UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of NEXTERA ENERGY SEABROOK, LLC (Seabrook Station, Unit 1)	Docket No. 50-443-LA-2 ASLBP No. 17-953-02-LA-BD01

Hearing Exhibit

Exhibit Number: NRC046

Exhibit Title: Summary of August 24, 2017, Meeting with NextEra Energy Regarding license amendment request on alkali silica reaction (CAC No. MF8260; EPID l-2016-lla-0007) (Oct. 13, 2017)

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

October 13, 2017

LICENSEE: NextEra Energy Seabrook, LLC

FACILITY: Seabrook Station, Unit No. 1

SUBJECT: SUMMARY OF AUGUST 24, 2017, MEETING WITH NEXTERA ENERGY REGARDING LICENSE AMENDMENT REQUEST ON ALKALI SILICA REACTION (CAC NO. MF8260; EPID L-2016-LLA-0007)

On August 24, 2017, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of NextEra Energy (NextEra, the licensee) at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss with NextEra issues related to the NRC staff's review of the alkali silica reaction (ASR) license amendment request (LAR) for Seabrook Station, Unit No. 1 (Seabrook). The meeting notice and agenda, dated August 10, 2017, are available in the Agencywide Documents Access and Management System (ADAMS) at Accession No. ML17222A087. Enclosure 1 to this memorandum is a list of attendees, Enclosure 2 is the NRC staff's presentation, and Enclosure 3 is the licensee's presentation.

The LAR proposes to change the licensing basis with a methodology to account for the effects of ASR in seismic Category I structures. A portion of this methodology describes a tiered approach of structural evaluations based on the level of ASR impact on each building. The different tiers are called stages one, two, and three, with stage three being the most complex evaluation. The meeting focused on the NRC staff's concerns with the stage three evaluations.

The meeting started with the NRC staff's presentation, which discussed what was being asked for in the LAR regarding stage three evaluations and then moved on to describe the staff's concerns. The NRC staff stated that based on the review of the submitted material and insights gained at a site visit to Seabrook from June 5, 2017, to June 9, 2017 (ADAMS Accession No. ML17199T383), it is not clear to the staff how the methodology described in the LAR could be consistently applied and similar results obtained.

The NRC staff also stated that significant decisions in the containment enclosure building calculation appear to be based on engineering judgment and that stage three evaluations appear to use an iterative process with no clear limitations. The NRC staff then detailed issues identified when reviewing the containment enclosure building calculation (list provided in the NRC staff's presentation). The staff expressed that in order to approve the methodology, the LAR must include sufficient detail on how the stage three evaluations are done such that a qualified engineer could follow the process from beginning to end and achieve consistent results. As Seabrook's LAR indicates it will remain in compliance with American Concrete Institute (ACI) 318-71, the staff requested a description of how those requirements will be met. If a requirement of ACI 318-71 will not be met, then the LAR should so indicate and provide justification for any alternatives. The NRC staff also stated it would expect a discussion in the application on limits for the use of iterative processes, guidance/criteria on when certain techniques or methods would be used (i.e., 100-40-40, moment redistribution, etc.), and limits on rebar strain under service load conditions, including ASR.

The NRC's presentation went on to discuss possible paths forward, including updating the methodology for stage three evaluations to address the issues discussed above or updating the application such that the licensee requests approval for the stage one and stage two methodologies, but for stage three, the licensee could submit each evaluation for NRC approval. The NRC stressed that it was up to NextEra to decide on the approach.

The NRC concluded its presentation by stating that some level of review of additional stage three evaluations is necessary (either a sample or all, depending on NextEra's path forward). The NRC's schedule for performing those reviews is dependent on NextEra completing its evaluations. The NRC staff expressed that being informed on the progress NextEra is making on the evaluations will allow the NRC to better plan out its resources for the reviews. The NRC staff also stressed that a completed evaluation ready for NRC staff review should be approved by NextEra from its vendor and incorporated by NextEra into its structures monitoring program.

NextEra began its presentation with an overview of its ASR evaluation process. During this discussion, NextEra stated that its path forward to resolving the NRC staff concerns related to stage three evaluations was to provide greater detail on how it performs its analyses by creating what it intends to call the methodology document. NextEra explained that the methodology document will provide a detailed repeatable process for stage one, stage two, and stage three evaluations. NextEra stated that the document will remove as much engineering judgment as possible and provide decision points as to what technical methods would be selected and why. NextEra stated that stage three evaluations will ensure a correlation between the model and field conditions. The NRC staff commented that the methodology document should ensure evaluations performed align with the results from testing done at the University of Texas also.

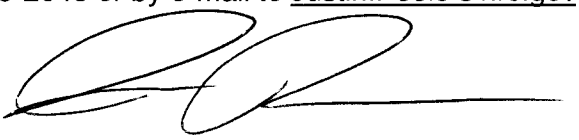
The NRC staff also questioned how this new document would align with others mentioned in the application, specifically, the criteria document. NextEra stated that the criteria document will no longer exist but will be incorporated into the methodology document. During NextEra's presentation on its methodology for developing threshold limits and monitoring those limits, the NRC staff had questions on the development of the minimum threshold factor. The NRC stated that the application needs to clearly define a process for how this is developed and how margin is added.

NextEra had slides providing the current status of the evaluations for the affected structures. The NRC asked NextEra to define what 100 percent complete meant. NextEra stated that 100 percent complete meant the calculations from the vendor had been reviewed and accepted by NextEra. The NRC staff commented that to support planning for NRC review, it would expect 100 percent complete to mean calculations from the vendor reviewed and accepted by NextEra and that NextEra has incorporated the results into its program. The NRC staff also asked whether any of the evaluations already completed would be reevaluated based on the creation of this new methodology document to ensure that the evaluations were done consistent with the process described in the new document. NextEra stated that those completed prior to the creation of the methodology document will be reviewed against the new document to see if any of the evaluations need to be re-done.

NextEra stated that while its planned path forward was to provide further detail on its process for performing stage three evaluations, it would discuss with management, based on the feedback provided by the NRC staff during the meeting, if this was still the preferred path to take. Since this meeting, NextEra has not indicated any change in plan.

Members of the public were in attendance. Ms. Diane Keenan made a comment to the NRC staff to ensure that NextEra provide more specific responses to the requests for additional information (RAIs) than seen in the past, and that the NRC staff ensure these findings ensure plant safety. Ms. Debbie Grinnell asked if there would be a transcript of the meeting to ensure that everything said is captured. The NRC staff responded that this meeting was not being transcribed and that it is not the practice of the NRC to transcribe all public meetings. Ms. Debbie Grinnell commented that since the NRC was repeating RAIs, there does not seem to be clarity in what NextEra is doing and that if it cannot answer the RAIs, Seabrook is in violation of its license. No public meeting feedback forms were received.

Please direct any inquiries to me at 301-415-2048 or by e-mail to Justin.Poole@nrc.gov.



Justin C. Poole, Project Manager
Plant Licensing Branch 1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures:
1. List of Attendees
2. NRC's Presentation
3. Seabrook's Presentation

cc w/Enclosures: Distribution via Listserv

LIST OF ATTENDEES

AUGUST 24, 2017, MEETING WITH NEXTERA ENERGY

REGARDING ALKALI SILICA REACTION LICENSE AMENDMENT REQUEST FOR

SEABROOK STATION, UNIT NO. 1

NRC Participants:

- Mary-Jane Ross-Lee, Deputy Division Director, Division of Engineering (DE), Office of Nuclear Reactor Regulation (NRR)
- Kamal Manoly, Senior Technical Advisor, NRR/DE
- Brian Wittick, Branch Chief, Structural Engineering Branch (ESEB), NRR/DE
- George Thomas, Senior Structural Engineer, NRR/DE/ESEB
- Bryce Lehman, Structural Engineer, NRR/DE/ESEB
- Angela Buford, Structural Engineer, NRR/DE/ESEB
- Dan Hoang, Senior Structural Engineer, NRR/DE/ESEB
- Justin Poole, Project Manager, Division of Operating Reactor Licensing, NRR
- Lois James, Senior Project Manager, Division of Materials and License Renewal (DMLR), NRR*
- Evelyn Gettys, Project Manager, NRR/DMLR
- Anita Ghosh, Senior Attorney, Office of the General Counsel
- Jeremy Wachutka, Attorney, Office of the General Counsel
- Jacob Philip, Senior Geotechnical Engineer, Division of Engineering, Office of Research
- Fred Bower, Branch Chief, Region 1, Division of Reactor Projects, Branch 3*
- Mel Gray, Branch Chief, Region 1, Division of Reactor Safety, Engineering Branch 1*
- William Cook, Senior Reactor Analyst, Region 1
- Richard Morante, Brookhaven National Laboratory*

NextEra Participants:

- Larry Nicholson, Licensing Director
- Ken Browne, Licensing Manager, Seabrook Station
- Mike Collins, Seabrook Engineering Director
- Edward Carle, Engineering Supervisor
- Jackie Hulben, Seabrook License Renewal
- Chuck Grimes, Engineering*
- Steven Hamrick, Attorney
- Said Bolourchi, Senior Principal, SGH
- Ryan Mones, Staff Structures, SGH
- John Simons, General Manager, MPR
- Amanda Card, Engineer, MPR
- James Moroney, Project Manager, MPR
- Paul Bessette, Attorney, Morgan Lewis

Public:

- Natalie Treat, C-10 Research and Education Foundation (C-10)
- Diane Keenan, C-10
- Debbie Grinnell, C-10

* participated by teleconference

Enclosure 2

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Seabrook Station
License Amendment Request
"Stage 3" Methodology

Justin Poole, Project Manager, DORL, NRR

Bryce Lehman, Structural Engineer, DE, NRR

George Thomas, Senior Structural Engineer, DE, NRR

Agenda

- Issues with Current Stage 3 Methodology
- Staff Expectations for Methodology
- Path Forward
- Schedule Discussion

Stage 3 as Described in LAR

- Description in LAR of advanced techniques proposed to be used is high-level with no implementation details provided for staff to evaluate as a generic method of evaluation
- Includes methods whose implementation appear open to interpretation, with no specific applicability limitations, justification or acceptance criteria, and may be outside the design code (ACI 318-71)
- LAR notes that analysis will demonstrate compliance with ACI 318-71

Staff Concerns with Stage 3

- It is unclear how the methodology as described in the LAR could be consistently applied and similar results obtained
  - Significant decisions in the Containment Enclosure Building (CEB) calculation appear to be based on engineering judgement
  - Stage 3 uses iterative processes with no clear limitations

Staff Concerns with Stage 3

- Review of Containment Enclosure Building (CEB) calculation identified several general issues:
  - ACI 318-71 requirements for moment redistribution do not appear to be met or justified; approach used does not appear to be supported by accepted concrete codes
  - Acceptance criteria are not provided for the structural adequacy of sections to develop a plastic hinge
  - A limit on moment redistribution iterations is not provided
  - No guidance is provided on determining the threshold factor or under what circumstances it can be modified
  - No evaluation of serviceability limit state included under normal service load conditions that include ASR

Staff Expectations for Methodology

- The LAR or UFSAR mark-up should include sufficient detail to allow qualified engineer to follow the process through any Stage 3 calc
  - How ACI 318-71 requirements will be met and/or justification for alternatives and requirements that are not met
  - Guidance/criteria on when proposed analysis techniques and methods can be used
  - Limits on the use of iterative processes
  - Identified rebar strain limits under normal service conditions including ASR load

Path Forward:
Potential LAR Supplement

- Potential LAR supplement options:
  - Update LAR to include detailed, consistently applicable methodology; staff will review a sample of completed calculations
  - Approval of partial methodology (Stage 1 & 2); all final Stage 3 evaluations for NRC review and approval
  - Other options?
- Approach is up to NextEra

Impacts on Schedule

- Staff intends to review a sampling of completed Stage 1, 2 and 3 analyses
  - Sampling dependent on analysis complexity and issues identified
- Schedule dependent on analyses availability
  - Analyses should be approved and incorporated by NextEra prior to NRC review

Questions?

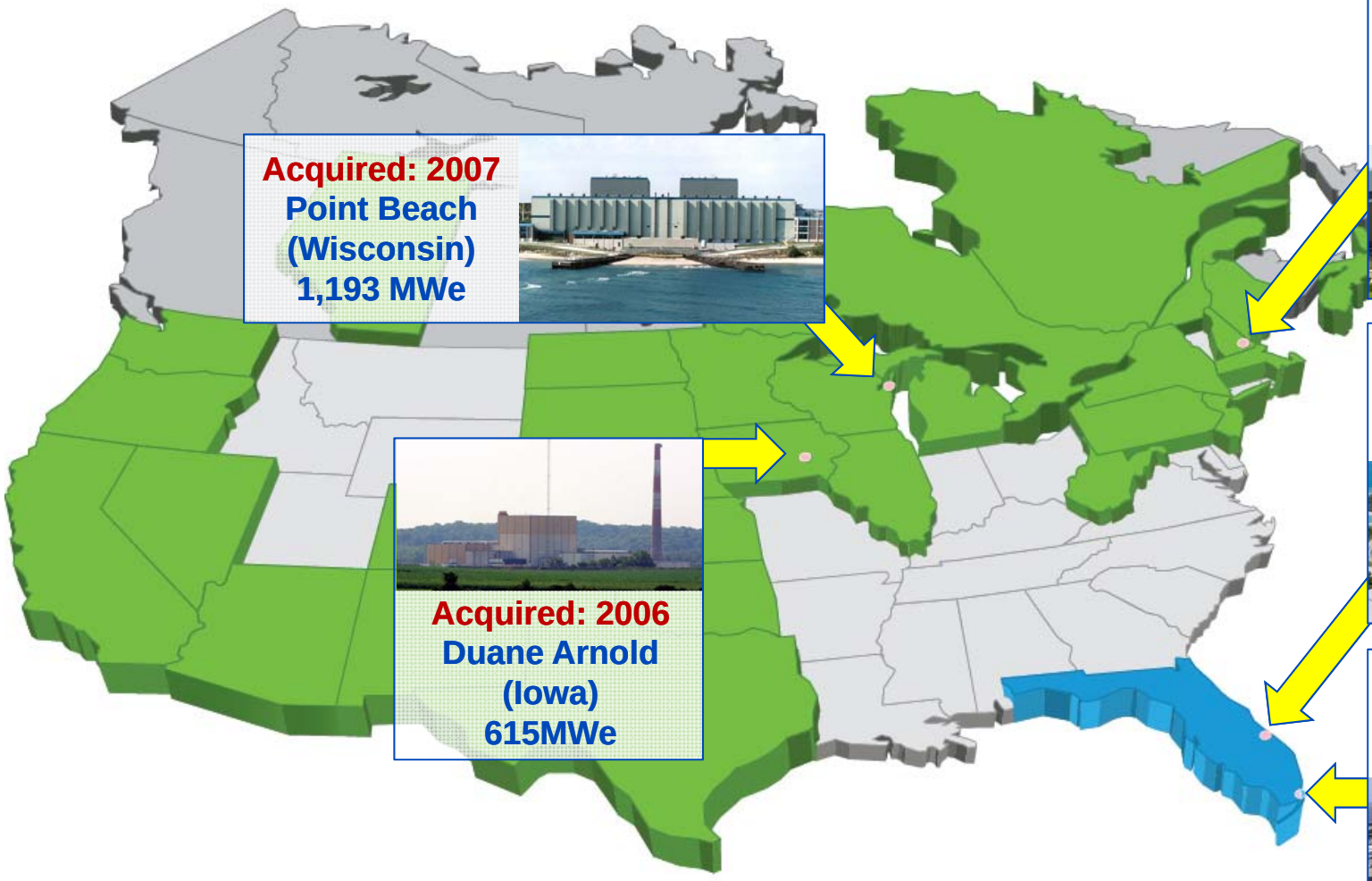
Enclosure 3

Seabrook Station
License Amendment Request 16-03
ASR Structural Evaluation Methodology

Ken Browne, Mike Collins

24 August 2017

NextEra Energy's nuclear fleet is 4th largest in MW generation and number of reactors in the U.S.



Acquired: 2007
Point Beach
(Wisconsin)
1,193 MWe

Acquired: 2006
Duane Arnold
(Iowa)
615MWe

Acquired: 2002
Seabrook
(New Hampshire)
1,245 MWe

St. Lucie
(Florida)
2,000 MWe

Turkey Point
(Florida)
1,600 MWe

NextEra Energy's nuclear plants represent approximately 27 percent of our generation

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The foundation for everything we do are the Values and Core Principles of our Nuclear Excellence Model

Nuclear Excellence Model

Vision	We are a team that delivers consistent excellent performance
Mission	We will produce energy in a safe, reliable, cost effective way, while caring for our employees, communities and the environment
Values	Conduct all activities to demonstrate a deep respect for Nuclear Safety Live the Safety Guiding Principles Be a Self-Improving Culture & Learning Organization Maximize the time spent on Prevention and Detection to minimize / eliminate Correction activities Foster a work environment where we are the employer of choice
Core Principles	Operationally Focused Passion for Excellence Engaged Leaders Standardized Processes Responsive to Stakeholders Effective Workforce Planning Engaged Employees Effective Long-Range Planning Strong Teamwork Strong Ownership & Accountability Effective Supervisors Worklife Balance
Strategic Focus Areas	Operational Excellence  Organizational Effectiveness  Generation Reliability  Effective Business & Financial Performance 

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Objective

- Understand staff expectations for methodology
- Address comments on LAR Stage 3 methodology
- Discuss methodology document
- Show consistency of applied methodology
- Schedule & path forward

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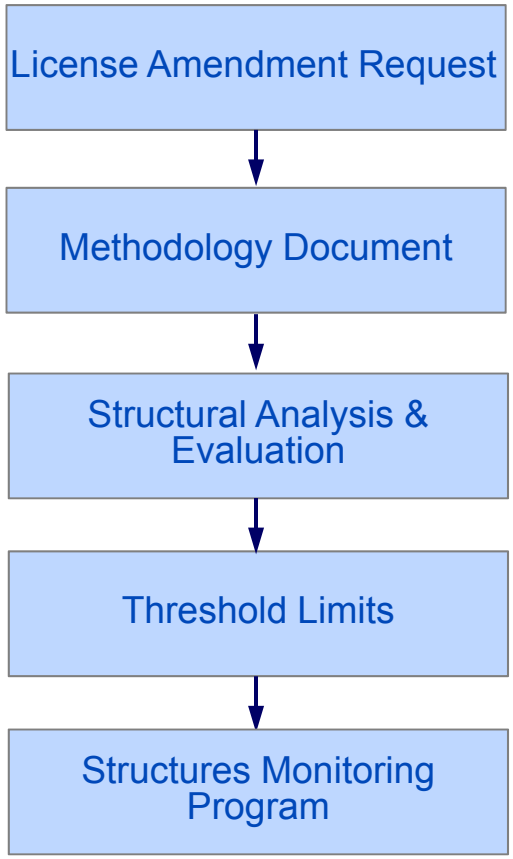
Overview of ASR Evaluation Process



- Stage 1, 2, and 3 analyses
- Material properties

- Repeatable process for stage 1, 2, and 3
- Decision points for analysis

- Demand calculations
- Compliant to ACI 318-71, ASME and UFSAR acceptance criteria

- Establish design margin

- Threshold limits
- ASR expansion limits
- Administrative limits

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Overview of Methodology Document

- **Overview**
- **Codes and Standards**
- **Materials**
- **Load and load combinations**
- **Analysis**
  - Stage One and Stage Two
  - Stage Three
    - -- Correlation of model to field conditions
    - -- Decision points
- **Acceptance Criteria**
- **ASR Threshold Limits and Monitoring**

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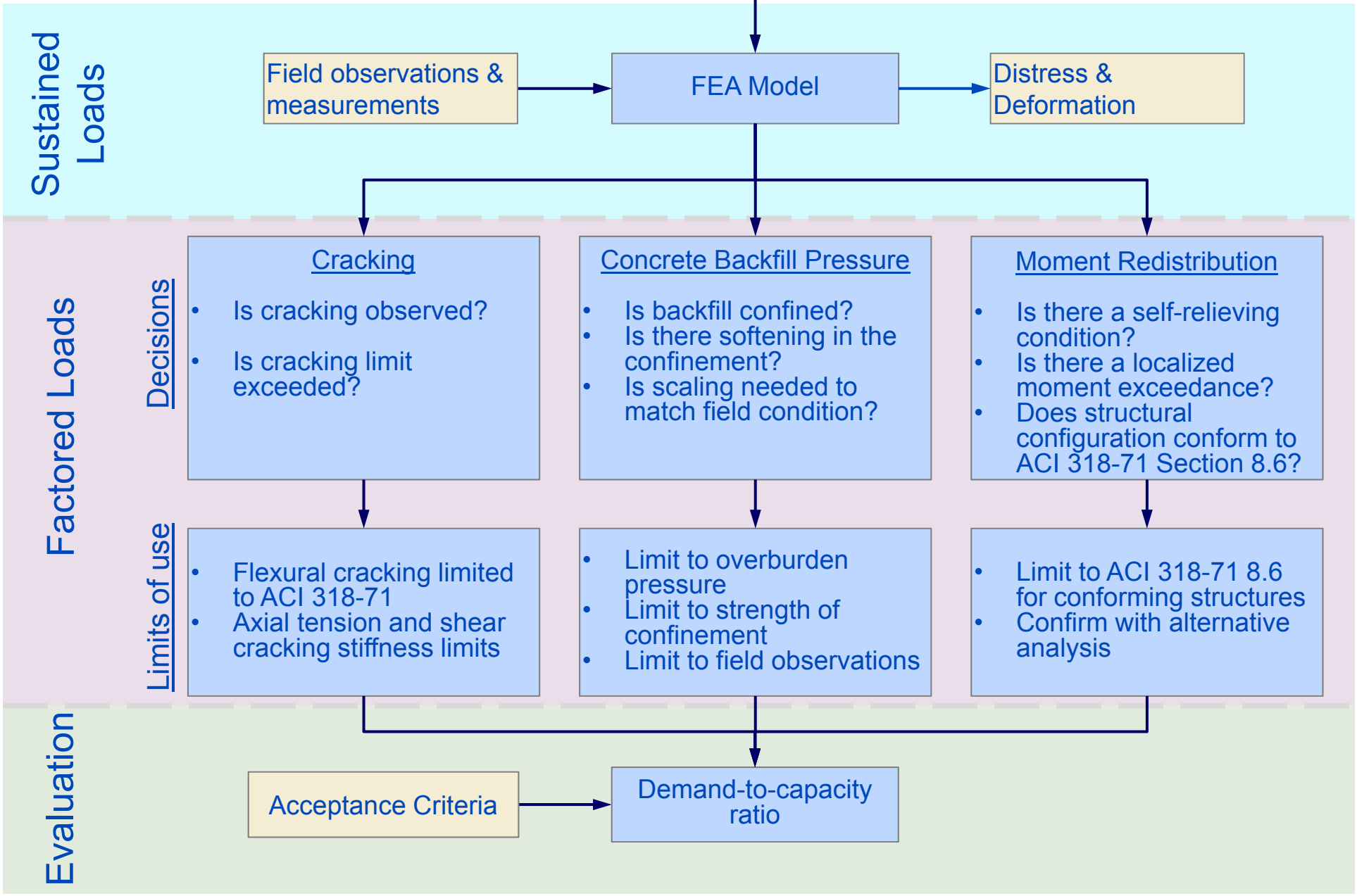
Stage Three Evaluation Process



Consistency of Methodology

	CEB	Make-up Air Intake	RHR	FSB	Control & Diesel	Mech. Pen. & MSFW-W	Cooling Tower	Electrical Manholes	Condensate Storage Tank	Equipment Hatch	Containment	Steam Gen. Blowdown	CEVA	Electrical Tunnel	Containment Internals
Stage▶	3	3	3	3	3	3	3	3,2,1	2	1	1	1	1	1	1
LOADS AND LOAD COMBINATIONS															
Load Combinations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Containment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA
Containment Internal Structures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	✓
Other Seismic Category I Structures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	NA
ANALYSIS															
Selection of Starting Stage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stage One Analyses	NA	NA	NA	NA	NA	NA	NA	✓	NA	✓	✓	✓	✓	✓	✓
Stage Two Analyses	NA	NA	NA	NA	NA	NA	NA	✓	✓	NA	NA	NA	NA	NA	NA
Stage Three Analyses	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
Field Observations to Support Stage Three Analyses	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
Non-ASR Demands for Stage Three Analyses	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
ASR Demands for Stage Three Analyses	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
ASR Expansion of Structural Components	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
ASR Expansion of Concrete Backfill	✓	NA	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA	NA	NA
Correlation of Model with Field Conditions	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
Refined Analytical Methods	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
Use of Cracked Section Properties in Stage Three Analyses	NR	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
Use of Moment Redistribution in Stage Three Analyses	✓	NR	✓*	NR	NR	NR	NR	✓*	NA	NA	NA	NA	NA	NA	NA
Factored Load Calculation	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA
ACCEPTANCE CRITERIA															
Acceptance Criteria for Containment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	✓	NA	NA	NA	NA
Acceptance Criteria for Other Seismic Category 1 Structures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓
Impact of ASR on Code of Record Acceptance Criteria	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Acceptance Criteria for Isolation Gaps	✓	NA	✓	✓	✓	✓	NA	NA	NA	✓	✓	✓	✓	✓	NA
Acceptance Criteria for Foundations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA
Acceptance Criteria for Stability	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA
ASR THRESHOLD LIMITS AND MONITORING															
Methodology to Account for Potential Future ASR Expansion	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ASR Threshold Limits and Monitoring for Stage One Structures	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.5	1.8	3.5	3.0	3.0	✓
ASR Threshold Limits and Monitoring for Stage Two Structures	NA	NA	NA	NA	NA	NA	NA	NA	1.6	NA	NA	NA	NA	NA	NA
ASR Threshold Limits and Monitoring for Stage Three Structures	1.2	1.4	1.2	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA

= Completed Structure

= In-Progress Structure

✓ = Evaluation follows this Section of the Methodology

NA = Not Applicable

NR = Not Required

* = Moment redistribution conforming to ACI 318-71 Section 8.6 only

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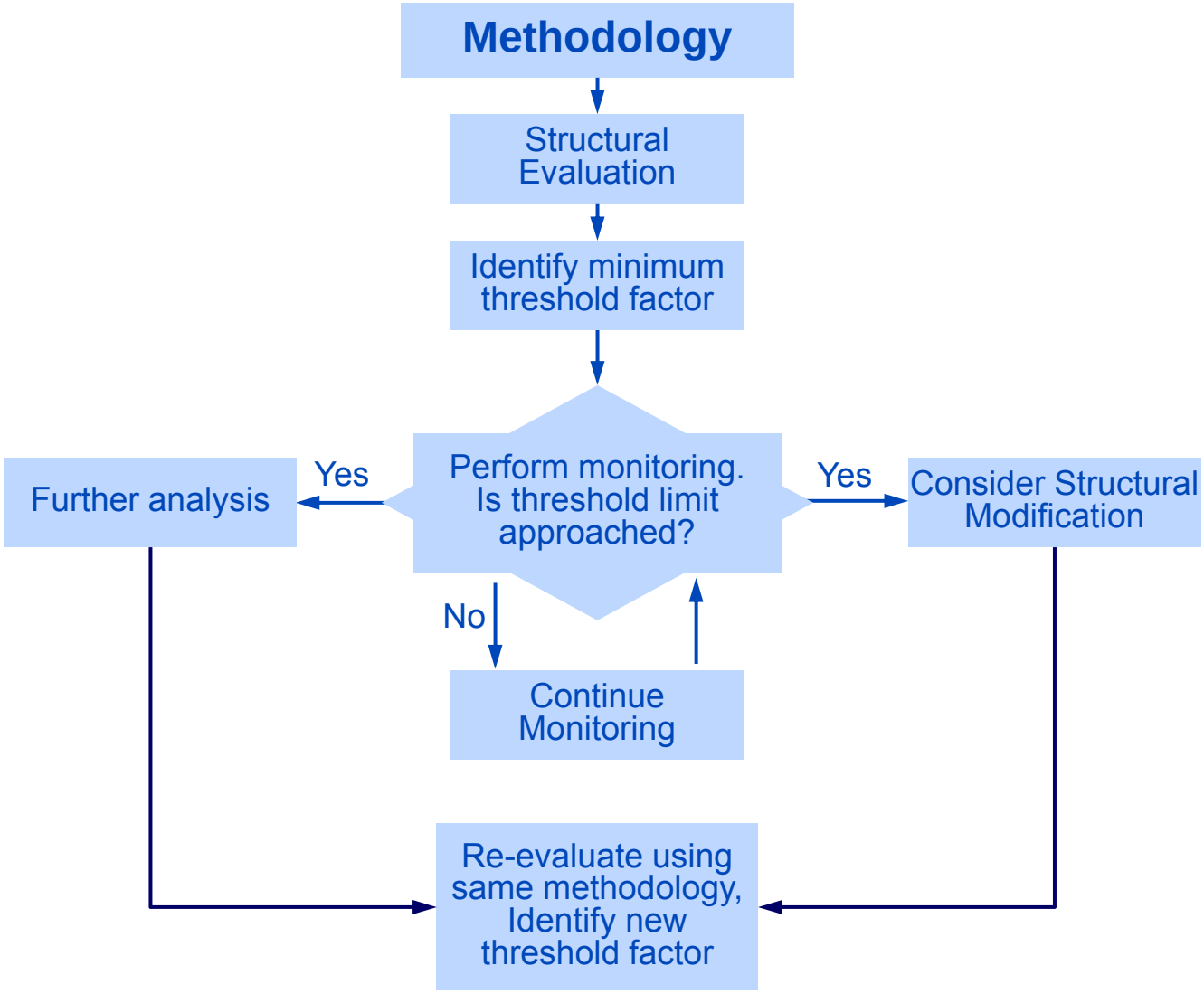
Threshold Monitoring



Building Deformation Analyses (1 of 2)

Structure	Schedule	Percent Complete
Condensate water storage tank	Complete	100%
Containment enclosure building	Complete	100%
Containment enclosure ventilation area	Complete	100%
Containment structure	Complete	100%
Equipment hatch missile shield	Complete	100%
Steam generator recovery blowdown bldg.	Complete	100%
Control room make-up air intake	Complete	100%
Electrical cable tunnels	Complete	100%
Pre-action valve building	3Q2017	80%
RHR equipment vault	Complete	100%
Containment internal structures	3Q2017	80%
Main steam and feed water east pipe chase Hydrogen recombiner structure	3Q2017	50%
Safety-related electrical duct banks and manholes	1Q2018	40%
Emergency feedwater pump building	3Q2017	10%
Fuel storage building	3Q2017	60%

Structures that are/expected to be Stage 3

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Building Deformation Analyses (2 of 2)

Structure	Schedule	Percent Complete
Control Building Diesel Generator Building	4Q2017	10%
Mechanical Penetration Personnel hatch area Main steam and feed water west pipe chase	4Q2017	30%
Primary auxiliary building	4Q2017	10%
Service water cooling tower incl. switchgear rooms	1Q2018	
Service water access (inspection) vault	1Q2018	
Circulating water pumphouse (below el. 21') Service water pumphouse	2Q2018	
Piping (RCA) Tunnels	2Q2018	
Tank farm area	2Q2018	
Waste processing building	2Q2018	

Structures that are/expected to be Stage 3

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Discussion with NRC Staff

Wrap Up

- The importance to establish a repeatable methodology with limits is understood
- A consistent methodology is being applied in the structural evaluations
- A methodology document will be submitted

Next Steps

- Submit methodology document
- Respond to issued RAIs
- Maintain communications with NRC staff

NEXTera™ ENERGY NUCLEAR FLEET

SUBJECT: SUMMARY OF AUGUST 24, 2017, MEETING WITH NEXTERA ENERGY REGARDING LICENSE AMENDMENT REQUEST ON ALKALI SILICA REACTION (CAC NO. MF8260; EPID L-2016-LLA-0007) DATED OCTOBER 13, 2017

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ADAMS Package Accession No.: ML17283A039 **Meeting Summary ML17278A748**

OFFICE	NRR/DORL/LPL1/PM	NRR/DORL/LPL1/LA	NRR/DORL/LPL1/BC	NRR/DORL/LPL1/PM
NAME	JPoole	LRonewicz	JDanna	JPoole
DATE	10/11/2017	10/10/2017	10/12/2017	10/13/2017

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