NEXTera ENERGY POINT BEACH

April 7, 2016

NRC 2016-0012
10 CFR 50.90

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

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

Response to Request for Additional Information,
License Amendment Request 271 Associated with NFPA 805

References:
(1) NextEra Energy Point Beach, LLC, letter to NRC, dated June 26, 2013, "License Amendment Request 271, Transition to 10 CFR 50.48(c) - NFPA 805, 'Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants,' 2001 Edition" (ML131820453)
(2) NextEra Energy Point Beach, LLC, letter to NRC, dated September 16, 2013, "License Amendment Request 271, Supplement 1, Transition to 10 CFR 50.48(c) – NFPA 805" (ML13259A273)
(3) NRC letter to NextEra Energy Point Beach, LLC, dated September 25, 2013, "Point Beach Nuclear Plant, Units 1 and 2 - Acceptance of Licensing Action re: License Amendment Request to Transition to NFPA 805, 'Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants" (TAC NOS. MF2372 and MF2373)" (ML13267A037)
(4) NextEra Energy Point Beach, LLC letter to NRC, dated August 26, 2015, "Supplement 2 to License Amendment Request 271 Associated with NFPA 805 (ML15238A870)
(5) NRC e-mail to NextEra Energy Point Beach, LLC, dated October, 9, 2015, "Request for Additional Information – Point Beach Nuclear Plant, Units 1 and 2 – NFPA 805 LAR - MF2372 and MF2373" (ML15348A262)
(6) NRC e-mail to NextEra Energy Point Beach, LLC, dated January, 20, 2016, "Request for Additional Information – Point Beach Nuclear Plant, Units 1 and 2 – NFPA 805 LAR - MF2372 and MF2373" (ML16022A004)

Pursuant to 10 CFR 50.90, NextEra Energy Point Beach, LLC, (NextEra) requested to amend Renewed Facility Operating Licenses DPR-24 and DPR-27 for Point Beach Nuclear Plant (PBNP), Units 1 and 2 (Reference 1 and supplemented via References 2 and 4). The NRC accepted the license amendment request for review as documented in Reference (3).

The NRC Staff has determined that additional information (References 5 and 6) is required to complete its evaluation. The enclosure provides the NextEra response to the NRC Staff's request for additional information.

~~**Security-Related Information – Withhold from Public Disclosure Under 10 CFR 2.390: Attachment W of the Enclosure to this letter contain security-related information. Upon removal of Attachment W of the Enclosure, this letter is uncontrolled.**~~

This letter contains no new Regulatory Commitments and no revisions to existing Regulatory Commitments.

If you have any questions regarding this letter, please contact Mr. Bryan Woyak, Licensing Manager, at (920) 755-7599.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on April 7, 2016.

Very truly yours,

NextEra Energy Point Beach, LLC

Eric McCartney
Site Vice President

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW

ENCLOSURE

NEXTERA ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST 271
ASSOCIATED WITH NFPA 805

Pursuant to 10 CFR 50.90, NextEra Energy Point Beach, LLC, (NextEra) requested to amend Renewed Facility Operating Licenses DPR-24 and DPR-27 for Point Beach Nuclear Plant (PBNP), Units 1 and 2 (Reference 1 and supplemented via References 2 and 4). The NRC accepted the license amendment request for review as documented in Reference (3).

The NRC Staff on October 9, 2015, requested additional information via email in order to complete its evaluation (Reference 5). NextEra initially provided the information to the NRC via electronic portal. Subsequently, the NRC via email dated January 20, 2016 (Reference 6) requested that the answers to the information request in Reference (5) be provided to the NRC on the docket. Additionally, the January 20, 2016, email requested additional information in order to complete the evaluation of the NextEra NFPA-805 LAR. This Enclosure provides the NextEra responses to both the October 9, 2015, and the January 20, 2016, NRC Staff's requests for additional information.

Request for Additional Information

PRA RAI S01 *(Modelling inadequate breaker fuse coordination in the Fire PRA)*

The NextEra letter, dated August 26, 2015 (ADAMS Accession No. ML15238A870), transmitting Supplement 2 of the Point Beach Nuclear Plant NFPA 805 LAR explains that "uncoordinated breakers were explicitly modelled in the Fire PRA after the 120 day response,' and that "[t]his change resulted in new Variance from Deterministic Requirements (VFDRs) and a change in the calculated risk results from the Fire PRA." The letter appears to indicate that re-assessment of breaker coordination and cable protection performed since providing the 120-day PRA RAI responses have revealed breaker coordination and cable protection vulnerabilities. Updated LAR, Attachment B, Section 3.5.2.4 provided as part of Supplement 2 states that 13kV and 4kV Switchgear, 480V switchgear and Motor Control Centers (MCCs), and 120VAC and 125VDC distribution panels "not properly coordinated and impacting safe shutdown power loads, cables and fire zone/scenario information were evaluated and VFDRs were generated." Also, updated LAR , Attachment B, Section 3.4.2.5 states that for 13kV and 4kV Switchgear that inadequate cable protection associated with the ability of certain breakers to clear a fault was identified and so a "risk-informed approach was utilized and this condition was incorporated into the Fire PRA model." Neither the letter nor the Supplement itself describes the specific sources of the circuit inadequacies, which could be undersized protective breakers or fuses or other deficiencies, or how these inadequacies were modelled in the Fire PRA. NRC notes that little NRC guidance exists on how to model inadequate breaker fuse coordination or cable protection. In light of these observations:

a) *Explain how inadequate breaker fuse coordination and cable protection was modelled in the Fire PRA and justify that this treatment addresses the failures that could occur as a result of the identified circuit inadequacies.*

b) *Include a description of the circuit failure modes addressed and how associated component failures were modelled in the Fire PRA. Also, describe and justify assumptions made in the Fire PRA about how fire-induced faults associated with inadequately coordinated/protected circuits impact upstream and downstream components from the fault.*

c) *Given that the lack of beaker coordination and/or cable protection have been acknowledged and the sizing and coordination of electrical protective devices appear to be in question, include an explanation of how the potential for secondary fires was addressed in the Fire PRA. If secondary fires were not modelled and fire-induced faults in inadequately protected circuits could lead to secondary fires, then justify this modeling exclusion. Alternatively, include modeling of secondary fires in the integrated analysis requested in PRA RAI 03.*

d) *In line with the issues described above, NRC staff also notes that the response to PRA RAI 25.01 in NextEra letter dated January 16, 2015, ML15015A281 explains a risk-informed approach that was used in association with removal of circuit protection related modifications No. 17 and No. 30 by modeling overcurrent failure modes and secondary fires. These modifications would have provided overcurrent trip protection for a certain circuits including protection/backup 125 VDC control power to 4 kV and 13.8 kV switchgear. As a result,*

   i. *Describe how the plant response model addresses fire-induced faulting of one or more load circuits at the same time that DC control power has been lost due to fire damage.*

   ii. *Explain how the lack of circuit protection and the resulting potential for common enclosure issues are analyzed.*

   iii. *Discuss the potential for secondary fires and describe how secondary fires are modeled (fire size, zone of influence, propagation, etc.).*

   iv. *Discuss the potential for High Energy Arcing Faults (HEAFs) to be created as a result of inability to clear fire-induced load faults at the load breaker. Without DC control power being available at the switchgear, circuit breakers upstream may have to clear the fault and those breakers will very likely have a much higher overcurrent setpoint than that required to protect the integrity of the cables being faulted.*

NextEra Response a)

Breaker/fuse coordination was addressed by reviewing plant calculations to identify buses, panels, and circuits with coordination concerns that could impact the NFPA 805 analysis for the fire probabilistic risk assessment (FPRA). Plant elementary and wiring diagrams were reviewed to identify cables whose breaker/fuse are not properly coordinated with the supply breaker/fuse.

Cables related to inadequate coordination, when damaged by fire, are assumed to result in the failure of the upstream uncoordinated bus, panel, or circuit. This treatment is considered conservative as not all cable failures would fail and/or prevent recovery of uncoordinated components.

Cable protection, or the ability of protective devices to provide short-circuit protection for power cables, was considered acceptable in the FPRA. Circuits identified as lacking proper short-circuit protection will be addressed by MOD-24 and MOD-26-2 committed to and listed in table S-2 of "Supplement 2 to License Amendment Request 271 Associated with NFPA 805." Risk-informed methods were not used for this failure mode.

Breaker failures due to control circuit damage or power loss is addressed in part (d) of this RAI response.

NextEra Response b)

Circuit failure modes addressed include hot shorts, shorts-to-ground, and open circuits, as applicable. The scope of this review is described in part (a) of this RAI response.

Cable fire damage to uncoordinated circuits is assumed to result in the failure of the upstream uncoordinated bus, panel, or circuit in the FPRA. The loss of downstream equipment due to cable damage was previously modeled in the FPRA and is retained. This provides a conservative representation in the FPRA model for inadequate coordination because the upstream device may not be failed or could be recovered.

As described in part (a) of this RAI response, short-circuit protection for power cables is assumed adequate in the FPRA.

NextEra Response c)

Cable protection is assumed adequate in the FPRA as described in part (a) of this RAI response; therefore, a secondary fire due to a lack of breaker coordination and/or cable protection is not considered a feasible failure mode in the FPRA.

Secondary fires are considered a possible failure mode for breakers that require external DC control power. FPRA modeling for secondary fires is described in part (d) of this RAI response.

NextEra Response d.i

Secondary fire impacts are modeled for all breakers that require external DC Control Power (DCCP) to support overcurrent trip (OCT) protection. This evaluation included all 13.8kV and 4.16kV buses regardless of their function in the NFPA 805 analysis.

Circuit analysis identified cables in breaker's control circuits whose fire-induced failure could result in loss of the breakers' ability to trip in response to an OCT condition. This includes the cables in the breaker's trip scheme and also the DCCP cable supplying the bus containing the breaker.

FPRA logic for the identified breakers was created. The FPRA logic models fire induced faults on the breakers (load cables) and control failures with separate logic for each breaker. Secondary fires can occur when the load cable and the breaker controls are damaged by same fire. The breaker control can be impacted by fire damage to control circuits or loss of DCCP. For instances where a breaker's OCT function could not be ensured, the damage effects were assumed to spread from the fault to the first available upstream supply breaker with available OCT function.

The identified failure logic modeled in the FPRA was used to evaluate failures caused by the lack of overcurrent protection and the resulting loss of credited power supplies. The analysis was evaluated for all compartments. This addressed fire-induced faulting of one or more load circuits at the same time that DCCP has been lost due to fire damage. The FPRA assumes the protection circuits are damaged prior to the load cables which has a conservative potential impact on the FPRA calculated risk.

NextEra Response d.ii

The lack of circuit protection and the resulting potential for common enclosure issues are analyzed by identifying the adjacent (common enclosure) cables for each un-isolated faulted cable. The FPRA functions associated with the identified common enclosure cables are failed in the FPRA when associated secondary fires occur. Only a discrete number of secondary fire fault locations are expected to occur per event. No method was developed for predicting the fault locations for secondary fires. It is conservatively assumed that the entire cable run exposed to the high current is faulted and all common enclosure cables from the fault to the power source are considered damaged simultaneously with the primary fire scenario zone of influence (ZOI) damage set. New fire scenarios were not created for the secondary fire damage. The secondary fire failures were added to existing fire scenario damage sets.

NextEra Response d.iii

Secondary fires resulting from a loss of overcurrent protection are expected to be generated by a fault drawing enough current to self-ignite the cable. As such secondary fires are modeled using guidance from FAQ 13-0005 "Cable Fires Special Cases: Self-Ignited and Caused by Welding and Cutting." This FAQ concludes that a fire caused by self-ignited cables would be contained within its immediate enclosure. Consistent with the FAQ, the damage sets for these secondary fires consist of the cables routed in the common enclosures with the cables impacted due to the loss of overcurrent protection. Refer to response (d.ii) of this RAI for more information on the identification of damage sets for common enclosures.

NextEra Response d.iv

Fire damage along the electrical cable route was described in part (d.iii) of this RAI response. FPRA assumes faulted load centers without control power are damaged.

A subsequent RAI, received on January 20, 2016, requested the potential cable HEAF damage be added to the FPRA model. This potential HEAF damage is addressed below in response to that request.

PRA RAI S02 *(Modelling licensing limitation to cross-tie the steam supply for the turbine-driven Auxiliary Feedwater (AFW) pumps)*

The NextEra letter, dated August 26, 2015 , ML15238A870 transmitting Supplement 2 of the Point Beach Nuclear Plant NFPA 805 LAR explains that the Fire PRA was updated to model licensing limitations associated with cross-tying the Unit 1 and 2 turbine-driven AFW pump steam supply and discharge. The letter does not identify these limitations or explain whether they are associated with specific conditions, certain accident scenarios, or other factors that might be reflected in the Fire PRA. The letter does explain that "to ensure this modification was not over credited the human reliability analysis rates were increased." It is not clear what the expression "human reliability rates" means, how decreasing "human reliability analysis rates" reflects licensing limitations, and whether this treatment is a departure from NRC guidance on developing Human Error Probabilities. NRC staff notes that this modification appears to have important risk reduction impact.

Briefly describe the licensing limitations associated with this modification and how these limitations were reflected in the Fire PRA.

NextEra Response

The licensing limitations associated with opening the TDAFW pump unit cross-tie isolation valves involve the use of the cross-tie in response to a single unit event and the requirement to place the unaffected unit in a technical specification action condition. Utilizing the cross-tie places an unaffected unit's AFW system in a configuration that does not comply with the technical specifications and accident analysis for that unit. The ability to use this cross-tie to mitigate a total loss of heat sink event on one unit and entering a limiting condition for operation action condition on an unaffected unit would require prior NRC approval.

The Point Beach Nuclear Plant FPRA credits operator action to cross-tie the steam supply and discharge for the 1P-29 and 2P-29 TDAFW pumps. This is a cross-unit cross-tie. Procedure changes have not been finalized; therefore, "human reliability rates," more commonly known as Human Error Probabilities (HEP), are not final. In order to provide a reasonable HEP, it was initially assumed in the FPRA that the TDAFW pump cross-tie procedural guidance would be placed in the Critical Safety Procedures (CSPs) for response to loss of secondary heat sink. However, because prior NRC approval would be required to revise certain procedures, the HEP values have been conservatively adjusted to reflect the potential that procedural guidance may not be available in all cases. For fires in the Control Room (fire zone 326), Cable Spreading Room (fire zone 318), or the 4160 Volt Vital Switchgear Room (fire zone 305), the HEP values are expected to remain close to the value calculated for the CSPs regardless of the actual procedures containing guidance. All of the other fire zones could have a different HEP depending on the procedure used, if any, and the timing for the operator actions. To provide margin, a screening HEP is used for these other fire zones to account for potentially longer timing, other less favorable performance shaping factors and lack of procedure guidance.

Once procedures are finalized, the TDAFW cross-tie HEPs will be revised as necessary per implementation item 142, consistent with the existing HEP methodology used in the NFPA 805 submittal and the overall risk impact will be assessed (Ref. *NextEra Energy letter to NRC*, NRC 2015-0057, "Supplement 2 to License Amendment Request 271 Associated with NFPA 805", dated August 26, 2015, Attachment S Item IMP-142).

HEAF: *Based on discussions between the NRC staff and the licensee, the impact of High Energy Arcing Faults (HEAFs) in cable trays as a result of fire-induced loss of DC control power and fire induced fault(s) of medium voltage load cables has been modeled in accordance with the guidance in FAQ 07-0035 (ADAMS Accession No. ML091610189), which addresses HEAF events in bus ducts.*

The NRC staff has several concerns with the use of FAQ 07-0035 for potential electrical faults of medium voltage cables in open cable trays (without top or bottom covers).

- *While the staff believes that there may be situations where the use of the model presented in FAQ 07-0035 may be appropriate (those situations where the faulting load cable is routed in conduit), a bus duct enclosure provides a substantial barrier to the energy released in a HEAF. The conditions present in a cable tray are different than a bus duct. Unless the cable tray has top and bottom metal covers, there is substantially more exposure of nearby trays from a HEAF event. Cables damaged as part of the HEAF event can experience significant mechanical forces causing conductors to whip around, potentially causing additional arcing and larger zones of influence.*

- *The damage footprint created during a HEAF is dependent upon not only the voltage and current available to "feed" the fault, but the duration of the arc event. In the situation created by the loss of DC control power, the duration and energy expended will likely be significantly higher than would otherwise be expected if protective relaying isolates the fault.*

There has been a number of HEAF events in the commercial nuclear industry. These events have both similarities and differences when compared to the expected conditions at Point Beach.

- *For instance, one industry operating experience event (11/5/13 cable fault at Beaver Valley; Licensee Event Report (LER) documented at ADAMS Accession No. ML14008A110) involved a self-ignited cable fire on a 4 kV cable in a specially designed cable tray (aluminum tray with both top and bottom covers). The damage footprint of the event was fairly substantial (there was significant collateral damage to nearby cables) but the extent of the damage was limited due to the proper operation of protective relaying. The fault was very quickly isolated as a result of the actuation of a transformer differential relay. The loss of DC control power in the postulated Point Beach scenario means that a breaker upstream of the bus providing the power would have to open, resulting in potentially higher currents and a longer arc duration before isolation. Point Beach also differs from the Beaver Valley event since that cable was run in a cable tray with top and bottom covers.*

- *Another industry event (3/28/10 cable fault at Robinson; Licensee Event Report (LER) documented at ADAMS Accession No. ML101530502) involved a 4 kV cable fault inside a conduit feeding a switchgear unit. The bus feeder providing power to the supplying switchgear had a blown fuse in the trip circuit resulting in the need to isolate the fault using an upstream breaker (similar to the situation expected at Point Beach). However, although this event involves a degraded distribution system due to the loss of power to the trip circuit of the feeder breaker, it differs from the Point Beach scenario because the faulted cable was routed inside steel conduit. The fault caused significant damage to the conduit (portions of the conduit were blown free/vaporized by the fault) as well as damage to the top of the switchgear unit the conduit entered. Had the conduit not provided a substantial barrier that impeded the damage propagation, a larger zone of influence and more substantial damage footprint would likely have occurred.*

- *A third industry event (02/03/01 HEAF at San Onofre; Licensee Event Report (LER) documented at ADAMS Accession No. ML01950010) involved a circuit breaker fault in a 4 kV switchgear. As a result of the fault, the breaker failed to open, resulting in the need to clear the fault from upstream feeders. At the time of the breaker fault, the bus was being powered from the Unit Aux Transformer*

(UAT), which sensed both overload and differential overcurrent. Actuation of protective relays isolated the UAT and the main generator. As a result of ionized gases and smoke from the initial breaker fault, the feeder breaker to the Reserve Aux Transformer (RAT) faulted also causing a differential overcurrent trip of the Reserve Aux Transformer (RAT). Although isolated from the grid, the faulted bus continued to be powered from the main generator as the turbine coasted down. This resulted in the fault being fed electrically for a significant period of time. Although this event involved a fault inside a switchgear unit, substantial damage occurred outside the switchgear as a result of the duration of the fault. This event forms a significant part of the basis for the recommended zone of influence in NUREG\CR-6850 Appendix M for HEAF events (5' vertical, 3' horizontal from the fault location).

- *A fourth industry event (080509 HEAF at Columbia Generating Station; Licensee Event Report (LER) documented at ADAMS Accession No. ML11145A114) involved an electrical fault on a 6.9 kV bus duct. While this event exhibited a limited zone of influence as a result of the HEAF, the conditions present differ from Point Beach in that the fault occurred inside a bus duct, which provides substantial physical protection between the fault and nearby targets.*

As discussed above, each of the operating experience events indicate that there is the potential for larger zones of influence than the guidance in FAQ 07-0035 when applied to HEAFs in cable trays. Based on the expected conditions at Point Beach for a loss of DC control power combined with a fire-induced fault on 4 kV and/or 13 kV cables, a zone of influence calculated in accordance with NUREG\CR-6850 Appendix M (5' vertical, 3' horizontal) appears to be more appropriate.

Revise your analysis with a zone of influence as calculated in accordance with NUREG/CR-6850 Appendix M (5' vertical, 3' horizontal) for the expected conditions with the loss of DC control power combined with a fire-induced fault on 4 kV and/or 13 kV cables in cable trays and provide an updated Attachment W for the Point Beach LAR using the Appendix M method.

Please provide your written response on the docket to this request and the earlier request dated October 9, 2015, within 30 days of the receipt of this email. In case of any further clarification needed, please arrange a teleconference to discuss the subject matter with the NRC staff. Thanks

NextEra Response (HEAF)

The fire modeling and FPRA model have been updated to incorporate an expanded zone of influence (ZOI) for potential high energy arc faults (HEAFs) for secondary fires involving cables with voltage greater than or equal to 4-kV. These expanded ZOIs were evaluated for fire scenarios impacting 4-kV and 13-kV cables located in cable trays in instances where a fire scenario causes both a fire-induced fault on the cable and a loss of DC control power to the associate breaker for the power cables. The HEAF potential is considered most likely to occur at the initial fault location in the primary fire ZOI. The ZOI expansion due to the HEAF damage is analyzed for the cables generating secondary fires located in the primary fire ZOI. Guidance in Appendix M of NUREG/CR-6850 was used to define the five foot vertical and three foot horizontal ZOI of the secondary cable HEAF. This expanded damage set is added to the primary fire potentially causing the secondary fire HEAF event.

An updated Attachment W for the Point Beach LAR is attached that documents the results of the revision to the analysis. This Attachment W includes integrated results for all changes made to the FPRA model as described in the RAI responses and LAR 271 supplement 4.

ATTACHMENT

NEXTERA ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST 271
ASSOCIATED WITH NFPA 805

UPDATED ATTACHMENT W,
LICENSE AMENDMENT REQUEST 271,
TRANSITION TO NFPA 805

33 pages follow

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