NEXTera ENERGY SEABROOK

December 17, 2010

SBK-L-10204
Docket No. 50-443

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Seabrook Station
Response to Request for Additional Information
NextEra Energy Seabrook License Renewal Application
Aging Management Programs

References:

1. NextEra Energy Seabrook, LLC letter SBK-L-10077, "Seabrook Station Application for Renewed Operating License," May 25, 2010. (Accession Number ML101590099)
2. NextEra Energy Seabrook, LLC letter SBK-L-10179, "Supplement to the NextEra Energy Seabrook, LLC, Seabrook Station License Renewal Application", October 29, 2010. (Accession Number ML10306002)
3. NRC Letter "Request for Additional Information Related to the Review of the Seabrook Station License Renewal Application (TAC NO. ME4028) – Aging Management Programs" November 18, 2010 (Accession Number ML103090558)

In Reference 1, NextEra Energy Seabrook, LLC (NextEra) submitted a application for a renewed facility operating license for Seabrook Station for Seabrook Station Unit 1 in accordance with the Code of Federal Regulations, Title 10, Parts 50, 51, and 54.

In Reference 3, the NRC requested additional information in order to complete its review of the License Renewal Application (LRA). Enclosure 1 contains NextEra's response to the request for additional information and associated changes made to the LRA. For clarity, deleted LRA text is highlighted by strikethroughs and inserted text highlighted by bold italics.

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NRR

Enclosure 2 provides changes to the LRA Appendix A – Updated Final Safety Analysis Report Supplement, to clarify frequency of manhole inspections associated with the Inaccessible Power Cables Not Subject to 10 CFR 50.49 EQ Requirements Program.

Commitment numbers 11 and 23 are modified and new commitments 50, 51 and 52 added to the License Renewal Commitment List. There are no other new or revised regulatory commitments contained in this letter. Enclosure 3 provides a revised LRA Appendix A - Final Safety Report Supplement Table A.3, License Renewal Commitment List, updated to reflect the license renewal commitment changes made in NextEra Energy Seabrook correspondence to date.

If there are any questions or additional information is needed, please contact Mr. Richard R.Cliche, License Renewal Project Manager, at (603) 773-7003.

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

Sincerely,

NextEra Energy Seabrook, LLC.

Paul O. Freeman
Site Vice President

Enclosures:

Enclosure 1- Response to Request for Additional Information Seabrook Station License Renewal Application Aging Management Programs and Associated LRA Changes

Enclosure 2- Changes to the Seabrook Station License Renewal Application Associated with Appendix A – Updated UFSAR Supplement

Enclosure 3- LRA Appendix A - Final Safety Report Supplement Table A.3, License Renewal Commitment List, updated to reflect the license renewal commitment changes made in NextEra Seabrook correspondence to date.

cc:

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NEXTera ENERGY
SEABROOK

I, Paul O. Freeman, Site Vice President of NextEra Energy Seabrook, LLC hereby affirm that the information and statements contained within 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

17 day of December, 2010

Paul O. Freeman
Site Vice President

Notary Public

SHIRLEY SWEENEY
MY COMMISSION EXPIRES NOV. 18, 2014
NOTARY PUBLIC
NEW HAMPSHIRE

Enclosure 1 to SBK-L-10204

Response to Request for Additional Information
Seabrook Station License Renewal Application
Aging Management Programs
and Associated LRA Changes

Request for Additional Information (RAI) B.2.1.2-1

Background

Generic Aging Lessons Learned (GALL) aging management program (AMP) XI.M2, "Water Chemistry" Program element 5, "monitoring and trending" states that whenever corrective actions are taken to address an abnormal chemistry condition, increased sampling is utilized to verify the effectiveness of these actions. The applicant's Aging Management Program Basis Document for Water Chemistry stated that its program specifies the frequency of sampling. This document also stated that routine primary and secondary system sampling frequencies are specified in station procedures in accordance with Electric Power Research Institute water chemistry guidelines. The applicant further stated that its Primary Chemistry Control Program document states that the Water Chemistry Program contains guidance on increasing sampling frequency to address an abnormal chemistry condition.

Issue

The staff reviewed the applicant's chemistry guidelines and could not identify any statements that indicated that under abnormal chemistry conditions the sampling frequency should be increased.

Request

Describe how the Water Chemistry Program will verify the effectiveness of corrective actions when an abnormal chemistry conditions occurs.

NextEra Energy Seabrook Response:

Section 3.4.2 of the EPRI Primary Water Guidelines and Section 5.4 of the EPRI Secondary Water Guidelines state that when a parameter exceeds an action level value, corrective actions may include measures that are specific to each parameter and plant. One typical action stated is to increase sampling and analysis frequency for short-term trending and confirmatory analyses of critical chemistry parameters.

While the practice of increasing sampling and analysis frequencies may be understood by personnel in the chemistry department and implemented as a routine measure, the program documents do not explicitly call out this attribute of the EPRI guidelines. A corrective action document has been initiated to revise the Seabrook Station chemistry program documents to include a statement that sampling frequencies are increased as appropriate when chemistry action levels are exceeded.

Request for Additional Information (RAI) B.2.1.2-2

Background

The Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants states that past operating experience would not necessarily invalidate an AMP because the feedback from operating experience should have resulted in appropriate program enhancements or new programs. A review of past operating experience has indicated a reoccurring condition in the condensate storage tank (CST) where the specific conductivity is high and out of specification. This type of occurrence was observed in 2005 (Condition Report (CR) 05-12035), early 2007 (CR 07-02531), and late 2007 (CR 07-15493).

Issue

It was not clear to the staff if the applicant has evaluated these incidents to determine if the cause of these conductivity spikes were related. If the causes were determined to be the same, it is not clear how the applicant has incorporated enhancements into its Water Chemistry Program to reduce the occurrence of any future CST conductivity excursions.

Request

Provide additional information if the CST conductivity excursions were evaluated for similar root causes. If the root cause is the same for the three instances reference previously, provide additional information on what steps have been taken to reduce the occurrence of any future CST conductivity excursions.

NextEra Energy Seabrook Response:

An explanation of the circumstances surrounding the Condensate Storage Tank (CST) condition reports that documented a trend of increasing specific conductivity results is provided below. The explanation includes a description of the apparent cause(s) and actions taken.

There were two potential causes identified for the high specific conductivity in the CST. First, recirculation flows from the startup feed pump and emergency feedwater pumps return feedwater addition chemicals to the CST, affecting CST specific conductivity. This is especially evident during surveillance testing with the plant shutdown and during quarterly operability testing of the turbine driven emergency feedwater pump. Secondly, air ingress past the CST floating lid seal, especially during cold weather operation, will impact CST specific conductivity. The CST limit of 0.1 μS/cm can be exceeded by trace amounts of ammonia (approximately 5 ppb) or by trace amounts of carbon dioxide (approximately 13 ppb) in air. Samples of the CST did not identify any chemical contaminant above the ion chromatograph analysis limit of detection. The Chemistry Department does not have an analysis method for measuring carbon dioxide. However, carbon dioxide is at least 369 ppm concentration in air. Therefore, any in-leakage of air into the CST will increase the specific conductivity due to the absorption of carbon dioxide in the water, as well as increase the CST oxygen concentration. In the absence of any identified contaminant, high CST specific conductivity does not impact the operation of the plant and is not detrimental to the long-term preservation of the steam generators.

Immediate actions included sampling the CST heat exchanger to determine if any leakage from the Auxiliary Steam side into the CST recirculation line was occurring; none was found. The seals on the CST Transfer Pump were initially suspected as a potential pathway for oxygen in-leakage, but were found not to be an issue. Feed and bleed of the CST was necessary to turn over the tank contents and reduce CST specific conductivity to within acceptable limits.

Recirculation flow for the startup feed pump and the emergency feedwater pumps is a function of plant design. Whether the startup feed pump suction is aligned to the hotwells (during plant shutdown or outages) or the emergency feedwater pumps are aligned with sections of normal feedwater piping containing secondary addition chemicals, routine plant evolutions will always have the potential to recirculate secondary addition chemicals into the CST.

In April 2008, during refuel outage 12, the CST floating lid seal was replaced. Since that time, CST specific conductivity has remained below the limit of 0.1 µS/cm. Based on the trend data of CST oxygen and specific conductivity from 2004 to the present, it appears that the CST floating lid seal was the more likely cause of high specific conductivity in the CST. This data indicates that CST high specific conductivity often coincides with high CST oxygen values.

This high CST specific conductivity has been determined to not adversely impact the operation of the plant and not be detrimental to the long-term preservation of the steam generators. The CST floating seal was replaced in April 2008. In addition to continued monitoring and replacement of the CST floating seal when necessary, conductivity excursions have been minimized by providing condenser hotwell makeup from the demineralized water storage tanks instead of the CST. This process reduces the number of CST draining and refill activities and reduces the cycles placed on the floating seal.

Request for Additional Information (RAI) B.2.1.9-1

Background

Program element 3, "Parameters Monitored/Inspected," of GALL AMP XI.M18, "Bolting Integrity," states that the program monitors the effects of aging on the intended function of bolting. Specifically, bolting for safety-related pressure retaining components is inspected for leakage, loss of material, cracking, and loss of preload/loss of prestress. Bolting for other pressure retaining components is inspected for signs of leakage.

License renewal application (LRA) Section B.2.1.9 states 'The program includes periodic inspection of closure bolting assemblies to detect signs of leakage that may be indicative of loss of preload, loss of material, or crack initiation. Periodic inspection of bolted closures in conjunction with the Seabrook Station (Seabrook) Inservice Inspection Program and Seabrook External Surfaces Monitoring Program will detect the aging effects and joint leakage. Operator rounds and system walkdowns will also identify joint leakage."

Issue

There are in-scope components in the applicant's fire protection system, service water system, and spent fuel pool cooling system that are in wet or submerged environments. Visual inspections conducted during operator rounds and system walkdowns to detect leakage which indicate a loss of preload may not be feasible due to these environmental conditions.

Request

Explain how the in-scope bolting components in wet or submerged environments will be inspected to effectively manage the loss of preload aging effect.

NextEra Energy Seabrook Response:

Loss of preload for bolting in soil (buried piping) in the Fire Protection system and for bolting in raw water (inaccessible submerged piping) in the Service Water System will be addressed by the Buried Piping and Tanks Inspection Program. Bolting in these environments will be inspected for leakage which indicates that a loss of preload may be occurring when the associated piping is inspected by this program. In instances where the Buried Piping and Tanks program allows hydrostatic testing, flow testing, or fire protection jockey pump monitoring in lieu of visual inspections, these methods will also be credited to identify leakage which may indicate a loss of preload at the bolted connections.

The service water pump column bolted connections are also submerged in raw water and cannot be inspected for leakage due to loss of preload. Therefore, the Service Water pump column bolting will be inspected when the Service Water pumps are removed for maintenance. A corrective action document has been generated to revise the service water pumps maintenance procedures to address inspection for loose or missing bolting.

The stainless steel bolting in the Spent Fuel Pool Cooling system that is shown with an external environment of treated borated water is associated with a strainer that is not in scope. The bolting has no pressure boundary function and is also not needed for leakage boundary since it is located underwater and therefore, the bolting line items have been removed from the Seabrook Station License Renewal Application.

Based on the above discussion, the following changes have been made to the Seabrook Station License Renewal Application.

1. In Section A.2.1.9, on page A-9, revised the 3rd paragraph as follows:

   The Bolting Integrity Program credits ~~six~~ ***seven*** separate aging management programs for the inspection of bolting.

2. In Section A.2.1.9, on page A-9, revised item 4 as follows:

   Buried Piping and Tanks Program, provides the requirements for the periodic visual inspections of corrosion on buried piping and tanks, including bolting. ***This program will also manage loss of preload in pressure retaining bolting within the scope of this program by visual inspection for evidence of leakage when the associated piping is inspected by this program.***

3. In Section A.2.1.9, on page A-10, added new item 7 as follows:

   7. Open-Cycle Cooling Water System provides for management of loss of material and loss of preload for service water pump column bolting in raw water environment.

4. In Section B.2.1.9, on page B-56, revised item d as follows:

   d. The Seabrook Station Buried Piping and Tanks Program (B.2.1.22) provides the requirements for the periodic visual inspections of corrosion on buried piping and tanks, including bolting. ***This program will also manage loss of preload in pressure retaining bolting within the scope of this program by visual inspection for evidence of leakage when the associated piping is inspected by this program.***

5. In Section B.2.1.9, on page B-56, added new item g as follows:

   g. The Seabrook Station Open Cycle Cooling Water System Program (B.2.1.11) provides for inspection for loss of material and loss of preload for service water pump column bolting in a raw water environment.

6. In Section B.2.1.9, on page B-57, revised the 1st paragraph as follows:

   The program includes periodic inspection of closure bolting assemblies to detect signs of leakage that may be indicative of loss of preload, loss of material, or crack initiation. Periodic inspection of bolted closures in conjunction with the Seabrook Station Inservice Inspection Program and Seabrook Station External Surfaces Monitoring Program will detect the aging effects and joint leakage. Operator rounds and system walkdowns will also identify joint leakage. ***Bolted connections in buried, underground, and inaccessible submerged piping will be inspected for indication of leakage caused by loss of preload when the associated piping is inspected by the Buried Piping and Tanks Inspection program. In instances where hydrostatic testing, flow testing, or fire protection jockey pump monitoring are used in lieu of visual inspections, these methods will also be credited to identify leakage caused by loss of preload at bolted connections. Additionally, the service water pump column bolted connections are submerged in raw water and cannot be inspected for leakage due to loss of preload. Service water pump column bolting will be inspected for loss of material and loss of preload when the service water pumps are removed for maintenance.***

7. In Section B.2.1.11, on page B-68, added the following new paragraph after the 4th full paragraph as follows:

   Loss of material due to pitting corrosion, crevice corrosion, microbiologically influenced corrosion, and fouling and loss of preload of the service water pump column bolting exposed to raw water will be inspected when the service water pumps are removed for maintenance.

8. In Supplement 1, letter SBK-L-10179 dated October 29, 2010, on page 3, of Enclosure 1 revised the last paragraph of A.2.1.22 as follows:

   This program also manages the aging effects ***(loss of material and loss of preload)*** of buried, underground, or inaccessible submerged piping system bolting.

9. In Supplement 1, letter SBK-L-10179 dated October 29, 2010, on page 6 of Enclosure 1, revised the last paragraph of Section B.2.1.22, Program Description, as follows:

   This Buried Piping and Tanks Inspection Program also provides for management of the aging effects (loss of material ***and loss of preload***) on buried, underground, and inaccessible submerged piping system bolting.

10. In Supplement 1, letter SBK-L-10179 dated October 29, 2010, on page 6 of Enclosure 1, revised the 3rd paragraph of Section B.2.1.22, Element 1 - Scope of Program, as follows:

    Loss of material due to corrosion of buried, underground, and inaccessible submerged piping system bolting within the scope of license renewal is managed using this program. ***This program will also manage loss of preload in pressure retaining bolting within the scope of this program by visual inspection for evidence of leakage when the associated piping is inspected by this program.***

11. In Supplement 1, letter SBK-L-10179 dated October 29, 2010, on page 10 of Enclosure 1, added the following sentences after the first sentence in the third paragraph in Element 3 in Supplement 1 letter SBK-L-10179 on page 10 as follows:

    This program also provides for management of the aging effects (loss of material) on buried, underground, and inaccessible submerged piping system bolting. ***Bolted connections in buried, underground, and inaccessible submerged piping will be inspected for indication of leakage caused by loss of preload when the associated piping is inspected by this program. In instances where hydrostatic testing, flow testing, or fire protection jockey pump monitoring are used in lieu of visual inspections, these methods will also be credited to identify leakage caused by loss of preload at bolted connections.***

12. In Supplement 1, letter SBK-L-10179 dated October 29, 2010, on page 11 of Enclosure 1, added the following new paragraph to the end of item (C) as follows:

    Bolting in buried, underground, and inaccessible submerged piping will be inspected for loss of material due to corrosion and bolted connections will be inspected for indication of leakage

caused by loss of preload when the associated piping is inspected by this program. In instances where hydrostatic testing, flow testing, or fire protection jockey pump monitoring are used in lieu of visual inspections, these methods will also be credited to identify leakage caused by loss of preload at bolted connections.

13. In Table 3.3.2-39, on page 3.3-482, for the Spent Fuel Pool Cooling system, deleted the 2nd and 3rd row line items as follows:

~~Bolting~~	~~Pressure Boundary~~	~~Stainless Steel~~	~~Treated Borated Water (External)~~	~~Loss of Preload~~	~~Bolting Integrity Program~~	~~None~~	~~None~~	~~G~~
~~Bolting~~	~~Pressure Boundary~~	~~Stainless Steel~~	~~Treated Borated Water (External)~~	~~Loss of Material~~	~~Bolting Integrity Program~~	~~VII.A3-8 (AP-79)~~	~~3.3.1-91~~	~~E, 2~~

14. In Table 3.3.2-39, on page 3.3-490, for the Spent Fuel Pool Cooling system, revised Note 2 as follows:

2 ***Not Used*** ~~NUREG-1801 specifies the Water Chemistry Program for this line item. The Bolting Integrity Program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination. Since the component type is bolting, The Water Chemistry Program is not applicable~~

15. In Table 3.3.1, on page 3.3-121 and 122, revised line item 3.3.1-91 for the Spent Fuel Pool Cooling system as follows:

3.3.1-91	Stainless steel and steel with stainless steel cladding piping, piping components, and piping elements exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Components in the Auxiliary Steam, Chemical and Volume Control System, Sample, Spent Fuel Pool Cooling, and Waste Processing Liquid Drains systems have been aligned to this line item based on material, environment, and aging effect. Consistent with NUREG-1801. The Water Chemistry Program, B.2.1.2, will be used to manage loss of material due to pitting and crevice corrosion of the following stainless steel components exposed to treated borated water: *a)* Stainless steel piping components exposed to treated borated water in the Auxiliary Steam, Boron Recovery, Chemical and Volume Control, Nitrogen Gas, Reactor Make-Up Water, Release Recovery, Resin Sluicing, Sample, Spent Fuel Pool Cooling, Valve Stem Leak-Off, Waste Gas, and Waste Processing Liquid Drains systems, *b)* Stainless steel heat exchanger components exposed to treated borated water in the Chemical and Volume Control, Spent Fuel Pool Cooling, and Waste Processing Liquid Drains system, ***and*** *c)* Stainless steel tanks exposed to treated borated water in the Chemical and Volume Control, Sample, Spent Fuel Pool Cooling, and Waste Processing Liquid Drains. ~~, and~~ ~~*d) Stainless steel bolting exposed to treated borated water in the Spent Fuel Pool Cooling system.*~~

Request for Additional Information (RAI) B.2.1.14-1

Background

Program element 5, "Monitoring and Trending," of the GALL AMP XI.M24, "Compressed Air Monitoring," states that the effects of corrosion and the presence of contaminants are monitored by visual inspection and periodic system and component tests.

LRA Section B.2.1.14 describes the inspection criteria as being set by New Hampshire state inspection requirements. The inspection methods to be used are not specified in the LRA. Furthermore, the LRA does not clarify whether there are additional visual inspections credited by this AMP which monitor the effects of corrosion and the presence of contaminants.

Issue

The inspections conducted in accordance with the New Hampshire state inspection requirements may or may not be equivalent to the specifications for inspection stated in the GALL Report. Furthermore, even if the current New Hampshire state inspection requirements are equivalent to those recommendations stated in the GALL Report, there is no assurance that they will not become divergent in the period of extended operations.

Request

Provide an explanation of how the in-scope components in the compressed air system will be inspected, consistent with the recommendations defined in GALL AMP XI.M24.

NextEra Energy Seabrook Response:

The Compressed Air Monitoring program provides for planned maintenance on the major components of the compressed air system on a regular basis. Planned maintenance is performed on the compressors, air dryers, valves, piping components and filters of the compressed air systems. As with any maintenance, the components are visually inspected and anomalies identified and evaluated as part of the maintenance activity.

The following Seabrook Station License Renewal Application change has been made to remove the reference to the State of New Hampshire air receiver tank inspection and reiterate the program requirements for the periodic internal inspection of compressed air system components as follows.

In Section B.2.1.14, on page B-90, revised the last paragraph as follows;

~~The plant compressed air system, containment compressed air system and Diesel Generator compressed air sub system air receiver tanks are subject to a New Hampshire State inspection, which is a visual inspection of the (1) vessel internal for structural integrity, (2) the code stamp and (3) relief valve. The inspection removes the tank access covers for internal tank inspection.~~ ***The plant compressed air system, containment compressed air system, and Diesel Generator compressed air sub system air compressors, air receiver tanks, piping components, filters, valves, and dryers are periodically inspected through plant preventive maintenance procedures and opportunistic inspections. Visual inspections are performed during the preventive maintenance procedures and opportunistic inspections to look for signs of corrosion and the presence of contaminants.***

Request for Additional Information (RAI) B.2.1.16-1

Background

GALL AMP XI.M27, Fire Water System Program description states that the fire protection system piping is to be subjected to required flow testing in accordance with guidance in National Fire Protection Association 25 to verify design pressure or evaluated for wall thickness (e.g., nonintrusive volumetric testing or plant maintenance visual inspections) to ensure that aging effects are managed and that wall thickness is within acceptable limits. The GALL Report also states that these inspections are performed before the end of the current operating term and at plant-specific intervals thereafter during the period of extended operation.

LRA Section B2.1.16 states that "the Fire Water System Program will be enhanced to perform periodic visual inspection or volumetric inspection, as required , of the internal surface of the fire protection system" and that "this inspection will be performed no earlier than 10 years before the period of extended operation."

Issue

The LRA only indicates when the inspections will not be conducted and does not indicate whether the visual inspection or volumetric inspection will be implemented prior to the period of extended operation. It is not clear to the staff if the intent of the enhancement is to have the inspections conducted prior to the period of extended operation, as recommended by the GALL Report.

Request

Confirm whether the inspection activities are planned to start before or after the period of extended operations. If inspections will be not be conducted prior to entering the period of extended operation, provide technical justification for not conducting the inspections until after entering the period of extended operation.

NextEra Energy Seabrook Response:

Seabrook has clarified the inspection commitment requirements (these inspections will be performed within ten years prior to the period of extended operation) for LRA Appendix A, Commitment 11 and Appendix B section B.2.1.16. These changes were provided in Enclosure 4 of Letter "Seabrook Station Supplement 2 to the NextEra Energy Seabrook, LLC Seabrook Station License Renewal Application," Letter number "SBK-L-10192," dated 11/15/2010, Adams number "ML103210330."

Request for Additional Information (RAI) B.2.1.16-2

Background

Standard Review Plan for Review of License Renewal Application for Nuclear Power Plants (SRP-LR) Table 3.3-2, "UFSAR Supplement for Aging Management of Auxiliary Systems" states that the Fire Water System Program Updated Final Safety Analysis Report (UFSAR) Supplement should include periodic full flow flush tests and system performance testing to prevent corrosion due to biofouling. The SRP also states that portions of the fire protection system exposed to water should be visually inspected.

GALL AMP XI.M27, Fire Water System Program, element 4, "detection of aging effects" states that as an alternative to non-intrusive testing, the plant maintenance process may include a visual inspection of the internal surface of the fire protection piping upon each entry to the system for routine or corrective maintenance, as long as it can be demonstrated that inspections are performed on a representative number of locations on a reasonable basis. The GALL Report also states that these inspections must be capable of evaluating (1) wall thickness to ensure against catastrophic failure and (2) the inner diameter of the piping as it applies to the design flow of the fire protection system.

The applicant's UFSAR Supplement states that the Fire Water System Program manages loss of material and reduction of heat transfer due to fouling of the Fire Water System components through detailed inspections via the Seabrook Surveillance Test Procedures.

Issue

The applicant's UFSAR supplement for the Fire Water System Program does not indicate that periodic full flow flush tests and system performance testing are performed or that the visual inspections included in the program will be able to detect wall thickness and the inner diameter of the piping.

Request

Modify the UFSAR supplement to indicate that periodic full flow flush tests and system performance testing are performed and that the visual inspections in the program will be able to detect wall thickness and the inner diameter of the piping .

NextEra Energy Seabrook Response:

The LRA Appendix A, section A.2.1.16, page A-12 is changed to include a new second paragraph as follows:

The Fire Water System Program includes periodic full flow flush tests and system performance testing per the guidance of NFPA 25. The program also includes a visual inspection of the internal surface of the fire protection piping upon each entry to the system for routine or corrective maintenance. These visual inspections will look for loss of material (wall thickness) or changes to the inner diameter of the piping.

Request for Additional Information (RAI) B.2.1.16-3

Background

GALL AMP XI.M27, Fire Water System Program, element 4, "detection of aging effects" states that as an alternative to non-intrusive testing, the plant maintenance process may include a visual inspection of the internal surface of the fire protection piping upon each entry to the system for routine or corrective maintenance, as long as it can be demonstrated that inspections are performed on a representative number of locations on a reasonable basis.

Issue

Neither the applicant's Fire Water System Program description in LRA Section B2.1.16 nor the program basis documentation provide any indication of how the inspections will be conducted on a representative number of locations on a reasonable basis.

Request

Provide information on how the Fire Water System Program inspects a representative number of locations on a reasonable basis, including both opportunistic and directed inspections.

NextEra Energy Seabrook Response:

The Seabrook Station License Renewal Application Section B.2.1.16, Enhancement 3 on page B-101 is changed to appear as follows:

3 The Seabrook Station Fire Water System Program will be enhanced to include the performance of periodic visual inspection or volumetric inspection, as required, of the internal surface of the fire protection system upon each entry to the system for routine or corrective maintenance to evaluate wall thickness and inner diameter of the fire protection piping. ***These inspections will be documented and trended to determine if a representative number of inspections have been performed prior to the period of extended operation. If a representative number of inspections have not been performed prior to the period of extended operation, focused inspections will be conducted.*** These inspections will be performed within ten years prior to the period of extended operation.

The Seabrook Station License Renewal Application Section A.3, License Renewal Commitment List number 11 on page A-37 is changed to appear as follows:

11	Fire Water System	Enhance the program to include the performance of periodic visual ***or volumetric*** inspection of the internal surface of the fire protection system upon each entry to the system for routine or corrective maintenance. ***These inspections will be documented and trended to determine if a representative number of inspections have been performed prior to the period of extended operation. If a representative number of inspections have not been performed prior to the period of extended operation, focused inspections will be conducted.*** These inspections will be performed within ten years prior to the period of extended operation.	A.2.1.16	Within ten years prior to the period of extended operation.

Request for Additional Information (RAI) B.2.1.17-1

Background

The program description of GALL AMP XI.M29 "Aboveground Steel Tanks" states that the program relies on periodic system walkdowns to monitor degradation of the protective paint or coating. LRA Section B.2.1.17 states that visual inspection of the external surface of the protective coatings on exterior surface of the in-scope tanks will be conducted in accordance with its Structural Monitoring Program.

Issue

LRA AMP B.2.1.31, Seabrook Structural Monitoring Program, does not state that coating inspections of aboveground steel tanks is within its scope.

Request

Confirm that the Seabrook Structural Monitoring Program includes coating inspection of aboveground steel tanks.

NextEra Energy Seabrook Response:

The Seabrook Station License Renewal Application Section B.2.1.31 is changed to include the following paragraph after the first full paragraph which ends on page B-165.

The Structures Monitoring Program will include an external surface inspection of the aboveground steel tanks 1-FP-TK-35-A, 1-FP-TK-35-B, 1-FP-TK-36-A, 1-FP-TK-36-B, and 1-AB-TK-29. This inspection will inspect the paint or coating for cracking, flaking, or peeling.

Request for Additional Information (RAI) B.2.1.17-2

Background

SRP Table 3.3-2, "UFSAR Supplement for Aging Management of Auxiliary Systems," states that the applicant's UFSAR supplement for the Aboveground Steel Tanks Program should include a statement that visual inspections of sealant and caulking inspections are included in the program.

Issue

The Seabrook UFSAR Supplement does not include a statement that visual inspections of sealant and caulking are in the scope of the Aboveground Steel Tanks Program.

Request

Revise the Aboveground Steel Tanks Program UFSAR Supplement, Section A.2.1.17 to include a statement that visual inspections of sealant and caulking are in the scope of the program.

NextEra Energy Seabrook Response:

The Seabrook Station License Renewal Application, UFSAR Supplement, Section A.2.1.17 on page A-12, is changed to include visual inspections of sealant and caulking, as follows:

A.2.1.17 Aboveground Steel Tanks

The Aboveground Steel Tanks Program manages aging effects through preventive measures to mitigate corrosion and through periodic inspections to manage any effects of corrosion on aboveground steel tanks within the scope of License Renewal.

The program utilizes the application of protective coatings on the exterior surfaces of the in-scope steel tanks to mitigate corrosion development due to environmental factors. To ensure that the exterior surfaces of the tanks remain protected, the protective coatings, ***sealant and caulking*** are visually inspected.

Inaccessible locations, such as the tank bottom, will be surveyed by ultrasonic thickness measurements from inside the tank to detect any material degradation. The ultrasonic thickness measurements of fuel oil tanks within the scope of this program will be performed in accordance with the Fuel Oil Chemistry Program.

Request for Additional Information (RAI) B.2.1.17-3

Background

The "detection of aging effects" program element of GALL AMP XLM29 "Aboveground Steel Tanks" states that periodic system walkdowns confirm that the sealant, and caulking are intact and they are an effective method to manage the effects of corrosion on the external surface of tanks. LRA Section B.2.1 .17 states that visual inspection will be performed to detect drying, cracking, or missing sealant and caulking applied along the tank and ground interface.

Issue

In order to detect hardening and loss of strength in elastomeric materials it is necessary to supplement the visual inspection with physical manipulation of the sealant and caulking.

Request

Confirm that the Aboveground Steel Tanks Program includes manual manipulation of elastomeric sealant and caulking material to detect hardening and loss of strength.

NextEra Energy Seabrook Response:

The Seabrook Station License Renewal Application Section B.2.1.17, page B-103 is changed to add a new paragraph after fourth paragraph to include a tactile examination as follows:

Caulking and flashing are applied along the tank and ground interface of the Auxiliary Boiler fuel oil storage tank and the two Fire Protection water storage tanks. The tanks are on concrete foundations with a compacted oiled sand foundation. The two diesel fire pump fuel oil tanks are raised on steel supports, clear of their concrete foundations.

Inspection for degradation of the sealant and caulking will be performed with a visual and tactile examination (manual manipulation) consisting of pressing on the sealant or caulking to detect a reduction in the resiliency and pliability.

Request for Additional Information (RAI) B.2.1.17-4

Background

The "acceptance criteria" program element of the GALL AMP XLM29 "Aboveground Steel Tanks" states that, "Any degradation of paint, coating, sealant, and caulking is reported and will require further evaluation. Degradation consists of cracking, flaking, or peeling of paint or coatings, and drying, cracking or missing sealant and caulking ." LRA Section B.2.1.17 states an enhancement to the Aboveground Steel tanks Program by adding paint flaking and drying, cracking, or missing sealant and caulking as examples of minor structural deficiencies.

Issue

The staff requires clarification of the meaning of the term "minor structural deficiencies."

Request

Does the term "minor structural deficiency" imply that no further evaluation of the degraded condition will occur? If no further evaluation will occur, justify this as an exception to GALL AMP XLM29.

NextEra Energy Seabrook Response:

The term "minor structural deficiencies" is changed to "degradation".

The Seabrook Station License Renewal Application Section B.2.1.17, Enhancement 1.b) on page B-104 is changed to appear as follows:

b) Add paint flaking and drying, cracking, or missing sealant and caulking as examples of ~~minor structural deficiencies~~ ***degradation***.

Request for Additional Information (RAI) B.2.1.17-5

Background

The "monitoring and trending" program element of GALL AMP XLM29, Aboveground Steel Tanks, states, "The effects of corrosion of the underground external surface are detectable by thickness measurement of the tank bottom and are monitored and trended if significant material loss is detected." LRA Section B.2.1 .17, Enhancement No. 2 states that for the two fire protection water storage tanks, the program will be enhanced to include the performance of an ultrasonic (UT) examination of the internal tank bottom surface within 10 years prior to the period of extended operation.

Issue

The staff is not clear whether the UT examination is a one-time or periodic inspection.

Request

Clarify whether the UT examination specified in LRA Section B.2.1.17, Enhancement No. 2 is a one-time measurement or periodic inspection. If it is a one-time UT inspection, justify how the one-time measurement can be used for monitoring and trending of aging effects.

NextEra Energy Seabrook Response:

The GALL XI.M29, element 5, Monitoring and Trending, states "The effects of corrosion of the underground external surface are detectable by thickness measurement of the tank bottom and are monitored and trended if significant material loss is detected".

Based on the NUREG-1801 statement above, Seabrook Station plans to perform a one-time ultrasonic thickness measurement of the tank bottoms within ten years prior to entering the period of extended operation.

Any thickness measurements indicating less than nominal thickness will require a condition report. The condition report ensures that an engineering evaluation is performed, and any necessary monitoring and trending is identified.

Request for Additional Information (RAI) B.2.1.21-1

Background

The parameters monitored or inspected element of the GALL AMP XI.M33 "Selective Leaching of Materials" recommends a possible expansion of the inspection sample size and location if selective leaching has occurred. The detection of aging effects element recommends the initiation of an engineering evaluation to determine the acceptability of the affected components if selective leaching has occurred. LRA Section B.2.1.21 states that if it is determined that selective leaching is occurring, then an engineering evaluation will be initiated to determine acceptability of the affected components for continued service. Follow-up of unacceptable inspection findings will include an expansion of the inspection sample size and location. LRA Section B.2.1.21 also states that Seabrook has experienced instances of de-aluminization of aluminum bronze components having an internal environment of raw sea water.

Issue

Given that selective leaching of aluminum bronze components has occurred, it is unclear how an expansion of the inspection sample sizes and locations are being implemented at Seabrook.

Request

1. Describe the methodology and criteria for selecting a representative sample population that envelop all plant systems and working conditions in materials where selective leaching has occurred. Describe any planned inspection and associated activities ahead.

2. Provide justification for the methodology, sample size and location used for selecting components with different material and environment combinations for selective leaching inspections.

NextEra Energy Seabrook Response:

Item 1:

Because Seabrook Station has previously identified selective leaching in aluminum bronze components in raw water, aluminum bronze components in raw water within the scope of this program will be grouped separately from other copper alloy components >15% Zinc in a periodic inspection program. Aging management activities will include periodic inspections in this material and environment combination to manage loss of material due to selective leaching such that the component intended function is maintained consistent with the current licensing basis through the period of extended operation. For the initial inspection of aluminum bronze components, the criteria, specified in LRA Section B.2.1.21, of a sample size of twenty percent of the population of aluminum bronze components within the scope of License Renewal, with a maximum of 25 locations, will be performed coincident with the inspection of other material/environment combinations within five years prior to the period of extended operation. Follow up of unacceptable inspection findings will include an evaluation using the corrective action program and a possible expansion of the inspection sample size and location. LRA Section B.2.1.21 has been revised to specify aluminum bronze in raw water as a population separate from other materials in the "Copper Alloy >15% Zinc" material group.

Item 2:

The criteria, as specified in LRA Section B.2.1.21, are a sample size of twenty percent of the population with a maximum of twenty-five locations, and considering each material/environment combination as a separate population. The selection of locations will consider time in service, severity of operating conditions, lowest design margin, and distribution of susceptible components across systems within similar material/environment combinations.

Based on the above discussions, the following changes have been made to the Seabrook Station License Renewal Application.

1. In Section A.2.1.21, on page A-13, revised the program description as follows:

A.2.1.21 SELECTIVE LEACHING OF MATERIALS

The Selective Leaching of Materials Program manages the aging effects of loss of material in components susceptible to selective leaching that are exposed to raw water, brackish water, treated water (including closed cycle cooling), or ground water environment.

The Selective Leaching of Materials Program will include ~~a one-time examination of selected components that may be susceptible to selective leaching~~:

1) A one-time inspection of selected components that are susceptible to selective leaching in

material/environment combinations where selective leaching has not been previously identified, and

2) ***Periodic inspections of selected components that are susceptible to selective leaching in material/environment combinations where selective leaching has been previously identified.***

Visual inspection and mechanical examination techniques (Brinell hardness testing or other mechanical examination techniques such as destructive testing (when appropriate), scraping, chipping or other types of hardness testing), or additional examination methods that become available to the nuclear industry, will be used to determine if selective leaching is occurring on the surfaces of a selected set of components.

2. In section A.3, on page A-43, revised Commitment 23 as follows:

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
23	Selective Leaching of Materials	Implement the Selective Leaching of Materials Program. ***The program will include a one-time inspection of selected components where selective leaching has not been identified and periodic inspections of selected components where selective leaching has been identified.***	A.2.1.21	Within five years of entering the period of extended operation

3. In Section B.2.1.21, on page B-121, revised the 2nd paragraph as follows:

The Seabrook Station Selective Leaching of Materials Program will include: ~~a one-time inspection of selected components that may be susceptible to selective leaching~~

1) ***A one-time inspection of selected components that are susceptible to selective leaching in material/environment combinations where selective leaching has not been previously identified, and***

2) ***Periodic inspections of selected components that are susceptible to selective leaching in material/environment combinations where selective leaching has been previously identified.***

Seabrook Station has previously identified selective leaching in aluminum bronze components in raw water. All aluminum bronze components in a raw water environment within the scope of this program will be grouped separately from other copper alloy components and included in the periodic inspection program. Because selective leaching is a slow acting corrosion

process, the one-time inspection for selective leaching will be performed within the last five years prior to entering the period of extended operation. ***The periodic inspection portion of the program will also be implemented during this five year period prior to entering the period of extended operation.***

4. In Section B.2.1.21, on page B-122, revised the 2nd paragraph as follows:

   Where practical, the inspection will include a representative sample of the population and focus on the bounding of lead components most susceptible to aging due to time in service, severity of operating conditions, and lowest design margin***, and distribution of susceptible components across systems within similar material/environment combinations***. Twenty percent of the population with a maximum sample of 25 constitutes a representative sample size. Otherwise, a technical justification of the methodology and sample size used for selecting components for a one-time inspection will be included in the Seabrook Station Selective Leaching of Materials Program. Each group of components with different material/environment combinations will be considered a separate population.

5. In Section B.2.1.21, on page B-122, after the 1st full paragraph added the following paragraph:

   To ensure the effectiveness of any corrective actions taken to address previous occurrences of de-alloying of aluminum bronze components, aluminum bronze in raw water will be treated as a population separate from other materials in the "Copper Alloy > 15% Zinc" material group and will be placed in a periodic inspection program. An initial sample size of twenty percent of the aluminum bronze population with a maximum sample of 25 will constitute a representative sample. Follow up of unacceptable inspection findings will include an evaluation using the corrective action program and a possible expansion of the inspection sample size and location.

Request for Additional Information (RAI) B.2.1.24-1

Background

The GALL Report XI.M36, "External Surfaces Monitoring" states that for program element 5, "monitoring and trending ," visual inspection activities are performed and associated personnel are qualified in accordance with site controlled procedures and processes. LRA section B.2.1.24 states that the program inspects for hardening and loss of strength in components made from elastomers by visual examinations to detect discontinuities and imperfections of the surface of the component, and non-visual examinations such as tactile techniques, which include scratching bending, folding , stretching and pressing in conjunction with the visual examinations.

Issue

The applicant's AMP has in-scope components that cannot be reached for hands-on inspection and therefore are not accessible for the tactile inspection described in the LRA AMP.

Request

Provide details describing how the inspections tactile techniques would be applied for the in-scope elastomeric components that are inaccessible for physical manipulation.

NextEra Energy Seabrook Response:

When an elastomer is inaccessible for the tactile inspection techniques, its condition can be determined by correlation to the inspection results of an accessible elastomer of the same construction in a similar environment with an equivalent age where the tactile techniques can be applied. The same situation would apply for metallic components that are inaccessible for visual inspection.

Therefore the following change has been made to the Seabrook Station License Renewal Application.

In Section B.2.1.24, on page B-133, added the following after the 1st paragraph.

When a component of a given material is not accessible to perform an external visual inspection or an elastomer is not accessible to perform physical manipulation, a material or an elastomer of the same construction in a similar environment with an equivalent age can be visually inspected or manipulated (in the case of an elastomer) to determine its condition. Performing the visual inspection or physical manipulation on these similar components can then be used to correlate its condition to the inaccessible material.

Request for Additional Information (RAI) B.2.1.24-2

Background

The program description in GALL Report XI.M36, "External Surfaces Monitoring," states that the program consists of periodic visual inspections of steel components such as piping, piping components, ducting, and other components with in the scope of license renewal and subject to aging management review (AMR) in order to manage aging effects. The program manages aging effects through visual inspection of external surfaces for evidence of material loss." LRA Section B.2.1 .24 states that in addition to steel, components of other construction materials will be covered. Specifically, LRA Section B.2.1.24 states "The Seabrook Station program will also apply to components made from other materials such as aluminum, cast austenitic stainless steel, copper alloy, copper alloy >15% Zn, elastomer, galvanized steel, gray cast iron, nickel alloy, and stainless steel."

Issue

The applicant's AMP is being applied to materials beyond steel, which is the material specified in the GALL Report for this AMP. The additional materials exhibit diffe rent aging mechanisms than steel, and the observable indications of corrosion are substantially different from those of steel. For example, the oxidation of in-scope aluminum components can not be identified by the discoloration

and appearance of rust which is the visual indicator of corrosion on steel. Therefore the inspections must be adapted to address detection of aging for the additional in-scope materials.

Request

Provide details on the additional inspection methods to be used to ensure that the AMP will adequately address potential aging effects on the additional in-scope materials.

NextEra Energy Seabrook Response:

The nuclear industry has collected information on how to identify that an aging effect is occurring and has developed programs to train plant staff on how to correlate the observed condition to a possible aging effect. Inspections completed under the implemented license renewal aging management programs will require training and qualification of the personnel completing the inspections ensuring that these inspections will adequately address potential aging effects on the additional in-scope materials.

As a clarification, the following information has been added to the Seabrook Station License Renewal Application.

In Section B.2.1.24, on page B-134, add the following new paragraph after the 7th paragraph.

Personnel completing inspections under the License Renewal Aging Management External Surfaces Monitoring Program will be trained to identify the inspection parameters associated with the aging effects monitored by the program. As an example the industry has developed the "Identification and Detection of Aging Issues" (EPRI 1007932) training program which is supplemented with an Aging Assessment Field Guide (EPRI 1007933) and Aging Identification and Assessment Checklists for Mechanical Components (EPRI 1009743). The EPRI training modules and/ or current industry endorsed training program at the time of implementation will serve as the basis for the training and qualification program.

Request for Additional Information (RAI) B.2.1.25-1

Background

The GALL Report XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" states in Program element 4, "detection of aging effects," the applicant should justify the inspection technique used for detecting the aging effects of concern. The applicant's AMP states that "The program will be used to detect hardening and loss of strength in components made from elastomers by visual examinations and non-visual examinations such as tactile techniques, which include scratching, bending, folding, stretching and pressing in conjunction with the visual examinations."

Issue

The management of aging effects of elastomers is covered by this AMP with the addition of non-visual examinations such as tactile techniques. However, there are instances of in-scope components that are not accessible for physical manipulations.

Request

Provide an explanation of how the tactile examinations described in the AMP will be applied to in-scope components that are not accessible for physical manipulations.

NextEra Energy Seabrook Response:

When an elastomer is inaccessible for the tactile inspection techniques, its condition can be determined by correlation to the inspection results of an accessible elastomer of the same construction in a similar environment with an equivalent age where the tactile techniques can be applied. The same situation would apply for metallic components that are inaccessible for visual inspection.

Therefore, the following change has been made to the Seabrook Station License Renewal Application:

In Section B.2.1.25, on page B-140, add the following new paragraph after the 1st paragraph.

When a component of a given material is not accessible to perform an internal visual inspection or an elastomer is not accessible to perform physical manipulation, a material or an elastomer of the same construction in a similar environment with an equivalent age can be visually inspected or manipulated (in the case of an elastomer) to determine its condition. Performing the visual inspection or physical manipulation on these similar components can then be used to correlate its condition to the inaccessible material.

Request for Additional Information (RAI) B.2.1.25-2

Background

The GALL Report XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" states that the acceptance criteria are established in the maintenance and surveillance procedures or other established plant procedures. In LRA Section B.2.1.25, it states "Visual inspection will monitor parameters such as corrosion, corrosion byproducts, coating degradation, discoloration on the surface, scale/deposits, pits and surface discontinuities." In LRA Section B.2.1 .25, it also states that "The degree to which these conditions exist will be used to establish baseline acceptance criteria for future inspections."

Issue

The statement in LRA Section B.2.1.25 indicates that the results of the applicant's inspections will be used to establish acceptance criteria.

Request

Provide details on the process to be used for establishing new acceptance criteria based on the results of the inspections. Details should include how the establishment of new acceptance criteria will be done in a manner that will assure the applicant's AMP is effective to detect aging effects prior to loss of component function.

NextEra Energy Seabrook Response:

The acceptance criteria for inspections will be included as a necessary part of the qualification and training program for inspectors performing these inspections. The training and qualification program will set the standards for identifying degraded conditions and all trained inspectors will be using the same criteria.

Therefore, the following change has been made to the Seabrook Station License Renewal Application:

In Section B.2.1.25, on page B-141, revised the 2nd full paragraph as follows:

Acceptance criteria for indications of various corrosion mechanisms or fouling will be identified in the appropriate inspection procedure and will be part of the training/qualification program required for inspectors. Visual inspection will monitor parameters such as corrosion, corrosion byproducts, coating degradation, discoloration on the surface, scale/deposits, pits and surface discontinuities. ~~The degree to which these conditions exist will be used to establish baseline acceptance criteria for future inspections.~~ ***Inspections will be completed by trained and qualified personnel. That training and qualification will provide the inspector with the knowledge used to establish as acceptance criteria, a threshold for identifying when evaluations of the as-found condition needs to occur.*** For painted or coated surfaces, any evidence of damaged or degraded coating may be an indicator of corrosion damage to the surface underneath. Therefore, evidence of damaged or degraded coatings will be documented and evaluated using the Seabrook Station Corrective Action Program. For materials susceptible to corrosion heavy corrosion, localized corrosion, blistering, pitting, or visible loss of material due to corrosion will be documented and evaluated using the Seabrook Station Corrective Action Program. A thin, light, even layer of oxidation provides protection against further corrosion. Oxidation is expected in some systems, and is acceptable.

Request for Additional Information (RAI) B.2.1.25-3

Background

The GALL Report XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" Program element 3, "parameters monitored/inspected," states that "visible evidence of corrosion may indicate possible loss of materials." In LRA Section B.2.1.25, it states "A thin, light, even layer of oxidation provides protection against further corrosion."

Issue

The statement in LRA Section B.2.1.25 regarding a layer of oxidation proving protection against further corrosion is not accurate for most of the in-scope materials. Therefore, taken in the general context as it appears in the applicant's AMP, the statement is not accurate.

Request

Provide technical clarification on the specific in-scope materials to which the subject statement is intended to describe. Also, provide an explanation of how this statement pertains to monitoring of oxidation by the inspections in this program .

NextEra Energy Seabrook Response:

The intent of the sentence "A thin, light, even layer of oxidation provides protection against further corrosion" was to contrast the condition of a thin layer of surface corrosion that often exists for carbon steel but is not indicative of corrosion that indicates a loss of material and continuing thinning of the carbon steel component, as is described in the previous sentence of the Seabrook LRA Section B.2.1.25. The intent of the Seabrook LRA Section B.2.1.25 was not to provide the inspection criteria that will be used by the inspectors implementing the Internal Surfaces Monitoring program, but to convey that corrosion occurs very differently for different materials and in different environments, and that all corrosion does not indicate a degraded condition that requires corrective action .

Determining an acceptable condition versus one that requires further evaluation is part of the training process to become qualified for performing inspections. The acceptance criteria for inspections are included as a necessary part of the qualification and training program for inspectors under this program. The training and qualification program will set the standards for identifying degraded conditions and all trained inspectors will be using the same criteria. Therefore, the last two sentences in the second paragraph on page B-141 are not needed.

Therefore, the following change has been made to the Seabrook Station License Renewal Application.

In Section B.2.1.25, on page B-141, deleted the last two sentences from the 2nd full paragraph as follows:

Acceptance criteria for indications of various corrosion mechanisms or fouling will be identified in the appropriate inspection procedure and will be part of the training/qualification program required for inspectors. Visual inspection will monitor parameters such as corrosion, corrosion byproducts, coating degradation, discoloration on the surface, scale/deposits, pits and surface discontinuities. The degree to which these conditions exist will be used to establish baseline acceptance criteria for future inspections. For painted or coated surfaces, any evidence of damaged or degraded coating may be an indicator of corrosion damage to the surface underneath. Therefore, evidence of damaged or degraded coatings will be documented and evaluated using the Seabrook Station Corrective Action Program. For materials susceptible to corrosion heavy corrosion, localized corrosion, blistering, pitting, or visible loss of material due to corrosion will be documented and evaluated using the Seabrook Station Corrective Action Program. ~~A thin, light, even layer of oxidation provides protection against further corrosion. Oxidation is expected in some systems, and is acceptable.~~

Request for Additional Information (RAI) B.2.1.27-1

Background

GALL Report AMP XI.S1, "ASME Section XI, Subsection IWE," recommend that the applicant is to consider the liner plate and containment shell corrosion concerns described in generic communications. In June 2010, the U.S. Nuclear Regulatory Commission (NRC) issued Information Notice (IN) 2010-12 to inform the holders of an operating license or construction permit for a nuclear power reactor about recent issues involving through wall corrosion of the steel reactor containment building liner. The recipients of this IN 2010-12 are expected to review the information for applicability to their facilities and to consider actions, as appropriate, to avoid similar problems.

Issue

During the AMP audit at Seabrook, the staff interviewed the applicant staff and reviewed documentation about the ground water seepage in different plant structures. The staff found that ground water infiltrated into the annular space between the concrete enclosure building and concrete containment. The bottom six feet of the concrete containment wall was in contact with the ground water for a long period of time. In addition, cracks due to Alkali-Silica Reaction (ASR) have been observed in different Seabrook plant concrete structures, including the concrete enclosure building. Therefore, the ground water may have penetrated the concrete containment wall and come into contact with the containment liner plate. This can result in through wall corrosion of the containment liner plate.

Request

Please provide the details of any plans to perform nondestructive examinations, such as UT, of the containment liner to demonstrate that the effects of prolonged exposure of bottom portion of the concrete containment to ground water have not introduced corrosion on the concrete side of the liner plate. Corrosion on the concrete side of the containment liner could affect its ability to perform its intended design function during the period of extended operation.

NextEra Energy Seabrook Response:

Seabrook continues to monitor the annulus area including the exterior concrete surface of containment where groundwater has accumulated. The lack of oxygen and high pH alkali environment of the concrete are inhibitors to a corrosive environment that would be detrimental to the integrity of the liner. This has been corroborated based on inspections of embedded reinforcing steel in other areas of the plant that were in a saturated condition.

The potential for loss of material at the concrete to liner plate interface due to water accumulating in the annulus area is very low.

However, based on NRC Information Notice 2010-12 and other industry and site specific Operating Experience, Seabrook will perform testing of the containment liner plate for loss of material. The testing will be conducted in accordance with approved ASME Section XI, Subsection IWE methodology, and will be complete prior to the period of extended operation.

License Renewal Application Appendix B, Section B.2.1.27, page B-151, is changed to read as follows:

Enhancements

Seabrook will perform testing of the containment liner plate for loss of material on the concrete side of the liner. The testing will be conducted in accordance with approved ASME Section XI, Subsection IWE methodology, and will be complete prior to the period of extended operation.

License Renewal Application Appendix A, Section A.3, page A-43 is changed to add new Commitment No. 50, as follows:

50.	***ASME Section XI, Subsection IWE***	***Perform testing of the containment liner plate for loss of material.***	***A.2.1.17***	***Prior to the period of extended operation.***

The groundwater infiltration in the annular space will be controlled as committed in RAI B.2.1.28-3, restated below:

> "In addition, Seabrook will implement measures to maintain the exterior surface of the Containment Structure from elevation -30 feet to +20 feet in a dewatered state."

Request for Additional Information (RAI) B.2.1.27-2

Background

GALL AMP XI.S1, "ASME Section XI, Subsection IWE," states that Title 10 of the *Code* of *Federal Regulations* (10 CFR) 50.55a imposes the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, Subsection IWE for steel containments (Class MC) and steel liners for concrete containments (Class CC). The full scope of IWE includes steel containment shells and their integral attachments; steel liners for concrete containments and their integral attachments; containment hatches and airlocks; seals, gaskets and moisture barriers; and pressure-retaining bolting . This evaluation covers the 2001 edition including the 2002 and 2003 Addenda, as approved in 10 CFR 50.55a. ASME Code Section XI, Subsection IWE and the additional requirements specified in 10 CFR 50.55a(b)(2) constitute an existing mandated program applicable to managing aging of steel containments, steel liners of concrete containments, and other containment components for license renewal.

Seabrook requested and received approval from the NRC on August 30, 2000 to implement the 1995 Edition with 1996 Addenda for ASME Section XI for second inspection interval between 2000 and 2010.

Article IWE-3122.3 of the 1995 Edition with 1996 Addenda for ASME Section XI states, "when flaws or areas of degradation are accepted by engineering evaluation, the area containing the flaw or degradation shall be reexamined in accordance with IWE-2420(b) and (c)." IWE -2420 requires that the flaws or areas of degradation remain essentially unchanged for three consecutive inspection

periods before these areas no longer require augmented examination in accordance with Table IWE-2500-1, Examination Category E-C.

Issue

During the site audit, the NRC *staff* reviewed documentation concerning the corrosion of containment liner plate around the fuel transfer tube vault documented during the 2009 IWE inspection. The containment liner plate had indications of heavy corrosion. UT examination of containment liner indicated that liner plate thickness varied between 0.484 to 0.411 inches (variation of 18 percent) within a small area.

The applicant accepted this degradation of the liner plate based on engineering evaluation. The applicant justification for acceptance was that the measured thickness of the liner plate was still greater than the 0.375 inch nominal thickness of the liner plate. However, the NRC *staff* did not find any requirement in the applicant's engineering evaluation that requires UT reexamination of the *affected* portion of the liner plate for three consecutive periods in accordance with IWE-2420.

Request

Provide the details of any actions planned for augmented examination of the containment liner plate around the fuel transfer tube where the corrosion was detected during the 2009 inspection. The *staff* needs this information to verify that the *effects* of aging on the intended function of the containment liner plate will be adequately managed for the period of extended operation.

NextEra Energy Seabrook Response:

This condition requires augmented inspection in accordance with 1995 Edition with 1996 Addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, Subsection IWE -2420(b) and (c). It has been identified in the ISI Program database for reexamination during subsequent scheduled inspections.

Request for Additional Information (RAI) B.2.1.28-1

Background

GALL AMP XI.S2, "ASME Section XI, Subsection IWL" Element 6 states that ASME Section XI, Subsection IWL, Article IWL-3000 provides acceptance criteria for concrete containments. The GALL Report further states that quantitative acceptance criteria based on the "Evaluation Criteria" provided in Chapter 5 of American Concrete Institute (ACI) 349.3R may also be used to augment the qualitative assessment of the responsible engineer. In addition, IN 2010-14, "Containment Concrete Surface Condition Examination Frequency and Acceptance Criteria" describes recent issues identified by the NRC staff during license renewal application review audits at different nuclear power plant sites concerning the containment concrete surface condition examination frequency and acceptance criteria.

Issue

The following statement is provided in LRA Section B2.1 .28.

> Acceptance criteria in accordance with IWL-3000 for concrete containment are provided in Seabrook Station procedures. For concrete surfaces, the acceptance criteria rely on the determination of the *"Responsible Engineer"* regarding whether there is any evidence of damage or degradation sufficient to warrant further evaluation or repair in accordance with IWL-3300. The acceptance criteria are qualitative. Seabrook Station procedures also require that the Responsible Engineer be a registered professional engineer experienced in evaluating the inservice condition of structural concrete and knowledgeable of the design and construction codes and other criteria used in design and construction of concrete containments.

In addition, during the audit, the staff reviewed the applicant's implementing procedure for ASME Section XI, Subsection IWL program. The staff found that the AMP implementing procedure did not have any quantitative acceptance criteria for concrete surface examination similar to one described in ACI 349.3R-02.

Request

1. Provide information on how the degradation of concrete containment is quantified, tracked, and trended for use as a baseline for the period of extended operation.

2. Provide a description of actions taken to address issues identified in NRC Information Notice 2010-14, "Containment Concrete Surface Condition Examination Frequency and Acceptance Criteria."

The staff needs the above information to confirm that the effects of aging of the concrete containment will be adequately managed so that it's intended function will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21 (a)(3).

NextEra Energy Seabrook Response:

1. Any Containment concrete degradation identified during IWL Examinations is documented (per the implementing procedure) on Examination Forms, using the guidance of ACI 349.3R and ACI 201.1R for condition quantification, description and terminology. The degraded area is marked in the field with an identifying label to guide the Responsible Engineer's review, and subsequent Examination review. An Action Request (AR) is generated for Examination Forms that document degradation, requiring an Evaluation by the Responsible Engineer. The Forms and Evaluations are retained and reviewed prior to the next Examination. During the subsequent Examination, previously reported areas are re-examined to determine if there has been any change in their condition.

The retained Forms and Evaluations from each successive Examination will be maintained up to and through the Period of Extended Operation, thereby creating a continuous record of the condition of the Containment concrete.

2. In October, 2010, in response to IN 2010-14, the Seabrook Inservice Inspection Procedure Primary Containment Section XI IWL Program was revised to include the guidance of ACI 201.1R and ACI 349.3R for identifying degradation during General Visual Examinations.

The Seabrook Station License Renewal Application Section B.2.1.28 third paragraph on Page B-155 is changed to include an acceptance criteria based on ACI-349.3R as follows:

Acceptance criteria in accordance with IWL-3000 for concrete containment are provided in Seabrook Station procedures. For concrete surfaces, the acceptance criteria rely on the determination of the "*Responsible Engineer*" regarding whether there is any evidence of damage or degradation sufficient to warrant further evaluation or repair in accordance with IWL-3300. The acceptance criteria are ~~qualitative~~ ***based on ACI-349.3R***. Seabrook Station procedures also require that the Responsible Engineer be a registered professional engineer experienced in evaluating the inservice condition of structural concrete and knowledgeable of the design and construction codes and other criteria used in design and construction of concrete containments.

Request for Additional Information (RAI) B.2.1.28-2

Background

GALL AMP XI.S2, "ASME Section XI, Subsection IWL" Element 6 states that ASME Section XI, Subsection IWL, Article IWL-3000 provides acceptance criteria for concrete containments and that quantitative acceptance criteria based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R may also be used to augment the qualitative assessment of the responsible engineer. LRA Section 82.1 .28 states that preventive maintenance work orders are used for tracking and identifying conditions identified during surveillances. Issues and events, whether external or plant-specific, that are potentially significant to containment reinforced concrete at Seabrook, or which show deficiencies in excess of acceptance criteria are evaluated.

Issue

During the audit, the staff reviewed results of visual examination of concrete containment surface (VT-3C) performed in October, 2005, provides VT-3C visual inspection results for the concrete containment. These results identified numerous areas of spalled concrete that equal or exceeded a depth of 1 in. According to evaluation criteria in ACI 349.3R-02, Sect. 5.1, spalled areas that exceed a depth of 3/8 inch and 4 inches in any dimension must be evaluated.

Request

The applicant is requested to provide the following information.

1) A description of the methods used to evaluate spalled areas that exceed a depth of 3/8 inch and 4 inches in any dimension in accordance with "Acceptance After Review" criteria in ACI 349.3R-02, Section 5.2, the acceptance criteria for spall size and depth, and results of the engineering evaluation.

2) A description of the methods used to evaluate spalled areas that exceed a depth of 3/4 inch and 8 inches in any dimension in accordance with "Conditions Requiring Further Evaluation" criteria in ACI 349.3R-02, Section 5.3, the acceptance criteria for spall size and depth that do not require repair, and results of the engineering evaluation.

3) The findings from the most recent Engineering Evaluation Report that was prepared to comply with ASME Section XI, Subsection IWL-3310 requirements.

The staff needs the above information to confirm that the effects of aging of the concrete containment will be adequately managed so that it's intended function will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3).

NextEra Energy Seabrook Response:

1. Prior to August 18, 2010, IWL examinations were conducted in accordance with ASME Section XI, Subsection IWL, of the 1995 Code with 1996 Addendum. Deficiencies were reported in qualitative terms and evaluations were conducted by the Responsible Engineer, a Licensed Professional Engineer.

   The September 2010, IWL examination was conducted in accordance with ASME XI, Subsection IWL, of the 2004 Code, and with the guidance of ACI 201.1R and ACI 349.3R. Deficiencies are reported in the quantitative terms of ACI 349.3R and evaluations are conducted by the Responsible Engineer, a Licensed Professional Engineer, with the guidance of ACI 349.3R.

2. See response to 1, above.

3. The findings of the Engineering Evaluation, written in response to the September 2010 IWL 5 year scheduled examination, are summarized below:

   Five Action Requests (ARs) were issued during the ASME Section XI, IWL examinations of the Containment concrete; eighty-four (84) deficient areas were identified that required an Engineering Evaluation.

   Each of the reported discontinuities in the Containment concrete were individually reviewed and evaluated by Design Engineering. All of the reported discontinuities were accepted-as-is with no further technical evaluation or remediation, based on the criteria of ACI 349.3R.

Request for Additional Information (RAI) B.2.1.28-3

Background

LRA Section 3.5.2.2.1.1 states that degradation of concrete due to aggressive chemical attack is applicable to the Seabrook and that groundwater analyses confirm that the Seabrook site groundwater is aggressive. Testing performed from November 2008 to September 2009 found pH values between 5.8 and 7.5, chloride values between 19 ppm and 3900 ppm, and sulfate values between 10 ppm and 100 ppm. The applicant further stated that corrosion of embedded steel becomes significant if environmental conditions are found to be aggressive. According to the applicant, concrete cracking due to expansion and reaction with aggregates is managed through the ASME Section XI, Subsection IWL Program, B.2.1.28 and the Structures Monitoring Program, B.2.1.31 .

Issue

Concrete containment surfaces that are exposed to groundwater are susceptible to cracking due to expansion and reaction with aggregates because the Seabrook site groundwater is aggressive. In addition, steel reinforcing bars embedded in concrete that is exposed to groundwater are susceptible to chloride-induced corrosion. Degradation of reinforced concrete on the outside of the containment in the annulus between the containment and the enclosure building from elevation -30 feet to +20 feet is possible if groundwater accumulates in this space. During the audit, the staff learned that the applicant observed water accumulation in the annulus between the containment and the enclosure building but the containment concrete does not exhibit evidence of cracking due to expansion and reaction with aggregates.

Request

The applicant is requested to provide the following information.

1) The test method or procedure used to confirm that the exterior containment concrete surface between elevation -30 feet and +20 feet is not experiencing cracking due to expansion and reaction with aggregates.

2) The test method or procedure used to verify that the compressive strength and modulus of elasticity of the containment concrete between elevation -30 feet and +20 feet are not affected by cracking due to expansion and reaction with aggregates.

3) Results of any existing or planned compressive, tensile, and modulus elasticity of concrete core samples taken from the concrete containment between elevation - 30 feet and +20 feet.

The staff needs the above information to confirm that the effects of aging of the concrete containment will be adequately managed so that it's intended function will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21 (a)(3).

NextEra Energy Seabrook Response:

1) The 2010 ASME Section XI, Subsection IWL five year inspection of the Containment Structure was performed using the guidance of ACI 349, "Evaluation of Existing Nuclear Safety-Related Concrete Structures."

2) There has been no sign of detrimental cracking in the Containment Structure based on the inspection performed using the guidance of ACI 349.3R. In the absence of detrimental cracking, there has been no reasonable expectation for loss of compressive strength or loss of modulus of elasticity.

3) Seabrook will perform confirmatory testing and evaluation of the Containment Structure concrete. The testing and evaluation will determine the concrete compressive strength, the presence or absence of Alkali Silica Reaction (ASR), the concrete modulus of elasticity, and the presence or absence of rebar degradation. The testing and evaluation will be completed prior to the period of extended operation.

   In addition, Seabrook will implement measures to maintain the exterior surface of the Containment Structure, from elevation -30 feet to +20 feet, in a dewatered state. These measures will be in effect prior to the period of extended operation.

License Renewal Application Appendix B, Section B.2.1.28, page B-156 is changed to read as follows:

Enhancements

The following enhancement**s** will be made prior to entering the period of extended operation.

1. The Seabrook Station ASME Section XI, Inservice Inspection, Subsection IWL Program implementing procedures will be enhanced to include the definition of *"Responsible Engineer"* ***(Registered Professional Engineer).***

   Program Elements Affected: Element 6 (Acceptance Criteria).

2. ***Seabrook will perform confirmatory testing and evaluation of the Containment Structure concrete. The testing and evaluation will determine the concrete compressive strength, the presence or absence of Alkali Silica Reaction (ASR), the concrete modulus of elasticity, and the presence or absence of rebar degradation. The testing and evaluation will be completed prior to the period of extended operation.***

   Program Elements Affected: Element 3 (Parameters Monitored or Inspected).

3. ***Seabrook will implement measures to maintain the exterior surface of the Containment Structure, from elevation -30 feet to +20 feet, in a dewatered state. These measures will be in effect prior to the period of extended operation.***

   Program Elements Affected: Element 2 (Preventive Actions).

License Renewal Application Appendix A, Section A.3, page A-43 is changed to add new Commitments No. 51 and 52, as follows:

51.	***ASME Section XI, Subsection IWL***	***Perform confirmatory testing and evaluation of the Containment Structure concrete***	***A.2.1.28***	***Prior to the period of extended operation***
52.	***ASME Section XI, Subsection IWL***	***Implement measures to maintain the exterior surface of the Containment Structure, from elevation -30 feet to +20 feet, in a dewatered state.***	***A.2.1.28***	***Prior to the period of extended operation***

Request for Additional Information (RAI) B.2.1.28-4

Background

During the audit, the staff learned that the concrete containment is susceptible to cracking due to expansion and reaction with aggregates because the groundwater is aggressive. According to the applicant, concrete cracking due to expansion and reaction with aggregates is managed through the ASME Section XI , Subsection IWL Program, B.2.1.28 and the Structures Monitoring Program, B.2.1. 31.

Issue

A review of Seabrook condition reports by the staff did not identify inspection findings that discussed cracking of concrete due to expansion and reaction with aggregates or nondestructive or destructive test data that quantify the magnitude or extent of cracking of accessible above-grade and below-grade portions of the concrete containment. In order to monitor and trend changes in the condition of the concrete, a baseline condition assessment should be performed and documented to serve as a reference for future containment concrete inspections and evaluations.

Request

The applicant is requested to provide the following information.

1) The plans and schedule for conducting a baseline inspection of the condition of accessible above-grade and below-grade portions of the concrete containment in accordance with ACI 349.3R requirements.

2) The plans and schedule for obtaining nondestructive or destructive test data for quantifying the mechanical properties (compressive strength, tensile strength, and modulus of elasticity) of concrete in areas that have experienced cracking due to expansion and reaction with aggregates.

The staff needs the above information to confirm that the effects of aging of the concrete containment will be adequately managed so that it's intended function will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21 (a)(3).

NextEra Energy Seabrook Response:

1) The most recent ASME Section XI, Subsection IWL examination of Containment concrete was completed in October 2010. This examination of the Containment concrete consisted of General Visual and Detailed Visual examinations consistent with the criteria in ACI 201.1-92 and ACI 349.3R-02. These two ASME IWL concrete examinations will serve as the baseline for future examinations of Containment concrete which are performed at 5 year intervals. The containment is enclosed by the Containment Enclosure Building and the inspection is based on one environment which is Air-Indoor Uncontrolled.

2) See response to RAI B.2.1.28-3.

Request for Additional Information (RAI) B.2.1.29-1

Background

10 CFR 50.55a imposes the ISI requirements of the ASME B&PV Code, Section XI, for Class 1, 2, 3, and Class MC piping and components and their associated supports. The LRA states that the Seabrook AMP 8.2.1.29, "ASME Section XI, Subsection IWF" is consistent with GALL AMP XI.S3, "ASME Section XI, Subsection IWF". The GALL AMP XI.S3 states that the IWF scope of inspection for supports is based on sampling of the total support population. Discovery of support deficiencies during regularly scheduled inspections triggers an increase of the inspection scope, in order to ensure that the full extent of deficiencies is identified. IWF-2430 provides guidance on how to increase the sample size in case deficiencies are identified during examination of the supports.

Issue

During the audit, the NRC staff reviewed documentation related to Seabrook operating experience and found that ISI inspections conducted during 1997 and 1999 identified 36 and 5 support conditions with deficient conditions respectively. During its review, the NRC staff did not find any documentation which indicated that support sample size was increased in accordance with IWF-2430. In addition, the staff review of the implementing procedures for IWF inspection did not find any guidance for increasing the sample size in accordance with IWF-2430.

Request

Please provide documentation that demonstrates the IWF support inspections are performed in accordance with the recommendations of the GALL AMP XI.S3 regarding increase in the sample size in case deficiencies are identified during examination of supports.

NextEra Energy Seabrook Response:

During the 1997 IWF (Refueling Outage OR05) Inspection, thirty-six apparent deficiencies were identified. All thirty-six were evaluated by Engineering. Of the thirty-six, thirty-two were suspect clearances which were found acceptable by Engineering, two were determined to be design issues (which were corrected), and two were evaluated as deficiencies which were repaired to acceptable condition. For these last two, expanded inspections were conducted, per procedure.

Similar results for clearance deficiencies were seen and dispositioned during the following, 1999, IWF Inspection.

IWF-2430(a) states:

> "... examinations ... that reveal flaws or relevant conditions exceeding the acceptance standards of IWF-3400 shall be extended, ... to those component supports for which corrective action is required."

IWF-3410(b)(6) identifies general conditions acceptable by the material, Design, and /or Construction Specifications as being nonrelevant conditions. The clearance deficiencies noted above were identified on the basis of ISI Drawings which gave an absolute value for clearance. The Engineering Evaluation, by evaluating the clearances against tolerances of the Design/Construction Specifications, found the conditions to be nonrelevant in accordance with IWF-3410(b). No corrective action was called for and an extended examination was not required.

The acceptance of a nonrelevant condition is consistent with GALL AMP XI.S3 Element 6, Acceptance Criteria, which is based on ASME Section XI, Subsection IWF-3400.

Request for Additional Information (RAI) B.2.1.31-1

Background

In the LRA and multiple condition reports, the applicant stated that below-grade concrete structures have experienced groundwater infiltration. During walkdowns, the staff observed indications of leaching and alkali-aggregate reactions in below-grade concrete structures.

Issue

To understand the possible effects of the groundwater infiltration on concrete structures, testing of affected concrete was scheduled for 2010. The LRA did not include the results of this concrete testing.

Request

1) Provide a summary of the results of the concrete testing performed to date. Results should include information on mechanical properties (e.g. compressive strength, modulus of elasticity, tensile strength, etc.). Explain how the properties of the cores can be correlated to the properties of the in-place concrete, and how this will be factored into the evaluation.

2) Explain if/why the samples are representative of affected concrete throughout the plant, including foundations and the containment enclosure building.

3) Discuss the root cause of any degradation (e.g. Alkali-Aggregate Reaction, leaching, etc.), and explain how it will be addressed in preparation for the period of extended operation.

4) Explain how future degradation will either be prevented, or managed during the period of extended operation.

5) Explain how structural stability will be maintained during the period of extended operation if concrete mechanical properties have been reduced by groundwater infiltration.

NextEra Energy Seabrook Response:

1) In May 2010, concrete testing was performed on the walls of the "B" Electrical Tunnel at el. -20'. Results of Penetration Resistance Testing (PRT) show an average concrete compressive strength of 5,340 psi while results of testing of core bores show an average compressive strength of 4,790 psi. A PRT performed in 1979 showed an average concrete compressive strength of 6,759 psi. Test cylinders that were cast during construction in 1975 showed an average strength of 6,120 psi. A comparison of the 2010 results to the 1979 results shows a 21.7 percent reduction in concrete compressive strength.

   The core samples taken in 2010 were also subjected to petrographic analysis for determination of any change in modulus of elasticity. The analysis shows the presence of Alkali Silica Reaction (ASR) and an indicated reduction in modulus of elasticity of approximately 47 percent.

   The tests and samples are all associated with the "B" Electrical Tunnel Walls at el. -20'. They can be considered representative of the concrete condition at that specific location, only.

   A Prompt Operability Determination concluded that the areas of concrete on the "B" Electrical Tunnel affected by Alkali Silica Reaction have been reviewed and are in compliance with the applicable design code. Structural integrity of the "B" Electrical Tunnel is fully intact and all system, structures, and components housed within the tunnel are operable and capable of performing their design function.

2) The tests and samples described above are all associated with the "B" Electrical Tunnel Walls at el. -20'. They can be considered representative of the concrete condition at that specific location, only. That testing was conducted on the most highly susceptible area; that which had shown the highest degree of calcium deposits. An Extent of Condition Investigation is in progress for five additional potentially susceptible areas, including the Containment Enclosure Building. These additional data points will aid in the assessment of the extent of condition.

3) Cause for the degradation is currently under development. An Engineering evaluation of the degradation will be part of the Extent of Condition Investigation. Any necessary remediation will be identified through the Corrective Action Program.

4) The Corrective Action Program will drive remediation, corrective, and preventative actions. The Structures Monitoring Program, by monitoring and inspecting to the standards of ACI 349, will manage aging effects during the Period of Extended Operation.

5) If deficiencies are identified by the Structures Monitoring Program during the Period of Extended Operation, they will be evaluated and put into the Corrective Action Program for resolution, as required. Resolution could include additional or augmented structural analysis, if necessary.

Request for Additional Information (RAI) B.2.1.31-2

Background

In the LRA and multiple condition reports, the applicant stated that below-grade concrete structures have experienced groundwater infiltration. During walkdowns, the staff also observed multiple locations of groundwater infiltration.

Issue

The groundwater infiltration has caused accelerated degradation of plant structures, supports and components as noted in multiple condition reports.

Request

Explain how plant structures and components (i.e. supports, baseplate, cable trays, etc.) throughout the plant will be managed for accelerated, or additional, aging effects due to exposure to groundwater infiltration, during the period of extended operation.

NextEra Energy Seabrook Response:

Components affected by groundwater in-leakage are managed through the plant's Structures Monitoring Program. Through the program, components are evaluated for acceptability based on the extent of degradation. Corrective actions are initiated to remediate component degradation. Follow-up inspections are scheduled to assess subsequent condition of components to determine if corrective actions are effective and whether additional degradation has occurred.

The Structural Engineering Standard Technical Procedure for the Structural Monitoring Program issued in March of 2010 is currently in use. The program covers elements to be evaluated such as "building structural steel, e.g., base plates, columns, beams, braces, platforms, cable trays, structural bolting and fasteners" and instructs inspectors to look for degradation such as the following:

- Corrosion
- Peeling paint
- Excessive deflection of support members

- Loose or missing anchors/fasteners
- Missing, cracked, or degraded grout under steel base plates
- Twisting, warping, or local deflecting of beams and columns
- Cracked welds

Request for Additional Information (RAI) B.2.1.31-3

Background

During the audit, the staff learned that below-grade concrete structures have experience groundwater infiltration which has led to concrete degradation.

Issue

The staff was unable to locate any inspection reports which identified and tracked the degradation in a quantitative manner. A baseline quantitative concrete inspection of in-scope structures is necessary for monitoring and trending degradation during the period of extended operation.

Request

Provide plans for conducting a quantitative baseline inspection, in accordance with ACI 349.3R, prior to the period of extended operation.

NextEra Energy Seabrook Response:

The Structures Monitoring Program as described in LRA Appendix A, Section A.2.1.31 and LRA Appendix B, Section B.2.1.31, has been changed to cite ACI 349 as a source document for the Program (Reference: Seabrook Station Supplement 2 to the NextEra Energy Seabrook, LLC Seabrook Station License Renewal Application, SBK-L-10192, November 15, 2010, Adams number "ML103210330").

The implementing procedure for the Structures Monitoring Program issued in March of 2010 describes the evaluation criteria based on the ACI 349.3R three-tiered hierarchy and quantitative limits. Structures Monitoring Program inspections are currently conducted in accordance with ACI 349.3R.

Request for Additional Information (RAI) B.2.1.31-4

Background

A review of plant-specific operating experience indicated that the spent fuel pool and transfer canal have shown indications of borated water leakage.

Issue

Leakage from the spent fuel pool may migrate through the concrete walls and cause degradation of the concrete and reinforcing steel.

Request

Clearly explain the operating experience related to the spent fuel pool leakage. Include the following in the response:

1) Historical data on the leakage occurrence and volume, including information on the assumed leakage path and structures that could potentially be affected by the presence of borated water. Provide the justification for assuming this leakage path.

2) Whether or not the leakage has stopped and justification for this conclusion. If the leakage has not stopped, discuss plans for remedial actions or repairs to address leakage through the spent fuel pool liner. In the absence of a commitment to fix the leakage prior to the period of extended operation, explain how the structures monitoring program, or other plant-specific program, will address the leakage to ensure that aging effects, especially in inaccessible areas, will be effectively managed during the period of extended operation.

3) Provide background information and data to demonstrate that the concrete and embedded steel reinforcement have not been degraded by exposure to the borated water and will continue to perform their intended function during the period of extended operation.

NextEra Energy Seabrook Response:

1) 1999 A Root Cause Investigation was initiated to identify the source of water in the annulus between the Containment Building and the Containment Enclosure Building. The Root Cause identified that the Spent Fuel Pool had a leak of undetermined quantity.

   Immediate actions included protecting site building foundations and ground water from contamination.

   For buildings, drained or vented water from contaminated systems was directed with hoses or tubing to prevent additional contamination of concrete structures.

   For the groundwater, selective dewatering through existing wells was instituted, to keep the groundwater gradient flowing toward the plant and to remove contaminated water.

   Once the Spent Fuel Pool was identified as the source, an enclosed tank was added to the Spent Fuel Pool leakoff sump to collect any additional leakage without contaminating the sump, and to control any leakage that could potentially reach the environment.

2000 Inspection and testing of the Spent Fuel Pool is conducted.

Through inspection of the leakoff channels, and raising and lowering the water levels, the source of the leak is narrowed to the Spent Fuel Transfer Canal and Cask Handling Area.

A specific leak of one drop every two seconds is identified in the Transfer Canal. Chemical analysis indicates the leak water is equivalent to the Spent Fuel Pool water.

2002 The leak rate is so small that efforts to locate actual source points fail. It is decided to apply a coating to the most suspect areas of the cask handling pit and the transfer canal.

Before the coating is done, the leak rate increases to about thirty gallons per day. Efforts to pinpoint the leak(s) now focus on the Cask Handling Pit and the Transfer Canal. No other areas appear to be leaking.

2004 The leak rate has increased to ~350 gallons per day. This occurred as the level in the Transfer Canal was being raised in an effort to pinpoint the leak. The leak water chemistry continues to be compatible with Spent Fuel Pool water.

All leak water is being collected.

Installed a non-metallic liner in the Cask Handling Area and Transfer Canal.

2005 The nonmetallic liner (coating), which has successfully stopped the leak, begins to delaminate. Repairs implemented.

2006 Requirements to monitor and sample Spent Fuel Pool leakage are made programmatic. The Spent Fuel Pool sump water is sampled and tested weekly.

2007 Minor problems with liner delaminating; repaired.

2008 Minor problems with liner delaminating; repaired.

2) There has been no Spent Fuel Pool water identified in the leakoff system since 2004. This is based on analysis of the sump contents. The chemistry is consistent with groundwater.

3) Boric acid (from the Spent Fuel Pool water) has been shown to have no adverse effect on concrete; see ACI 515.1R, *Manual of Concrete Practice*, Table 2.5.2, *Effects of Chemicals on Concrete*.

In line with the above information, in 2004, Seabrook Station joined in a study of the effect of boric acid on concrete structures that was being conducted, based on Operating Experience, at Salem Station. A Seabrook-specific evaluation concluded:

"Through participation in the on-going activities of this OE it has been determined that there are no adverse effects specific to the structural integrity of the FSB [Fuel Storage

Building] *due to borated water leaking through the Cask handling Area liner."*

The evaluation further stated:

> *"...the structural integrity of the FSB* [Fuel Storage Building] *has not been adversely impacted."*

Seabrook Station has concluded that the concrete and embedded steel reinforcement have not been degraded and will continue to perform their intended function during the period of extended operation.

Enclosure 2 to SBK-L- 10204

Changes to the

Seabrook Station License Renewal Application

Associated with

Appendix A – Updated UFSAR Supplement

Introduction

This enclosure contains an update to information contained in NextEra Energy Seabrook License Renewal Application (LRA) Supplement 1 related to the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. The LRA is being updated to add manhole inspection requirements to Appendix A, Section A.2.1.34 which are similar to those currently found in LRA Supplement 1, Appendix B, Section B.2.1.34.

Description of Change

In Supplement 1, letter SBK-L-10179 dated October 29, 2010, on page 5 of Enclosure 2, change the 1st bullet of Section A.2.1.34, Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, as follows:

> The Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program manages the aging of inaccessible ≥ 400 volt power cables exposed to adverse localized environments caused by significant moisture. Seabrook Station defines significant moisture as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Seabrook Station considers periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) as not being significant.
>
> The program includes the following two components:
>
> - Periodic Inspections Of Manholes Containing In-Scope Power Cables
>
> In-scope manholes shall be periodically inspected for water collection. Water found in the manholes shall be drained.
>
> The frequency of manhole inspections shall be ~~adjusted~~ based on ~~inspection results~~ ***plant specific operating experience with cable wetting or submergence (i.e. the inspection is performed periodically based on water accumulation over time and event driven occurrences, such as heavy rain or flooding)***. However, the maximum time between inspections shall be no more than one year. The first inspections shall be performed prior to entering the period of extended operation

Enclosure 3 to SBK-L- 10204

LRA Appendix A - Final Safety Report Supplement

Table A.3 License Renewal Commitment List

A.3 LICENSE RENEWAL COMMITMENT LIST

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
1.	PWR Vessel Internals	An inspection plan for Reactor Vessel Internals will be submitted for NRC review and approval at least twenty-four months prior to entering the period of extended operation.	A.2.1.7	Program to be implemented prior to the period of extended operation. Inspection plan to be submitted to NRC not less than 24 months prior to the period of extended operation.
2.	Closed-Cycle Cooling Water	Enhance the program to include visual inspection for cracking, loss of material and fouling when the in-scope systems are opened for maintenance.	A.2.1.12	Prior to the period of extended operation
3.	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Enhance the program to monitor general corrosion on the crane and trolley structural components and the effects of wear on the rails in the rail system.	A.2.1.13	Prior to the period of extended operation
4.	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Enhance the program to list additional cranes for monitoring.	A.2.1.13	Prior to the period of extended operation
5.	Compressed Air Monitoring	Enhance the program to include an annual air quality test requirement for the Diesel Generator compressed air sub system.	A.2.1.14	Prior to the period of extended operation
6.	Fire Protection	Enhance the program to perform visual inspection of penetration seals by a fire protection qualified inspector.	A.2.1.15	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
7.	Fire Protection	Enhance the program to add inspection requirements such as spalling, and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates by qualified inspector.	A.2.1.15	Prior to the period of extended operation.
8.	Fire Protection	Enhance the program to include the performance of visual inspection of fire-rated doors by a fire protection qualified inspector.	A.2.1.15	Prior to the period of extended operation.
9.	Fire Water System	Enhance the program to include NFPA 25 guidance for "where sprinklers have been in place for 50 years, they shall be replaced or representative samples from one or more sample areas shall be submitted to a recognized testing laboratory for field service testing".	A.2.1.16	Prior to the period of extended operation.
10.	Fire Water System	Enhance the program to include the performance of periodic flow testing of the fire water system in accordance with the guidance of NFPA 25.	A.2.1.16	Prior to the period of extended operation.
11.	Fire Water System	Enhance the program to include the performance of periodic visual ***or volumetric*** inspection of the internal surface of the fire protection system upon each entry to the system for routine or corrective maintenance. ***These inspections will be documented and trended to determine if a representative number of inspections have been performed prior to the period of extended operation. If a representative number of inspections have not been performed prior to the period of extended operation, focused inspections will be conducted.*** These inspections will be performed within ten years prior to the period of extended operation.	A.2.1.16	Within ten years prior to the period of extended operation.
12.	Aboveground Steel Tanks	Enhance the program to include components and aging effects required by the Aboveground Steel Tanks.	A.2.1.17	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
13.	Aboveground Steel Tanks	Enhance the program to include an ultrasonic inspection and evaluation of the internal bottom surface of the two Fire Protection Water Storage Tanks.	A.2.1.17	Within ten years prior to the period of extended operation.
14.	Fuel Oil Chemistry	Enhance program to add requirements to 1) sample and analyze new fuel deliveries for biodiesel prior to offloading to the Auxiliary Boiler fuel oil storage tank and 2) periodically sample stored fuel in the Auxiliary Boiler fuel oil storage tank.	A.2.1.18	Prior to the period of extended operation.
15.	Fuel Oil Chemistry	Enhance the program to add requirements to check for the presence of water in the Auxiliary Boiler fuel oil storage tank at least once per quarter and to remove water as necessary.	A.2.1.18	Prior to the period of extended operation.
16.	Fuel Oil Chemistry	Enhance the program to require draining, cleaning and inspection of the diesel fire pump fuel oil day tanks on a frequency of at least once every ten years.	A.2.1.18	Prior to the period of extended operation.
17.	Fuel Oil Chemistry	Enhance the program to require ultrasonic thickness measurement of the tank bottom during the 10-year draining, cleaning and inspection of the Diesel Generator fuel oil storage tanks, Diesel Generator fuel oil day tanks, diesel fire pump fuel oil day tanks and auxiliary boiler fuel oil storage tank.	A.2.1.18	Prior to the period of extended operation.
18.	Reactor Vessel Surveillance	Enhance the program to specify that all pulled and tested capsules, unless discarded before August 31, 2000, are placed in storage.	A.2.1.19	Prior to the period of extended operation.
19.	Reactor Vessel Surveillance	Enhance the program to specify that if plant operations exceed the limitations or bounds defined by the Reactor Vessel Surveillance Program, such as operating at a lower cold leg temperature or higher fluence, the impact of plant operation changes on the extent of Reactor	A.2.1.19	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
		Vessel embrittlement will be evaluated and the NRC will be notified.		
20.	Reactor Vessel Surveillance	Enhance the program as necessary to ensure the appropriate withdrawal schedule for capsules remaining in the vessel such that one capsule will be withdrawn at an outage in which the capsule receives a neutron fluence that meets the schedule requirements of 10 CFR 50 Appendix H and ASTM E185-82 and that bounds the 60-year fluence, and the remaining capsule(s) will be removed from the vessel unless determined to provide meaningful metallurgical data.	A.2.1.19	Prior to the period of extended operation.
21.	Reactor Vessel Surveillance	Enhance the program to ensure that any capsule removed, without the intent to test it, is stored in a manner which maintains it in a condition which would permit its future use, including during the period of extended operation.	A.2.1.19	Prior to the period of extended operation.
22.	One-Time Inspection	Implement the One Time Inspection Program.	A.2.1.20	Within ten years prior to the period of extended operation.
23.	Selective Leaching of Materials	Implement the Selective Leaching of Materials Program. ***The program will include a one-time inspection of selected components where selective leaching has not been identified and periodic inspections of selected components where selective leaching has been identified.***	A.2.1.21	Within five years prior to the period of extended operation.
24.	Buried Piping And Tanks Inspection	Implement the Buried Piping And Tanks Inspection Program.	A.2.1.22	Within ten years prior to entering the period of extended operation

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
25.	One-Time Inspection of ASME Code Class 1 Small Bore-Piping	Implement the One-Time Inspection of ASME Code Class 1 Small Bore-Piping Program.	A.2.1.23	Within ten years prior to the period of extended operation.
26.	External Surfaces Monitoring	Enhance the program to specifically address the scope of the program, relevant degradation mechanisms and effects of interest, the refueling outage inspection frequency, the inspections of opportunity for possible corrosion under insulation, the training requirements for inspectors and the required periodic reviews to determine program effectiveness.	A.2.1.24	Prior to the period of extended operation.
27.	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.	A.2.1.25	Prior to the period of extended operation.
28.	Lubricating Oil Analysis	Enhance the program to add required equipment, lube oil analysis required, sampling frequency, and periodic oil changes.	A.2.1.26	Prior to the period of extended operation.
29.	Lubricating Oil Analysis	Enhance the program to sample the oil for the Switchyard SF_6 compressors and the Reactor Coolant pump oil collection tanks.	A.2.1.26	Prior to the period of extended operation.
30.	Lubricating Oil Analysis	Enhance the program to require the performance of a one-time ultrasonic thickness measurement of the lower portion of the Reactor Coolant pump oil collection tanks prior to the period of extended operation.	A.2.1.26	Prior to the period of extended operation.
31.	ASME Section XI, Subsection IWL	Enhance procedure to include the definition of "Responsible Engineer".	A.2.1.28	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
32.	Structures Monitoring Program	Enhance procedure to add the aging effects, additional locations, inspection frequency and ultrasonic test requirements.	A.2.1.31	Prior to the period of extended operation.
33.	Structures Monitoring Program	Enhance procedure to include inspection of opportunity when planning excavation work that would expose inaccessible concrete.	A.2.1.31	Prior to the period of extended operation.
34.	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Implement the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program.	A.2.1.32	Prior to the period of extended operation.
35.	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Implement the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits program.	A.2.1.33	Prior to the period of extended operation.
36.	Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Implement the Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program.	A.2.1.34	Prior to the period of extended operation.
37.	Metal Enclosed Bus	Implement the Metal Enclosed Bus program.	A.2.1.35	Prior to the period of extended operation.
38.	Fuse Holders	Implement the Fuse Holders program.	A.2.1.36	Prior to the period of extended operation.
39.	Electrical Cable Connections Not Subject to 10 CFR	Implement the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program.	A.2.1.37	Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
	50.49 Environmental Qualification Requirements			
40.	345 KV SF_6 Bus	Implement the 345 KV SF_6 Bus program.	A.2.2.1	Prior to the period of extended operation.
41.	Metal Fatigue of Reactor Coolant Pressure Boundary	Enhance the program to include additional transients beyond those defined in the Technical Specifications and UFSAR.	A.2.3.1	Prior to the period of extended operation.
42.	Metal Fatigue of Reactor Coolant Pressure Boundary	Enhance the program to implement a software program, to count transients to monitor cumulative usage on selected components.	A.2.3.1	Prior to the period of extended operation.
43.	Pressure –Temperature Limits, including Low Temperature Overpressure Protection Limits	Seabrook Station will submit updates to the P-T curves and LTOP limits to the NRC at the appropriate time to comply with 10 CFR 50 Appendix G.	A.2.4.1.4	The updated analyses will be submitted at the appropriate time to comply with 10 CFR 50 Appendix G, Fracture Toughness Requirements.
44.	Environmentally-Assisted Fatigue Analyses (TLAA)	(1) Consistent with the Metal Fatigue of Reactor Coolant Pressure Boundary Program Seabrook Station will update the fatigue usage calculations using refined fatigue analyses, if necessary, to determine acceptable CUFs (i.e., less than 1.0) when accounting for the effects of the reactor water environment. This includes applying the appropriate F_{en} factors to valid CUFs determined from an existing fatigue analysis valid for the period of extended operation or from an analysis using an NRC-approved version of the ASME code or NRC-approved alternative (e.g., NRC-approved code case). (2) If acceptable CUFs cannot be demonstrated for all the selected locations, then additional plant-specific locations will be evaluated. For the additional plant-specific locations, if CUF, including environmental effects is	A.2.4.2.3	At least two years prior to entering the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
		greater than 1.0, then Corrective Actions will be initiated, in accordance with the Metal Fatigue of Reactor Coolant Pressure Boundary Program, B.2.3.1. Corrective Actions will include inspection, repair, or replacement of the affected locations before exceeding a CUF of 1.0 or the effects of fatigue will be managed by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method accepted by the NRC).		
45.	Mechanical Equipment Qualification	Revise Mechanical Equipment Qualification Files.	A.2.4.5.9	Prior to the period of extended operation.
46.	Protective Coating Monitoring and Maintenance	Enhance the program by designating and qualifying an Inspector Coordinator and an Inspection Results Evaluator.	A.2.1.38	Prior to the period of extended operation
47.	Protective Coating Monitoring and Maintenance	Enhance the program by including, "Instruments and Equipment needed for inspection may include, but not be limited to, flashlight, spotlights, marker pen, mirror, measuring tape, magnifier, binoculars, camera with or without wide angle lens, and self sealing polyethylene sample bags."	A.2.1.38	Prior to the period of extended operation
48.	Protective Coating Monitoring and Maintenance	Enhance the program to include a review of the previous two monitoring reports.	A.2.1.38	Prior to the period of extended operation
49.	Protective Coating Monitoring and Maintenance	Enhance the program to require that the inspection report is to be evaluated by the responsible evaluation personnel, who is to prepare a summary of findings and recommendations for future surveillance or repair.	A.2.1.38	Prior to the period of extended operation
50.	***ASME Section XI, Subsection IWE***	***Perform testing of the containment liner plate for loss of material.***	***A.2.1.17***	***Prior to the period of extended operation.***
51.	***ASME Section XI, Subsection IWL***	***Perform confirmatory testing and evaluation of the Containment Structure concrete***	***A.2.1.28***	***Prior to the period of extended operation***

No.	PROGRAM or TOPIC	COMMITMENT	UFSAR LOCATION	SCHEDULE
52.	***ASME Section XI, Subsection IWL***	***Implement measures to maintain the exterior surface of the Containment Structure, from elevation -30 feet to +20 feet, in a dewatered state.***	***A.2.1.28***	***Prior to the period of extended operation***