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

April 3, 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: REQUEST FOR WITHHOLDING INFORMATION FROM PUBLIC DISCLOSURE REGARDING LICENSE AMENDMENT REQUEST 14-04 FOR SEABROOK STATION, UNIT 1 (TAC NOS. MF4576 AND MF4577)

Dear Mr. Curtland:

By letter dated March 9, 2015, NextEra Energy Seabrook, LLC (NextEra or the licensee) submitted a Westinghouse Electric Company LLC (Westinghouse) affidavit dated March 6, 2015, executed by Mr. James A. Gresham (Enclosure 2 to NextEra's letter), for the Response to Request for Additional Information for License Amendment Request 14-04, "Revised Reactor Coolant System Pressure – Temperature Limits Applicable for 55 Effective Full Power Years."

NextEra requested that the information contained in Enclosure 3 to its letter be withheld from public disclosure pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 2.390. Specifically, NextEra requested that the following document be withheld:

> Response to Request for Additional Information for License Amendment Request 14-04, "Revised Reactor Coolant System Pressure – Temperature Limits Applicable for 55 Effective Full Power Years" (Proprietary)

A non-proprietary copy of the document (Enclosure 2 to NextEra's letter) has been placed in the U.S. Nuclear Regulatory Commission's (NRC's) Public Document Room (PDR) and added to the Agencywide Documents Access and Management System Public Electronic Reading Room.

The affidavit stated that the submitted information should be considered exempt from mandatory public disclosure for the following reasons:

(4)(ii)(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(4)(ii)(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(4)(ii)(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

The NRC staff has reviewed your application and the material in accordance with the requirements of 10 CFR 2.390 and, on the basis of the statements in the affidavit, has determined that some of the submitted information sought to be withheld contains proprietary commercial information and should be withheld from public disclosure. However, the NRC staff has concluded that some of the information contained in the RAI response should not be exempt from mandatory public disclosure and should be released and placed in the PDR. The specific information that we believe should not be exempt from mandatory public disclosure is listed in the enclosure to this letter along with the reasons for our conclusions.

Therefore, we request that you resubmit a proprietary version of the RAI response with the information sought to be withheld specifically identified within 30 days of the receipt of this letter. In addition, a non-proprietary version should be submitted to allow for proper docketing pursuant to 10 CFR 2.390(b)(1) and Section 103(b) of the Atomic Energy Act of 1954, as amended. Upon receipt of this information, we will proceed with our determination as to whether the RAI response should be withheld from public disclosure.

If you have any questions, please contact me at (301) 415-3100.

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

Enclosure:
As stated

cc: Distribution via Listserv

PROPRIETARY FINDING ON ENCLOSURE 3 TO RAI RESPONSE DATED MARCH 9, 2015

By letter dated March 9, 2015, NextEra Energy Seabrook, LLC (NextEra or the licensee) submitted a Westinghouse Electric Company LLC (Westinghouse) affidavit dated March 6, 2015, executed by Mr. James A. Gresham (Enclosure 2 to NextEra's letter), for the Response to Request for Additional Information for License Amendment Request 14-04, "Revised Reactor Coolant System Pressure – Temperature Limits Applicable for 55 Effective Full Power Years."

NextEra requested that the information contained in Enclosure 3 to its letter be withheld from public disclosure pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 2.390.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the letter dated March 9, 2015 in accordance with the requirements of 10 CFR 2.390 and, on the basis of the statements in the affidavit, has determined that some of the submitted information sought to be withheld contains proprietary commercial information and should be withheld from public disclosure; this information is the blank space between the brackets in Response to RAI2.1.4. However, the NRC staff has concluded that some of the information contained in the RAIs and the RAI responses should not be exempt from mandatory public disclosure and should be released and placed in the PDR. The specific information that we believe should not be exempt from mandatory public disclosure is listed below in red text within brackets along with the reasons for the NRC staff conclusions.

RAI-2.1.1

Table 4-2 of WCAP-17444-P (the WCAP) lists values for the reference nil-ductility temperature (RT_{NDT}) for the Seabrook closure head region. [Please indicate whether the RT_{NDT} values for the base metal components (closure head dome, closure head ring (torus) segments), closure head flange, and vessel flange)] are measured heat-specific values from certified material test reports that were obtained in accordance with ASME Code, Section III, NB-2331 requirements. If not, identify whether NUREG-0800 Branch Technical Position (BTP) 5-3 was used to establish the RT_{NDT} values listed in Table 4-2 for these base metal components. If BTP 5-3 was used, identify the specific position of that document that was used, and provide the calculations used to determine the RT_{NDT} for each of these materials.

<u>NRC Staff finding on the above redaction</u>:
Table 4-2 of WCAP-17444-P lists heat-specific RT_{NDT} values for the reactor pressure vessel (RPV) closure head and flange region materials and is bracketed as proprietary (except for the title of Table 4-2). The highlighted text in the RAI question above is not proprietary; it is just a generic identification of RPV closure head components, which is publicly available in WCAP-17444-NP (Figure 4-1), the FSAR, the ASME Code, and elsewhere. Staff did not identify the RT_{NDT} values contained in Table 4-2 of WCAP-17444-P. In fact, the FSAR (a publicly available document) has a complete listing of all the RPV components and their heat-specific material properties required to satisfy 10 CFR Part 50, Appendix G and ASME Code, Section III, NB-2300 requirements, including the exact same RPV closure head components and RT_{NDT} values for these components listed in Table 4-2 of WCAP-17444-P (i.e. the contents of this table was just pulled out of the FSAR). Therefore, even the RT_{NDT} values are not proprietary, and should not have been redacted in WCAP-17444-P.

Response to RAI-2.1.1

Table 4-2 contains proprietary information. The values for the reference nil-ductility temperature (RTNDT) for the Seabrook reactor vessel (RV) closure head region base metal component (closure head dome, closure head ring (torus) segments, closure head flange, and vessel flange) are measured heat specific values reported on Certified Material Test Reports (CMTRs). The Seabrook reactor vessel was designed in accordance with ASME Section III, 1971 Edition through Winter 1972 addenda and incorporated the changes to the requirements included in the Summer 1972 Addenda to ASME Section III, NB-2300 including testing of Charpy specimens in the transverse (weak) direction.

NRC Staff finding:
(There are no redactions in this RAI-2.1.1 response. Therefore, the NRC staff has no objection to the RAI-2.1.1 response.)

RAI-2.1.2

[There is a discrepancy between the axial stress distribution for the end of heatup provided in the last column of Table 6-1 of the WCAP, and the axial stress distribution for the corresponding time in Appendix C, Page C-4 of the WCAP. Please provide additional information to resolve this discrepancy (or point to the location in the submittal that addresses it).]

NRC Staff finding on the above redaction:
The redaction of this RAI is not acceptable. Staff included no PROP stress distribution data from Table 6-1 of WCAP-17444-P in this RAI. The title of Table 6-1, "Axial Stress Distributions at the Closure Flange Region - Seabrook Unit 1," is provided in WCAP-17444-NP (Publicly Available). Furthermore, the following qualitative description of this stress data is also provided in Section 6, third paragraph of WCAP-17444-NP (Publicly Available):

> Table 6-1 provides a comparison of the axial stresses at boltup with those at the governing heatup/cooldown transient time step, which occurs at the end of heatup (time step = 344.2 minutes). Note that the stresses at boltup are mostly bending, with a very small membrane stress; however, as the vessel is pressurized, the membrane stresses increase. The stress results were taken from a finite element analysis of the heatup/cooldown process. A through-wall welding residual stress profile from ORNL/NRC/LTR-05/18 [Reference 6] was added to the boltup stresses as well as to the heatup/cooldown transient pressure and thermal stresses.

Therefore, it is clear that the publicly available WCAP-17444-NP text has already revealed quite a lot of qualitative detail concerning the contents of the PROP stress distribution table, Table 6-1 of WCAP-17444-NP. The above RAI-2 reveals no such detail, and therefore its redaction in the RAI response is not justified.

Response to RAI-2.1.2

[As mentioned in Notes (a) and (b) of Table 6-1, the axial stresses shown include boltup stresses and residual stresses. The stresses shown in Appendix C include boltup stress, but exclude residual stress. Therefore the difference between the stress values in Table 6-1 and Appendix C is the inclusion of residual stresses in Table 6-1.]

NRC Staff finding on the above redaction:
The NRC staff will not concede that any information in this RAI response is proprietary. The fact that the axial stresses from Table 6-1 include boltup stresses and residual stresses is publicly identified in the qualitative description of the stress data provided in Section 6, third paragraph of the WCAP-17444-NP (Publicly Available).

RAI-2.1.3

Section 4 of the WCAP indicates that the stress analysis of the flange region was carried out with both temperature and pressure varying with time, for heatup and cooldown transients of 100 °F per hour. Additionally, the proposed technical specification pressure-temperature (P-T) limits for 55 effective full power years (EFPY) were developed based on a maximum allowable heatup and cooldown rate of 100 °F per hour.

[The staff noted that the heatup and pressurization of the RPV from the minimum boltup temperature to the temperature specified in the third column of Table 6-1, within the specified time identified in Table 6-1, corresponds to a heatup rate that is less than 100 °F per hour. Please address how the flange integrity analysis in the WCAP is applicable to a 100 °F per hour heatup rate, or revise the analysis to address an actual 100 °F per hour heatup rate.]

NRC Staff finding on the above redaction:
The redaction of this RAI text is not acceptable. See above on the redaction of RAI Question RAI-2.1.2 for justification.

Response to RAI-2.1.3

For the fracture mechanics evaluation, the heatup process begins at a temperature of [120°F and a time of 82 minutes and ends at a temperature of 557°F and a time of 344.2 minutes] which represents standard design plant heatup conditions. [Per Seabrook UFSAR (Section 3.9), the heatup design transient begins at an assumed 120°F (ambient condition) and proceeds on uniform rate of 100°F/hr.] In actual practice, the rates of heatup are much lower especially at initial conditions.

The heatup rate used in the evaluation is therefore: [(557°F - 120°F)/(344.2 minutes – 82 minutes) = 1.67°F/ minute, or 100°F/hour. To account for the heatup transient beginning at a temperature of 120°F, a conservative fracture toughness (K_{IC}) based on a temperature of 60°F was compared to the stress intensity factor based on the stresses at time = 82 minutes. The comparison ($2K_I < K_{IC}$) yielded acceptable results at time= 82 minutes.]

<u>NRC Staff finding on the above redaction</u>:
The NRC staff will not concede that any of the redacted information in this RAI response is proprietary. Plant-specific times and temperatures for the beginning and end of the RCS heatup process are not proprietary because they are publicly available in WCAP-17444-NP and the UFSAR, Section 3.9(N). Specifically, the public WCAP-17444-NP identifies the time and temperature for the end of heatup as 344.2 minutes and 557 deg. F, respectively (see Section 6, third and fifth paragraphs of WCAP-17444-NP). Figures 6-1 and 6-2 of WCAP-17444-NP also identify 82 minutes as a time step for the heatup analysis. The 120 deg. F temperature for the beginning of the heatup process is publicly identified in the UFSAR, Section 3.9(N). The 100 deg. F per hour heatup rate is identified in WCAP-17444-NP, the UFSAR, and the TS. Therefore, none of this information is proprietary.

RAI-2.1.4

[Table 6-2 of the WCAP indicates the minimum ratio of the fracture toughness (K_{IC}) divided by 2 times the applied stress intensity factor (K_I) occurs at boltup at Cut 3.] The staff's calculations show that the fracture toughness increases as heatup progresses reaching the upper shelf value of 200 ksi√in by 82 minutes. However, the staff is concerned that the applied K_I values could peak at some time between boltup and 82 minutes due to a combination of boltup stress plus pressure and thermal stresses while the toughness is still relatively low, resulting in a more limiting ratio of K_{IC} to 2 times K_I.

[For the 100 °F per hour heatup transient, please confirm that the most limiting ratio of K_{IC} to 2 times the applied K_I for the outside flaw with depth a/t = 0.10 in the closure head torus-to-flange weld (i.e., Cut 3) occurs at boltup (time=0).] Provide the values of K_{IC} and K_I at several intermediate times between boltup and 82 minutes for the same location. If the most limiting ratio does not occur at boltup, provide the limiting K_{IC} to 2 times K_I ratio, the corresponding time, and the values of K_I and K_{IC} at that time

<u>NRC Staff finding on the above redaction</u>:
Table 6-2 is publicly available in its entirety in WCAP-17444-NP. Furthermore, Figures 6-1 and 6-2 are also publicly available in WCAP-17444-NP and provide full plots of applied K_I values as a function of flaw depth at all publicly identified times during the heatup/cooldown transient for the two locations of interest in the RPV closure head/flange region, "Cut 2" and "Cut 3", which are also publicly identified in WCAP-17444-NP. The staff's RAI does not even provide the applied K_I values that are already publicly available in Table 6-2 and Figures 6-1 and 6-2 of WCAP-17444-NP. Therefore, the redaction is not acceptable.

Response to RAI-2.1.4

The design transient for heatup as specified in Seabrook [UFSAR, Section 3.9(N) starts at 120°F and ramps up to no-load temperature of 557°F at a rate of 100°F/hr.] [
] This design transient specification is used in the evaluation for WCAP-17444, where the heatup process begins [at time= 82 minutes (T = 120°F,] [ ] [and reaches the no-load condition at 344.2 minutes (T= 557°F,] [ ]

[Below 120°F, during the cold shutdown condition, the reactor coolant system is depressurized and at a uniform temperature somewhere between 70°F and 120°F. Per the Seabrook UFSAR, Section 3.9(N), for the temperature range between 70°F and 120°F, the temperature changes very slowly without causing any significant thermal transient effects, especially in the closure head region.] This is consistent with plant operation standards, where Technical Specifications Table 1.2 defines that 200°F or below with the reactor vessel head tensioned is Mode 5 (Cold Shutdown). Evolutions in Mode 5 such as reactor coolant system evacuation and fill or pressurizer bubble formation do not produce rapid temperature changes below 120°F. In addition, heatup from ambient conditions is inherently limited as reactor heat is not available until Mode 2 (i.e., sole source of heatup is reactor coolant pump heat and decay heat). For example (based on the most recent plant startup from refueling in March 2014, readings from the wide range cold leg A0344V RCLP2 indicator), the initial heatup from ambient conditions occurred from 88.5°F to 155.7°F over 11 hours (i.e., approximately 6.1 °F/hr heatup) which was followed by a second heatup from 187.3°F to 332.2°F over 5.3 hours (i.e., approximately 27.3°F/hr heatup). Both heatups occurred far below the 100°F/hr heatup limit described in the [Seabrook UFSAR, Section 3.9(N). Furthermore, the residual decay heat from the core can place the temperature around 120°F within the reactor vessel, therefore, the ambient condition is assumed to be 120°F for the beginning of the heatup transient. As a result, for temperatures below 120°F, there are no significant thermal transient stresses that should be considered in the fracture mechanics evaluation.]

Furthermore, in the fracture mechanics evaluation for WCAP-17444, [the fracture toughness (K_I) at the initial heatup time step (t = 82 min) is calculated based on a conservative wall temperature of 60°F, this minimum temperature value is used to cover the temperature range between 60°F (boltup) and 120°F (start ofheatup).] Therefore, the K_I, value of 70.98 ksi-in$^{1/2}$ is applied to both the boltup and initial heatup time step, [based on RT_{NDT} of 30°F and wall temperature of 60°F. As mentioned above, the applied stress intensity factor between the boltup condition of 60°F and the start of heatup at 120°F will be negligible since there are no significant thermal transient stresses in that temperature range. Therefore, along with the limiting time step at the boltup, another limiting fracture mechanics time step (based on K_I/K_{IC}) from the heatup transient is at time = 82 minutes, since the wall temperature is set to 60°F for the KI, calculations.

Given below are the $2K_I$ and K_{IC} values for the boltup condition and the start of heatup (t = 82 min) for the postulated outside surface circumferential flaw (a/t = 0.10) at Cut 3. All other time steps are less limiting.

Boltup (temperature= 60°F)

$2K_I$ = 61.504 ksi-in$^{1/2}$ < K_{IC} = 70.98 ksi-in$^{1/2}$

Heatup (t = 82 min, design transient temperature = 120°F, however 60°F is used in K_{IC} calculation)

$2K_I$ = 66.408 ksi-in$^{1/2}$ < K_{IC} = 70.98 ksi-in$^{1/2}$]

<u>NRC Staff finding on the above redaction</u>:
With the exception of the **<u>blank text contained between brackets above</u>**, the NRC staff will not concede that the redacted information in this RAI response is proprietary because it can be found in publicly available sources: WCAP-17444-NP; UFSAR, Section 3.9(N); WCAP-17441-NP; and TS. All K_I and K_{IC} values above can be found in the public WCAP-17444-NP, Table 6-2, and Figures 6-1 and 6-2. All time and temperature data for the heatup transient is available in the public WCAP-17444-NP and the UFSAR Section 3.9(N), as described in the Staff Finding on the redactions in the RAI-3 response. The limiting flange region RT_{NDT} of 30 °F is identified in the public WCAP-17444-NP in numerous locations. The boltup temperature is identified in the public WCAP-17441-NP, and the 100 °F per hour heatup rate is identified in TS and elsewhere.

(4)(ii)(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

The NRC staff has reviewed your application and the material in accordance with the requirements of 10 CFR 2.390 and, on the basis of the statements in the affidavit, has determined that some of the submitted information sought to be withheld contains proprietary commercial information and should be withheld from public disclosure. However, the NRC staff has concluded that some of the information contained in the RAI response should not be exempt from mandatory public disclosure and should be released and placed in the PDR. The specific information that we believe should not be exempt from mandatory public disclosure is listed in the enclosure to this letter along with the reasons for our conclusions.

Therefore, we request that you resubmit a proprietary version of the RAI response with the information sought to be withheld specifically identified within 30 days of the receipt of this letter. In addition, a non-proprietary version should be submitted to allow for proper docketing pursuant to 10 CFR 2.390(b)(1) and Section 103(b) of the Atomic Energy Act of 1954, as amended. Upon receipt of this information, we will proceed with our determination as to whether the RAI response should be withheld from public disclosure.

If you have any questions, please contact me at (301) 415-3100.

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

Enclosure:
As stated

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