UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	Docket No. 50-443-LA-2
NEXTERA ENERGY SEABROOK, LLC	)	
	)	January 31, 2020
(Seabrook Station Unit 1)	)	

NEXTERA ENERGY SEABROOK LLC'S
SUPPLEMENTAL PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

Pursuant to 10 C.F.R. § 2.1209, and the Atomic Safety and Licensing Board's ("Board") Orders of November 25, 2019,[1] and January 17, 2020,[2] NextEra Energy Seabrook, LLC ("NextEra") submits its Supplemental Proposed Findings of Fact and Conclusions of Law ("Supplemental Proposed Findings") regarding C-10 Research and Education Foundation, Inc.'s ("C-10") Contention, as admitted by the Board in LBP-17-7.[3] As directed by the Board,[4] these Supplemental Proposed Findings are limited to the specific issues raised in Dr. Saouma's supplemental mineralogy testimony (INT051-R) and NextEra's and the NRC Staff's supplemental testimony in response thereto (NER077 and NRC091). NextEra's Supplemental Proposed Findings provide citations to the evidentiary record in this proceeding and are set out in numbered paragraphs beginning in the next section. NextEra's Supplemental Proposed Findings

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1 Licensing Board Order (Granting C-10's Motion to Compel Mineralogical Data and Request to Submit Supplemental Written Testimony Concerning the Data; Denying C-10's Motion to Submit Additional Exhibits) (Nov. 25, 2019) (unpublished) ("11/25/19 Order").

2 Licensing Board Order (Admitting Exhibits, Closing the Record of the September 2019 Evidentiary Hearing, and Providing Additional Instruction for Supplemental Proposed Findings) (Jan. 17, 2020) (unpublished) ("1/17/20 Order").

3 *NextEra Energy Seabrook LLC* (Seabrook Station Unit 1), LBP-17-7, 86 NRC 59, 90 (2017), *aff'd* CLI-18-4, 87 NRC 89 (2018).

4 11/25/19 Order at 17; 1/17/20 Order at 2.

are submitted in the form of a supplement to NextEra's initial Proposed Findings[5] and Responsive Proposed Findings[6] (which were in the form of a proposed Initial Decision by the Board), and therefore continue using the same acronyms and short citations as previously defined.

I. SUPPLEMENTAL FINDINGS

A. Additions to "History of the Proceeding" (Proposed Findings § II)

1. On December 13, 2019, NextEra filed a Motion for Leave to File Responsive Proposed Findings,[7] which we granted on January 6, 2020.[8]

2. Pursuant to the Board's November 25, 2019 Order, C-10 submitted its supplemental mineralogy testimony on December 19, 2019.[9] NextEra[10] and the NRC Staff[11] submitted their supplemental testimony in response thereto on January 10, 2020. We admitted those exhibits, and closed the record of this proceeding, on January 17, 2020.[12] The parties filed

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5 NextEra Energy Seabrook, LLC's Proposed Findings of Fact and Conclusions of Law (Nov. 21, 2019) (ML19325F390) ("NextEra FOF").

6 NextEra Energy Seabrook, LLC's Responsive Proposed Findings of Fact and Conclusions of Law (originally filed Dec. 13, 2019; scrivener's error corrected Dec. 17, 2019) (ML19351F136) ("NextEra Responsive FOF").

7 NextEra Energy Seabrook LLC's Motion for Leave to File Responsive Proposed Findings of Fact and Conclusions of Law (Dec. 13, 2019) (ML19347D064).

8 Licensing Board Order (Granting NextEra's Motion for Leave to File Responsive Proposed Findings of Fact and Conclusions of Law) (Jan. 6, 2020) (unpublished).

9 Supplemental Testimony of Victor E. Saouma, Ph.D Regarding Adequacy of Petrographic Documents to Support Mineralogical Comparison Between Seabrook Concrete and LSTP Test Specimens (INT051) (Dec. 20, 2019). On January 6, 2020, C-10 filed a revised version. Supplemental Testimony of Victor E. Saouma, Ph.D Regarding Adequacy of Petrographic Documents to Support Mineralogical Comparison Between Seabrook Concrete and LSTP Test Specimens (INT051-R) (Jan. 6, 2020) ("Saouma Mineralogy Testimony").

10 Testimony of NextEra Witnesses John Simons, Christopher Bagley, Oguzhan Bayrak, Matthew Sherman, and Edward Carley in Response to Exhibit INT051-R (Jan. 10, 2020) (NER077) ("NextEra Mineralogy Testimony").

11 Staff Testimony in Response to Exhibit INT051-R (Jan. 10, 2020) (NRC091) ("Staff Mineralogy Testimony").

12 1/17/20 Order.

their supplemental proposed findings addressing this supplemental mineralogy testimony on January 31, 2020.[13]

B. Additions Related to "Concrete Mixture Design" (Proposed Findings § IV.D.(1)) and "In-Plane Expansion" (Proposed Findings § IV.E.(1)a.)

3. In his Mineralogy Testimony (INT051-R), Dr. Saouma argues that "NextEra has not provided enough information to allow a comparison between the mineralogy of Seabrook concrete and LSTP test specimens, and consequentially the concrete is not proven to be sufficiently representative."[14] Dr. Saouma's argument is premised on his opinion that "chemical characteristics"—and more specifically, the "[r]eactivity of the aggregate"—"has a significant effect on the characteristics of the gel and microcracking."[15] As NextEra's experts observed, the "[c]hemical characteristics of the minerals in the aggregate may be a relevant input to the type of predictive chemo-mechanical modeling approach advocated by Dr. Saouma. However, Dr. Saouma cites no support for a claim that these chemical characteristics are a relevant consideration (much less a critical characteristic) for NextEra's approach to ASR monitoring," which focuses on structural adequacy.[16] The NRC Staff reached the same conclusion.[17] And the Board agrees. C-10 has cited no published literature, academic research, or independent studies to support a finding that the chemical characteristics of the minerals in the aggregate (referred to herein as "aggregate chemistry") or ASR gel type somehow are relevant considerations for ASR

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[13] C-10 Research and Education Foundation's Supplemental Proposed Findings of Fact and Conclusions of Law (Jan. 31, 2020) ("C-10 Supplemental Proposed Findings"); NRC Staff Supplemental Proposed Findings of Fact and Conclusions of Law (Jan. 31, 2020); NextEra Energy Seabrook LLC's Supplemental Proposed Findings of Fact and Conclusions of Law (Jan. 31, 2020).

[14] Saouma Mineralogy Testimony at 2 (INT051-R).

[15] *Id*. at 1 (citing Exh. INT028 §§ D.1, D.6, D.7.2, D.8.1; Tr. 981-82, 984-85, 1073-76, and 1082-83).

[16] NextEra Mineralogy Testimony at A9 (NER077); *see also* MPR Testimony at A198 (NER001).

[17] Staff Mineralogy Testimony at A5 (NRC091) ("nothing in the literature supports Dr. Saouma's argument.").

monitoring programs such as NextEra's that use expansion measurements[18] (e.g., crack width, pin-to-pin, and extensometer measurements) to determine the structural impacts of ASR.

4. In contrast, there exists a body of literature that supports NextEra's conclusion that aggregate chemistry and the resulting ASR gel type are not relevant to NextEra's traditional aging management approach to ASR monitoring.[19] For example, current industry guidance for addressing ASR, including the ISE Guideline (NER012), FHWA Guideline (NER013), and CSA Guideline (NRC076), all advocate the use of expansion measurements to gauge structural ASR impacts. None of these documents identify aggregate chemistry or ASR gel type as having any influence on the structural impacts of ASR, the recommended approach for assessing ASR-affected structures, or expansion monitoring techniques for ASR. And none of these documents identify gel chemistry as a parameter to be determined either in the initial diagnosis phase or in the subsequent monitoring phase of an ASR aging management program.

5. More specifically, the ISE Guideline explicitly acknowledges and discusses differences in ASR gel type (e.g., noting that "[i]ts consistency can range from that of heavy engine oil to that of polyethylene"),[20] but does not suggest that these differences have any impact

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[18] [NOTE: The Board requested that the parties' supplemental proposed findings identify exhibits that address "the question whether differences in the chemical composition of ASR gel may (or may not) affect either (1) the structural impacts of ASR, or (2) the adequacy of the CCI methodology for ASR expansion monitoring." 1/17/20 Order at 2. NextEra's Supplemental Proposed Findings address both topics. However, for the sake of clarity, NextEra notes that the discussion of CCI is couched within the broader term of "expansion measurements." This term is intended to encompass all measurement methods in the LAR, including crack width measurements (i.e., CI and CCI), pin-to-pin measurements, and extensometer measurements.]

[19] *See, e.g.*, MPR Testimony at A118 (NER001) ("The LSTP focused on structural performance rather than the specific chemical interactions. The different types of ASR may cause different levels of expansion; however, for a given level of ASR-induced expansion, similar levels of structural impacts are to be expected, regardless of the chemical composition of the ASR gel causing the expansion."); *see also* NextEra Mineralogy Testimony at A8 (NER077) (noting that the recommendations in these documents "are based on measured total expansion, and do not include any conditional provisions if the given expansion is comprised of many tiny microcracks or a lesser number of wider cracks.").

[20] ISE Guideline § 3.3 (NER012).

on structural performance or monitoring techniques such as crack width indexing.[21] The FHWA Guideline similarly discusses the use of expansion measurements such as crack width indexing for ASR monitoring, with no differentiation as to ASR gel type.[22] Further, the FHWA Guideline states that ASR gel volume (which is influenced by aggregate chemistry) is not evidently correlated with the magnitude of expansion and cracking.[23] The CSA Guideline reaches a similar conclusion,[24] and likewise excludes any suggestion that determining the chemical composition of the aggregate or the ASR gel is necessary for (or relevant to) the use of expansion to gauge structural impacts in an ASR monitoring program.[25] The absence of any discussion in the published literature of a connection between aggregate chemistry and ASR expansion measurements is conspicuous and undercuts C-10's unsupported claim that such a connection exists.

6. At the evidentiary hearing, Dr. Saouma agreed with NextEra that these documents do not differentiate structural effects based on ASR gel type.[26] And Dr. Saouma further agreed with NextEra that ASR gel type is not relevant to shear strength.[27] Thus, there is no dispute

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[21] *Id*. §§ 6.3.2 (characterizing the "expansion index" into five tiers by expansion level with no mention of any adjustments based on aggregate chemistry or gel type); 8.2 (discussing structural consequences based on the "expansion index," again with no mention of different potential structural consequences based on aggregate chemistry or gel type).

[22] FHWA Guideline §§ 4.4.2, 5.2.2, App. B, tbl. C1, C.2.1 (NER013).

[23] *Id*. § C.2.1.

[24] CSA Guideline § 6.2.2.3 (NRC076) ("The presence of large amounts of gel in a concrete specimen does not necessarily indicate that large expansion or extensive cracking has occurred in the structure. On the other hand, cracking due to ASR has been observed in many concrete structures in which very little gel was found.").

[25] *Id*. §§ 5.7.2, 5.7.3.

[26] Tr. at 988.

[27] Tr. at 998.

among the parties on either of these points.[28] And to the extent C-10 argues that these guidance documents (and ASR monitoring programs, generally) *should* differentiate structural effects or monitoring techniques based on ASR gel type, it cited no studies or other research to support its views.[29]

7. Indeed, C-10 admits that it presented no evidence that aggregate chemistry or ASR gel type are relevant to structural capacity—which is the fundamental focus of the LSTP and NRC Staff's review.[30] Rather, C-10 argued that aggregate chemistry and ASR gel type impact the ASR reaction *rate* and the ultimate expansion *potential*—which Dr. Saouma speculates could be "under-estimated" if aggregate chemistry and ASR gel type are not analyzed.[31] But C-10 presented no evidence that the rate or the potential ultimate expansion value are relevant to an ASR monitoring program that regularly measures and trends (i.e., does not seek to "estimate" or predict) expansion.[32]

8. C-10 also argued that the specific cracking pattern (influenced by aggregate chemistry or ASR gel type) is a relevant consideration.[33] But again, C-10 proffered no evidence or explanation to connect this alleged relevance to NextEra's specific ASR monitoring program, which measures total expansion regardless of whether "the given expansion is comprised of

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[28] *See also* Staff Mineralogy Testimony at A5 (NRC091) ("[i]ndustry guidelines and published research on the structural impacts of ASR do not differentiate based on the characteristics of the gel giving rise to the ASR expansion").

[29] *Accord* NextEra Mineralogy Testimony at A9 (NER077) ("Dr. Saouma cites no support for a claim that these chemical characteristics are a relevant consideration (much less a critical characteristic) for NextEra's approach to ASR monitoring"); Staff Mineralogy Testimony at A5 (NRC091) ("Dr. Saouma does not provide any support for his argument").

[30] C-10 Supplemental Proposed Findings at 2 ("Dr. Saouma has not testified that the chemical characteristics of aggregates and the associated ASR gel are relevant to structural capacity.").

[31] *Id*. at 3.

[32] As noted elsewhere in our decision, no LSTP data was used to establish NextEra's monitoring intervals.

[33] C-10 Supplemental Proposed Findings at 3.

many tiny microcracks or a lesser number of wider cracks."[34] By way of example, under NextEra's monitoring program, four cracks that each had X width would yield the same total expansion value as two cracks that each had a width of 2X. C-10 fails to explain why the specific *arrangement* of the cracks could—in any way—materially impact this methodology. Accordingly, we find there is insufficient support in the record for a claim that the absence of aggregate chemistry or ASR gel type in the LSTP's list of critical characteristics for concrete mixture design somehow renders the LSTP data non-representative or defeats a finding of reasonable assurance.[35]

9. The Board also notes that, *if* accepted industry guidance evolves in the future—based on additional ASR research (e.g., from RILEM[36] or other bodies) and concrete industry experience—and indicates that aggregate chemistry or ASR gel type are in fact relevant to monitoring programs that use expansion measurements to gauge ASR-related structural impacts, NextEra would be *required* to evaluate and address such new information as part of its NUREG-0737 Operating Experience program and other docketed commitments made to the NRC.[37]

10. The Board concludes that a preponderance of the evidence demonstrates that neither aggregate chemistry nor ASR gel type are "critical" parameters for representativeness in the Seabrook ASR monitoring program. Further, the LSTP's use of a faster reacting concrete mix (which purposefully does not yield a representative *rate* of expansion) is common and necessary for accelerated ASR testing and, as a result, the concrete used in the LSTP and

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[34] NextEra Mineralogy Testimony at A8 (NER077).

[35] *Accord* Staff Mineralogy Testimony at A5 (NRC091) ("there is no reason to believe the exact characteristics of the gel could affect structural capacity").

[36] RILEM is the International Meeting of Laboratories and Experts of Materials, Construction Systems and Structures, of which Dr. Saouma is a member. *See* Saouma Testimony at A.3 (INT001-R).

[37] *See* Tr. at 1135-37.

Seabrook cannot be "mineralogically identical," as C-10 demands.[38] None of C-10's arguments in this regard materially challenge the applicability of the LSTP data to Seabrook or defeat a finding of reasonable assurance.

Respectfully submitted,

Executed in Accord with 10 C.F.R. § 2.304(d)

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Dated in Washington, DC
this 31st day of January 2020

[38] C-10 Supplemental Proposed Findings at 2.

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CERTIFICATE OF SERVICE

Pursuant to 10 C.F.R. § 2.305, I certify that, on this date, the foregoing "NextEra Energy Seabrook LLC's Supplemental Proposed Findings of Fact and Conclusions of Law" was served upon the Electronic Information Exchange (the NRC's E-Filing System), in the above-captioned proceeding.

Signed (electronically) by Ryan K. Lighty

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