NEXTera® ENERGY
POINT BEACH

August 17, 2017

NRC 2017-0040
10 CFR 50.54(f)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Point Beach Nuclear Plant, Units 1 and 2
Docket 50-266 and 50-301
Renewed License Nos. DPR-24 and DPR-27

NextEra Energy Point Beach, LLC, Seismic Mitigating Strategies Assessment (MSA) Report for the Reevaluated Seismic Hazard Information – NEI 12-06, Appendix H, Section H.4.4, Path 4: GMRS ≤ 2X SSE

References:

1. NEI 12-06, Revision 2, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, dated December 2015 (ML16005A625)

2. JLD-ISG-2012-01, Revision 1, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, dated January 22, 2016 (ML15357A163)

3. NextEra Energy Point Beach, LLC's Notification of Full Compliance with Order EA-12-049 Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events and Submittal of Final Integrated Plan, dated December 16, 2015 (ML15350A085)

4. NRC Letter, Point Beach Nuclear Plant, Units 1 and 2 - Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC Nos. MF0725, MF0726, MF0729, and MF0730), dated September 23, 2016 (ML16241A000)

5. NRC Letter, Point Beach Nuclear Plant, Units 1 and 2 – Correction Letter Regarding Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC Nos. MF0725, MF0726, MF0729, and MF0730), dated October 24, 2016 (ML16278A166)

6. NextEra Energy Point Beach, LLC Seismic Hazard and Screening Report (CEUS Sites), Response [to] NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dia-ichi Accident, dated March 31, 2014 (ML14090A275)

7. NextEra Energy Point Beach, LLC's Expedited Seismic Evaluation Process Report (CEUS Sites), Response [to] NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated December 22, 2014 (ML14356A426)

8. NRC Letter, Point Beach Nuclear Plant, Units 1 and 2 – Staff Review of Interim Evaluation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 (TAC Nos. MF5263 and MF5264), dated July 29, 2015 (ML15209A657)

9. NRC Letter, Point Beach Nuclear Plant, Units 1 and 2 – Staff Assessment of Information Provided Pursuant to Title 10 of the *Code of Federal Regulations* Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident (TAC Nos. MF3959 and MF3960), dated August 3, 2015 (ML15211A593)

This letter provides the results of the assessment for NextEra Energy Point Beach, LLC, Units 1 and 2 (Point Beach), to demonstrate that the FLEX strategies developed, implemented and maintained in accordance with NRC Order EA-12-049 can be implemented considering the impacts of the reevaluated seismic hazard. The assessment was performed in accordance with the guidance provided in Appendix H, Section H.4.4 of NEI 12-06, Revision 2 (Reference 1), which was endorsed by the NRC (Reference 2). The attached report documents that the mitigating strategies for Point Beach (References 3, 4, 5) are acceptable for the reevaluated seismic hazard (References 6, 7, 8, 9).

This letter contains no new regulatory commitments.

If you have any questions please contact Mr. Eric Schultz, Licensing Manager, at (920) 755-7854.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 17, 2017.

Sincerely,

NextEra Energy Point Beach, LLC

Robert Coffey
Site Vice President

cc: Director, Office of Nuclear Reactor Regulation
Administrator, Region III, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC

Enclosure: Document 16Q0396-RPT-004, Revision 0, NEI 12-06 Appendix H – Seismic "Path 4" Mitigating Strategies Assessment for Point Beach Nuclear Plant

ENCLOSURE

DOCUMENT 16Q0396-RPT-004, REVISION 0

NEI 12-06 APPENDIX H – SEISMIC "PATH 4" MITIGATING STRATEGIES ASSESSMENT FOR POINT BEACH NUCLEAR PLANT

(16 pages follow)

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|---|
| Document ID: 16Q0396-RPT-004<br>Title: NEI 12-06 Appendix H – Seismic "Path 4" Mitigating Strategies Assessment for Point Beach Nuclear Plant |

Document Type:
Criteria ☐ Interface ☐ Report ☒ Specification ☐ Other ☐ Drawing ☐

| |
|---|
| Project Name: NEI 12-06 Appendix H Seismic Evaluations |
| Job No.: 16Q0396 |
| Client: NextEra Energy – Point Beach |

This document has been prepared in accordance with the S&A Quality Assurance Program Manual, Revision 18 and project requirements:

| Initial Issue (Rev. 0) | |
|---|---|
| Originated by: K. Dommer | Date: 8/3/2017 |
| Checked by: B. Schwarz | Date: 8/3/2017 |
| Approved by: M. Delaney | Date: 8/3/2017 |

| Revision Record: | | | | |
|---|---|---|---|---|
| Revision No. | Originated by/ Date | Checked by/ Date | Approved by/ Date | Description of Revision |
| | | | | |
| S&A Stevenson & Associates | | DOCUMENT APPROVAL SHEET Figure 2.8 | | PROJECT NO. 16Q0396 |

## 1. BACKGROUND

Point Beach Nuclear Plant (PBNP) has completed a mitigating strategies assessment (MSA) for the impacts of the reevaluated seismic hazard to determine if the mitigating (FLEX) strategies developed, implemented and maintained in accordance with NRC Order EA-12-049 remain acceptable at the reevaluated seismic hazard levels. The MSA was performed in accordance with the guidance provided in Appendix H of NEI 12-06 Revision 2 [Reference 1] which was endorsed by the NRC [Reference 2].

The Mitigating Strategies Seismic Hazard Information (MSSHI) is the reevaluated seismic hazard information at PBNP, developed using the Probabilistic Seismic Hazard Analysis (PSHA). The MSSHI includes a performance-based Ground Motion Response Spectrum (GMRS), Uniform Hazard Response Spectra (UHRS) at various annual probabilities of exceedance, and a family of seismic hazard curves at various frequencies and fractiles developed at the PBNP control point elevation. PBNP submitted the reevaluated seismic hazard information including the UHRS, GMRS and the hazard curves to the NRC on March 31, 2014 [Reference 3]. The NRC staff concluded that the GMRS that was submitted adequately characterizes the reevaluated seismic hazard for the PBNP site [Reference 4]. Section 6.1.1 of Reference 2 identifies the method described in Section H.4.4 of Reference 1 as applicable to PBNP.

## 2. ASSESSMENT TO MSSHI

Consistent with Section H.4.4 (Path 4) of Reference 1, the PBNP GMRS has spectral accelerations greater than the safe shutdown earthquake (SSE) but no more than 2 times the Safe Shutdown Earthquake (SSE) anywhere in the 1 to 10 Hz frequency range. As described in the Final Implementation Plan (FIP) [References 14, 15], the plant equipment relied on for FLEX strategies have previously been evaluated as seismically robust to the SSE levels. The basic elements within the MSA of Path 4 SSCs are described in Reference 1. Implementation of each of these basic Path 4 elements for the PBNP site is summarized below.

### 2.1 Step 1 – Scope of MSA Plant Equipment

The scope of SSCs considered for the Path 4 MSA was determined following the guidance used for the expedited seismic evaluation process (ESEP) defined in EPRI 3002000704 [Reference 9]. FLEX SSCs excluded from consideration in the ESEP were added to the MSA equipment scope. In addition, SSC failure modes not addressed in the ESEP that could potentially affect the FLEX strategies were added and evaluated.

SSCs associated with the FLEX strategy that are inherently rugged or sufficiently rugged are discussed in Section 2.3 below and identified in Section H.4.4 (Path 4) of Reference 1. These SSCs were not explicitly added to the scope of MSA plant equipment.

### 2.2 Step 2 – ESEP Review

Equipment used in support of the FLEX strategies has been evaluated to demonstrate seismic adequacy following the guidance in Section 5 of NEI 12-06. As stated in Appendix H of NEI 12-

06, previous seismic evaluations should be credited to the extent that they apply for the assessment of the MSSHI. This includes the expedited seismic evaluation process (ESEP) evaluations [Reference 10] for the FLEX strategies which were performed in accordance with EPRI 3002000704 [Reference 9]. The ESEP evaluations remain applicable for this MSA since these evaluations directly addressed the most critical 1 Hz to 10 Hz part of the new seismic hazard using seismic responses from the scaling of the design basis analyses. In addition, separate evaluations are performed to address high frequency exceedances under the high frequency (HF) sensitive equipment assessment process, as required, and are documented in Section 4 of this report.

In addition, a review of the PBNP Final Integrated Plan (FIP) [Reference 14] was performed for changes with respect to the implementation plan at the time ESEP was performed [Reference 31] to identify any items not included in the ESEP evaluations which are now critical to the implementation of FLEX. The only items which were not included in ESEP but require additional evaluation are the Fuel Oil Storage Tanks T-175A and T-175B. These tanks were evaluated and determined to be seismically adequate per the criteria identified in Table 2-4 of NP-6041-SL [Reference 12], which is consistent with both the ESEP evaluations as well as the evaluations using Section H.5 of Reference 1.

## 2.3 Step 3 – Inherently/Sufficiently Rugged Equipment

The qualitative assessment of certain SSCs not included in the ESEP was accomplished using (1) a qualitative screening of "inherently rugged" SSCs and (2) evaluation of SSCs to determine if they are "sufficiently rugged." Reference 1 documents the process and the justification for this ruggedness assessment. SSCs that are either inherently rugged or sufficiently rugged are described in Reference 1 and no further evaluations for these rugged SSCs are required under the MSA.

## 2.4 Step 4 – Evaluations Using Section H.5 of Reference 1

Step four for Path 4 plants includes the evaluations of:

1. FLEX equipment storage buildings and Non-Seismic Category 1 Structures that could impact FLEX implementation
2. Operator Pathways
3. Tie down of FLEX portable equipment
4. Seismic Interactions not included in ESEP that could affect FLEX strategies
5. Haul Paths

The results of the reviews of each of these five areas are described in the sections below.

### 2.4.1 FLEX Equipment Storage Buildings

The north half of the Steam Generator Storage Faciality has been repurposed to be the FLEX equipment storage building. This building is a reinforced concrete structure. Calculation NEE-009-CALC-010 [Reference 30] evaluates the structure using a seismic demand equal to two times the Safe Shutdown Earthquake (SSE). The Seismic

Category 1 SSE allowable stresses were used in the evaluation. Per Table 7.1-3 of Reference 26, the maximum horizontal GMRS/SSE ratio is 2.292 at 12.5 Hz. In accordance with page 2-55 of EPRI NP-6041 SL Revision 1 [Reference 12], it is conservative to accept the SSE as the Conservative Deterministic Failure Margin (CDFM) Seismic Margin Earthquake level (or HCLPF capacity or $C_{1\%}$ capacity). Conservatively consider the SSE allowable to be equivalent to the $C_{1\%}$ allowable. Consider a minimum $C_{10\%}/C_{1\%}$ factor of 1.36 (per Table H.1 of Appendix H of Reference 1). The $C_{10\%}$ capacity of the building is, therefore, at least (2*SSE)*1.36 = 2.72 * SSE. Since this value is greater than the maximum horizontal GMRS/SSE ratio of 2.292, the structure is shown to have a $C_{10\%}$ capacity which exceeds the GMRS.

Non-Seismic Category 1 Structures

The following are the Non-Seismic Category 1 Structures which could impact the operator pathways at the GMRS level:

- Unit 1 Façade
- Unit 2 Façade
- Primary Auxiliary Building (PAB) Superstructure (including Central, North and South Wings)
- Turbine Building

Per Reference 27, the structures listed above have been evaluated using the guidance provided in Section H.5 of Reference 1. Information provided in the existing design basis calculations (including wind evaluations) for these structures, as well as the $C_{10\%}/C_{1\%}$ ratios provided in in Table H.1 of Appendix H of Reference 1, were used to determine a $C_{10\%}$ capacity for these structures. All of the structures listed above have been shown to have a $C_{10\%}$ capacity which exceeds the GMRS.

The impact of Non-seismic category 1 structures at the GMRS level on the haul paths has been evaluated via a walkdown and evaluation [Reference 27]. Alternate pathways as well as debris removal capabilities have been credited to verify that no Non-Seismic Category 1 structures prevent implementation of the FLEX haul path strategies.

### 2.4.2 Operator Pathways

The Operator pathways included in the FLEX strategy include hose and cable deployment pathways for the portable FLEX equipment. These hose and cable routes are described in detail in Reference 24. In addition to these deployment routes, access routes to the components identified and evaluated as part of the ESEP are essential to FLEX implementation. PBNP has reviewed the operator pathways and verified that the operator pathways are not impacted by the MSSHI. Considerations for this review included:

- A walkdown to assess seismic interactions associated with a GMRS level seismic event for relevant operator pathways
- Multiple available pathways

- Evaluation of the seismic ruggedness for the structures which contain operator pathways
- Debris removal capabilities for moderate to smaller seismic interactions

Reference 27 provides the detailed documentation associated with the walkdown and evaluation of these operator pathways and verifies that the operator pathways are not impacted by the MSSHI.

2.4.3 Tie Down of FLEX Portable Equipment

The list of FLEX portable equipment is provided in Attachment M of NP 7.7.36 [Reference 24]. Upon a review of Section 4.6.8 of Reference 24, the portable FLEX equipment can be grouped into the following types of equipment:

- Hose/cable trailers
- Trailer mounted pumps
- Super duty towing vehicles
- 480V trailer mounted generators
- Debris removal vehicle (CAT loader)
- 6kW Generators
- 500 gallon diesel refueling trailer with a 6 kW Generator
- Modes 5/6 RCS makeup pumps and fittings
- Portable Diesel Driven Charging Pumps (PDCPs) and associated hoses
- SFP Spray Ozzie Nozzles and associated 2-1/2" hoses
- Sump Pumps with hoses / cords
- Hoses, chords, and check valve transition covers
- Battery / inverter carts
- Portable lighting units
- Miscellaneous tools and support equipment

Stored equipment were evaluated (for stability and restraint as required/necessary) and protected from seismic interactions to the SSE level as part of the FLEX design process to ensure that unsecured and/or non-seismic components do not damage the FLEX equipment. In addition, large FLEX equipment such as pumps and power supplies were secured as necessary to protect them during a SSE seismic event.

A detailed evaluation of the tie down of FLEX portable equipment is provided in Appendix A of Reference 28. To justify the acceptability of the restraint (or lack thereof) for a given component, at least one of the following was shown:

- The component is not adversely affected by overturning/sliding during the Ground Motion Response Spectrum (GMRS) seismic event (e.g. hoses, pipe fittings, etc.).
- The component has a low aspect ratio and will not overturn when subjected to the GMRS seismic loading.
- The restraint provided is adequate to prevent damage from overturning/sliding.

PBNP has reviewed the storage requirements (including any tie-down or restraint devices) in effect for FLEX portable equipment and verified that the equipment has no adverse interactions or significant damage that could impair the ability of the equipment to perform its mitigating strategy function during or following the GMRS-level seismic event using the methods described in Section H.5 of NEI 12-06.

2.4.4 Additional Seismic Interactions

Seismic interactions that could potentially affect the FLEX strategies and were not previously reviewed as part of the ESEP program (e.g., flooding from non-seismically robust tanks, interactions to distributed systems associated with the ESEP equipment list, etc.) were reviewed for PBNP. Piping attached to buried tanks within the FLEX strategy were also reviewed as part of the seismic MSA to verify that the piping could not be affected by soil failure.

Although the ESEP did not specifically require a review for seismic interactions except for masonry block wall interactions, the ESEP performed for PBNP included walkdowns which comprised a review for all credible seismic interactions. The walkdowns are documented in the Screening Evaluation Work Sheets (SEWS) provided in Appendix B of Reference 25. The seismic interaction reviews of these SEWS include (but are not limited to) soft targets, attached lines, collapse of nearby equipment/structures, block walls, flooding, and other potential interaction concerns. Upon review of the SEWS for the walkdowns for the ESEP components, no seismic interaction was identified by these walkdowns which has not already been addressed by the modifications performed for ESEP (discussed in Reference 23) or by the structural evaluations discussed in Section 2.4.1.

Note that Section H.4 of NEI 12-06 allows the use of sampling walkdowns of ESEP components to evaluate interactions not specifically required to be included during ESEP. The ESEP SEWS provided for PBNP document a level of rigor with regard to seismic interactions which is significantly greater than the level of rigor expected for a "sampling walkdown".

PBNP has reviewed the additional seismic interactions and verified that the Mitigation Strategy is not adversely impacted by the GMRS.

2.4.5 Haul Path

The primary and alternate haul path routes included in the FLEX strategy are identified in Figure 4-1 of Reference 24. The primary haul path route is from the FLEX equipment storage building, along the north side of the plant, and then to the pump and generator staging locations to the east of the Turbine building (and just west of Lake Michigan).

Per Attachment B of Reference 27, the haul paths were reviewed during a walkdown to assess seismic interactions associated with a GMRS level seismic event. Considerations for this review included:

- Justifying that liquefaction stability failure of the deployment path is highly unlikely regardless of the magnitude of the earthquake at PBNP given the site topography and soil profile
- A walkdown to assess seismic interactions associated with a GMRS level seismic event
- Crediting multiple haul paths which will not have seismically correlated failure modes
- Crediting on-site capabilities for debris removal to reestablish a haul path following a beyond-design-basis earthquake

PBNP has reviewed the haul paths and verified that the haul paths are not adversely impacted by the MSSHI.

## 3. SPENT FUEL POOL COOLING REVIEW

Spent Fuel Pool Cooling Evaluation

The evaluation of spent fuel pool cooling for PBNP was performed based on the initial conditions established in NEI 12-06 [Reference 1] for spent fuel cooling coping in the event of an ELAP/LUHS. The evaluation also used the results of pool heatup analyses from the ELAP evaluation as input.

The FLEX strategy for spent fuel pool (SFP) cooling utilizes SFP level monitoring and make-up capability as described in the PBNP Final Integrated Plan (FIP) [Reference 14]. SFP make-up capability is provided using a portable FLEX pump taking suction though a portable flexible hose and discharging either through a permanently installed FLEX makeup connection tie-in to the SFP emergency make-up piping or through a flexible hose directly to the SFP. The source of make-up water is the CWPH SW pump bay, the forebay, or the plant ultimate heat sink (Lake Michigan). Since the PBNP FLEX strategy for SFP cooling includes an option to run a flexible hose directly from the discharge of the portable pump to the SFP, the permanently installed FLEX makeup connection tie-in is not solely relied upon and no additional evaluation of this component is required.

The permanently installed plant equipment relied on for the implementation of the SFP Cooling FLEX strategy has been designed and installed, or evaluated to remain functional, in accordance with the plant design basis to the SSE loading conditions. The spent fuel pool integrity evaluations demonstrated inherent margins of the spent fuel pool structure and interfacings plant equipment above the SSE to a peak spectral acceleration of 0.8g [Reference 16]. The portable FLEX equipment availability, including its storage and deployment pathways, needed to accomplish SFP cooling have subsequently been evaluated considering the GMRS loading conditions via a review of Section 2 (which verifies the availability of the FLEX components after a GMRS seismic event). As such, makeup capability of the SFP is shown to be seismically adequate for the GMRS demand.

*Level Instrumentation*

Per Reference 29 and Section 4.2.3 of Reference 24, several components were installed to provide level indication for the SFP in response to NRC Order EA-12-051 and are relied upon for FLEX

implementation. The $C_{10\%}$ capacity of these components is determined in Section 7.3 of Reference 28 to exceed the GMRS demand.

The SFP makeup capability and SFP level instrumentation equipment needed to accomplish SFP cooling strategies are acceptable for the MSA using the guidance of Section H.4.4 of Reference 1.

## 4 HIGH FREQUENCY REVIEW

The high frequency review is included as Enclosure 1 to this report. Section H.4.4 of Reference 1, also referred to as "Path 4", refers to Section H.4.2 of Reference 1, also referred to as "Path 2", for the methodology and criteria to be applied to the high frequency evaluation required to be performed under Path 4.

PBNP completed the evaluation of potentially sensitive contact devices in accordance with NEI 12-06 [Reference 1], Appendix H Section H.4.2 and EPRI 3002004396 [Reference 7]. The results of the evaluation confirm that the FLEX strategies for PBNP can be implemented as designed and no further seismic evaluations are necessary.

## 5 CONCLUSION

Therefore, the FLEX strategies for PBNP as described in the FIP [14] are acceptable as specified and no further seismic evaluations are necessary.

## 6 References

1. NEI 12-06, Revision 2, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, December 2016, ADAMS Accession Number ML16005A625
2. JLD-ISG-2012-01, Revision 1, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, January 22, 2016, ADAMS Accession Number ML15357A163
3. Point Beach Letter, NRC 2014-0024, "NextEra Energy Point Beach, LLC Seismic Hazard and Screening Report (CEUS Sites), Response NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", March 31, 2014, ADAMS Accession Number ML14090A275
4. NRC (T. Govan) Letter to NextEra Energy Point Beach (E. McCartney). "Point Beach Nuclear Plant, Units 1 and 2 – Staff Assessment of Information Provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai ichi Accident (TAC NOS. MF3959 and MF3960)." August 3, 2015, ADAMS Accession Number ML15211A593
5. Point Beach Letter, NRC 2017-0037, "NextEra Energy Point Beach, LLC High Frequency Seismic Evaluation Confirmation Report", August 2, 2017
6. Not Used
7. EPRI 3002004396, Final Report, July 2015, High Frequency Program Application Guidance for Functional Confirmation and Fragility Evaluation, ADAMS Accession Number ML15223A102
8. NRC Letter, Endorsement of Electric Power Research Institute Final Draft Report 3002004396, "High Frequency Program: Application Guidance for Functional Confirmation and Fragility", dated September 17, 2015, ADAMS Accession Number ML15218A569
9. EPRI, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic", Report Number 3002000704, Palo Alto, CA, April, 2013.
10. Point Beach Letter, NRC 2014-0088, "NextEra Energy Point Beach, LLC Expedited Seismic Evaluation Process Report (CEUS Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", December 22, 2014, ADAMS Accession Number ML14356A426
11. EPRI, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic", Report Number 1025287, Palo Alto, CA, November, 2012.
12. EPRI, "EPRI NP-6041-SL Revision 1: A Methodology for Assessment of Nuclear Plant Seismic Margin, Revision 1", Palo Alto, CA, August, 1991.
13. NRC Letter, "Point Beach Nuclear Plant, Units 1 and 2 – Staff Review of Interim Evaluation Report Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force

Recommendation 2.1 (Tac No. MF5263 and MF5264)", ADAMS Accession Number ML15209A657

14. Point Beach Letter, NRC 2015-0072, "NextEra Energy Point Beach, LLC's Notification of Full Compliance with Order EA-12-049 Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events and Submittal of Final Integrated Plan", December 16, 2015, ADAMS Accession Number ML15350A085
15. NRC Evaluation of PBNP Final Implementation Plan
    15.1 NRC Letter, "Point Beach Nuclear Plant, Units 1 and 2 – Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC Nos. MF0725, MF0726, MF0729, and MF0730)", ADAMS Accession Number ML16241A000
    15.2 NRC Letter, "Point Beach Nuclear Plant, Units 1 and 2 – Correction Letter Regarding Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC Nos. MF0725, MF0726, MF0729, and MF0730)", ADAMS Accession Number ML16278A166
16. Point Beach Letter, NRC 2016-0050, "Spent Fuel Pool Evaluation Supplemental Report, Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", November 30, 20165, ML16335A143
17. NRC (W. Dean) Letter to the Power Reactor Licensees on the Enclosed List. "Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident." October 27, 2015
18. NRC (E. Leeds) Letter to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status. EA-12-049. "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events." March 12, 2012
19. EPRI 3002002997. "High Frequency Program: High Frequency Testing Summary." September 2014.
20. EPRI NP-7147-SL. "Seismic Ruggedness of Relays." August 1991
21. EPRI NP-7147 SQUG Advisory 2004-02. "Relay GERS Corrections." September 10, 2004
22. EPRI NP-7148-SL, "Procedure for Evaluating Nuclear Power Plant Relay Seismic Functionality", 1990
23. Point Beach Letter, NRC 2017-0002, "NextEra Energy Point Beach, LLC, Notification of Modification Completion", January 10, 2017, ADAMS Accession Number ML17010A227
24. NP 7.7.36, Rev. 2, "Diverse and Flexible Coping Strategies (FLEX) Program
25. 14Q0224-RPT-002, Rev. 2, "ESEP Walkdown and HCLPF Evaluation Summary Report"
26. 16Q0396-CAL-001, Rev. 2, "Evaluation of Central Primary Auxiliary Building Steel Superstructure for GMRS Loading"

27. 16Q0396-RPT-001, Rev. 0, "Evaluation of Operator Pathways and Haul Path in Support of FLEX Implementation"

28. 16Q0396-RPT-003, Rev. 0, "Mitigating Strategies Assessment for Point Beach Nuclear Plant"

29. EC 276803, Rev. 2, "NRC Order Fukushima Strategy – Spent Fuel Pool Instrumentation Upgrade LTAM# PB-11-0010"

30. NEE-009-CALC-010, Rev. 1, "Evaluation and Modification of Steam Generator Storage Facility for Storage of FLEX Equipment"

31. Point Beach Letter, NRC 2014-0052, "NextEra Energy Point Beach, LLC's Third Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)", August 28, 2014, ADAMS Package Accession Number ML14241A266

32. 16Q0396-RPT-002, Rev. 0, "Selection of Relays and Switches for NEI 12-06 Appendix H High Frequency Seismic Evaluation"

## Enclosure 1 – High Frequency Review Consistent with Section H.4.2 (Path 2) of Reference 1

Refer to Section 1 and 2 of the main body of this submittal for discussion on background and assessment to the MSSHI. Reference numbers used in this enclosure are consistent with the references listed in Section 6 of the main body of this submittal. Note: The selection of components is provided in Reference 32.

# 1 SELECTION OF COMPONENTS

The fundamental objective of the MSA evaluation is to determine whether the FLEX strategies developed, implemented and maintained in accordance with NRC Order EA-12-049 [Reference 18] can be implemented considering the impacts of the reevaluated seismic hazard. Within the applicable functions identified in Section H.4.2 [Reference 1], the components that would need a high frequency evaluation are contact control devices subject to intermittent states in seal-in or lockout (SILO) circuits. Plants in Path 4 are required to evaluate SILO devices in the control systems of four specific categories: (1) Reactor Trip/Scram, (2) Reactor Vessel Coolant Inventory leakage pathways, (3) FLEX Phase 1 Components, and (4) Automatically Operated FLEX Phase 2 Components to ensure those functions perform as necessary in the FLEX strategies. The equipment selection process for each of those categories is described below.

## 1.1 Reactor Trip/SCRAM

Section H.4.2 of NEI 12-06 Appendix H [Reference 1] identifies the Reactor Trip/SCRAM function as a function to be considered in the high frequency evaluation. The EPRI guidance for High Frequency Confirmation [Reference 7] notes that "the design requirements preclude the application of seal-in or lockout circuits that prevent reactor trip/SCRAM functions" and that "No high-frequency review of the reactor trip/SCRAM systems is necessary." Therefore, no additional evaluations are necessary for the reactor trip/SCRAM function.

## 1.2 Reactor Vessel Inventory Control

The equipment in the Reactor Vessel Inventory Control function are the same equipment evaluated in the PBNP NTTF 2.1 High Frequency Confirmation. The primary concern for both the NTTF 2.1 and MSA programs is the actuation of valves that have the potential to cause a loss-of-coolant accident (LOCA). A LOCA following a seismic event could provide a challenge to the mitigation strategies and lead to core damage. Control circuits for the Safety Relief Valves (SRV) as well as other Reactor Coolant System (RCS) valves were analyzed as part of the PBNP submittal to address NTTF 2.1 recommendations [Reference 5]. The components covered in this category are a subset of those covered in the RCS/Reactor Vessel Inventory Control category of EPRI 3002004396 PBNP submittal [Reference 5]. There are no Mitigation Strategy related components associated with Reactor Vessel Inventory Control.

## 1.3 FLEX Phase 1

Section H.4.2 of NEI 12-06 Appendix H [Reference 1] requires the analysis of relays and contactors that may lead to circuit seal-in or lockout that could impede the Phase 1 FLEX capabilities, including vital buses fed by station batteries through inverters. Phase 1 of the FLEX Strategy is defined in NEI 12-06 [Reference 1] as the initial response period where a plant is relying solely on installed plant equipment. During this phase the plant has no AC power and is

relying on batteries, steam, and air accumulators to provide the motive force necessary to operate the critical pumps, valves, instrumentation, and control circuits.

In response to NEI 12-06, EPRI released document 3002000704 [Reference 9], which describes an Expedited Seismic Evaluation Process (ESEP) that addresses interim evaluations of critical permanent plant equipment necessary for these mitigation strategies. The process described in EPRI 3002000704 also included the same analysis of relays and contactors that could affect Phase 1 capabilities. Because of this programmatic overlap, the Expedited Seismic Equipment List (ESEL) generated as part of the ESEP can be used to identify contact devices needing review for high frequency effects in this category. Point Beach's ESEL is Appendix I in their "Diverse and Flexible Coping Strategies (FLEX) Program" document, NP 7.7.36 [Reference 24]. Table A-1 of this enclosure includes the list of FLEX Phase 1-related contact devices[1] listed on the ESEL and thus requiring high frequency seismic evaluation.

### 1.4 FLEX Phase 2 Automatic Operation

NEI 12-06 Appendix H [Reference 1] requires the inclusion of SILO relays and contactors that could impede FLEX capabilities for mitigation of seismic events in permanently installed Phase 2 SSCs that have the capability to begin operation without operator manual actions.

With the loss of AC power, Phase 2 SSCs are limited to any permanently installed FLEX generator and, if allowed to automatically start, any electrical components powered by the FLEX generator and relied upon for Phase 2 of the FLEX Strategy. PBNP credits a portable FLEX generator for Phase 2 response, and the operator actions necessary to install and connect the generator exclude any devices from being identified in this category.

### 1.5 Summary of Selected Components

A list of the contact devices requiring a high frequency evaluation is provided in Table A-1 of this enclosure.

## 2 SEISMIC EVALUATION

### 2.1 Horizontal Seismic Demand

PBNP performed a High Frequency Confirmation using the criteria in Reference 7, which is the same criteria specified for the MSA Path 2 evaluation [Reference 1]. The horizontal ground motion applicable to the MSA Path 2 evaluation is the same horizontal ground motion identified in PBNP submittal dated August 2, 2017 [Reference 5].

### 2.2 Vertical Seismic Demand

PBNP performed a High Frequency Confirmation using the criteria in Reference 7, which is the same criteria specified for the MSA Path 2 evaluation [Reference 1]. The vertical ground motion applicable to the MSA Path 2 evaluation is the same vertical ground motion identified in PBNP submittal dated August 2, 2017 [Reference 5].

[1] The ESEL includes AC contactors associated with repowering the battery chargers. Since this is a Phase 2 activity, these contactors have been excluded from the high frequency program.

## 2.3 Component Horizontal Seismic Demand

Per Reference 7, the peak horizontal acceleration is amplified using the following two factors to determine the horizontal in-cabinet response spectrum:

- Horizontal in-structure amplification factor $AF_{SH}$ to account for seismic amplification at floor elevations above the host building's foundation
- Horizontal in-cabinet amplification factor $AF_c$ to account for seismic amplification within the host equipment (cabinet, switchgear, motor control center, etc.)

The in-structure amplification factor $AF_{SH}$ is derived from Figure 4-3 in Reference 7. The in-cabinet amplification factor, $AF_c$ is associated with a given type of cabinet construction. The three general cabinet types are identified in Reference 7 and Appendix I of EPRI NP-7148 [Reference 22] assuming 5% in-cabinet response spectrum damping. EPRI NP-7148 [Reference 22] classified the cabinet types as high amplification structures such as switchgear panels and other similar large flexible panels, medium amplification structures such as control panels and control room benchboard panels and low amplification structures such as motor control centers.

All devices identified for High Frequency Review in Section 1.5 were previously evaluated during ESEP [Reference 10]. Consistent with the evaluations provided during ESEP, all the electrical cabinets containing the components subject to high frequency confirmation (see Table A-1 of this enclosure) can be either realistically or conservatively categorized as medium amplification structures (i.e. control cabinets).

## 2.4 Component Vertical Seismic Demand

The component vertical demand is determined using the peak acceleration of the VGMRS between 15 Hz and 40 Hz and amplifying it using the following two factors:

- Vertical in-structure amplification factor $AF_{SV}$ to account for seismic amplification at floor elevations above the host building's foundation
- Vertical in-cabinet amplification factor $AF_c$ to account for seismic amplification within the host equipment (cabinet, switchgear, motor control center, etc.)

The in-structure amplification factor $AF_{SV}$ is derived from Figure 4-4 in Reference 7. The in-cabinet amplification factor, $AF_c$ is derived in Reference 7 and is 4.7 for all cabinet types.

## 3 CONTACT DEVICES EVALUATION

Per Reference 7, seismic capacities (the highest seismic test level reached by the contact device without chatter or other malfunction) of each subject contact device are determined by the following procedures:

(1) If a contact device was tested as part of the EPRI High Frequency Testing program [Reference 19], then the component seismic capacity from this program is used.

(2) If a contact device was not tested as part of Reference 19, then one or more of the following means to determine the component capacity were used:

(a) Device-specific seismic test reports (either from the station or from the SQURTS testing program.

(b) Generic Equipment Ruggedness Spectra (GERS) capacities per References 20 and 21.

(c) Assembly (e.g. electrical cabinet) tests where the component functional performance was monitored.

The high-frequency capacity of each device was evaluated with the component mounting point demand from Section 2 using the criteria in Section 4.5 of Reference 7 and the acceptance criteria in Section H.5 of Reference 1.

A summary of the high-frequency evaluation results is provided in Table A-1 of this enclosure.

# A *Components Identified for High Frequency Evaluation*

**Table A-1: Components Identified for High Frequency Evaluation**

| No. | Unit | Component | | | Enclosure Type | Building | Component Evaluation Result[2] |
|---|---|---|---|---|---|---|---|
| | | ID | Type | System Function | | | |
| 1 | 1 | 1-62/4044 | Time Delay Relay | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 2 | 1 | 42(c) (Panel 1SMS-2019) | Closing Contactor | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 3 | 1 | 42(c) (Panel 1SMS-2020) | Closing Contactor | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 4 | 1 | 42(o) (Panel 1SAF-4006) | Opening Contactor | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 5 | 1 | 1-62/4044C | Time Delay Relay | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 6 | 1 | 1-4077LLL-X | Auxiliary Relay | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 7 | 1 | 42(o) (Panel 1SAF-4067) | Opening Contactor | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 8 | 2 | 2-62/4044 | Time Delay Relay | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 9 | 2 | 42(c) (Panel 2SMS-2019) | Closing Contactor | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 10 | 2 | 42(c) (Panel 2SMS-2020) | Closing Contactor | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 11 | 2 | 42(o) (Panel 2SAF-4006) | Opening Contactor | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 12 | 2 | 2-62/4044C | Time Delay Relay | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 13 | 2 | 2-4077LLL-X | Auxiliary Relay | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |
| 14 | 2 | 42(o) (Panel 2SAF-4067) | Opening Contactor | FLEX Phase 1 Response | Control Cabinet | Control Building | Cap > Dem |

[2] The Capacity (Cap) is defined using the criteria discussed in Section 3 of Enclosure 1 of this report. The Demand (Dem) is defined using the criteria discussed in Sections 2.3 and 2.4 of Enclosure 1 of this report. A component is acceptable when it is shown that the Capacity exceeds the Demand.