



April 5, 2011

10 CFR 50.90

SBK-L-11068

Docket No. 50-443

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Seabrook Station

Response to Request for Additional Information Regarding  
License Amendment Request 10-06, Request to Revise Technical Specification (TS)  
Sections 6.7.6.k, "Steam Generator (SG) Program," and TS 6.8.1.7, "Steam Generator Tube  
Inspection Report," for Temporary Alternate Repair Criteria

References:

1. NextEra Energy Seabrook, LLC letter SBK-L-10234, "License Amendment Request to Revise Technical Specification (TS) Sections 6.7.6.k, "Steam Generator (SG) Program," and TS 6.8.1.7, "Steam Generator Tube Inspection Report," for Temporary Alternate Repair Criteria," January 27, 2011 (ML 110330202)
2. NRC E-mail, Miller to Kilby, Re: Draft RAI for Seabrook H\* LAR, March 29, 2011 (ML 110880508)

In Reference 1, NextEra Energy Seabrook, LLC (NextEra) submitted License Amendment Request (LAR) 10-06 for an amendment to the Technical Specifications (TS) for Seabrook Station. The proposed change would revise TS 6.7.6.k, "Steam Generator (SG) Program," to exclude portions of the SG tubes below the top of the SG tubesheet from periodic inspections during refueling outage 14 (OR14) in the spring of 2011 and the subsequent inspection cycle. In addition, this amendment request proposed to revise TS 6.8.1.7 "Steam Generator Tube Inspection Report."

The scope of SG tube inspections planned for OR14 is limited to  $\pm 3$  inches from the top of the tubesheet on the hot leg side to detect outside diameter stress corrosion cracking (ODSCC). However, if the inspection in OR14 detects the presence of primary water stress corrosion cracking (PWSCC) in the tubesheet region, then expanding the inspections to the full depth of the tube sheet would be required unless an alternate repair criterion is approved by the NRC.

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To support approval of the requested change, NextEra proposed in Reference 1 a plan for performing full-depth SG tube inspections if PWSCC is detected during the limited inspections planned for OR14. During its review of the proposed change, the NRC staff requested additional information in Reference 2 as a result of an inconsistency between the proposed TS change and the scope of SG inspections discussed in Reference 1. In addition, a conference call between the NRC staff and NextEra on April 1, 2011 identified the need to include justification for the proposed SG tube alternate repair criteria, which could be provided with a reference to a previously approved similar licensing action.

Attachment 1 provides NextEra's response to the request for additional information. Included in Attachment 2 is a revised mark-up of the proposed changes to TS 6.7.6.k, Steam Generator (SG) Program. Attachment 3 provides a revision to section 3.2 and section 6.0 of Reference 1 that includes justification for the proposed SG tube alternate repair criteria with a reference to a previously approved licensing action.

The changes to the proposed amendment do not alter the conclusion in Reference 1 that the proposed change does not involve a significant hazard consideration pursuant to 10 CFR 50.92. The Seabrook Station Operation Review Committee has reviewed this change, and a copy of this letter has been forwarded to the New Hampshire State Liaison Officer pursuant to 10 CFR 50.91.

This letter neither makes any new commitments nor alters any existing commitments.

Should you have any questions regarding this letter, please contact Mr. Michael O'Keefe, Licensing Manager, at (603) 773-7745.

Sincerely,

NextEra Energy Seabrook, LLC



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Paul Freeman  
Site Vice President

#### Attachments

cc: NRC Region I Administrator  
G. E. Miller, NRC Project Manager  
W. J. Raymond, NRC Senior Resident Inspector

Mr. Christopher M. Pope, Director Homeland Security and Emergency Management  
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AFFIDAVIT

**SEABROOK STATION UNIT 1**

Facility Operating License NPF-86

Docket No. 50-443

**Response to Request for Additional Information Regarding  
License Amendment Request 10-06, Request to Revise Technical Specification (TS)  
Sections 6.7.6.k, "Steam Generator (SG) Program," and TS 6.8.1.7, "Steam Generator  
Tube Inspection Report," for Temporary Alternate Repair Criteria**

The following information is enclosed in support of this License Amendment Request:

- Attachment 1, NextEra's Response to Request for Additional Information
- Attachment 2, Revised Mark-up of Proposed Changes to TS 6.7.6.k
- Attachment 3, Revision to Section 3.2 and Section 6.0 of LAR 10-06

I, Paul Freeman, Site Vice President of NextEra Energy Seabrook, LLC hereby affirm that the information and statements contained within this response to request for additional information are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

Sworn and Subscribed

before me this

5<sup>th</sup> day of April, 2011

Shirley Sweeney  
Notary Public

Paul Freeman  
Paul Freeman  
Site Vice President



## Attachment 1

### NextEra's Response to Request for Additional Information (RAI)

#### **RAI #1**

The proposed "exclusion criteria" for paragraph d. of TS 6.7.6.k is not consistent with the planned inspection scope (described in Section 3.2 of the technical evaluation supporting the proposed LAR) in the event that PWSCC is found at the TTS during the upcoming inspection. The planned inspection scope is a key element supporting the proposed amendment for an interim H\*. Please resolve the discrepancy or provide a revised proposal for paragraph d. which resolves the above inconsistency.

#### ***Response to RAI #1***

NextEra proposes to revise the proposed change to TS 6.7.6.k.d as shown below to eliminate the inconsistency between the exclusion criteria and the planned SG inspection scope that will be implemented if primary water stress corrosion cracking (PWSCC) is detected during the limited SG inspections planned for the spring 2011 refueling outage (OR14).

#### **TS 6.7.6.k.d**

Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. For refueling outage ~~13~~ 14 and the subsequent inspection cycle, the portion of the tube below ~~13.1~~ 15.2 inches from the top of the tubesheet is excluded from this requirement *with the following exceptions:*

- 1. If primary water stress corrosion cracking (PWSCC) is detected in the expanded area of the tubing within the tubesheet on the hot leg side, a 20% sample of tubes will be inspected full depth from top of tubesheet to the end of the tube on the hot leg side in all steam generators.***
- 2. If cracks are detected below 15.2 inches from the top of the tubesheet on the hot leg side in more than 5% of the tubes inspected, then full depth inspections will expand to 100% of the tubes on the hot leg side in the affected steam generator.***

The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

Attachment 2

Revised Mark-up of Proposed Changes to TS 6.7.6.k

ADMINISTRATIVE CONTROLS

PROCEDURES AND PROGRAMS

6.7.6 (Continued)

The following alternate tube repair criteria shall be applied as an alternative to the 40% depth based criteria:

INSERT 1

~~For refueling outage 13 and the subsequent inspection cycle, tubes with service-induced flaws located greater than 13.1 inches below the top of the tubesheet do not require plugging. Tubes with service-induced flaws located in the portion of the tube from the top of the tubesheet to 13.1 inches below the top of the tubesheet shall be plugged upon detection.~~

d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria.

INSERT 2

~~For refueling outage 13 and the subsequent inspection cycle, the portion of the tube below 13.1 inches from the top of the tubesheet is excluded from this requirement.~~ The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.
2. Inspect 100% of the tubes at sequential periods of 120, 90, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 48 effective full power months or two refueling outages (whichever is less) without being inspected.

## INSERT 1

1. For refueling outage 14 and the subsequent inspection cycle, if the number of tubes with service-induced flaws located greater than 15.2 inches below the top of the tubesheet is less than or equal to 5% of the total tubes inspected, then tubes with service-induced flaws located greater than 15.2 inches below the top of the tubesheet do not require plugging. Tubes with service-induced flaws located in the portion of the tube from the top of the tubesheet to 15.2 inches below the top of the tubesheet shall be plugged upon detection.
2. For refueling outage 14 and the subsequent inspection cycle, if the number of tubes with flaws located below 15.2 inches from the top of the tubesheet is greater than 5% of the total tubes inspected in any SG, the following applies to the affected SG:
  - a. Tubes with flaws having a circumferential component greater than 203 degrees found in the portion of the tube below 15.2 inches from the top of the tubesheet and one inch from the bottom of the tubesheet shall be removed from service. When more than one flaw with circumferential components is found in the portion of the tube below 15.2 inches from the top of the tubesheet and above one inch from the bottom of the tubesheet with the total of the circumferential components greater than 203 degrees and an axial separation distance of less than one inch, then the tube shall be removed from service. When the circumferential components of each of the flaws are added, it is acceptable to count the overlapped portions only once in the total of circumferential components.
  - b. When one or more flaws with circumferential components are found in the portion of the tube within one inch from the bottom of the tubesheet, and the total of the circumferential components found in the tube exceeds 94 degrees, then the tube shall be removed from service. When one or more flaws with circumferential components are found in the portion of the tube within one inch from the bottom of the tubesheet and within one inch axial separation distance of a flaw above one inch from the bottom of the tubesheet, and the total of the circumferential components found in the tube exceeds 94 degrees, then the tube shall be removed from service. When the circumferential components of each of the flaws are added, it is acceptable to count the overlapped portions only once in the total of circumferential components.
3. For refueling outage 14 and the subsequent inspection cycle, tubes with axial crack indications located greater than 15.2 inches below the top of the tubesheet do not require plugging.

## INSERT 2

For refueling outage 14 and the subsequent inspection cycle, the portion of the tube below 15.2 inches from the top of the tubesheet is excluded from this requirement with the following exceptions:

1. If primary water stress corrosion cracking (PWSCC) is detected in the expanded area of the tubing within the tubesheet on the hot leg side, a 20% sample of tubes will be inspected full depth from top of tubesheet to the end of the tube on the hot leg side in all steam generators.
2. If cracks are detected below 15.2 inches from the top of the tubesheet on the hot leg side in more than 5% of the tubes inspected, then full depth inspections will expand to 100% of the tubes on the hot leg side in the affected steam generator

Attachment 3

Revision to Section 3.2 and Section 6.0 of License LAR 10-06,  
Request to Revise Technical Specification (TS) Sections 6.7.6.k, "Steam Generator (SG)  
Program," and TS 6.8.1.7, "Steam Generator Tube Inspection Report," for Temporary  
Alternate Repair Criteria

### 3.2 SG Inspections During Refueling Outage 14 (OR14) in the Spring 2011

At the conclusion of the fall 2009 refueling outage, NextEra had met all periodic SG inspection requirements for the current 90 effective full power month's inspection period. During the 2009 inspection, however, a single ODSCC indication was detected at the top of tubesheet in one tube in SG-C. As a result of this condition, TS 6.7.6.k.d.3 reduces the maximum interval between inspections from two operating cycles to one operating cycle, and the TS requires inspection for the specific degradation mechanism that caused the crack indication (i.e., ODSCC). The scope of tube inspections planned for OR14 is limited to  $\pm 3$  inches from the top of the tubesheet on the hot leg to detect ODSCC. However, if the inspection in OR14 detects the presence of PWSCC in the tubesheet region during the planned inspection, then an expansion to the full depth of the tube sheet would be required unless an alternate repair criterion is approved by the NRC.

In a phone call with the NRC on November 9, 2010, NextEra discussed its plans for limited SG inspections during OR14 and the potential need for a temporary amendment if PWSCC is detected. The NRC stated that a full depth inspection of a portion of tubes within the tubesheet would be required to confirm that the condition of the tubes within the tubesheet is consistent with the condition of tubes at other plants that have been granted a similar temporary license amendment.

Based on the January 10, 2011 public conference call regarding this proposed change, this request proposes an alternate repair criteria for crack indications below the H\* depth of 15.2" from the top of the tubesheet. This repair criteria would be invoked for crack-like flaws below the H\* depth only if the total number of tubes with crack indications is greater than 5% of the tubes inspected. The NRC previously approved such alternate repair criteria, which is referred to as the Interim Alternate Repair Criteria (IARC), for use at Vogtle, Millstone 3, and Wolf Creek, plants with steam generators similar to Seabrook. Wolf Creek Nuclear Operating Company (WCNOC) submitted a response to a request for additional information regarding a license amendment request for IARC in March 2008 [Reference 21]. The NRC approved the IARC proposed by WCNOC in Amendment No. 78 on April 4, 2008 [Reference 22]. NextEra is proposing alternate repair criteria similar to that approved for WCNOC.

The IARC technical bases did not rely on contact pressure for the H\* depth; however, this submittal justifies the use of contact pressure between the tube and tubesheet. Therefore, applying the IARC repair criteria for cracks below the H\* depth of 15.2 inches below the top of the tubesheet is conservative.

To provide additional support for approval of the requested amendment, NextEra proposes to expand the scope of SG inspections and repair as outlined below if PWSCC is detected during SG inspections in OR14.

- a. If PWSCC is detected in the expanded area of the tubing within the tubesheet on the hot leg side, then tube inspections will expand to 15.2 inches below the top of the tubesheet in 100% of the tubes on the hot leg side in the affected SG and in 20% of the tubes on the hot leg side in each unaffected SG.

In addition, if PWSCC is detected in the expanded area of the tubing within the tubesheet on the hot leg side, a 20% sample of tubes will be inspected full depth from top of tubesheet to the end of the tube on the hot leg side in all steam generators.

- b. If cracks are detected below the H\* depth of 15.2 inches from the top of the tubesheet on the hot leg side in more than 5% of the tubes inspected, then full depth inspections will expand to 100% of the tubes on the hot leg side in the affected steam generator.
- c. For crack indications located below 15.2 inches from the top of the tubesheet:
  1. Tubes with axial cracks do not require plugging.
  2. If cracks are detected in less than or equal to 5% of the tubes inspected in a steam generator, then the tubes do not require plugging.
  3. If cracks are detected in greater than 5% of the tubes inspected, the tubes will be removed from service as required by the criteria proposed in the change to TS 6.7.6.k.c.2.

## 6.0 REFERENCES

1. NRC Letter “Seabrook Station, Unit 1 – Issuance of Amendment RE: Limited Inspection of the Steam Generator Tube Portion within the Tubesheet (TAC NO. MC85544),” September 29, 2006 (ML062630450)
2. NRC Letter “Seabrook Station, Unit 1 – Issuance of Amendment RE: Changes to the Steam Generator Inspection Scope and Repair Requirements (TAC NO. ME1386),” October 13, 2009 (ML092460184)
3. NEI 97-06, “Steam Generator Program Guidelines” Revision 2, May 2005
4. EPRI 1003138, “Pressurized Water Reactor Steam Generator Examination Guidelines,” Revision 7
5. EPRI 1012987, Steam Generator Integrity Assessment Guidelines
6. NRC Information Notice 2005-09, “Indications in Thermally Treated Alloy 600 Steam Generator Tubes and Tube-to-Tubesheet Welds,” April 7, 2005
7. NRC Regulatory Guide 1.121, “Bases for Plugging Degraded PWR Steam Generator Tubes,” August 1976
8. Westinghouse Electric Company LLC, WCAP-17330-P, “H\*: Resolution of NRC Technical Issue Regarding Tubesheet Bore Eccentricity,” Rev. 0, November 2010
9. Westinghouse Electric Company LLC, WCAP-17071-P, “H\*: Alternate Repair Criteria for the Tubesheet Expansion Region in Steam Generators with Hydraulically Expanded Tubes (Model F)”
10. Westinghouse Electric Company LLC, LTR-SGMP-09-100, “LTR-SGMP-09-100 P-Attachment, “Response to NRC Request for Additional Information on H\*; Model F and Model D5 Steam Generators,” August 12, 2009
11. Westinghouse Electric Company LLC, LTR-SGMP-09-109 P-Attachment, “Response to NRC Request for Additional Information on H\*; RAI #4; Model F and Model D5 Steam Generators,” August 25, 2009.
12. Westinghouse Electric Company LLC, LTR-SGMP-10-33 P-Attachment and LTR-SGMP-10-33 NP-Attachment, LTR-SGMP-10-33 P-Attachment, “H\* Response to NRC Questions Regarding Tubesheet Bore Eccentricity,” (Proprietary/Non-Proprietary) for Review and Approval,” September 13, 2010

13. Westinghouse Electric Company LLC, LTR-SGMP-10-78 P-Attachment and LTR-SGMP-10-78 NP-Attachment, "Effects of Tubesheet Bore Eccentricity and Dilation on Tube-to-Tubesheet Contact Pressure and Their Relative Importance to H\*," (Proprietary/Non-Proprietary) for Review and Approval," September 7, 2010
14. NRC Letter dated August 13, 2009 "Seabrook Station, Unit NO.1 – Request for Additional Information (RAI) Regarding Steam Generator Program (TAC NO. ME 1386)" (ML092100324)
15. NRC Letter dated September 1, 2009 "Seabrook Station, Unit NO. 1 – Second Request for Additional Information (RAI) Regarding Steam Generator Program (TAC NO. ME1386)" (ML 092400135)
16. NRC Letter dated December 23, 2009 "Seabrook Station, Unit NO.1, Transmittal of Unresolved Issues Regarding Permanent Alternate Repair Criteria for Steam Generators (TAC NO. ME2628)" (ML 09342186)
17. SBK-L-09118, "License Amendment Request 09-03, Revision to Technical Specification 6.7.6.k, "Steam Generator (SG) Program," for Permanent Alternate Repair Criteria (H\*)," May 28, 2009 (ML091530539)
18. SBK-L-09168, "Response to Request for Additional Information Regarding Permanent H\* Alternate Repair Criteria for Steam Generator Inspections," September 16, 2009 (ML092650369)
19. SBK-L-09196, "License Amendment Request to Revise Technical Specification (TS) Sections 6.7.6.k, Steam Generator (SG) Program" and TS 6.8.1.7, "Steam Generator Tube Inspection Report" for One-Time Alternate Repair Criteria," September 18, 2009 (ML 09270883)
20. Westinghouse Electric Company LLC, LTR-SGMP-09-111 P-Attachment, Rev. 1 and LTR-SGMP-09-111 NP-Attachment, Rev. 1, "Acceptable Value of the Location of the Bottom of the Expansion Transition (BET) for Implementation of H\*," (Proprietary/Non-Proprietary) for Review and Approval," September 1, 2010
21. Wolf Creek Nuclear Operating Company Letter ET 08-0016, "Docket No. 50-482: Response to Request for Additional Information Related to License Amendment Request for Interim Alternate Repair Criterion to Technical Specification 5.5.9, "Steam Generator (SG) Program," March 21, 2008 (ML 080860248)

22. NRC Letter “Wolf Creek Generating Station – Issuance of Amendment Re:  
Revision to Technical Specification 5.5.9 on the Steam Generator Program (TAC  
No. MD8054),” April 4, 2008 (ML 080840004)