NEXTera ENERGY SEABROOK

March 30, 2012

SBK-L-12061
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
Supplemental Response - Alkali Silica Reaction (ASR)

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-10204, "Seabrook Station Response to Request for Additional Information, NextEra Energy Seabrook License Renewal Application Aging Management Programs – Set 1", December 17, 2010. (Accession Number ML103540534)
3. NextEra Energy Seabrook, LLC letter SBK-L-11063, "Seabrook Station Response to Request for Additional Information, NextEra Energy Seabrook License Renewal Application – Set 13", April 14, 2011. (Accession Number ML11108A131)
4. NextEra Energy Seabrook, LLC letter SBK-L-11154, "Seabrook Station Response to Request for Additional Information, NextEra Energy Seabrook License Renewal Application – Set 15", August 11, 2011. (Accession Number ML11227A023)

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

In Reference 2, NextEra provided a response to RAI B.2.1.28-3 related to the IWL Aging Management Program. Response to RAI Follow-Up B.2.1.28-3 was provided in Reference 4.

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In Reference 3, NextEra provided a response to request for additional information (RAI) B.2.1.31-1 related to the aging management of the alkali-silica reaction (ASR) affected structures as part of the Structures Monitoring Program. NextEra's response noted that it would perform an engineering evaluation as part of its extent of condition investigation.

Based on the Reference 3 RAI response, the staff issued RAI Follow-Up B.2.1.31-1, which noted that the analysis of the ASR issue is ongoing. NextEra Response to RAI Follow-Up B.2.1.31-1 is provided in Reference 4. That response explained the content of the engineering evaluation will include: discussion of degradation mechanisms in concrete, identification of areas susceptible to ASR, results of in-situ testing of concrete and impact on current licensing basis calculations and analyses, results of lab testing to establish ASR degradation rates in concrete, and mitigation techniques. In addition, NextEra's response explained that it plans to update the structural monitoring program, as appropriate, to manage aging related to ASR in concrete structures based on the results of the engineering evaluation.

Based on results of testing and analysis performed associated with ASR-affected structures, NextEra is providing in Enclosure 1 supplemental responses to ASR-related RAIs B.2.1.28-3, B.2.1.31-1 and Follow-Up B.2.1.31-1.

There are no new or revised regulatory commitments contained in this letter. Enclosure 2 provides the current 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- Revised Response to Requests for Additional Information Seabrook Station License Renewal Application and Associated LRA Changes

Enclosure 2- 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
30 day of March, 2012

Paul O. Freeman
Site Vice President

Shirley Sweeney
Notary Public

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

Enclosure 1 to SBK-L-12061

Revised Response to Requests for Additional Information
Seabrook Station License Renewal Application

BACKGROUND

The License Renewal Rule, 10 CFR 54, requires that for each structure and component subject to an Aging Management Review (AMR), the licensee shall demonstrate that the effects of aging will be adequately managed such that the intended functions(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Historically, NextEra Energy Seabrook (NextEra) has experienced groundwater infiltration through cracks, capillaries, pore spaces, seismic isolation joints, and construction joints in the below grade walls of concrete structures. Some of these areas have shown signs of leaching, cracking, and efflorescence on the concrete due to the infiltration. During the early 1990's an evaluation was conducted to assess the effect of the groundwater infiltration on the serviceability of the concrete walls. That evaluation concluded that there would be no deleterious effect, based on the design and placement of the concrete and on the non-aggressive nature of the groundwater.

In 2009, NextEra tested seasonal groundwater samples to support the development of a License Renewal Application. The results showed that the groundwater had become aggressive. Based on the determination of aggressive ground water NextEra initiated a comprehensive review of possible effects to in-scope structures.

Based on a qualitative walkdown of plant structures, the "B" Electrical Tunnel was identified as showing the most severe indications of groundwater infiltration. Core bores from this area were removed, tested for strength and elasticity values, and subjected to petrographic examination. While the results showed that both strength and elasticity values had declined, they remained within the design margin. The results of the petrographic examination also showed that the samples had experienced Alkaline-Silica Reaction (ASR).

NextEra initiated an extent of condition evaluation and cores were taken from five other areas of the plant - areas that showed characteristics with the greatest similarity to the "B" Electrical Tunnel. Additional cores were also taken from an expanded area around the original cores in the "B" Electrical Tunnel.

Tests on these cores confirmed that the original "B" Electrical Tunnel cores show the most significant ASR. For the five new areas under investigation, final results of compressive strength and modulus testing indicate that the compressive strength in all areas is greater than the strength required by the design of the structures. Modulus of elasticity was in the range of the expected value except for the Diesel Generator and Containment Enclosure Buildings which were less than the expected value in localized areas.

Evaluation of the test results shows that the affected structure walls are within design limits and fully capable of performing their safety functions, but potentially are subject to further degradation of material properties due to the effects of ASR.

OVERVIEW

Due to the effects of ASR on material properties, NextEra has initiated actions to perform additional testing to demonstrate that the effects of ASR on in-scope structures can be managed to maintain the intended functions of affected structures through the Period of Extended Operation (PEO).

NextEra will perform accelerated expansion testing to determine remaining reactivity in the aggregate. In addition, NextEra has initiated actions to perform testing on full-scale replicas of station structural configurations that will provide the data necessary to establish the current and future implications of the effects of ASR on plant buildings. Specifically, these tests will elucidate the effects of ASR with regards to reinforcing steel anchorage, flexural stiffness and shear strength.

Through this testing, quantitative crack limits will be developed. The crack limits will be incorporated into the Structural Monitoring Program to manage the effects of ASR on concrete walls. These quantitative crack limits will be used to develop acceptance criteria such that corrective action can be implemented prior to loss of intended function.

NextEra will demonstrate that the effects of ASR on in-scope structures can be managed to maintain the intended functions of affected structures through the PEO.

Supplemental Information regarding previous Request for Additional Information

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) **Initial response:**

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."

Additional response:

Additional inspections of the exterior face of the Containment Structure were performed in September 2011. The results show a maximum crack width of 8 mils, which is less than the 15 mil criteria for acceptance without further evaluation in the first-tier of the Structural Monitoring Program. Inspections revealed two isolated locations of the Containment exterior surface that exhibit pattern cracking that may be indicative of ASR. The width of the pattern cracking on the exterior surface of the Containment Structure is smaller than the cracking in the "B" Electrical Tunnel and is considered insignificant. Although the identified crack width does not meet the Structural Monitoring Program threshold for further evaluation, these two locations will be included in the second-tier evaluation criteria of the program due to the past groundwater in-leakage and follow-up inspections will be performed. Any identified crack growth will require additional evaluation. NextEra Energy Seabrook has previously committed to maintaining the exterior surface of the Containment Structure in a dewatered state which will mitigate any further effects of ASR (Commitment #52).

2) **Initial response:**

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.

Additional response:

Indications of cracking are minor, as explained in item 1 above, and do not require additional evaluation. However, follow-up inspections will be performed under the Structural Monitoring Program.

3) **Initial response:**

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.

Additional response:

Core samples have not been taken and are not currently planned. Indications of cracking are minor, as explained in responses in items 1 and 2 above. However, follow-up inspections will be performed under the Structural Monitoring Program.

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

No additional response is necessary. Please refer to previous response (Reference 4) to RAI Follow-up RAI B.2.1.28-3

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) Initial response:

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.

Additional response:

Additional concrete core sampling has been performed to determine the extent of condition both from the perspective of additional areas that might be affected by ASR and also the extent of ASR degradation within a given area. The extent of condition cores have been taken in six different areas of the plant:

1. Containment Enclosure Bldg – Four (4) concrete core bore samples have been taken including areas of concern (wetted) and control areas (limited-wetted adjacent areas).
2. RCA walkway - Four (4) concrete core bore samples have been taken including areas of concern (wetted) and control areas (non-wetted adjacent areas).
3. DG Oil Storage Room - Four (4) concrete core bore samples have been taken including areas of concern (wetted) and control areas (non-wetted adjacent areas).
4. RHR Vaults - Four (4) concrete core bore samples have been taken including areas of concern (wetted) and control areas (non-wetted adjacent areas).
5. EFW Pump house stairwell - Four (4) concrete core bore samples have been taken including areas of concern (wetted) and control areas (non-wetted adjacent areas).
6. "B" Electrical Tunnel – Eighteen (18) additional concrete core bore samples have been taken including areas of concern (wetted) and control areas (non-wetted adjacent areas).

Tests on these cores confirmed that the original "B" Electrical Tunnel cores show the most significant ASR. For the six areas under investigation, final results of compressive strength and modulus testing indicate that the compressive strength in all areas is greater than the strength required by the design of the structures. Modulus of elasticity was in the range of the expected value except for the Diesel Generator and Containment Enclosure Buildings which were less than the expected value in localized areas.

Literature and research results that were reviewed by NextEra indicate that the testing of core bores removed from ASR-affected reinforced concrete structures will identify conservative (low) values for mechanical properties such as tensile strength, and elastic modulus. This occurs due to the loss of confinement by reinforcing steel when the core is extracted from the

full structure. In-place concrete, subject to the confining effects of reinforcement, will exhibit higher strength and elasticity values.

The expansion, cracking, and performance of ASR-affected concrete is greatly influenced by internal and external restraints unique to the geometry, reinforcement pattern, boundary conditions, and applied loads of a particular structure (i.e. structural context). Therefore, the unrestrained core bore tests are conservative. When applying these conservative test results, the structures meet all design requirements.

NextEra has initiated actions to perform testing on full-scale replicas of station structural configurations that will provide the data necessary to establish the current and future implications of ASR deterioration on plant structures. The use of representative scale and materials will ensure that data collected during each of the test programs will be directly applicable to the assessment and management of in-scope structures at Seabrook Station.

2) **Initial response:**

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.

Additional response:

NextEra has taken "bias samples" in that concrete cores were removed from areas exhibiting signs/features of the highest degradation. An extent of condition evaluation and cores were taken from five other areas of the plant - areas that showed characteristics with the greatest similarity to the "B" Electrical Tunnel. Additional cores were also taken from an expanded area around the original cores in the "B" Electrical Tunnel.

NextEra has also performed walkdowns to assess the condition of accessible concrete structures at Seabrook Station. The walkdowns focused on evidence of alkali-silica reaction and evidence of moisture, either past or present, which could lead to expansion due to alkali-silica reaction. The walkdown scope aligns with the scope of the Structural Monitoring Program (10 CFR 50.65 Maintenance Rule structures). The walkdown report for accessible areas is currently under review. Results summarized in the report will be categorized and tracked in accordance with the "Structural Monitoring Program." Walkdowns to assess the condition of inaccessible areas (e.g. manholes, vaults, high radiation areas, etc) will be conducted as access conditions permit.

3) **Initial response:**

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.

Additional response:

NextEra has completed a comprehensive root cause evaluation and identified the following causes:

- The ASR developed because the concrete mix designs unknowingly utilized an aggregate that was susceptible to Alkali-Silica Reaction. Although the testing was conducted in accordance with ASTM standards, those testing standards were subsequently identified as limited in their ability to predict long term ASR.
- The health monitoring program for systems and structures does not contain a process for periodic reassessment of failure modes that were excluded from the monitoring criteria to ensure that the monitoring/mitigating strategies remain applicable and effective.

Aging management of the effects of ASR will be integrated into the Structural Monitoring and Section XI IWL Programs as discussed below in item 4. This will ensure that ASR will be managed in the period of extended operation.

4) Initial Response:

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.

Additional response:

The Structural Monitoring and Section XI IWL Programs will provide the programmatic requirements to manage and prevent future degradation during the period of extended operation.

- Aging management of ASR-related degradation will be integrated into the Structural Monitoring Program where concrete inspection, tracking and evaluation are performed in accordance with ACI 349 and the Maintenance Rule Program.

  NextEra has initiated actions to perform testing on full-scale replicas of station structural configurations. Through this testing, quantitative crack limits will be developed. The crack limits will be used in the Structural Monitoring Program to manage the effects of ASR-related degradation on concrete material properties of plant structures. These quantitative crack limits will be used to develop acceptance criteria such that corrective action can be implemented prior to loss of intended function.

- Aging management of ASR age related degradation will be integrated into the Section XI IWL Program where concrete inspection, tracking and evaluation are in accordance with ACI 349.

5) Initial response:

If deficiencies are identified by the Structural 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.

Additional response:

NextEra has initiated actions to perform testing on full-scale replicas of station structural configurations that will provide the data necessary to establish the current and future implications of ASR deterioration on concrete material properties of plant structures. The use of representative scale and materials will ensure that data collected during each of the test programs will be directly applicable to the assessment and management of in-scope structures at Seabrook Station.

The testing will be used to develop the following correlating data:

- Concrete material properties in different stages of ASR
- Crack mapping index (quantitative damage limits)

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

Background:

By letter dated December 17, 2010, the applicant responded to RAI B.2.1.31-1 regarding concrete degradation due to groundwater in-leakage and explained that recent cores had shown significant reductions in concrete compressive strength and modulus of elasticity. The applicant stated that a prompt operability determination concluded the affected areas were in compliance with the design code and that an extent of condition investigation was ongoing. The applicant further stated that any necessary future remediation will be identified and conducted through the corrective action program.

Issue:

The response lacked information regarding the extent of condition assessment including approximate completion dates and probable path forward.

Request:

Provide additional information regarding the extent of the condition investigation, including the following:

1. Any additional tests planned or results of investigations conducted since the initial RAI response was submitted.
2. An estimated timeframe for the extent of condition investigation.
3. A proposed path forward, including the location and timing of future tests as well as proposed remedial actions based on available information.
4. How the investigation / path forward will ensure the adequacy of the concrete during the period of extended operation.

NextEra Energy Seabrook Response:

1. **Initial response:**

With respect to additional testing or examinations completed since the initial RAI response was submitted, Seabrook is completing the extent of condition assessment in support of the prompt operability determination. This consisted of removing core bores for testing from five additional suspect building location areas. Selection of locations for cores was based on below grade areas that exhibited groundwater inleakage and surface cracking indicative of ASR being present. Sampling of cores was based on American Concrete Institute (ACI) standard ACI 228.1R-03 "In-Place Methods to Estimate Concrete Strength" The samples are being prepared for shipment to a lab for analysis. Testing will determine compressive strength (ASTM C 42-04 "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete"), modulus of elasticity (ASTM C 469-02 "Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression") and examination for the presence of Alkali Silica Reaction (ASTM C 856-04 "Petrographic Examination of Hardened Concrete"). Testing of concrete cores for tensile properties are not performed as tensile properties of concrete are not used in the design of concrete structures at Seabrook Station.

Test results are used as input to reconcile existing calculations and analyses to ensure that concrete structures satisfy all design basis conditions (i.e. deadweight, wind, seismic, etc). Results of the testing are expected in May 2011.

Additional response:

Additional concrete core sampling has been performed to determine the extent of condition both from the perspective of additional areas that might be affected by ASR and also the extent of ASR degradation within a given area. The extent of condition cores have been taken in six different areas of the plant:

1. Containment Enclosure Bldg – Four (4) concrete core bore samples have been taken including areas of concern (wetted) and control areas (limited-wetted adjacent areas).
2. RCA walkway - Four (4) concrete core bore samples have been taken including areas of concern (wetted) and control areas (non-wetted adjacent areas).
3. DG Oil Storage Room - Four (4) concrete core bore samples have been taken including areas of concern (wetted) and control areas (non-wetted adjacent areas).
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6. "B" Electrical Tunnel – Eighteen (18) additional concrete core bore samples have been taken including areas of concern (wetted) and control areas (non-wetted adjacent areas).

Tests on these cores confirmed that the original "B" Electrical Tunnel cores show the most significant ASR. For the six areas under investigation, final results of compressive strength and modulus testing indicate that the compressive strength in all areas is greater than the

strength required by the design of the structures. Modulus of elasticity was in the range of the expected value except for the Diesel Generator and Containment Enclosure Buildings which were less than the expected value in localized areas.

NextEra has initiated actions to perform testing on full-scale replicas of station structural configurations that will provide the data necessary to establish the current and future implications of ASR deterioration on plant structures. The use of representative scale and materials will ensure that data collected during each of the test programs will be directly applicable to the assessment and management of in-scope structures at Seabrook Station.

2. **Initial response:**

The extent of condition assessment to support the prompt operability determination is scheduled to complete in June 2011.

The comprehensive long term extent of condition assessment is detailed in the action plan discussed in response number 3 below.

Additional response:

NextEra has performed walkdowns to assess the condition of accessible concrete structures at Seabrook Station. The walkdowns focused on evidence of alkali-silica reaction and evidence of moisture, either past or present, which could lead to expansion due to alkali-silica reaction. The walkdown scope aligns with 10CFR50.65 Maintenance Rule structures. The walkdown report for accessible areas is currently in review. Results summarized in the report will be categorized and tracked in accordance with the "Structural Monitoring Program." Walkdowns of inaccessible areas (e.g. manholes, vaults, high radiation areas, etc) will be conducted as access conditions permit.

3. **Initial response:**

Utilizing the knowledge gained from testing completed to date, an action plan has been developed to:

- Identify other areas at Seabrook that are potentially susceptible to ASR.
- Complete testing of concrete in other susceptible areas. Testing will determine compressive strength (ASTM C 42-04 "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete"), modulus of elasticity (ASTM C 469-02 "Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression"), and examination for the presence of Alkaline Silica Reaction (ASTM C 856-04 "Petrographic Examination of Hardened Concrete").
- Based on test results, reconcile existing calculations and analyses to ensure that concrete structures satisfy all design basis conditions (i.e. deadweight, wind, seismic, etc).

- Perform Lab tests with in-situ concrete material to determine how ASR degradation mechanism propagates. Tests to be completed per ASTM and other appropriate standards include:
  - Alkali reactivity tests of coarse aggregates per:

    ASTM C 1260 "Mortar Bar Expansion Test" - Short duration testing (16 Days)

    ASTM C 1293 "Concrete Prism" – Long duration testing (1-2 years)

Other tests subjecting cores to an accelerated aging process to establish a rate of ASR degradation.

- Issue Engineering Evaluation "Alkali-Silica Reaction of Concrete at Seabrook Station", tentatively scheduled for March 2012. Content of evaluation includes:
  - Technical discussion on ASR degradation mechanism in concrete
  - Identification of areas susceptible to ASR
  - Results to date of in-situ testing of concrete and impact on Current Licensing Basis (CLB) calculations and analyses
  - Results of Lab testing to establish ASR degradation rate in concrete
  - Mitigation Techniques
- Based on test results of concrete samples and inspection of plant areas, update the Structures Monitoring Program (SMP) to include:

  Type of monitoring required to detect ASR degradation such as ASR indicative crack pattern, surface acid etching, and presence of water.

  The frequency of monitoring areas impacted by ASR, utilizing the multi-tiered process as described in the SMP for evaluating deficiencies.
- Develop a long range plan to implement mitigation measures to arrest degradation attributed to ASR. Utilizing rate for progression of ASR concrete degradation, prioritize areas to be remediated. Develop mitigation techniques to divert groundwater from the below grade structures utilizing industry input on waterproofing technology and insights gained from the new groundwater fate and transport study (the study of groundwater distribution and movement) completed for the Seabrook site.

  Implementation of the action plan is scheduled to be completed in December 2013

Additional response:

The strategy going forward to address the ASR mechanism:

1. Establishment of rate of degradation – In order to predict future degradation and its impact on design margins, the rate at which ASR is continuing to occur must be established. The rate is highly dependent upon the specifics of the actual aggregate. Short term and long term reactivity testing of the aggregates used in Seabrook concrete will be performed. The testing will establish the extent that the aggregate has reacted to date and what additional reactivity is expected going forward.

2. Perform structural testing of ASR affected concrete elements - In order to determine the effect of ASR on concrete properties, full scale testing of ASR affected concrete beams will be performed. Data obtained from the testing will be used to correlate the degree of ASR with the impact on mechanical properties of in-situ concrete.
3. Reconcile the Current Licensing Basis – Utilizing results of testing and knowledge learned on concrete ASR degradation, areas of concrete structures impacted with ASR will be reviewed / reanalyzed to ensure they are in compliance with the Current Licensing Basis.
4. Monitoring – Update the Structural Monitoring Program to include monitoring criteria that address ASR concrete degradation, its progression, and the impact on the integrity of the structure.
5. Potential Mitigation Strategies of ASR– Elimination of groundwater in-leakage to prevent further degradation. Consideration of application of lithium salts or other techniques to stop or slow the ASR reaction.

4. Initial response:

The Seabrook Structural Monitoring Procedure will be revised to include actions for inspection and monitoring of concrete due to ASR. The Extent of Condition review will provide the plant staff with the scope of the effects of ASR on concrete structural elements at Seabrook. Actions will be taken on the basis of the extent of condition to keep the structures within the limits of the current design bases. The Seabrook Structural Monitoring Procedure will be revised to include direction on monitoring the presence of ASR.

Additional response:

NextEra has initiated actions to perform testing on full-scale replicas of station structural configurations that will provide the data necessary to establish the current and future implications of ASR deterioration on concrete material properties of plant structures. The use of representative scale and materials will ensure that data collected during each of the test programs will be directly applicable to the assessment and management of 10CFR50.65 Maintenance Rule structures at Seabrook Station.

The testing will be used to develop the following correlating data:

- Concrete material properties in different stages of ASR
- Crack mapping index (quantitative damage limits)

The quantitative damage limits will be used to enhance the following:

- Aging management of ASR related degradation will be integrated into the Structural Monitoring Program where the concrete inspection, tracking and evaluation are performed in accordance with ACI 349 and the Maintenance Rule Program.

- Aging management of ASR age related degradation will be integrated into the Section XI IWL Program where concrete inspection, tracking and evaluation are performed in accordance with ACI 349.

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

Background:

By letter dated April 14, 2011, the applicant responded to a staff RAI regarding concrete degradation due to groundwater in-leakage and the occurrence of Alkali-Silica Reaction (ASR) in the concrete. The applicant stated that an extent of condition investigation regarding the ASR degradation was on-going, along with the development of a long range aging management plan. The applicant explained that the plan would not be fully developed and implemented until December 2013. The applicant's response also listed several American Society for Testing and Materials (ASTM) standards that would be used to estimate the ASR reaction rate.

Issue:

The applicant provided no specific information about the applicability of the original operability determination conducted when ASR was initially identified. The response also lacked specific information about what tests (laboratory and in-situ) would be conducted and when. The response also made no mention of how possible reductions in concrete shear strength were being estimated and addressed. In addition, the RAI response stated that cores were being taken in accordance with American Concrete Institute (ACI) 228.1R-03; however, it did not address the statistical validity and size of core samples taken or planned at each location.

Request:

1. Explain if the current operability determination remains valid until the long term aging management plan is developed and implemented.
2. Explain how the concrete tests and evaluations performed so far can be used to establish a trend in degradation of the affected structures until the long term aging management plan is implemented.
3. Provide detailed and comprehensive information regarding the planned approach to addressing ASR degradation throughout the site. The description of the actions planned to test, evaluate, and mitigate ASR in the RAI response do not provide sufficient details for the staff to determine if the aging of the structures will be adequately managed during the period of extended operation.

At a minimum include a discussion of the following:

(a) The locations where monitoring or sampling will be conducted, and how these results will be used to address other susceptible locations.

(b) The frequency of the monitoring and sampling to establish a trend in degradation of the structures and rate of ASR, and why the provided frequency is adequate.

(c) Detailed information about the planned in-situ monitoring or testing and laboratory testing. This should include the test method, frequency, and schedule.

(d) How the number of concrete samples taken or planned from each structure will ensure statistical validity.

(e) How the length of core samples taken or planned will account for variation of ASR across the wall thickness.

(f) How the extent of degradation/corrosion of rebars will be established in the ASR affected areas during the period of extended operation.

(g) How the reduction in load carrying capacity in the steel embedments and anchors be established in the ASR affected areas during the period of extended operation.

(h) How the results of the petrographic examination will be used to determine quantitative damage in concrete and rate of degradation for the period of extended operation.

(i) Plans, if any, for relative humidity and temperature measurements of affected concrete areas over the long term.

(j) Plans to perform stiffness damage tests to estimate the expansion attained to date in ASR affected concrete.

(k) How the current and future rate of expansion of concrete will be determined to ensure that bond between the rebar and concrete is effective over the long term.

(l) How the results of concrete compressive strength and modulus of elasticity conducted so far will be adjusted to account for future degradation during the period of extended operation.

4. Explain how the possibility of a reduction in shear strength capacity due to ASR degradation is being evaluated and addressed since core samples are not being used to establish the tensile strength of concrete. The response should include a discussion of how the possible reduction is being quantified and how the reduction is shown to be acceptable for the period of extended operation.

<u>NextEra Energy Seabrook Response</u>

1. Initial response:

The current operability determination is expected to remain valid but may require modification, as discussed below. A comprehensive plan to evaluate and address ASR concrete degradation, and develop and implement a long term monitoring plan is ongoing, (See Item 2 response below).

As required by 10 CFR § 54.30(a), if information / results are identified, that impact the current operability determination, they will be evaluated and addressed accordingly. If the reviews show that there is not reasonable assurance that during the current license term,

concrete affected by Alkali Silica Reaction is in compliance with applicable design codes, then NextEra Energy Seabrook will take measures under its current license, as appropriate, to ensure that the intended function of those systems, structures or components will be maintained in accordance with the current licensing basis ("CLB") throughout the term of its current license. Thus, by regulation, compliance with the CLB must be maintained until the long term aging management plan is developed and implemented.

As noted in the current operability determination, the areas of concrete affected by Alkali Silica Reaction are in compliance with the applicable design codes stated in the CLB. Structural integrity of the affected structures is fully qualified and all system, structures, and components housed within the structures are capable of performing their design function. The long term effects of the ASR condition are being monitored by the Structures Monitoring Program and the status of the condition is included in the Structures Health Report which, reports the results of subsequent investigations and testing to the Plant Health Committee. Should the condition degrade further, a higher level of qualification analysis will be employed to demonstrate that significant margin exists for operability.

Additional response:

No additional response is necessary.

2. **Initial response:**

Detailed and comprehensive information regarding the planned approach to addressing ASR degradation throughout the site will be included in an engineering evaluation scheduled to complete in March 2012. The content of the evaluation will include: discussion of degradation mechanisms in concrete, identification of areas susceptible to ASR, progress of in-situ testing of concrete and impact on current licensing basis calculations and analyses, progress of lab testing to establish ASR degradation rates in concrete, and mitigation techniques. Specific questions presented in Follow-up RAI B.2.1.31-1, items 2 through 4, will be addressed in this evaluation.

NextEra Energy Seabrook plans to update the structures monitoring program, as appropriate, to manage aging related to ASR in concrete structures based on the engineering evaluation results.

Additional response:

Until a trend is established, NextEra will inspect 20 previously inspected cracked locations at six months intervals. These 20 areas show cracking characteristics with the greatest similarity to the "B" Electrical Tunnel. Once trending data has been established, inspection intervals may be adjusted accordingly. Any change in crack size will be trended and reevaluated in accordance with the Structural Monitoring Program.

3. **Initial response:**

Discussion Items 3a through 3l will be addressed in the evaluation described in Item 2 above.

Additional response:

a. NextEra has performed walkdowns to assess the condition of accessible concrete structures at Seabrook Station. The walkdowns focused on evidence of alkali-silica reaction and evidence of moisture, either past or present, which could lead to expansion

due to alkali-silica reaction. The walkdown scope aligns with the Structural Monitoring Program (Maintenance Rule structures). The walkdown report for accessible areas is currently in review. Results summarized in the report will be categorized and tracked in accordance with the Structural Monitoring Program. Walkdowns of inaccessible areas (e.g. manholes, vaults, high rad areas, etc) will be conducted as access conditions permit.

Until a trend is established, NextEra will inspect 20 previously inspected cracked locations at six months intervals. These 20 areas show cracking characteristics with the greatest similarity to the "B" Electrical Tunnel. Once trending data has been established, inspection intervals may be adjusted accordingly. Any change in crack size will be trended and reevaluated in accordance with the Structural Monitoring Program.

b. As stated in 3a above, until a trend is established, NextEra will inspect 20 previously inspected cracked locations at six months intervals. These 20 areas were chosen because they showed characteristics with the greatest similarity to the "B" Electrical Tunnel Once trending data has been established, inspection intervals may be adjusted accordingly. Any change in crack size will be trended and reevaluated.

c. NextEra has initiated actions to perform testing on full-scale replicas of station structural configurations at the University of Texas. The full-scale concrete replicas will be fabricated with a mix design similar to the Seabrook structures and will be aged to duplicate current and future plant conditions. Based on test results, thresholds will be established for corrective action prior to loss of intended functions.

d. NextEra has taken "bias samples" in the concrete cores that were removed from areas exhibiting signs/features of the highest degradation. The extent of condition evaluation and cores were taken from five other areas of the plant - areas that showed characteristics with the greatest similarity to the "B" Electrical Tunnel. Additional cores were also taken from an expanded area around the original cores in the "B" Electrical Tunnel.

   Going forward, core data will not be used. Full scale testing will provide concrete material properties.

e. NextEra has developed a damage rating index and visual assessment rating of Alkali-Silica Reaction in core sections of three partial-depth cores from the "B" Electrical Tunnel. The core sections represent the near-surface and central portion of the concrete wall at each of the three core locations. At each location, nominal 16 in. deep cores were drilled horizontally from the exposed interior wall surfaces into the 24 in. thick concrete walls of the "B" Electrical Tunnel. The interior wall surfaces are unrestrained and open to the air, while the corresponding, below grade, exterior wall surfaces are located adjacent to fill concrete and bedrock.

   A nominal 1-in. thick longitudinal section was cut from the center of each core section for examination and analysis. After cutting the nominal 1-in. thick longitudinal section from the center of each core, the sections were polished to produce flat, smooth surfaces for use in determining the degree of ASR-related distress in the hardened concrete.

The examiner observed higher visual rating (cracks) values in the samples of the concrete located nearer the exposed, interior wall surfaces of the "B" Electric Tunnel, as compared to the concrete removed from deeper within the wall. Also, based on observations and findings, it is expected that where there is cracking in the interior exposed walls, the level of ASR-related distress will be similar on the exterior wall surface.

f. To identify signs of rebar degradation, NextEra conducted an operating experience review utilizing a key word search of corrective action documents from August 1998 through May 2010. In addition during the removal of the "B" Electrical Tunnel core bores, a section of the concrete cover was removed to expose the rebar in the ASR affected area. No instances of rebar corrosion or degradation were identified in either of these reviews. Seabrook will continue to monitor for rebar corrosion through the Structural Monitoring Program.

g. Anchor bolt pull-out testing is being performed at the University of Texas. The results of this testing will provide the basis to manage the effects of aging on anchors and ensure that anchors continue to support the intended functions.

h. Petrographic examinations have been used to establish the current extent of ASR distress in concrete core samples. Quantitative damage limits will be based on full-scale replica testing; see response to item c. above.

i. ASR degradation is mostly caused by groundwater that has fully saturated the walls in locations where the waterproofing membrane has not been effective. Therefore, the ASR locations are considered fully saturated. Ambient temperatures and humidity have and will continue to be recorded during any ASR crack measurements.

j. NextEra has no plans to perform a stiffness damage test however NextEra is currently performing accelerated expansion testing to determine remaining reactivity in the aggregate. By performing this test NextEra will be able to determine the current stage and potential for long term ASR degradation at Seabrook Station.

k. As explained in item c. above, the full-scale replica testing will demonstrate the affects of ASR on the bonding between rebar and concrete.

l. The material properties from the compressive and modulus testing are used to evaluate the current conditions. Going forward, concrete material properties will be based on the results of the full-scale replica testing at the University of Texas.

4. Initial response:

See Item 2 response above.

Additional responses:

The possibility of reduction in shear strength capacity will be determined by the full-scale, replica concrete testing, which will establish concrete material properties.

Enclosure 2 to SBK-L-12061

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		SCHEDULE
1.	PWR Vessel Internals	An inspection plan for Reactor Vessel Internals will be submitted for NRC review and approval.		Program to be implemented prior to the period of extended operation. Inspection plan to be submitted to NRC not later than 2 years after receipt of the renewed license or not less than 24 months prior to the period of extended operation, whichever comes first.
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.	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.	Prior to the period of extended operation

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
4.	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Enhance the program to list additional cranes for monitoring.		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.		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.		Prior to the period of extended operation.
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.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
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.		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.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		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.		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.		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.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
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.		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.		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.		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 Vessel embrittlement will be evaluated and the NRC will be notified.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
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.		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.		Prior to the period of extended operation.
22.	One-Time Inspection	Implement the One Time Inspection Program.		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.		Within five years prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
24.	Buried Piping And Tanks Inspection	Implement the Buried Piping And Tanks Inspection Program.		Within ten years prior to entering the period of extended operation
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.		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.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
27.	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program.		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.		Prior to the period of extended operation.
29.	Lubricating Oil Analysis	Enhance the program to sample the oil for the Reactor Coolant pump oil collection tanks.		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.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
31.	ASME Section XI, Subsection IWL	Enhance procedure to include the definition of "Responsible Engineer".		Prior to the period of extended operation.
32.	Structures Monitoring Program	Enhance procedure to add the aging effects, additional locations, inspection frequency and ultrasonic test requirements.		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.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
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.		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.		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.		Prior to the period of extended operation.
37.	Metal Enclosed Bus	Implement the Metal Enclosed Bus program.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
38.	Fuse Holders	Implement the Fuse Holders program.		Prior to the period of extended operation.
39.	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Implement the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program.		Prior to the period of extended operation.
40.	345 KV SF_6 Bus	Implement the 345 KV SF_6 Bus program.		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.		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.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
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.		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)	NextEra Seabrook will perform a review of design basis ASME Class 1 component fatigue evaluations to determine whether the NUREG/CR-6260-based components that have been evaluated for the effects of the reactor coolant environment on fatigue usage are the limiting components for the Seabrook plant configuration. If more limiting components are identified, the most limiting component will be evaluated for the effects of the reactor coolant environment on fatigue usage. If the limiting location identified consists of nickel alloy, the environmentally-assisted fatigue calculation for nickel alloy will be performed using the rules of NUREG/CR-6909. (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		At least two years prior to entering the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
		be evaluated. For the additional plant-specific locations, if CUF, including environmental effects is 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.	Number Not Used			
46.	Protective Coating Monitoring and Maintenance	Enhance the program by designating and qualifying an Inspector Coordinator and an Inspection Results Evaluator.		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."		Prior to the period of extended operation

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
48.	Protective Coating Monitoring and Maintenance	Enhance the program to include a review of the previous two monitoring reports.		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.		Prior to the period of extended operation
50.	ASME Section XI, Subsection IWE	Perform UT testing of the containment liner plate in the vicinity of the moisture barrier for loss of material.		Within the next two refueling outages, OR15 or OR16, and repeated at intervals of no more than five refueling outages
51.	Number Not Used			

No.	PROGRAM or TOPIC	COMMITMENT		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.		By 2013
53.	Reactor Head Closure Studs	Replace the spare reactor head closure stud(s) manufactured from the bar that has a yield strength > 150 ksi with ones that do not exceed 150 ksi.		Prior to the period of extended operation.
54.	Steam Generator Tube Integrity	Unless an alternate repair criteria changing the ASME code boundary is permanently approved by the NRC, or the Seabrook Station steam generators are changed to eliminate PWSCC-susceptible tube-to-tubesheet welds, submit a plant-specific aging management program to manage the potential aging effect of cracking due to PWSCC at least twenty-four months prior to entering the Period of Extended Operation.		Program to be submitted to NRC at least 24 months prior to the period of extended operation.
55.	Steam Generator Tube Integrity	Seabrook will perform an inspection of each steam generator to assess the condition of the divider plate assembly.		Prior to entering the period of extended operation

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
56.	Closed-Cycle Cooling Water System	Revise the station program documents to reflect the EPRI Guideline operating ranges and Action Level values for hydrazine and sulfates.		Prior to entering the period of extended operation.
57.	Closed-Cycle Cooling Water System	Revise the station program documents to reflect the EPRI Guideline operating ranges and Action Level values for Diesel Generator Cooling Water Jacket pH.		Prior to entering the period of extended operation.
58.	Fuel Oil Chemistry	Update Technical Requirement Program 5.1, (Diesel Fuel Oil Testing Program) ASTM standards to ASTM D2709-96 and ASTM D4057-95 required by the GALL XI.M30 Rev 1		Prior to the period of extended operation.
59.	Nickel Alloy Nozzles and Penetrations	The Nickel Alloy Aging Nozzles and Penetrations program will implement applicable Bulletins, Generic Letters, and staff accepted industry guidelines.		Prior to the period of extended operation.

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
60.	Buried Piping and Tanks Inspection	Implement the design change replacing the buried Auxiliary Boiler supply piping with a pipe-within-pipe configuration with leak indication capability.		Prior to entering the period of extended operation.
61.	Compressed Air Monitoring Program	Replace the flexible hoses associated with the Diesel Generator air compressors on a frequency of every 10 years.		Within ten years prior to entering the period of extended operation.
62.	Water Chemistry	Enhance the program to include a statement that sampling frequencies are increased when chemistry action levels are exceeded.		Prior to entering the period of extended operation.
63.	Flow Induced Erosion	Ensure that the quarterly CVCS Charging Pump testing is continued during the PEO. Additionally, add a precaution to the test procedure to state that an increase in the CVCS Charging Pump mini flow above the acceptance criteria may be indicative of erosion of the mini flow orifice as described in LER 50-275/94-023.		Prior to the period of extended operation

No.	PROGRAM or TOPIC	COMMITMENT		SCHEDULE
64.	Buried Piping and Tanks Inspection	Soil analysis shall be performed prior to entering the period of extended operation to determine the corrosivity of the soil in the vicinity of non-cathodically protected steel pipe within the scope of this program. If the initial analysis shows the soil to be non-corrosive, this analysis will be re-performed every ten years thereafter.		Prior to entering the period of extended operation.
65.	Flux Thimble Tube	Implement measures to ensure that the movable incore detectors are not returned to service during the period of extended operation.		Prior to entering the period of extended operation
66.	Number Not Used			
67.	Structures Monitoring Program	Perform one shallow core bore in an area that was continuously wetted from borated water to be examined for concrete degradation and also expose rebar to detect any degradation such as loss of material.		No later than December 31, 2015
68.	Structures Monitoring Program	Perform sampling at the leakoff collection points for chlorides, sulfates, pH and iron once every three months.		Starting January 2014