 62 states:

> Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations.

Paragraph 50.68(b)(1) of 10 CFR states:

> Plant procedures shall prohibit the handling and storage at any one time of more fuel assemblies than have been determined to be safely subcritical under the most adverse moderation conditions feasible by unborated water.

Paragraph 50.68(b)(2) of 10 CFR states:

> The estimated ratio of neutron production to neutron absorption and leakage (k-effective) of the fresh fuel in the fresh fuel storage racks shall be calculated assuming the racks are loaded with fuel of the maximum fuel assembly reactivity and flooded with unborated water and must not exceed 0.95, at a 95 percent probability, 95 percent confidence level. This evaluation need not be performed if administrative controls and/or design features prevent such flooding or if fresh fuel storage racks are not used.

Paragraph 50.68(b)(3) of 10 CFR states:

> If optimum moderation of fresh fuel in the fresh fuel storage racks occurs when the racks are assumed to be loaded with fuel of the maximum fuel assembly reactivity and filled with low-density hydrogenous fluid, the k-effective corresponding to this optimum moderation must not exceed 0.98, at a 95 percent probability, 95 percent confidence level. This evaluation need not be performed if administrative controls and/or design features prevent such moderation or if fresh fuel storage racks are not used.

Paragraph 50.36(c)(4) of 10 CFR states:

> Design features. Design features to be included are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in categories described in paragraphs (c) (1), (2), and (3) of this section.

The Seabrook NFV NCS analysis demonstrates that, consistent with the requirements of 10 CFR 50.68.

4.0 TECHNICAL EVALUATION

4.1 Proposed Change

There are several proposed TS changes, originally provided in Reference 1 and supplemented, that either impact the NCS analysis or implement changes in fuel storage requirements. These changes are related to revised criticality control requirements for both the NFV and the SFP, incorporation of the effects of BORAL™ blistering in the Region 1 analysis, elimination of credit for Boraflex in the Region 2 analysis, and taking credit for the presence of soluble boron in the SFP. The technical evaluation detailed in this safety evaluation focuses only on the changes related to the NFV.

The proposed TS changes related to the NFV remove the restrictions currently in place when fuel with enrichments greater than or equal to 3.675 weight percent Uranium-235 is stored in the NFV.

The TS changes related to fuel storage in the NFV include:

- Elimination of Section 3/4.9.14, "NEW FUEL STORAGE"
- Revision of Section 5.6.1.2 to more accurately describe the spacing of fuel storage locations and to refer to USFAR Chapter 9 for NCS analysis details

The proposed TS changes do not include any maximum enrichment limit, as was previously specified in Section 3/4.9.14. Furthermore, the revised analysis covers only the Westinghouse 17x17 RFA fuel assembly design.

4.2 Method of Review

The review was performed consistent with Section 9.1.1 of NUREG-0800 and the guidance provided in Division of Safety System Interim Staff Guidance DSS-ISG-2010-01, "Staff Guidance Regarding the Nuclear Criticality Safety Analysis for Spent Fuel Pools" (Reference 11).

4.3 NFV NCS Analysis Review

Reference 4 includes an analysis of the NFV. This analysis supports elimination of restrictions imposed for fuel stored in the NFV with enrichments equal to or greater than 3.675 weight percent Uranium-235. The regulatory criteria specific to the NRC staff's review of the revised NCS analysis for the Seabrook NFV is above.

4.3.1 Computational Method

Monte Carlo N-Particle transport code, version 5 (MCNP5) with Evaluated Nuclear Data File Neutron Data (ENDF/B-V) nuclear data was predominantly used for the NFV analysis. The supporting validation is documented in HOLTEC report HI-2104790 (Reference 12) and in Appendix A of HI-2114996 (Reference 9). Section 3.2.2 of HI-2114996 states the bias and 95 percent probability, 95 percent confidence level, uncertainty from the validation are **[[** **]]** Δk and **[[** **]]** Δk, respectively. This bias and bias uncertainty are similar to values reported for other analyses.

During review of the computational method validation for use with the NFV k_{eff} optimum moderation calculations, it was noted that some **[[**

]]. This does not appropriately cover **[[** **]]** because the reactivity of the optimum moderation condition in the NFV is driven by the water between the fuel assemblies, not by **[[** **]]**. A more appropriate metric for this situation is the energy of average lethargy of neutrons causing fission (EALF). This quantity better characterizes the neutron energy spectrum seen by the fuel pins in the low moderator density configuration. The Request for Additional Information (RAI) 8 response (Attachment 1 to Reference 4) provided a comparison of the range of the EALF values for the critical experiments used in the validation study with the values from the safety analysis models and showed that it bounded the safety analysis calculation EALF range.

4.3.1.1 Validation of Calculations at Elevated Temperatures

Particularly important for low moderation peak k_{eff} calculations is validation at elevated temperatures. The Seabrook NFV NCS analysis lacks validation coverage at elevated temperatures.

The validation study used critical experiments with temperatures at approximately **[[** **]]**. The safety analysis calculations were performed with temperatures of 27°C and 127°C. From Table 3.6.1 in HI-2114996, the change from 27°C to 100°C increases k_{eff} by 0.0497 Δk. Note that for these two conditions, cross-section data at **[[** **]]** were used with moderator densities that were a percentage of the full water density at 27°C and 100°C.

At peak reactivity, the k_{eff} value rises from 0.9022 to 0.9330. This increase in k_{eff} due to temperature variation (i.e. ~0.03 Δk) is large enough that variation in k_{eff} with temperature should be validated or a suitable margin adopted to cover uncertainty associated with use of elevated temperature data.

To address the temperature-based validation gap in the benchmarking of MCNP for Seabrook NFV k_{eff} calculations, the licensee **[[**

]] as described in the response to RAI 2 (Reference 7). These experiments expand the validation to include experiments with **[[**

]]. The previous validation, including appropriate trending analyses, was updated to include consideration of **[[** **]]** and code bias and bias uncertainty estimates were updated accordingly. The bias increased by 0.0025 Δk and the bias uncertainty increased by 0.0006 Δk, which results a net margin reduction of approximately 0.0025 Δk.

Based on the NRC staff's review, the validation of the criticality code has been appropriately revised to cover NFV modeling at elevated temperatures.

The NRC staff reviewed the computational method and supporting validation and finds them acceptable.

4.3.2 New Fuel Storage Rack Model

The Seabrook NFV model is defined by five rows of storage cells with 18 storage cells per row in a tight fitting thick-walled concrete canyon. Assemblies are stored in square tubes with a nominal inner dimension of 9.00 inches and 0.093 inch thick type 304 stainless steel walls. In general, storage cells are nominally spaced with a 21 inch center-to-center cell pitch, with the spacing between the second and third rows and between the third and fourth rows defined by a 33 inch center-to-center cell pitch. Rack structures between storage cells are conservatively omitted. The fuel assembly model includes only the active length of the fuel assembly and conservatively omits grids. The array of fuel assemblies in storage cells is reflected on the sides and bottom by thick concrete and by full density water above the fuel.

In the Seabrook NFV model, no information was provided concerning the composition of the concrete used to model the floor and walls. Due to the tight-fitting concrete walls and floor, the k_{eff} of the NFV is sensitive to the concrete composition model.

The response to RAI 1 (Attachment 1 to Reference 4) provided a description of the concrete model used and a statement that "the exact isotopic composition of the concrete and their uncertainties in the Seabrook NFV is unknown." The RAI 1 response did provide some justification for concluding that the concrete model used was conservative. However, the NRC staff performed confirmatory calculations with SCALE 6.1.2 (Reference 14) using the Seabrook NFV concrete model and several other commonly used concrete models (e.g., Magnuson's concrete, Oak Ridge concrete, Rocky Flats Concrete) including "ordinary concrete" as defined in a radiation shielding text book by Chilton, Shultis and Faw (Reference 15). The results indicated that some of the other concrete compositions yielded higher low-moderation peak k_{eff} values.

Furthermore, a survey of concrete compositions suggests that the tolerances used in the uncertainty analysis calculations performed for the Seabrook NFV concrete model do not appear to adequately capture the composition variations noted in various references, and the tolerances specified in the RAI 1 response (Attachment 1 to Reference 4) appear to be somewhat arbitrary. Additionally, it does not appear that the potential for time-dependent loss of water from the concrete was considered.

In the response to RAI 1 in Reference 7, the licensee stated that it is known that Portland cement was used in the concrete mixture along with specific details regarding the fine and coarse distributions of the aggregate – this reduces the potential variability of the concrete mixture. Additionally, the licensee notes that **[[**

]].

An updated NFV model was constructed based on more precise knowledge of the concrete aggregate from discussions with "Seabrook site concrete experts." The change in k_{eff} with the updated NFV was found to be minimal for both optimum moderation and full density moderation cases. Only the full density moderation case showed an increase in k_{eff}, and the calculated k_{eff} was updated accordingly as shown in Table 8 of the RAI 2 response (Reference 7); the margin reduction due to refinement of the concrete modeling was calculated to be approximately 0.001 Δk.

Although the RAI 1 response (Reference 7) does update the concrete composition used in the Seabrook NFV criticality model, the response does not discuss the potential for time-dependent loss of water from the concrete. The NRC staff is concerned about the implications of the potential for time-dependent water loss since the response to RAI 1 (Attachment 1 to Reference 4) shows that a **[[** **]]** for the optimum moderation case – a substantial change. There is also **[[**

]] that would be associated with water loss. Based on the **[[** **]]** in the Seabrook NFV concrete, the NRC staff again requested that the licensee determine the impact of time-dependent water loss in the Seabrook NFV concrete. In the response to RAI 1 (Reference 8), the licensee provided adequate justification for the assumed minimum water content in the Seabrook NFV concrete by assuming a water content consistent with Hanford dry concrete as described in Reference 16, which states the following regarding Hanford dry concrete:

> Starting from the data in the reference for wet concrete, the water content was reduced to model drying for decades in a dry environment. A reasonable minimum hydrogen content for old dry concrete is about 0.4 weight percent.

In the response to RAI 2 (Reference 8), the licensee provided adequate justification that the water content in the Seabrook NFV concrete cannot decrease below the minimum water content over time as determined in the RAI 1 response based on the licensee's knowledge of:

- the concrete type
- water-to-cement ratio used during mixing
- environment relative humidity
- the amount of water that remains "an integral part of the microstructure of cement hydration products and is not lost on drying"
- other sources of water that are present and depend on environment relative humidity

Therefore, the NRC staff has reasonable assurance that the water content assumed in the Seabrook NFV criticality analysis is appropriate.

Based on the NRC staff's review of the above, the new fuel storage rack model used in the NFV NCS analysis is acceptable.

4.3.3 Design Basis Fuel Assembly

The NFV analysis presented in Section 3 of HI-2114996 (Reference 9) evaluates only the Westinghouse 17x17 RFA fuel assembly design to satisfy the maximum fuel assembly reactivity requirement. Future fuel assembly design changes may require review of the criticality analysis for the NFV.

The fuel assembly design is conservative in that the **[[** **]]**. Instead, the fuel is modeled as **[[** **]]** uranium dioxide at 5 weight percent Uranium-235. Generally, Seabrook fuel also includes integral fuel burnable absorbers (IFBA) in the form of zirconium diboride on the outside of the fuel pellets. The IFBA coating is conservatively omitted from the NFV calculations and represents significant uncredited margin. Table 3.6.4 of HI-2114996 shows that the IFBA coating is worth between 1% and 14% Δk, depending on the number of IFBA rods and the moderator density.

Based on the NRC staff's review of the above, the fuel assembly model used in the NFV NCS analysis is acceptable.

4.3.4 NFV Uncertainty Analysis

During the review it was noted that no dimensional uncertainties were provided for the spacing between cells and for the spacing between the cells and the NFV walls. It was also noted that eccentric placement of fuel in the storage cell locations was treated as an uncertainty when it should have been treated as a bias term. The responses to NFV RAIs 1 through 8 provided in Reference 4 provide an updated NFV uncertainty analysis and analysis of the impact on the margins to the safety limits. Table 7 and Table 8 in the response to RAI 2 both show the updated tolerances uncertainties (causing an increase of 0.0003 Δk for the optimum moderation case) along with the remaining margin to the corresponding regulatory limits.

Furthermore, the calculated k_{eff} values were updated to correspond to the bounding eccentric fuel assembly position as discussed in the response to RAI 6 (Attachment 1 to Reference 4); only the optimum moderation case was significantly affected resulting in a net increase of 0.0033 Δk.

Based on the NRC staff's review of the above, the uncertainty analysis performed in the NFV NCS analysis is acceptable.

4.4 Technical Conclusion

The NRC staff's initial review of the Seabrook NFV NCS analysis documented in HI-2114996 identified potential non-conservatisms.

For the storage of fuel in the Seabrook NFV, the impact associated with the potential non-conservatisms were evaluated and the available margin to the regulatory limits given in 10 CFR 50.68(b)(2) and 10 CFR 50.68(b)(3) were considered as part of this evaluation.

The RAI 2 response (Reference 7) shows the net margin reduction as a result of:

- Removal of certain modeling simplifications
- Revision of eccentric fuel assembly positioning treatment
- More precise concrete material specification
- Accounting for potential time-dependent water loss in the concrete
- An updated criticality code validation incorporating **[[ ]]**

The margin to the regulatory limit for the full density moderation case is reduced to 0.0096 Δk and the margin to the regulatory limit for the optimum moderation case is reduced to 0.0187 Δk. The minimum margin case (0.0096 Δk) occurs for the full density moderation case leaving significant margin to the regulatory limit.

Following review of the supporting analysis reports and based on consideration of the identified non-conservatisms, margins to regulatory limits, and crediting of analysis conservatism, the NRC staff concludes that there is reasonable assurance that the Seabrook NFV fuel assembly storage racks meet the applicable regulatory requirements.

Due to the need to evaluate offsetting effects in the licensee's analysis, the licensee's analysis constitutes a methodology for which any change would be a departure from a method of evaluation described in the Final Safety Analysis Report, as updated, used in establishing the design bases for the NFV.

The NRC staff finds the TS changes acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Hampshire and Massachusetts State officials were notified of the proposed issuance of the amendment. The State officials had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (77 FR 48559, 8/14/12). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need to be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

8.0 REFERENCES

1. NextEra Energy Seabrook, LLC letter SBK-L-11245 to NRC, "Seabrook Station, License Amendment Request 11-04, Changes to the Technical Specifications for New and Spent Fuel Storage," January 30, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12038A036).

2. NextEra Energy Seabrook, LLC letter SBK-L- 12099 to NRC, "Supplement to LAR 11-04, Changes to the Technical Specifications for New and Spent Fuel Storage," May 10, 2012 (ADAMS Accession No. ML12136A126).

3. NextEra Energy Seabrook, LLC letter SBK-L- 12199 to NRC, "Response to Request for Additional Information Regarding License Amendment Request 11-04, Changes to Technical Specifications for New and Spent Fuel Storage," September 20, 2012 (ADAMS Accession No. ML12271A276).

4. NextEra Energy Seabrook, LLC letter SBK-L-13061 to NRC, "Seabrook Station, Response to December 2012 Request for Additional Information Regarding License Amendment Request 11-04, Changes to the Technical Specifications for New and Spent Fuel Storage," March 27, 2013 (ADAMS Accession No. ML13099A022).

5. NextEra Energy Seabrook, LLC letter SBK-L- 13224 to NRC, "Request for Review and Approval of License Amendment Request (LAR) 11-04, Changes to Technical Specifications for New and Spent Fuel Storage, in Two Parts," December 20, 2013 (ADAMS Accession No. ML13360A045).

6. NextEra Energy Seabrook, LLC letter SBK-L-14018 to NRC, "Response to Request for Additional Information for License Amendment Request 11-04, Changes to Technical Specifications for Spent Fuel Storage," January 29, 2014 (ADAMS Accession No. ML14035A218).

7. NextEra Energy Seabrook, LLC letter SBK-L-14053 to NRC, "Seabrook Station, Response to Request for Additional Information for License Amendment Request 11-04, Changes to the Technical Specifications for New Fuel Vault," March 13, 2014 (ADAMS Accession No. ML14078A057).

8. NextEra Energy Seabrook, LLC letter SBK-L-14053 to NRC, "Seabrook Station, Response to Request for Additional Information for License Amendment Request 11-04, Changes to the Technical Specifications for New Fuel Vault," February 25, 2015 (ADAMS Accession No. ML15065A029).

9. HOLTEC International report, "Licensing Report for Seabrook Spent Fuel Pool and New Fuel Vault Analyses," HI-2114996, Rev. 3, HOLTEC International, Marlton, NJ, March 2013.

10. HOLTEC International report, "Licensing Report for Seabrook Spent Fuel Pool and New Fuel Vault Analyses," HI-2114996, Rev. 2, HOLTEC International, Marlton, NJ, January 2012.

11. NRC Division of Safety Systems Interim Staff Guidance DSS-ISG-2010-01, Rev. 0, "Staff Guidance Regarding the Nuclear Criticality Safety Analysis for Spent Fuel Pools," October 13, 2011 (ADAMS Accession No. ML110620086).

12. HOLTEC International Report, "Nuclear Group Computer Code Benchmark Calculations", Holtec Report HI-2104790, Rev. 0, January 2011.

13. [[

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14. *Scale: A Comprehensive Modeling and Simulation Suite for Nuclear Safety Analysis and Design*, ORNL/TM-2005/39, Version 6.1, Oak Ridge National Laboratory, Oak Ridge, Tenn., June 2011. Available from Radiation Safety Information Computational Center at Oak Ridge National Laboratory as CCC-785.

15. A.B. Chilton, J.K. Shultis, and R.E. Faw, Principles of Radiation Shielding, PRENTICE-HALL, INC., Englewood Cliffs, NJ, 1984.

16. PNNL-15870, Rev. 1, "Compendium of Material Composition Data for Radiation Transport Modeling," 2011.

Principal Contributor: Amrit Patel

Date: May 18, 2015

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA

John G. Lamb, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures:
1. Amendment No. 148 to NPF-86
2. Non-Proprietary Safety Evaluation
3. Proprietary Safety Evaluation

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