October 1, 2021

L-2021-174
10 CFR 54.17

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
11545 Rockville Pike
One White Flint North
Rockville, MD 20852-2746

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

SUBSEQUENT LICENSE RENEWAL APPLICATION - AGING MANAGEMENT REQUEST FOR ADDITIONAL INFORMATION (RAI) SET 9 RESPONSE

References:

1. NextEra Energy Point Beach, LLC (NEPB) Letter NRC 2020-0032 dated November 16, 2020, Application for Subsequent Renewed Facility Operating Licenses (ADAMS Package Accession No. ML20329A292)
2. U.S. Nuclear Regulatory Commission (NRC) Letter dated January 15, 2021, Point Beach Nuclear Plant, Units 1 and 2 - Determination of Acceptability and Sufficiency for Docketing, Proposed Review Schedule, and Notice of Opportunity to Request a Hearing Regarding the NextEra Energy Point Beach, LLC Application for Subsequent License Renewal (EPID No. L-2020-SLR-0002) (ADAMS Accession No. ML21006A417)
3. NRC Letter dated January 15, 2021, Point Beach Nuclear Plant, Units 1 and 2 - Aging Management Audit Plan Regarding the Subsequent License Renewal Application Review (ADAMS Accession No. ML21007A260)
4. U.S. Nuclear Regulatory Commission Meeting with NextEra Energy Concerning the Point Beach Subsequent License Renewal Application Review – June 3, 2021 Public Meeting (ADAMS Accession No. ML21148A116)
5. NEPB Letter L-2021-144 dated August 11, 2021, Subsequent License Renewal Application - Aging Management Requests for Additional Information (RAI) Set 2 Responses (ADAMS Accession No. ML21223A308)
6. NRC Email and Attachment dated September 2, 2021, Point Beach SLRA Safety RAI Set 9 Final (ADAMS Accession Nos. ML21273A023, ML21273A022)

NEPB, owner and licensee for Point Beach Nuclear Plant (PBN) Units 1 and 2, has submitted a subsequent license renewal application (SLRA) for the Facility Operating Licenses for PBN Units 1 and 2 (Reference 1). On January 15, 2021, the NRC determined that NEPB's SLRA was acceptable and sufficient for docketing (Reference 2), and on January 15, 2021 issued the regulatory audit plan for the aging management portion of the SLRA review (Reference 3). Based on the information exchanged and discussions held during the public meeting held on June 3, 2021 (Reference 4), and NEPB's responses to RAIs B.2.3.27-1 and B.2.3.27-4 (Reference 5 Attachments 13 and 16), the NRC issued its Set 9 RAI to NEPB (Reference 6). The attachment to this letter provides the response to this follow-up information request.

For ease of reference, the index of attached information is provided on page 3 of this letter.

Should you have any questions regarding this submittal, please contact me at (561) 304-6256 or William.Maher@fpl.com.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 1st day of October 2021.

Sincerely,

William Maher

Digitally signed by William Maher
DN: cn=William Maher, o=Nuclear, ou=Nuclear Licensing Projects, email=william.maher@fpl.com, c=US
Date: 2021.10.01 08:14:08 -04'00'

William D. Maher
Licensing Director - Nuclear Licensing Projects

Cc: Administrator, Region III, USNRC
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Resident Inspector, Point Beach Nuclear Plant, USNRC
Public Service Commission Wisconsin

Attachment Index		
Attachment No.	RAI No.	Subject
1	B.2.3.27-1a	Cathodic Protection for Buried Steel Piping/Preventive Action Category E

1. SLRA Section B.2.3.27, "Buried and Underground Piping and Tanks"

Note: This is a follow-up RAI to address the applicant's responses to RAIs B.2.3.27-1 and B.2.3.27-4, dated August 11, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21223A308).

Regulatory Basis:

Section 54.21(a)(3) of Title 10 of the *Code of Federal Regulations* (10 CFR) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the U.S. Nuclear Regulatory Commission (NRC) staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. In order to complete its review and enable it to make a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

RAI B.2.3.27-1a [Cathodic Protection for Buried Steel Piping/Preventive Action Category E]

Background:

SLRA Section B.2.3.27, "Buried and Underground Piping and Tanks," states, in part, that "[t]he PBN Buried and Underground Piping and Tanks AMP [aging management program], with enhancements, will be consistent with exception [not related to the subject RAI] with the 10 elements of NUREG-2191 ['Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report'], Section XI.M41, 'Buried and Underground Piping and Tanks.'"

The applicant's responses to RAIs B.2.3.27-1 and B.2.3.27-4 state, in part, the following:

- (RAI B.2.3.27-1 response) "[t]he 2015 cathodic protection survey for PBN states that the following buried piping systems have cathodic protection: circulating water supply and return, service water supply and return, fire protection water, fuel oil, and propane system lines. However, not all of these buried piping systems are completely cathodically protected. No activities are currently planned to increase the coverage of cathodic protection system to 100 percent of the buried SLR [subsequent license renewal]-scope piping."
- (RAI B.2.3.27-4 response) "[s]ince not all of the buried piping within the scope of SLR is cathodically protected and no activities are planned to increase the cathodic protection coverage to 100 percent, a clarification is added to state that buried SLR-scope piping will be classified as Category E, unless a reevaluation

based on future OE [operating experience] and soil conditions, as defined in NUREG 2191, Table XI.M41-2, ["Inspection of Buried and Underground Piping and Tanks,"] determines that another Preventive Action Category, such as Category F, is more applicable. Preventive Action Category C will not be used."

- (RAI B.2.3.27-1 response) "[a] 1992 analysis of soil samples was obtained during the installation of 4 groundwater monitoring wells in the Unit 1 and Unit 2 facades, near the containment structures. The soil samples were extracted every 5 feet during the well borings and the samples were analyzed for pH, resistivity, and chlorides. The samples had an average resistivity of 16,740 ohm-cm, which was considered "mildly corrosive" per the sampling manual used, "Corrosion Control," *Air Force Manual (AFM), No. 88-9*. The average pH was 9.52, which was considered to be within the optimum range of 8.5 to 11.0. The average amount of chlorides was approximately 59 ppm, which was well below the 500 ppm minimum for an aggressive chloride environment."
- (RAI B.2.3.27-1 response) "[a] 2009 analysis of soil samples in the immediate vicinity of the buried fire protection system piping was performed after the piping had been excavated for 10-year inspections…. The sample results indicated that resistivity was within the 13,800-16,600 Ohm-cm range, redox potential had a range of 81.9-172 mV [millivolts], the soil pH was 7.9, chlorides were measured at 31.8 mg/kg, sulfides were within a range of 11.6-13.4 mg/kg, and moisture content was at 19.1 percent. The associated action request (AR) stated that the soil sample results proved that the soil was nonaggressive."
- (RAI B.2.3.27-1 response) "[a] review of PBN plant-specific operating experience (OE) spanning the 10-year operating period prior to January 1, 2020, was performed and was documented in SLRA Section B.2.3.27. The OE review was inclusive of all buried components, including components outside the scope of SLR. No aging-related failures were identified for buried piping or tank components.… The OE review indicated that when excavations were performed in 2009 and 2016, no evidence of wall loss was identified."

GALL-SLR Report Table XI.M41-2 states that Preventive Action Category E applies when a cathodic protection system has been installed but all or portions of the piping covered by that system fail to meet any of the criteria of Preventive Action Category C piping, provided (a) coatings and backfill are provided in accordance with the "preventive actions" program element of this AMP; (b) plant-specific OE is acceptable (i.e., no leaks in buried piping due to external corrosion, no significant coating degradation or metal loss in more than 10 percent of inspections conducted); and (c) soil has been determined to not be corrosive.

GALL-SLR Report Table XI.M41-2 references American Water Works Association (AWWA) C105, "Polyethylene Encasement for Ductile-Iron Pipe Systems," Table A.1, "Soil-Test Evaluation," with respect to determining soil corrosivity. AWWA C105, Table A.1 uses the soil parameters of soil resistivity, pH, redox potential, sulfides, and moisture to determine the overall soil corrosivity index.

Issue:

The responses to the RAIs B.2.3.27-1 and B.2.3.27-4 did not quantify the coverage of the cathodic protection system with respect to in-scope buried steel piping. Without this information, the NRC staff cannot make a reasonable assurance finding with respect to whether Preventive Action Category E is appropriate for in-scope buried steel piping. The staff notes that Preventive Action Category E applies when a cathodic protection system has been installed but fails to meet any of the criteria of Preventive Action Category C piping. It was not the staff's intent that Preventive Action Category E would be used where cathodic protection was not installed.

The staff also notes the following: (a) the 1992 soil analysis does not provide results related to redox potential, sulfides, or moisture; and (b) these soil parameters are cited in AWWA C105, Table A.1 to determine the overall soil corrosivity index for steel components.

Request:

Provide additional information quantifying the coverage of the cathodic protection system with respect to in-scope buried steel piping. If cathodic protection will not be provided for a significant majority of in-scope buried steel piping, provide additional technical justification for why cathodic protection is not necessary (e.g., the number of inspections performed on buried steel piping between 2009 and 2016, whether these inspections were performed on cathodically protected or non-cathodically protecting piping, number of soil analyses performed in 1992 and 2009, location of the soil samples with respect to in-scope buried steel piping, discussion of external surface loss of material rates for buried steel piping).

NEPB Response:

The buried steel piping in the scope of the PBN Buried and Underground Piping and Tanks AMP includes service water, fire protection and fuel oil. Based on the potentials measured with the portable reference cell (PRC) ($Cu/CuSO_4$ cell) as part of the PBN cathodic protection (CP) survey performed in 2015, a conclusion can be drawn that the buried piping located in the area between the intake structure and the turbine building on the east side of the plant has adequate CP coverage. The buried steel piping located at all other areas of the plant have minimal to no coverage. Accordingly, based on the total linear feet of in-scope buried steel piping for the plant site, approximately 20% of the piping has CP coverage. However, the piping on the east side of the plant could be considered to have at least 80% coverage.

Table 1 provides a summary of both in-scope and non-in-scope buried steel (including cast iron and ductile iron) piping inspections that have been performed at PBN to date, a majority of which, as noted in column four, can be considered to have no CP coverage.

Table 1 – Buried Steel Piping Inspections

Date of Inspection	Components Inspected	Type of Inspection	CP Coverage	Results
8/2009	Fire Protection Ring Header Section 3B (SLR scope)	Visual Hardness Soil	No (West side of plant)	The excavated piping was coated with coal-tar epoxy. Coating was intact on about 80% of the pipe, hard and tightly adhering. Numerous rocks and stones from backfill were embedded in the coating. The bottom 20% of the piping did not appear to be coated. Exposed surfaces (uncoated) were visually inspected. A dark magnetite oxide layer was on the exposed piping, which is consistent with a low-oxygen, low-corrosive environment. No pitting was identified nor was there any significant external wall degradation. Soil samples demonstrated a low-corrosivity environment (13,800 – 16,600 ohm-cm Resistivity, 7.9 pH, 31.8 mg/kg Chlorides). The excavation exposed less than 10 feet of the piping due to the proximity to the road and the short length of this piping segment. Hardness testing was performed indicating no presence of selective leaching.
11/2011	Service Water Return Header (SLR scope)	Ultrasonic (UT) Guided Wave (GW)	Yes(1) (East side of plant)	Conventional UT was performed near the GW collars and did not reveal any internal wall loss. GW identified one section 2 feet 11 inches beyond the curve north where there was a coating anomaly. The approximate location of the anomaly was where there is a sleeve/support for the piping where it travels through the Unit 2 Turbine Hall foundation. A total of 18 feet of the piping was inspected with GW representing 11.5% of the entire return header.

Date of Inspection	Components Inspected	Type of Inspection	CP Coverage	Results
6/2012	Fire Protection Ring Header Section 2A, 2 (SLR scope)	Visual Radiography (RT) Hardness	No (South side of plant)	15 feet of piping (10 feet for section 2 and 5 feet for section 2A) were visually inspected and supplemented with radiography and hardness testing. The results indicated that the internal cement liner was adhered to the piping and there was no external pitting/general corrosion. Based on the visual inspection, the coating on piping was in excellent condition. Hardness testing was performed on the top of an uncoated mechanical flange which indicated no presence of selective leaching. Other exposed systems were visually inspected during this excavation and were found to be in good condition.
6/2012	Drainage and Sanitary Waste - Abandoned Turbine Hall to Old Sewer Treatment / Segment 2 (Non-SLR scope)	Visual RT	No (South side of plant)	10 feet of 6-inch diameter coated cast iron piping was visually inspected with supplemental RT performed. The external coating was degraded with tape edges peeled back, metal exposed, and had poor adhesion. The piping had surface rust and exterior pitting and mill scale present. Since this piping is abandoned, no remaining life projection was made.
6/2012	Drainage and Sanitary Waste – Water Treatment Filter Backwash (Non-SLR scope)	Visual RT	No (South side of plant)	10 feet of 6-inch diameter uncoated cast iron piping was visually inspected with supplemental RT performed. The external portion of the pipe appeared to be in relatively good shape which included some general surface rust with minor exterior pitting. This piping was estimated to have a general corrosion rate of 0.00162 in/year and is expected to function well beyond the period of extended operation (PEO) end date.

Date of Inspection	Components Inspected	Type of Inspection	CP Coverage	Results
6/2012	Service Air – Fuel Oil Pumphouse to Turbine Hall (Non-SLR scope)	Visual RT	No (South side of plant)	10 feet of 1-inch diameter uncoated carbon steel piping was visually inspected with supplemental RT performed. No measurable external corrosion was identified. The rate of corrosion was determined to be very small and the remaining life of the common-Unit pipe would function well beyond the PEO end date.
4/2015	Fire Header 6”-KC-1 (SLR scope)	Visual	No (North side of plant)	A 6-foot horizontal section and a 4-foot vertical section of 6-inch diameter cement lined cast iron fire piping were inspected. Original installation of this piping included a heavy plastic liner around the piping, thus the piping was not in direct contact with the surrounding soil. There was a thin black coating (most likely bituminous or asphaltic) on the piping that was in very good condition. There were no obvious holidays in the coating and there was no evidence of external wall loss. The internal surface was also inspected and the cement lining was fully intact throughout the length of the piping.
11/2016	Fire Protection Diesel Generator Bldg. West Header Cross Connect (SLR scope)	Visual	No (North side of plant)	The valve and piping were in very good condition. The paint was still fully adhered both inside and out on the valve. The external tar coating was still intact, with no discernible wall loss. Internally, the cement lining was intact with uniform wall thickness and no signs of degradation. The soil conditions were uniform from top to bottom.

Date of Inspection	Components Inspected	Type of Inspection	CP Coverage	Results
11/2020	T-072, Emergency Fuel Oil Storage Tank (SLR scope)	UT Visual (tank interior and exterior of non-buried portion)	No	The emergency fuel oil storage tank, T-072, was internally cleaned and visually inspected within the tank interior and the non-buried portion of the tank exterior. UT wall thickness measurements were obtained for the tank from the interior. The corrosion rate was determined to be 0.31 mils/yr and the calculated remaining life was determined to be well beyond the PEO end date.

Notes:

1. Two of the test points near the service water piping were less than -850 mV but still greater than -800 mV. Consistent with Element 6, Item m.ii, of GALL-SLR XI.M41, this polarized potential was considered acceptable based on the generally high resistivity of the soil.

Since CP coverage is not provided for all of the in-scope buried steel piping, the following discussion provides justification for why additional CP coverage is not necessary:

Fire Protection Piping Installed per NFPA 24

As mentioned in the response to Set 2 RAI B.2.3.27-2 (Reference 3), since the fire protection piping was installed per the requirements of NFPA 24 and the piping will be subject to periodic flow testing in accordance with NFPA 25, section 7.3.1, per NUREG-2191, Section XI.M41, Element 2 Item g.iii, preventive actions beyond those in NFPA 24 need not be provided. Therefore, a CP system is unnecessary for the buried fire main piping. Additionally, the external surface of this piping will be periodically inspected as part of the PBN Buried and Underground Piping and Tanks AMP.

Soil Analyses

The results of the soil sample analyses performed in 1991 (note the soil sample was obtained in 1991 but the results were published in 1992), 2009, and 2012 are discussed in the response to Set 6 RAI B.2.3.21-2 (Reference 4). Additionally, per NUREG-2191, Section XI.M41, Element 2 Item g.ii backfill quality was described by plant records as stated in the response to Set 2 RAI B.2.3.27-4 (Reference 3) and excavations inspections have examined the backfill. Each of these soil sample analyses described the soil as having low aggressiveness. The soil sample aggressiveness is confirmed by comparing soil parameters to AWWA C105, Table A.1 (Reference 5). The location of these soil samples with respect to in-scope buried steel piping is as follows:

- The 1991 soil samples were obtained during the installation of 4 groundwater monitoring wells in the Unit 1 and Unit 2 facades, near the containment structures. Although not adjacent to any specific buried piping, these samples were in the vicinity of buried fire protection piping. The soil sample parameters can be scored as follows with respect to AWWA C105:
  - Resistivity: 16,740 ohm-cm average; (>3,000 ohm-cm; 0 points)
  - pH: 9.52 average; (>8.5; 3 points)
  - Redox potential: 0.13 standard hydrogen electrode (SHE); (Selected ≥50 to +100 mV based on 2009 results; 3.5 points)
  - Sulfides: Sulfides were not measured, but the sulfate level was 360 ppm. (Assumed “Trace”; 2 points)
  - Moisture: 21.6% average (Assumed “Fair drainage, generally moist”; 1 point)

  Based on assumptions made for redox potential, sulfides, and moisture content, the soil sample would have an approximate score of 9.5 points with respect to AWWA C105. Therefore, there is reasonable assurance that the soil from these samples can be treated as mildly corrosive and note that the samples were not adjacent to any specific pipe.
- The 2009 soil sample analysis was adjacent to the buried fire protection piping section 3B (just outside the required backfill). This piping is on the west side of the plant and is considered to have minimal or no CP coverage. The soil sample parameters are listed below with the respective AWWA C105 category and points within parentheses:
  - Resistivity: 13,800-16,600 ohm-cm; (>3,000 ohm-cm; 0 points)
  - pH: 7.9; (7.5-8.5; 0 points)
  - Redox potential: 81.9-172 mV; (≥50 to +100 mV; 3.5 points)
  - Sulfides: 11.6-13.4 mg/kg, but the AR noted that sample data was taken outside of the EPA recommended hold times. “Trace” was used in the BP Works V1.0A simulation. (Selected “Positive” for conservatism; 3.5 points)
  - Moisture: 19.1% (Assumed “Fair drainage, generally moist”; 1 point)

  The soil sample would score 8.0 points with respect to AWWA C105. Per AWWA C105, Section A.2, since the total is not equal to 10 points or higher, the soil is not considered corrosive to ductile-iron pipe.
- The 2012 soil sample analysis was adjacent to the buried fire protection piping sections 2 and 2A (just outside the required backfill). This piping is on the south side of the plant and is considered to have minimal or no CP coverage. The soil sample parameters can be scored as follows with respect to AWWA C105:
  - Resistivity: 6,740 ohm-cm; (>3,000 ohm-cm; 0 points)
  - pH: 8.6; (>8.5; 3 points)

- Redox potential: 107 mV; (>100 mV; 0 points)
- Sulfides: 1.2 mg/kg dry weight which was below the reporting limit of 3.5 mg/kg. ("Trace"; 2 points)
- Moisture: 7.9% (Assumed "Fair drainage, generally moist"; 1 point)

The soil sample would score 6.0 points with respect to AWWA C105. Per AWWA C105, Section A.2, since the total is not equal to 10 points or higher, the soil is not considered corrosive to ductile-iron pipe.

In summary, the soil near the buried piping considered to have minimal or no CP coverage is of low aggressiveness. Additionally, the in-scope buried steel piping is installed substantially above ground water level minimizing exposure to moisture.

Inspections on Buried Piping

As previously stated in the response to Set 2 RAI B.2.3.27-4 (Reference 3), per NUREG-2191, Section XI.M41, Element 2 Item g.iv, a review of PBN plant-specific operating experience (OE) spanning the 10-year operating period prior to January 1, 2020 was performed and documented in SLRA Section B.2.3.27. The OE review was inclusive of all buried components, including components outside the scope of SLR. No aging-related failures were identified for buried piping or tank components. As shown in Table 1, of the 9 buried steel piping and tank inspections documented between 2009 and 2020, 8 of these inspections were performed on components with minimal or no CP coverage. For the one inspection performed on the service water piping considered to have CP coverage, no discernible wall loss was identified. For the cast iron drainage and sanitary waste piping between the turbine hall and the old sewer treatment facility, external pitting was identified but no corrosion rate was required to be calculated, since it had been abandoned. The external corrosion for the non-abandoned uncoated drainage and sanitary and waste piping was low. In addition, T-072, the emergency fuel oil storage tank, was found to have minor internal/external corrosion. This piping and structure are considered to have minimal or no CP coverage. For the service air piping and fire protection piping, no discernible wall loss was identified, and therefore, no corrosion rate was calculated. Since the projected remaining life of inspected piping and tank goes well beyond the PEO end date, the risk of component failure or failing to meet wall thickness criteria prior to the respective pre-SPEO inspections and component life re-evaluations remains low.

The AMP basis document did not take any exception to NUREG-2191, Section XI.M41, Element 4; therefore, piping inspection locations are selected based on risk (i.e., susceptibility to degradation and consequences of failure), and characteristics such as coating type (i.e., material type), coating condition, CP system efficacy, backfill characteristics, soil resistivity, pipe contents, and pipe function are considered. CP system efficacy, as determined by historical and the most recent CP survey reports, will be a factor in selection of pre-SPEO and SPEO inspection locations.

In conclusion, none of the piping within the scope of SLR showed discernible wall loss on the piping exterior, and the only measurable wall loss was on the emergency fuel oil storage tank, T-072, and the non-SLR scope drainage and sanitary piping which was minimal. Therefore, there is reasonable assurance that performing the number of inspections recommended by NUREG-2191, Table XI.M41-2 Preventive Action Category E will be adequate for identifying and managing aging of such piping. No additional CP installation nor supplementary inspections in addition to those committed to in the previous RAI responses need to be performed for the buried steel (including cast iron/ductile iron) piping. The SLRA commitments include provisions to inspect more frequently or expand inspection samples if the inspected piping fails to meet acceptance criteria or is projected to not meet acceptance criteria.

References:

1. "Point Beach Nuclear Plant Units 1 and 2 Subsequent License Renewal Application (Public Version)," Enclosure 3, Attachment 1, dated November 2020 (ADAMS Accession No. ML20329A247)
2. NextEra Energy Point Beach, LLC (NEPB) Letter to NRC L-2021-081 dated April 21, 2021, Subsequent License Renewal Application – Aging Management Supplement 1 (ADAMS Accession No. ML21111A155)
3. NextEra Energy Point Beach, LLC (NEPB) Letter to NRC L-2021-144 dated August 11, 2021, Subsequent License Renewal Application – Aging Management Requests for Additional Information (RAI) Set 2 Responses (ADAMS Accession No. ML21223A308)
4. NextEra Energy Point Beach, LLC (NEPB) Letter to NRC L-2021-157 dated September 10, 2021, Subsequent License Renewal Application – Aging Management Requests for Additional Information (RAI) Set 6 Responses (ADAMS Accession No. ML21253A140)
5. ANSI/AWWA C105/A21.5-18, AWWA Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems, American Water Works Association, Denver Colorado, September 2018.

Associated SLRA Revisions:

None.