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

May 4, 2012

LICENSEE: NextEra Energy Seabrook, LLC (NextEra)

FACILITY: Seabrook Station, Unit 1 (Seabrook)

SUBJECT: MEETING SUMMARY REGARDING CONCRETE DEGRADATION HELD ON APRIL 23, 2012

On April 23, 2012, a public meeting was held between members of the U.S. Nuclear Regulatory Commission (NRC) staff, and representatives of NextEra Energy Seabrook, LLC (NextEra) at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The purpose of this meeting was to discuss NextEra's plans and schedule regarding concrete degradation caused by alkali silica reaction (ASR) at Seabrook Station, Unit 1 (Seabrook) as referenced in the NRC inspection report (Agencywide Documents Access and Management System (ADAMS) Accession No. ML120480066).

The meeting notice was issued on March 23, 2012 (ADAMS Accession No. ML121070659). By letter dated April 17, 2012 (ADAMS Accession No. ML121040102), the NRC provided NextEra questions to be addressed during the public meeting. The presentation slides provided by NextEra are available in ADAMS under Accession Nos. ML121160422, ML121160349, and ML121160414. The presentation slides provided by the NRC staff are available under ADAMS Accession No. ML121160433. A list of the meeting attendees is provided in the Enclosure.

The meeting commenced at 10:00 am. John G. Lamb, Senior Project Manager in Division of Operating Reactor Licensing (DORL) in the Office of Nuclear Reactor Regulation (NRR) started the meeting. Mr. Lamb stated it was a Category 1 Meeting. The public was invited to observe the meeting and had one opportunity to communicate with the NRC after the business portion, but before the meeting was adjourned. Also, there was a bridge line for the public to listen to the meeting. To preclude interruption of the meeting, the phone was placed on a listening mode during the presentations and discussions. It was requested that the speakers be close to microphones, identify themselves, and speak with sufficient clarity and volume so that they could be readily heard. Also, a webinar was available to view the meeting slides. The webinar was accessed by the following link: https://www1.gotomeeting.com/register/933281464. There were technical difficulties with the webinar for approximately the first 15 minutes of the meeting.

Mr. Lamb explained that the ASR is a chemical reaction in concrete, which occurs over time in the presence of water, between the alkaline cement paste and reactive non-crystalline silica that is found in some common coarse aggregates. In the presence of water, the ASR forms a gel that expands, causing micro-cracks that change the physical structural properties of the concrete, including compressive and tensile strength, modulus of elasticity, and Poisson's Ratio. At Seabrook, the below-grade concrete structures have experienced groundwater infiltration.

Next, Mr. Lamb went over the meeting agenda, and then he turned the presentation over to Chris Miller, Director of the Division of Reactor Safety (DRS) in Region 1.

Mr. Miller thanked all the participants for attending and providing a significant amount of information that will be useful to the NRC to better understand the ASR phenomena at the Seabrook Station and to help determine, based on licensee plans and commitments, what the NRC's next steps will be. Mr. Miller pointed out that this is a complicated subject and there are many parts of this overall issue to consider and resolve in both current operating and license renewal space; and NRC staff has been doing this in a well-coordinated manner with good communication of the issues being our goal both internally and externally.

Mr. Miller explained what the NRC staff was trying to accomplish at the meeting and what plans the NRC staff has for future communication on this topic. While the NRC staff believes that the structures known to be affected by ASR can perform their safety function, the NRC staff does not have all the information needed to evaluate the degradation at Seabrook. The NRC staff has informed NextEra of the need for this information at various times, including an Inspection Report issued on March 26, 2012. This meeting was planned as a discussion with NextEra and the NRC to make clear the need for timely information, plans and firm schedules for resolving this issue both in the short and long term. The NRC opened this up to public participation because the NRC staff knows there is public interest in this issue. However, this meeting was not intended to be an information session where the NRC staff explains ASR to our stakeholders. The NRC staff plans to do that at a venue closer to the Seabrook site during the summer so many of our local stakeholders will have an opportunity to attend. At that point, the NRC staff expects to have more information on the issue in hand, reviewed and inspected.

Even though the mechanical properties of concrete have been reduced or degraded, there is no indication that the ASR issue has rendered any structure at Seabrook incapable of performing its safety function at this time. However, the issue is recognized as a significant condition adverse to quality being addressed in detail under the Corrective Action program. Questions related to the design basis are being pursued. The NRC staff is thoroughly evaluating this technical issue. The results of detailed and long-term testing, structural evaluations and effectiveness of the long-term aging management plan, including measures to reduce groundwater intrusion, will determine whether any future structural retrofits are necessary. The NRC staff has inspected elements of NextEra's technical work in this matter to date. Currently, the NRC's independent assessment of the situation supports NextEra's determination that the affected structures can fulfill their safety functions. However, the NRC staff needs additional information from NextEra to ensure that their determination remains valid, and that all factors supporting this determination are fully brought to light. Mr. Miller stated that the NRC staff needs firm commitments from NextEra to undertake the necessary efforts to provide the information highlighted in this meeting in a timely manner.

Mr. Miller turned the meeting over to Mr. Conte of DRS Region 1 staff to discuss the NRC staff informational needs in order to fully evaluate the ASR problem, both, in the near-term and longer term.

Mr. Conte presented the questions that the NRC staff has posed to NextEra:

(1) What buildings are affected by alkali silica reaction (ASR)? How do you plan to confirm ASR and what is your supporting basis?

(2) When do you plan to update the operability determinations for all buildings affected by ASR and what key information do you plan to incorporate into them including key assumptions, bases for inputs, including material properties, and calculation methods used?

(3) If you continue to use the empirical relationships in the American Concrete Institute (ACI) design basis code for operability determinations, what is the basis for use of those relationships, and what is the explanation regarding why these are appropriate for the degraded conditions in the building?

(4) What are your ongoing or planned methods, analysis or testing that will be used to monitor/manage ASR affected structures? What is your knowledge of the ASR reaction rate, possible end point, and how it affects operability?

(5) When will you submit to the NRC staff your Corrective Action Plan to address this issue?

(6) When will you provide the technical details for the larger-scale testing planned at the contracted research and development facility?

Mr. Michael Marshall of the Division of License Renewal presented the relationship of Part 50 to Part 54 regarding aging management programs (AMPs). Mr. Marshall described the impact of the Seabrook ASR issue on the license renewal. The Seabrook license renewal review schedule has been impacted by the ASR issue.

Even though the NRC staff has questions regarding Seabrook ASR, Mr. Miller clearly stated that the NRC staff has no immediate safety concern and the Seabrook structures affected by ASR are operable but degraded. Mr. Miller turned the meeting over to NextEra.

Mr. Paul Freeman, the Site Vice President at Seabrook, provided an overview of the ASR issue. Mr. Freeman stated that the ASR was self-identified by NextEra. He said that ASR has very limited impact of the performance of Seabrook and that the ASR impacts a small localized percentage of Seabrook structures. Mr. Freeman stated that a formal monitoring plan is in place to identify any change in performance. Mr. Freeman provided overview information regarding Seabrook. Mr. Freeman said that NextEra identified that the concrete walls in the "B" electrical tunnel were experiencing ASR in September 2010.

Mr. Rick Noble of NextEra explained the ASR reaction. He stated that Seabrook concrete structures comply with the American Concrete Institute (ACI) 318-71 design code. Mr. Noble explained that ASR can potentially affect the following concrete properties: (1) compressive strength, (2) modulus of elasticity, (3) flexural stiffness, (4) shear strength, and (5) tensile strength. Mr. Noble provided information regarding NextEra's concrete core testing and

petrographic examination results. He explained that NextEra confirmed ASR in Seabrook structures and listed the affected structures.

Mr. Noble provided the following actions performed by NextEra to date: (1) engaged industry experts, (2) assessed extent of condition, (3) assessed impact of reduced modulus of elasticity, (4) performed petrographic examinations, (5) evaluated structural anchors, and (6) evaluated the affect of ASR on concrete structures. Mr. Noble explained restrained versus unrestrained expansion of test specimens.

Mr. Michael Collins of NextEra stated that the Seabrook structures affected by ASR are operable but degraded. Mr. Collins said that testing is anticipated to show that performance of ASR-affected concrete structures is not compromised and the operability determinations will be closed documenting compliance with ACI 318-71, once testing is completed. Mr. Collins explained the margin summary bar graph slide.

Mr. Collins stated that the root cause evaluation identified:

(1) The ASR developed because concrete mix designs unknowingly utilized an aggregate susceptible to ASR. Although testing was conducted per ASTM standards, those testing standards were subsequently identified as limited in their ability to predict long-term ASR.

(2) The Health Monitoring Program for systems and structures does not contain a process for periodic reassessment of failure modes excluded from the monitoring criteria to ensure monitoring/mitigating strategies remain applicable and effective.

Mr. Collins explained that shear and lap splice test programs will be conducted at the University of Texas at Austin and the University of Texas at Austin will conduct a series of full-scale, concrete beam tests to provide representative test data of in-situ strength of restrained concrete elements. He also provided information regarding the anchor test program, aggregate expansion testing, and monitoring.

Mr. Collins stated that the AMP for the Seabrook license renewal application will initially reflect criteria to be used for periodic inspection of the 20 previously crack indexed locations, at 6-month intervals. He said the AMP criteria and frequency will be revised as the full-scale concrete beam test program develops.

Mr. Collins concluded that Seabrook's structures remain fully operable assuming conservative losses in concrete structural performance.

The lunch break started at 12:35 pm and ended at 1:30 pm.

Oguzhan Bayrak, Ph.D. from the Ferguson Structural Engineering Laboratory at the University of Texas at Austin presented the findings and structural testing plan for NextEra's Seabrook ASR-affected concrete. Dr. Bayrak presented four topics: (1) knowledge base, (2) involvement to date, (3) interim assessment, and (4) structural testing.

Dr. Bayrak presented his experience with ASR and explained his involvement with Seabrook began in November 2011. Dr. Bayrak stated that he wrote two white papers: (1) Structural Implications of ASR State of the Art, and (2) Perspectives on ACI 318-71 Shear Strength and Lap Splice Performance. He explained that these two white papers were inputs for the "Seabrook Station: Impact of Alkali-Silica Reaction on Concrete Structures and Attachments," written by MPR Associates, Inc. for NextEra.

Dr. Bayrak explained that the shear and lap splice test programs will (1) quantify margin available above code-calculated capacities, and (2) quantify impact of ASR on structural capacity and stiffness. He stated that the concrete mixture will be developed through trial batching with representative coarse and fine aggregates, will be sufficiently reactive to obtain the necessary data in a timely manner, and will develop mechanical properties that are representative of Seabrook structures.

Dr. Bayrak explained the shear testing, anchorage testing, and project workflow (beam fabrication, conditioning, expansion monitoring, and structural testing). He provided graphs showing that ASR beams were stronger than beams without ASR. Dr. Bayrak said the testing results will provide input for the final structural assessment by MPR Associates, Inc. which will provide input to NextEra's AMP.

Dr. Bayrak stated that testing to quantify margin available above code-calculated capacities will be completed in November 2012 and testing to quantify impact of ASR on structural capacity and stiffness will be completed in May 2013. He said the final report by University of Texas at Austin will be issued in April 2014, and this final report will input the final structural assessment by MPR Associates, Inc., which will provide input to NextEra's AMP. Dr. Bayrak also presented his backup slides.

A break occurred at 3:20 pm and ended at 3:30 pm.

Mr. Miller of the NRC provided a summary. Mr. Miller stated that the NRC staff agreed with NextEra that the Seabrook ASR-affected structures are operable but degraded. Ms. Melanie Galloway of the NRC stated that the NRC review of the Seabrook license renewal application (LRA) has already been impacted by an 11-month delay, and it will be further impacted since NextEra will not provide a final AMP until sometime after April 2014.

Mr. Michael O'Keefe of NextEra stated that NextEra is committing to send a letter on the docket by May 6, 2012, with dates for submitting a root cause evaluation, interim assessment engineering evaluation, revised operability determination, University of Texas test results, ASR reaction rate, and corrective action plan. Mr. O'Keefe also said that NextEra plans to submit an ASR AMP for the Seabrook LRA by May 25, 2012.

The public comment period started at 3:40 pm. Ms. Debbie Grinnell of C-10 Foundation, Mr. Bruce Skud of No More Fukishimas!, Doug Bogen of Seacoast Anti-Pollution League, and David Gress of the University of New Hampshire participated during the public comment/question period.

Ms. Grinnell provided the NRC staff with the following documents: (1) Concrete Degradation at the Seabrook Nuclear Power Plant, (2) Commentary on the Alkali-Silica Reaction in Concrete Structures at the Seabrook Nuclear Plant, dated March 14, 2012, and (3) a letter requesting additional information concerning Seabrook's ASR concrete degradation's extent of condition (ADAMS Accession No. ML121160459). Documents (1) and (2) are located on the Union of Concerned Scientists webpage at the following link: http://www.ucsusa.org/news/press_release/report-finds-many-unanswered.html

On April 24, 2012, Ms. Grinnell provided an email (ADAMS Accession No. ML121160451) replacing questions from the letter provided at the public meeting contained in ADAMS Accession No. ML121160459.

Mr. Skud provided comments (ADAMS Accession No. ML121160467).

Mr. Bogen stated that the sea level rise/storm surge coastal impacts in coming decades, even being 20 feet above sea level, is no guarantee against "worst case" potential storm surge impacts. Mr. Bogen made reference to Dr. Cameron Wake and University of New Hampshire's Institute for the Study of Earth, Oceans and Space and Dr. Ellen Douglas at University of Massachusetts in Boston. Mr. Bogen said that these and others are contributing to a growing body of research on the acceleration of change in water regimes of coastal areas, including the seacoast of New Hampshire, that threatens coastal infrastructure in coming decades that the NRC ignores to resident's peril.

Mr. Gress was supportive of the approach NextEra was taking concerning the ASR issue and he agreed that the University of Texas at Austin testing plan is the best approach.

The public comment period ended at 4:25 pm. No regulatory decisions were made during the meeting. The meeting adjourned at 4:30 pm.

Please direct any inquiries to me at 301-415-3100 or John.Lamb@nrc.gov.

John G. Lamb, Senior Project Manager
Plant Licensing Branch 1-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure: List of Attendees

cc w/encl: Distribution via Listserv

SEABROOK ASR PUBLIC MEETING
ATTENDANCE

April 23, 2012

10:00 AM

Commissioner Hearing Room O-1F16/O-1G16

Name	Branch
1. John G. Lamb	NRC
2. Meena Khanna	NRC
3. George Thomas	NRC
4. Mike Marshall	NRC
5. Alice Erickson	NRC
6. Abdul Sheikh	NRC
7. Rich Conte	NRC
8. Chris Miller	NRC
9. Melanie Galloway	NRC
10. Louise Lund	NRC
11. Art Burritt*	NRC
12. Jacob Philip*	RES
13. Debbie Grinnell	C-10
14. Bruce Skud*	No More Fukushimas!
15. Dave Mullen*	IBEW
16. Matthew Brock*	Commonwealth of Massachusetts
17. Steve White*	Structural Integrity Associates, Inc.
18. Joanna Hammond*	No More Fukushimas!
19. Nicolas Petit*	
20. Kurt Sitler*	
21. Jennifer Fallace*	Commonwealth of Massachusetts
22. Brenda Buote*	Boston Globe
23. Sandra Lindo-Talin*	NRC
24. Michael Waldron*	NextEra
25. Dean Deschenes*	Ferguson Structural Engineering Laboratory
26. Allen Hiser*	NRC
27. Dom Nicasto*	Gatehouse Media
28. Sara Gebo*	NextEra
29. Matthew Hiser*	NRC
30. Tom Irwin*	Conservation Law Foundation
31. Paul Willougby*	NextEra
32. Al Griffith*	NextEra
33. Michal Freedhoff*	Congressman Markey's office
34. Charles Moskowitz	Congressman Tierney's office

Enclosure

35. Tom Crimmins*	Worley Parsons (consultant for Massachusetts Municipal Wholesale Electric Company)
36. Kenneth Chew*	NextEra
37. Paul O. Freeman	NextEra
38. Richard Noble	NextEra
39. Michael Collins	NextEra
40. Michael O'Keefe	NextEra
41. Richard Cliché	NextEra
42. Brian Brown	NextEra
43. Theodore Vassallo	NextEra
44. Thomas Roberts	MPR Associates
45. John Simons	MPR Associates
46. Dr. Oguzhan Bayrak	University of Texas at Austin
47. Alan Griffith	NextEra
48. Steve Hamrick	NextEra
49. Bill Raymond*	NRC
50. John Joliceur	NRC
51. Shir Haberman*	Portsmouth Herald
52. Cimberly Nickell*	NRC
53. Kenneth Snyder*	NIST
54. Doug Bogen*	Seacoast Anti-Pollution League
55. Ryan Maisel*	MPR Associates
56. Jim Haddadin*	Foster's Daily Democrat
57. Kevin Gantz*	MPR Associates
58. James Connolly*	FPL
59. Sandra Gavutis*	C-10
60. Dan Naus*	ORNL
61. Neil Sheehan*	NRC
62. David Gress*	University of New Hampshire
63. Daniel Diorio*	Senator Scott Brown's office (R-MA)
64. Mark Fuhrmann	NRC
65. Martin Murphy	NRC
66. Mike Cheok	NRC
67. James Clifford	NRC
68. Suresh Chaudhry	NRC
69. Herman Graves	NRC
70. John Vera	NRC
71. Eugene Dacus	NRC
72. Scott Burnell	NRC
73. Mary Spencer	NRC

*via telephone

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Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure: List of Attendees

cc w/encl: Distribution via Listserv

Distribution:

Public LPL1-2/Branch Reading RidsNrrLPL1-2 Resource
RidsNrrPMSeabrook RidsNrrLAABaxter

ADAMS Accession No. ML121220109 ***via email**

OFFICE	LPL1-2/PM	LPL1-2/LA	RI/DRS/BC	RI/DRP/BC	DLR/BC	LPL1-2/BC	LPL1-2/PM
NAME	JLamb	ABaxter *	RConte*	ABurritt*	MMarshall*	MKhanna	JLamb
DATE	4/ 30/12	05/03/12	05/03/12	04/ 27/12	04/ 29/12	5/ 03 /12	5/ 04 /12

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