



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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November 25, 2014

Mr. Dean Curtland
Site Vice President
Seabrook Station
NextEra Energy
626 Lafayette Road
Seabrook, NH 03874

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RELATED TO THE REVIEW OF
THE SEABROOK STATION LICENSE RENEWAL APPLICATION – SET 23
(TAC NO. ME4028)

Dear Mr. Curtland:

By letter dated May 25, 2010, NextEra Energy Seabrook, LLC submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew the Operating License NPF-86 for Seabrook Station, Unit 1, for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review.

The request for additional information was discussed with Mr. Edward Carley, and a mutually agreeable date for the response is within 90 days from the date of this letter. If you have any questions, please contact me at 301-415-1427 or by e-mail at richard.plasse@nrc.gov.

Sincerely,

/RA/

Richard Plasse, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure:
Requests for Additional Information

cc w/encl: Listserv

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SEABROOK STATION
LICENSE RENEWAL APPLICATION
REQUEST FOR ADDITIONAL INFORMATION SET 23

B.2.1.31A-2(a)

Background

In its response to Request for Additional Information (RAI) B.2.1.31A-2, part 4, dated May 15, 2014, regarding criteria by which the frequency of inspection may be changed, the applicant stated that there are no plans to change the inspection frequency. However, the applicant also stated that if the “ASR monitoring results” indicate a need to amend the acceptance criteria or frequency of inspection, it will take such action under the “operating experience” program element of the Alkali-Silica Reaction (ASR) Monitoring Program.

Issue

It is not clear if the “ASR monitoring results” will be used to increase the inspection interval to greater than the 5-year interval specified in American Concrete Institute (ACI) 349.3R. Changing the inspection frequency for either tier two or tier three structures beyond 5 years may inhibit the applicant’s ability to adequately monitor for expansion due to cracking from reaction with aggregates.

Request

State whether the frequencies of inspection, established within the ASR Monitoring Program (Tier 2 and 3), will be allowed to exceed the 5-year interval generally accepted for concrete inspections per ACI 349.3R. If so, provide a justification for how inspection frequencies, exceeding a 5-year interval, will ensure adequate aging-management of ASR-affected structures.

B.2.1.31A-5(a)

Background

In its response to RAI B.2.1.31A-4, dated May 15, 2014, the applicant clarified that the large-scale testing program does not have a role in establishing the technical basis for the ASR Monitoring Program, and with respect to the monitoring parameters, the large-scale testing program is “confirmatory in nature.” However, the testing is referenced in and appears to be relied upon to address the staff’s concerns regarding the “parameters monitored or inspected” “detection of aging effects,” “monitoring and trending,” and “acceptance criteria” program elements.

In response to RAI B.2.1.31A-5, dated May 15, 2014, part (1) regarding the adequacy of the crack indexing methodology to monitor volumetric expansion, the applicant indicated that the magnitude of expansion in the reinforced direction (the in-plane, or “x-y”, direction which is the direction being monitored on the concrete surface onsite) will be smaller than in a non-reinforced direction (the “through-wall” or “transverse” direction not currently being monitored). The applicant also stated that:

ENCLOSURE

[b]ased upon a preliminary review of large-scale testing results to date, the test specimens appear to confirm CCI as an appropriate parameter for monitoring ASR progression.... However, expansion in the test specimens in x and y plane appears to level off over time and is smaller in magnitude than the transverse direction.

The applicant further stated that “the test specimens continue to generate information for other parameters including transverse direction expansion, material property changes (e.g., modulus) and the results will be used to confirm and adjust monitoring parameters....”

In response to RAI B.2.1.31A-5, part (2) regarding a proposed method or technique to monitor expansion in the transverse direction, the applicant committed (Commitment No. 83) to install instrumentation in “representative sample areas” to monitor expansion in the transverse direction. The applicant stated that “expansion data from deep pins installed in test specimens will be used to correlate with transverse expansion measurements from instruments to be installed in plant structures,” and that if determined necessary, “the instrument and pin expansion data will be used to establish acceptance criteria and monitoring frequencies for monitoring transverse expansion.

Nuclear Regulatory Commission (NRC) guidance as stated in Standard Review Plan for License Renewal (SRP-LR), Section A.1.2.3.3, states that the “parameters monitored or inspected” program element should provide a link between the parameters that will be monitored and how monitoring these parameters will ensure adequate aging management.

Issue

The staff has identified the following concerns:

1. The applicant stated, in its response dated May 15, 2014, to part (1) of RAI B.2.1.31A-5, that a larger number of smaller cracks would be anticipated in the restrained direction relative to a smaller number of larger width cracks in an unrestrained direction for the same amount of ASR progression. However, the applicant did not provide any information regarding the structural implications of this phenomenon.
2. It is not clear to the staff how measuring Combined Cracking Index (CCI) and crack width as parameters will correlate the aging effect of cracking due to expansion from reaction with aggregates to the degradation of ASR-affected structures in order to evaluate whether there is an impact on the structure’s intended function. Also, confinement due to reinforcement detailing may affect the CCI measurement between structures. The staff is not clear how it can be confirmed that the same CCI value measured on different structures represents the same degree of ASR degradation.
3. In its response dated May 15, 2014, to part 2 of RAI B.2.1.31A-5, the applicant refers to “representative sample areas” that it plans to monitor expansion due to ASR in the out-of-plane direction. However, the response did not provide any further information as to

how the sample will be determined. SRP-LR Section A.1.2.3.4 states that when sampling is used to represent a larger population size, the basis for the sample size should be provided, and should be biased toward locations most susceptible to the specific aging effect. The staff does not have sufficient information to determine whether the sample will be adequate to ensure that the areas instrumented for through-wall expansion data will be bounding of the ASR-related degradation at the plant.

4. Commitment No. 83 states that instrumentation to monitor expansion due to ASR in the out-of-plane direction will be installed “to determine whether there is a need to enhance the program to monitor expansion in the out-of-plane direction.” Commitment 83 also states that this evaluation will take place “prior to the period of extended operation;” however, the implementation schedule did not contain sufficient detail for the staff to review and evaluate. The staff is concerned that depending on when this activity is performed, if it is determined that it is necessary to monitor out-of-plane expansion, there may not be sufficient time to acquire enough information to determine whether the expansion could impact structural function. The RAI response did not provide any information regarding schedule and duration of activities, and associated technical bases, in order for the staff to determine whether the time of implementation provides for adequate monitoring and trending during the Period of Extended Operation (PEO).
5. The applicant’s RAI response states “expansion data from deep pins installed in test specimens will be used to correlate with out-of-plane expansion measurements from instruments to be installed in plant structures.” It also states that “[i]f an additional monitoring parameter in the out-of-plane direction is determined to be necessary as part of the [ASR] Monitoring Program, NextEra will enhance the [program]...to establish acceptance criteria and monitoring frequencies for monitoring out of plane expansion.” It is not clear how the expansion data from deep pins in test specimens will be correlated to data from instrumentation installed in plant structures because there is no expansion data measured to date for onsite structures, and it is not clear how the test specimens simulate the boundary conditions of the structural components (e.g., walls) of the onsite structures.
6. Since the majority of the walls of the ASR-affected structures at Seabrook are not restrained in the transverse direction, expansion in the transverse direction could lead to laminar cracking which could propagate with time. It is not clear whether the program accounts for the potential for laminar cracking and its implication with regard to structural and anchor bolt capacity or if there is a technical basis for not considering the potential for delamination.
7. During a February 21, 2013, public meeting with the applicant, the staff expressed its concern regarding the ability to correlate CCI to loss of strength, a parameter not

monitored as part of the ASR Monitoring Program. As documented in the meeting summary (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13066A488), the applicant responded to that concern stating that the selection of specific acceptance criteria was based on its review of industry experience. The large-scale testing, which it is currently pursuing, will provide results that will be used for its structural evaluation to determine operability and for assessing and evaluating plant structures impacted by ASR. The staff is concerned that there is no aspect of the ASR Monitoring Program, either periodic or one-time, that would validate the assumed changes in material properties being established through the large-scale testing program. It is unclear to the staff whether the applicant will have enough information to perform an adequate structural evaluation if warranted.

At this time, it appears that multiple elements of the program have yet to be fully established and may need to be amended; therefore, the staff does not have sufficient information to make a determination that the effects of cracking due to expansion from reaction with aggregates will be adequately managed during the period of extended operation.

Request

Considering the staff concerns identified in the "Issue" section, provide information with technical basis to: (1) demonstrate the adequacy of the parameters proposed to be monitored or inspected by the program to manage the effects of aging due to ASR; and (2) clearly establish the link between the parameters that will be monitored and how monitoring these parameters will ensure adequate aging management such that intended function will be maintained during the period of extended operation.

B.2.1.31A-6(a)

Background

In its response to RAI B.2.1.31A-6, dated May 15, 2014, the applicant stated that a separate evaluation for inaccessible areas has not been performed; however, the opportunistic or focused inspections performed every 5 years will establish the baseline for future monitoring and trending. The applicant also stated that the concrete materials used to produce concrete at the site was the same for both accessible and inaccessible areas of structures; therefore, the performance and aging would be the same.

Regarding the evaluation of inaccessible areas, the applicant stated in its response to RAI B.2.1.31-1, dated March 30, 2012, that "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." The applicant also stated in its response to RAI B.2.1.31-9 dated November 2, 2012, that "since these [accessible] surfaces have the least confinement, the expansion will be most pronounced on the exposed surfaces."

Issue

In the absence of an evaluation for the acceptability of inaccessible areas, where conditions in accessible areas indicate the presence of ASR, the staff cannot verify that the effects in accessible areas would be the same for inaccessible areas. The rate of expansion on the exterior surface of structures, some of which are directly exposed to groundwater, could be greater than the observed planar (“x-y,” or “in-plane”) expansion on the interior surfaces of structures. Although the ASR Monitoring Program was revised to include inspection of inaccessible areas meeting the criteria described in the program, the staff is concerned that the opportunistic or focused inspections may not be representative of inaccessible areas of accessible concrete exhibiting the highest levels of ASR degradation.

Request

For inaccessible areas of concrete structures, state whether actions will be taken to confirm the validity of the expectation that the magnitude of cracking due to expansion from reaction with aggregates is not greater than that observed on the accessible surfaces. Include a discussion of any planned actions. If not, explain how, absent an evaluation of inaccessible areas, the program will ensure ASR is not more severe in inaccessible areas.

RAI B.2.1.31A-7

Background

LRA Section B.2.1.31A, dated May 16, 2012, states under the “Monitoring and Trending” program element that “newly discovered areas exhibiting visual signs of ASR are identified during routinely performed Structural Monitoring Program inspections.” LRA Section B.2.1.31 states that periodic visual inspections are performed at a frequency determined by the characteristics of the environment in which the structure is found. LRA Section B.2.1.31 further states that for structures in a harsh environment, inspections are performed on a 5 year basis whereas for structures in a mild environment, inspections are performed on a 10 year basis. The applicant’s response to RAI B.2.1.31-5, dated February 3, 2011, describes what is defined as a harsh environment and lists the frequency of visual inspections for the structures within the scope of license renewal, based on the structure category defined in ACI-349.3R.

Issue

ASR has been observed throughout the site in concrete structures exposed to various environments. Considering that the ASR Monitoring Program augments the Structures Monitoring Program and ASME Section XI, Subsection IWL Program, and that “newly discovered” areas requiring monitoring for ASR progression will be identified during routine inspections in accordance with these programs, the staff is concerned that the frequency of inspection for structures in a mild environment, i.e., 10 years, may not identify “newly discovered” areas in a manner that would provide for adequate monitoring and trending.

Request

The staff requests that the applicant:

1. State whether the 10-year inspection frequency is adequate for identifying new locations affected by ASR in structures exposed to a mild environment, and if so, provide the

basis why the 10-year frequency will provide for adequate monitoring and trending, during the period of extended operation.

2. If these structures in a mild environment will be monitored at a frequency other than that originally described in the License Renewal Application (LRA), state the new inspection frequency and provide the basis for its determination.

Letter to D. Curtland from R. Plasse dated November 25, 2014

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